Abstracts of Scientific Papers and Posters Presented at the ISPRM World Congress and Annual Meeting of the Association of Academic Physiatrists

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BEST PAPER PRESENTATIONS

Faculty Category Award Winner

MILD TRAUMATIC BRAIN INJURY IS ASSOCIATED WITH INCREASED DUAL TASK COST DURING AMBULATION
Shantani Pinto, MD, Mark A. Newman, PhD, MPH, Michael S. Runyon, MD, MPH, Michael Gibbs, MD, Lori M. Graffon, MD, and Mark A. Hirsch, PhD, FACRM

OBJECTIVES: To determine the impact of dual task conditions on mobility following mild traumatic brain injury (mTBI).

DESIGN: Eleven individuals with mTBI (age 37.6 ± 12.1 years; 6 female) within 1 week of injury and 10 age and sex matched healthy controls (age 38.9 ± 11.6 years; 5 female) completed gait trials with a single task condition (baseline) and 3 separate dual task conditions: counting by 1 (low cognitive load), serial subtraction by 3 (medium cognitive load), and alternating sequence of letters and numbers (high cognitive load). Gait speed was measured using the GaitRite walkway. Dual task cost (DTC) refers to the percent decline in performance with addition of a simultaneous task and was calculated for each dual task condition. Repeated measures ANOVA was used to determine differences in gait speed or DTC by group and dual task condition.

RESULTS: There were significant differences in gait speed based on group and dual task condition (p-value 0.006) with significant main effect for group (p-value <0.001). Participants with mTBI ambulated slower than control subjects with significant differences only in the medium and high cognitive loads (p-value < 0.05). Only 1/11 individuals with mTBI and 1/10 controls demonstrated gait speed < 0.8 m/s, which is predictive of community mobility, during any dual task condition. Significant differences were noted in DTC based on group and dual task condition (p-value < 0.001) with significant differences noted for group (p-value < 0.001) and dual task condition (p-value 0.005). DTC was greater for those with mTBI compared with controls with significant group differences for the low and high cognitive loads (p-value < 0.05). DTC exceeded 11.9%, previously determined to be the minimal detectable change in healthy adults, for 9/11 individuals with mTBI compared with 3/10 controls.

CONCLUSIONS: DTC may be a more sensitive measure for impairment during dual task conditions than gait speed following mTBI.

Fellow Category Award Winner

PERCEIVED BENEFITS WITH THE IMPLEMENTATION OF A CADAVER-BASED ULTRASOUND PROCEDURE WORKSHOP CURRICULUM IN PHYSICAL MEDICINE AND REHABILITATION (PM&R) RESIDENT AND FELLOW TRAINEES
Sharon Bushi, MD, Rex T. Ma, MD, MS, RMSK, FAAPMR, and Tiffany Excape, BS, MD CANDIDATE 2021

OBJECTIVES: Assessment of resident and fellow perceived benefits with a cadaver-based workshop to enhance their training for ultrasound-guided procedural skills.

DESIGN: 28 PM&R trainees in a single institution participated in a hands-on cadaver-based workshop with focus on ultrasound guided musculoskeletal and spasticity procedures. Five hours were Designated for the workshop with the first hour consisting of practice using tofu to visualize needles under ultrasound. This was followed by four hours of hands-on rotations through six stations, four for musculoskeletal and two for spasticity procedures, using cadavers and supervised by faculty with musculoskeletal ultrasound experience. The trainees were asked to fill out surveys before and after the workshop to assess self-perceived benefits.

RESULTS: The trainees were divided into the following post-graduate year (PGY) levels: 8 PGY2, 8 PGY3, 8 PGY4 and 4 fellows. Everyone completed the surveys except one resident was excluded because she helped create the workshop. Among the trainees, 81.4% planned to incorporate musculoskeletal procedures in their practice while 74.1% planned to incorporate spasticity procedures. Most trainees felt clinical rotations to be most valuable in learning these types of procedures (77.7%) compared to independent study (48.1%) and formal didactics (44.4%). 40.7% of the trainees attended outside courses related to procedural training. Following the workshop, 92.6% of the trainees felt improvement in their overall knowledge of ultrason guided musculoskeletal procedures with 77.8% increasing their knowledge of ultrason guided spasticity procedures. In addition, 70.4% improved their level of comfort in planning procedures independently while 59.3% improved their level of comfort performing the procedures independently after this workshop.

CONCLUSIONS: The use of a cadaver-based workshop demonstrated benefits in self-perceived knowledge, as well as comfort with independent planning and performing of ultrasound-guided musculoskeletal and spasticity procedures in PM&R trainees. This is especially important as most trainees plan to incorporate these procedures into their future practice.

Resident Category Award Winner

PREVALENCE OF OBESITY AND CARDIOMETABOLIC SYNDROME IN SCI PATIENTS IN AN ACADEMIC UNIVERSITY HOSPITAL SYSTEM
Natasha Bhatia, MD, and Joshua L. Elkin, MD

OBJECTIVES: Obesity prevalence increases annually in the United States. In the SCI population, the development of obesity, subsequent cardiometabolic syndrome, and further sequelae occurs at earlier ages and with increased prevalence compared to the able-bodied population. However, the diagnosis of obesity after SCI is complicated by a rapid loss of muscle mass and accumulation of visceral adipose tissue which artificially lowers BMI, and thus comorbid risk factor likelihoods have been significantly underappreciated in this population. Studies have shown that using the SCI-specific BMI cut-off of 22 (as opposed to the cut-off of 30 in the able-bodied population) results in obesity prevalence of up to 70-80% in the SCI population. This study was created as a quality improvement project to determine the prevalence of obesity and cardiometabolic syndrome in traumatic spinal cord injured patients within an academic hospital system in order to better understand our population’s need for screening and intervention.

DESIGN: A retrospective observational study was conducted of patients with traumatic SCI within an academic hospital system from available electronic medical records. Collected information included age, SCI level/classification, mechanism of accident, bone injury, BMI, lipid levels, blood pressures, and fasting glucose levels. Obesity prevalence was determined by using the adjusted and unadjusted BMI measures (22 and 30 respectively).

Metabolic syndrome prevalence was determined by IDF criteria. This is defined as obesity in addition to two of the following: serum triglycerides ≥150 mg dL-1 or drug treatment for elevated triglycerides, serum high-density lipoprotein HDL cholesterol < 40 mg dL-1 in men or < 50 mg dL-1 in women or drug treatment for low HDL cholesterol, blood pressure ≥130/85 mmHg or drug treatment for elevated blood pressure, fasting plasma glucose ≥100 mg dL-1 or drug treatment for elevated blood glucose) with adjusted BMI.

RESULTS: The sample consisted of 113 patients. 54 patients (48%) experienced a traumatic spinal cord injury and were included in the analysis. The average time since onset of SCI was 13 years, and 91% of the patients included were more than 1 year out from their initial injury. Time from injury ranged from 1 month to 43 years. 37% of the patients had a cervical injury, 26% thoracic, 9% lumbar, and 28% did not have a documented level of injury. Of the 52 patients with an available measured BMI, 45 (87%) met the criteria for obesity using the SCI-adjusted BMI cutoff of greater than 22. Only 22 (42%) of these would meet criteria for obesity when the unadjusted BMI >30 cutoff is used. Of the patients who had available metabolic laboratory values (n=23), 10 of them (43%) met criteria for metabolic syndrome, while the remaining 13 patients (57%) did not.

CONCLUSIONS: Previous studies have shown that using the SCI-specific BMI cut-off of 22 Results in obesity prevalence of up to 70-80% in the SCI population. In our retrospective observational study, we found an obesity prevalence of
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87%, though 45% of these patients would not have been categorized as such had the able-bodied BMI criteria been used. Patients with SCI are at increased risk of developing poor cardiovascular outcomes, but this risk may be under-recognized. In patients with traumatic SCI, both obesity and cardiometabolic syndrome are common and lead to a myriad of chronic inflammatory diseases. Our study shows, however, that many SCI patients may not be receiving rigorous screening given the high rate of incomplete data found in our cohort. More stringent guidelines for screening and treating these conditions must be implemented for primary and secondary prevention in this patient population.

Medical Student Category Award Winner

THE ACUTE IMPACT OF LOWER BODY POSITIVE PRESSURE TREADMILL WALKING ON BIOLOGICAL MARKERS OF JOINT DISEASE AND JOINT PAIN IN INDIVIDUALS WITH KNEE OSTEOARTHRITIS

Sarah Libfraind, BS, Chad M. Hanaoka, BA, Avraham E. Eisenstein, Irmina J. Swiostek, BS, and Prakash Jayabalan, MD, PhD

OBJECTIVES: The lower body positive pressure (LBPP) treadmill has potential in allowing individuals with knee osteoarthritis (OA) to obtain the cardiovascular benefits of exercise without risking potentially adverse articular cartilage loading by controlling the magnitude of biomechanical stress at the knee joint. The goal of this study was to investigate the biological and symptomatic effects of varying the percentage of joint loading imposed on the lower extremity during LBPP treadmill walking in individuals with knee OA.

DESIGN: Participants with knee OA (n=13) underwent two 45-minute walking sessions at least 72 hours apart. In each session, individuals walked on the LBPP treadmill at 100% and 50% body weight (BW), respectively. Every 15 minutes while walking, subjects were asked their pain score using the numeric pain rating scale (NPRS) and also had blood/serum drawn which was tested for a biological marker of cartilage turnover (cartilage oligomeric matrix protein, COMP), degradative enzyme (MMP-3) and inhibitor of degradation (TIMP-1).

RESULTS: The mean age of participants was 66.0±9.0 years, with a BMI of 29.5±4.0. At 45 minutes of walking, subjects had a significant reduction in knee pain (NPRS) compared to the 100% BW condition (mean difference 2.39±1.59, p<0.001). Biomarker analyses revealed that 100% BW walking was associated with a significant increase in COMP at 45 minutes of walking compared to baseline, not observed with the 50% BW condition (p=0.02). In addition, 50% BW walking was associated with a trend in increase of TIMP-1 (an inhibitor of cartilage degradative enzymes, 11% increase) that was not observed with 100% BW condition. There was no significant change in MMP-3 pre- and post-walking in each loading condition.

CONCLUSIONS: Controlled knee joint off-loading using the LBPP treadmill, may limit the biomechanical and subsequent biological stress on the knee joint, improving symptoms, and has the potential to improve the catabolic state of the osteoarthritic knee joint

A PROTOCOL AIMED TO OPTIMIZE BACTERIURIA MANAGEMENT IN PATIENTS WITH SPINAL CORD INJURY

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OBJECTIVES: Bacteriuria, either asymptomatic (ASB) or symptomatic urinary tract infection (UTI), is common in persons with spinal cord injury (SCI). Current Veterans Health Administration (VHA) guidelines recommend a screening urinalysis and urine culture for every Veteran with SCI during annual evaluation; even when asymptomatic, which is contrary to other national guidelines, such as those from the Infectious Diseases Society of America (IDSA). Through a series of innovative studies we aim to gain an in-depth understanding about the knowledge, attitudes and behaviors driving current UTI and ASB testing and treatment practices during the Veterans Health Administration (VHA) SCI annual exam (AEE), as well as quantitative data on the clinical outcomes of these practices.

DESIGN: Prospective qualitative interviews and quantitative surveys; retrospective database analysis.

RESULTS: 12 SCI providers (SCI attending and resident physicians, physician assistants and nurse practitioners) were interviewed. Thematic analysis of the interviews identified lack of awareness of the IDSA guidelines for ASB and UTI among SCI providers as a potential barrier to their use, but agreement that the guidelines are applicable to their patient population once informed. 24% of provider participants responded to a survey querying knowledge of the IDSA guidelines for treatment of UTI/ASB; 30% of all participants endorsed incorrect triggers for obtaining a urine culture (change in urine color, cloudiness or odor). 10 SCI patients were interviewed, thematic analysis revealed a good understanding of the importance of taking antibiotics for UTI as prescribed, as well as the possible consequences of antibiotic over-use. Analysis of the 9,880 unique AEs completed during 2018 and 2019 revealed that 29% had a screening urine culture obtained.

CONCLUSIONS: The negative consequences of bacteriuria over-testing, sub-sequent antibiotic overuse and antibiotic resistance are well documented, and have national and even global implications. We have identified actionable gaps in SCI provider knowledge and behaviors towards ASB/UTI treatment. This study will inform an intervention aimed to educate stakeholders on evidence-based management of ASB and UTI, and guide antibiotic stewardship in the high-risk SCI population.

A RETROSPECTIVE REVIEW OF CHEMOPROPHYLAXIS FOR DEEP VENOUS THROMBOSIS (DVT) IN POST-OPERATIVE HIP FRACTURE PATIENTS DURING ACUTE INPATIENT REHABILITATION

Armeen S. Ali, DO, Corey Johnson, DO, Brian Mavretich, DO, Perry Stein, MD, and Ann Erlanger, PSYD, ABPP

OBJECTIVES: Compare the incidence of DVT in hip fracture patients on various chemoprophylactic agents. The goal of this study would be to determine if Aspirin is sufficient for preventing a DVT.

DESIGN: This was a retrospective study. Included all patients (N=157) with hip fractures status-post operative repair admitted to acute inpatient rehabilitation between the dates July 2017 to July 2019. Patients with a prior history of DVT, pulmo-nary embolism, metastatic cancer or inherited Pro-thrombotic coagulopathies were excluded from this study. The study was conducted at Mercy Medical Center Acute Inpatient Rehabilitation Facility in Rockville Centre, New York. Data points gathered included age, gender, type of hip fracture, method of hip fracture repair, anticoagulant agent used and comorbidities. To adequate power, the anticoagulants were classified into three main groups. Aspirin (Group 1), Heparins (Group 2), and Novel Oral anticoagulants (NOAC) or Coumadin (Group 3). Patients on aspirin were examined with a weekly scheduled lower extremity venous ultrasound during the rehabilitation course.

RESULTS: 25.7% of patients in Group 1 developed a DVT. This is compared to 6% of patients in Group 2, and 2.6% of patients in Group 3. Hence, the incidence of patients developing a DVT on aspirin is significantly higher compared to heparin or NOAC/coumadin.

CONCLUSIONS: Based on these results, patients treated with aspirin for chemoprophylaxis have a higher incidence of DVT. Our Results revealed, 25.7% of patients on Aspirin developed a DVT, compared to 6% on heparin, and 2.6% on NOAC/coumadin. We refute the recommendations by various orthopedic articles (2,3,4) claiming aspirin as one of the most effective, inexpensive and safest method for DVT prophylaxis in these patients. These findings represent the importance of sufficient chemoprophylaxis to prevent potentially fatal pulmonary emboli. Hence, adequate anticoagulation with heparin or NOAC is imperative for good patient outcomes status post-surgical hip fracture repair. To adequate power, the anticoagulation medications were separated into three primary groups, irrespective of the dose of anticoagulation. For this reason, we recommend further research into analysis with account of the dosages of medications.

AUGMENTED REALITY TREADMILL TRAINING AS A MODALITY TO IMPROVE GAIT REHABILITATION POST-STROKE

Nabela Enam, MD, Oluwaseun Ibronke, Brandon Ross, Karen J. Nolan, PhD, and Rakesh Pilkar, PhD

OBJECTIVES: Gait impairment following stroke often limits a patient’s ability to achieve functional independence. The objective of this study is to develop an augmented reality-based treadmill program and evaluate its efficacy as a rehabilitation modality to improve dynamic gait symmetry and balance in individuals with post-stroke hemiparesis by targeting gait symmetry.

This is a randomized, control study. We include a healthy control to validate the equipment and six post-stroke patients with hemiparetic gait (3 stroke control, 3 stroke intervention). Both stroke groups undergo a treadmill intervention three days per week for a total of four weeks. The stroke control group performs standard treadmill training while the augmented reality group goes through treadmill training with augmented reality in the form of projected stepping stones to guide step length. The outcome measures include pre and post intervention data collection of the six-minute walk test, ten-meter walk test, dynamic post stroke gait function and knee joint angle.
gait index, berg balance scale, and timed up and go. The physical activity enjoyment scale (PACES) is implemented as a post-intervention assessment tool.

RESULTS: Data interpretation from the healthy control showed that with feedback from augmented reality during treadmill training, the participant’s center of pressure and leading force profiles could be manipulated towards by adjusting step length. With this rationale, we propose to implement augmented reality based guidance to specifically train the paretic-side stepping mechanisms during gait. Data collection for the stroke control and intervention groups is ongoing.

CONCLUSIONS: Augmented reality treadmill training is a novel approach with the potential to impact and improve post-stroke gait training by providing patient-specific and interactive training in a safe environment.

CACHEXIA SYNDROME IS ASSOCIATED WITH THE FUNCTIONAL RECOVERY OF CANCER PATIENTS IN INPATIENT REHABILITATION
Ishan Roy, MD, PhD, Kevin Huang, DO, Akash Bhakta, DO, MHA, Jacqueline Spangenberg, BS, and Prakash Jayabalan, MD, PhD

OBJECTIVES: The primary goal of this study was to investigate the association of cachexia syndrome with functional recovery in patients with cancer in inpatient rehabilitation through the following objectives: to characterize the incidence of cachexia syndrome using weight- and lab-based criteria; identify factors associated with incidence of cachexia prior to rehabilitation; and determine if cachexia impacts functional recovery.

DESIGN: Retrospective cohort study of 330 admissions to Shirley Ryan AbilityLab(SRAlab). Included – subjects aged ≥ 18 years with diagnosis of cancer admitted to Northwestern Memorial Hospital(NMH) for acute care preceding rehabilitation. Data regarding oncologic care, acute care, and inpatient rehabilitation were acquired via medical charts at NMH and SRAlab. Non-exclusion cohorts for cachexia syndrome were identified: chronic weight loss(5% body weight loss (BWL)) ≥2% BWL with BMI< 20 in 2-6 months), rapid weight loss(5% BWL ≤2% BWL with BMI<20 during acute care), serum creatinine< 0.60 mg/dL, and serum albumin< 3.5 g/dL.

RESULTS: On admission to inpatient rehabilitation, the incidence of chronic weight loss was 58%, rapid weight loss was 25%, low creatinine was 35%, and low albumin was 69%. Chronic weight loss was associated with hematologic cancer(OR=2.1, p=0.02), recurrent cancer(OR=3.8, p=0.0001), and infection (OR=2.9, p=0.01). Rapid weight loss was associated with GI cancers(OR=3.4, p=0.008), infection (OR=2.4, p=0.02), increased acute care length of stay(LOS) (OR=3.0, p=0.0001), ICU stay(OR=3.7, p=0.003), and need for supplemental nutrition(OR=3.9, p=0.007). Low creatinine was associated with supplemental nutrition (OR=2.6, p=0.017), while low albumin was associated with increased acute care LOS and ICU stay(OR=7.8, p=0.0025; OR=7.5, p=0.031). Multivariate analysis then showed that low creatinine was independently associated with negative motor Functional Independence Measure gains during rehabilitation(p=0.021).

CONCLUSIONS: This is the first study to characterize the incidence of cachexia syndrome in cancer patients requiring rehabilitation. While a diversity of factors are associated with cachexia, low creatinine was independently associated with poor functional prognosis, suggesting that this population may require more tailored rehabilitation.

DEVELOPMENT OF A NOVEL TASK-ORIENTED REHABILITATION PROGRAM USING A REHABILITATION ROBOT
Yi Mei Chen, Master Degree, Szu Shen Lai, Master Degree, Yu Cheng Pei, MD, PhD, Jian Jia Huang, PhD, Chia Ju Hsieh, Bachelor Degree, and Wei Han Chang, MD, PhD

OBJECTIVES: Hand function is essential for activities of daily living. Task-oriented rehabilitation is an individualized training program that involves multiple sensory feedbacks and facilitates neuroplasticity to recover from upper limb dysfunction caused by neurological disorders. However, it is usually difficult for a stroke patient to move his paralyzed fingers during hand function training in task-oriented rehabilitation. We then developed a new task-oriented training program using a novel robotic system that assists the movement of paretic fingers during robot-assisted rehabilitation and showed its effectiveness in patients with stroke.

DESIGN: The case series study consists of two steps: first, three healthy adults were recruited for investigating the usability and safety of training program; second, three stroke patients were recruited (age: 20-60 years-old, unilateral stroke, MAS score ≥2, BBS-AE ≥2, and MMSE≥24) for investigating the utility of training program. The robotic system consists of an exoskeletal hand for affected hand, a sensor glove for non-affected hand and a control box. For the robot-assisted task-oriented training program, five types of objects were designed to fit patient’s hand function with different BRS, including: peg, rectangular cube, cube, ball, and cylindrical bar. Training program: firstly, a 5 min of PROM and a 5 min of robotic hand assisted bimanual movement applied as the preparation stage, and then applied task-oriented training using 5 objects for 20 times each object as the manipulation stage. The program was conducted for consecutive 3 days.

RESULTS: In the first step, the subjects in the healthy group perfectly manipulated all the objects both with and without the robotic hand. The average of successful rates in 3 days with and without robotic hand were 100.0%. The results support the usability of the training program. In second step, subjects in the patient group had poor motor abilities and were unable to manipulate the objects without the use of robot. However, their successful rates dramatically increased after the application of the robotic hand (success rate: 98.89±1.92%, cube: 97.78±2.55%, ball: 99.44±0.96% and cylindrical bar:100.0%) and thus showed no statistical significance as compared with the healthy subjects, indicating that the training program improved stroke patients’ motor activities. Besides, the results revealed no significant difference between each subject with assistance by the robotic hand, again supporting the utility of our robot-assisted, task-oriented rehabilitation program for stroke patients.

CONCLUSIONS: The objects can be successfully grasped by both healthy or stroke subjects, indicating the sufficient feasibility, stability and elasticity of the grasping objects we chosen. Also, the training program can be fruitfully performed in stroke patients, which indicates its utility in hand function rehabilitation. In the future, our team will perform a randomized controlled trial to evaluate the therapeutic effect of the training program.

DIAGNOSTIC UTILITY OF ELECTROMYOGRAPHY TO ASSESS CONSCIOUSNESS IN PATIENTS WITH DISORDERS OF CONSCIOUSNESS - A LITERATURE REVIEW
Nathan Darji, DO

OBJECTIVES: There is a growing interest in diagnostic tools for the assessment of consciousness in patients with a disorder of consciousness (DoC). Currently, the gold standard for assessment of consciousness is the Coma Recovery Scale-Revised (CRS-R), a behavioral assessment that often relies on examiner impression and observed behaviors. Amongst the available diagnostic tools to assess consciousness, electromyography is underreported in current literature reviews. Given the significant ethical and rehabilitation implications of an accurate diagnosis of consciousness in patients with DoC, there is a necessity to review the effectiveness and potential clinical use of electromyography in the assessment of consciousness in patients with DoC, which is the objective of this literature review.

DESIGN: A comprehensive review of the literature was performed. Multiple databases including PubMed, MEDLINE, Embase, Cochrane, and CINAHL were searched with no timeframe restrictions. Search terms included “electromyography” and “disorders of consciousness” in all fields. Inclusion criteria included human subject patients with a diagnosis on the DoC spectrum, comparison of EMG to CRS-R (gold standard), and electromyography response as an outcome measure. Exclusion criteria included non-human studies, editorial commentaries, and literature reviews. The Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) was used to assess the quality of the reviewed literature.

RESULTS: A total of 183 studies were identified from the initial literature search, 72 of which studied human subject DoC patients. 19 articles remained after duplicates removed and 6 articles used EMG response as an outcome measure. 5 articles compared EMG to CRS-R. 1 article was excluded as it was an editorial commentary. A total of 4 studies examining the use of electromyography as a diagnostic tool to assess consciousness were included in this review.

CONCLUSIONS: There is great variability in the methods of assessing EMG response in the reviewed studies. All 4 of these studies identified patients who were behaviorally non-responsive on CRS-R but demonstrated a significant clinical EMG response to either command or to a joke. All 4 studies demonstrated a high risk of bias on the QUADAS-2. Given that electromyography can potentially identify sub-clinical behaviors, there are significant diagnostic implications for the use of electromyography in the assessment of consciousness, but further studies with Designs that limit the risk of bias are needed. While there are limitations to using EMG as an assessment tool, it can potentially be utilized by the interdisciplinary team concurrently with standard rehabilitation treatments and assessments such as the CRS-R to enhance the diagnostic accuracy of patients on the DoC spectrum.

EARLY AMPUTATION VS LIMB SALVATION - COMPARING THE IMPACT ON QUALITY OF LIFE
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OBJECTIVES: To compare patients’ quality of life before and after amputation.

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EFFECT OF INDEPENDENT VERSUS COMMON GOAL TASK CONDITION ON PARETIC ARM MOVEMENT PERFORMANCE

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OBJECTIVES: Individuals with unilateral stroke resulting from cerebrovascular accident (CVA) demonstrate substantial motor performance deficits in the contralesional paretic arm. While rehabilitation interventions involve task practice, characteristics of task conditions that augment paretic arm performance are highly debatable. In particular, the extent to which paretic arm performance is modified when a stroke survivor uses it to accomplish bimanual tasks with independent goals or a common goal is not known. The main purpose of this study was to compare motor performance of the paretic arm during bimanual common goal, bimanual independent goal and unimanual performance. A secondary aim was to determine if the effect of task conditions on motor performance differed between those with left and right CVA.

DESIGN: 17 individuals with LCV A, 16 individuals with RCV A and 10 neurotypical age-matched controls reached to grasp a dowel under three task conditions: unimanual, bimanual with independent goals and bimanual with common goal. Total movement time, peak velocity for reaching actions, grasp aperture, time to peak grip aperture and time from peak velocity to object grasp were extracted from position data acquired using electromagnetic sensors donned to the tip of index finger, thumb and palm.

RESULTS: Compared to unimanual and independent bimanual conditions, common goal bimanual actions led to faster movements, higher peak reach velocity, smaller peak grasp aperture, and shorter time from peak reach velocity to object grasp in stroke survivors. Particularly, common goal bimanual task led to greater performance benefits in the LCV A group compared to the RCV A group. There were minimal effects of task conditions on motor performance in neurotypical adults.

CONCLUSIONS: Our results indicate that task goals during bimanual actions significantly influence the kinematics of the paretic arm during reach-to-grasp actions. Common-goal bimanual actions need to be incorporated in therapeutic practice for arm rehabilitation after stroke, particularly for those with left CVAs.

FACTORS ASSOCIATED WITH AMBULATORY AND TRANSFER ABILITY: A STUDY FROM THE NATIONAL SPINA BIFIDA PATIENT REGISTRY

Nicholas L. Benjamin, BS, Gina McKernan, PhD, Sara Izzo, Theresa M. Crytzer, PT, DPT, ATP, Gerald Clayton, PhD, Pamela Wilson, MD, Amy Houtos, MD, PhD, MPH, and Brad Dicicco, MD, MS

OBJECTIVES: This study used a Spina Bifida (SB) Electronic Medical Record (EMR) and the National Spina Bifida Patient Registry (NSBPR) to explore the effects of surgical history and other defined variables on ambulatory and transfer status over time in individuals with SB.

DESIGN: This study was an analysis of longitudinal data collected within the NSBPR. Demographics, motor level, ambulation ability, and transfer ability were collected. Ambulation and transfer ability were treated as binary outcomes. The SB EMR was used to collect additional variables at three sites (i.e. full orthopedic and neurosurgical history). Separate logistic regression models were created for ambulation ability and transfer ability for both myelomeningocele (MMC) and non-MMC subtypes.

RESULTS: In total, 643 individuals with MMC and 163 individuals with non-MMC had complete records and were included in the analysis. For ambulation in the MMC group, higher motor level, tethered cord releases, spinal correctional surgeries, hip orthopedic surgeries, and having supplemental insurance with or without public insurance were associated with decreased independent ambulation ability over time. Tibial torsion surgeries, being female, being non-Hispanic/Latino, and having public-only insurance were associated with increased independent ambulation ability over time while age, number of shunt revisions, and number of annual visits had weak associations. In the MMC group, higher motor level was associated with decreased independent transfer ability over time. Age, number of shunt revisions, and number of annual visits had weak associations. No significant associations were detected for ambulation or transfer ability in the non-MMC group.

CONCLUSIONS: In addition to using the NSBPR, collecting a full neurosurgical and orthopedic surgery history within the SB EMR provides information useful for modeling ambulation and transfer ability over time. These results can help clinicians inform patients and families about functional prognosis and the effect of surgical interventions on ambulation ability and the ability to transfer.

FUNCTIONAL CHANGES AFTER MULTILEVEL SURGERY IN CHILDREN WITH CEREBRAL PALSY

Javier R. Delgado Martínez, Diana Soto, FT, and Fernando Ortiz Correder, Physical Medicine and Rehabilitation Specialist

OBJECTIVES: The goal of orthopaedic surgery in children with Cerebral Palsy is to improve the functionality in ambulation in those patients with the potential to perform this activity or correct and prevent deformities. To analyze postoperative functional changes in children with CP after multilevel surgery, measured with the GMFM-66 scale on each level of GMFCS.

DESIGN: Retrospective study, to compare GMFM-66 scores before and after multilevel surgery in patients under 18 years old with CP evaluated at one third level Hospital since 2004 until 2018. We excluded cases with unilateral CP those operated before the first functional assessment with the GMFM-66 scale and those with other orthopaedic surgeries. The Wilcoxon signed-rank test was used for statistical analysis.

RESULTS: A sample of 103 patients was obtained, from 5 to 17 years old (mean 8.03); 58 boys. GMFCS: 4 patients in Level I (3.8%), 11 in Level II (10.5%), 18 in Level III (17.1%), 39 in level IV (37.1%) and 33 in level V (31.4%) of GMFCS. Type of CP: 77.1% spastic, 19.1% dyskinetic and 3.8% mixed. 56 of 103 patients showed a higher postoperative score of GMFM-66, 42 a lower score and 7 draws (Wilcoxon signed-rank test, p=0.41). With the analysis by functional level groups, it was found that there were no significant changes for levels I-II (p=0.33), Level III (p=0.24) or levels IV-V (p=0.92).

CONCLUSIONS: It is controversial that the multilevel surgery results in a shift towards improvement in the functionality of patients with CP. However, studies of better methodological Design are required to clarify these Conclusions. It should be noted that patients with functional levels III, IV and V did not show a deterioration of their functional level measured with the GMFM-66 scale after multilevel surgery.

FUNCTIONAL RESTORATION IN BURNS: A COMPARISON BETWEEN ENZYMATIC DEBRIDEMENT AND SURGERY

Davide Dalla Costa, MD, Patrizia Sabussoli, Physiotherapist, Vincenzo Morello, Physiotherapist, Michele Nichelatti, Statistician, and Antonella Cittiero, MD

OBJECTIVES: Acute phase of wound care in burns is crucial for the outcomes. The aim of the study is to analyze the impact of enzymatic debridement (ED) using Nexobrid (NXB) on rehabilitation, functional restoration and scarring outcome, compared to escharectomy (standard of care SOC).

DESIGN: 74 patients (aged 18-88) were enrolled consecutively in this retrospective study, divided in two arms (ED & SOC) according to depth of burn, total body surface area (TBSA), anatomical regions.

Inclusion criteria: age 18–88 years; deep dermal/full thickness burns of upper/lower limb, trunk, neck; caused by fire, flame, contact; requirement of surgical escharectomy, event occurred < 72 hours, wound area >0.5% TBSA. Burn Specific Health Scale-Brief (BSSH-B), Michigan Hand Questionnaire – Brief (Brief MHQ)

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were applied for Quality of Life (QoL) and functional recovery. Vancouver Scar Scale (VSS), Patient and Observer Scar Assessment Scale (POSAS) judged the scars. The same rehabilitation program was used. Measurements were recorded at discharge and follow-up (3-6-12 months). The primary objective was analyzed by means of a child’s logistic regression. Analysis of differences between arms included Mann-Whitney U test (Fisher’s exact test). ANOVA was applied for VSS, POSAS, Brief-MHQ, BSHS-B.

**RESULTS:** The groups were similar respect to TBSA (NXB 16%, SOC 17%, p=0.038). The odds of needing rehabilitation was reduced by 81.2% (CI95% (p=0.001) using NXB. About scar assessment (VSS, p=0.969; POSAS patient p=0.01, observer p=0.2), functional recovery and QoL, any significant differences were observed. Within each group, QoL was improved for BSHS-B and MHQ-B (p= 0.001).

**CONCLUSIONS:** ED may reduce the need and length of rehabilitation after discharge in comparison with SOC for deep partial and full thickness burns. A larger cohort study should be done in order to corroborate these findings.

**HIGH PREVALENCE OF DISABILITY IN CHILDREN AGED 2-17 YEARS OLD IN HONDURAS, CENTRAL AMERICA, 2017**

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**OBJECTIVES:** To determine disability prevalence in children aged 2-17 years old, Honduras, 2017, with the purpose to contribute with information for public policies to prevent and treat disabilities in this age group.

**DESIGN:** Cross-sectional descriptive study. Honduras National University (UNAH) last-year medical students trained in disability/rehabilitation visited 50 houses in their designated geographical area across the country and according to a multi-staged randomized sample methodology. Previous informed consent/assent, data was registered using two forms: one registered cases/population, and the other disability characteristics (Washington Group Instrument) and related factors (perinatal, congenital, genetics and acquired).

**RESULTS:** 271 last-year medical students were distributed nation-wide, covering 310 communities, 180 (58.1%) urban and 130 (41.9%) rural. They visited 16,676 houses of which 13,854 (83.1%) were inhabited with 15,511 children aged 2-17 years old, 4,852 (31.3%) aged 2-4 and 10,659 (68.7%) aged 5-17, 7,662 (49.4%) males and 7,849 (50.6%) females. The disability prevalence was 1,390 (8.8%), sex distribution was 4.8% (CI95%=4.3-5.5), and children aged 5-17 was 10.8% (CI95%=10.3-11.4). Provinces with most disability prevalence were in the country central corridor: El Paraíso (13.7%), Francisco Morazán (12.4%), Santa Bárbara (11.5%), Cortés (10.2%). The structures and functions most affected were the ones related to the Central Nervous System, 62.2% (CI95%=59.6-64.7) and 67.5% (CI95%=64.9-69.9), respectively. The most affected limbs were behavior 4.3% (CI95%=3.8-4.6) and learning 3.1% (CI95%=2.6-3.4).

**CONCLUSIONS:** Childhood disability prevalence identified was 9.0%, 7.5 times higher than the previously registered for Honduras by INE 2002. It is necessary to review perinatal policies to reduce preventable factors associated to childhood disability in Honduras.

**HIGH RATES OF VITAMIN D DEFICIENCY IN ACUTE INPATIENT REHABILITATION**

Jennifer Wu, MD, PhD, Jay Han, MD, and Bi-Ying Yeh, MD

**OBJECTIVES:** Vitamin D deficiency has wide ranging implications for the rehabilitation patient, including muscle strength, risk of falls, and osteopenia. The objective of the current study was to determine contemporary rates of vitamin D insufficiency and deficiency in an acute inpatient rehabilitation setting.

**DESIGN:** Retrospective cohort study of vitamin D levels in patients admitted to a university-affiliated inpatient rehabilitation facility (IRF). Secondary analyses examined demographic and clinical variables, including age, admission IRF length of acute hospitalization, admitting diagnosis, and concurrent treatment with antiepileptics and systemic steroids and their association with vitamin D status.

**RESULTS:** In 100 patients admitted to a university-affiliated IRF, 76% of patients demonstrated low vitamin D level (serum 25(OH)D <30ng/mL), with 47% vitamin D deficiency (<20ng/mL) and 29% vitamin D insufficiency (20-29.9ng/mL). Hormone status was associated with lower rates of vitamin D deficiency and low vitamin D level (p=0.001).

**CONCLUSIONS:** Vitamin D deficiency is common in patients admitted to an acute inpatient rehabilitation facility, particularly in younger individuals. The current results lend support to routine vitamin D deficiency screening in the inpatient rehabilitation setting.

**IPSIELSONAL INTRACORTICAL EXCITABILITY AND HAND RECOVERY AFTER STROKE – AN INTEGRATIVE NEUROIMAGING APPROACH**

Carmen M. Cirstea, MD, PhD, In-Young Choi, PhD, Phil Lee, PhD, Andrew Apostol, and Shawn Yoo

**OBJECTIVES:** Hand recovery after stroke is in part dependent on neuroplasticity. By neuroplasticity, which can take many forms, we mean here changes in intracortical excitability. For instance, an increase of excitability augments plastic properties of the neural circuits resulting in creation of newly available networks and strengthening the existing ones, all to generate a new motor output to the impaired hand. In vivo evaluation of intracortical excitability, especially at the molecular level, is lacking in humans and thus, it remains difficult to discern whether such changes are functionally relevant. We tested whether intracortical excitability (MR Spectroscopy-measured marker of excitability, Glx) in the motor and premotor representations of the impaired hand, defined functionally (functional MRI), is altered and plays a role in the trajectory of hand recovery after stroke.

**RESULTS:** Six subacute (age: mean±SD, 65.5±9.3 years, 50% males) and 10 chronic (58.7±6.8 years, 50% males) survivors of a subcortical ischemic stroke underwent GLX and clinical (Fugl-Meyer, FM) assessments. In chronic survivors, FM was repeated after a four-week motor training and clinical gain was defined as positive values of FM changes (∆FM). GLX levels in stroke were compared to those in 16 age/sex/handedness-matched controls. Correlations between GLX levels and FM or AFM were also evaluated.

**RESULTS:** GLX in subacute stroke survivors was significantly lower compared to both controls and chronic stroke survivors (motor: by 29%, p=0.02 and by 27%, p=0.03 respectively; premotor: 28%, p=0.04; 25%, p=0.04). GLX in chronic stroke survivors was not significantly different from controls (motor: p=0.2; premotor: p=0.4) but significantly correlated with ∆FM (motor: r= 0.77, p=0.01; premotor: r=0.78, p=0.008).

**CONCLUSIONS:** An increase in GLX with time implies that lower intracortical excitability early after stroke “reverses” later on. Strong correlations between GLX and subsequent clinical gain suggest that higher intracortical excitability in ipsilesional motor area induces a suitable environment for hand motor improvement. This knowledge helps developing new or modify current treatments to maximize hand recovery after stroke.

**KNOWLEDGE, ATTITUDES AND PRACTICES OF HEALTH PERSONNEL REGARDING REHABILITATION IN INPATIENTS, HONDURAS 2019**

Maria F. Calderon, MD, Karla Funes, MD, Jessica Galeas, MD, Erika Calderon, MD, Yanitza Hernandez, MD, Jackeline Alger, MD, PhD, Elpidio Sierra, MD, Edna J. Maradiaga, MD, Claudia Martinez, MD, and Mauricio Gonzales, Licenciatura

**OBJECTIVES:** One out of ten patients suffer an adverse event during their hospital stay, deserving interdisciplinary collaboration. Knowledge, Attitudes and Practices (KAP) studies provide information to organizations responsible for the creation and execution of rehabilitation programs. It is imperative that health personnel master basic knowledge to perform rehabilitation practices to enhance the recovery and functionality of patients. The objective of the study was to determine the KAP of health personnel in relation to rehabilitation of inpatients in four hospitals, Honduras, in order to provide information that contributes to the design of strategies that favor the integral management of patients.

**DESIGN:** Descriptive cross-sectional study in health personnel, Medical Surgical wards, sample size n=162. Non-probabilistic and intentional sampling; self-administered questionnaire previous written informed consent. Univariate analysis with frequencies, percentages and measures of central tendency/dispersion.

**RESULTS:** Average age 39 years, women 74.7% (121), auxiliary nurses 37.0% (60) and specialized physician 22.8% (37); average years of training 6.4. About 90% (147) reported working in the hospital environment for more than 1 year (average 11.5 years). Overall, 51.2% (83) of the global staff had poor knowledge, with greater deficit in detecting the appropriate moment for the initiation of rehabilitation (78.4%); nonetheless the attitude towards the importance in rehabilitation of the impaired patient is positive. Most performed practices: request rehabilitation intervention (88.3%), education to family members about risk of falls (81.5%) and water mattress installation (80.9%). Less performed practices: cough stimulation (28.4%) and bedside sitting (28.4%).
CONCLUSIONS: The overall knowledge of health personnel regarding rehabilitation of hospitalized patients is poor; however, a positive attitude towards the importance and impact of rehabilitation in the prevention of complications and recovery of the hospitalized patient, is reflected in some practices they said to perform. Therefore, it is essential the continuous training of health personnel and protocolize rehabilitation care in the different hospitals.

MICROPROCESSOR KNEE TECHNOLOGY REDUCES ODDS OF INCURRING AN INJURIOUS FALL FOR DIABETIC/DYSVASCULAR AMPUTEES

Shane R. Wurderman, PhD, CPO, Taavy Miller, MS, PO, Phillip Stevens, MED, CPO, and James H. Campbell, PhD

OBJECTIVES: Microprocessor Knees (MPKs) represent a now established technological advancement in the field of external limb prostheses. MPKs have been identified with a number of clinical benefits including reductions in stumbles and falls. However, these observations are largely derived from smaller studies in which amputees due to trauma were common. The impact of MPKs on stumbles and falls in general, and in individuals with amputation due to diabetes or vascular disease has not been specifically studied. Given the role of diabetes/vascular disease as a known risk factor for falls, the purpose of this analysis was to determine the impact of MPK technology on injuries falls in a large cohort of patients with amputation due to diabetes/vascular disease.

DESIGN: Subjects: From a multi-center outcomes database of patients with lower limb amputation, 881 individuals were identified. Inclusion criteria included amputation due to diabetes/vascular disease, unilateral above-knee or knee disarticulation amputation, and K3 ambulation status. PLUS-M® mobility scores and comorbid health status were also required (age: 61.7±11.1y, male: 63.6%, BMI: 31.1±7.0, PLUS-M®: 44.3±9.7). Instruments: A binary fall question was administered during outcomes assessment asking patients whether they had incurred a fall within the previous 6 months which subsequently resulted in the need for medical attention. The full question was anchored to a medical event for improved recall memory by patients. Procedures and Analysis: Summary and descriptive statistics were calculated among the sample population. Next, univariate logistic regression was used to model the association between falls and MPK utilization. Each independent variable was subsequently analyzed. Lastly, multivariate logistic regression was used to calculate adjusted odds ratios and 95% confidence intervals.

RESULTS: The results of this study showed that compared with those individuals utilizing an MPK, individuals without an MPK had 3.38 increased odds of having an injury fall within a 6-month time frame (Odds Ratio=3.38; 95% CI=1.44-7.94; P=0.005). By contrast, the additional variables of BMI (Body Mass Index adjusted for limb loss), Gender, Age and Time Since Amputation had no significant influence on the rates of reported injurious falls within this population.

CONCLUSIONS: Individuals with unilateral transfemoral amputation who were not fit with an MPK were more than 3 times as likely to report an injurious fall than their peers fit with this prosthetic technology. These results were specifically found in a large population comprised only of individuals with amputation due to diabetes and/or vascular disease that were classified for functional level (i.e. K3). Importantly, age, time since amputation, gender, and BMI were all controlled for within the statistical model. Combined with previous evidence, the current findings would suggest for a patient classified as functional level K3, with an above-knee amputation due to diabetes/vascular disease, a MPK should be considered for reducing the likelihood of the patient incurring an injurious fall.

PRELIMINARY EFFECT OF THREE DIMENSIONAL PRINTING DYNAMIC ANKLE FOOT ORTHOSIS ON PLANTAR PRESSURE DISTRIBUTION IN STROKE PATIENTS

Jimmy Chun Meng Fu, MD, MS, Yi-Pei Chen, BACHELOR, Liang-Ying Ke, MD, Yi-Jen Chen, MD, PhD, and Chia-Aoy Chen, MD, PhD

OBJECTIVES: To compare the plantar pressure distribution during wearing 3 dimensional printing dynamic ankle foot orthosis(3DP-DAFO) with wearing anterior ankle foot support (A-AFO) in post-stroke hemiplegic patients.

DESIGN: Total 8 stroke patients were enrolled in this study. Selection criteria including at least 3 months after stroke or patient reach motor improvement plateau, Unilateral hemiplegia with brumstorm stage of lower extremity III-IV, and patient can walk independently without using the aids. Exclusion using the inclusion criteria.

RESULTS: The results of this study showed that compared with those individuals with 3DP-DAFO walking, 3DP-DAFO walking also showed the trend of decrease maximal force of foot (P=0.08), decrease peak pressure of lateral midfoot (P=0.08) and increase peak pressure of medial midfoot (P=0.08). Effect of plantar parameters change in sound side leg using different AFO. The contact area and peak pressure of medial midfoot of unaffected leg are significantly increased in 3DP-DAFO walking. (P=0.008 and 0.04) However, there is no difference in walking speed and cadence between 3DP-DAFO, A-AFO and bare foot walking. In QUEST survey, patient has better satisfaction with wearing 3DP-DAFO in aspects of safety, durability, adjustment, effectiveness, comfort and feasibility, but inferior in aspects of weight.

CONCLUSIONS: 3DP-DAFO has better effect to reduce the degree of ankle inversion and plantar flexion of affected leg during walking in post stroke patient. 3DP-DAFO has good subjective satisfaction. Overall, 3DP-DAFO is a reasonable choice for hemiplegic patient to improve ankle control and ambulation satisfaction.

PREVALENCE OF LATERAL EPICONDYLOSIS IN MANUAL WHEELCHAIR USERS PARTICIPATING IN ADAPTIVE SPORTS

Andrea Cyr, DO, Michael J. Uihlein, MD, Berdale Colorado, MD, Kristin Garlanger, DO, MBS, and Kenneth K. Lee, MD

OBJECTIVES: The objective of this study was to determine the prevalence of LE in the dominant elbow in manual wheelchair-users who participate in adaptive sports. We hypothesized that the prevalence of LE would be higher in the wheelchair athletes than reported norms in able-bodied individuals.

DESIGN: This was a prospective, cross-sectional study conducted at the 2018 and 2019 National Veteran Wheelchair Games. Participants completed a questionnaire then the dominant arm of each participant was examined by a board-certified, ultrasound-trained physician to evaluate tendon thickening, increased vascularity and hypoechoogenicity and a standard physical exam was performed using palpation, the Cozens and Mills test.

RESULTS: 87 participants (78 male, 9 female) were recruited. Average age of the individuals was 56.3±12.3 years. Injuries included spinal cord injuries (n=56; 64%), amputation (n=19; 28%) and “other” (n=9; 10%), and the average time using a manual wheelchair was 16±13 years. Self-reported elbow pain was reported in 25% of participants (n=22). The prevalence of LE in manual wheelchair-users was dramatically higher than published norms for able-bodied individuals, with 46% (n=40) of participants meeting the diagnostic criteria for LE by ultrasound assessment and 17% (n=15) meeting the criteria based on physical exam alone.

CONCLUSIONS: Neuromodulation by surface electrical stimulation at sole of foot is simple, non-pharmacological, non-invasive, inexpensive, promising alternative treatment modality for reducing detrusor overactivity.
CONCLUSIONS: Compared to previously published meta-analysis with able-bodied individuals, there is approximately a 35-fold increase in the prevalence of LE in manual wheelchair users who participate in adaptive sports based on ultrasound examination, and a 13-fold increase based on physical examination. Wheelchair-users depend upon increased use of their upper extremities for mobility, thus they are predisposed to significant chronic joint pathology of the upper extremity. Ultrasound evaluation of the lateral epicondyle in manual wheelchair-users in the context of adaptive sport can be used to better assess the population most at risk to develop symptomatic LE.

SALBUTAMOL IMPROVES FIDELITY OF NEUROMUSCULAR JUNCTION TRANSMISSION AND PHYSICAL FUNCTION IN AGED MICE

Elizabeth A. Page, BS, W. David Arnold, MD, and Deepthi Chugh, PhD

OBJECTIVES: Sarcopenia is a geriatric syndrome associated with pathologic loss of muscle mass and strength that is associated with increased morbidity and mortality. Our recent studies in aged mice suggest that NMJ transmission may be a rational therapeutic target. We hypothesized that salbutamol, a treatment that is effective in a primary NMJ disorder, would improve NMJ transmission in aged mice.

DESIGN: Two experiments were designed to investigate salbutamol as a method to improve NMJ transmission and physical function in aged wildtype mice (C57BL/6J, 25-27 months). Raters were blinded to treatment and groups were balanced for age/sex. Experiment 1 assessed repetitive nerve stimulation decrement (RNS) 25 minutes after a single intravenous salbutamol dose (8mg/kg). Experiment 2 assessed the effect of repetitive salbutamol dosing (intraperitoneal 8 mg/kg, once per day for 3 days) on motor function (grip strength, rotarod) and NMJ transmission (single fiber electromyography [SFEMG]).

RESULTS: A single salbutamol dose reduced decrement on RNS (Salbutamol: 33±2% of baseline decrement versus Vehicle: 91±3% of baseline decrement, p<0.0027). Repeated salbutamol dosing reduced rotator fatigability ratio by 65% (0.1260±0.0780 vs 0.3464±0.2707, p=0.0456) and improved grip strength by ~10% (Salbutamol=6.928 g/g; Vehicle=6.303 g/g, p=0.0738), but only rotator reached significance. SFEMG was significantly improved following salbutamol treatment for both jitter (Salbutamol=16±17us versus Vehicle=35±25us, p=0.0001) and blocking (Salbutamol=26% blocking versus Vehicle=74% blocking, p=0.0003).

CONCLUSIONS: Salbutamol has a marked effect on NMJ transmission and motor function in aged mice. This warrants future investigation regarding NMJ transmission in older adults as a potential contributor to sarcopenia and whether treatments that modulate NMJ transmission may be therapeutic for sarcopenia. Future studies are needed to understand how salbutamol increases NMJ transmission fidelity, to assess the long-term effects of salbutamol on muscle and NMJ function, and to explore relationships between different dosages of salbutamol and response.

TEACHING REHABILITATION IN LOW RESOURCES COUNTRIES

Gennaro Pestelli

CASE DIAGNOSIS: The world needs more rehabilitation systems for disable people. In low resource countries there are a lot of disable people without rehabilitation services except in the main towns. Territories and villages are completely lack of rehabilitation both medical and social.

CASE DESCRIPTION: More is the poverty of people and more you can meet disability. The situation in low resources countries and also in some countries in economic problems is dramatic. If people have money, they can have health care and rehabilitation if people have no money are in very problematic situation of health and for participation to a good quality of life. Where is poverty you meet surely disability.

DISCUSSIONS: From 1999 we start, as association as SIMFER as volunteers, to teach rehabilitation to volunteers and workers of ONG in all of country all over the world: Albania, Macedonia, Moldova, Ethiopia, Guatemala, Romania, Ukraine, Djibuti, Jordan, Peru, Montenegro, and in the next time in Mozambique, Madagascar and Kazakhstan. We start to teach to volunteers and workers to improve activities on Community based Inclusive development and in some country, so as Albania, we start after a few years with a regular university course of rehabilitation for therapists. Volunteers began to do reeducation and rehabilitation activities in the compounds of humanitarian associations and in the villages. They are also today, giving help to a lot of disable and forgotten people.

CONCLUSIONS: We believe that to teach rehabilitation, everywhere disability and social problems are daily a big problem for the quality of life of people, may be a good way to propose rehabilitation all over the world and to arrive with medical and social rehabilitation must arrive: in the last village of the poorest countries. This is a simple way to have less poverty and disability. #rehabilitationforall.
Abstracts

The impact of CMS’ mandatory bundled payment model on post-acute care discharge disposition of patients with lower joint replacements: A national study

Liliana E. Pozzin, PhD, JD, Eric Hume, MD, Emily McGinley, MS, MPH, Daniel Polsky, PhD, Roy Schwartz, MBA, Mita McLarney, MD, and Timothy Dillingham, MD, MS

OBJECTIVES: Prompted by the growth in Medicare spending and uncertainty about the effectiveness of post-acute care provided at alternative settings (e.g., inpatient rehabilitation facilities, IRF; skilled nursing facilities, SNF), CMS established a mandatory, episode-based, prospective bundling payment model for persons undergoing elective joint arthroplasties (CJR 2016). In this paper, we examine the impact of CJR on the composition of patients undergoing joint replacements and their post-acute care disposition.

RESULTS: Difference-in-difference techniques applied to serial cohorts of elderly Medicare beneficiaries undergoing joint replacement before (2013-2014) and after (2017-2018) CJR in geographic areas subjected to or exempted from the mandatory, episode-based, prospective bundling payment model for persons undergoing elective joint arthroplasties (CJR 2016). In this paper, we examine the impact of CJR on the composition of patients undergoing joint replacements and their post-acute care disposition.

CONCLUSIONS: The results suggest that gait asymmetry involving a unilateral deviation from baseline is associated with lower metabolic power than a symmetric, bilateral deviation of a comparable magnitude. Furthermore, when confronted with a unilateral constraint, healthy participants opt for asymmetry rather than conserving the human preference for symmetric gait.

The implication process of disability evaluation system based on the ICF in Taiwan, 10-year experience

Tsan-Hon Liou, MD, PhD, and Kwang-hwa Chang, PhD

OBJECTIVES: Since 1980, the Taiwanese government enacted certain legislative procedures to create and revise categories regarding disabilities. However, the criteria for disability evaluation mainly based on the medical model that considered disabilities as physical and mental impairment. Thus, physicians identified candidates for disability benefits mainly based on their severity of body impairment, but without a sufficient evaluation of their daily activity, participation, and environmental factors. In 2007, Taiwan legislated a law known as the “People with Disabilities Rights Protection Act”. This act mandated that the assessment of individual eligibility for disability benefits should base on the ICF framework. The purpose of this study is to report the implementation process and major outcome of the new national-level, biopsychosocial model based on the ICF.

DESIGN: During the preparation period (2007–2012), there were eight steps of implementation process. Step 1: taskforce building and meeting, step 2: developing assessment tools for medical and functional assessments, step 3: developing measurement tools for needs assessment, step 4: a small-scale field trial, step 5: refine evaluation tools, step 6: a nationwide study, step 7: verify the evaluation procedure, step 8: collaboration and monitor the new system. We formulated a core set of disability evaluation and carried out several field and nationwide trials. This new system has been implemented successfully in July 2012. We monitored the data and reported to our government monthly for quality control since then. We also assessed the applicants’ perceptions and attitudes toward the system and identified those factors associated with the applicants’ satisfaction with the system.

RESULTS: We developed a core set of disability evaluation which included components of body function/structure (43 categories), activity & participation (36 items of WHODAS 2.0, test–retest reliability r = 0.83-0.89), personal and environmental factors. We trained 11,417 certified testers for the purpose of functioning assessment. By August, 2018, we have accepted 1,089,955 application cases. Among them, 44% were from mental and cognitive dysfunction, 24% neumorosculoskeletal dysfunction, and 16% sensory dysfunction. From a nationwide questionnaire survey, most participants were satisfied with the new system overall (58.7%) and persons with disabilities and their primary caregivers have positive attitudes towards the ICF-based new system.

CONCLUSIONS: To our knowledge, Taiwan is the pioneer to implement disability evaluation system based on the ICF. Our experience demonstrated that disability evaluation system based on this biopsychosocial model could provide a common language between disability eligibility, needs assessment and welfare services. Policy makers could have a better understanding of persons’ needs and make a good allocation of resources. Persons with disabilities and their stakeholders have positive attitudes towards the ICF-based system after implementation.
OBJECTIVES: Clinical practice guidelines (CPGs) provide evidence-based recommendations to improve quality of care, and decrease variability in practices and costs. However, CPGs have been criticized for being not very applicable clinically. Our objective was to review existing papers that used Appraisal of Guidelines Research & Evaluation version II (AGREE II) to evaluate rehabilitation CPGs, especially in the Applicability domain.

DESIGN: MEDLINE, Cochrane, PsyCINFO, Embase, CINAHL and Web of Science were searched from 1/2017-8/2019. 449 abstracts resulted; 47 papers that used AGREE II to evaluate the quality of rehabilitation CPGs were reviewed in full text, using these criteria: the 6 AGREE II domain scores and/or 23 item scores were reported for each CPG; the CPGs rated involved rehabilitation; primary target of the CPG was a rehabilitation clinician or other health care provider. Relevant data on the CPGs evaluated were extracted, and the 6 domain percent scores calculated from the 23 item scores if needed.

RESULTS: We found 41 papers that provided AGREE II ratings on a total of 591 CPGs (Median=10 CPGs/paper). The average global quality rating was 5.6 (1-7 scale; SD=1.4). Summary CPG recommendations included: 18% “not recommended”; 44% “recommended with modifications” and 38% “recommended”. The average Applicability domain score was 34% (SD=25%). The 4 Applicability Domain item scores averaged from 2.4 to 3.5. CPGs’ quality improved over time, but slightly so.

CONCLUSIONS: These findings suggest that rehabilitation CPGs have poor quality, especially in the applicability domain, and cannot be recommended, even with modifications, in 18-38% of cases. Lack of consideration of facilitators and barriers to application, advice and tools for putting recommendations into practice, resource implications and monitoring and auditing criteria are some of the key problems. CPGs need to be improved to become more likely to be implemented in practice.

THE RELATIONSHIP BETWEEN GAIT COMPLEXITY AND DECLINE IN PHYSICAL FUNCTION

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OBJECTIVES: Stable gait relies on neuromuscular adaptability. A loss of physiological complexity is a characteristic of many pathological conditions as well as decreased ability to compensate for limitations with senescence. Compensation for impairments that accompany lower-limb osteoarthritis (OA) often results in repetition of specific motion patterns, i.e., a loss of complexity, recognized as a limp, for example. The objective of this study was to test the hypothesis that lower gait complexity predicts worsening physical function and physical performance (increase in: WOMAC-PF, walk and chair stand times) over 24-month follow-up.

DESIGN: Participants in the Multicenter Osteoarthritis Study (MOST) who completed the 144-month baseline and 24-month follow-up visits were recruited. Gait complexity was assessed by measuring Sample entropy (SampEn) during a 6-minute walk test. Motion patterns were assessed using the vertical acceleration signal from triaxial accelerometers attached to posterior pelvis, using a subseries of 5-second epochs. Self-reported physical function was assessed with the WOMAC-PF (0-68 scale). Physical performance was assessed as the time to stand from a chair five times and the time to walk 20 meters. Change scores were calculated between baseline and 24-month follow-up and correlation coefficients and linear models were constructed for the continuous worsening of physical performance. Minimal clinically important worsening (MCIW) on the WOMAC-PF was defined by worsening of ≥8 points by ≥1-, ≥2- or ≥3-month follow-up, using cumulative logistic regression models adjusted for age, sex, race, clinical site, BMI and pain severity in the worse knee (NRS).

RESULTS: 1,128 participants had baseline and follow-up measurements for gait complexity, outcomes and covariates. Less gait complexity correlated with worse baseline WOMAC-PF score (r=0.35), greater age (r=0.39) and greater BMI (r=0.21) (all p<.0001). Less complexity was associated with MCIW of WOMAC-PF (OR=6.45 (0.43, 0.98) per unit of SampEn (p=0.038)), even after adjustment for maximal knee pain, sub-cohort characteristics, radiographic knee OA, clinic, race, sex, BMI and age (OR=0.63 (0.42, 0.95)). In unadjusted analyses, greater complexity was associated with smaller increases in chair stand time over 24-months (p=0.002). However, this association between lower complexity and chair stand time worsening was attenuated by additional adjustment for site, race, sex, BMI, age and baseline maximal knee pain (p=0.357). Entropy was not associated with worsening walk time (p=0.345).

CONCLUSIONS: In this cohort of people with or at risk for symptomatic knee OA, a reduction in gait complexity (i.e., lower-gait complexity) appears to confer lower risk for worsening of self-reported physical function over 24-month follow-up. Gait complexity was not significantly associated with worsening of chair stand or walk times after considering other potential contributors to worsening physical performance.

TREATMENT OF SPASTIC HEMIPARESIS WITH GUIDED SELF-REHABILITATION CONTRACTS COMBINED WITH SIMULTANEOUS INJECTIONS OF ABOTULINUMTOXINA IN UPPER AND LOWER LIMBS: RESULTS FROM THE ENGAGE STUDY

Jean-Michel Gracies, MD, PhD; Gerard E. Francisco, MD; Robert Jech, MD, PhD; Svetlana Khatkova, MD; Carl Rios, PhD; and Pascal Maisonneuve, MD

OBJECTIVES: ENGAGE, an international phase 3b/4, prospective, single-arm, open-label study (NCT029699356), assessed effects of Guided Self-rehabilitation Contracts (GSC) combined with concomitant abotulinumtoxinA (aboBoNT-A; Dysport®) injections into the upper (UL) and lower limbs (LL) on active movements, in patients with spastic hemiparesis. Here we report baseline and primary outcomes from ENGAGE.

RESULTS: Patients with spasticity resulting from acquired brain injury, stratified with UL or LL as primary treatment target (PTT), received 2 consecutive injections of aboBoNT-A 1,500 U across PTT and non-PTT limbs, together with personalized GSC. Primary efficacy endpoint was the proportion of responders in the PTT (improvement in composite active range of motion [CRA]); a novel composite endpoint, of ≥35° or ≥5° in UL or LL, respectively) at Cycle 2 Week 6.

DESIGN: Of 160 patients enrolled, 153 were included in the intention-to-treat (ITT) population (mean [SD] age, 52.9 [12.6] years; etiology, 90.8% stroke). Proportion of patients split by PTT was 52.3% vs 47.7% for UL and LL, respectively; median baseline aboBoNT-A dose administered was 1,000 U (for each PTT). Mean (SD) overall compli-ance to GSC was 92.8% (9.9) and 98 patients (72.1% [95% CI: 64.0, 78.9]) achieved the primary efficacy endpoint (modified ITT population [n=136]). Greater responder rate was observed in patients with LL as PTT versus UL (83.1% [95% CI: 72.0, 90.5] vs 62.0% [95% CI: 50.3, 72.4], respectively; ITT). Mean (SD) CRA increased from 141.5° (33.7) at baseline to 162.6° (28.1) at last study visit in LL, and from 318.8° (118.3) to 368.0° (112.8) in UL (mITT). Safety data were in line with the known profile of aboBoNT-A; 78 (49.7%) patients reported treatment-emergent adverse events.

CONCLUSIONS: In this single-arm, open-label study in patients with spastic hemiparesis, the combination of GSC with aboBoNT-A simultaneously injected into UL and LL was associated with improvement of composite active range of motion (CRA).

Friday, March 6, 2020 POSTERS

40 YEAR OLD MALE WITH SMART SYNDROME AFTER RECEIVING RADIATION FOR MEDULLOBLASTOMA IN CHILDHOOD

Joshua Levin, DO, and Brian MacDonald, DO

CASE DIAGNOSIS: SMART (Stroke-like Migraine After Radiation) Syndrome.

CASE DESCRIPTION: 40 year old with history of childhood medulloblastoma (1983) with resection, whole brain radiation and chemotherapy. He developed a headache with emesis and was taken to the hospital after being confused and answering questions inappropriately. He was aphasic with left sided weakness and a left 4th cranial nerve palsy. Imaging revealed an extra-axial mass centered within the left temporal lobe, with a dural tail extending into the sylvian fissure. The patient was admitted for further evaluation and care. Over the course of the next 2 weeks, he became extremely weak and aphasic. Fortunately this condition usually spontaneously resolves and he made good progress after being transferred to inpatient rehabilitation services and he made good progress after being transferred to inpatient rehabilitation services.

The patient was readmitted to the hospital 1 month later due to worsening of his symptoms. He was found to have a right-sided hemiparesis with the right arm weighing 10 pounds, and the right leg weighing 7 pounds. He was unable to walk or even sit up. His speech was very slurred and he was unable to answer questions inappropriately. He was aphasic with left sided weakness and a left 4th cranial nerve palsy. Imaging revealed an extra-axial mass centered within the left temporal lobe, with a dural tail extending into the sylvian fissure. The patient was admitted for further evaluation and care. Over the course of the next 2 weeks, he became extremely weak and aphasic. Fortunately this condition usually spontaneously resolves and he made good progress after being transferred to inpatient rehabilitation services.

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Given the length of time between his radiation treatments (1983) and the development of SMART Syndrome (2019), the diagnosis could have been overlooked. This case highlights the importance of taking a good history as SMART Syndrome may not have been considered if his remote radiation exposure was unknown. Although uncommon, for patients with a known radiation exposure history who develop new neurologic deficits, SMART Syndrome should be considered after ruling out more serious pathology.

83NM LIGHT-EMITTING DIODE THERAPY REDUCES PERSISTENT INFLAMMATORY PAIN: ANALYSIS OF THE MECHANISM OF ACTION

Bruna L. Turnes, MSC, Bruna Hoffmann de Oliveira, MSC, Franciane Bobinski, PhD, Ralph F. Rosas, MSC, Lucinéa G. Danielski, MSC;

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A CASE OF A POSTERIOR FOSSA ATYPICAL TERATOID Rhabdoid Tumor in an Adult Female

Michael V. Lin, MD, Laura Prince, MD, Courtney Hogendorn, MD, and Benjamin T. Gillespie, DO
CASE DIAGNOSIS: Atypical teratoid rhabdoid tumor of the central nervous system.
CASE DESCRIPTION: A 39-year-old female was diagnosed with a fourth ventricular mass presenting with severe nystagmus and ataxia. Treatment included gross total microsurgical resection of the tumor with pathology revealing WHO grade IV atypical teratoid rhabdoid tumor (AT/RT). Rehabilitation course was complicated by poor appetite, which improved on dronabinol and mirtazapine; significant nausea/emesis, which responded to prochlorperazine; and symptomatic orthostatic hypotension that responded to fludrocortisone and midodrine. She made functional gains while in acute inpatient rehabilitation and was safely discharged home. Patient then underwent adjuvant craniospinal radiotherapy without significant clinical toxicity. Rehab medicine assisted with weaning patient off of appetite stimulants and BP supportive medications in preparation to begin multi-agent systemic chemotherapy.

DISCUSSIONS: At/RT of the central nervous system are rare and extremely aggressive tumors that primarily affect children younger than 3 years old, with very rare adult cases reported in the literature. Of adult cases reported, the most common tumor locations are sellar and hemispheric. Treatment in adults with AT/RT is typically extrapolated from protocols developed for pediatric patients. Given such limited cases reported in adults, overall prognosis and impact of resection and adjuvant therapy remains unclear.

CONCLUSIONS: At/RT is a rare, potentially devastating diagnosis which can produce an array of neurologic and functional deficits. These patients would benefit from early access to a multidisciplinary team including oncology, neurosurgery and rehabilitation medicine to assist with ongoing care.
with a benzodiazepine can result in dramatic improvements of the perceived neurologic deficits that ultimately translate to meaningful functional progress.

CONCLUSIONS: Catatonia is an uncommonly, and likely under-diagnosed sequela of traumatic brain injury that can easily be misdiagnosed as other common neurologic deficits, such as aphasia. Recognition of catatonia in a patient after traumatic brain injury and the use of a benzodiazepine both diagnostically and therapeutically is critical in allowing for the patients’ maximal functional recovery.

A CASE OF DIFFUSE LARGE B CELL LYMPHOMA LEADING TO INCREASED MORBIDITY
Adam Michulik, DO, and Ramzi A. El-Hassan, MD, MS

CASE DIAGNOSIS: Diffuse Large B Cell Lymphoma /Conus Medullaris Syndrome (DLBCL) has been previously demonstrated to affect the spinal cord through extradural (extradural and intradural) and rarely as intramedullary lesions (1). However, the evaluation of patients with spinal disorders can be complex and fraught with diagnostic pitfalls and astute clinical nous is necessary to identify lesions that masquerade as mechanical spine disease (2).

CASE DESCRIPTION: 63 year old female with no past medical history presented with progressive bilateral lower extremity weakness, urine incontinence, and saddle anesthesia. Pre-operative lumbar magnetic resonance imaging (MRI) demonstrated degenerative lumbar scoliosis, increased T2 signal in the conus medullaris with only mild central stenosis at L4-5. Patient was incorrectly presumed to have cauda equina syndrome and underwent L3-L5 laminectomy. Post-operative course complicated by continued neurological decline prompting transfer to an academic medical center for further evaluation. Initial exam was notable for diffuse weakness in bilateral lower extremities, impaired lumbar sacral sensation and partial surgical incision dehiscence. Repeat MRI of the lumbar spine demonstrated enlarging, heterogeneous T2 lesion involving the lower thoracic cord and conus medullaris and expected post-surgical changes. Given enlarging lesion in the conus, concern for malignancy prompted further diagnostic studies and confirmed metastatic DLBCL. Additionally, patient developed enterococcus surgical site infection requiring transfer to a higher level of care.

DISCUSSIONS: Unfortunately, the lack of accurate and timely diagnosis resulted in increased morbidity for this patient. Poor interpretation of advanced neuroimaging in conjunction with poor clinical judgment led to inaccurate diagnosis and unwarranted surgical treatment, respectively (3). This case demonstrates an unusual presentation of DLBCL.

CONCLUSIONS: It is important for interventional spine physicians to be aware of this clinical entity, diagnostic testing, and treatment in order to prevent increased morbidity.

A CASE OF ELDERLY HIP JOINT TRANSSECTION ACQUIRING PROSTHETIC GAIT FROM ACUTE STAGE
Saya Iwasa, MD, Yuki Uchiyama, MD, PhD, Yasunari Hashimoto, MD, Jun Aoyagi, MD, Toshiaki Yasukawa, MD, Kazuko Takahashi, MD, Noriko Kodama, MD, Toshiki Yasukawa, MD, Kazuhisa Domen, MD, PhD

CASE DIAGNOSIS: In 2010, a 78-year-old woman underwent extensive resection and chemotherapy for left thigh liposarcoma at our hospital. In October 2018, she had a patellar fracture due to tumor infiltration into the femur. Radical treatment was initiated, and hip disarticulation was planned. Rehabilitation treatment was initiated 5 days before the surgery.

CASE DESCRIPTION: Because the patient’s cognitive function was normal and the muscle strength of both the upper and right lower limbs were maintained, she was successfully able to adapt to the hip prosthesis. Three days after the operation, she started walking on parallel bars, and 19 days later, she started wearing the fixed walker. Her FIM score increased from 66 on the first day of hospitalization to 108 on the 30th postoperative day.

DISCUSSIONS: To our knowledge, this is the first case in which an elderly patient with hip disarticulation began using prosthesis during the acute phase after surgery. Compared with patients with other lower limb amputations, those with hip disarticulation need compensatory exercises using the pelvis to align the artificial leg and for special selection of knee/foot joints; therefore, patients often take time to be able to walk.

CONCLUSIONS: Even elderly people should consider the use of hip prosthesis. Like this case, it is thought that there are not a few cases that eventually lead to practical walking.

A CASE OF ISOLATED LEFT FOOT COBOID FRACTURE RESULTING IN LEFT FOOT CHRONIC REGIONAL PAIN SYNDROME TYPE II
Aaron Knueger, MD, and Lindsay Wilkinson, MD

CASE DIAGNOSIS: We present here the case of a 32 year old male who sustained an isolated left foot cuboid fracture at the age of 27 from a hyperextension injury. The patient had immediate pain and swelling at the top of his foot and was misdiagnosed with an ankle sprain for 3 months until his fracture was identified on x-ray. The patient subsequently developed Chronic Regional Pain Syndrome (CRPS) II approximately 2 years after the initial injury.

CASE DESCRIPTION: 32 year old male who sustained a left foot non displaced cuboid fracture misdiagnosed with an ankle sprain after an injury in the ocean where his foot was hyperextended under the sand. He was treated with con- servative measures for 3 months leading to improper bone healing, being allowed to bear weight through the foot, ultimately leading to chronic pain and swelling which developed into CRPS II with confirmed nerve damage 2 years later.

DISCUSSIONS: CRPS type II is hallmarked by chronic flares of swelling, erythema, and burning pain following a traumatic injury with confirmed nerve damage in the nerve distribution of the initial injury. The patient’s treatment included neuropathic pain medications, sympathetic blocks, and PT. The patient's CRPS II was managed best after the placement of a spinal cord stimulator, reducing his pain by 60%. He is currently managed on Gabapentin and Amitriptyline. His injury is chronic.

CONCLUSIONS: While CRPS type I and II are more commonly found in patients sustaining brachial plexus injuries, we describe here the case of a 32 year old male who developed CRPS II after sustaining a left foot isolated cuboid non displaced fracture misdiagnosed as an ankle sprain, resulting in the development of his chronic pain, erythema, and swelling. After multiple treatment modalities, he subsequently had a spinal cord stimulator placed which provided him with good pain relief.

A CASE OF TWO NON-CONTIGUOUS SPINAL CORD INJURIES (SCI): A REAL INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISCSCI) CASE WITH CLASSIFICATION CHALLENGES
Daniela A. Iliescu, MD, and Sam Coluchis, MD

CASE DIAGNOSIS: Cervical and thoracic traumatic SCIs from a bicycle accident.

CASE DESCRIPTION: A healthy 27 year old male was admitted after being struck by a motor vehicle while riding his bike. He suffered multiple injuries including: non-displaced C7 facet fracture, unstable fracture of the T6 vertebral body, central canal narrowing between T5-T6, right transverse process fractures from T2 through T7, along with TBI, anoxic brain injury and fractures of his right upper and left lower limb. After a complicated hospital course, he was transferred to ITACH, then admitted for inpatient rehabilitation, and then discharged.

On chart review, medical records were inconsistent with patient described with upper limb weakness, but labeled as a paraplegic. Upon admission to IPR, patient reported weakness in bilateral arms, inability to move bilateral lower extremities, neurogenic bladder and bowel, and neuropathic pain. An ASIA exam was completed and revealed two levels of SCI: an incomplete cervical SCI at C4 and a complete thoracic SCI at the level of T5.

DISCUSSIONS: The ISNCSCI were developed to provide clarity and consistency in defining the extent of a SCI. Despite revisions, SCI cases still arise that are very difficult to classify using the AIS. For this case, the patient appears to have an incomplete injury at C4 and concomitant complete injury at T5. The challenge is that the thoracic lesion prevents one from knowing the AIS for cervical lesion. Therefore, the current recommendation of the committee based on the consensus response from 2014 is to not document an ASIA impairment scale, but to clearly state what is seen on exam.

CONCLUSIONS: Although not uncommon, patients with two non-contiguous SCIs are problematic for the AIS classification. This case exemplifies that it is important to clearly document physical exam findings when a single AIS classification cannot be assigned. Clear documentation is important for consistency in communication between providers.

A CASE REPORT OF ACUTE SEVERE CUBITAL TUNNEL SYNDROME FOLLOWING PROLONGED CELL PHONE USE
Gary L. Hoover, DO, and Travis Cleland, DO

CASE DIAGNOSIS: Acute severe cubital tunnel syndrome.

CASE DESCRIPTION: A 44-year-old right-hand-dominant female presented with a two-day history of persistent right arm and ulnar-sided hand pain and paresthesia after using her cell phone for five consecutive hours with her elbows in pronation and elbow flexion. Physical examination at that time was significant for finger adductor weakness and abnormal sensation in the ulnar aspect of the right hand. One month later, electrodiagnostic studies demonstrated severe incomplete demyelinating and axonal ulnar neuropathy across the elbow without evidence of cervical
radiculopathy. At that time, the patient also had first dorsal interosseous atrophy. The patient was referred for surgical evaluation, however was lost to follow-up and did not have surgery.

**DISCUSSIONS**: Cubital tunnel syndrome is an ulnar neuropathy at the elbow that presents with hand paresthesia, weakness, and in severe cases, intrinsic hand muscle wasting. Cell phone use is almost ubiquitous in the modern world and has been implicated as a cause. However, no case reports of acute severe cubital tunnel syndrome following prolonged cell phone use exist. Prolonged elbow flexion posture has been shown to result in slowed nerve conduction velocity across the elbow. Although other musculoskeletal disorders have been associated with frequent cell phone use, an association with the elbow and cell phone use has not been established. Diagnosis of acute cubital tunnel syndrome is based on history and physical exam, electrodiagnostic studies, and imaging. Management depends on the severity of symptoms and ranges from activity modification to surgical intervention.

**CONCLUSIONS**: Cell phone use with prolonged elbow flexion should be considered as an etiology of acute cubital tunnel syndrome.

**A COMMON NERVE CONDUCTION STUDY PITFALL**: **PSEUDO-CONDUCTION BLOCK OF THE ULNAR NERVE**

Monica Barnes, DO, Drew Parkhurst, DO, and Michael Andary, MD

**OBJECTIVES**: To determine if differential hand positioning will artificially mimic ulnar nerve conduction block.

**DESIGN**: A prospective cohort study of 10 participants with a mean age of 30 years old underwent unilateral or bilateral nerve conduction studies (NCS) assessing the ulnar nerve (n=18). All patients were >18 years old. Exclusion criteria included paresthesias in ulnar nerve distribution, known nerve or muscle disease, diabetes, and disease of the thyroid or kidneys. Simultaneous two-channel recording was utilized to assess the motor response to the abductor digiti minimi (ADM) and first dorsal interosseous (FDI). Ulnar motor NCS were then performed in three positions: 1) with the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints in extension, 2) with the MCP joints in 90 degrees flexion, with PIP and DIP joints in extension, and 3) with the MCP, PIP, and DIP joints all maximally flexed to the subjects tolerance.

**RESULTS**: Eight out of 18 upper extremities (44.4%) demonstrated a greater than 20% difference in compound muscle action potential (CMAP) amplitude to ADM between the same stimulation sites with differential hand positioning. Six out of 18 upper extremities (33.3%) demonstrated a similar 20% CMAP amplitude decrements with upper-limb motor studies to FDI.

**CONCLUSIONS**: There are many common technical pitfalls when performing ulnar motor NCS. To date, much of the literature has been dedicated to discussing elbow positioning when assessing the ulnar nerve. The authors propose that hand and finger position also plays a critical role during ulnar motor NCS. Changes in hand positioning during ulnar motor NCS have the capability to mimic conduction block across the elbow or forearm, potentially leading to unnecessary surgery or antidelay targeted therapy.

**A CONSECUTIVE 25-WEEK PROGRAM OF GAIT TRAINING, INCLUDING 10 WEEKS OF TRAINING USING THE HYBRID ASSISTIVE LIMB (HAL®) ROBOT, AND ITS EFFECTS ON WALKING ABILITY OF A PATIENT WITH A CHRONIC THORACIC SPINAL CORD INJURY**

Hirotaka Matsuzaki, MD, PhD, Atsushi Kanazawa, RPT, Kenichi Yoshikawa, RPT, PhD, Kazunori Koseki, RPT, MS, and Ryoko Takeuchi, MD, PhD

**CASE DIAGNOSIS**: In this study, we examined the effect of a consecutive 5-week gait training program, using the Hybrid Assistive Limb (HAL) robot, on the walking ability of a 50-year-old man with a chronic thoracic spinal cord injury. Clinical features of this patient’s paraplegia were as follows: neurological level, T7; American Spinal Cord Injury Association Impairment Scale Score, C; Lower Extremity Motor Score, 10; Berg Balance Scale score, 15 points; Walking Index for Spinal Cord Injury, 6 points.

**CASE DESCRIPTION**: The patient completed a 100-m walk, under close supervision, using a walker and bilateral ankle-foot orthoses. The intervention included two phases: Phase A, conventional walking practice and physical therapy for 5 weeks, and Phase B, walking using the HAL robot (3 day/week, 30-min/session), combined with conventional physical therapy, and an unaffected hemispheres, but neither of them showed association with clinical motor scores. In contrast, we found smaller CMAP in the paretic than the non-paretic sides, the size of which was positively correlated with all motor scores of SIAS, FMA, and ARAT.

**A MAGNETOENCEPHALOGRAPHY STUDY OF INFORMATION PROCESSING DURING PICTURE NAMING TASK**

Yuer Jiang, Master, Feng Lin, Doctor, and Zhongli Jiang, Postdoctor

**CASE DIAGNOSIS**: Approximately one-third of stroke patients experience aphasia, which leads to difficulty in understanding or producing spoken and written language. On the one hand, picture naming can improve the naming and discourse ability of aphasia patients as a treatment. On the other hand, it can also effectively evaluate speech function as an assessment. Picture naming tests test the preset object better perceived with the spoken language task as well as the phoneme prompt compared with the task of retelling or reading. The study is aimed to explore the activation of brain regions during different naming tasks, which provide evidence for precious treatment.

**CASE DESCRIPTION**: Ten healthy right-handed adults were selected. The task is divided into two naming tasks consist of related and unrelated pictures. The brain structure of the individual was acquired by MRI, and the activation of the whole brain at different time windows was recorded by MEG (magnetoencephalography) during the picture naming task.

**DISCUSSIONS**: Comparing the activation of picture naming tasks over different time windows, the dominant brain region was located in the bilateral frontal lobe in naming of related pictures (P< 0.05) and the left temporal lobe in naming of unrelated pictures (P< 0.05). There was no significant difference in the semantic-related time window. The dominant brain region of unrelated pictures in the phonological-related time window was mainly located in the left temporal lobe (P< 0.05).

**CONCLUSIONS**: The information process of picture naming will show activation differences with the change of time or tasks. The specific activation was located in bilateral frontal lobe in the visual-related stage during related picture naming and in left temporal lobe in the phonological-related stage during unrelated picture naming. It is suggested that the early stage may be related to category judgment, while the middle and late stage correspond to speech coding and self-monitoring process.

**A PERIPHERAL NEUROPHYSIOLOGICAL INDEX IS ASSOCIATED WITH UPPER-LIMB MOTOR IMPAIRMENT AND FUNCTION IN SUBACUTE STROKE PATIENTS**

Shintaro Uehara, PT, PhD, Tetsuhiro Watari, PT, Seichiro Koyama, PT, PhD, Shin Itamura, OT, Yota Obayashi, OT, PhD, Kazuki Ito, OT, Hitaru Kondo, PT, Eiichi Saitoh, MD, PhD, and Yohi Otake, MD, PhD

**CASE DIAGNOSIS**: Neurophysiological plasticity is thought to constitute a key element for motor recovery in post-stroke patients. Transcranial magnetic stimulation (TMS) has been used as a valid tool to non-invasively evaluate neuropsychological states in certain neural tracts/circuits, likely representing consequences of post-stroke plastic changes. It remains unclear, however, whether and which neurophysiological indices are associated with the current hemiparetic motor impairment and function.

**CASE DESCRIPTION**: Here we performed neurophysiological assessments using TMS and cross-sectionally investigated their relations with hemiparetic upper-limb motor function in stroke (n = 22) in the subacute stage where improvement of SIAS, FMA, and ARAT.

**DISCUSSIONS**: In a subgroup of patients who showed MEPs from the affected hemisphere (n = 10), we found a tendency to decrease in SICI and CBI in the affected hemisphere compared with the contralesional hemispheres, but neither of them showed association with clinical motor scores. In contrast, we found smaller CMAP in the parietal than the non-paretic sides, the size of which was positively correlated with all motor scores of SIAS, FMA, and ARAT.
CONCLUSIONS: These findings suggest that, despite specific neurophysiological states in the affected hemisphere such as less activity in certain inhibitory tracts/circuits, the more peripheral index, potentially reflecting use-dependent peripheral neuromuscular changes as well as central neural reorganization, may attract circuits, the more peripheral index, potentially reflecting use-dependent logical states in the affected hemisphere such as less activity in certain inhibitory residual right lower extremity weakness at the time of discharge.

Therapy. She received a right ankle-foot orthosis and made gains in therapy but had positive and the patient was initiated on a one-week course of valacyclovir. She varicella lesions along her right L3-L4 dermatomes. Varicella Zoster Virus PCR was department. After being admitted to acute care, she had eruption of erythematous vesicular lesions along her right L3-L4 dermatomes. Varicella Zoster Virus PCR was positive and the patient was initiated on a one-week course of valacyclovir. She was admitted to acute inpatient rehabilitation for intensive physical and occupational therapy. She received a right ankle-foot orthosis and made gains in therapy but had residual right lower extremity weakness at the time of discharge.

Discussions: Acute herpes zoster is a benign infection usually affecting the sensory part of the nervous system with a painful vesicular eruption. Most common complication of acute herpes zoster infection is post-herpetic neuralgia. There is no documented incidence of segmental limb paresis although, it is extremely rare given only a few documented case reports in the literature.

Conclusions: Segmental zoster paresis is a very rare complication of herpes zoster infection and should be considered in a differential diagnosis of individual limb pain and weakness, with or without a rash, especially in an immunocompromised patient.

A RARE CASE OF LIMB PARESIS FROM THE VARICELLA ZOSTER VIRUS

Kelly M. Brander, DO, and Christopher Reger, MD

Case Diagnosis: Limb paresis secondary to varicella zoster virus.

Case description: The patient is an 89-year-old female with a history of myasthenia gravis on chronic steroids who was in her usual state of health until she fell at home. She presented to the emergency department, imaging was negative for fractures, and was discharged home with pain control. After returning home, she developed worsening weakness and right knee and hip pain. She had difficulty using her walker and was bed bound for several days prior to returning to the emergency department. After being admitted to acute care, she had eruption on erythematous vesicular lesions along her right L3-L4 dermatomes. Varicella Zoster Virus PCR was positive and the patient was initiated on a one-week course of valacyclovir. She was admitted to acute inpatient rehabilitation for intensive physical and occupational therapy. She received a right ankle-foot orthosis and made gains in therapy but had residual right lower extremity weakness at the time of discharge.

Discussions: Acute herpes zoster is a benign infection usually affecting the sensory part of the nervous system with a painful vesicular eruption. Most common complication of acute herpes zoster infection is post-herpetic neuralgia. There is no documented incidence of segmental limb paresis although, it is extremely rare given only a few documented case reports in the literature.

Conclusions: Segmental zoster paresis is a very rare complication of herpes zoster infection and should be considered in a differential diagnosis of individual limb pain and weakness, with or without a rash, especially in an immunocompromised patient.

A RARE CASE OF LUMBOSACRAL PLEXOPATHY SECONDARY TO A PELVIC HEMATOMA: A CASE REPORT

Naveen Khokhar, DO, and Hannah Florida, MD

Case Diagnosis: Lumbosacral plexopathy secondary to a pelvic hematoma.

Case Description: A 76 year old female with a history of thrombocytosis presented to her Hematology clinic for a bone marrow biopsy. Post biopsy, the patient developed a right lower extremity weakness, dysesthesia, paresthesia, and edema. She was found to have a right pelvic hematoma on CT Abdomen and Pelvis. Of note, biopsy was consistent with Essential Thrombocytosis with JAK2 mutation positive. On exam the patient was noted to have 2/5 R hip flexion and knee extension and 0/5 ankle dorsiflexion and plantar flexion on manual muscle testing. Additionally, she had diminished sensation and pain in the L5-S2 dermatomal distribution. The differential diagnosis included lumbosacral plexopathy, and the patient required an ankle foot orthotic for ambulation. Electromyography confirmed lumbosacral plexopathy affecting the sciatic and superior gluteal nerves.

Discussions: Lumbosacral plexopathy has a wide array of etiologies that can result in lower extremity weakness and foot drop with hematoma as a possible cause. Essential Thrombocytosis is a rare disorder in which the body produces too many platelets with an unknown etiology. This can lead to abnormal clotting cause. Essential Thrombocythemia is a rare disorder in which the body produces too many platelets with an unknown etiology. This can lead to abnormal clotting

Conclusions: Segmental zoster paresis is a very rare complication of herpes zoster infection and should be considered in a differential diagnosis of individual limb pain and weakness, with or without a rash, especially in an immunocompromised patient.

A RARE CASE OF INCOMPLETE TETRAPLEGIA RESULTING FROM A HAEMATOMA IN THE CERVICAL SPINAL CORD

Mollie Andreac, MD, Veronica Chehata, MD, and Michael A. Kryger, MD, MS

Case Diagnosis: Solitary Fibrous Tumor (SFT) of the Cervical Spinal Cord Resulting in Incomplete Tetraplegia.

Case Description: A 37 year old right-handed, previously independent female presented with ambulatory decline, left-sided weakness and neuropathic pain. Electrodiagnostic studies showed no evidence of peripheral neuropathy. Rheumatologic workup was negative. Symptoms progressed for two years despite conservative management. Cervical spine MRI revealed a 2.6 cm enhancing cystic lesion at C4-C5. She underwent tumor resection and C3-C6 laminectomy. Pathology confirmed an extramedullary SFT. Post-operatively, her deficits included right sided hemiparesis and loss of proprioception in bilateral lower extremities. On admission to acute inpatient rehabilitation, she was found to have C2 AIS D tetraplegia requiring maximal assistance with ambulation, transfers, and ADL’s. Her main functional barriers included sensory and proprioceptive deficits and spasticity. On discharge, she ambulated long distances with bilateral ankle foot orthoses and performed transfers with supervision. She achieved modified independence for most ADL’s.

Discussions: SFTs are rare, slow-growing, mostly benign, mesenchymal tumors that are uncommonly found in the spinal cord. A recent literature review revealed 81 reported cases of spinal SFTs, 28 of which were located in the cervical region. Presentation usually includes pain, weakness, hyperreflexia, and bowel or bladder dysfunction. Treatment consists of surgical resection. In general, patients with spinal cord tumors who undergo inpatient rehabilitation have been shown to make functional improvements comparable to their counterparts with traumatic spinal cord injury.

Conclusions: We present a rare case of a cervical spinal cord extramedullary SFT, to provide a greater understanding of this unique presentation, as well as the functional deficits and rehabilitation outcomes associated with cervical spinal cord tumors. Early recognition of the signs and symptoms of spinal cord tumors is critical for initiation of treatment, followed by inpatient rehabilitation on a dedicated spinal cord injury unit, allowing for the best possible functional outcomes.

A RARE CASE OF LUMBOSACRAL ARTERIOVENOUS SHUNT AND NEGATIVE INITIAL ANGIOGRAM

Makinja C. Oestreicht, BA, James Dvorak, MD, MBA, Wayne Hisao, MD, and Parisa Salehi, MD

Case Diagnosis: Lumbar extradural arterio-venous fistula.

Case Description: A 73-year-old male with degenerative disk disease presented with progressive bilateral lower extremity weakness, paresthesia, and urinary retention. Over three months, he developed numbness and weakness in his legs after using an inversion table for chronic low back pain. Spinal MRI demonstrated an area of flow void residual at T7-8 concerning for thoracic AVM, however spinal angiogram was negative. He also had an elongated hypertensive signal through the cord suspicious for edema. An extensive inflammatory work-up for myelopathy was negative. Repeat angiogram to lower level revealed an extradural arterio-venous fistula (eAVF) near the conus. The internal iliac lateral sacral artery supplied the eAVF with venous drainage through L5 radicular branch. Endovascular embolization improved the patient’s functional status.

Discussions: Spinal eAVFs are an exceedingly rare type of spinal arteriovenous (AV) shunt. Typically, eAVFs are supplied by radicular branches and drain into the epidural venous plexus. A less common route of drainage occurs intradurally, as was evident in our patient. Morbidity from eAVF results from mass effect or venous hypertension. Possibly, the inversion table exacerbated venous hypertension surrounding our patients eAVF. Progressive myelopathy is the most frequently described neurological symptomatology for eAVFs. Intradural drainage of eAVFs is associated with worse bladder function compared with extradural. The initial angiogram of our patient failed to reveal his AV shunt since blood was supplied via the internal iliac artery. Though rare, pelvic arterial supply of eAVFs has been described and standard angiograms may miss this variation. eAVFs are a cause of significant patient morbidity, however are amenable to endovascular embolization and have high obliteration rates.

Conclusions: Spinal eAVFs can be supplied pelvic arteries and caution should be taken when interpreting angiograms without visualization of the pelvic vasculature. The early identification of spinal AV shunts is vital to decreasing patient morbidity.

A RARE CASE: REVERSIBLE ACUTE AXONAL POLYNEUROPATHY IN THE SETTING OF RECENT HEAVY ALCOHOL USE AND WERNICKE-KORSAKOFF SYNDROME

Dayana Yorks, DO, Anem Ankohli, MD, MBBS, and Nida Gvevckas-Martens, DO, MS

Case Diagnosis: Acute alcohol-related axonal polyneuropathy.

Case Description: A 28-year-old female with history of anxiety and alcohol use disorder (1-3 drinks daily for three years) was admitted to the intensive care unit with delusions and hallucinations in alcohol withdrawal. Brain imaging was consistent with Wernicke-Korsakoff syndrome, and she was treated with intravenous thiamine. History revealed recent heavy drinking. She complained of bilateral toe
tingling for five months, which worsened to painful burning two days into her hospitalization. Exam was notable for diminished pinprick sensation in a stocking distribution, intact strength, intact light touch/vibratory sensation, and 1+ reflexes. After extensive work up, she was diagnosed with alcoholic neuropathy. Her symptoms resolved completely one month later with abstinence from alcohol and thiamine repletion. Electrodiagnostic testing performed 1.5 months later revealed normal bilateral lower extremity sensory nerve action potentials, decreased bilateral peroneal motor amplitudes, left dorsal interossei acute denervation, and left tibialis anterior subacute denervation consistent with acute/subacute polyneuropathy.

**DISCUSSIONS:** Chronic alcohol consumption is a well-known cause of insidious peripheral neuropathy, which may result in poor vascular response to positional changes. This patient was on multiple antihypertensives due to his uncontrolled hypertension previously but developed severe prolonged distal onset latency and severely reduced amplitudes, consistent with axonal injury. Our patient represents a rare case of acute axonal polyneuropathy in the setting of recent heavy alcohol use confirmed with electrodiagnostic testing likely due to alcohol toxicity and Wernicke-Korsakoff syndrome. The prognosis for acute alcohol-related neuropathy is not well-established, but may be good. Our patient’s symptoms completely resolved with abstinence from alcohol and thiamine repletion.

**CONCLUSIONS:** Peripheral neuropathy is a common indication for electrodiagnostic testing. While chronic alcohol use is an established cause of peripheral neuropathy, physiatrists should include acute heavy alcohol use and Wernicke-Korsakoff syndrome in the differential diagnosis for patients who present with painful, symmetric, length-dependent symptoms. Electrodiagnostic testing will likely show an acute axonal length-dependent polyneuropathy. Given the potential for good recovery, it is important to encourage cessation of drinking and thiamine correction in these patients.

**A REHAB DILEMMA IN AN AGING POPULATION: AN EXTREME INCIDENT OF SUPINE HYPERTENSION WITH ORTHOSTATIC HYPOTENSION: A CASE REPORT**

Naveen Khokhar, DO, and Alexandria Dinu, MD

**CASE DIAGNOSIS:** Supine Hypertension and Orthostatic Hypotension.

**CASE DESCRIPTION:** An 80-year-old male with a history of subdural hematomas (SDH) presented with agitation and imaging noted an enlarging old SDH with mass effect requiring emergent burr hole placement. Hospital course was complicated by labile blood pressures requiring as needed (prn) clonidine and midodrine for blood pressure control. During rehab course, the patient had significant supine hypertension and orthostatic hypotension. This limited therapies as his baseline blood pressures were elevated, and he intermittently had near syncopal episodes with positional changes. To overcome this, moderately elevated blood pressures were permitted, and prn antihypertensives were given only when systolic blood pressure was greater than 180 mmHg. Fluid status was optimized to improve orthostasis and midodrine’s use was decreased. Abdominal binders and compression stockings were used. Therapies utilized temperature contrasting baths, tilt table, and aquatic therapy to train appropriate autonomic and vasogenic responses.

**DISCUSSIONS:** Supine hypertension with orthostatic hypotension is a condition affecting the aging population. Chronic hypertension and autonomic failure may result in poor vascular response to positional changes. This patient was on multiple antihypertensives due to his uncontrolled hypertension previously but developed syncopal episodes leading to falls and SDH. Carotid atherosclerosis also plays a role in syncopal episodes during orthostasis due to poor neuro-perfusion.

**CONCLUSIONS:** It may be necessary to adjust goal blood pressure ranges in an aging population with supine hypertension and orthostatic hypotension. Therapeutic modalities to train the autonomic system and vascular responses may benefit improving patient symptoms and reducing falls secondary to syncope.

**A REHABILITATION PHYSICIAN’S ROLE IN THE MANAGEMENT OF A CRITICALLY ILL PATIENT IN THE INTENSIVE CARE UNIT: A CASE REPORT**

Varun Y. Goswami, MD, Naveen Khokhar, DO, and Sudeep K. Mehta, MD

**CASE DIAGNOSIS:** Acute Hypoxic Respiratory Failure secondary to Cervical Spinal Cord Injury.

**CASE DESCRIPTION:** Patient with a 6-month history of progressive weakness and neurogenic claudication was admitted to an intensive care unit (ICU) due to central cord syndrome and cervical myelopathy, with bilateral upper extremity strength of 1/5 and bilateral lower extremity strength of 4/5 on manual muscle testing. Cervical spine magnetic resonance imaging (MRI) demonstrated posterior disc osteophytes complexes at C3-C4 with severe liguimen flavum hypertrophy, degenerative facet joints and cord compression. The patient underwent C3-C4 anterior cervical discectomy allograft/autograft placement. Post-operatively he developed acute hypoxic respiratory failure requiring ventilation. Physiatry was consulted to perform electrodiagnostic studies (EDXs). EDXs confirmed evidence of moderate bilateral phrenic mononeuropathy. Nerve conduction studies of the bilateral phrenic nerves revealed severely prolonged distal onset latency and severely reduced amplitudes, consistent with axonal injury.

**DISCUSSIONS:** Cervical spinal cord injuries have the propensity to lead to respiratory compromise secondary to thoracic column degeneration, leading to accessory muscle weakness. Phrenic nerve involvement seen in higher cervical cord injuries can also lead to respiratory compromise due to denervation of the diaphragm. EDXs may be used to evaluate the function of the phrenic nerve in patients that are ventilator dependent in the intensive care unit. Findings of axonotmesis in this case demonstrates an intact epineurium indicating the opportunity for neuronal regeneration. This information helps prognosticate the possibility of weaning from ventilator support in the near future.

**CONCLUSIONS:** Our physiatry team was consulted to perform a procedure on a critically ill patient in the ICU to help provide prognosis for respiratory failure. EDXs are helpful in diagnosing the severity of phrenic nerve injury. This delineates the degree of injury and helps to determine prognosis such as ventilator dependence or candidacy for diaphragmatic pacer in critically ill spinal cord injury patients.

**A RETROSPECTIVE STUDY ON INPATIENT REHABILITATION OUTCOMES OF BRAIN TUMOR PATIENTS IN SINGAPORE**

Zhi-Yan Valerie Ng, MBBS, MRCP (UK), Poo Lee Ong, MRCP (UK), MMED(INT MED), Chien Joo Lim, MSC, and Karen Chua Sui Geok, MBBS, MRCP, (UK), FAMS, FRCP (EDIN)

**OBJECTIVES:** To determine the characteristics that affect inpatient rehabilitation outcomes in Asian brain tumor patients.

**DESIGN:** A retrospective review of electronic medical records from a single brain injury rehabilitation unit was conducted over 5 years. Inclusion criteria included >18 years of age with confirmed first-ever brain tumors on CT/MRI. Exclusion criteria included incomplete data records. The brain tumors were subdivided into tumor types, benign or malignant tumors and locality. Main outcome measures were admission and discharge Functional Independence Measure (FIM), discharge disposition and days in rehabilitation.

**RESULTS:** In all, 57 out of 244 screened records met eligibility criteria. 82.5% (47) were benign and 17.5% (10) were malignant tumors including 3.5% (2) malignant meningiomas and 14% (8) Glioblastomas. The mean age of the population studied was 56 years, 40.4% (23) male, 59.6% (34) female and 73.7% (42) were Chinese. There was a significant difference between mean total admission FIM (71.88, SD 27.31, P=0.001) and the mean total discharge FIM (94.67, SD 27.61, P=0.001). The mean total FIM gain was 22.79 (SD 16.14, 95% CI 18.50-27.07, P=0.000). The mean days in rehabilitation was 32.26 days (SD 26.54) and 96.5% (55) patients were discharged home. Using multivariate regression analyses, it was found that malignant and benign brain tumors (P=0.007, Beta -0.199 ), Rehabilitation length of stay (LOS) (P=0.050, Beta 0.858) and total admission FIM (P=0.000, Beta 0.156), were significant predictors of the total discharge FIM (R Square 0.739).

**CONCLUSIONS:** This study demonstrated that brain tumor patients, including high-grade malignancies significantly benefited from inpatient rehabilitation with the majority achieving functional independence and returning home. The presence of malignant brain tumors, longer rehabilitation LOS and lower total admission FIM significantly predicted a poorer total discharge FIM.

**A SECOND-GENERATION 3D PRINTED MYOELECTRIC HAND FOR IMPROVED FUNCTIONAL ABILITY IN A DEVELOPING WORLD SETTING**

Michael Hagen, MD/MA, Richa Sheth, MS3, Vinay Vanodia, MD, Zachary G. Eichenberger, N/A, Nitesh K. Byrappa, MD, Glenn Hutnick, CPO, FAAOP, Stephanie Rand, DO, and Matthew N. Bartels, MD

**OBJECTIVES:** Transradial amputation of right hand.

**DESIGN:** The patient suffered a traumatic right long transradial amputation from machete attack in 1994. Despite preserved flexor and extensor muscles and good muscle control, the patient did not have a prosthesis. We provided the patient a malleable, open-source 3D printed (3D) body-powered hand modified for myoelectric control using a custom designed circuit and control program which converted surface electromyographic input signals to flex or extend the digits. We redesigned the hand based upon his feedback. Redesign elements included: 1. A more realistic appearance; 2. Shortened overall arm length to accommodate his long-transradial amputation; 3. A rechargeable miniature power supply, instead of 4. A nine-volt battery, which provides him increased access to power; 4. Decreased number of motors; 5. Providing a protective case for increased water resistance from simple spills. The end product has increased water resistance and a more realistic appearance at a lower production cost.
RESULTS: Current barriers to myoelectric prostheses in developing countries are cost and accessibility. Readily available open-source 3D printed prostheses can be myoelectrically controlled or body-powered, engaging either wrist flexion or elbow flexion to close the terminal device. While such devices are not expected to have the same cosmetic functionality, and longevity as traditional prostheses, our new generation open-source hand demonstrates that these open source devices made with readily available components on consumer grade printers are becoming more competitive for patients in economically constrained environments with limited resources or access to insurance coverage.

CONCLUSIONS: Modified open-source 3D printed myoelectric prosthetics can offer patients many of the benefits of a traditional prosthesis at a lower price.

A SEEMINGLY INNOCUOUS SYMPTOM, THE PRIMARY SIGN OF A PULMONARY EMBOLISM IN AN ACUTE INPATIENT REHABILITATION FACILITY
Kishan A. Sitapara, MD, Andrew Bloomfield, MD, MPHIL, BSC, and Benjamin Seidel, DO
CASE DIAGNOSIS: 74 year old female admitted to an acute inpatient rehabilitation facility (IRF) after a right M1 MCA stroke found to have a subsegmental pulmonary embolism (PE).

CASE DESCRIPTION: Patient was admitted to a stand-alone rehabilitation facility where she tolerated therapy well for one week. At that time patient was noted to have hiccups for 1 day and a slight decrease in her oxygen saturations from 98% to 95%. Patient otherwise was at her baseline and despite a prior negative lower extremity DVT study, a CT angiogram of the chest was done which showed a subsegmental PE. Patient was subsequently started on therapeutic anticoagulation.

DISCUSSIONS: In most acute IRFs, especially free standing ones, rehabilitation physicians are responsible for monitoring patient’s medical conditions. This often means identifying preliminary signs of post stroke complications such as falls, urinary tract infections, deep vein thrombosis, and pulmonary embolisms. A 2014 study showed nearly 1% of patients with acute ischemic strokes suffered from a PE as compared to an annual incidence rate of 0.50 to 0.69 per 1000 persons. This shows that patients in IRF after ischemic strokes are at a higher risk of developing a PE. Physiatrists thus need to be aware of atypical presentations of such a devastating complication. This was an interesting case because the patient did not present as a classic PE, her most concerning symptom was a new onset of hiccups.

CONCLUSIONS: One article has been published highlighting 3 cases of PEs presenting as hiccups, as was the case with this patient. This is extremely important because physiatrists often treat patients with a much higher risk of developing PEs. Furthermore, often rehabilitation facilities are free standing units without access to the ICU which makes detecting PEs early critical. This case highlights one atypical presentation of a PE that physicians need to be cognizant of.

A SEVERE CASE OF CRITICAL ILLNESS POLYNEUROPATHY IN A YOUNG WOMAN FOLLOWING CARDIAC ARREST
Aaron M. Greenberg, DO, Daniel P. Spunberg, MD, and Karen Pechman, MD
CASE DIAGNOSIS: Critical Illness Polyneuropathy.

CASE DESCRIPTION: A 29-year-old female with diabetes, morbid obesity, and hypothyroidism was initially found unresponsive at home, achieving ROSC after 3 minutes of CPR. She was subsequently intubated and admitted to a local ICU for management of severe DKA and cardiac arrest. While at acute care, she developed sepsis secondary to a central line infection. The hospital stay was further complicated by development of a popliteal DVT and the patient was started on a Heparin infusion. She was subsequently intubated and admitted to a local ICU which makes detecting PEs early critical. The patient was eventually diagnosed with SIRS and 50% of patients who have required an ICU stay no longer follows closely with the surgeon after being cleared. As in this case, a thoracic CT scan was performed and a PTA was performed which showed a subsegmental PE. The patient was subsequently started on therapeutic anticoagulation.

CONCLUSIONS: This case describes a medically complex patient who underwent an extended ICU/acute care course leading to significant functional decline and the diagnosis of CIP. The distinct complications over the progression of this case support the eventual findings, and emphasize the important role physiatrists play in overseeing the rehabilitation process and determining this diagnosis.
CASE DIAGNOSIS: Non-traumatic Spinal Cord Injury Secondary to an Arte-
riovenous Malformation (AVM).

CASE DESCRIPTION: A 26-year-old transgender male presented with bilat-
eral lower extremity weakness and hypoesthesia. MRI confirmed spinal cord steno-
sis and cord compression at T3-T6 secondary to a T4 AVM (Schobering stage III). The patient previously received weekly testosterone injections (200mg) to induce gender affirmation, and likely contributed to the AVM development. He underwent successful vascular embolization, epidural hematoma evacuation, and T3-T6 laminectomy and fusion. His inpatient rehabilitation course was complicated by re-
gression in strength and sensation throughout the lower extremities. A CT myelogram demonstrated severe narrowing at the T4 level secondary to hematoma recurrence. Patient underwent urgent T3-T6 decompression and hematoma evacuation. He resumed inpatient rehabilitation with improved lower extremity strength and sensation. In addition to common spinal cord injury impairments (pain, spasticity, neurogenic bowel and bladder), special attention was devoted to the patient’s gender identity and the discontinuation of his hormone treatments. A multidisciplinary ap-
proach involving psychiatry and psychology was utilized.

CONCLUSIONS: Over one year, the incidence of spinal AVMs in the USA is near 300. It has been reported that both males and females experience a two-fold risk of AVMs during adolescence, correlating with increased levels of sex hormones in circulation. While our patient was not an adolescent, he had been receiving regular exogenous hormone therapies. Additionally, Schobering Stage III AVMs exhibit in-
creased expression of endothelial progenitor cells and growth factors that promote vascularization. This corresponds with increased rate of recurrence and hemorrhage.

A STUDY OF BRAIN’S COMPENSATION IN ANOMIC APHASIA PATIENTS AT THE ACUTE STAGE POST STROKE BASED ON PICTURE NAMING TASK FUNCTIONAL MAGNETIC RESONANCE IMAGING

YuMei Zhang, and Na Ye, MD

OBJECTIVES: We tried to find the brain regions with functional impairment and compensation of anomic aphasia at the acute stage post stroke (AAAPS) based on picture naming (PN) task-state functional magnetic resonance imaging (task-
FMRI), and hope to provide evidence for new rehabilitation methods, such as re-
peated transcranial magnetic stimulation, etc.

DESIGN: Collected AAAPS cases from November 2016 to November 2018 as AAAPS group and collected Healthy volunteers as normal control (NC) group. All subjects were scanned by magnetic resonance imaging (MRI) system for T1 weighted phase and T2 weighted fluid attenuated inversion recovery imaging, and also scanned during PN-task, and then we compared the differences of activation of the brain regions during PN between the AAAPS and NC group.

RESULTS: We recruited twenty -four NC group and twenty AAAPS patients. The brain regions activated of NC group mainly include bilateral occipital lobe, bi-
lateral frontal lobe (mostly left), left frontal medialus, bilateral precentral (mostly left), bilateral superior parietal (mostly left), bilateral supplementary motor area and left hippocampus, otherwise, the brain areas activated in AAAPS patients were mainly in the bilateral occipital lobe, as well as the left thalamus and the right angular gyrus. Controlling the influence of age, sex and educational level factors, using the general linear model method to compare the brain activation differences, we found that there was no significant reduction of AAAPS compared with NC, while AAAPS patients had a higher activation than the NC group in the right hemisphere.

CONCLUSIONS: Compared with the NC group, there was no brain area where the activation level was significantly reduced in AAAPS patients, while the higher brain area was mostly in the right hemisphere of the brain.

A STUDY ON LONG TERM FUNCTIONAL OUTCOME AND DISABILITY IN PATIENTS FOLLOWING STROKE ATTENDING TO NEUROLOGY CLINIC AT A TERTIARY CARE HOSPITAL

Sachithra H. Adhiikri, MD,MRCP, and Dinusha W. Dharmaratna, MBBS

OBJECTIVES: To assess functioning and disability in patients following stroke at follow-up visit at 3 months after a stroke. To compare the impact of rehabilitation on long term functioning of the individual.

DESIGN: Descriptive cross sectional study on 104 patients with one to 5 years post stroke, attending to the outpatient neurology department in a tertiary care hospital were recruited. Functioning level was assessed using Brief International Classification of Functioning, Disability and Health questionnaire with qualifiers, in categories of body structure and function, activity and participation. Overall dis-
ability was assessed using mRS. Two sample t test was used to compare the disability before and after rehabilitation.

RESULTS: Out of the patients who attended the clinic 76% had received reha-
bilitation. The average mRS on admission was 4 and following rehabilitation mRS was 2 which was statistically significant(< 0.05). The average mRS in non-
rehabilitated group was 4 on discharge and was 3 at the time of interview, which was statistically insignificant. 45% had partial function of stroke while 15% had complete function in affected side, 10% had mild continuing impairment, 35% had mild impairment in muscle power and muscle tone. 25% had mild impair-
ment in gait. Activities of daily living were mildly affected in 16% while severely af-
fected in 3%. 30% of people had mild difficulty in using transportation while 12% had severe difficulty. Community participation was impaired in 20% of patients and 5% did not engage in any social activity.

CONCLUSIONS: Majority of patients attending to the clinic had only mild im-
pairment in long term functioning, with statistically significant improvement in pa-
tient who received rehabilitation.

A UNIQUE CASE OF ALIEN HAND SYNDROME POST STROKE

Morgan Moore, MD CANDIDATE, and Kelly Crawford, MD

CASE DIAGNOSIS: Alien Hand Syndrome (AHS)

CASE DESCRIPTION: A 65 year old right handed male presented to the Emer-
gency Room with right lower extremity weakness and aphasia. Magnetic Resonance Imaging revealed diffuse infarcts, including the left corpus callosum, left medial frontal lobe, and left posterior circulation. Upon admission to inpatient rehabilitation, he stated his right arm had “a mind of its own” and involuntarily “took over” when trying to per-
form activities with his left hand. On exam, he had a right grasp reflex and his right hand performed the activities his left hand was instructed to perform.

DISCUSSIONS: Alien Hand Syndrome (AHS) is a rare neurological syndrome of involuntary limb movement, often described as feeling the limb does not belong to the subject or it has “a will of its own.” There are various etiologies of AHS, in-
cluding neurosurgery, trauma, tumor, and stroke. AHS is used to describe a wide spectrum of motor and sensory deficits that are broken down into three variants: 1. Frontal, 2. Callosal, and 3. Posterior. This patient had the frontal form, usually affect-
ing the dominant hand and characterized by impulsive groping, compulsive manipu-
lation of objects, and difficulty releasing objects. While AHS can improve or complete resolve weeks to months following a stroke, sometimes there is never an improvement. This patient reported 5 months post stroke his right arm continued to involuntarily reach out and pull or push objects.

CONCLUSIONS: While this patient had infarcts throughout his brain that could cause all variants of AHS, his syndrome fit the frontal variant. Physicians should be suspicious of post stroke AHS if a patient has brain lesions within the cor-
pus callosum, parietal region, or frontal region, and is manifesting associated symp-
toms. AHS post stroke is rare and can be distressing to patients, making appropriate diagnosis and education important.

A UNIQUE PRESENTATION OF ISOLATED PERSISTENT TROCHEAL NERVE PALSY FOLLOWING A MIDBRAIN STROKE AFTER CARDIAC CATHETERIZATION: A CASE REPORT

Summer C. Nestorowicz, BS, Leslie Bagay, MD, and Sara Cucurullo, MD

CASE DIAGNOSIS: Patient is a 70 year old female who presented with sudden double vision following cardiac catheterization, consistent with a left fourth nerve palsy due to a right midbrain stroke.

CASE DESCRIPTION: The patient presented for cardiac catheterization and was found with mild non-obstructive coronary artery disease. Immediately post-
procedure, after turning her head to the side, she developed sudden diplopia. CT head was negative for intracranial hemorrhage, she received ICP. MRI of the brain showed a small recent infarct involving the right periaqueductal midbrain. After discharge, she had persisting blurry vision at primary gaze and double vision when looking down and to the right. Her exam showed a mild left eye hypertropia worse with right gaze and tilting the head left, and adductive depression was limited. While strength and sensation were intact, she had persisting visual difficulties which affected her balance. She was fit with prism to assist her primary gaze vision, and participated in outpatient physical/occupational therapies to address balance impairments and visual deficits.

HISTORY OF PRESENT ILLNESS: Isolated persistent trochlear nerve palsy. The trochlear nerve nucleus originates within the midbrain (inferior colliculus) and the nerves then travel surrounded by the periaqueductal grey matter. Many trochlear nerve palsies re-
solve completely, however some become chronic and are a challenge to treat. Prisn
therapies can assist with primary gaze vision, but does not address muscle weakness. Combining prism therapy with positional therapies allows the patient to strengthen their extracocular muscles and improve function by incorporating visual exercises into daily tasks, gait and balance training.

CONCLUSIONS: While many trochlear nerve palsies resolve, some patients have persisting symptoms which can be treated with multiple modalities including prism therapy and positional therapies. Although more recent literature has addressed if exploring other therapies may be effective in treating chronic trochlear nerve palsy, more research is needed.

A UNIQUE PRESENTATION OF SPASTIC PARAPLEGIA FOLLOWING NON-PARANEOPLASTIC ANTI-N-METHYL-D-ASPARTATE RECEPTOR ENCEPHALITIS: A CASE REPORT

Mina K. Shenouda, MD, Brian D. Greenwald, MD, and Sara Cuccurullo, MD

CASE Diagnosis: Patient is a 28-year-old previously healthy, independent woman who developed spastic paraplegia following nonparaneoplastic anti-N-methyl-D-aspartate (NMDA) receptor encephalitis.

CASE Description: Patient initially presented to an acute care hospital with seizures and confusion. Magnetic resonance imaging of the brain showed parasagittal frontal cortical edema with associated mild cortical and sulcal enhancement, concerning for cerebritis versus vasculitis. Patient developed acute respiratory failure and underwent tracheostomy and percutaneous endoscopic gastrostomy tube placement. Cerebral Spinal fluid was positive for anti-NMDA receptor antibodies. Positron emission tomography showed no teratoma or evidence of malignancy. Patient received broad spectrum antibiotics, intravenous immunoglobulin therapy, nimbex infusion, high dose steroids, plasmapheresis, and rituximab. Patient was transferred to acute rehabilitation where she was decannulated and progressed to a regular diet. She progressed functionally and cognitively; however, suffered from persistent spasticity in bilateral hip and knee flexion and ankle plantar-flexion, requiring dantrolene and ankle splinting. She was discharged to a long term extended recovery unit and then ultimately home at a wheelchair level.

CONCLUSIONS: Anti-NMDA receptor encephalitis is a rare autoimmune disease characterized by antibodies targeting NMDA receptors in the brain causing edema and neurologic dysfunction such as seizures, psychiatric disturbances, and movement disorders. The exact etiology is unknown. While most patients recover well, 25% of cases result in severe deficits or death. Motor deficits are less common and spastic paraplegia has to our knowledge never been described in the literature. Unfortunately, our patient had persistent impairments despite prompt treatment and comprehensive rehabilitation.

ACCURACY OF THE SCRATCH COLLAPSE TEST FOR CARPAL TUNNEL SYNDROME IN COMPARISON TO ELECTRODIAGNOSTIC STUDIES

Daniel Areson, DO, and William Filer, MD

OBJECTIVES: The Scratch Collapse Test (SCT) has been previously studied as a reliable and reproducible test to diagnose Carpal Tunnel Syndrome (CTS). The purpose of this study is to determine the diagnostic potential of the SCT, in a clinical setting, when compared to more reliable EDX testing. Previous studies evaluating this physical exam maneuver have shown bias and incomplete blinding, which may have lead to variations in reported sensitivity and specificity of the SCT for diagnosing CTS.

Case Report: Forty patients were included in the study; all patients were referred to the EDX lab for examination of an upper extremity. The referrals that were included in the study were: mononeuropathy, arm numbness/tingling, hand weakness, hand numbness tingling, or cervical radiculopathy. One physician examiner performed the SCT on all forty patients. A different physician performed the EDX. The examiner performing the SCT was blinded to the referral diagnosis, patient symptoms, as well as medical history. The electrodiagnostician was blinded to the Results of the SCT.

RESULTS: The relationship between the SCT performed by blind examiners and EDX performed by blinded examiners shows a sensitivity of 48%, specificity of 59%, positive predictive value of 61%, and negative predictive value of 45%. These Results were not statistically significant with a p = .676.

CONCLUSIONS: Our literature search revealed that previous research used examiners who were aware the patient had a referral diagnosis of suspected CTS. Our study attempted to demonstrate the usefulness of the SCT as it would be in an initial clinical evaluation. A setting where a patient may present with a primary complaint of pain, numbness, or weakness in an upper extremity. Currently with our study Results, we would not recommend relying solely on the SCT and abandoning other subjective physical exam maneuvers for the evaluation of CTS in the clinical setting.

ACCESS TO PARENTHOOD FOR YOUNG ADULTS WITH MOTOR DISABILITIES

Sophie Achille-Fauveau, Elise Brindejonc, Claire Laforest, Marie-Pierre Reillon, Sophie Achille-Fauveau, Elise Brindejonc, Claire Laforest, Marie-Pierre Reillon

CONCLUSIONS: In this population, access to parenthood requires exchanges, support and assistance from a network of relevant stakeholders. They also guide the content of training sessions for these young adults and provide the first steps towards the creation of a “parenting and disability resource center” for all.

ACCUCLASCENT OF ARNOLD-CHIARI MALFORMATION DUE TO MOTOR VEHICLE COLLISION IN AN ADULT: EXPLORING REHABILITATIVE CHALLENGES AND SUCCESSES

Saranyan Senthelal, B Sc, Gurpreet Sarwan, MD, Vivek Nagar, MD, MBA, Shayan Senthelal, MD, and Erika Trovato, DO

CONCLUSION: In the study the aim was to determine the accuracy of the SCT as it would be in an initial clinical evaluation. A setting where a patient may present with a primary complaint of pain, numbness, or weakness in an upper extremity. Currently with our study Results, we would not recommend relying solely on the SCT and abandoning other subjective physical exam maneuvers for the evaluation of CTS in the clinical setting.
Abstracts

CASE DIAGNOSIS: 41 year old female with acquired Arnold Chiari malformation (ACM).

CASE DESCRIPTION: Patient was rear-ended in a motor vehicle accident, after which she presented with cerebellar ataxia, bilateral nystagmus, cervicalgia and occipital pain with progressively worsening bilateral upper extremity weakness and numbness. On presentation to the emergency room, CT scan revealed dorsal protrusion of both cerebellar tonsils through the foramen magnum, indicative of ACM, a rare complication of traumatic brain injury. She underwent suboccipital decompression with C1 laminectomy, however, her post-operative course was complicated by meningitis and hydrocephalus, which she was treated with intravenous antibiotics and ventriculoperitoneal shunt was placed to reduce intracranial pressure. After admission to the inpatient rehabilitation facility, a multidisciplinary approach was used, including neurosurgical and neurological services for shunt titation, and physical and occupational therapy that addressed her gait disturbance and upper extremity weakness. Functional gains included increases in ambulatory distance (10 feet to 290 feet), upper extremity strength, coordination and pain.

DISCUSSIONS: Review of the literature indicates only a handful of cases that attribute motor vehicle accidents to Arnold-Chiari malformation with a lack of reports detailing the rehabilitation challenges and successes that we discuss in this unique case. We will explore anatomic and genetic factors that may predispose adult patients from acquiring ACM along with a description of pathology and disease process.

CONCLUSIONS: Serious, yet fascinating, complications can occur after seeming minor trauma to the head and neck. Awareness of traumatic causes of ACM may expedite treatment and care for patients who present with cerebellar, cranial nerve and motor symptoms.

ACTIVE TRANSLATIONAL SHOULDER STABILITY IS DECREASED IN THE APPREHENSION POSTURE

Constantine P. Niccolozakes, N/A, Emma M. Baillargeon, PT, Daniel Ludvig, PhD, Amee L. Seitz, PhD, PT, and Eric J. Perreault, PhD

CASE DIAGNOSIS: Shoulder instability contributes to shoulder pain in individuals with paraplegia requiring use of a manual wheelchair. Instability symptoms typically occur in the apprehension posture of abduction and external rotation like one would move to when combing their hair or washing their back. Universally, rehabilitation for shoulder instability aims to increase shoulder stability by strengthening surrounding muscles, especially in the apprehension posture. It is unclear if these strengthening exercises can sufficiently augment shoulder stability in the apprehension posture. Clinical cases suggest shoulder muscles contribute less to stability than in more neutral postures. However, this active shoulder stability has never been assessed in human shoulders. Thus, the purpose of this study was to determine if active shoulder stability is reduced in the apprehension posture.

CASE DESCRIPTION: 16 (8F) asymptomatic adults participated. A custom cast attached the upper arm to a linear motor at 90° shoulder abduction in neutral (0° rotation) and apprehension (90° external rotation) postures. The linear motor applied random anterior-posterior glenohumeral displacements. Displacements were applied while subjects produced isometric shoulder torque in six directions (abduction/adduction, internal/external rotation, horizontal abduction/adduction) at 5%/10% maximum voluntary contraction. Translational stiffness was estimated as a quantitative metric of shoulder stability. A linear mixed effects model computed active stiffness, the linear relationship between stiffness and torque magnitude.

DISCUSSIONS: Active stiffness was approximately 30% lower in the apprehension posture than in the neutral posture (P = 0.0001). This stiffness reduction was driven by decreased stiffness in the apprehension posture when subjects produced torque in abduction (57% decrease; P < 0.0001), horizontal abduction (37% decrease; P = 0.0001), and internal rotation (35% decrease; P = 0.002).

CONCLUSIONS: Active shoulder stiffness decreased in the apprehension posture. Shoulder muscle strengthening during rehabilitation may have reduced capacity to increase stability in the apprehension posture, suggesting additional emphasis needs to be placed on strengthening exercises in this posture.

ACUTE C8 CERVICAL RADICULOPATHY WITH COMPLETE LOSS OF FINGER FUNCTION

Stephen K. Anderson, MD, Whitney Luke, MD, and John Vetter, MD

CASE DIAGNOSIS: Electively severe acute left C8 cervical radiculopathy in an 83-year-old female after a brief yet intense period of shoulder abduction as demonstrated on nerve conduction study (NCS) and electromyography (EMG) and tumor resection. He was transferred to an acute inpatient rehabilitation hospital, and made functional gains including ambulation without an assistive device. On post-operative day (POD) 15, he completed the steroid taper. On POD 26, he developed acute bilateral lower extremity weakness secondary to T5-T7 epidural metastases. He was started on a dexamethasone taper, and underwent therapy with intravenous immunoglobulins and intensive treatment in acute inpatient rehabilitation ward with excellent response. First Electrodagnostic study 8 days after onset of hemiparesis not strictly met criteria for Acute Inflammatory Demyelinating Polyneuropathy. Study done two weeks later was remarkable for AMAN with more than 90% reduction in amplitudes, absence and latency prolongation of F-waves. Upon discharge from inpatient rehabilitation, patient’s functional status improved. He achieved agility strength in right hemibody, modified independence in transfers, and ambulated at least 250 feet with rolling walker.

DISCUSSIONS: This case presents a very rare clinical presentation of AMAN. This patient presented with a right-sided hemiparesis that mimicked a stroke, which ultimately resulted in a delay in diagnosis and management. In addition, patient presented with diminished but preserved patellar reflexes initially, which is also uncharacteristic of AMAN. There are very few reported cases in literature of AMAN presenting with hemiparesis. In this particular case, patient responded well with high intensity rehabilitation and intravenous immunoglobulins.

CONCLUSIONS: Atypical Guillain-Barre Syndrome may present with asymmetric weakness mimicking a stroke. Treatment with IVIG and intensive rehabilitation seems to improve functional outcomes.

ACUTE PARAPARESIS SECONDARY TO ADDISONIAN CRISIS

Shelly Hsia, MD, and Jeremiah D. Nieves, MD

CASE DIAGNOSIS: Addisonian crisis.

CASE DESCRIPTION: A 49-year-old male with prostate cancer presented to an acute care hospital with paraparesis. He was diagnosed with cord compression secondary to T3-T7 epidural metastases. He was started on a dexmethasone taper, and underwent tumor T5-T6 laminectomy and tumor resection. He was transferred to an acute inpatient rehabilitation hospital, and made functional gains including ambulation without an assistive device. On post-operative day (POD) 15, he completed the steroid taper. On POD 26, he developed acute bilateral lower extremity weakness and hypotension. The patient was emergently transferred to the acute care hospital given concern for cord compression versus cord hypoperfusion secondary to hypertension. Repeat electromyography (EMG) showed no acute changes on imaging. The patient was diagnosed with Addisonian crisis by endocrinology, and restarted on high dose steroids with a two-month taper. His strength improved the next day, and he was able to ambulate within a few days.

ACUTE CEREBROVASCULAR ACCIDENT OR INFLAMMATORY DEMELINATING POLYNEUROPATHY? ATYPICAL GUILLAIN BARRE PRESENTATION: A CASE REPORT

Daniel G. Colon-Conde, MD, Eduardo Maldonado-Colon, MD, Anelys Torres-Rivera, MD, and Irma Valentin-Salgado, MD

CASE DIAGNOSIS: Primarily Motor Axonal Neuropathy.

CASE DESCRIPTION: 55-year-old male with history of hypertension, diabetes, and asthma, who suffered a gastrointestinal infection. Two weeks after patient presented with right lower extremity weakness progressing rapidly to involve the right upper extremity. Work-up for cerebrovascular accident including head CT and MRI, carotid Doppler, echocardiogram; came unremarkable. Lumbar puncture revealed albuminocytologic dissociation, serum anti-GM1 IgG elevated, 1.51200. Nerve conduction study revealed acute motor axonal neuropathy. Patient underwent therapy with intravenous immunoglobulins and intensive treatment in acute inpatient rehabilitation ward with excellent response. First Electrodagnostic study 8 days after onset of hemiparesis not strictly met criteria for Acute Inflammatory Demyelinating Polyneuropathy. Study done two weeks later was remarkable for AMAN with more than 80% reduction in amplitudes, absence and latency prolongation of F-waves. Upon discharge from inpatient rehabilitation, patient’s functional status improved. He achieved agility strength in right hemibody, modified independence in transfers, and ambulated at least 250 feet with rolling walker.

DISCUSSIONS: This case represents a very rare clinical presentation of AMAN. This patient presented with a right-sided hemiparesis that mimicked a stroke, which ultimately resulted in a delay in diagnosis and management. In addition, patient presented with diminished but preserved patellar reflexes initially, which is also uncharacteristic of AMAN. There are very few reported cases in literature of AMAN presenting with hemiparesis. In this particular case, patient responded well with high intensity rehabilitation and intravenous immunoglobulins.

CONCLUSIONS: Atypical Guillain-Barre Syndrome may present with asymmetric weakness mimicking a stroke. Treatment with IVIG and intensive rehabilitation seems to improve functional outcomes.
DISCUSSIONS: Addisonian crisis occurs due to an acute decrease in glucocorticoid and mineralocorticoid levels in patients with primary or secondary adrenal insufficiency. This results in increased renal sodium loss and potassium reabsorption, leading to intravascular volume depletion. Common presenting symptoms are hypotension, abdominal pain, nausea, vomiting, and confusion. It requires emergent treatment with glucocorticoid replacement therapy and fluid replacement. Without treatment, life-threatening shock progresses to coma and death.

CONCLUSIONS: In this case, Addisonian crisis presented as acute paraparesis in a patient with secondary adrenal insufficiency 10 days after completion of the steroid taper. Addisonian crisis is a medical emergency, and should be included on the differential diagnosis for patients with adrenal insufficiency presenting with hypotension and non-specific clinical features. It is essential to recognize the early features of Addisonian crisis, as delayed identification and intervention is associated with high mortality.

ACUTE POST-STROKE PSYCHOSIS IN INPATIENT REHABILITATION: A REVIEW OF LITERATURE AND RARE CASE SERIES

Kuntal Chowdhary, MD, and James E. Eubanks, MD, MS

CASE DIAGNOSIS: Post-stroke psychosis.

CASE DESCRIPTION: This case series consists of two females, 40 (patient A) and 63 (patient B) years old respectively, who presented with acute (1-2 weeks) post-stroke psychosis. Both patients presented with two separate ischemic distributions - right MCA and left external capsule/corona radiata respectively. Patient A had a past medical history of major depressive disorder; however, following her stroke, she developed profound personality changes and delusions. Patient B had a past medical history of alcohol use disorder and developed visual hallucinations. Both patients were managed while in inpatient neurorehabilitation.

DISCUSSIONS: Post-stroke psychosis is a rare complication found in certain stroke patient populations. This condition has typically been implicated in strokes of the right hemisphere of the cerebellum, thalamus, insula, basal ganglia, corona radiata, lentiform nucleus and inferior frontal lobe. Based on our literature review, we found several cases of progressive development of post-stroke psychosis. There are, however, very few cases of the acute development of post-stroke psychosis. The pathogenesis of acute post-stroke psychosis is also unclear, as the patients presented in this series had strokes in different areas, different past psychiatric histories and different post-stroke presentations.

CONCLUSIONS: It is important to consider acute post-stroke psychosis in patients with signs and symptoms of delirium, especially as admission to inpatient neurorehabilitation occurs early in the course of recovery. There have been many cases of post-stroke psychosis documented several weeks to months following stroke; however, the course of psychosis may have been indolent and present in the acute period. Thus, it is imperative for physiatrists and neurorehabilitation clinicians to recognize and treat post-stroke psychosis during the acute period following stroke to prevent potential patient harm in the setting of untreated psychosis.

ACUTE RESULT OF TRANSCRANIAL DIRECT CURRENT STIMULATION AND EXERCISE IN TREADMILL RUNNING IN THE AUTONOMIC MODULATION OF HEMIPARETIC PATIENTS POST CHRONIC STROKE – CLINIC TEST, CONTROLLED, RANDOMIZED, DOUBLE-BLIND

Glauber Heinz, MSC, Katia D. Angelis, PhD, Simone D. Corso, PhD, Maria Helena G. Sousa, MSC, Ariane Viana, MSC, Fernando D. Santos, PhD, João Carlos F. Corrêa, PhD, and Fernanda I. Corrêa, PhD

OBJECTIVES: To evaluate the effect of Transcranial Direct Current Stimulation (tDCS) on the systolic blood pressurevariability (SBPV) and heart rate variability (HRV) applied before a single session of physical activity on a treadmill in individuals who had a stroke.

DESIGN: Randomized sham controlled crossover trial. Were evaluated the SBPV and HRV of 12 individuals, in the moments before and after interventions with tDCS and during the treadmill exercise recovery phase. SBPV and HRV analyzed by the Variance R-R (ms) interval and by the variances of pulse intervals (PI) in time domain and frequency, linear method. Randomized interventions in 2 groups, 48-hour intervals: group1 (active tDCS before treadmill) and group2 (sham tDCS before treadmill). Duration of the protocol (40 minutes, being 20 minutes of tDCS followed by 20min of treadmill). Electrode anode on left temporal cortex and cathode on right lateral neck muscle. 2mA.

RESULTS: There were no difference in the VSBP and the HRV between the groups, compared with the baseline data, however, in the intragroup analysis the parasympathetic modulation after active tDCS increased by 18% over baseline by the RMSDD with IC 95% (-7.85 - -0.34). In group 1, the post-tDCS active and post-exercise periods presented a value of variance above baseline, indicating a better prognosis. In group 2, there was a significant reduction of 38% of Variance values (p = 0.006) after tDCS sham.

CONCLUSIONS: The tDCS did not have significant immediate effects on HRV and SBPV, except for cardiac parasympathetic modulation (RMSDD and PI HF band). The results, by group, suggest that tDCS was able to maintain greater parasympathetic modulation after acute exercise. It is believed that studies with a longer stimulation time may elucidate these effects.

ADJUNCTIVE HYPERBARIC OXYGEN THERAPY WITH INTENSIVE NEUROREHABILITATION IN IMPROVING NEUROLOGICAL OUTCOME IN PERSONS WITH DISORDERS OF CONSCIOUSNESS WITH SUBACUTE BRAIN INJURY

Faiz Mohamed, SPECIALIST, Abhishek Srivastava, MD, PhD, Navita Purohit, MD, CIPS, and Tushar Sonawane, MBBS

OBJECTIVES: To assess the effect of adjunctive HBOT in improving neurological outcome in patients with DOC with subacute brain injury & to find out the safety of using HBOT in patients with severe DOC.

DESIGN: Retrospective study of persons with traumatic/non traumatic brain injury, underwent rehabilitation and adjunctive HBOT from April 2017-March 2019. HBOT was given in Perry TM Monoplace Chamber 1.5 ATA for 60 minutes each session when neurologically and medically stable. Neurological status was assessed by Glasgow Coma Scale (GCS) and Glasgow Outcome Scale (GOS) before and after the intervention. Medical complications observed in HBOT file was noted.

RESULTS: 99 persons (F:82;M:17) with brain injury (TBI: ICH: IS = 49 : 35 : 15), age 8 – 86 years (48.8) were included. 57 persons underwent surgery (24 TBI; 27 ICH; 6 IS). HBOT was started 10 days-240 days after the injury (mean 61days).

HBOT sessions varied from 12 – 68 (mean 18). GCS score pre-intervention improved from E1M1V1 – E4M4V2 (m:5.94) to E4M3V1 – E4M0V5 (m:9.91). The post HBOT GOS was Grade-II-44, III – 34, IV-6 and V–12. 6 of 84 persons in GOSIS pre intervention improved to GradeIV, 2 to IV, 29 to III, 44 in II and 3 in I. Of 12 in GOS III: 5 improved to GradeV, 2 to IV and 2 to III. Of 3 in Grade IV GOS: 1 improved to Grade V and 2 in Grade IV. Complications during HBOT were Dysautonomia, hypoglycaemia and increased tracheal secretions.

CONCLUSIONS: Adjunctive HBOT is safe and tolerated well by persons with subacute brain injury and can contribute in improving neurological and functional outcome of persons with DOC. The maximum improvement in GCS was in the component of spontaneous eye opening.

ADVOCACY OF DISABILITIES GROUP POLICY IN REALIZING THE INCLUSIVE AND HEALTHY UNIVERSITY

Rupali Diarola Aparta, SPDI, Ema Setjiangrumin, MSi, and Aguswan Nurdin, DR

OBJECTIVES: Health and inclusive are the concern of people with disabilities to get the same opportunity as others.

DESIGN: This paper is to see how disability groups in Airlangga University strive to realize their desire for an inclusive campus and the accessibility they want to achieve. We use a study based on an integrated advocacy strategy developed by Reem Topatmasang as the blade of the analysis.

RESULTS: The findings in the field show that disability groups at Airlangga University form a group called Airlangga Inclusive Learning (AIL), hold Discussions, express aspirations through Focus Group Discussions and engage in forums created by universities, campaign for the importance of their rights through personal and group and conduct routine evaluations together. The Results of the policy advocacy produced positive Results in its implementation such as making elevators for disabilities, guiding blocks for the visually impaired, RAM for wheelchair users, special toilets with disabilities and easy access to other services. Airlangga University also provides free health services for students with disabilities and non-disabled students, and its officers have also been given special training in how to provide health services for persons with disabilities.

CONCLUSIONS: Policy advocacy is an instrument to make policy change, in the case of Airlangga Inclusive Learning has success to advocate any issue needed by disabilities group.

AGE- AND SEX-SPECIFIC EFFECTS IN PARAVERTEBRAL SURFACE ELECTROMYOGRAPHIC BACK EXTENSOR MUSCLE FATIGUE IN CHRONIC LOW BACK PAIN

Gerald R. Ebenbichler, MD, Richard Habenicht, MS, Sara Ziegbelecke, MS, Josef Kollmitzer, PhD, Patrick Mair, PhD, and Thomas Kienbacher, MD
OBJECTIVES: The impact of aging is not well understood yet may hold clues to both normal aging and chronic low back pain (cLBP). In sustained high submaximal back extensions, spectral surface electromyographic (SEMG) fatigue, a surrogate measure of glycocalyx muscle metabolism, may be decreased with increasing age, but increased with cLBP. Previous research by our group found the spectral SEMG fatigue method able to discriminate between older and younger back extensor muscles function, despite the fact that younger and older individuals demonstrated comparable maximum back extension strength scores. Thus, this study sought to investigate whether the spectral SEMG back muscle fatigue method would be as sensitive as it is in healthy individuals to detect age- and sex-specific differences in neuro muscular and muscle metabolic functions in patients with cLBP in a reliable way.

DESIGN: With participants seated on a dynamometer (20° trunk anteflexion), paraspinal SEMG activity was recorded bilaterally from the multifidus (L5), longissimus (L2) and iliolumbals (L1) muscles during isometric, sustained back extensions loaded at 80% of maximum from a total of 117 younger (58 females) and 112 older (56 females) cLBP individuals. Tests were repeated after 1-2 days and 6 weeks. Median frequency (MF), the spectral SEMG variable indicating neuromuscular fatigue, was analyzed.

RESULTS: Maximum back extensor strength scores were comparable between younger and older individuals. Significantly less MF-SEMG back muscle fatigue was observed in older than younger, or in older female than male cLBP individuals. Relative reliability was excellent, but absolute reliability appeared large for this SEMG-fatigue measure.

CONCLUSIONS: Findings suggest that cLBP unlikely masks the age-specific diagnostic potential of the MF-SEMG back extensor fatigue method. Thus, this method possesses a great potential for being further developed toward a valuable biomarker intended to very early detect back muscle function at risk for sarcopenia.

AN EXPLORATORY ANALYSIS: CLOUD COMPUTING BIG DATA QUERY AT AN ACADEMIC SPINE CENTER

Dustin Anderson, MD, Tiffany Callahan, BS, Larry Hunter, PhD, Adele Meron, MD, and Venu Akuthota, MD

OBJECTIVES: Cloud-computing equips researchers with opportunities to explore large data sets and obtain novel insights into disease patterns and patient outcomes. Advanced statistical learning allows extensive data sets to be evaluated rapidly. Here we explore a cloud-based health database in a representative sample population.

DESIGN: An IRB-approved retrospective cohort study was initiated to evaluate outpatient data. Patients seen at an academic spine center between the ages of 18-99 were included. Data was provided by Health Data Compass and stored/processed using Google Cloud Platform Tools. For this abstract, we focus on patients in the data set who had a diagnosis of radiculopathy (cervical, thoracic, or lumbar) and underwent a transforaminal epidural injection (fluoroscopically or CT guided). Our goal was to gauge the feasibility of the cloud platform for data analytics and assess the potential for more specific downstream studies.

RESULTS: Of 2,212,431 unique patient charts, 77,750 patients were eligible. A random sample of 27,550 patients was obtained from the eligible population. A query was run for all diagnoses, procedures, medications, labs, and genomics. These patients were predominantly female (56%), and white (82%) with a mean age of 58 (SD = 16). 13,150 (48%) had diagnosis codes consistent with thoracic or lumbarcal intervertebral disc disorders, 6,220 (23%) had cervical disc disorders, and a small subset of 950 (3%) had radiculopathy with associated spinal instability.

CONCLUSIONS: Cloud-based health data tools allow for evaluation of extensive disease bases. Our study included a query of 2.2 million patients. These samples are clinically meaningful and can be used for future cohort analyses. Limitations include the observational nature of the study and computational resources available. In summary, cloud-based health data tools represent a promising avenue to efficiently explore big data sets in the field of PM&R.

AN IDIOPATHIC SYRINGOMYELIA PATIENT PRESENTING WITH BILATERAL UPPER LIMB SENSORY AND MOTOR DEFICITS

Jun Hyun Choi, MD, and Jong Hoo Lee, MD

CASE DIAGNOSIS: A 35-year-old woman with unremarkable past medical history, experiencing bilateral arm weakness along with tingling sensation, presented to our clinic. These symptoms were subjectively noted 3 weeks prior to presentation. Both biceps and knee jerks were mildly accentuated and Hoffmann sign was objectively noted. Babinski sign was absent. Bilateral arm strength was grade 4 by manual therapy, botulinum toxin injections, and neuromuscular blocking agents has been attempted to reduce involuntary movement and restore voluntary control of the hand.

CONCLUSIONS: Alien hand syndrome has been observed mostly secondary to a supratentorial lesion involving the non-dominant hemisphere; infratentorial lesions resulting in an alien hand syndrome is uncommon. This case is presented to raise awareness on this uncommon clinical manifestation as clinician’s recognition of the disorder could help to reduce the patient’s anxiety and a better outcome.

AN ANATOMICALLY-BASED PROPOSED TECHNIQUE FOR CERVICAL PARASPINAL MAPPING EMG

Andrew J. Haig, MD, and Tyler J. McGuire, BS

CASE DIAGNOSIS: Lumbar paraspinal mapping EMG has standardized and validated the use of EMG, showing it superior to imaging in many ways. However, no valid cervical technique has been proposed. This study devises an anatomically valid, quantifiable technique for Cervical Paraspinal Mapping needle EMG.

CONCLUSIONS: The technique and texts regarding cervical paraspinal anatomy and cervical paraspinal EMG techniques were reviewed to determine possible innervation patterns of the cervical paraspinal muscles. A technique was designed based on this information and clinical experience.

DISCUSSIONS: We found no study that specifies anatomical insertion site, angle, extent of insertion, standardization of scoring, and range of norms. Anatomical evidence suggests that the single-root innervated multifidus originates at any given cervical spinous process and inserts in a multipennate manner at 2, 3, 4, 5, 6, and sometimes 7 transverse processes below. This occurs in a small space between the spinous process and transverse process and deep to large superficial muscles innervated by C2, 3, and 4.

CONCLUSIONS: The Cervical Paraspinal Mapping technique was proposed: Six scores are obtained as follows, then summed. At C5, C7, and T2 spinous process palpate a location 2 cm lateral to midline. At each of these locations insert a monopolar needle at a 60o angle to midline, until contact with bone. Withdraw, orient the needle 45o caudal, insert at 60o depth to bone contact. Insertions should be in ½ cm steps, eliciting any positive waves or fibrillations. These are scored from 0 (no fibrillations lasting more than 1 second) to 4+ (fibrillations occlude baseline. Total for 6 locations and findings at each level are reported. This Cervical Paraspinal Mapping technique has been found practicable in clinical situations, not reported here. Future work must develop norms, assess sensitivity and specificity for radiculopathy, and compare to imaging standards. The impact on treatment and outcomes needs to be evaluated.

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the more commonly known causes of syringomyelia. However, IS is not associated with any of the aforementioned conditions. We report herein, a case, of a patient without evidence of other underlying pathologic conditions who was subsequently diagnosed with IS and later was found to have improvement of the associated neurologic symptoms with supportive care.

**DISCUSSIONS:** The precise etiology and management for idiopathic syringomyelia is still unclear.

**CONCLUSIONS:** We diagnosed IS in a patient who presented with neurologic deficits. The suspected diagnosis of IS was confirmed by imaging study with C-MRI. Subjective symptomatology was shown to have improved with supportive care. We recommend considering an MRI study when CNS pathology is suspected in patients presenting with neurologic symptoms including sensory and motor deficits.

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**AN INPATIENT POST-STROKE MODEL OF REHABILITATION PATIENTS WITH THE HISTORY OF HEART TRANSPLANTATION. RETROSPECTIVE OBSERVATIONAL STUDY**

Elizbieta D. Miller, and Marta Niwalt

**OBJECTIVES:** The aim of the study was to evaluate the safety, effectiveness, and clinical problems during post-stroke model of rehabilitation patients with the history of heart transplantation.

**Design:** We conducted a retrospective observational case study of 3 patients with left side paralysis after first-life ischemic stroke and with the history of heart transplantation. Our 31 days model of rehabilitation was conducted as an intensive interval of 3-5 (10 min long exercises) with gradually increasing time of trainings (from 120 to 180 min/ per day 6 days per week), physical therapy (10-20 min/day) and psychological therapy (30-60 min/day). The Results were estimated in several scales: Barthel index, Rankin scale, Rivermead Motor Assessment, The National Institutes of Health Stroke Scale, Mini-Mental State Examination, Geriatric Depression scale. Moreover, the monitoring of heart rate (before and after training) and other clinical parameters were carried out.

**Results:** As a result of comprehensive rehabilitation, functional status improvement was observed in all estimated scales. The highest differences (admission vs discharge) were reported in Barthel index 3.3 vs 13.7 and National Institutes of Health Stroke Scale 13.7 vs 7.7. Main clinical problems were: heart rate (the mean value 94/min after training), depression (18.3 vs 7.0) and cognitive impairment (21.6 vs 26.7).

**Conclusions:** In the case of patients with the history of heart transplantation despite the tachycardia gradually increasing physical effort was tolerated. Early post stroke rehabilitation may achieve significant improvement in functional status.

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**AN UNUSUAL CASE OF MILLER FISHER VARIANT OF GUILLAIN-BARRE SYNDROME WITH OVERLAPPING FEATURES OF PHARYNGEAL-CERVICAL-BRACHIAL SUBTYPE**

Amanpreet Saini, MD, Gaurish Soni, DO, Anthony Roviso, MS4, Padma Srigiriraju, MD

**CASE DIAGNOSIS:** Miller-Fisher variant of Guillain-Barre Syndrome with overlapping features of pharyngeal-cervical-brachial (PCB) subtype.

**CASE DESCRIPTION:** A 72-year-old female presented with diplopia, ataxia, dysarthria, and dysphagia for several days after an upper respiratory infection. Further examination showed right ptosis, limited vertical/horizontal gaze, areflexia of the lower extremities, dysmetria and weakness in the upper extremities, and weak deltoids. Neurology was consulted, and stroke was ruled out, lumbar puncture showed elevated glucose with no albuminocytological dissociation. EMG findings indicated Miller-Fisher syndrome (MFS) with multifocal axonal polyneuropathy in the upper extremities. Patient had an elevated GQ1b IgG antibody titer. She completed a five-day regimen of IVIG and subsequent PLEX therapy. She was eventually discharged to acute inpatient rehabilitation (AIR) and made significant functional improvement. Her dysphagia resolved, and she was advanced to a regular diet. She progressed from two-person assist for ambulation and met goals for minimal assistance overall.

**Anido Roy, PhD, and Michael A. Dimyan, MD**

**OBJECTIVES:** Spasticity is difficult to quantify consistently, plagued with inter- and intra-rater reliability errors. The objective of this study was to determine whether variables captured by a robotic ankle training device could be used to provide a more reliable measurement of spasticity.

**DESIGN:** The study included 4 subjects with spastic hemiplegia. Spasticity in the gastrocnemius, soleus, and tibialis posterior muscles were assessed wearing the robotic ankle device, Anklebot. Spasticity was rated by a single clinician on the Modified Ashworth Scale (MAS). The Anklebot recorded the clinician’s actions and then played back the same actions. Testing was done at the time of chemodenervation and again approximately 6 weeks post-chemodenervation. A spastic catch was defined by the point of peak deceleration. Factors of interest were examined during clinician testing for correlation with an increase in MAS, including percent range of motion the catch occurred, speed pre and post-catch, acceleration post-catch, and change in acceleration post-catch. A model of spasticity scoring was created using linear regression and applied to the Anklebot recreations.

**Results:** Factors that correlated with an increased MAS were identified as percent range of motion the catch occurred (R= -0.688, p= 0.001), peak speed pre-catch (R= -0.458, p= 0.024), and change in acceleration post-catch (R=0.556, p=0.005). A linear regression model was created for an estimate of MAS scores based on the variables of interest (F(3,20)=8.285, p=0.005). A linear regression model was created for an estimate of MAS scores based on the variables of interest (F(3,20)=8.285, p=0.001). Applying this model to the Anklebot recreations, spasticity values were calculated with a R2=0.83 (p= 0.001) and NRMSE of 0.116.

**Conclusions:** Using an Anklebot to recreate spasticity testing maneuvers, a consistent quantifiable measure of spasticity can be created. The current model is limited by its basis on the MAS and assumption of a linear nature of spasticity. A larger sample size may provide better insight to factors of interest, allowing a more independent model (e.g. piecewise linear) for scoring of spasticity.

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**ANKLEBOT AS A RELIABLE MEASURE OF CHRONIC LOWER EXTREMITY SPASTICITY**

Anthony Manfredo, MD, Angela F. Davis, PT, MHS, NCS, Bradley Henssies, MBA, MHA, Richard Macko, MD, Larry Forrester, PhD, Anindo Roy, PhD, and Michael A. Dimyan, MD

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ANOXIC BRAIN INJURY WITH DYSTONIA AND SPASTICITY

Christopher Elmore, MD, Garrett Lui, MD, Ariel Savitz, MD, and Destiny N. Murphy, DO

CASE DIAGNOSIS: A 42-year-old female developed severe anoxic brain injury including rigidity, alien hand syndrome, and severe dystonia.

CASE DESCRIPTION: Patient presented with drug overdose resulting in severe hypoxia. Post-pulseless arrest, hypothermia protocol was complicated by respiratory failure requiring intubation. Magnetic resonance imaging of brain demonstrated fluid-attenuated inversion recovery hyperintensity of bilateral thalami, cerebellum, and basal ganglia involving the caudate nucleus, globus pallidus and external capsule due to global ischemia. Clinical exam in acute rehabilitation hospital consistent with atypical parkinsonism including asymmetric rigidity, dystonia, and involuntary left upper limb movements due to alien hand syndrome. Rigidity and involuntary left upper limb movements responded to carbipoda-levodopa, but dystonia and spasms persisted. Her dystonia was minimally responsive to oral anti-spasmodics including high dose tizanidine and maximal dose oral baclofen necessitating an intrathecal baclofen trial proving so successful patient progressed from minimal assistance with rolling walker to supervision ambulation without a device.

DISCUSSIONS: Less than two months post anoxic brain injury, early intrathecal baclofen pump intervention and addition of carbipoda-levodopa significantly improved patient dystonia, alien hand syndrome, rigidity and spasms allowing patient to achieve modified independence to supervision level with dressing, bathing, toileting, and ambulation at discharge. Anoxic brain injury causes significant morbidity and mortality in all ages. Injuries can be widespread and severe including neuronal cell ischemia and death. Impact varies due to period of anoxia, preexisting comorbid conditions, and baseline cognition. This case highlights the need for an interdisciplinary team to improve functional outcome and the benefits of early intrathecal baclofen pump placement.

CONCLUSIONS: Neurologic complications of anoxic brain injury such as rigidity and dystonia improve significantly through interdisciplinary rehabilitation. We need to rethink current practices to include use of carbipoda-levodopa for atypical parkinsonian features post anoxic injury and use of early intrathecal baclofen pump placement to improve patient’s functional status and quality of life.

ANTON’S SYNDROME IN THE SETTING OF ANOXIC BRAIN INJURY IN 38-YEAR-OLD MALE: A CASE REPORT

Stephen W. Peirce, MD, and Alexandru Dinu, MD

CASE DIAGNOSIS: Anton’s Syndrome

CASE DESCRIPTION: 38-year-old previously healthy male presented after cardiac arrest. Patient was drinking Redbull and smoking marijuana when he collapsed, requiring CPR, defibrillation and 5 doses of Epinephrine. Intubated on the scene and admitted to intensive care, extubated after 5 days and noted to have acute encephalopathy thereafter MRI brain showed anoxic injury to cortical parietal and occipital areas bilaterally. He recovered well on the acute floor with residual cognitive, visual, and proprioceptive deficits. Psychiatry was consulted and he was admitted to inpatient rehabilitation after 20 days of acute care.

DISCUSSIONS: Upon admission to rehab, he had limited orientation and unable to perform simple commands. There were obvious visual impairments but he denied his deficit and would confabulate answers when questioned or examined. Furthermore, he experienced visual hallucinations, possibly indicating a Charles-Bohnet Syndrome component. During his stay, visual evoked potentials (VEP) were performed and interpreted by our PM&R department revealing evidence of patent pathways. He worked intensively with therapies for 21 days and by discharge, his cognition had improved to premorbid baseline. His vision and proprioception had only mildly improved along with his insight into the deficit. PT and SLP FIM scores improved well, however OT scores lagged as his vision and proprioception remained an issue.

CONCLUSIONS: Anton-Babinski syndrome is rare and results in visual anosognosia due to occipital brain damage; patient’s denying their blindness despite obvious signs such as walking into walls and objects. VEP is a measurement of the electrical signal recorded along the pathways toward the occipital cortex in response to light stimulation. This is a rare syndrome with limited literature, however suspicion must be raised in patients presenting with visual deficits in the setting of bilateral occipital lobe injury. VEP studies can be useful in identifying specific locations of neurologic deficit as it relates to visual deficits.

ATYPICAL POEMS SYNDROME MIMICKING CIDP WITH ANTI-NEUROFASCIN ANTIBODIES

Alexandra E. Fogarty, MD, Gurpeet Khakh, MBBS, and Mohammed Al-lozi, MD

CASE DIAGNOSIS: POEMS syndrome (polyneuropathy, organomegaly, endocrinopathy, monoclonal protein, skin changes) is a rare multisystem disease that is characterized by monoclonal plasma cell proliferation. A combination of clinical criteria and serum markers are used to make the diagnosis and to distinguish it from other entities, such as chronic inflammatory demyelinating polyradiculoneuropathy (CIDP). Neurofascin 155 and 140/186 are axonal proteins localized in paranodal and nodal regions, respectively. Pathologic antibodies to these proteins are thought to be implicated in a subset of CIDP cases.

CASE DESCRIPTION: A 60-year-old man presented with numbness, weakness, and loss of balance over several months. Examination showed distal more than proximal weakness, sensory loss, and diffusely diminished tendon reflexes. Electrodiagnostics revealed mixed demyelinating/axonal neuropathy and nerve biopsy demonstrated abnormal paranodal vessels, subperineurial edema, and focal intramyelinic lesions. Immuno fixation and serum/urine protein electrophoresis, and light chain valence and ratio were normal. The patient continued to decline despite immunosuppressive therapy. Further testing revealed pleural effusion, elevated VEGF level, and endocrine abnormalities. POEMS diagnosis was entertained and bone marrow biopsy revealed plasma cell dyscrasia. Chemotherapy resulted in rapid improvement.

DISCUSSIONS: POEMS is a rare condition characterized by the presence of a monoclonal plasma cell disorder (PCD) and peripheral neuropathy. POEMS syndrome with neurofascin 140/186 and 155 antibodies is rarely reported. Neurofascin antibodies are identified in 2-10% of CIDP cases, which are often refractory to immunosuppressive treatment. This case suggests that these antibodies are not specific, and can present in other diseases. Further workup should be pursued with a low threshold.

CONCLUSIONS: The diagnosis of POEMS is often difficult and should not be excluded in patient with Neurofascin antibodies, or with negative serum protein electrophoresis. POEMS may be misdiagnosed as CIDP. However, diagnosis and interventions vary greatly, so early differentiation is imperative.

APPLICATION OF VIRTUAL REALITY VISION THERAPY AFTER BRAIN INJURY: CASE SERIES

Andrew Y. Vassantachart, BS, and Brian Chau, MD

OBJECTIVES: Traumatic brain injury (TBI) often causes visual impairments, such as accommodative dysfunction and convergence insufficiency. Current therapies for vision impairment after TBI include monocular eye patching, prism, and compensatory visual strategies which are often limited by poor compliance and are strictly visual. Virtual reality (VR) based visual therapies offer the opportunity to increase compliance by augmenting the therapy with scenarios and challenges that engage the patient and integrate the visual development with systems such as visuomotor skills and stereopsis.

DESIGN: Patients with TBI were recruited from a single-institution acute rehabilitation center to undergo 45-minute immersive VR therapy sessions using the VR Vivid Vision application with an HTC Vive head mounted display (HMD). Supervising occupational therapists guided patient treatment and patients completed a post-therapy satisfaction survey after their final session.

RESULTS: In the post-therapy survey, all patients (n=3) reported enjoyable experiences and positive impressions of the VR therapy. Two of the three patients reported that the VR therapy was more enjoyable than traditional vision therapy. Therapists involved in the study noted that patients were more motivated and attentive to the tasks during the VR therapy sessions compared to traditional visual therapy.

CONCLUSIONS: This preliminary feasibility study explores utilizing VR vision therapy for patients with TBI within the inpatient acute rehabilitation setting. VR therapies have the potential to provide an enjoyable experience that motivates patients to engage in and remain attentive to tasks. The limitations of this study were the small sample size and the limited number of therapy sessions. Continued investigation into VR vision therapy efficacy and protocol is recommended for future studies.

ARTIFICIAL INTELLIGENCE-COST EFFECTIVE ALTERNATIVE TO CONVENTIONAL ENVIRONMENTAL CONTROL UNIT

Alice Hon, MD, Hung Nguyen, MD, and Maureen Jennings, PT, DPT

OBJECTIVES: To explore the use of artificial intelligence, Amazon Echo, as cost-effective device compared with the conventional environmental control unit (ECU), and how it can improve the quality of life for individuals with spinal cord injury (SCI) and spinal cord disorders (SCD) with limited hand and upper extremity function.

DESIGN: Thirty individuals with high level SCI(C1-7), multiple sclerosis, and amyotrophic lateral sclerosis with limited hand and upper extremity function were recruited for this three month qualitative study. All individuals were given an...
Amazon Echo. Individuals who use an ECU at home also selected up to five smart devices. They completed three monthly surveys.

**RESULTS:** The majority used the Amazon Echo daily to listen to music, keep up with news media, and current events. A smaller number accessed social media, emailed or texted, played games, watched movies, and operated smart devices. The majority over all the three months indicated after using the Amazon Echo that their changes in health status, social participation, level of independence, and outlook on life were either “a little better” or “better.” They were able to use the smart video doorbell, smart light bulbs, smart outlets, and smart TV accessory. Some reported a preference for the Amazon Echo device over the convention ECU in operating various aspects of their home devices.

**CONCLUSIONS:** This is a pilot study investigating the use of Amazon Echo in the individuals with high level SCI and SCD with limited hand and upper extremity function. Overall individuals with high level SCI and SCD were able to use the Amazon Echo, and the majority reported that it improved their quality of life. There were individuals that reported a preference for the Amazon Echo device over the conventional environmental control unit in operating certain aspects of their home devices.

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**ASSOCIATION BETWEEN SELF-REPORTED CARDIOVASCULAR EXERCISE AND HEALTH OUTCOMES IN CHRONIC SPINAL CORD INJURY**

Andrew ParScogk, MD, Stephanie C. Ryder, MD, Mitch Sevigny, MS, Ricardo Battaglino, PhD, and Leslie Morse, DO

**OBJECTIVES:** Cardiovascular disease is a primary cause of morbidity and mortality in persons living with spinal cord injury (SCI) with higher prevalence and earlier occurrence than the general population. Exercise is a proven method to improve cardiovascular outcomes. Updated SCI-specific physical activity guidelines in addition to the previous recommendation, added an aerobic only conditional recommendation as more aerobic exercise appears to be necessary to achieve cardiovascular benefit in comparison to aerobic in conjunction with strengthening. Our study aims to characterize the association between physical activity and health outcomes based on those meeting the updated aerobic recommendations.

**DESIGN:** We assessed the association between those who met aerobic exercise guidelines (>90 minutes/week) versus those who did not in 325 participants with SCI >1 year post-injury using multivariable models.

**RESULTS:** Of participants, 27% were active (289 min/week + 158.8) and 73% were sedentary. There was no difference in mean age, gender, race, and BMI. Participants with motor incomplete SCI or ambulators were both approximately 2 times more likely to be active. Smokers were nearly 50% less likely to be active. The odds of being active decreased with increasing years post-injury, CRP levels, % gynoid fat, history of heart disease, lower bone density at the distal tibia, and history of lower extremity fracture. The association between CRP and activity was independent of current UTI and current skin pressure injury.

**CONCLUSIONS:** We report a high rate of sedentary behavior in SCI. Meeting the physical activity guidelines for aerobic exercise suggests an association with lower gynoid fat, self-reported heart disease, CRP, osteoporotic fractures, and greater proximal tibia density. Given the cross-sectional nature of this study, causality cannot be determined. Active smoking, wheelchair use, and motor complete injury may be barriers to meeting these guidelines. Future interventions to increase physical activity or smoking cessation programs may confer health benefits in SCI.

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**ASSOCIATION BETWEEN USE OF HIGHER TIDAL VOLUME AND CLINICAL OUTCOMES AMONG ACUTE SPINAL CORD INJURY: A RETROSPECTIVE COHORT STUDY**

Rahula Korupolu, MD, MS, Ellia Ciammaichella, DO, Patrick Mollett, DO, Hannah Uhlig-Reche, and Emmanuel Achilike, MD

**OBJECTIVES:** Approximately two thirds of people with acute spinal cord injury (SCI) will experience respiratory complications necessitating mechanical ventilation (MV) which is associated with higher morbidity and mortality. Current SCI clinical guidelines recommends tidal volume (TV) setting of $\geq 15$ cc/kg ideal body weight for those requiring MV after acute SCI which is in contrast to the ARDSnet protocol which was developed for patients with acute respiratory distress syndrome (ARDS). Emerging evidence suggests favorable outcomes with low TV ventilation in patients with non ARDS lungs as well. We conducted a retrospective study to determine if higher TV MV in acute SCI is associated with poor outcomes.

**DESIGN:** Retrospective cohort study; 43 ventilator dependent people with SCI admitted to acute inpatient rehabilitation (AIR) unit between Jan 2016- Dec 2017 were included. MV with TV of $\leq 15$ cc/kg IBW or $\geq 15$ cc/kg IBW. Outcomes: Ventilator weaning days, AIR hospital length of stay (LOS) and incidence of pneumonia. The majority used the Amazon Echo daily to listen to music, keep up with news media, and current events. A smaller number accessed social media, emailed or texted, played games, watched movies, and operated smart devices. The majority over all the three months indicated after using the Amazon Echo that their changes in health status, social participation, level of independence, and outlook on life were either “a little better” or “better.” They were able to use the smart video doorbell, smart light bulbs, smart outlets, and smart TV accessory. Some reported a preference for the Amazon Echo device over the convention ECU in operating various aspects of their home devices.

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hospital LOS and increased incidence of pneumonia. Future research is required into optimal ventilation settings for acute SCI patients.

**ATTAINMENT OF PHYSIOLOGIC SALIVARY FLOW RATE WITH LONG-TERM INCOBOTULINUMTOXINA TREATMENT FOR SIALORRHEA IN PARKINSON’S DISEASE AND OTHER NEUROLOGIC CONDITIONS**

Fernando Pagan, MD

**OBJECTIVES:** We present salivary flow rate from the 64-week SIAAXI study, and investigate the effect of repeated incobotulinumtoxinA injections on salivary flow rate in adults with chronic sialorrhea due to Parkinson’s disease (PD), atypical parkinsonism, stroke, or traumatic brain injury.

**DESIGN:** SIAAXI (NCT02091739) was a pivotal double-blind, randomized, placebo-controlled phase 3 study with a 48-week extension period (EP). In the main phase (MP) subjects were randomized (2:2:1) to incobotulinumtoxinA 75 or 100 U (n=74 each), or placebo (n=36) in a single injection cycle (IC). At completion, eligible patients entered the EP and received three further incobotulinumtoxinA ICs (each 16±2 weeks) of 75 U or 100 U. Outcomes assessed in subjects who received incobotulinumtoxinA in all four ICs included: unstimulated salivary flow rate (uSFR), modified Radboud Oral Motor Inventory for Parkinson’s Disease (mROMP) speech symptom scores and dental adverse events (AEs).

**RESULTS:** In total, 140/148 subjects, who received incobotulinumtoxinA 75 U (n=68) or 100 U (n=72) in all ICs, completed the MP and entered the EP. With incobotulinumtoxinA 75 and 100 U, respectively, mean (SD) uSFR decreased in all ICs from MP baseline (0.42 [0.28] and 0.40 [0.27] g/min; including subjects who did not continue to EP) at all visits to 0.26 (0.24) and 0.22 (0.18) g/min at the end-of-study visit. Maximal reductions were observed at 4 weeks and sustained at 16 weeks post-injection in all ICs. The most common dental AE was tooth extraction (4.4% and 5.6%) unrelated to treatment. Treatment-related gingivitis was reported in one 100 U recipient.

**CONCLUSIONS:** Data demonstrate consistent reduction in salivary flow rate at each IC, within normal physiological levels. Subjects did not reach a level of hyposalivation. Stable mROMP speech symptom scores suggest that sufficient saliva remained in the oral cavity to prevent speech impairment. Assessment of dental health showed no safety issues due to hyposalivation.

**ATYPICAL PRESENTATION OF WEAKNESS AND ABNORMAL EMG FINDINGS IN A PATIENT WITH CML AND ALS: A CASE REPORT**

Clarisse Melinda San Juan, MD, Steven J. Mann, MD, and Getahun Kifle, MD

**CASE DIAGNOSIS:** Amyotrophic Lateral Sclerosis.

**CASE DESCRIPTION:** 35 year-old female with a 7-year history of Chronic Myeloid Leukemia in remission on Imatinib, who presented with frequent falls. She initially developed muscle spasms and stiffness, which progressed to weakness of left lower limb, then right lower, followed by left upper extremity and changed her walking pattern. She reported a 50 lb weight loss over 1 year. On examination, her gait was antalgic and she had a positive Romberg test. Her strength was normal in right upper extremity while left upper extremity was not tested. She had normal reflexes. Sural nerve biopsy was scheduled, however, the patient refused to undergo the procedure. She was discharged on observation.

**CONCLUSIONS:** Patients with CML require a multidisciplinary approach and should be closely followed. Early recognition of atypical presentations is essential to initiate appropriate treatment. Further cases of patients with CML and ALS are needed to better define the natural history and optimal treatment strategies.

**AVOIDING CATASTROPHE: LEFT PONTINE STROKE AS THE ANTECEDENT EVENT TO CATASTROPHIC ANTIPHOSPHOLIPID ANTIBODY SYNDROME**

Nicole Pontee, MD, MS, and Gary N. Inwald, DO

**CASE DIAGNOSIS:** Catastrophic Antiphospholipid Antibody Syndrome

**CASE DESCRIPTION:** E.C. is a 43 year old man with hypertension and autism who presented with right hemiparesis on 2/10/19 and was diagnosed with acute left pontine infarction. He was admitted to inpatient rehabilitation on 2/15. He had a long history of thrombocytopenia and autoantibodies positive for anticardiolipin antibody (ACLA) and lupus anticoagulant.

**DISCUSSIONS:** The presentation of E.C. was atypical for a left pontine infarction, which is typically accompanied by contralateral hemiparesis and less commonly, autonomic symptoms. E.C.’s history of recurrent thrombocytopenia, thrombosis, and positive anticardiolipin antibodies raised concern for a catastrophic presentation of antiphospholipid syndrome. The diagnosis of catastrophic APS was confirmed, and he was started on anticoagulation and immunosuppression. E.C. made a remarkable recovery and was discharged from inpatient rehabilitation after 72 days.

**CONCLUSIONS:** Awareness of the risk factors associated with catastrophic APS is crucial for early recognition and timely initiation of treatment. This case highlights the importance of considering catastrophic APS in patients with a prior history of thrombosis and positive anticardiolipin antibodies, even in the absence of other clinical features.

**AXILLARY NERVE PALSY AFTER LOW ANTERIOR RESECTION**

Briana Novello, DO, and Hamza Khalid, DO

**CASE DIAGNOSIS:** Axillary nerve palsy

**CASE DESCRIPTION:** A 52 year old female with recently diagnosed stage 2 colon cancer underwent laparoscopic low anterior resection. Post-operatively, she presented with left shoulder weakness and numbness. Physical exam showed left shoulder abduction and external rotation strength of 3/5 and elbow flexion strength of 4/5.
Left shoulder ROM was limited to 30 degrees of abduction. On POD 2, MRI of the left brachial plexus, left shoulder, and cervical spine were unremarkable. On POD 15, EMG showed abnormal spontaneous activity in the left deltoid muscle.

**DISCUSSIONS:** Laparoscopic low anterior resection surgery typically involves lithotomy and trendelenburg positioning. Upper extremities are often abducted for ease of IV access. Hyperabduction of the arm and steep trendelenburg increases the risk of brachial plexus injury. Stretches of the nerves leads to the disruption of intraneural blood flow and in severe cases, endoneural edema and disruption of axoplasmic flow, which result in demyelination and segmental degeneration. Conservative management includes physical therapy. Severe cases or failure of conservative management may require surgical intervention.

**CONCLUSIONS:** The patient’s positioning should be considered from a safety standpoint rather than one of only operative convenience. Prevention of axillary nerve palsy requires minimization of operative time and trendelenburg position. Abnormal axoplasmic flow, which result in demyelination and segmental degeneration. Conservative management includes physical therapy.

**BACLOFEN TOXICITY FROM INTRATHecal PUMP IN THE SETTING OF ACUTE RENAL INSUFFICIENCY**

**CASE DESCRIPTION:** A 22-year-old man with cerebral palsy, spasticity. Treatment with intrathecal baclofen pump, and stage 4 chronic kidney disease due to IgA nephropathy, presented with a 3-day history of decreased arousal. Admission labs showed creatinine 1.79 (baseline 1.4), GFR 53, and potassium 5.6. The patient was found to be in urinary retention requiring intermittent catheterization, which was thought to be the cause of his worsened renal function. Due to concern that his AKI on CKD due to urinary obstruction had resulted in baclofen toxicity, his nighttime bolus was discontinued and the continuous pump rate was reduced. His symptoms improved with this reduction in his baclofen dose and supportive management, and he was discharged home in improved condition.

**DISCUSSIONS:** Baclofen toxicity is a rare outcome which occurs more frequently in patients with impaired renal function due to baclofen’s excretion by the kidneys. This patient had known stable renal disease and an unchanged dose of intrathecal baclofen. After an acute reduction in GFR due to urinary retention, he developed symptoms of baclofen overdose characterized by decreased level of consciousness. Baclofen overdose can also manifest with hypotension, bradycardia, seizures, and nausea/vomiting. It is treated with reduction in IT baclofen dose (or cessation of oral dose), and supportive measures. Hemodialysis, effective in clearing serum baclofen, must be initiated in some cases.

**CONCLUSIONS:** Caution must be exercised with administration of baclofen in patients with underlying renal disease or those at risk of developing renal insufficiency. Baclofen is most often used in our patient population for spasticity after neurologic insult, but many of these patients are also likely to develop neurogenic bladder, putting them at risk of post-renal acute kidney injury. In patients with both bladder/renal issues and spasticity treated with baclofen, any change in arousal or mental status should prompt consideration of baclofen overdose.

**BATTLEFIELD ACUPUNCTURE FOR PAIN MANAGEMENT IN A TETRAPLEGIC**

**CASE DESCRIPTION:** A 64-year-old tetraplegic after a trauma 2 years ago with significant pain. He needed daily morphine and oxycodone. These medications caused many intolerable side effects.

**CASE DESCRIPTION:** We performed battlefield acupuncture on him. Within minutes of treatment, his neck pain and stiffness decreased from an 8 to 4/10 and within hours decreased to 1/10. This relief persisted for 5-7 days. The treatment was then repeated with the same Results. 2 weeks after initiating this treatment, we started decreasing his oral morphine dose. Within 6 weeks, decreased his daily dose by 93%.

**DISCUSSIONS:** Acupuncture is a treatment which originated in China 5,000 years ago. It has effects where the needles are placed as well as in areas distinct from where the treatment is performed. The treatment is believed to reduce pain by two mecha- 

**CONCLUSIONS:** Pain is a complication in paralyzed people. It may impact a person’s performance in social, vocational and leisure activities. It may interfere with quality of life, social functioning, employment, mood, as well as rehabilitation therapy. Battlefield acupuncture is a safe and effective treatment for individuals with SCI. We have integrated this treatment in our practice and have seen many positive outcomes for our paralyzed patients.

**BENEFICIAL EFFECTS OF 3'-SIALYLLACTOSE IN HUMAN CHONDROGENIC & OSTEOGENIC DIFFERENTIATION**

Junyoung Park, MD, Sung Hoon Kim, MD, PhD, Young hae Lee, MD, PhD, and Ji Yoon Jang, MD

**CASE DIAGNOSIS:** Three'-sialylactose (3'-sialyllactose, 3'SL) is an oligo-

**CASE DESCRIPTION:** The human bone marrow derived mesenchymal stem cells (hBMSCs) treated with 3'-sialyllactose.

**DISCUSSIONS:** In the micromass culture treated with 3'-SL, mRNA and protein expression of Sox9 and aggrecan, which are cartilage differentiation indicators, were significantly increased. In addition, alizarin red staining confirmed the positive of the proteoglycan, a cartilage-specific substrate, were stained more strongly in the 3'-sialyllactose treated micromass culture than the untreated group. mRNA and protein expression of MMP13 and Col10, which are cartilage hypertrophy markers, were significantly decreased compared to the untreated group. To the next, in the 3'-SL treated group, mRNA and protein expression of RUNX2, an osteo-

**CONCLUSIONS:** Three’SL significantly increase chondrogenic and osteo-

**BENEFITS OF A CONTINUUM OF REHABILITATION FOR A YOUNG ADULT WITH LENNOX-GASTAUT SYNDROME AND THE ESSENTIAL COMPONENTS OF THE TREATMENT PLAN**

Ryan P. Nussbaum, DO, and Leslie Rydberg, MD

**CASE DIAGNOSIS:** Lennox-Gastaut syndrome (LGS) has a prevalence be-

**CONCLUSIONS:** Lennox-Gastaut syndrome (LGS) has a prevalence be-

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**Abstracts**

**BRAINSTEM HEMISPHERIC TRANSCRANIAL DIRECT CURRENT STIMULATION THERAPY IN STROKE PATIENTS: A RANDOMIZED DOUBLE BLIND STUDY**

Selin Ozen, MD, and Seyhan Soyay, PROF, MD, Oya Umit Yemisci, ASSOC PROF, MD, Dilek Cetinkaya Alisar, MD

The aim of this study was to establish the effects of bihemispheric tDCS on upper extremity function and recovery in stroke patients. tDCS is a novel approach in stroke rehabilitation aiming to increase plasticity and reorganization following brain injury. In order to use tDCS routinely and find answers to questions, such as the duration and intensity of treatment needed, it is necessary to conduct randomized controlled clinical trials.

**OBJECTIVES:**

- To compare the effects of bihemispheric tDCS on upper extremity function and recovery in stroke patients with sham cortical stimulation simultaneously to occupational therapy (OT).
- To evaluate the safety and tolerability of bihemispheric tDCS in stroke patients.

**METHODS:**

- A randomized controlled clinical trial involving 32 stroke patients was conducted. Patients were randomized into two groups (16 tDCS group, 16 sham groups).
- Both groups received conventional upper extremity rehabilitation therapy and occupational therapy (OT) 5 days a week, for 3 weeks.
- The tDCS group received 30 minutes bihemispheric tDCS for 15 sessions while the control group received sham cortical stimulation simultaneously to OT.

**RESULTS:**

- There was a significant improvement in the tDCS group compared to the sham group in terms of functional independence measure (FIM) and Brunnstrom stages of stroke recovery (BSSR).
- The improvement in the tDCS group was statistically significant (p < 0.001).
- The results suggest that bihemispheric tDCS is a safe, pain-free, and non-invasive brain stimulation technique that can enhance functional recovery in stroke patients.

**CONCLUSIONS:**

- Bihemispheric tDCS is a promising treatment for improving upper extremity function and recovery in stroke patients.
- Further research is needed to determine the optimal duration and intensity of tDCS for maximum benefit.
- Bihemispheric tDCS should be considered as an adjuvant therapy to conventional rehabilitation in stroke patients.

**BIHEMISFERIC TRANSCRANIAL DIRECT CURRENT STIMULATION THERAPY IN STROKE PATIENTS: A RANDOMIZED DOUBLE BLIND STUDY**

Michael Gallagher, MD, Allison Averill, MD, and Tejas Shah, BS

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- Bihemispheric tDCS should be considered as an adjuvant therapy to conventional rehabilitation in stroke patients.
inpatient rehab, the patient had urinary retention and patient was max-assist with min-assist with bed mobility, max-assist for transfers, with hip flexion and knee extension too weak to stand. With comprehensive inpatient rehabilitation, the patient had good functional outcomes in ADLs and transfers, is able to stand but will requiring ongoing home care. Among 123 BBSA-registered member-countries, 31 do not have any completed blind sport registrations, of which 22 have a blindness/VI prevalence higher than global average. Regression analysis shows no significant correlation between regional prevalence of blindness/VI and blind sport participation prevalence.

CONCLUSIONS: Blind sport participation is affected by factors other than regional blindness/VI prevalence. Blind/VI individuals in poor world regions are most underrepresented in blind sports, which mirrors trends in the broader Paralympic Movement: participation favors high-income countries. Closing this gap, in favor of globally balanced participation that accounts for trends in blind/VI density, would support IBBA’s purpose and increase opportunities for optimal physical, mental and social health among those with blindness/VI.

BLOOD NEUROPEPTIDE Y CONCENTRATION IS INCREASED OVER TIME IN RESPONSE TO ANNUAL PUNCTURE IN A RAT MODEL OF INTERVERTEBRAL DISC DEGENERATION
Chaoming Zhou, MD, Richard Wawrose, MD, Brandon Couch, MD, Joseph Chen, BS, Dong Wang, MD, Joon Lee, MD, Nam Vo, PhD, and Gwendolyn Sowa, MD, PhD
OBJECTIVES: Intervertebral disc degeneration (IDD) is an age related and complex process, and improved biomarkers are needed to improve treatment of IDD. Serum biomarkers are an important indicator of pathogenesis, disease progression, and/or treatment response. The goal of this study was to examine the concentration of biomarkers NPY and RANTES in response to puncture induced IDD as confirmed by MRI.

DESIGN: A total of ten rats underwent a percutaneous fluoroscopically-assisted needle puncture procedure of the lumber intervertebral discs at levels L2-L3, L3-L4 and L4-L5. Ten rats served as uncontrolled controls. T2 weighted sagittal MRIs were obtained at baseline as well as 6, 12 and 18 weeks post puncture, and vertebral signal intensities and disc volumes were quantified using DSI Studios fiber-tracking software. Serum samples were collected at before puncture, and 1, 6, 12, 18 weeks post puncture and assayed for NPY and RANTES using commercially available ELISA kits.

RESULTS: The stabbed intervertebral disc at levels L2-L3, L3-L4 and L4-L5 demonstrated MRI signal intensity decreased by 70%, 71% and 64% and disc volumes decreased by 73%, 74% and 73% from baseline through 18-week time point. A significant increase in serum biomarker NPY in post puncture animals at week 6 (p<0.03), at week 12 (p=0.0002) and at week 18 (p<0.02). No significant change was observed in the serum biomarker RANTES from baseline through the 18-week time point.

CONCLUSIONS: The results shown NPY expression in our stab model of IDD was upregulated post-puncture through the course of MRI observed degeneration. Previous work has reported a relationship of circulating NPY levels with stress and pain, as well as in humans with disc degeneration. These preliminary results suggest NPY as an important biomarker in response to disc degeneration. Animal behavioral studies will be needed to clarify the relationship of NPY and pain.

BODY FAT AND RISK OF CARDIOVASCULAR DISEASE OF ADULTS WITH CEREBRAL PALSY
Se Hoe Jung, MD, PhD
OBJECTIVES: We aimed to investigate the characteristics of body fat amount and distribution with regard to cardiovascular disease (CVD) risk in adults with cerebral palsy (CP).

DESIGN: This is a cross-sectional study in university hospitals and communities for persons with disabilities in South Korea. A total of 99 adults with CP (58 men, mean age of 41.8±8.95 years) were included. The body composition was analyzed using dual-energy x-ray absorptiometry. Body fat mass, body mass index (BMI), fat mass index, and fat mass and ratio in android and gynoid region were analyzed. Resting blood pressure was measured and fasting blood samples were obtained for measurement of plasma glucose, serum triglycerides and cholesterol. The Framingham risk score (FRS) was calculated for estimating the risk of coronary heart disease (CHD).

RESULTS: The mean body weight was 57.3±12.9 kg and the mean BMI was 22.5±8.6kg/m2. The rate of obese and overweight based on BMI and FMI criteria were higher than what was reported in general population in South Korea. The mean body fat percent was 30.1±11.6%. The mean FRS was 4.6±6.5, and the mean risk of developing CHD was 2.5±4.0. The mean FRS was similar or higher than that of general Korean population. Simple and multiple linear regression analyses were performed to determine the factors independently associated with the FRS. Variables
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with p<0.1 on univariate analyses were used for multivariate analysis. According to the results of the multivariate regression model with stepwise selection, a formula was driven for the FRS as “FRS = -18.79 + 0.42 * Age + 0.54 * Android body fat (%), R²=0.741”.

CONCLUSIONS: The rate of obese and overweight and FRS was higher in adults with CP than the general Korean population. Percent android body fat was associated with the CVD in adults with CP.

BODY MASS INDEX (BMI) AND ITS EFFECT ON REHABILITATION OUTCOME DURING INPATIENT REHABILITATION: INTERIM RESULTS FROM AN ASIAN COHORT
Sze Chin Jong, MD, MRCP (UK), Dip Sport Med (Singapore), Karen Chua Sui Geok, MBBS, MRCP (UK), FAMS, FRPC (Edin), Gobinathan Chandran, BSc (Hons), MBBS (Sydney), MRCP (UK), MMED (Int Med), Jovic A. Fuentes, MD (Philippines), DPCP (Philippines), Dip Rehab Med (Singapore), Angie En Qin See, RN, and Chien Joo Lim, MSC

OBJECTIVES: The “obesity paradox” in rehabilitation suggests an inverse relation between body mass index (BMI) and rehabilitation outcome. We examined the association between BMI and its effect on post-discharge rehabilitation outcomes and report interim results.

DESIGN: A prospective observational cohort study was carried out from 31/1/ 2019 to 31/4/19 after obtaining ethics approval. All patients admitted to a tertiary rehabilitation centre were recruited and followed to discharge. WHO Asian standards for BMI were used to categorise BMI: underweight (BMI ≤ 18.5 kg/m²), normal (BMI 18.5-22.9 kg/m²), overweight (BMI 23.0-24.9 kg/m²), obese (BMI 25.0-29.9 kg/m²), or extreme obese (BMI ≥ 30 kg/m²). The primary outcome measures were ΔFIM–Total and FIM efficiency by admission BMI levels.

RESULTS: A total of 205 of 300 intended subjects were recruited over a 3-month period. Mean age was 59.4 (SD 13.6) years, 70.2% (144) were male, mean admission FIM was 69.09 (SD 27.03) and mean rehabilitation length of stay was 29.97 (SD 16.74) days. The distributions of underweight, normal, overweight, obese and extremely obese patients were 11.7% (24), 30.2% (62), 19.5% (40), 28.8% (59) and 9.8% (20), respectively on admission, and 12.2% (25), 36.1% (74), 17.6% (36), 25.4% (52) and 8.8% (18) respectively on discharge. Significant differences (p<0.001) were found in ΔBMI (Discharge BMI – Admission BMI) and ΔFIM total (Discharge FIM total - Admission FIM total) between patients with different BMI categories. There were no significant relationship between admission BMI with ΔFIM total (β=0.124, p=0.612) and FIM efficiency (β=-0.021, p=0.197) after adjusted for age and gender. No correlation noted between ΔBMI and ΔFIM total (r=0.047, p=0.505).

CONCLUSIONS: Our interim analyses suggest that admission BMI in either direction does not significantly impact the ability to achieve functional gains during inpatient rehabilitation, thus challenging the “obesity paradox”. Further studies are necessary to determine if BMI indeed impacts rehabilitation outcome.

BONE MINERAL DENSITY AND T-SCORE DISCORDANCE OF ADULTS WITH CEREBRAL PALSY
Se Hee Jung, MD, PhD

OBJECTIVES: To investigate the prevalence of osteoporosis and osteopenia and describe characteristics of the bone mineral density of adults with CP.

DESIGN: This is a cross-sectional study in university hospitals and communities for persons with disabilities in South Korea. A total of 87 adults with CP (52 men, mean age of 42.0±8.29 years) were included. The bone mineral density and body composition was assessed using dual-energy x-ray absorptiometry. We investigated the correlation between the bone mineral density and CP-related characteristics. The T-score discordance and its prevalence were also assessed.

RESULTS: The prevalence of osteopenia was 42.5% (40.0% in men and 45.7% in women) and that of osteoporosis was 25.3% (30.8% in men and 17.1% in women). The mean Lspine (LS) T-score was lower in men than women but T-score in femur neck (FN) and total femur (FT) did not show difference by sex. LS, FN, and FT T-score were negatively correlated with the Gross Motor Function Classification System (GMFCS) level. Non-absorbed subjects showed lower FN (r=-1.4±1.5, p=0.048, r=-0.019) and LS T-score (r=-1.2±1.9, p=0.134, p=0.04) than amputated subjects. With controlling with the GMFCS level, the body mass index (BMI) was correlated with LS, FN, and FT T-score. The percent body fat was correlated with LS, FN, and FT T-score and LS Z-score. The total fat free mass was correlated with LS T-score and the total fat mass was correlated with LS, FN, and FT T-score.

CONCLUSIONS: Adults with CP had decreased bone mineral density. The BMD was correlated with motor function, physical activity, BMI, and percent body fat. As T-score discordance was more frequent in adults with CP than in general populations, estimation of fracture probability may need more caution in adults with CP.

BRAIN TAKEN HOSTAGE! CASE REPORT: ANTI-NMDA RECEPTOR ENCEPHALITIS
Kaila T. Yeste, DO, Nevin Vijayarghaavan, DO, William T. Riden, DO, MBA, and John Baratta, MD, MBA

CASE DIAGNOSIS: Catatonia found to be anti-NMDA receptor encephalitis complicated by pain, seizures, and poor oral intake.

CASE DESCRIPTION: A healthy 23-year-old female presented to the ED for seizures. She developed dysarthria, lower arm movement of her right arm, and child-like verbalization. Her symptoms progressed and within one week of admission, she was nonverbal and unable to follow commands. A serum study ultimately diagnosed anti-NMDA receptor encephalitis. After her treatment plan was initiated, she was discharged to inpatient rehabilitation where she stayed for 36 days.

DISCUSSIONS: The patient made gradual functional improvements during inpatient rehabilitation. For ambulation, she progressed from requiring two-person maximum assistance to single-person moderate assistance with a rolling walker. For ADLs, she progressed from requiring maximum assistance to minimum assistance with extended time. Her cognitive deficits were slow to improve, however, her spontaneous speech improved at the time of discharge. She was cleared for a regular diet but refused to eat and her primary means of nutrition was via G-tube. She was discharged home in the care of her mother and home health therapy. At her two-month follow-up appointment, she demonstrated the ability to ambulate with a rolling walker. She is independent with most ADLs and requires minimal assistance for toileting and bathing. She tolerates soft foods and is anxious to liberalize her diet. She will continue with outpatient therapies and ongoing physiatry follow-up.

CONCLUSIONS: Anti-NMDA receptor encephalitis is an uncommon syndrome which typically presents in young females of reproductive age and may be associated with the presence of a teratoma. These patients have complex medical needs requiring close monitoring and a multi-modal approach to rehabilitation. This patient required inpatient rehabilitation for physical, occupational, recreational, and speech therapy needs along with her complex medical needs for pain, seizures, hypotension, provoked pulmonary embolism, and tube feedings.

BRAIN-COMPUTER INTERFACE SYSTEM FOR LOWER EXTREMITY REHABILITATION OF CHRONIC STROKE PATIENTS BASED ON FUNCTIONAL ELECTRICAL STIMULATION AND AVATAR FEEDBACK
Nensi Murovec, MSC, Marc Sebastian-Romagosa, MSC, Woosang Cho, MSC, Sara Dangl, BSC, Rupert Ortner, PhD, Kartin Mayr, MSC, Fan Cao, MSC, and Christoph Guger, PhD

CONCLUSIONS: Appendicular bone mass of adults with CP was associated with the muscle strength of the limb and physical function. This correlation was observed only in bilateral CP.
OBJECTIVES: Brain–Computer Interfaces (BCIs) show important rehabilitation effect for patients after stroke. Previous studies have shown improvement, also for patients that are in chronic stage and/or have severe hemiparesis and are particularly challenging for conventional rehabilitation techniques.

DESIGN: For this pilot study five stroke patients in chronic phase with hemiparesis in the lower extremity were recruited. All of them participated in 25 BCI sessions about 3 times a week. BCI system was based on the motor imagery of the paretic foot and healthy hand with Functional Electrical Stimulation (FES) and Avatar feedback. Assessments were conducted to assess the changes in motor improvement before, after and during the rehabilitation training.

RESULTS: Our primary measures used for the assessment were 10-meters walk test (10MWT) and Timed “Up and Go” Test (TUG). The results show an improvement in the 10MWT of 8.54 seconds (25.5%) for all 5 patients in self-selected velocity. TUG improvement was 7.3 seconds (16%) faster. One patient was not able to perform this test the results before the rehabilitation training due to the impermanent and difficulties in mobility, but was finally able to perform this test after the BCI sessions.

CONCLUSIONS: These outcomes show the feasibility of this BCI approach for chronic stroke patients, and further support the growing consensus that these types of tools might develop into a new paradigm for rehabilitation tool for stroke patients. However, the Results are from only five chronic stroke patients so the authors believe that this approach should be further validated in broader randomized controlled studies involving more patients.

BROCA’S AREA AS AN INITIATOR OF SPEECH IN A PATIENT WITH LEFT FRONTOTEMPOROPARIETAL PARTIAL LOBECTOMY

Ihsan Balkaya, MD; Alice Can Ran Qin, BS, and Eric L. Altschuler, MD, PhD

CASE DIAGNOSIS: A 45-year-old right handed male without significant past medical history presented with right sided hemiplegia and aphasia after left frontotemporalparietal lobectomy secondary to traumatic brain injury.

CASE DESCRIPTION: Patient admitted 3 months after head trauma. On exam, the patient had right hemiparesis with right sided facial paralysis and expressive aphasia. Patient’s expressive language was limited to 2 to 3 word utterances, and he was able to follow commands. Interestingly, the patient had intact repetition with normal articulation. Then we initiated counting “1, 2, 3”, remarkably, the patient carried on until 10. Similarly, after starting the alphabet and days of the week, the patient was able to complete each sequence. When prompted by months of the year, he continued up to June. When skip counting was initiated “2, 4, 6”, he proceeded until 14. Patient was able to read audibly and demonstrated reading comprehension significantly above chance (7/12 correct matching read word to four picture or color choices). He pointed to salient activities in the “Cookie Theft Picture” but could not verbalize.

DISCUSSIONS: Broca’s aphasia and apraxia of speech (AoS) are distinct phenomena, yet they frequently coincide, especially in dominant hemisphere stroke patients. The importance of Broca’s area’s role in speech production is widely accepted; however, the dynamics of language networks are still largely unknown. Stroke in the left premotor cortex—an area surgically excised in this patient—is known to cause AoS. Thus, this case unequivocally illustrates that there is (an)other area(s) that can coordinate normal articulation (eg. left insula, right premotor cortex) with connection to this patient’s Wernicke’s area (WA) evidenced by normal repetition. WA alone must be capable of “super-repetition”sequence completion.

CONCLUSIONS: Broca’s area, absent in this patient, is essential for initiating speech. WA with connection to an articulation area might be more useful for function than previously appreciated.

BROWN-SÉQUARD SYNDROME SECONDARY TO STAB WOUND TO THORAX REHABILITATION, A CASE REPORT

Cecilia Cordova Vallejos, MD, and Devin Oakes, DO

CASE DIAGNOSIS: Brown-Séquard Syndrome at T10 level of thoracic spinal cord

CASE DESCRIPTION: 38 year old male presented to the emergency department with stab wound to left upper thorax complaining of decreased sensation and loss of movement in left lower extremity, normal upper extremities and normal sensation in the right C2 dermatome & below and diminished pinprick at left C4 / C5 and left biceps tendon reflex. MRI of the C-spine showed cord edema (C1-C3), focus artifact at C2 consistent with cord edema and in the right posterior paraspinal muscles. Symptoms included shortness of breath requiring supplemental oxygen, neurogenic bowel and bladder, left sided upper and lower extremity weakness, and right sided sensory and temperature impairment. Further imaging showed paralyzed left hemidiaphragm. Clinical picture was consistent with brown-sequad syndrome cervical spinal cord injury. Patient underwent 2 weeks of acute inpatient rehabilitation where focus on gait, neuromuscular re-education, bowel, and bladder management. Upon discharge, patient was ambulating with a walker and regained full control of bladder and bowel movements.

DISCUSSIONS: The cervical dorsal ramus medial branch wraps around the convexity of the articular pillar of its respective vertebra and may be ablated for facet mediated pain. It is commonly performed under fluoroscopic guidance, although ultrasound guided techniques are available. Proximity to the spinal cord, exiting nerve roots, and vertebral artery makes skill, experience, and utilization of safety views imperative. Given radiolucency of the vertebral artery and spinal nerves, ultrasound guidance for visualization may be used alone or in conjunction with fluoroscopy to enhance safety and minimize radiation. Furthermore, sensory and motor testing prior to radiofrequency ablation should be performed to avoid damaging other structures in the event of anomalous anatomy.

CONCLUSIONS: Brown-Sequad Spinal Cord Injury may be a rare side effect of cervical radiofrequency ablation. Multiple views and sensory/motor testing prior to radiofrequency ablation is imperative to ensure safety.

BROWN-SÉQUARD SYNDROME FOLLOWING MENINGIOMA RESECTION, A CASE REPORT

Joseph M. Seldin, MD, Samuel Jacob, DO, and Chanel Davi, doff, DO

CASE DIAGNOSIS: We herein present a case of a 58-year-old woman with history of meningioma, who presented to acute inpatient rehabilitation after undergoing elective C2 laminectomy and partial resection of meningioma due to chronic neck pain and was found to have clinical findings consistent with Brown-Sequad syndrome.

CASE DESCRIPTION: The patient was diagnosed on imaging with a meningioma November/2016 after suffering from chronic neck pain. At that time the patient had no deficits and advised to be monitored by her surgeon. However, the patient’s pain increased and developed gait impairment. Upon re-evaluation by her surgeon, was advised to plan for elective C2 laminectomy with partial resection of meningioma. After the procedure May/2018. Post-operative course was notable for right sided weakness and gait imbalance. PM&R was consulted, patient was noted to be minimum assist for ambulation, transfers, ADLs and recommended for rehabilitation. The patient had no deficits and advised to be monitored by her surgeon. However, the patient’s pain increased and developed gait impairment. Upon re-evaluation by her surgeon, was advised to plan for elective C2 laminectomy with partial resection of meningioma. After the procedure May/2018. Post-operative course was notable for right sided weakness and gait imbalance. PM&R was consulted, patient was noted to be minimum assist for ambulation, transfers, ADLs and recommended for acute rehabilitation. On admission to our acute rehabilitation facility the following was noted on exam; Right elbow flexors strength 2/5, sensory impairments to light touch/vibration right C2 dermatome & below and diminished pinprick at left C4 / C5 and left biceps tendon reflex. The patient participated in aggressive therapy and was discharged to the community as modified independent.

DISCUSSIONS: Meningioma’s although a benign mass of the central nervous system that can be treated surgically, it can cause neurological compromised due to
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Sarah M. Smith, MBBS, and Juan L. Asanza, MD
CORD INJURY: A CASE REPORT
OPEN TRAUMATIC BRAIN INJURY: A CASE REPORT
CARBIDOPA-LEVADOCA IMPROVES SPEECH APRAXIA AFTER CROSS-SECTIONAL STUDY
CA VITY FOR THE MULTIDISCIPLINARY REHABILITATIVE DIFFERENCES BETWEEN THE TWO HALVES OF THE ORAL CAVITY FOR THE MULTIDISCIPLINARY REHABILITATIVE MANAGEMENT OF RIGHT BRAIN STROKE SURVIVORS? A CROSS-SECTIONAL STUDY

Alessandro de Sire, MD, Alessio Baricich, MD, PhD, Martina Ferrillo, DMD, Mario Migliaro, MD, Carlo Cisari, MD, and Marco Invernizzi, MD, PhD
OBJECTIVES: ‘Buccal hemineglect’ has been recently defined as a particular form of unilateral spatial neglect (USN) with detrimental oral effects on right stroke survivors. Aim of our study was to compare the oral hygiene between the two halves of oral cavity in right stroke survivors with and without USN.

DESIGN: In this cross-sectional study, we assessed a cohort of right-handed subjects affected by right brain stroke with left hemiparesis, divided into two groups based on the presence of USN. We administered an evaluation protocol including: New Method of Plaque Scoring, Oral Hygiene Index (OHI), Gingival Index, Oral Food Dehiscence Index and Winkel Tongue Coating Index (WTCLI). All outcome measures were assessed in the entire cohort considering both left and right halves of oral cavity.

RESULTS: Of the 21 patients included (mean aged 64.19±7.60 years), the 14 affected by USN (mean aged 64.50±8.06 years) had significantly worse values in all outcome measures in the left oral cavity compared to the right one (p<0.01). On the other hand, the 7 patients not affected by USN (mean aged 63.57±7.16 years) showed statistically significant differences only in OHI (p=0.03) and WTCLI (p=0.03).

CONCLUSIONS: Hygiene of left oral cavity was significantly worse than contralateral in right brain stroke survivors with USN. This study highlights the need to develop an adequate oral rehabilitation program in right stroke survivors with USN.

CARBIDOPA-LEVADOCA IMPROVES SPEECH APRAXIA AFTER OPEN TRAUMATIC BRAIN INJURY: A CASE REPORT

James J. Bresnahan, MD, Philip J. Kocher, DO, MS, and Mithra Manayepanda, MD
CASE DIAGNOSIS: Speech apraxia due to open traumatic brain injury.

CASE DESCRIPTION: A 24-year-old male with open traumatic brain injury (TBI) due to gunshot wound (GSW). Initial evaluation revealed a GCS of 3 with GSW to left arm, left abdomen, left flank, and left skull. Initial work up with CT-Head showed extensive subarachnoid hemorrhage and cerebral edema with residual bullet fragments in the posterior fossa. Thirty days later he was transferred to our rehabilitation hospital. His examination was notable for significant bilateral weakness, and severe impairment most consistent with speech apraxia.

The patient was started on amantadine 25-100mg twice daily on day 40. On day 46 of rehabilitation he was able to consistently answer yes-no closure cues, and 100% with verbal model.

CONCLUSIONS: This case presents a patient with speech apraxia that had a dose-dependent response to carbidopa-levodopa. Carbidopa-levodopa should be considered for treatment of speech apraxia.

CARING FOR A TRANSGENDER FEMALE PATIENT WITH SPINAL CORD INJURY: A CASE REPORT
Sarah M. Smith, MBBS, and Juan L. Asanza, MD
CASE DIAGNOSIS: C4 AIS B spinal cord injury (SCI) in a transgender female patient

CASE DESCRIPTION: A transgender female patient sustained a C4 AIS B spinal cord injury after MV ejection collision in July of 2016. The patient had initiated gender affirming transition therapies in 2004. She underwent orchietomy in February of 2004 and was on estrogen therapy until 2009, when it was discontinued in the setting of multiple DVTs and a pulmonary embolism. She was subsequently started on oral progesterone to maintain feminization, which was continued until the onset of her SCI. After consulting with endocrinology, she was restarted on progesterone approximately eight weeks after her initial injury.

DISCUSSIONS: Several questions pertaining to this individual’s care arose from providers and staff, including: (1) the appropriate gender of roommate(s) for this patient; (2) hormone therapy in the setting of acute SCI; and (3) gender assigned at birth. Though this is an uncommon form of unilateral spatial neglect (USN) with detrimental oral effects on right stroke survivors. Aim of our study was to compare the oral hygiene between the two halves of oral cavity in right stroke survivors with and without USN.

CASE OF INTRACTABLE HICCUPS IN LATERAL WALLERNBERG SYNDROME RELIEVED WITH BACLOFEN AND SPEECH THERAPY
Bestin Kuriakose, DO, and Anuja Korlipara, MD
CASE DIAGNOSIS: 68 year old Male with PMHx of HTN, HLD, Left CVA (2009) with residual prosopagnosia/balance issues presented to emergency room with dizziness, left sided facial droop, hoarseness, left upper and lower extremity weakness with MRI of brain showing left acute lateral medullary infarct, rehabilitation course was complicated with intractable hiccups.

CASE DESCRIPTION: On discharge to acute rehabilitation, patient had left facial droop, hemiparesis, ptosis, and loss of sensation on left side of face and was on a dysphagia III diet. Speech therapy focused on increasing swallowing function and increasing normalized response to sensory stimulation. Patient developed intractable hiccups which were refractory to various forms of oral therapy. Initially patient was started on Thorazine and Ativan to help abate the symptoms with minimal relief. Reglan was also used with minimal relief. Patient had full resolution of symptoms with Baclofen in conjunction with speech therapy who used various modalities including Neuromuscular Electrical Stimulation (NMES) which helped with dysphagia symptoms.

DISCUSSIONS: Patients with Wallenberg syndrome have an occlusion of the ipsilateral vertebral artery that gives rise to the posterior inferior cerebellar artery. Common risk factors include hypertension (most common), being male over the age of 55 and history of smoking, all seen in the patient. Hiccups occurs due to an involuntary, intermission, spasmic contraction of the diaphragm and intercostal muscles and represent a reflex arc made up of several neural pathways. Baclofen activates GABA which is an inhibitory neurotransmitter that relaxes skeletal muscles. NMES focused on direct stimulation of muscles, including the epiolitiss which is a spasmodic muscle seen with hiccups.

CONCLUSIONS: Hiccups are an unusual and difficult to treat symptom associated with Lateral Wallenberg Syndrome, the use of Baclofen in conjunction with modalities used in Speech Therapy such as NEMS device helped abate the symptoms with improvement of dysphagia as well.

CASE REPORT: COGNITIVE DECLINE IN A PATIENT WITH CADASIL
Christian B. De Allie, BS, Diane Thompson, MD, and Kristian von Rickenbach, MD
CASE DIAGNOSIS: Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leukoencephalopathy (CADASIL)

CASE DESCRIPTION: A 37 year old man with a history of migraines and erratic behavior resulting in MRI diagnosis of CADASIL (confirmed with Notch 3 genetic testing), presented with lethargy and declining cognitive function after recently being started on Haloperidol for mood changes. Initial MRI brain confirmed a right medsional and parietal acal aneculate infarcts and multiple white matter changes consistent with CADASIL. EEG was unremarkable for epileptiform discharges. The patient was subsequently transferred to acute inpatient rehabilitation unit for further management. At baseline, the patient was independent in ADLs and iADLs until 2018
when he experienced a rapid decline in cognitive function and was no longer able to work. He required frequent assistance and reminders from family to complete ADLs. While in inpatient rehabilitation, his exam was notable for paucity of movement and speech, delayed recall, and executive cognitive deficits in complex reasoning and problem solving. Expressive and receptive language were preserved.

**DISCUSSIONS:** CADASIL is a rare, inherited small vessel disease identified by Notch 3 mutation that presents with microvascular infarcts, diffuse white matter changes, and brain atrophy often leading to cognitive dysfunction, mood disturbances, and disability. 40% of patients with CADASIL display a lack of motivation and decreased voluntary behavior characterized as apathy. Mood changes secondary to depression, paroxysmal atrial fibrillation, and Haloperidol was considered. Compensatory strategies for memory, attention, and planning were taught by an occupational therapist with observable improvements. With physical therapy, he worked on balance, strengthening and ambulation prior to discharge home with physical therapy and a home health aide.

**CONCLUSIONS:** This case illustrates a rare disease leading to rapid cognitive decline in a middle-aged man. Early cognitive impairments such as attention, recall, and planning are commonly displayed in patients with CADASIL, while episodic memory is typically preserved.

**CASE REPORT: REHABILITATION CONCERNS IN STIFF PERSON SYNDROME**

Caroline Lee, MD, Barthelemy Liabaud, MD, and Walter Valesky, MD

**CASE DIAGNOSIS:** Stiff person syndrome (SPS) is characterized by progressive muscle stiffness, rigidity, and spasms involving the axial muscles. SPS has three variants: Classic, Partial, and Paraneoplastic. Diagnosis is made via glutamic acid decarboxylase (GAD) antibodies which causes a subsequent decrease in levels of gamma-aminobutyric acid (GABA).

**CASE DESCRIPTION:** A 78 year old female with no significant past medical history presented for one year of bilateral knee, hip, and back pain. The pain started in her hips and knees and progressed to her back, wrist, and shoulders. The patient gradually regressed from independent ambulation to use of a rollator secondary to several falls, from which, she reported agoraphobia secondary to fall anxiety. Imaging demonstrated degenerative disc disease but was negative for acute pathology. Despite a full course of physical and occupational therapy, her symptoms persisted. Rhenumatoid work-up was negative and the patient was referred to Neurology for neuromuscular work-up. GAD antibody testing was positive and the patient was diagnosed with SPS. The patient underwent twelve sessions of plasmapheresis and was started on valium for muscle spasms.

**DISCUSSIONS:** SPS is a rare disease that is more common in females in the 20-50 age range. Diagnosis is confirmed by the presence of anti-GAD antibodies and is treated with IVIG, plasmapheresis, and anti-spasmodics. Recent reviews note that patients may have the stetle reflex, head retraction reflex, and agoraphobia secondary to fall anxiety. Without early intervention, patients can progress to severe joint contractures and immobility.

**CONCLUSIONS:** As seen in our case, patients with SPS are difficult to diagnose as they present with complaints that are similar to those of aging: joint stiffness, pain, and difficulty ambulating. While our patient was older than typical, this differential should be considered in rehabilitation patients with multiple musculoskeletal complaints but whose work-up is otherwise negative.

**CENTRAL CORD SYNDROME RESULTING IN TETRAPLEGIA AFTER CHIROPRACTIC MANIPULATION**

James Cole, MD, and Sean Terada, MS3

**CASE DIAGNOSIS:** Central Cord Syndrome Resulting in Tetraplegia after Cervical Chiropractic Manipulation

**CASE DESCRIPTION:** A 69-year-old male with chronic neck pain and numbness presented after an episode of quadriparesis during mechanical massage from a chiropractor. Patient was moving from his back to his side after manipulation when he suddenly lost feeling in all four extremities but didn’t experience acute pain. On presentation to emergency department, he was at his baseline numbness in his upper extremities with loss of sensation and new weakness throughout upper and lower extremities bilaterally with increased tone in upper extremities. He denied bowel or bladder incontinence, new pain, loss of range of motion of neck, or vision changes. Cervical spine MRI demonstrated degenerative disease with acute central cord compression causing decreased cord signal changes including edema from C3-6. Patient underwent decompression and fusion from C3-C6 and required short stay in ICU for monitoring. Patient was subsequently admitted to inpatient rehabilitation, where he regained some strength but remained tetraplegic.

**DISCUSSIONS:** Tetraplegia is a rare complication of chiropractic manipulation and current research is lacking on the need for evaluation of underlying pathology to assess patients at increased risk for adverse events. Underlying cervical spine pathology may increase risk for developing central cord syndrome from cervical manipulation but there are no current guidelines for determining patients who are poor candidates for this intervention.

**CONCLUSIONS:** While chiropractic manipulation is a generally safe intervention for patients with chronic neck and back pain, some patients may be at increased risk for developing spinal complications with lasting sensory and motor deficits even after surgery with decompression and fusion. Further research should be done to examine risk factors for spinal injury after chiropractic manipulation with possible development of standardized assessment prior to starting chiropractic manipulation.

**CERVICAL ARTERIOVENOUS FISTULA: A RARE PRESENTATION OF CERVICAL MYELOPATHY**

Edward W. Ference, MD, Jason Lauer, MD, LTanya Lofh, MD, and Leon Chandler, MD

**CASE DIAGNOSIS:** Cervical Arteriovenous Fistula

**CASE DESCRIPTION:** A 46-year-old African American male with a history of tobacco abuse, hypertension presented to the emergency department with complaints of neck stiffness and thunderclap headache. Non-contrast CT head demonstrated a small intracranial hemorrhage in the third ventricle. CT angiography demonstrated enhancing tubular structures along the 4th ventricle and posterior spinal canal subarachnoid space extending to the C4 level, concerning for spinal arteriovenous fistula (AVF). Neurosurgery performed spinal arteriography confirming high flow fistula. The patient underwent complex endovascular embolization, requiring therapeutic sacrifice of the left vertebral artery at the C4 level. Postoperatively, the patient was found to have left greater than right sided weakness, loss of pin prick sensation, neurogenic bowel and bladder, with intact sensation to fine touch. MRI demonstrated T2 hyperintensity in the ventral cord from C4-C6. He made significant recovery with inpatient rehabilitation, ultimately discharging home with the ability to walk 400ft with a hemi walker.

**DISCUSSIONS:** Spinal vascular malformations make up 3-4% of intradural spinal lesions. The vast majority of spinal AVFs occur in the thoracolumbar area between T4 and L3. Spinal AVFs cause arteriolarization of the coronal venous plexus, resulting in vascular congestion, local spinal cord ischemia, and myelopathy. MRI is typically the first study utilized to evaluate the classic progressive myelopathy, demonstrating T2 hyperintensity and spinal cord edema across multiple levels. Serpiginous perimedullary vessels can be seen along the dorsal or ventral spinal cord. Spinal angiography is the gold standard for confirmation, and treatment involves microcatheter or endovascular embolization. Outcomes are directly related to the severity of symptoms at the time of diagnosis, with prolonged, severe deficits carrying poor prognosis for recovery.

**CONCLUSIONS:** Spinal arteriovenous fistulas are uncommon causes of spinal pathology, and cervical lesions are exceptionally rare. Our patient had neurological deficits following successful embolization, but made significant recovery with inpatient rehabilitation.

**CERVICAL DYSTONIA POST CERVICAL RHIZOTOMY: A CASE REPORT**

Rohit Namalam, DO, and Arny Hellman, MD

**CASE DIAGNOSIS:** Cervical rhizotomy is a radiofrequency nerve-blocking technique that selectively severe problematic nerves in the intradural space. It is used frequently for neck pain in those where medial branch block trials have proven efficacious as well as spastic disorders like cerebral palsy. Despite being a primary treatment option for cervical dystonia, cervical dystonia is also an extremely rare complication of cervical rhizotomy. Most literature on the subject focuses on the effectiveness of cervical rhizotomy for treatment of cervical dystonia, stating 20-30% improvement, while there have been none to few recorded cases of cervical dystonia as a side effect.

**CASE DESCRIPTION:** We present a case of a 55-year-old female with a past medical history of bipolar disorder and drug-induced parkinsonism who underwent bilateral C2-C5 cervical rhizotomy for chronic neck pain who developed severe cervical dystonia with right torticollis and laterocollis with muscle spasm and hypertrophy post-operative day two. Our patient underwent physical therapy for four months post dystonia presentation and along with this she received continued botulinum toxin injections to cervical musculature. She had a stable left hand tremor previously diagnosed with drug-induced parkinsonism secondary to levetiracetam.

**DISCUSSIONS:** This acute cervical dystonia was determined to be due to either peripheral nerve injury during rhizotomy or re-initiation of previously prescribed neuroleptics for bipolar disorder, but neither fit the timeframe. MRI brain did not show...
secondary causes of dystonia and MRI of cervical spine was contraindicated due to a spinal cord stimulator previously placed for left arm pain and paresthesias a year prior.

CONCLUSIONS: This scenario may be concerning for those considering cervical rhizotomy.

CHALLENGES IN REHABILITATION OF LARYNGOTRACHEAL INJURIES RESULTING IN VOCAL CORD PARALYSIS IN RESOURCE-LIMITED TERTIARY CARE CENTER

Mallikarjun Gunjiganvi, Master Of Chirargie, Trauma Surgery And Critical Care, Siddharth Rai, MD, and Amit Agarwal, MCH

CASE DIAGNOSIS: Laryngotracheal injury with vocal cord palsy. Laryngotraceal injuries are rare. They require multidisciplinary team work including trauma surgeons, ENT specialists, physiatrists, and speech therapists for restoring speech. Speech therapy in non-trauma scenarios follows established protocol strategies. But in trauma, due to unpredictable injuries to laryngotracheal complex, pose difficulty in rehabilitation. We present 2 cases of laryngotracheal trauma with vocal cord paralysis and rehabilitation difficulties.

CASE DESCRIPTION: Case 1: 19 year old female, accidental strangulation injury neck resulting in complete thyrotracheal disruption with avulsion of bilateral recurrent laryngeal nerves (RLN). Thyroid fracture fixation, thyrotracheal repair with tracheostomy was done. Post op fibre optic laryngoscopy revealed bilateral vocal cord paralysis. Case 2: 35 year old male with RTI, head injury, facial injury with laryngeal injury. Head injury managed non-operatively, thyroid cartilage grade 5 injury repaired with tracheostomy and later maxillary and mandibular fixation was performed. Fibre-optic laryngoscopy revealed bilateral vocal cord paralysis.

DISCUSSIONS: RLIN injury can result from ischemia, contusion, partial avulsion or complete transection. A patient with laryngotracheal injury need of addressing life threatening injuries result in delayed diagnosis. It is difficult to evaluate the vocal cord paralysis due to injury to recurrent laryngeal nerve injury owing to need of securing airway urgently and need of tracheostomy for prolonged period. Rehabilitation strategy involves evaluation, observation for spontaneous recovery, RLN reconstruction, laryngeal framework reconstruction surgeries, adjunctive therapy and assessing need of prosthetics. India is yet to have dedicated trauma system and integrated rehabilitation centers for trauma victims. Also most of trauma victims are below average socio-economic status and can't afford dedicated prosthetics.

CONCLUSIONS: Laryngotraceal injuries are rare but associated vocal cord paralysis causes significant morbidity. Integrated rehabilitation centers are required for effective training and restoring the voice to as near as possible.

CHALLENGES INREHABILITATION OF A CORPUS CALLOSUM INFARCTION PATIENT: A CASE REPORT

Yashesh A. Parekh, BS, Nadja Mencin, MD, and Gary N. Inwald, DO

CASE DIAGNOSIS: 57-year-old male with a history of hypertension and diabetes who presented with left-sided hemiparesis, wide-based gait, and dysmetria.

CASE DESCRIPTION: The patient’s MRI showed evidence of corpus callosum infarction. Subsequently, he was admitted to acute inpatient rehabilitation for upper extremity limitations. As of now, most of his left-hand movements were left-hand movements and balance while standing. The therapists commented on his decreased self-awareness and insights into his deficits, along with his difficulty with visual-spatial reasoning. The patient often missed the chair when trying to sit and bumped into obstacles during gait training. He also perceived his left upper extremity deficit to be more severe than objectively recorded. Participating in therapy was challenging due to deficits in sustained attention, delayed recall, and working memory. He was also susceptible to unpredictable emotional outbursts and periods of apathy.

DISCUSSIONS: As the corpus callosum receives a rich blood supply from both anterior and posterior circulation, corpus callosum infarction is a rare diagnosis. The often complex clinical presentation, which also lacks specificity, can be attributed to the inherent complexity of physiologic function conducted by the corpus callosum. The most common initial presentation in these patients includes higher-level neurologic dysfunction such as cognitive impairment, mental disorder, and sleep disorder with or without mild-to-moderate sensory and motor deficits. Given this wide spectrum of presentations, delayed diagnosis or treatment of these patients is common, which may contribute to the poor prognosis and higher recurrence rates associated with this diagnosis.

CONCLUSIONS: The rehabilitation of patients suffering from corpus callosum infarctions can be uniquely challenging, as the patients’ lack of self-awareness, difficulty following commands, and emotional liability can make it difficult for them to consistently participate in therapy. In light of these challenges, broader interdisciplinarity approaches involving neuropsychologists, to more efficiently tailor therapy to a patient’s specific needs, may be useful for preventing persistent functional impairment.

CHANGE IN BONE MINERAL DENSITY IN PATIENTS WITH SPINAL CORD INJURY DURING ACUTE PHASE AFTER INJURY MEASURED THROUGH DUAL-ENERGY X-RAY ABSORPTIMETRY

Muhammad Iram, MBBS, FCPS

OBJECTIVES: To compare the mean change in bone mineral density (BMD) at initial presentation and after three months during acute phase of spinal cord injury (SCI) and correlate it with age, gender, neurological level and severity of injury.

DESIGN: After taking permission from hospital ethics committee, traumatic SCI patients post one month were recruited and information was gathered through interviews and review of medical management charts, with consent. Examination and classification were established on severity and level of injury. DEXA scans were performed at admission and after three months, BMD measurements at lumbar spine and femoral neck expressed as T-score. Data was analyzed with SPSS 20. Paired sample t-test was applied to determine the mean change in BMD. Pearson’s correlation analysis correlated age with reduction in BMD while controlling level and severity of injury. Univariate analysis of covariance using general linear model controlling for age was applied to compare the mean reduction in BMD score amongst groups based on differing categorical variables.

RESULTS: Amongst 70 patients, 62 were male and 8 were female. The mean age was 33 ± 7. Majority had complete injury (71.4%) and had a level of SCI at or above T6 (54.3%). The mean T-score was significantly reduced after three months at lumbar spine (p< 0.001) and at femoral neck (p< 0.001). On comparing different variables, the mean T-score was significantly reduced at lumbar spine in patients with complete injury (p< 0.001) and neurological level above T6 (p< 0.001) and at femoral neck in patients with complete injury (p<0.003). Age and gender did not significantly affect the loss in BMD.

CONCLUSIONS: The BMD decreases following SCI at lumbar spine and femoral neck in the acute phase. The loss at lumbar spine and femoral neck is higher in patients with complete injury and neurological level above T6.

CHANGED TOLERANCE OF CERVICAL COLLAR AND WEAKNESS AS THE INITIAL PRESENTATION OF DEEP SURGICAL SITE INFECTION IN CENTRAL CORD SYNDROME PATIENT STATUS POST C2-5 POSTERIOR FUSION

Gabriel Kim, MD, MSe, Sean A. Lacey, DO, and Keith Myers, MD

CASE DIAGNOSIS: Deep surgical site infection in central cord syndrome patient who underwent posterior fusion

CASE DESCRIPTION: 60 year old man with cervical stenosis sustained a synchronous episode from a cervical fracture. He was found by a co-worker and reported being unable to move arms or legs. Diagnostic workup revealed C3-C4 fracture. All rupture and central cord syndrome. He underwent C2-C5 posterior fusion following day and received post-operative course of steroids. Upon transfer to inpatient rehabilitation service on post-op day 11, patient was noted to have 4/5 strength in arms and 5/5 strength in legs. Two days later, CT noted patient 2.5/5 strength in shoulders. He underwent C2-C5 corpectomy and C3-C4 fusion. For the first time in his life, he was able to raise his arms and 5/5 strength in legs. At post-op day 18, patient described subjective left arm weakness and Lhermitte sign.

DISCUSSIONS: According to literature review, reported surgical site infection (SSI) incidence following spine surgery ranges from 0.5 to 18.8%. SSI has slow, insidious onset and is often difficult to diagnose due to paucity of exam findings, minor symptoms, and dependence on plain X-rays that lack sensitivity. Most common presenting symptom is pain usually 1 month after the procedure. Intra-operative risk factors include surgical invasiveness, and type of fusion. Pre-operative levels of inflammatory markers such as ESR and CRP should be compared with post-operative levels when suspecting SSIs. MRI is diagnostic modality of choice when SSI is suspected. Samples from wound drainage should be sent for Gram stain and cultures.

CONCLUSIONS: Patients who undergo inpatient rehabilitation after spine surgery should receive daily neurological exams and be monitored for increased pain or discomfort, especially in those with pre-operative and intra-operative risk factors.

CHANGES IN POSTURAL COMPONENTS DURING WHOLE-BODY REACHING TRAINING

Hirosi Saito, PhD, RPT, Satoshi Kasahara, PhD, RPT, and Hiroshi Goto, PhD, RPT

OBJECTIVE: A reaching movement is an important action adopted as a rehabilitation treatment. It is well known that motor components such as the peak velocity of arm movements improve through reaching training. However, it remains unclear how postural components such as ankle joint movements improve during...
reaching training. Therefore, we investigated that changes in joint movements and muscle activities of lower limbs during reaching training.

**DESIGN:** Fourteen healthy subjects (23 ± 1 years) performed reaching training to a small target placed in the maximum reach distance as quickly as possible. Reach movements were repeated 100 trials a day. The reaching training was consisted of five consecutive days included rest for one day. Hip, knee, and ankle joint angles were calculated using a three-dimensional motion analysis system. Muscle activities of tibialis anterior (TA) and gastrocnemius (GAS) was recorded. Mean value in the first 10 trials on the first training day was compared with that of the first 10 trials on the other training day during using one-way repeated measure ANOVA and a post-hoc test.

**RESULTS:** No significant difference was found in maximum joint angles, range of joint movement, and damage of the main muscle activity. Both GAS and TA activities increased significantly from reaching training (p < 0.01). Also, the maximum ankle dorsiflexion angle increased (p < 0.05), and the appearance time of the maximum angle occurred earlier (p < 0.05). Furthermore, TA activities increased in the initial phase of reaching (p < 0.01). These effects were retained after rest for one day (p < 0.05).

**CONCLUSIONS:** We found that ankle joint movements changed through reaching training and TA activity to drive the ankle joint movement increased. These results suggest that reaching training leads to improvement in postural components related to initiation of forward whole-body movement. The changes in postural components may be contributed to the improvement in motor components during reaching training.

**CHARACTERISTICS OF NON-LINGUISTIC COGNITIVE IMPAIRMENT IN POST-STROKE APHASIA PATIENTS**

Yu Wei Zhang

**OBJECTIVES:** Many aphasia patients had non-linguistic cognitive impairment, the study aimed to investigate the association between language functions and non-linguistic cognitive functions in patients with aphasia after stroke.

**DESIGN:** A total of 135 stroke patients were recruited. The Western Aphasia Battery (WAB) and the oral fluency scale of Chinese aphasia and their non-linguistic cognitive functions were evaluated. The patients were divided into post-stroke aphasia group and non-aphasia group. The LOTCA scores were compared. Potential confounders were adjusted in the multivariate analysis. Finally, partial correlation analysis between the sub-scores of various language functions from the WAB and the non-linguistic cognitive function scores from the LOTCA test was performed.

**RESULTS:** The total LOTCA score in the aphasia group was significantly lower than the non-aphasia group (75.34±17.48 vs. 96.90±7.71, respectively, P< 0.01), and the scores in both groups were lower than the normal group. Except for visual perception, other cognitive sub-tests were all impaired in the aphasia group. The LOTCA score of the non-fluent aphasia group was lower than the fluent aphasia group (67.58±17.43 vs. 82.50±14.44, respectively, P< 0.01). The total score and each cognitive sub-score of the LOTCA in the aphasia group was linearly positively correlated with language function of the WAB and the aphasia quotient (AQ) (r=0.291,0.738, P= 0.05, P= 0.01, respectively).

**CONCLUSIONS:** Non-linguistic cognitive impairment exists in post-stroke aphasia patients. Non-fluent aphasia patients have more severe cognitive impairment than the fluent aphasia patients.
OBJECTIVES: Climate change is known to affect the frequency and severity of extreme weather events. Persons with disabilities and, in particular, individuals with a spinal cord injury (SCI) are especially vulnerable to extreme weather events due to impairment of temperature regulation, mobility, personal care, and everyday functioning. Yet the extreme weather events. Persons with disabilities and, in particular, SCI patients about disaster preparedness; however, 85% expressed interest in further education and resources. Further education and resources must be made available for health care professionals. Moreover, climate change is an ongoing, increasing problem to address these issues. Further education and resources must be made available for health care professionals. Moreover, climate change is an ongoing, increasing problem to address these issues.

RESULTS: Respondents included 125 rehabilitation professionals working in SCI. Fifty percent were from Europe, 19% from North America, 19% from Asia, 7% from Australia and South America. Most (74%) were physicians, while 12% were physical therapists. Of respondents, 58% acknowledged local climate had changed, 22% reported it had not, and 18% were unsure. Of those reporting a changing local climate, 70% noted an impact on patient’s health. Temperature, dehydration, fatigue, respiratory problems, mood changes, and accessibility were the greatest concerns. Provider-reported preparedness to address climate change and weather disasters for patient’s had a median score of 4 on a 0-10 scale (SD 2.1) whereas provider-reported patient preparedness had a median score of 3.45 (SD 2.26). Only 25% of respondents acknowledged providing education to their patients with SCI about disaster preparedness; however, 85% expressed interest in further information about extreme weather and climate concerns for people with SCI.

CONCLUSIONS: Many rehabilitation professionals working in SCI acknowledge issues about extreme weather and climate change but are inadequately prepared to address these issues. Further education and resources must be made available for health care professionals. Moreover, climate change is an ongoing, increasing problem without borders. Therefore, resources must be developed in multiple languages and future research needs must be anticipated.

CLINICAL AND FUNCTIONAL ASPECTS OF THE REMAINING LIMB OF LOWER LIMB AMPUTEES: EQUIPMENT DIFFICULTIES IN AN AFRICAN CONTEXT
Koffi Benjamin Manou, Professor Of Medicine, Konan Joseph Kouakou, Assistant Medicine, Cisse Ali, Master Of Orthopedic, Awo Dorcas Akadje, Assistant Medicine, Abdouramane Mohamed Kaba, Internal In Hospital, Abdouramane Coulibaly, Pmr Specialist, Manse Beatrice Ndanjui, Professor Of Medicine, and Kan Serge Paçôme Yao, Internal In Hospital

OBJECTIVES: Describe the different residual limb anomalies post lower limb amputations and the adjustment challenges in a black African population secondary to various amputation causes.

DESIGN: A descriptive prospective study where patients underwent clinical examination on the quality and functional tests of the residual limb prosthetic construction and deambulation specific to amputees fitted at the Orthopedist Center-Vive Debutot at the University Hospital Center of Yopougon in Côte d’Ivoire from 2016 to 2018.

RESULTS: The study recruited 323 patients with lower limb amputations identified from a total population of 1792 patients admitted to the orthopedic center with a frequency of 18.02% (traumatic and vascular causes were the most represented with 52.94% and 32.5% respectively). The majority of sit amputations were transfibular at 70.28%. There were 123 cases of stump abnormalities (38.08%) including: trophic disturbances in 11 cases, 54 cases were abnormalities of length, and 11 cases of painful nerves of stump.

Skin pathology related to the maladjustment of the prosthesis was seen in 37 cases. The mobility performance of the fitted amputees showed that the degree of autonomy according to Houghton’s score was on average 9.6/12. The average distance to the TM6 was 479.33 meters. Univariate analysis revealed a statistically significant association between the quality of the residual limb and the mobility performance of the amputee.

CONCLUSIONS: Traumatic and vascular amputations of the lower limbs are surgically managed on the one hand under emergency conditions with the priority objective of saving the life of the patient and on the other hand belatedly related to limited financial means of the neediest patients. This still does not lead the orthopedic surgeons in our context to make a useful stump for a future prosthesis adapted to an adequate mobility performance and a quality locomotor function. Amputation of the lower limbs whatever the cause is stigmatized with negative consequences on the autonomy and quality of life. The hope of eventual recovery of locomotor function as close as possible to the amputee’s previous condition depends on the quality of the residual limb. However, the residual limbs of the amputees are the frequent site of stump anomalies with a consequence of difficulties in prosthetic use.

CLINICAL CHAPLAINCY: THE NEW ELEMENT IN BRAIN INJURY REHABILITATION
Jordan Adler, MD, David H. Glazer, MD, DABPMR (BIM), and Brad M. Bradley, MD

OBJECTIVES: The Richmond Veterans Administration Polytrauma Rehabilitation Center (PRC) is a 20-bed inpatient unit which specializes in the rehabilitation of veteran and active duty service members who have sustained traumatic brain injuries. A clinical chaplain is embedded as a full-time member of the interdisciplinary rehabilitation team. The chaplain provides clinical pastoral care for all patients. The primary goal of the chaplain is to improve rehabilitation outcomes. Prior studies have demonstrated that spirituality helps improve rehabilitation outcomes. However, these studies have not examined the value of a dedicated chaplain for patients with a brain injury.

RESULTS: Anonymous survey was administered to PRC patients asking them what they find different about working with patients with a brain injury and their families in the PRC versus in other hospital units.

RESULTS: Responses from the patients were very positive. The chaplain responses were also positive but identified some of the challenges they face when working with patients with a brain injury.

CONCLUSIONS: The results of this study are similar with prior studies which demonstrate that spirituality helps improve rehabilitation outcomes. This study also provides justification for the implementation of full-time unit chaplains in an inpatient brain injury center as well as the importance of educating chaplains on how to interact with a patient who has sustained a traumatic brain injury.

CLINICAL HIGHLIGHT OF ELECTRODIAGNOSTIC TESTING IN DIAGNOSIS OF TARSAL TUNNEL SYNDROME: A CASE REPORT
Vishal Bansal, BSC, and Ankur D. Mehta, DO

CASE DIAGNOSIS: Tarsal tunnel syndrome; posterior tibial nerve entrapment

CASE DESCRIPTION: A 65 year old female presented with a one week history of right knee and right foot pain associated with numbness and tingling sensation on the plantar surface of her right foot. Past history reveals a recent knee replacement surgery and a well-healed incision in the anterior line of the knee on physical examination. She reported her symptoms started shortly after the surgery. Further evaluation revealed mild vascular changes but did not meet Budapest criteria that would qualify for complex regional pain syndrome. Electromyography and nerve conduction studies were ordered and revealed posterior tibial nerve entrapment. Positive Tinel sign inferior to the medial malleolus was also noted, further supporting the diagnosis. A posterior tibial nerve block with a corticosteroid was recommended and provided relief of symptoms.

DISCUSSIONS: The clinical presentation of tarsal tunnel syndrome can vary depending on the exact segment of the tibial nerve or its branches (calcaneal, medial and lateral) that are involved. Electromyography and nerve conduction studies demonstrate high sensitivity and specificity. Nerve conduction studies in this patient revealed prolonged distal onset latency and reduced amplitude in the right tibial motor nerve.

CONCLUSIONS: Detailed electrodiagnostic testing in addition to clinical evaluation can prove to be a powerful diagnostic tool in diagnosis of tarsal tunnel syndrome. This case highlights the clinical importance of electromyography and nerve conduction studies to determine idiopathic causes of tarsal tunnel syndrome that have not responded to conservative management.

CLINICAL NEUROLOGIC LEVEL OF INJURY AND EARLY MRI LEVEL OF INJURY IN TRAUMATIC SPINAL CORD INJURY (SCI): IS THERE A CORRELATION?
Lisa Pascual, MD, Debra Hemmerle, RN, Talbott Jason, MD, PhD, Jacqueline Brennahan, PhD Michael Beattie, PhD, Vinodita Singh, MD, Jonathan Pan, MD, PhD, William Whetstone, MD, Philip Weinstein, MD, Xuan Duong Fernandez, BA, Thomas Leigh, BA, and J. Russell Haei, PhD

OBJECTIVES: Following SCI, determination of the neurological level of injury (NLI) and American Spinal Injury Association Impairment Scale (AIS) grade may be difficult due to medical instability. Retrospective studies have examined the role of early MRI as a surrogate for classifying injury severity. Correlations between the longitudinal extent of injury on MRI and clinical NLI (cNLI) and between MRIs and AIS grades (using the Brain and Spinal Injury Center [BASIC] score) have been demonstrated. Our objective was to ascertain if early MRI accurately correlates with cNLI in SCI.

DESIGN: Prospective data (2015-2019) for Level 1 Trauma Center SCI patients (N=120) were analyzed. Early MRIs (< 24 hours post-injury) and cNLIs (<48 hours, 24-48 hours, and 48-72 hours post-injury) were obtained. Neuro-radiologists determined three NLI measures: cranial and caudal margins of the manually segmented lesion and injury epicenter using the BASIC score. Experienced clinicians determined cNLIs and AIS grades. Non-parametric Spearman correlation analyses were...
COGNITIVE ASSESSMENT IN VIRTUAL REALITY AFTER TRAUMATIC BRAIN INJURY

Daria Mukhamedova, SPECIALIST, Eduard Novak, MD, Natalia Slepneva, SPECIALIST, and Vadim Li, PhD

OBJECTIVES: Patients with traumatic brain injury (TBI) have everyday life problems due to cognitive impairment. While the traditional neuropsychological examination combines the assessment of separate cognitive functions (e.g., memory, attention), the everyday performance is underestimated as a combination of these functions. Virtual reality (VR) is promising to solve this issue in an integrative approach applied in a safe and controlled environment.

DESIGN: All patients with TBI admitted to the Department of Rehabilitation of Pirogov Center in the first decade of 2019 were assessed with the traditional quantitative and qualitative neuropsychological tests and with the tests adjusted to VR environment. The latter aimed to stimulate daily activities with different cognitive demands.

RESULTS: In total, 62 patients were included. The results revealed a dissociation between paper neuropsychological tests and VR-based daily functioning assessment. On the one hand, the majority of patients with cognitive impairment were able to function independently and perform everyday life tasks in VR, which is expected for mild cognitive impairment by neurological tests. However, present data do not reveal any correlation with long-term cNLIs. The injury epicenter demonstrates the closest agreement with cNLIs, although at 2-4 dpi, the relationship differed as cNLIs were more rostrally located.

CONCLUSIONS: Our prospective data demonstrate significant correlations between cNLIs and cNLIs performed < 48 hours and 2-4 days post-injury, with cNLIs found to be more rostral (p = 0.05). The closest agreement with cNLIs and least overall bias was at the BASIC epicenter.

COGNITIVE BEHAVIORAL THERAPY FOR TRAUMATIC BRAIN INJURIES: A SYSTEMATIC REVIEW AND META-ANALYSIS

Xin Li, MASTER, and Qing Du, PhD

OBJECTIVES: Over the last years, many scientific studies showed that cognitive rehabilitation and psychological therapies are beneficial to brain injuries, but it is still not clear whether cognitive behavior therapy (CBT) has a favorable effect on traumatic brain injury (TBI). This systematic review and meta-analysis aimed to assess the effects of CBT on TBI, with databases including PubMed, Embase, the Cochrane Library, Cumulative Index to Nursing and Allied Health (CINAHL), and Web of Science were systematically searched for English-language parallel-group studies reporting the effect of CBT in TBI patients published up to July 2019. Outcomes, including depression, anxiety, post-concussive symptoms, self-reported sleep quality, cognitive deficits and dysfunctional behavior and adverse events were investigated. Differences were expressed using mean difference (MD) with 95% confidence interval (CI). The statistical analysis was performed using RevMan (5.3).

RESULTS: 13 trials with 700 TBI patients were included and provided data for the meta-analysis. Statistical improvement was shown in depression, reported as HADS-D (MD -1.31, 95% CI -2.56 to -0.05; P = 0.04), and BDI-II (MD -2.66, 95% CI -4.96 to -0.36; P = 0.02); as well as in anxiety, reported as HADS-A (MD -1.22, 95% CI -2.05 to -0.39; P = 0.004). Significant difference for self-reported sleep quality and dysfunctional behavior was shown as improvement on Pittsburgh self-reported sleep quality index (PISQ) (MD -1.73, 95% CI -2.3 to -1.17; P < 0.00001) and child behavior checklist (CBCL) (MD -2.78, 95% CI -4.55 to -1.01; P = 0.002). No significant decrease was reported regarding post-concussive symptoms or the cognitive deficits. Furthermore, no major adverse events related to CBT was reported in the included trials. The overall quality of evidence ranged from moderate to very low.

CONCLUSIONS: Evidence is underpowered to suggest that CBT is effective in the management of TBI. Future studies with a larger population are recommended to determine significance.

COMBINED TBI AND Physical Therapy for Traumatic Brain Injury (TBI)

Jinfeng Li, Haoyu Xie, Zhijin Xu, and Xi Chen

CASE DESCRIPTION: Myasthenia gravis (MG) associated with Parkinson’s disease (PD)

CASE DESCRIPTION: A 55-year-old male patient was diagnosed as MG 42 years ago with bilateral ptosis, double vision, and the neostigmine test (+). The symptoms increased at night and decreased in the morning. The patient was treated long-term with pyridostigmine, and the ptosis improved significantly. Ten years ago, he developed bradykinesia and no swing on the left upper limb when walking. When he was diagnosed as PD by neurologists in 2010. At present, the symptoms of the patient manifested as bilateral ptosis, head drop, pelvis with left lateral tilt, scoliosis in the thoracic vertebra, and typical Parkinson’s features of resting tremors, bradykinesia, and rigidity in the left upper limb.

DISCUSSIONS: To our knowledge, this case is the third in the world to be reported where MG predisposed PD. Drug treatment alone is difficult to re-establish the neurotransmitter equilibrium because increasing dosages of anti-PD or anti-MG drugs will aggravate the symptoms of each other. Physical therapy, including posture correction, gait training and technical training with the visual and auditory feedback, was added to improve the symptoms of PD, thereby maintaining or reducing the dose of anti-PD drugs and improving the symptoms of MG which anti-PD drugs will aggravate. Considering the low exercise tolerance of patients with MG and PD, the core principles are low-intensity, short-duration to control the fatigue accurately, and to raise the quality of life. Moreover, physiotherapists should continuously pay attention to patients’ conditions and be alert to MG crisis during therapy.

CONCLUSIONS: When MG and PD coexisted in patients, personalized medical treatment plans should be scheduled. Both physical therapy and drug treatment play essential roles in patients with MG and PD.

COMPARING WEIGHT CHANGES IN THE POST-ACUTE SETTING ACROSS DIFFERENT DIAGNOSES

Beenu Pujar, MBBS, Jillian M. Williams, Vikram Madan, MPH, and Carolin I. Dohle, MD

OBJECTIVES: Strokes are the World’s leading cause of disability. Approximately two-thirds of patients do not fully recover after strokes and one third cannot walk on their own. Studies have examined whether stroke alters metabolism the same way as other neurological injuries, and not found a change in resting energy expenditure. Weight loss after stroke is a phenomenon reported in the literature, but it is unclear whether this is due to stroke specific sarcopenia or due to deconditioning as result of hospitalization. We here investigate whether weight loss differs between stroke, traumatic brain injury and debility patients.

DESIGN: This is a retrospective study of patients admitted to Burke Rehabilitation Hospital with a diagnosis of stroke, traumatic brain injury or debility. Charts were retrospectively assessed and measures like preadmission/acute care weight, weight upon admission to Burke, discharge weight, Functional measure of Independence Score(FIM) demographics and diet ordered were recorded. All the measures were analyzed to examine whether weight loss is similar between patients with debility, stroke or Traumatic Brain Injury(TBI), and whether degree of weight loss is correlated with functional outcomes.

RESULTS: Paired t-test within the groups for acute care admission to discharge weight in TBI patients n=17 showed P value 0.018, mean difference -12.9 and in stroke patients n=25 showed P value 0.0026, mean diff = -8.29 which implies the change in body weight from acute care admission to discharge has significant weight loss at the time of discharge. However, there was no significant weight loss in the Debleity patients n=27.

CONCLUSIONS: There is significance in weight loss in both the Stroke and TBI patients which gives the opportunity to further assess the body composition changes after stroke.

COMPARISON BETWEEN ELDERLY GYMNASTICS AND 30-MINUTE WALKING TO IMPROVE ENDURANCE IN THE ELDERLY GROUP

Noemiek Noergaehni, SPKFR-K, alip Nofiani Devi, FT, Dewi Masrifah Ayuh, SPKFR, and Akhmud Suslojii, FT
OBJECTIVES: elderly, elderly gymnastics, 30-minute walking exercises, endurance, six minutes walking test.

DESIGN: This was a quasi-experimental study with pre and post test group design involving 40 elders in a senior citizen health center. They were split non-randomly into two groups of 20 people each. (1) Elderly Gymnastics group (2) 30-minute walking exercise group. All exercises were done for 3 times a week for 4 consecutive weeks. The endurance was measured using Six Minutes Walking Test. Analysis data was performed using EZR (Easy R).

RESULTS: In group 1, the pre and post results showed significant improvement of 17.72 minutes and 19.19 minutes respectively (p<0.000179). In group 2, the pre and post results showed 17.86 minutes and 17.80 minutes respectively (p<0.0096). There was no significant difference between the pre and posttest difference of both groups showed that there was a statistically significant difference (p<0.00278).

CONCLUSIONS: Elderly Gymnastics showed better and significant improvement in Six Minutes Walking Test compared to 30-minute walking exercise. Elderly Gymnastics can be an alternative to improve endurance in the elderly.

COMPARISON BETWEEN RIGHT AND LEFT ANTIHYPERALGESIC EFFECT OF VAGAL NERVE NEUROSTIMULATION IN A MOUSE MODEL OF PERIODIC INFLAMMATORY PAIN

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OBJECTIVES: Osteoarthritis (OA) is a predominant pathology with aging and occurs mainly in women. OA is refractory to various forms of treatment and is accompanied by persistent inflammation. Noninvasive vagal auric nerve (aVNS) stimulation has shown surprising results in the treatment of inflammatory conditions, including OA. Objective: To compare the effects of left and right ear aVNS at different times on mechanical hyperalgesia in an animal model of inflammatory pain. Design: The study was approved by the ethics committee under No. 18.048.2.07.IV. Female Swiss mice (35-45g) submitted to intraplantar injection of Complete Freund's Adjuvant (CFA) were distributed (n = 8 animals / group) into the following groups: CFA + aVNS off 30'; CFA + aVNS 10', CFA + aVNS 20' and CFA + aVNS 30'. aVNS parameters were: Frequency (1) = 2 Hz; Pulse width (1) = 700 μs; Time (1) = 5 seconds; Resting time = 0. Frequency (2) = 10 Hz; Pulse width (2) = 200 μs; Time (2) = 5 seconds; Resting time = 0. Mechanical hyperalgesia was evaluated with von Frey monofilaments (0.6g) applied to the right hind paw at 6 and 96hs after CFA injection.

RESULTS: The results showed that aVNS for 10 min induced better anti-hyperalgesic effect (p < 0.05) both at 6 and 96 hours after CFA injection, when compared to 20 min and 30 min stimulation.

CONCLUSIONS: aVNS for 10 min in the left ear was more effective in reducing mechanical hyperalgesia in both phases of the inflammatory profile induced by CFA intraplantar injection.

COMPARISON OF ELECTRODIAGNOSTIC STUDY WITH CLINICAL AND ULTRASONOGRAPHIC PARAMETERS BEFORE AND AFTER TREATMENT OF PATIENTS OF CARPAL TUNNEL SYNDROME WITH EXTRACORPOREAL SHOCKWAVE THERAPY

Renu Ambardar, MBBS, DPMR, DFM, and Diaa Shehata, FRCPC

OBJECTIVES: To find out improvement in Electrodiagnostic study in patients with Carpal tunnel syndrome treated with Extracorporeal shockwave therapy.

DESIGN: Adults with mild to moderate carpal tunnel syndrome (MAYO CLINIC CLASSIFICATION) were included. Patients presenting with tingling, numbness in first, second or third digits, pain, positive Tinel sign were evaluated using Boston carpal tunnel syndrome questionnaire (BCTSQ) scores calculating symptom severity score (SSS), functional status score (FSS), ultrasonographic evaluation and nerve conduction study to confirm the diagnosis. Painful patients were subjected to Extracorporeal shock wave therapy (ESWT) once a week for 4 weeks and received total of four sessions. BCTSQ was used to record SSS and FSS. Visual analogue scale (VAS) was used for evaluating the pain. Ultrasonographic measurement of median nerve cross sectional area (CSA) at the carpal tunnel inlet was calculated for each patient. Nerve conduction study (gold standard for diagnosing carpal tunnel syndrome) was done and latency and conduction velocity for both median motor and median sensory was recorded. All the parameters were repeated after treating patient with ESWL.

RESULTS: Five patients were included in the study (5 hands) with average age 46.5 (Four female and one male). There was improvement in BCTSQ score (SSS improved 47.14% and FSS 40.14%) VAS score (70.89%) and there was marginal improvement in ultrasonographic evaluation. Nerve conduction parameters motor latency improved by 13.37% motor CV 13.76% as well as sensory latency 16.52% and sensory CV 23.15% which was consistent with improvement in clinical findings. BCTSQ SCORE, VAS SCORE as well as ultrasonographic findings.

CONCLUSIONS: This is the first Preliminary study showing clear benefit of extracorporeal shockwave therapy in mild and moderate carpal tunnel syndrome using the gold standard Electrodiagnostic study which correlated with the clinical signs and symptoms, BCTSQ, VAS score and ultrasonographic evaluation. We recommend larger study to validate the finding of our study.

COMPARISON OF LEARNING STYLES AMONG POST GRADUATE RESIDENTS AND FULL TIME SPECIALTY CLINICIANS PURSUING HIGHER EDUCATIONAL DEGREE

Nasir Mansoor Sahibzada, MBBS, FCPS(PMR), MCPPS(HPE), MSC PAIN MEDICINE

OBJECTIVES: to compare the different learning styles preferences among full time specialty clinicians and post graduate residents.

DESIGN: quantitative cross sectional comparative study. Participants were sampled using random sampling technique. All residents were obtained in training center. The sample size was calculated as 382 participants. In this study, two groups, post graduate residents and full time specialty clinicians currently enrolled in higher degree education program. self administered questionnaire including demographic data and Honey and Mumford learning style questionnaire was distributed. spss version 22 was used for statistical analysis.

RESULTS: there were 70 participants, 40 residents and 30 consultants. Mean age for consultant was 46.53 and for resident was 27.63. there were 45 males and 25 females. Average weekly study hours for consultants was 12.67 and resident was 11.13 (0.741). 96.7% consultants used internet while 75.7% of residents used internet. self study was used by 90% of consultants and 62.25 % of residents (p=0.0009). all the consultant managed time by scheduling, time management, weekends, late nights, leaves, early mornings and peer assistance. 72.55 residents did not use any strategy for time (p=0.000). Majority of both groups had more than one learning style(2-3). learning style combination of consultant was Reflector theorist (57%), reflector pragmatist (16.7%), activist pragmatist (10%), activist reflector (13.3%), learning style combination for residents was activist theoretician and activist reflector 22.5% each, reflector theorist 27.5% and reflector pragmatist 12.5% (p=0.023).

CONCLUSIONS: consultants have a much better learning style and better time management techniques as compared to residents. Reflector, theorist and pragmatist are the predominant learning style of consultants while Activist theoretician is the predominant learning style of post graduate residents.

COMPARISON OF MICROANALYTES AND SELF-REPORTS IN PEOPLE WITH MYOFASCIAL PAIN, WITH AND WITHOUT WIDESPREAD PAIN

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OBJECTIVES: To find out improvement in Electrodiagnostic study in patients with Carpal tunnel syndrome treated with Extracorporeal shockwave therapy.

DESIGN: Adults with mild to moderate carpal tunnel syndrome (MAYO CLINIC CLASSIFICATION) were included. Patients presenting with tingling, numbness in first, second or third digits, pain, positive Tinel sign were evaluated using Boston carpal tunnel syndrome questionnaire (BCTSQ) scores calculating symptom severity score (SSS), functional status score (FSS), ultrasonographic evaluation and nerve conduction study to confirm the diagnosis. Painful patients were subjected to Extracorporeal shock wave therapy (ESWT) once a week for 4 weeks and received total of four sessions. BCTSQ was used to record SSS and FSS. Visual analogue scale (VAS) was used for evaluating the pain. Ultrasonographic measurement of median nerve cross sectional area (CSA) at the carpal tunnel inlet was calculated for each patient. Nerve conduction study (gold standard for diagnosing carpal tunnel syndrome) was done and latency and conduction velocity for both median motor and median sensory was recorded. All the parameters were repeated after treating patient with ESWL.

RESULTS: Five patients were included in the study (5 hands) with average age 46.5 (Four female and one male). There was improvement in BCTSQ score (SSS improved 47.14% and FSS 40.14%) VAS score (70.89%) and there was marginal improvement in ultrasonographic evaluation. Nerve conduction parameters motor latency improved by 13.37% motor CV 13.76% as well as sensory latency 16.52% and sensory CV 23.15% which was consistent with improvement in clinical findings. BCTSQ SCORE, VAS SCORE as well as ultrasonographic findings.

CONCLUSIONS: This is the first Preliminary study showing clear benefit of extracorporeal shockwave therapy in mild and moderate carpal tunnel syndrome using the gold standard Electrodiagnostic study which correlated with the clinical signs and symptoms, BCTSQ, VAS score and ultrasonographic evaluation. We recommend larger study to validate the finding of our study.
CONCLUSIONS: Our findings distinguish patients with WSP from nWSP on the basis of micro-analytic profiles including NE, DHEA, dopamine and IGFI. A higher NE concentration suggests WSP is associated with pain facilitation. These findings offer promise for future applications of biomarker profiles the diagnostic workup of patients presenting with MPS. Future studies are needed to assess mechanisms contributing to the unique biomarker profiles characteristic for each condition.

COMPLETE VOCATIONAL REHABILITATION AFTER COMPLETE ISOLATED HAND PARALYSIS FOLLOWING STROKE: A CASE REPORT.

Mahmut T. Kacer, MD, Joel Fandel, BS, Kathy Wann, BS, Kasandra Erazo, BS, Rasha Kakish, OT/L, Maria Chiechi, MD, and Eric L Ahschuler, MD, PhD

CASE DIAGNOSIS: Isolated hand paralysis following left cortical hand knob area ischemic stroke

CASE DESCRIPTION: A 68-year-old man presented with near complete paralysis of his dominant right hand following stroke with nearby muscle groups only minimally and transiently impaired. Sensation remained fully intact; no facial droop or dysarthria. Strength was 5/5 throughout bilateral shoulders and elbows, with right wrist extension 5-/5 and right wrist flexion 4-/5. Hand muscle strength ranged from 1+ to 2-. CT scan confirmed an acute ischemic infarct of the left frontal lobe, a location consistent with the cortical hand knob area. Recovery of adjacent muscle groups was observed within hours, and the patient’s only lasting deficit was severe weakness of all hand muscles with sparing of the wrist and face. He underwent occupational therapy, undergoing putting, strengthening with resistance bands, and performing fine motor tasks like picking up coins and rolling a pen through his fingers. Long finger extensors and flexors returned to 5/5; residual weakness in hand intrinsic muscles remained.

DISCUSSIONS: This case serves as an example of complete vocational recovery following stroke and brings to question the unusually favorable prognosis of strokes of the cortical hand knob area. We discuss how simple noninvasive studies of patients with isolated hand paralysis from ischemic stroke may be helpful in revealing mechanism of recovery.

CONCLUSIONS: Within 6 weeks our patient had complete clinical recovery with independence in all activities of daily living (ADLs) as well as the ability to return to manual labor as a custodian, though with some residual deficits in fine dexterity of the right hand and weakness of hand intrinsic muscles. Formal study of the rehabilitation patterns of patients with complete hand paralysis following stroke may improve our understanding of the neural substrates of recovery of this stroke entity and appropriate treatment protocols for optimized recovery.

COMPLETION RATES OF SLEEP APNEA SCREENING MEASURES IN TBI SURVIVORS UNDERGOING INPATIENT NEUROREHABILITATION

Marie Dahdah, PhD, Risa Nakase-Richardson, PhD, Jessica Ketchum, PhD, Emily Almeida, MS, and Kathleen Bell, MD

CASE DIAGNOSIS: Sleep apnea (SA) has been effectively screened in community populations without known neurologic or cognitive sequelae. Several measures have been developed to screen for suspected SA. Some are established as gold standard measures by the American Academy of Sleep Medicine (AASM). This study examines completion rates for three well established SA screening measures/indices in TBI survivors: Berlin, STOP-BANG, and MAPI. SA is an important condition to screen, completion rates for three well established SA screening measures evaluated, with MAPI evidencing the highest participant response rate, followed by STOP-BANG, and Berlin. Differences in verbage for similar items partially impacted response rates. A future study conducting receiver-operating characteristics (ROC) curve analyses to analyze differential sensitivities and specificities of each screening measure at the item-level would be beneficial.

COMPLICATED REHABILITATION COURSE OF A PATIENT RECOVERING POST-CRANIOTOMY FROM A NEUROSURGICAL RESECTION OF RARE PARAGANGLIOMA. A CASE REPORT

Jennifer M. Cushman, MD, and Raj Murthy, MD, MPH

CASE DIAGNOSIS: Rare case presentation of a paraganglioma of the head that resulted in dizziness and balance impairment, swallowing and speech pathology, right sided diplopia, and severe headaches, as well as severe hypertension. This case discusses the multidisciplinary approach to the rehabilitation management following a craniotomy of a rare brain neoplasm.

CASE DESCRIPTION: 38 year-old female with no significant PMH presents to IRF in order to engage in inpatient rehabilitation to address problems with diploia, balance, speech and swallow impairments, and management of eames and vomiting following a craniotomy of a rare brain paraganglioma.

DISCUSSIONS: Paragangliomas are rare neoplasms that arise from extra-adrenal chromaffin cells. Larger neoplasms that are localized in the head and neck region may cause cranial nerve palsies, commonly impinging the vagus and hypoglossal nerves causing swallowing impairment. A paraganglioma that lies close to the structures, Gliomas tympanicum and Glomus jugulare can present as a middle ear mass resulting in tinnitus. About only 3% of paragangliomas are found in the head and neck region. Many can present with findings such as malignant hypertension, headache, and visual and balance abnormalities depending on location of the head and neck. Many complications such as speech and swallow impairment, balance, diplopia, and impairment of breathing resulting in intubation following resection of brain tumor may result.

CONCLUSIONS: This patient presented with a rare brain neoplasm that required extensive inpatient therapy due to worsening of her mental status and impaired cognition throughout therapy. This case outlines a multidisciplinary approach necessary to optimize therapy and strategize the management of patients presenting with this rare neoplasm. Our case study emphasizes the importance of a multidisciplinary team approach during a patient’s inpatient rehab course dealing with the various complications resulting from this rare brain neoplasm.

COMPLICATIONS OF ORBITAL COMPARTMENT SYNDROME IN AN AMPUTEE FOLLOWING CRANIOTOMY

Michael E. Farrell, MD, and John Asell, MD

CASE DIAGNOSIS: Orbital compartment syndrome resulting in visual deficits following craniotomy and frontal lobe mass resection.

CASE DESCRIPTION: A 76 year old male with past medical history of PVD, and subsequent above the knee amputation, was admitted for acute inpatient rehabilitation following elective resection of a right sided brain mass. While in the community he experienced head trauma when his motorized scooter tipped. Head CT revealed a frontal mass suggestive of a meningioma. He underwent bifrontal craniotomy for resection of the mass following the procedure he developed elevated right sided orbital pressure, altered vision, and anisocoria. He was diagnosed with right sided orbital compartment syndrome and underwent right lateral canthotomy. Deficits following the procedure included complete vision loss and afferent pupillary defect from an optic nerve injury. He received a course of dexamethasone as well as a short course of acute inpatient rehabilitation to address new challenges with ambulation and douching and donning his prosthesis given vision loss.

DISCUSSIONS: Compartment syndrome is a surgical emergency that can arise in an acute inpatient rehabilitation setting. It is caused by an increase in pressure within a fascial compartment from bleeding or rapidly accumulating edema. Compartment syndrome most commonly occurs in the limbs where increased pressure and swelling leads to the hallmark findings of pain, numbness or tingling, and lack of a pulse. In rare cases of compartment syndrome occurring outside of the limbs recognition of classic signs and symptoms may become difficult. In patients who have undergone craniootomy it is important to consider cranial compartment syndrome as a differential if neurologic structures become compromised following a surgical procedure.

CONCLUSIONS: In patients who have undergone craniootomy, cranial compartment syndrome is a rare but serious surgical complication which must be considered while a patient is recovering in the acute inpatient rehabilitation setting.

COMPRESSION VERSUS ISCHEMIA: AN ACUTE ONSET OF TRANSIENT PARAPLEGIA, PARESthesia, AND URINARY RETENTION DURING HYPTERTENSIVE URGENCY

Elaine K. Gregory, MD, Ray Chang, MD, and Arshia Etesam, MD

CASE DESCRIPTION: An 85 year-old female presented to the emergency department with altered mental status, abrupt onset of generalized weakness, and decreased level of consciousness. A computed tomography of the head revealed a right frontoparietal acute ischemic stroke.
CASE DIAGNOSIS: Acute onset of Transient Spinal Cord Ischemia and Spinal Cord Injury in the Setting of Hypertensive Urgency and Radiologic Evidence of Multilevel Lumbar Stenosis

CASE DESCRIPTION: A 71-year-old active male, while seated had an acute onset of paraplegia and paresthesia. On exam, systemic blood pressure (SBP) was 220, lower extremities were cold, pulseless, with loss of reflexes. One dose of Labetalol, decreased his SBP to 180 with return of doppler signals, motor, and sensory function. Extensive imaging, Electromyography/Nerve Conduction Studies (EMG/NCS) and laboratory exams on blood and spinal fluid were performed. Magnetiic Resonance Imaging (MRI) of the Lumbar Spine revealed moderate to severe spinal canal stenosis (L2-4), and moderate to severe bilateral foraminal stenosis (L2-L5), Investigations for inflammatory causes were negative. EMG/NCS revealed chronic right L5 radiculopathy. He received steroids, but had poor response. His neurologic symptoms slowly improved with mild strength and sensory deficits upon discharge.

DISCUSSIONS: Lumbar spinal stenosis (LSS) causes significant disability in the aging population. LSS includes pathologic anatomic narrowing at the intraspinal canal, lateral recess or neural foramen. Compression and/or ischemia at the nerve roots can produce neurologic symptoms. MRI can identify sites of compression, but findings often don’t correlate with symptoms. Unlike lumbar disc pathology, currently for LSS, consensus guidelines aren’t established. Alternatively, transient ischemia, due to spinal stroke, severe vasoconstriction or decreased perfusion with his existing lumbar pathology might explain the rapid reversibility of his symptoms.

CONCLUSIONS: The exact pathophysiology of LSS is unknown, but compression and/or ischemia at the nerve roots is proposed. Compression can be direct (oressus) or indirect (increased intrathecal pressure, venous congestion or decreased arterial perfusion). MRI findings don’t necessarily correlate with disease or prognosis. Physiatrists should be aware of the pathophysiologic of LSS and the pitfalls in its diagnosis, interpreting all information in the context of their history and physical exam findings.

CONCOMITANT NEUROMYELITIS OPTICA AND SYSTEMIC LUPUS ERYTHEMATOSUS IN HIV/AIDS PATIENT PRESENTING WITH BROWN SEQUARD SYNDROME: A CASE REPORT

Steven Tijmes, DO, and Joanne Delgado Lefron, MD

CASE DIAGNOSIS: Transverse myelitis secondary to systemic lupus erythematosus and neuromyelitis optica spectrum disorder (NMOSD).

CASE DESCRIPTION: 61-year-old female with a history of HIV/AIDS who presented with left sided weakness which began two days PTA. Physical exam revealed severe left sided weakness with right sided diminished pain/temperature sensation from the right mid-thorax extending to the toes. MRI showed longitudinally extensive severe abnormality from T2-C7 slightly eccentric to the left without cord compression. Patient was diagnosed with transverse myelitis, an infectious etiology was ruled out and she received 5 days of IV methylprednisolone with good response and minimal residual deficits. While admitted to inpatient rehabilitation facility, rheumatologic workup revealed positive anti-DsDNA/RNP/Smith antibodies and ANA titer of 1:640 suggesting SLE as well as positive Aquaporin-4 antibody leading to the diagnosis of NMOSD.

DISCUSSIONS: This rare case of concomitant SLE and NMOSD presenting as a Brown Sequard Syndrome in the setting of HIV/AIDS provides an opportunity for discussion regarding the coexistence of these multiple disorders and possible impact in patient’s functional capacity. Prior reports have described the coexistence of NMOSD with a variety of immune-mediated disorders. However, many questions have yet to be answered, including the possibility of a shared autoimmune pathophysiology, prevalence of co-occurrence, type and severity of attacks, response to treatment, prognosis, etc. Another question involves the potential for long-standing HIV/AIDS to affect this patient’s susceptibility to auto-immune diseases. One proposed mechanism linking NMOSD with HIV involves early detection of HIV life cycle markers in astrocytes which, when damaged, are the predisposing factor to developing NMOSD.

CONCLUSIONS: The above case offers a rare presentation of multiple coexisting disease processes. While further epidemiological and clinical studies are necessary to determine a true association between these diseases, our hope is that reporting such cases may lead to further understanding, investigation and improved management of such patients in the future.

CONSTIPATION OR SYRINX? THE STRANGE CASE OF SEVERE REFRACTORY ABDOMINAL PAIN IN SPINAL CORD INJURY

Neal Rakesh, MD, MSE, Jonathan Ramin, DO, and Stephen Kornfeld, MD

CASE DIAGNOSIS: Syrinx in spinal cord injury (SCI) presenting as severe abdominal pain.

CASE DESCRIPTION: A 71-year-old male with T7 ASIA A after a fall (status post T7-12 posterior fusion and T9-10 laminectomies) initially presented with mild abdominal pain. Six months later, he was admitted to the hospital for severe refractory generalized burning abdominal pain. An extensive workup by gastroenterology was unremarkable. The pain was refractory to duloxetine, cyclobenzapine, gabapentin, and ibuprofen. Additionally, his opioids were stopped to prevent worsening constipation. He endorsed mild pain relief with diazepam. An MRI revealed a large thoracic syrinx from T3-5. Four months later, the patient underwent bilateral C2-C7 laminectomies with C3-6 laminoplasties for cervical spondylody. Subsequently, he reported a complete resolution of abdominal pain. A repeat MRI revealed significant thoracic syrinx shrinkage. Two weeks later, his abdominal pain returned with a subsequent MRI revealing an increase in thoracic syrinx size with extensive cord atrophy around the area. Currently, he is undergoing evaluation for surgical syrinx drainage.

DISCUSSIONS: SCI is associated with a variety of complications such as autonomic dysreflexia, neurogenic bowel/bladder, sexual dysfunction, osteoporosis, spasticity, and syringomyelia. Syrinx formation is common in the SCI population as a likely result of focal necrosis and cord tissue liquefaction. Within 3-4% of SCI patients, it can progress towards worsening myelopathy presenting as motor/sensory symptoms, bowel/bladder dysfunction and pain. While constipation is a common complaint in the SCI population, severe refractory abdominal neuropathic-type pain can be indicative of a worsening neurologic status from a syrinx

CONSTRAINT-INDUCED MOVEMENT THERAPY COMBINED WITH ROBOTIC TRAINING AFTER BOTULINUM TOXIN INJECTION IN CHRONIC STROKE PATIENTS WITH SEVERE OR MODERATE AFFECTED UPPER EXTREMITY

Yuki Uchiyama, MD, PhD, Saya Iwasa, MD, Yasunari Hashimoto, MD, Jun Asog, MD, Toshiki Yasukawa, MD, Kazuko Takahashi, MD, Northiko Kodama, MD, PhD, and Kuzuhisa Doman, MD, PhD

OBJECTIVES: Constraint-induced movement therapy (CIMT) is a standard therapy to improve affected upper extremity motor function in chronic stroke patients. However, it is known that CIMT has limited practical significance for stroke patients with severe or moderate hemiparesis. Recently, robotic training and botulinum toxin injection have been interesting options as an add-on intervention to CIMT. This study aimed to examine the effect of combined therapy of robotic training and botulinum toxin injection with CIMT on improving upper extremity function in chronic stroke patients with severe or moderate hemiparesis.

DESIGN: This retrospective study included chronic stroke patients who underwent CIMT at a college hospital between 2012 and 2019. The study received ethical approval for the use of an opt-out methodology by the ethics committee. From one week after botulinum toxin (Botox) injection, the patients received one hour of robotic training (ReoGo-J) and 0.5 hour of CIMT three per week for 10 consecutive weeks (total 45 hours of training). The Fugl-Meyer Assessments (FMA), Action Research Arm Test (ARAT), and Motor Activity Log (MAL) were used before and after intervention. Between-group differences were analyzed by Wilcoxon single-rank test.

RESULTS: A statistically significant increase between before and after intervention was observed in all outcomes (FMA, ARAT, MAL amount of use and MAL quality of movement).

CONCLUSIONS: This study suggested that CIMT combined with robotic training following botulinum toxin injection may enhance the recovery of motor function with practical significance in chronic stroke patients with severe or moderate hemiparesis after stroke.
specific tasks were chosen according to her most difficult UP motor abilities. As far as it improved, other tasks were chose. We assessed different UE movements as forearm's pronation and supination, wrist extension, finger's flexion, extension and abduction. Post intervention, the function of upper extremity decreased from 26.25 to 17.2 seconds in WMFT. MAL showed an increased from 1,85 to 4.5 points. These mean a better velocity and useful function motor of upper extremity hemiplegic.

**CONCLUSIONS:** CIMT protocols proved to be effective for improving post stroke UP functionality in this case report.

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**CONUS COMPRESSION FROM SPINAL EPIDURAL ABSCESS AFTER TRIAL SPINAL CORD STIMULATOR LEAD REMOVAL: A CASE REPORT**

Gaurish Soni, DO, Satyam Parikh, MD, and Anita Kou, MD

**CASE DIAGNOSIS:** Conus Compression from Spinal Epidural Abscess after Spinal Cord Stimulator Trial Lead Removal

**CASE DESCRIPTION:** 39 year old male with chronic back pain syndrome underwent trial Spinal Cord Stimulator (SCS) placement with marked symptom improvement and subsequent removal of leads. Four days later, patient developed intractable back pain, fever, and urinary retention. MRI revealed fluid collection dorsal to thoracolumbar dura with conus compression. Elevated inflammatory markers, leukocytosis, and fevers resulted in repeat imaging, confirming epidural abscess. Patient completed eight weeks of IV antibiotics. Physiatry was consulted for comprehensive rehabilitation after patient demonstrated impairments in mobility and self-care. After a twelve day acute rehabilitation course, patient was discharged to home at a modified independent to complete independent level.

**DISCUSSIONS:** Removal of trial external SCS has not typically been associated with epidural complications such as abscesses. Spinal epidural abscesses have notoriously been secondary to bacteremia, surgical intervention, or spinal injections. A handful of cases have been associated with SCS implantation; however, there are no documented cases of abscesses after a trial SCS removal. It is essential to be familiar with clinical presentations in order for prompt attention and management.

**CONCLUSIONS:** This case further supplements evidence of variations in spinal epidural abscess etiology. Even with aseptic removal of a successful trial SCS, the risk remains. Aforementioned in prior literature, the prompt diagnosis depends on clinical presentation of back pain. Upper motor neuron signs such as urinary retention can develop alongside fevers and elevated inflammatory markers. Prompt recognition of these symptoms are imperative for favorable treatment outcomes.

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**CORRELATION BETWEEN HEART RATE VARIABILITY AND BLADDER SENSATIONS DURING FILLING AND VOIDING PHASE OF URODYNAMIC STUDY IN PATIENTS WITH MYELOPATHY**

Anupam Gupta, MD, and Tenzil Gomez, MD

**OBJECTIVES:** Correlation between heart rate variability (HRV) and bladder sensations during filling and voiding phase of urodynamic study-UDS in patients with myelopathy.

**DESIGN:** Myelopathy patients (traumatic and nontraumatic) within 6 months of illness were included. Demographic data, epidemiopathological diagnosis & urinary complaints were noted. UDS was performed and simultaneous HRV calculated at each event of filling and voiding phase by recording and calculating standard deviation of normal-to-normal (NN) interval-SDNN, Root mean square of successive differences, total power-TP, average heart rate, high frequency-HF, low frequency-LF and LF/HF ratio and data analyzed.

**RESULTS:** Study included 30 patients (23 males) with mean age of 31.2 years (range 18-60 years, SD11.6). The mean of LF in normalized units showed an increase from 43.6 ± 14.1 at baseline to 48.9 ± 17.4 at strong desire to void (SDV) and at urgency to 44.1 ± 14.5. HF at baseline 40.4 ± 14.1 reduced to 36.4 ± 12.8 at SDV and rose at urgency to 41.2 ± 13.2. LF/HF at baseline was 1.3 ± 0.8, which increased to 1.6 ± 1.1 at SDV and reduced to 1.2 ± 0.6. Significant change in mean value was seen in TP (p<0.01) and SDNN (p<0.009) at First Desire to Void-FDV. Significant positive trend was seen in TP (p<0.048) and SDNN (p<0.042) during filling.

**CONCLUSIONS:** Comparison of HRV measures failed to show significant rise in sympathetic or parasympathetic component in myelopathy patients during urodynamic study and requires more critical evaluation.

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**CORRELATION BETWEEN STATE OF CONSCIOUSNESS (WHIM) AND FEEDING MODALITY (FOIS) IN SEVERE TRAUMATIC BRAIN INJURY**

Anna Cadeau, René Mallart, and Eric VERIN, MD, PhD

**OBJECTIVES:** 80% of severe TBI suffer from swallowing disorders, with consequences of pneumonia and further impairment of their outcome. The aim of this retrospective study was to look for a correlation between feeding modalities (FOIS, functional oral intake scale) and the state of consciousness (WHIM), or the level of post traumatic amnesia (GOAT). We also looked for a benefit of VFSS over the over evaluation modalities, and an exploratory correlation analysis was realized.

**DESIGN:** We reviewed the clinical information of 68 VS (vegetative state) or MCS (minimal conscious state) patients (mean age 44 ± 6) regarding oral feeding and psychometric parameters. VS or MCS diagnosis was made after repeated behavioural assessments using the WHIM scale (Wessex Head Injury Matrix). Post traumatic amnesia was assessed using the Galvestone outcome amnesia test (GOAT). Swallowing evaluation was made using either videofluoroscopy (VFSS), fiber endoscopy (FEES) or clinical examination. The main outcome statistics were performed using Pearson correlation analysis.

**RESULTS:** The feeding modality FOIS depended on the level of consciousness evaluated by WHIM (p= 0.60, p < 0.001). A VFSS evaluation seemed to increase that correlation (p= 0.80; p < 0.001), and to decrease the time needed to switch from semi-liquid to solid texture in oral feeding. The level of post-traumatic amnesia measured by GOAT (p= 0.34; p < 0.05) was also correlated to FOIS. The effect of the coma arousal unit on refeding was important d = 1.6, with an increase in FOIS of 3. There was still a positive evolution of FOIS after discharge.

**CONCLUSIONS:** FOIS is strongly correlated to WHIM and moderately correlated to GOAT, suggesting an impact of post-traumatic amnesia on swallowing. GOAT and WHIM scales could be used to determine the more appropriate moment to perform VFSS, adjusting the benefit risk balance in this frail population. Swallowing stimulation should be maintained after discharge.

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**CORRELATION OF MUSCLE ACTIVATION CHANGES WITH FUNCTIONAL IMPROVEMENT AFTER FES INTERVENTION IN PATIENTS POST STROKE**

Tong Wang, Bachelor, Chih-Hong Chou, Doctor, Yong Bao, Master, Manzhao Hao, Doctor, Lin Gu, Master, Chuanxin M Niu, Doctor, Qiong Xie, Master, and Ning Lan, Doctor

**OBJECTIVES:** Functional Electrical Stimulation (FES) assistance enables activation of target muscles to restore impaired muscle synergies toward normal patterns. It provides a technology for rehabilitation of motor functions in the post-stroke. Muscle synergies can represent a central neural module that organizes and activates a group of muscles for performing a certain task. This study examines whether muscle synergy changes in post-stroke patients after FES intervention is correlated to improvement of motor ability.

**DESIGN:** Muscle synergies and movement kinematics before and after a 5-day FES intervention in the post-stroke are evaluated, and Pearson correlation analysis is used to evaluate the relations of these performance indices with Fugl-Meyer clinical scores. Electromyography (EMG) signals and movement kinematics were recorded in 9 patients in FES group and 8 patients in control group before and after the intervention. The baseline synergies from a normal subject are used as the template for formulating the FES pattern. Similarity indices are computed to indicate the closeness of muscle synergies before and after FES intervention with the normal template.

**RESULTS:** The results showed that compared with the control group, synergy similarity in the FES group was significantly increased, but the kinematics did not demonstrate a significantly improvement. The changes in synergy similarity was correlated significantly to the increase in Fugl-Meyer scores in all patients in both groups.

**CONCLUSIONS:** The results imply that even in a short-term (5 days) intervention, synergy-based FES assistance starts to show its effectiveness in reorganizing neural circuits in the brain, which leads to repairing of the impaired muscle activation pattern towards the normal pattern. However, the recovery of motor ability has not been reflected in kinematics yet, such as velocity and duration time during the movement. Nevertheless, the results suggest that a larger scale efficacy study of long-term intervention using the synergy-based FES strategy is justified.

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**CORTICOBASAL SYNDROME IN THE INPATIENT REHABILITATION SETTING: A CASE REPORT**

Erol Jahja, DO, Morgan Pyne, DO, Melita Theyagaraj, MD, and Henry S. York, MD
CASE DIAGNOSIS: Corticobasal Syndrome (CBS) secondary to Progressive Multifocal Leukoencephalopathy (PML).

CASE DESCRIPTION: 69-year-old man actively undergoing chemotherapy for MALT Lymphoma, who developed progressive left-sided weakness over three months, resulting in three falls. Brain and Cerebral MRI showed an old right frontotemporal infarct, stable dolicohematocrit right vertebral and basilar artery with mass effect on the right side of the medulla and a tiny cervical syrinx extending from C5-C7. Spinal tap showed albuminocytologic dissociation and oligoclonal bands. Neurology reported apraxia due to CBS from either an autoimmune or paraneoplastic process. Symptoms responded well to plasmapheresis. During inpatient rehabilitation, he was able to ambulate with moderate assistance until he rapidly developed apparent left-sided hemiparesis, including apraxias and weakness. Brain imaging was negative for CVA and more careful examination utilizing distraction revealed severe apraxia. Imaging subsequently showed increased signal intensity in the gray matter extending into the periventricular and subcortical white matter, consistent with Progressive Multifocal Leukoencephalopathy (PML). He was again treated by plasmapheresis with good response.

DISCUSSIONS: CBS can be seen in many conditions, including PML. CBS is an atypical parkinsonian syndrome presenting with varying degrees of ideomotor apraxia, akinesia, rigidity, myoclonus, and cortical sensory loss with an un-sustained response to levodopa. Although CBS was originally thought to solely be a motor disorder, it is now known to have a cognitive component, with cognitive deficits often presenting before the onset of motor symptoms.2 Utilizing the Modified Bak and Hodges Criteria, physicians can support the diagnosis of CBS over CVA in the setting of neurological changes.2

CONCLUSIONS: CBS remains a difficult diagnosis given the wide range of cognitive, behavioral and motor aspects that can vary greatly among patients. While treatment remains symptomatic, disease-modifying agents targeting the pathologic process are currently undergoing development.3

CRANIOPLASTY: TIMING, OUTCOMES AND QUALITY OF LIFE

Harry Moe, MBMS, Angelos Kolias, Gemma Whiting, Fahim Anwar, and Peter Hutchinson

OBJECTIVES: Following a craniectomy for TBI or an MCA infarct, a cranioplasty is usually performed between 6-12 months later with the main aims of restoring skull integrity and cosmesis. The number of early cranioplasties is increasing; however, the timing of ‘early and late’ remains varied and debated.1,2 The evidence base is expanding but there is a lack of high-quality prospective studies. Moreover, the definitions of neurological recovery vary significantly. A randomised trial will help answer the question around optimal timing of cranioplasty. A core outcome set (COS) will hopefully standardise the endpoints that should be measured and will facilitate cross-study comparisons.

DESIGN: A single-centre, pilot, prospective, parallel group randomised trial with 1:1 allocation ratio to early vs late cranioplasty of participants 16 yo. The Cranioplasty COS is a mixed methods study divided into 2 phases. Phase 1 is information gathering of current outcomes used in cranioplasty studies. Phase 2 is the Delphi study and formation of the core outcome set. Alongside is a phenomenological qualitative study exploring the issues and hurdles that affect the patients quality of life before and after a cranioplasty.

RESULTS: Recruitment is for 12 months from April 2019. To date, 12 patients have been recruited, 7 eligible and 6 enrolled (86%). Participants stratified depend- ing on aetiology. Baseline data at 2 months and further timepoints at 6, 12 and 18 months from craniectomy date. The primary outcome is the GOSE at 6 months.

CONCLUSIONS: A cranioplasty has so many different dimensions and although its complications are well documented there is no universal consensus on the optimal time for the operation, and only minimal, inconclusive, evidence base to aid clinicians. This work, hopefully, will help to tackle a few of these issues and help better understand the hurdles and difficulties a patient may face before and after a cranioplasty.

CRYPTOGENIC STROKE AND HETEROZYGOUS MTHYLENE-TETRA-HYDRO-FOLATE-REDUCTASE (MTHFR) POLYMORPHISM

Lawrence G. Chang, DO, MPH, Mery Elashvili, MD, DO, and Shirin Ardeshirzadeh, MD

CASE DIAGNOSIS: Multiple Stroke Infarcts and Heterozygous MTHFR Gene Mutations

CASE DESCRIPTION: MS is a 42 year old female with history of heavy alcoholism, preeclampsia, recent Mirena IUD placement about a year ago, and a heavy alcoholic history. Mirena IUD does not seem to be stroke related since its complications are well documented there is no universal consensus on the optimal time for the operation, and only minimal, inconclusive, evidence base to aid clinicians. This work, hopefully, will help to tackle a few of these issues and help better understand the hurdles and difficulties a patient may face before and after a cranioplasty.

DISCUSSIONS: A literature review was conducted to examine the relationship between MTHFR and stroke as a new biomarker for stroke predisposition. Most studies postulate that MTHFR gene mutations increase hyper-homocystinemia with risk of thrombotic events and abortions. The homozygous MTHFR form is associated with an increase in strokes. On one hand, the MTHFR A1298C mutation increases ischemic stroke risk. On the other hand, the MTHFR 677T variant increases hemorrhagic and ischemic strokes risk in the lacunar region and small cerebral or intracranial arteries. Heterozygous MTHFR is cited as less likely to cause strokes due to a 50% reduction of MTHFR activity compared to homozygous MTHFR.

CONCLUSIONS: MTHFR can increase risk of ischemic strokes, but the extent to which the heterozygous form predominates is still unclear. In this case, however, it is theoretically plausible that the heterozygous form predisposed the likelihood of multiple acute stroke infarcts when other risk factors were in play such as having a PFO and a heavy alcoholic history. Mirena IUD does not seem to be stroke related since no studies support this but IUD removal may be advised if one develops a new stroke. The public health significance is to raise awareness of genetic risk factors for strokes and discuss about preventative measures for this.

DELAYED NEUROLOGICAL DEFICITS FOLLOWING SPINAL CORD STIMULATION AND THE IMPORTANCE OF PATIENT EDUCATION: A CASE REPORT

Eric Liu, DO, Tomas W. Salazar, MD, Beverly Hon, MD, and Sara Cucurullo, MD

CASE DIAGNOSIS: Paraplegia following spinal cord stimulator trial and implantation.

CASE DESCRIPTION: A 70-year-old male with a past medical history of lumbar spinal fusion, left sided foot drop, and gout, who initially presented to the acute care hospital for lower extremity weakness with bowel and bladder incontinence. History was significant for a spinal cord stimulator (SCS) trial five days prior to presentation. Patient reportedly did well following the procedure and was discharged home. Three days later he started developing gait abnormalities with associated bowel and bladder incontinence. Upon presentation, the spinal cord stimulator leads were removed by neurosurgery and CSF leakage was noted. Steroid taper was initiated and he was noted to have improvement in his lower extremity strength before being discharged to acute inpatient rehabilitation hospital for intensive therapy program.
DISCUSSIONS: Risks and side effects are discussed with patients prior to any procedure. These often include bruising, bleeding, tenderness at site, or infection. Documented complications related to SCS implants include lead migration, lead fracture, hardware malfunction, infection, CSF leak, and hematoma. Although the risk for neurologic deficits remains rare, providers are still obligated to educate patients regarding warning signs and symptoms that necessitate immediate evaluation. While this patient experienced delayed onset of neurologic decline, prompt evaluation resulted in improvement of his neurologic and functional status. Further delay in treatment could have led to more permanent disability.

CONCLUSIONS: While newer techniques and leads have reduced overall complication rates, complications can still occur. Early identification of neurologic deterioration following spinal cord stimulator implantation can be critical for patient outcomes. Detection of acute changes in strength, sensation, bowel and bladder continence warrants immediate evaluation. This case highlights the importance of physician and patient education. Awareness of serious complications following SCS procedures and early recognition of symptoms can have a significant effect on a patient’s functional outcome.

DELAYED ONSET NEUROMYELITIS OPTICA
Erica R. Eldon, DO, Sammy Wu, BS, Charles Kent, DO, Michael Chiou, MD, Yasheesh A. Parikh, BS, and Vincent Huang, MD

CASE DIAGNOSIS: Neuromyelitis Optica
CASE DESCRIPTION: An 88-year-old male presented with chest pain and low-grade fever, was started on antibiotics for presumed pneumonia, and awoke the next morning with bilateral lower extremity weakness and numbness. MRI revealed central cord edema from C3 to T11. LP was significant for elevated protein to 91.5. He was found to have positive anti-aquaporin-4 IgG antibody by neuromyelitis optica/aquaporin-4 fluorescence-activated cell sorting. He was treated with methylprednisolone, one round of rituximab, and five rounds of plasma exchange without significant improvement.

DISCUSSIONS: Neuromyelitis optica (NMO) has a prevalence of 1 to 10 per 100,000 people. Typically, NMO has a median onset of 40 years of age, and there are limited reports of NMO in octogenarians. To our knowledge, there is no published literature to date that identifies why the diagnosis is more rare in the elderly. NMO is an autoimmune-mediated, demyelinating, inflammatory disorder where the immune system primarily targets the optic nerves and spinal cord but may also attack the brain and brainstem. Tests for the presence of anti-aquaporin-4 antibody should be carried out when an extensive spinal cord lesion is encountered. More than 70% of NMO patients test positive for NMO-IgG, (also known as the anti-aquaporin-4 antibody). For patients with acute or recurrent attacks of NMO, initial treatment is with high-dose IV methylprednisolone. In patients with severe symptoms unresponsive to glucocorticoids, treatment is with therapeutic plasma exchange.

CONCLUSIONS: Although NMO was not considered as the first-line diagnosis in our patient, it is important to consider neuromyelitis optica, regardless of age in patients with comparable signs and symptoms. Medical providers should be aware that disease onset can occur at late onset ages. Early diagnosis and treatment is essential to prevent further morbidity and mortality.

DELAYED POST-HYPOXIC LEUKOENCEPHALOPATHY: A CASE REPORT
Genevieve Jacobs, DO, Priya Chandan, and Matthew Adamkin

CASE DIAGNOSIS: Delayed post-hypoxic leukencephalopathy
CASE DESCRIPTION: A 56-year-old male with a history of alcoholism, hypothyroidism, and anxiety undergoes elective cervical spine fusion. One week following discharge, he was found down at home after ingesting pain medication and alcohol with subsequent hypoxic brain injury. Within 2 weeks of injury, the patient was able to talk and follow commands before then developing profound functional deficits including decreased mobility, cognition, swallowing, and Parkinsonism symptoms. Upon arrival to acute inpatient rehabilitation, the patient demonstrated akinetic mutism. Pertinent negatives included EEG, CT head, chest and abdominal imaging, blood and urine cultures, and pituitary labs. Vitals were stable throughout. Neurology and psychiatric evaluations failed to identify the etiology of the patient’s symptoms.

DISCUSSIONS: It was suspected the patient had developed a rare sequelae of anoxic brain injury - delayed post-hypoxic leukencephalopathy (DPHL) - which is characterized by cognitive decline after several days of lucidity following an anoxic brain injury. Case reports detail a similar clinical picture with akinetic mutism, cognitive impairments, and Parkinsonism symptoms that improved with Sinemet. MRI 18 days following anoxic event demonstrated T2-hyperintensity in the centrum semiovale which had not been present on the initial MRI performed 1 day before and 1 day after treatment. FA and ADC values of the corticospinal tract obliterates using DTI. Both patients were followed in TBI clinic for prior mild TBI complicated by post-concussion syndrome. Patient One is a 68-year-old female; four months after her trauma, her primary symptoms included vertigo, headaches, anxiety, impaired balance, and recent pulsatile left ear tinnitus. Physical exam was unremarkable. Imaging demonstrated T2-hyperintensity of left temporal lobe and right side of the brain. Patient Two is a 47-year-old male; 8 months after his injury, he was found down at home after ingesting pain medication and alcohol with subsequent resolution of tinnitus. In a TBI patient, these vague symptoms are usually manifestations of post-concussion syndrome. When considering alternative causes, AVF in particular may be overlooked as delayed presentation of traumatic AVF is exceptionally rare. Only two other cases of traumatic AVFs presenting over 72 hours after injury exist in the literature. The two patients in this report had traumatic AVFs which presented months after injury, highlighting the importance of keeping AVF on the differential throughout ongoing follow-up.

CONCLUSIONS: Traumatic AVFs are an uncommon but serious cause of neurologic symptoms after TBI. Traumatic dural AVFs typically present within 48 hours of trauma, but the two patients in this report presented months later. Identification of AVFs is especially important because treatment may improve symptoms and prevent significant morbidity and mortality. In both of these patients, work-up of pulsatile tinnitus led to appropriate diagnosis and treatment of dural AVFs with ultimate resolution of symptoms.

DEMONSTRATION THE IMPORTANCE OF EARLY REHABILITATION IN STROKE PATIENTS BASED ON DIFFUSION TENSOR IMAGING DATA
Berna Urkmez, MD, Yasar Keskin, MD, Bahar Atasoy, MD, Ayse Aralasmak, PROF, and Tocan Aydin, PROF

OBJECTIVES: The purpose of our study was to evaluate, through clinical examination, whether there was any difference between patients who underwent early rehabilitation and those who underwent late rehabilitation in terms of improvements in motor and functional impairment after rehabilitation, and also to evaluate this difference objectively by analyzing white-matter pathways (corticospinal tracts) using DTI.

DESIGN: Twenty-eight (28) adults (12 women, 16 men, average age 58 years) with first-time stroke who met the study criteria were divided into two groups depending on the duration of their stroke at the time of their presentation to our facility. Group 1 consisted of patients who underwent rehabilitation program within the first 1 to 4 weeks after stroke, whereas Group 2 consisted of patients who underwent rehabilitation program within 5 to 8 weeks after stroke. Both groups were evaluated using the BRS, FMA scale, FAC and BI scales. For cranial imaging, DTI was obtained 1 day before and 1 day after treatment. FA and ADC values of corticospinal tracts were measured using DTI. Patients were enrolled in a rehabilitation program, which was designed for a total of 4 weeks, with daily sessions lasting a total of 1 h on 5 days of a week.

RESULTS: There was no significant difference in terms of functional gains between the two groups. In both groups, the FA values of the corticospinal tract obtained with DTI before the treatment were similar, whereas the mean FA increase after treatment was higher in Group 1 than in Group 2.

CONCLUSIONS: In our study, all stroke patients gained functional benefits regardless of whether they underwent early and late rehabilitation. The fact that the mean corticospinal FA values of the early-rehabilitation patients, was higher than that
of the late-treatment patients, might indicate that early rehabilitation might be more effective in recovery of corticospinal tracts.

DEGENERATION MYOSITIS SEEN IN SPINAL CORD INJURY
Tyler Williamson, MB, BCH, Alexander Turfe, DO, and Michael Bush-Arnold, MD
CASE DIAGNOSIS: Degeneration myositis following anterior spinal artery infarct
CASE DESCRIPTION: A 51 year old female admitted to rehab unit with anterior SCI following anterior vertebral artery infarct of unknown etiology, negative vascular and rheumatologic workup. Admission exam findings included impaired motor function and atrophy with preservation of proprioception and light touch. During stay, she made mild improvements in muscle function, however was limited by right hip pain, thus requiring workup. X-Ray showed mild osteoarthritic changes to bilateral hips, and bone scan was not typical for heterotopic ossification. MRI demonstrated muscle edema in bilateral gluteus medius and minimus, proximal adductor muscles; as well as left gluteus maximus, right pectineus, quadratus femoris, and obturator externus muscles. CPK was normal, and negative rheumatologic work-up. We discontinued statin, as statin induced myopathy was possible despite normal CPK. Yet, pain persisted, prompting intraarticular corticosteroid hip injection which improved her pain. Follow up during outpatient therapy: she continues to progress, restarted statin, now without pain.

DISCUSSIONS: Degeneration myositis, usually seen in peripheral nerve entrapment, consists of acute (within 1 week, MRI normal), subacute (>3 weeks, MRI: mixed edema and atrophy), and chronic (MRI: only atrophy) phases. With negative labs, positive radiographic findings, and no relief from discontinuing statins, we were able to make subacute degeneration myositis a diagnosis of exclusion. CONCLUSIONS: If MRI findings show edema and/or atrophy 3 or more weeks post SCI injury, consider the diagnosis of degeneration myositis in the context of a negative workup.

DESEMPEÑO FUNCIONAL DE DESARTICULADO DE RODILLA COMPARADO CON NIVELES TRANSTIBIAL Y TRANSFEMORAL
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CASE DIAGNOSIS: Comparar el desempeño funcional de tres niveles de amputación por medio de pruebas físicas estandarizadas.
CASE DESCRIPTION: Estudio retrospectivo a partir de la base de datos del departamento de Amputados y prótesis de un hospital de referencia del país, registrado en el software de captura de datos electrónicos RedCap. Se compararon las medianas de las pruebas funcionales Up and Go Test, L-test, alcance funcional y velocidad de marcha en 2 minutos por medio de estadístico no paramétrico para K medianas de las pruebas funcionales Up and Go Test, L-test, alcance funcional y velocidad de marcha en 2 minutos por medio de estadístico no paramétrico para K grupos, con análisis post hoc.

DISCUSSIONS: Se obtuvo una muestra de 109 amputados de miembro inferior valorados en un hospital de referencia de la ciudad, 76 (69,7%) transtibiales, 12 (11%) desarticulados de rodilla y 18 (16,5%) transfemorales. Se encontraron diferencias significativas para la velocidad de marcha, up and go test y L-test entre el nivel de amputación transfibular comparado con los niveles desarticulado de rodilla y transfemoral. No se encontró diferencia significativa para estas pruebas entre transfemorales y desarticulados de rodilla, pero si se observa una tendencia hacia un mejor desempeño entra más distal es la amputación. Para la prueba de alcance funcional no se encontraron diferencias entre los grupos.

CONCLUSIONS: Los amputados transtibiales tienen un mejor desempeño en pruebas de desplazamiento y movilidad dadas por una mayor velocidad para realizar dichas pruebas. En las pruebas que se relacionan con equilibrio, la distancia de alcance funcional no se encuentra diferencia en el desempeño entre los 3 niveles. Es probable que el nivel transtibial tenga mejor desempeño; no encontrar diferencia significativa entre transfemoral y desarticulado de rodilla implica que no cambia el desempeño al conservar un brazo de palanca de mayor longitud.

DESPERIMINE WITHDRAWAL SYNDROME COMPLICATING RECOVERY FROM HYPOXIC-ISCHEMIC BRAIN INJURY: A CASE STUDY
Mark L. Volker, BS, Jonathan Reisman, DO, Diane Mortimer, MD, and Kelli Hall, PHARM, BCPS
CASE DIAGNOSIS: Desipramine withdrawal in the setting of post-hypoxic myoclonus.
CASE DESCRIPTION: A 65-year-old male with depression suffered an anaphylactic reaction with loss of airway for approximately ten minutes. Complications included improved pain perception with post-hypoxic myoclonus. Desipramine was stopped while he was critically ill. He was admitted to the Acute Rehabilitation Unit on day 27. His Nonverbal Orientation Log (N-O-LOG) was 2/10. Myoclonus interfered with care and therapies. Within 3 weeks, N-O-LOG progressed to 9/10. On levitirametac and clonazepam, he achieved near-resolution of movements at rest. When he reported feeling depressed, desipramine was restarted. Within 2 weeks, his mood improved but his myoclonus worsened, and he became unsafe for transfers. Desipramine was rapidly weaned, calming his myoclonus. While his IADLs improved, his cognition declined with N-O-LOG of 0/10, and he became paranoid and physically aggressive. He was diagnosed with desipramine withdrawal syndrome. Two weeks into resuming desipramine, his N-O-LOG increased to 7/10.

DISCUSSIONS: An interdisciplinary team represented by psychiatry, pharmacy, and psychology proved vital in highlighting desipramine withdrawal as the cause of his acute changes. Desipramine is a tricyclic antidepressant whose actions include blocking serotonin and noradrenergic uptake. For the patient, discontinuation of desipramine resulted in improvement of his myoclonus but worsening of his cognition and mood. Because centrally acting medications, such as desipramine, have intended and unintended effects throughout the body, it is important to consider all previous medication adjustments when establishing a diagnosis.

CONCLUSIONS: To our knowledge, this is the first reported case of desipramine exacerbating post-hypoxic myoclonus, likely through the effects of one or both of serotonin or norepinephrine. In this complex case, where rehabilitation treatments for cognitive, motor, and mood symptoms were both overlapping and conflicting, identifying and addressing desipramine withdrawal paved the way for a better functional outcome.

DETECTION OF VISUAL FIXATION AND FUNCTIONAL OBJECT USE THROUGH SMART PHONE USE IN A PATIENT WITH A DISORDER OF CONSCIOUSNESS: A CASE REPORT
Nicole Diaz-Segarra, MD, and Benjamin Seidel, DO
CASE DIAGNOSIS: Smart phone use to detect signs of consciousness.
CASE DESCRIPTION: A 38-year-old male who sustained a severe traumatic brain injury underwent decompressive hemi-craniectomy and was discharged to rehabilitation in an unresponsive state on day 25. The Cora Recovery Scale-Revised (CRS-R) was performed using the patient’s smart phone to supplement the protocol. For visual fixation and functional object use, he was unable to consistently fixate on a balloon or use a pen to write as part of the CRS-R. He was, however, able to consistently fixate on his phone with a video of his daughter playing. In addition, when asked to answer an incoming call on his smart phone, he consistently “swiped” to answer, held the phone to his ear, and gave verbal responses including: “Hey”, “How’s it going?” “What’s up;” and “Talk to you soon.”

DISCUSSIONS: There is currently no literature regarding smart phone use to assess for early signs of consciousness in patients with disorders of consciousness (DOC). Current clinical assessments rely on the observation of behavior responses to a stimulus, with the CRS-R being the most commonly used standardized tools. Standardized tests, however, may overlook certain manifestations of awareness. In this case, technology specific conscious behaviors for visual fixation and functional object use were observed earlier than CRS-R specific behaviors. This approach has the potential to assess for early signs of consciousness and may ultimately be able to assist clinicians in differentiating between unresponsive wakefulness, a minimally conscious state, and emergence into full consciousness.

CONCLUSIONS: This case highlights the detection of visual fixation and functional object use in a patient with a DOC. While additional research is needed, this shows the utility of integrating smart phone technology into the assessment to detect for early signs of consciousness, particularly in the younger population whose familiarity with technology may reinforce existing cortical pathways.

DETERMINANTS OF LENGTH OF STAY AND AMBULATION DURING REHABILITATION OF TRAUMATIC SPINAL CORD INJURY PATIENTS- INSIGHTS FROM NORTHERN INDIA
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CASE DIAGNOSIS: Traumatic spinal cord injury (TSCI) is one of the most devastating injuries, and Results in different neurological deficits. A long hospital stay occupies medical and financial resources which leads to substantial social loss and economic burden. To increase the efficiency of resource utilization for rehabilitation care centers that treat TSCI patients, it is important to evaluate the determinants of hospitalization length as well as their ambulation. To describe the length of hospital stay and ambulation in patients with traumatic spinal cord injury(TSCI) and identify the associated epidemiological and clinical factors.

CASE DESCRIPTION: A retrospective study, utilizing a quantitative approach, with an N=108 patient population. The measures of this study to assess for the inclusion criteria and discharged from the hospital between 1st January 2016 and 31st December 2017 were reviewed with the help of a data collection tool developed for the same to capture relevant information. Sociodemographic and clinical
characteristics of the traumatic paraplegics were collected. Rehabilitation Length of stay was defined as the number of days in the hospital or rehabilitation center from the day of the patient’s first admission after injury to the date of discharge from the hospital.

DISCUSSIONS: The mean duration of hospital stay was 39.7±3.8 days. 63.6% of age group 15-30 years had hospital stay of ≥30 days. 51.7% patients with AIS grade A and 61.5% patients with pressure ulcers had hospital stay of ≥30 days. Age (AOR 9.88; 95% CI: [2.33 – 41.81]; 0.002), employment status (AOR 5.57; 95% CI: [1.09 – 28.37];0.039, location of residence (AOR 0.14 95%CI: [0.03-0.63];0.01), Pressure Ulcer (AOR 5.81; 95% CI: [1.77 – 19.06]; 0.004) and history of treatment (AOR 1.98; 95%CI: [1.76–14.16]; 0.002) were significant predictors of factors influencing hospital stay in patients with TSCI. Significant factors for ambulation after hospital stay were age, gender, location of residence and neurological category of injury (p<0.05).

CONCLUSIONS: The study has observed that age, employment status, pressure ulcers and operation are significant determinants of hospitalization length in TSCI patients and ameliorating these factors can improve their quality of life. Probability of Ambulation was observed to be better in females than in males and age, gender, location of residence and neurological category were affecting ambulation of traumatic paraplegics during the rehabilitation length of stay in hospital.

DEVELOPMENT AND RELIABILITY ANALYSIS OF AN ICF CORE SET FOR FUNCTIONING ASSESSMENT OF ADULTS TREATED FOR CANCER AT HOSPITAL DISCHARGE
Luz A. Lorca, MAGISTER, Cinara A. Sacamori, PhD, and Paulina A. Benavente, MAGISTER

CASE DIAGNOSIS: To describe the elaboration process and reliability analysis of a Core Set for functioning assessment of adults treated for cancer at Hospital discharge.

CASE DESCRIPTION: Descriptive study of the process of developing a Core Set, which included five stages: (1) systematic review; (2) identification and linking of concepts with ICF categories (3) expert’s consensus (4) operationalization (5) analysis of inter-rater reliability. Population: 21 experts participated in stage 3; 63 experts in stage 4 and 31 adults treated for cancer in stage 5. The study was approved by the scientific ethics committee (December 15, 2015). Descriptive study of the process of developing a Core Set, which included five stages: (1) systematic review; (2) identification and linking of concepts with ICF categories (3) expert’s consensus (4) operationalization (5) analysis of inter-rater reliability. Population: 21 experts participated in stage 3; 63 experts in stage 4 and 31 adults treated for cancer in stage 5. The study was approved by the scientific ethics committee (December 15, 2015).

DISCUSSIONS: 47 articles were included, from them 55 instruments were extracted. 208 concepts were identified from the instruments, of which 204 could be linked to CIF categories. In the expert’s consensus 24 categories were selected, which were operationalized. In the reliability analysis, 23 codes obtained a significant correlation that varied between r = 0.74 and r = 1.0. The code c240 (stress management) did not obtain good inter-rater reliability, which is why it was eliminated.

CONCLUSIONS: The ICF provides a valuable frame of reference for identifying significant concepts related to the functioning of patients treated for cancer at hospital discharge. After the process of 5 stages we obtained a Core Set with 23 categories, this will soon undergo a validation process in a multicentric study with the participation of 5 health institutions, national and international.

DEVELOPMENT OF A QUANTITATIVE EVALUATION OF MOTOR PARALYSIS USING AN ACCELEROMETER: RELIABILITY AND Validity
Ren Fujii, MASTER, Yoshimitsu Hashizume, PhD, and Shinichiro Tanaka, PM&R DOCTOR

OBJECTIVES: We have developed a new quantitative evaluation system of motor paralysis using an accelerometer. The purpose of this study is to verify the reliability and validity of the evaluation system as a preliminary study.

DESIGN: Ten healthy adult volunteers were participated in this study. Measurement tasks were arm elevation movement, hip flexion movement, knee extension movement, ankle dorsiflexion movement, based on Stroke Impairment Assessment Set motor items. We recorded joint movement during each motor tasks using an accelerometer (AXI, Axivity Inc.) and calculated velocity and distance. The accelerometer was attached to the dorsal center of the wrist joint during the arm elevation task, lateral epicondyle of femur during the hip flexion task, lateral malleolus during the knee extension task and fifth metatarsal bone during the ankle dorsiflexion task. To confirm the concurrent validity, we performed also measurement using a three-dimensional motion capture system (KinemaTracer, KISSEI COMTECH Inc.) at the same time. For the statistics analyses, spearman’s rank correlation coefficient was used for validity, and intraclass correlation coefficient (ICC) and 95% confidence interval for minimal detectable change (MDC95) for reliability.

RESULTS: The correlation coefficient between the parameters of the accelerometer and the three dimensional motion capture system was r=0.75-0.84 (p<0.05) at velocity and r=0.71-0.82 at distance for each tasks. In addition, ICC were 0.93-0.95 and MDC95 were 4.51-6.89% for each tasks.

CONCLUSIONS: The reliability and validity of the evaluation system were indicated in the present study. Future studies are required to focus on clinical utility.

DEVELOPMENT OF ACUTE ONSET UPPER EXTREMITY MOTOR PARESIS FOLLOWING OUTBREAK OF HERPES ZOSTER RASH: A CASE REPORT
Rebecca Caine, MD, Timothy Foster, MD, and Mark Goddard, MD

CASE DIAGNOSIS: Herpes zoster infection with subsequent motor paresis. A case of probable brachial neuritis

CASE DESCRIPTION: A 60-year-old female with past medical history of hypertension and fibromyalgia presented with right upper extremity pain followed by development of a characteristic vesicular rash in the C4-C5 dermatomes, for which she was prescribed valacyclovir. The patient had subsequent acute onset of weakness and was prescribed a methylprednisolone dose pack. Strength was graded as 1/5 for shoulder flexion, extension, abduction, external rotation and 3/5 for elbow flexion. Sensation and reflexes were intact. Right shoulder MRI was significant for subtle muscle edema signal involving the supraspinatus, infraspinatus and posterior aspect of the deltoid. Nerve conduction studies were within normal limits. Needle electromyography was significant for active denervation of the deltoid and infraspinatus. The patient underwent physical therapy and regained near full active range of motion three months after initial onset of weakness.

DISCUSSIONS: A leading diagnosis is brachial neuritis given the presentation of pain followed by weakness. There are several reports detailing its association with herpetic zoster and MRI findings are consistent with this diagnosis. Another consideration is mononeuritis multiplex, with involvement of the axillary and suprascapular nerves. This condition can be associated with infection and there are case reports describing an association with herpes simplex virus. A more remote possibility is segmental zoster paresis, a rare and often under recognized complication, in which viral spread from the dorsal root ganglion to the anterior horn cell or ventral root results in motor impairment. There is involvement of the C5 dermatome and myotome, however additional C5 muscles tested on electromyography were within normal limits. Neurder electromyography was significant for active denervation of the deltoid and infraspinatus. The patient underwent physical therapy and regained near full active range of motion three months after initial onset of weakness.

CONCLUSIONS: The data does not definitively support or exclude any of the above diagnoses. This case is intended to enhance awareness and explore the mechanisms of development of motor paresis following infection with herpes zoster virus.

DEVELOPMENT OF A TABLET-BASED PARTICIPATION MEASURE FOR OLDER PATIENTS IN OUTPATIENT REHABILITATION SETTINGS
Feng-Hang Chang, SCD, OTR/L, Yu Su, MS, and Zong-Liang Tseng, PhD

OBJECTIVES: Tablet technology is recognized as an innovative solution for administering health outcome assessments. However, it is unclear whether adopting tablet technology to measure complex self-reported functional outcomes such as participation is as reliable and acceptable to clients, particularly the older populations. The aim of this study was to (1) develop a tablet-based participation measure; (2) compare the reliability and concordance of this tablet-based measure with the paper-form version; and (3) compare the acceptability to older adults in outpatient rehabilitation settings between these two versions.

DESIGN: We programmed a multidimensional participation measure, the Participation Measure–3 Domains, 4 Dimensions (PM-3D4D), into a mobile application software and presented on tablet computers. A two-group design with two administered versions of the PM-3D4D was employed. A convenience sample of 80 adults (mean age: 70.16 years; 52.5% female; 82.5% was diagnosed with musculoskeletal disorders) in the Taipei area. All participants completed the tablet-based and paper-form PM-3D4D at two time points: at the baseline and at 1-week follow-up. Intra-class correlation coefficients (ICCs) were calculated for concordance and test-retest reliability. Participants’ ratings and responses as to their preference and perceived difficulty of using the two versions of the measure was reported. Significant concepts related to the functioning of patients treated for cancer at hospital discharge were included. After the process of 5 stages we obtained a Core Set with 23 categories, this will soon undergo a validation process in a multicentric study with the participation of 5 health institutions, national and international.

RESULTS: The correlation coefficient between the parameters of the accelerometer and the three dimensional motion capture system was r=0.75-0.84 (p<0.05) at velocity and r=0.71-0.82 at distance for each tasks. In addition, ICC were 0.93-0.95 and MDC95 were 4.51-6.89% for each tasks.

CONCLUSIONS: The reliability and validity of the evaluation system were indicated in the present study. Future studies are required to focus on clinical utility.

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administering the tablet-based PM-3D4D to an older Chinese population in rehabilitation settings.

**DESIGN OF TRISMS DURING LOCKED-IN SYNDROME DUE TO CENTRAL PONTINE MYELINOLYSIS: A CASE REPORT**

Wiaam Y. Elkeithab, BSE, and Whitney Pratt, MD, PhD

**CASE DIAGNOSIS:** This report describes a case of severe trismus without clear etiology successfully treated with onabotulinum toxin-A, a bilateral masseter injection following development of central pontine myelinolysis (CPM).

**CASE DESCRIPTION:** A 33-year-old female who presented to the hospital with ascending weakness five days following hyponatraemia correction at rates within guideline recommendations. MRI revealed increased signal in the central pons suggestive of CPM. Eighteen days later, she sustained tongue laceration after acute bilateral masseter hypertonic spasticity which was treated with chemodenervation. Patient gradually regained the functional capacity to voluntarily open jaw for speech and mastication over several weeks.

**DISCUSSIONS:** Trismus is an upper motor neuron pathology resulting in hypertonicity of masticatory muscles with a broad differential. Cerebrovascular accidents are known culprits as well, although trismus following brainstem lesions is a rarer complication than those in the cerebral hemisphere. No inciting events, past medical history, nor prior imaging findings on further review explained this development. In theory, it may be possible that regional inflammation and edema surrounding the pons secondary to myelinolysis, or less likely an otherwise subclinical microvascular stroke, may have caused sufficient irritation to the trigeminal nerve to induce trismus. Treatment with onabotulinum toxin-A was chosen given severity of the case, the focal nature of her symptoms, the need for oral access to facilitate patient care, and to potentially help relieve pain caused by tonic spasm of the masticatory muscles.

**CONCLUSIONS:** Chemo-denervation therapy for this unusual incident of trismus appears to have assisted in alleviating symptoms and improving functionality in speech, swallowing, and facial expression. The significance of this case report centers around the development of trismus in absence of distinctly attributable causation in the context of CPM.

**DIAPER UA – A NEW SCREEN TEST FOR URINARY OCCULT BLOOD WITHOUT COLLECTING URINE**

Hung-Chi Chen, SCHOLAR, Meng-Chih Lee, PhD, and Hsin-Ying Chen, PhD

**CASE DIAGNOSIS:** A novel catheter-free urine test device is invented and produced by Iding Medical Equipment Company. It is called DiaperUA, urine analysis within the diaper. DiaperUA is composed of a wireless enuresis alarm and a stainless-steel cage capable of holding wet sensor and test paper stick. In this study, the occult blood (OB) urine test paper is used for its correlation with urinary tract infection. The color change of test paper will happen soon after contact with urine by spreading.

**CASE DESCRIPTION:** This study was designed to test the sensitivity and specificity of DiaperUA (OB) to urinary tract infection (UTI). It was consented by the institutional review board of a regional hospital in Taiwan. From 2018 March to June, 10 bedridden patients in respiratory care ward were enrolled. DiaperUA (OB) was applied to every patient once per week. Each time after alarming, the residual urine was obtained by catheterization, and urinalysis was done immediately.

**DISCUSSIONS:** According to the standard color change of OB test paper, (-) or (+) is defined as negative, (+ and ++) is defined as positive. The normal result of urine sediment WBC is 0–5/HPF. The sensitivity and specificity of DiaperUA (OB) to urinary tract infection (UTI) is 80% and 96.3% respectively.

**CONCLUSIONS:** The results suggested that DiaperUA (OB) can be a screen test for occult blood phenomenon of urine. Positive result may indicate the possibility of urinary tract infection.

**DIFFERENCES IN LONG-TERM FUNCTIONAL OUTCOMES BY SEX: THE KOSCO STUDY**

Yun Sangmoon, MD, Won Hyuk Chang, MD, PhD, Doeg Yung Kim, Min Kyun Sohn, Jongmin Lee, Sam-Gyu Lee, Yong-il Shin, Young-Soo Lee, Min Cheol Joo, So Young Lee, Jun Hee Han, Jeonghoon Ahn, Gyeong-Jae Oh, Min Kyun Sohn, Jongmin Lee, Sam-Gyu Lee, Yong-il Shin, Young-Soo Lee, Min Cheol Joo, So Young Lee, Jun Hee Han, Jeonghoon Ahn, Gyeong-Jae Oh, Min Kyun Sohn, Jongmin Lee, Sam-Gyu Lee, Yong-il Shin, Young-Soo Lee, Min Cheol Joo, So Young Lee, Jun Hee Han, Jeonghoon Ahn, Gyeong-Jae Oh, Won Hyuk Chang, MD, PhD, and Yun-Hee Kim, MD, PhD

**OBJECTIVES:** Stroke patients show diverse recovery patterns. In case of recovery of upper extremity (UE) motor function, diverse clinical and neuroimaging markers were reported as predictive factors. However, a few studies reported factors related to recovery of lower extremity (LE) motor function. In this study, we investigated predictive factors for recovery of UE and LE motor function after stroke using the clinical and neuroimaging characteristics.

**DESIGN:** Forty-two subacute ischemic stroke patients participated. All patients underwent structural and functional MRI data acquisition and cognitive/behavioral assessments at two weeks after stroke onset. Assessments included Fugl-Meyer assessment (FMA), mini-mental state examination (MMSE), and NIH stroke scale (NIHSS). FMA scores were assessed again at three months as outcomes. Important neuroimaging markers were investigated. Corticospinal tract (CST) fractional anisotropy (FA), lesion volume, CST lesion load, and interhemispheric homotopic functional connectivity (IHFC) were extracted from MRI data. A normalized difference between MMSE and FMA scores (diff[MMSE, FMA]) was used as an additional factor. A linear regression model was used to investigate predictive factors.

**RESULTS:** Recovery-related factors and their predictive power were noticeably different between UE and LE motor function. Age, MMSE, diff[MMSE, FMA] and ipsilesional CST FA were predictive factors in both UE and LE recovery. NIHSS score, CST lesion load, lesion volume, and IHFC were related to UE recovery only, whereas contralesional CST FA was related to LE recovery only. Age and diff[MMSE, FMA] showed higher predictive power in LE recovery compared to UE recovery.

**CONCLUSIONS:** Most of predictive markers which were meaningful for UE motor recovery did not show significant relationship with LE motor recovery. On the other hand, age of patient, cognitive function, and integrity of unaffected CST are crucial for LE recovery. These results indicated that different mechanisms might underlie between the UE and LE motor recovery after stroke.

**DIFFERENT PREDICTIVE FACTORS FOR UPPER AND LOWER EXTREMITY MOTOR RECOVERY AFTER ISCHEMIC STROKE**

Jung soo Lee, PhD, Ahee Lee, MS, Hee gow Kim, BS, Jinuk Kim, MS, Won Hyuk Chang, MD, PhD, and Yun-Hee Kim, MD, PhD

**OBJECTIVES:** Stroke patients show diverse recovery patterns. In case of recovery of upper extremity (UE) motor function, diverse clinical and neuroimaging markers were reported as predictive factors. However, a few studies reported factors related to recovery of lower extremity (LE) motor function. In this study, we investigated predictive factors for recovery of UE and LE motor function after stroke using the clinical and neuroimaging characteristics.

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**DIFFERENT RELATIONSHIPS BETWEEN PHYSICAL ACTIVITY LEVELS AND FINE MOTOR PERFORMANCE IN INDIVIDUALS WITH AND WITHOUT TYPE II DIABETES MELLITUS**

Ali A. Weinstein, PhD, Leyla de Avila, Jillian K. Price, PhD, Carey Escheik, Pegah Golabdi, MD, Naomi Lynn Gerber, MD, and Zobair M. Younossi, MD, MPH

**OBJECTIVES:** Previous research has demonstrated a decrease in fine motor speed in individuals with Type II diabetes mellitus (T2DM). However, the relationship between physical activity levels and fine motor performance has not been extensively examined in this population. Therefore, the current study examines the relationship between fine motor performance and physical activity in those with and without T2DM.

**DESIGN:** Forty-nine individuals, 24 with T2DM (age: 55.2 ± 11.0 years; 46% female; body-mass index (BMI): 32.8 ± 5.3 kg/m2) and 25 without T2DM (age: 47.2 ± 13.6 years; 56% female; BMI: 28.6 ± 7.3 kg/m2) participated in a cross-sectional study. Fine motor performance was assessed with the Grooved Pegboard task and physical activity levels were examined with the Human Activity Profile,
a self-report tool that has two measures of activity: Maximal Activity Score (MAS) and Adjusted Activity Score (AAS).

RESULTS: In individuals without T2DM, there were statistically significant correlations between time to complete the grooved pegboard and both MAS (r=0.46; p<0.01) and AAS (r=0.31; p=0.03) but not between time to complete the maze and both MAS (r=0.24; p=0.27) and AAS (r=0.11; p=0.33) were not statistically significant. The fine motor performance was statistically significantly different in comparing individuals with and without T2DM (t(47)=-4.5, p<0.01) but MAS and AAS were not statistically significantly different between the groups (MAS: t(47)=1.7, p=0.10; AAS: t(47)=1.1, p=0.27).

CONCLUSIONS: Individuals with T2DM were slower in performing a fine motor task than individuals without T2DM, but there wasn’t a statistically significant correlation between physical activity levels and fine motor performance, a relationship that did exist in individuals without T2DM. Fine motor performance difference between individuals with/without T2DM might be driven by other factors, such as sensory neuropathy which would preferentially affect fine motor performance rather than overall activity (MAS/AAS).

DIFFUSION TENSOR IMAGING STUDIES ON A TRAUMATIC SPINAL CORD INJURY PATIENT: A CASE REPORT

Jill C. Penman, MD, Mariko Kubinec, MD, Camilo Castillo, MD, and David Haustein, MD, MBA

CASE DIAGNOSIS: C3 AIS A spinal cord injury with diffuse spontaneous activity on EMG distal to the neurological level of injury

CASE DESCRIPTION: A 41-year-old female with a C3 AIS A spinal cord injury secondary to a gunshot wound to the neck was evaluated for diaphragmatic pacing at 3 months post-injury after multiple unsuccessful attempts at ventilator weaning. To assess the integrity of the phrenic nerves for pacing, electromyography (EMG) and nerve conduction studies (NCS) were performed. Routine NCS of peripheral nerves in the limbs were normal, but stimulation of the bilateral phrenic nerves resulted in only volume-conducted responses without consistent compound motor action potentials at the hemidiaphragms. On EMG testing, widespread spontaneous activity was noted throughout the upper and lower limbs distal, but not proximal to, the neurologic level of injury. On ultrasound, the diaphragm appeared atrophic without clear contraction.

DISCUSSIONS: While critical illness myopathy and polyneuropathy may also be considered in the differential diagnosis, diffuse spontaneous activity below the level of the lesion has been documented in the setting of CNS lesions, including spinal cord injuries. The etiology remains unclear but is presumed to be due to transsynaptic degeneration and anterior horn cell depression after diminished trophic input. This case highlights that in the EMG workup of persons with CNS pathology, widespread spontaneous activity below the level of injury may be an expected finding and thus not indicative of peripheral nervous system pathology.

CONCLUSIONS: Specific to the assessment of phrenic nerve integrity, limiting the need EMG study to the diaphragm may result in a false positive interpretation of phrenic nerve injury if the only abnormality is spontaneous activity. An analysis of phrenic NCS, other NCS, motor unit recruitment, motor unit action potential morphology, and needle EMG findings in other muscles are essential elements to properly interpret a study in the setting of CNS pathology.

DIFFUSION TENSOR IMAGING STUDIES ON A TRAUMATIC SPINAL CORD INJURY PATIENT: A CASE REPORT

George S. Chen, DO, PhD, Hannah Ovadia, MA, Steven Kirshblum, MD, and Bing Yao, PhD

CASE DIAGNOSIS: Using diffusion tensor imaging (DTI) to evaluate neuro-recovery in an incomplete traumatic spinal cord injury (SCI) patient

CASE DESCRIPTION: A 39-year-old male with no significant past medical history was admitted to an acute inpatient rehabilitation hospital after suffering a fall at a construction site. Imaging in the emergency room showed a C4-6 fracture with cord compression and a small anterior herniation at C5-6. He underwent C4-6 ACDF and C5 corpectomy. InSNCSCI exam on admission showed C7 ASIA D. The patient successfully completed a course of inpatient rehabilitation. He was then followed over the course of 6 months, and repeat InSNCSCI exams along with DTI studies were performed. Correlations were noted between the various DTI indices and overall neuro-recovery. InSNCSCI exam at 6 months showed C7 ASIA D.

DISCUSSIONS: Clinically, the International Standards for the Neurological Classification of Spinal Cord Injury (ISNCSCI) remains the gold standard. DTI is a powerful tool that can measure the diffusion of water molecules within nerve fibers and fiber tracts, and can potentially be used to study pathology that are undetectable with conventional imaging and electrodiagnostic techniques. In our case, we examined 4 different DTI indices (axial diffusivity, fractional anisotropy, mean diffusivity, and radial diffusivity) both above and below the level of injury and found that not only do the DTI indices change during the 6-month period, but there is also a significant correlation between the DTI indices and the patient's sensory and motor function recovery.

CONCLUSIONS: Our case demonstrates that DTI can not only serve as a tool to evaluate structural changes after SCI, but it can also potentially be used to predict motor and sensory recovery over time. Further studies are currently underway.

DISABILITY AND QUALITY OF LIFE UNDER AND OVER 60 YEARS, 12 MONTHS AFTER A TRAFFIC ACCIDENT: COHORT STUDY


OBJECTIVES: To compare 12 months later functioning, quality of life (CV), pain, anxiety and depression among adults under and over 60 years who had moderate and severe injuries in traffic accidents (TA) in Medellin and its metropolitan area.

DESIGN: Secondary analysis of two prospective case-control studies 2009-2010 (18 to 60 years) and 2015-2016 (over 60 years). They were evaluated at baseline and 12 months with functioning (WHO-DASII), QoL (SF-36), pain (EAV), anxiety (STAI-R and STAI-E) and depression (PHQ-9). The differences between groups were compared 12 months later by means of the t-student test. A multiple linear regression analysis was done to determine factors related to disability and QoL.

RESULTS: 837 patients were included (590 of 18-60 years and 247 > 60 years), 84.8% completed the follow-up. The motorcycle was the main vehicle involved (86.1% vs. 60.7%). Personal Care scores were significantly better in >60 years but greater commitment in the domestic and outside activities, and global work scale. The QoL twelve months later was significantly better in < 60 years in the Emotional Role, Physical Role, and Physical functioning. Pain in both groups was mild 12 months later. Anxiety and depression with greater commitment in > 60 years. In the multivariate analysis age > 60, pain, severity of trauma, anxiety, depression and being a woman were associated with worse outcomes.

CONCLUSIONS: The global disability score, the ER, PR, PF at twelve months was more compromised at > 60 years. It is necessary to develop preventive AT policies of greater impact to reduce road accidents that affect the population, mainly motorcycle users and the vulnerable population of roads such as pedestrians, bicycle users and motorcycle or motorcycle occupants.

DOES MARIJUANA SMOKING INCREASE THE RISK OF ATRIAL FIBRILLATION (AF) AND STROKE?

Yusik Cho, MD, Mery Elashvili, MD, DO, and Lawrence G. Chang, DO, MPH

CASE DIAGNOSIS: Left temporal stroke

CASE DESCRIPTION: A 45-year-old female daily marijuana smoker (has a medical card) presented to the emergency room with delirium and bizarre and aggressive behavior. She had a history of atrial fibrillation (AF) status post ablation two years ago, substance abuse (quit alcohol three years ago), and depression. She was found to have a left temporal infarct confirmed on MRI of brain and developed rapid AF treated with cardizem and heparin. MRA did not show any arterial stenosis. Carotid doppler and echocardiogram were normal. Urine toxicology was positive for marijuana. While she was treated at our acute rehabilitation facility, her tachycardia was well controlled with cardizem. Patient marked progress in all language domains and was discharged home with supervision.

DISCUSSIONS: To date, marijuana is the most widely used illicit drug and has been shown to be a precipitating factor for AF especially in young patients without any risk factor. A range of arrhythmias occur from acutely smoking marijuana: sinus tachycardia to atrial or ventricular rhythms to atrial or ventricular fibrillation. Smoking marijuana is also associated with adrenergic stimulation in atrial coronary or microvascular flow and may facilitate AF development due to increased pulmonary vein ectopy, enhanced atrial electrical remodeling, and increased dispersion of refractoriness. Marijuana use also increases risk of myocardial infarction and ischemic strokes directly through reversible cerebrovascular spasms.

CONCLUSIONS: Acute marijuana smoking can increase risk of AF to stroke development. At this time, the purity or chronicity of marijuana smoking as risk factors for AF to stroke is inconclusive. Marijuana smokers, however, with cryptographic tachycardia should be evaluated by a cardiologist. The significance of this study is to educate and advise for cessation of smoking marijuana to prevent any future
incidences of life threatening cardiac disturbances and possible subsequent strokes, especially among the younger population.

DOES OLFATORY FUNCTIONING RELATE TO OUTCOME FROM INPATIENT REHABILITATION IN STROKE PATIENTS?
Lakshmi A. Nerusu, BS, Amanda Reyes, MD, Rizwan Alvi, MD, Johannaht Ho, MD, and P Tyler Roskos, PhD, ABPP

CASE DIAGNOSIS: Case reports suggest stroke patients are at risk for altered olfaction, which affects nutrition, dietary intake, and quality of life. However, relationships between olfaction and rehabilitation outcomes are poorly understood. This study aimed to examine the incidence of olfactory dysfunction in individuals with stroke compared to a control group. We also explored relationships between olfaction and rehabilitation outcome measures. We hypothesized that impaired olfaction may be an indicator of more severe stroke and poorer outcome from inpatient rehabilitation.

CASE DESCRIPTION: This study included participants admitted to the inpatient rehabilitation service with a diagnosis of stroke (n=20) or musculoskeletal injury/debility (n=20). The following inclusion criteria were used: age 18 or older; cognitively intact based on orientation assessment; and ability to provide informed consent. Patients were excluded if they had prior stroke or neurological disease affecting olfaction; had history of anosmia; or had smoked tobacco products within the past month. Participants were administered an olfactory test rating their sense of smell as normal, decreased, or absent. Functional independence measure and NIH stroke scale scores were used as outcome variables.

DISCUSSIONS: Results showed no difference between groups on demographic variables. Incidence of olfactory dysfunction was higher in the stroke group (89%) compared to controls (65%). The groups did not show significant differences on admission or discharge FIM scores or the olfactory test. We did not see significant differences on outcome measures as a function of olfactory ratings. Correlations between olfactory ratings and outcome measures were low-to-moderate, but non-significant.

CONCLUSIONS: Although incidence of abnormal olfaction was higher in participants with stroke, results demonstrated no direct relationship between olfactory ratings, severity of stroke, and rehabilitation outcome. Future research may utilize a more sensitive tool to evaluate olfaction to better understand how impaired olfaction may impact functioning in a rehabilitation setting.

DOES THE PULMONARY FUNCTION AFFECT THE DIETARY LEVELS OF SUBACUTE STROKE PATIENTS?
Yoon Ghi Park, MD, PhD, myung eun yoo, MD, and Hyo Jung Lee, MD

OBJECTIVES: Previous studies have reported that there is a relationship between the pulmonary function and deglutition. However, there is a lack of study identifying specific correlations between pulmonary function and dysphagia in patients with stroke. To efficiently treat and prevent dysphagia, this study aimed to clarify the correlation between the pulmonary function tests and parameters of videofluoroscopy.

DESIGN: 36 stroke in-patients with dysphagia were retrospectively analyzed. We evaluated pulmonary function tests in sitting position, including vital capacity (VC) measured by spirometry and peak cough flow (PCF) measured by a cough flow meter. For assessment of dysphagia, we used videofluoroscopic swallowing study (VFSS). At admission and discharge, the patients were divided into 3 groups by dietary levels (G1, tube feeding; G2, dysphagia diet; G3, general diet).

RESULTS: The optimal cutoff values of VC and PCF for presence of aspiration were analyzed (cutoff point of VC = 47.8 %, cutoff point of PCF = 155 mL/min). The correlation between VC or PCF and parameters of VFSS was analyzed. The chi-square test. It showed only one element of VFSS with liquid, ‘Food propelling posteriorly’, was significant difference of presence of aspiration at discharge by using the cutoff value of VC (p=0.02). The dietary levels at admission had significant positive correlation coefficients with VC (r=0.57, P=0.0003) and PCF (r=0.35, P=0.03). The one-way ANOVA of VC among groups divided by three diet levels at admission showed statistically significant difference (p=0.001). The independent t-test of VC between G1 and G3 dietary groups at discharge showed a significant difference (p=0.02).

CONCLUSIONS: Based on our research, pulmonary function can affect the dietary levels. The pulmonary function in dysphagia patients with stroke should be clinically emphasized. In addition, large scale study is needed to correlate pulmonary function with swallowing difficulty.

DRESS, A SERIOUS REACTION FROM LEVETIRACETAM SEIZURE PROPHYLAXIS IN TBI
Jennifer Horng, MD, Emily Ryan-Michailidis, DO, Malaka Badri, DO, and Shailaja Kalva, MD

CASE DIAGNOSIS: Drug reaction with eosinophilia and systemic symptoms (DRESS)

CASE DESCRIPTION: 41 year old man with traumatic brain injury (TBI) with subdural hematoma after a motorcycle accident was placed on levetiracetam for seizure prophylaxis. Two months afterward, patient presented with a pruritic maculopapular rash on the face, trunk and extremities, mucosal lip erosions, fever, transaminitis and eosinophilia. Biopsy was consistent with drug reaction with eosinophilia and systemic symptoms (DRESS) and patient was treated in the burn unit with soludemol, topical triamcinolone and emollients. He received erythromycin and tense for eye involvement, nasogastric tube for nutrition, and foley for urethral meatal involvement. He continued to have cardiac and thyroid monitoring for organ involvement. Patient initially presented to acute rehab with impaired cognition, problem solving and insight. Eventually the patient met goals for cognition using compensatory strategies and acknowledging functional implications of deficits.

DISCUSSIONS: After severe TBI, many patients receive an antiepileptic to prevent early posttraumatic seizure. More recently, levetiracetam has been used because of an improved side effect profile compared with phenytoin. This patient demonstrates that serious complications, such as DRESS syndrome may occur with levetiracetam within 8 weeks of initiation.

CONCLUSIONS: Physiatrists should be aware of DRESS syndrome as a severe drug induced reaction of levetiracetam and be mindful in using antiepileptics to prevent early posttraumatic seizures.

DRUG USE AND DISABILITY IN TRAUMA EVENTS CAPTURED BY THE NATIONAL TRAUMA DATA BANK, 2016
Katherine D. Goss, MPH, Margaret K. Formica, PhD, and Margaret A. Turk, MD

OBJECTIVES: People with disability and those who misuse/abuse drugs both demonstrate increased emergency department (ED) utilization. However, little research explores the potential relationship between these variables. This study assessed drug use across disability status in events captured by the National Trauma Data Bank (NTDB), the largest aggregate of United States trauma data.

DESIGN: Trauma events among adults captured by the NTDB in 2016 were analyzed. Data items included: patient information, drug use (pre-existing drug use disorder (DUD) and current illegal/prescription drug use), and disability comparison groups (DUD-1: pre-existing functionally dependent health status; DUD-2: a pre-existing qualifying disability condition). Descriptive statistics and adjusted logistic regression Results are reported.

RESULTS: A total of 782,241 trauma events among adults were included for analysis. Of all included events, 4.7% (N=49,459) involved patients with pre-existing DUD. 15.8% tested positive for current drug use (N=120,029), 5% were in DCG-1 (N=39,011), and 24.7% were in DCG-2 (N=193,513). Patients in DCG-1 were 23.5% less likely to have a pre-existing DUD (AOR= 0.765; 95% CI: 0.71, 0.83; p< .001), and were also less likely to have current drug usage (AOR=0.568; 95% CI: 0.54, 0.66; p<.001). Contrastingly, patients in DCG-2 were 17% more likely to have a pre-existing DUD (AOR=1.171; 95% CI: 1.15, 1.20; p< 0.001) and also more likely to have current drug usage (AOR=1.288; 95% CI: 1.26, 1.31; p<.001).

CONCLUSIONS: While individuals in DCG-1 were less likely to be diagnosed with DUD or have current drug use in recorded trauma events, individuals in DCG-2 were more likely to have DUD and current drug use. These findings indicate a relationship between disability, drug use, and trauma which may be complex and varied, and warrants further analysis. While registry data has inherent limitations, this work provides a novel assessment of drug use and disability using a large and diverse trauma population.

DRUG-INDUCED SWEET’S SYNDROME INITIALLY PRESENTING AS STEVENS-JOHNSON SYNDROME IN THE ACUTE REHABILITATION SETTING
Eugene Palatulan, MD, and Nasim Chowdhury, MD

CASE DIAGNOSIS: Drug-induced Sweet’s syndrome

CASE DESCRIPTION: A 28-year-old female with Asthma underwent subcutaneous injection and topical corticosteroids for a finger abscess. Patient presented with a pruritic drug-induced delayed-hypersensitivity potentially from Celecoxib, Tizanidine and Cyclobenzaprine, new medications started postoperatively. Benadryl, hydrocortisone cream, and on-standby epinephrine were provided. Dermatology performed a
punch biopsy and recommended Etanercept for a suspected Stevens-Johnson syn-
drome. Final pathology revealed ichthyosis vulgaris suggestive of drug-induced
Sweet’s syndrome. Cessation of offending agents and switch to triamcinolone-
camphor cream controlled the hypersensitivity. Patient completed AIR course and
discharged at modified independence.

DISCUSSIONS: Drug-induced Sweet’s syndrome is a rare illness characterized
by neutrophilic dermatosis characterized by appearance of edematous and erythem-
atosus papules, plaques, or nodules two weeks after starting new medication. In
a type-IV hypersensitivity reaction, it is vitally important to review medications naïve
to patient. Cessation of offending agents and initiation of corticosteroid agent is key.
Determining offending agents suspected, Celecoxib is known to cause drug-induced
Sweet’s syndrome.

CONCLUSIONS: Drug-induced Sweet’s syndrome is a rare illness that may
initially present as Stevens-Johnson syndrome and can be caused by various drugs
such as Celecoxib which was the presumptive etiology in this case. Early detection,
prompt withdrawal of offending agent and corticosteroid treatment is vital as pain/
discomfort poses a barrier to a patient’s acute rehabilitation course.

DTRAX CAGE MOVEMENT WITH SUBSEQUENT HEMIPLEGIA AND ALLODYNIA: A CASE REPORT
Anthony L. Cooper, DO, and Raymund Millan, MD
CASE DIAGNOSIS: Alloodynia
CASE DESCRIPTION: A 77 year old female presented to acute hospital
5 days after C4-C7 arthrodesis and fusion for cervical spondylolisthesis and multiple her-
niated discs. After surgery she experienced progressive left arm pain and eventually
hemiplegia. CT revealed facet fixation cage was anterior and medial in position
incroaching on the left lateral C4-5 neutral foramen, compromising the left C5 nerve root.
She underwent laminectomy, foraminotomy, and removal of displaced DTRAX
cage. After surgery patient had residual hemiparesis and new onset allodynia. On phys-
ical exam light touch of her arm provoked 10/10 pain. Patient’s pregabalin 150mg
twice daily was increased to three times daily and diclofenac gel was added. Massage
therapy, fluidotherapy, and anodyne therapy were utilized one hour per day. As patient’s
hypersensitivity to pain decreased, she began to have gains in upper extremity strength.
The patient subsequently experienced resolution of allodynia and had 4/5 strength
throughout the affected extremity at discharge.

DISCUSSIONS: Alloodynia is often associated with cervical radiculopathy pain.
Since the mechanisms underlying cervical radiculopathic pain-associated allodynia
are unclear, adequate treatment remains elusive. A multimodal approach incorporating
a neuropathic pain medication such as pregabalin, anti-inflammatory medication such
diclofenac gel along with desensitization modalities like fluidotherapy and anodyne
therapy may serve as a good treatment regimen. As a result of decreased pain, func-
tional gains can be made during therapy.

CONCLUSIONS: A multimodal approach to alloodynia treatment including med-
cations and intense desensitization therapy may be helpful in cervical radiculopathic
pain-associated allodynia.

DUAL-TASK ELICITS DECREASED BALANCE PERFORMANCE IN ADOLESCENTS FOLLOWING SPORT-RELATED CONCUSSION
Abdulaziz A. Alkathiry, PT, MSC, PhD, Anthony Kontos, PhD, Joseph Furman, PhD, Susan Whitney, PhD, Patrick Sparro, DR, and
Saud F. Alsabaie, DR
OBJECTIVES: Sports activities require high performance on cognitive tasks and
balance function simultaneously. In individuals with concussion, postural insta-
ibility and imbalance are evident in the first 72 hours post-injury and usually return
to normal within a week of injury. However, some studies have reported persistent,
sub-clinical balance deficits months after injury when patients were tested using
dual-task assessments. The primary goal was to assess changes in dual-task balance
performance over time in adolescents with sport-related concussion (SRC).

DESIGN: Twenty-three adolescents (female (n = 9)) aged 12 to 19 years with a
recently, currently symptomatic SRC were assessed within 10 days, 4-17 days after the
first visit, and at clearance. Body sway was measured during the single-task con-
titions while participants stood quietly on firm and compliant surfaces. For the
dual-task condition, participants concurrently performed either a simple spatial-
discrimination or complex perceptual-inhibition visual feedback task. Body sway
was estimated using the root mean square (RMS) of the center of pressure (COP)
recorded with a portable force plate. A linear-mixed-model was performed to in-
clude the effects of visit, surface, and task on RMS COP in the anterior-
posterior (AP) and medio-lateral (ML) directions.

RESULTS: A significant increase in AP sway was observed in the dual-task
condition (p < 0.001), and the perceptual-inhibition-task resulted in more sway
than the spatial-discrimination-task in both directions (p < 0.001). There was a sig-
nificant increase in sway at the second compared with the first visit (p = 0.036 in
AP, p = 0.028 in ML).

CONCLUSIONS: The results demonstrated that a cognitive visual dual task elicits
balance perturbations in adolescents following SRC. The increase in sway
during recovery from the SRC was unexpected and warrants further examination.

DYSPHAGIA AFTER ANTERIOR CERVICAL DISCECTOMY AND FUSION: A CASE REPORT
Mohammad Islam, MD, and Kasandra Erazo, BS
CASE DIAGNOSIS: Dysphagia after Anterior Cervical Discetomy and Fusion
CASE DESCRIPTION: 73 old was admitted due to a mechanical fall down 7-8
flights of stairs. She was found to have significant damage to her spinal cord second-
ary to long standing cervical stenosis and arthritis of C3-C5 vertebrae. Neurosurgery
performed a C4 corpectomy with cage placement and fusion. She was transferred to
acute rehabilitation at Metropolitan hospital for expected benefit from therapies.
Speech and swallow evaluation revealed aspiration of fluids and particulate matter
on modified barium swallow. The patient was made NPO and further aspiration pre-
cautions were in effect. After lengthy therapy by speech and swallow team, patient was
to resume feedings by mouth.

DISCUSSION: The anterior approach is thought to be the best method to
receive pain and recover the function of patients (4). However a variety of complica-
tions have been reported, dysphagia is the most common complication after this
procedure (4). Dysphagia rates can reach as high as 83% most of which are self-
limiting and typically resolve in 3 months (4). The incidence of prolonged dysphagia
can range between 3% and 35% of cases and can cause significant health and nutri-
tional risks for patients

CONCLUSIONS: Dysphagia is a common complication after anterior cervical
decompression and fusion that can cause a decreased quality of life for a patient. To
prevent such an event from occurring there are certain intraoperative and postopera-
tive techniques after ACSS. 1.Modifying diet and controlling the size of the bolus
given 2. Heightening sensory input prior to or during swallowing, 3. Applying vol-
untary control to the swallow (breathe holding, effortful swallow), 4. Protecting the
airway with postural adjustments to reduce risks of aspiration (ie chin. Tuck, head
tilt, head rotation, head lift); and 5. Performing exercises to strengthen weak facial
muscles to improve coordination.

DYSPHAGIA IS RELATED TO BONE MASS AND FAT FREE MASS IN ADULTS WITH CEREBRAL PALSY
Se Hee Jung, MD, PhD
OBJECTIVES: One of common disability of cerebral palsy (CP) is dysphagia which frequently
Results in long-standing inadequate dietary intake. Inadequate di-
etary intake can affect body weight, bone mass, bone mineral density, muscle mass,
and fat mass in general population. However, there is no study to investigate the re-
lation between the severity of dysphagia and the body composition in adults with
CP. We aimed to determine whether the severity of dysphagia is associated with the
body composition of adults with CP.

DESIGN: This is a cross-sectional study in university hospitals and communities
for persons with disabilities in South Korea. A total of 99 adults with CP (58 men,
mean age of 41.8±9.0 years) were included. The severity of dysphagia was assessed
as no, mild, moderate, and severe. The body composition was analyzed using dual-
energy x-ray absorptiometry. The correlation between the dysphagia severity and body
weight, waist circumference, body mass index, percent body fat, trunk percent fat,
antioxidant-gynoid fat ratio, bone mass, bone mineral density, T-score, Z-score, fat
mass, and fat free mass was investigated using the Spearman correlation analysis.

RESULTS: The dysphagia severity was not related to age or the Gross Motor
Function Classification System level. The severity of dysphagia was related to 1) bone
mass (trunk and legs), 2) fat free mass (total and legs), 3) lean mass (total and legs),
4) bone mineral density (lumbar spine, femur neck and total femur), and 5) T-score
(lumbar spine, femur neck and total femur). However, the severity of dysphagia was
not related to body weight, waist circumference, body mass index, fat mass, percent
body fat, trunk percent fat, and android-to-gynoid fat ratio.

CONCLUSIONS: Dysphagia in adults with CP is related to bone mass, fat free
mass and bone mineral density. Dysphagia does not show relationship with well-
known parameters of obesity or underweight in adults with CP

EARLY DIAGNOSIS OF IATROGENIC INFERIOR TRUNK PLEXYPATHY
Andrew Lai, DO, Kyaw Lin, DO, and Marc Eivind Evensen, MD
CASE DIAGNOSIS: 69-year-old male presents with left forearm and hand weakness, tingling, and numbness shortly after coronary artery bypass grafting.

CASE DESCRIPTION: 69-year-old right handed male presents to our electrodiagnostic clinic with left forearm and hand weakness, tingling, and numbness, after a coronary artery bypass grafting 6 weeks prior. Symptoms began the very next day after the surgery, and has been gradually worsening. There is also pain in the left 4th and 5th digit and medial palm with numbness in the medial-posterior forearm that wakes him up at night. No past medical history of arm or wrist problems prior to the surgery. Physical examination revealed mild atrophy noted in left first dorsal interosseus, flexor carpi ulnaris, thenar and hypothenar eminences compared to contralateral side and strength intact in bilateral upper extremities except for 3/5 left thumb abduction and 4/5 left finger flexion. Sensation intact bilateral upper extremities to light touch, except decreased sensation to left median forearm, medial hand, 4th and 5th fingers.

DISCUSSIONS: Electrodiagnostic evaluation revealed left median motor axonal neuropathy, left ulnar sensorimotor neuropathy, left medial antebrachial cutaneous neuropathy, and acute denervation at the left extensor digitorum communis, left abductor pollicis brevis, and left first dorsal interosseous muscles. Our final impression was a left inferior trunk plexopathy which correlates with his physical examination findings.

CONCLUSIONS: Brachial plexus injury is an uncommon complication of coronary artery bypass grafting (CABG). Mechanism of injury includes sternal retraction which results in compression of the brachial plexus. Often the condition is transient, however may be permanent and create life-long disability for patients. Physiatrists and cardiothoracic surgeons should always have plexopathy in their differential diagnosis after CABG. This case illustrates how a comprehensive physical examination of a post-op CABG patient and expedited electrodiagnostic study can lead to early identification and treatment of iatrogenic plexopathy.

EARLY MOBILIZATION IN INTENSIVE CARE FOR SEVERE ACQUIRED BRAIN INJURY PATIENTS: CURRENT PRACTICES IN FRANCE

François Feuvrier, MD, Olivier Barber, MD, Claire Jourdan, MD, PhD, Karolina Griffiths, MD, Margrit Ascher, PT, Frédérique Pavillard, MD, Kevin Chaillard, MD, Paul Bory, MD, Pierre-François Perrigault, MD, and Isabelle Laffont, MD, PhD

OBJECTIVES: Early mobilisation (EM) in intensive care units (ICU) is safe, feasible and beneficial for patients. Little is known about the current practices of EM for patients with acquired brain injury (ABI) in ICU in France. The aim of the study was to evaluate the current mobilisation practices and its barriers in ICUs for patients with ABI.

DESIGN: A cross-sectional survey on EM practices was conducted online with two questionnaires in July 2017, August 2018 and a follow up in July-August 2019. Questionnaires were distributed to physicians and physiotherapists working in 130 ICUs across France.

RESULTS: The survey was completed by 48 physiotherapists (PTs) and 54 physicians in 39 different wards. Responses from one physician and one physiotherapist for each ward were analysed. The mean number of inpatients/wards was 21 (range 9-50) and mean length of stay of 11 days (5-22). PRM physicians were involved in care according to 82% of ICU physicians responses. EM was most frequently started within 24-48 hours after admission. Most physiotherapists (87%) stated that 75%-100% of patients received positioning and passive range of motion therapy. Standing exercises were less frequently performed, reported by 29% of PT and concerning less than 25% of the patients. Walking therapy was reported by 46% of PT (< 25% of patients) and electrostimulation was mostly proposed for patients with SCI may arise, which make surgery is contraindicated. We tried to perform early surgery and rehabilitation promote better functional outcome. It was proven effective.

CONCLUSIONS: The early surgery and rehabilitation promote better functional outcome and affect the quality of life. They are worth fighting for although more supporting evidences are required. Improvement in health services, systems and policies are expected in the future.

EEG ALPHA CHARACTERISTICS IN EYES-CLOSED AND EYES-OPEN RESTING-STATES IN ADULT MALES WITH TRAUMATIC SPINAL CORD INJURY

Jinhui Peng, MASTER, Lijian Ao, PROFESSOR, Wenli Wang, MASTER, and Xia He, BACHELOR

CASE DIAGNOSIS: Extrapyramidal tuberculosis (EPTB) is associated with high morbidity and mortality rates. Skeletal tuberculosis accounts for 10–35% of EPTB, with tuberculosis spondylitis (TS) represent 50% of the cases. Magnetic resonance imaging (MRI) is an excellent diagnostic procedure for TS.

CASE DESCRIPTION: A 46-years-old homemaker with four children was referred to the Rehabilitation Department in the acute setting on her fourth-day admission with TS Spinal Cord Injury AIS C due to TS with lung tuberculosis. She was presented with paraparesis, bedridden, bladder bladder problems, adjustment disorder, and fully dependent ADL. Thoracic spine MRI showed compression fracture forming gibbous deformity and suppressing the posterior fragments; paravertebral abscesses extended into the epidural space causing spinal canal stenosis with signs of myelopathy. She underwent internal stabilization after two weeks receiving anti-tuberculosis therapy for five weeks since her first complaint. Her immediate family became her complete facilitator and her toddler child was the main motivator for her recovery. She showed very good progress on the medical, psychological, and functional outcomes within two weeks after surgery. She could walk without an assistive device three months later and became AIS E in six months.

DISCUSSIONS: TS management in developing countries often encounters some obstacles which limit the provision of adequate management. The economic issue, bureaucratic health services, systems and policies in Indonesia can delay surgery for months. Theoretically, delayed surgery affects rehabilitation and functional outcomes. Even worse, while waiting for the surgery, complications of TS-related SCI may arise, which make surgery is contraindicated. We tried to perform early surgery and rehabilitation for a better medical and functional outcome, and it was proven effective.

CONCLUSIONS: The early surgery and rehabilitation promote better functional outcome and affect the quality of life. They are worth fighting for although more supporting evidences are required. Improvement in health services, systems and policies are expected in the future.
Effect of Exercise and Nicotinamide Ribose on the Aging in Mice
Zhiguan Huang, PhD, Qing Mei Wang, MD, PhD, and Xun Luo, MD

Objectives: This study aimed to investigate the effect of exercise and nicotinamide riboside (NR) on cognition and muscle strength of the senescence-accelerated prone (SAMP8) mice during aging.

Design: Male SAMR1 mice were used as healthy group (A), while SAMP8 mice were used as abnormally aging group and randomly divided into control group (B), exercise (C), NR supplement (D), exercise + NR (E). Each group had 10 mice. At age of 7 months, exercise program using rotary training instrument were as following: in the first week, the speed was 12 RPM for 10 min and ran for 5 times per week. Speed gradually increased to 22 RPM for 30 min/week, 5 times-week/week for 10 weeks. At 7th week, NR was administrated i.p. at the dose of 200mg/kg/day after 2 hours of exercise. Cognition was measured with Morris water maze experiment. Body weight and grip force were measured every week. Max contraction force of gastrocnemius was measured under anesthesia with isoflurane.

Results: At the age of 7 months, the baseline body weight of SAMP8 was significantly lower than that of the SAMR1. The incubation period of group E was significantly lower than that of B, C, and D, and the number of platform crossing of C, D and E was higher than that of B. The body weight of mice in groups of exercise, NR and combination treatment, body weight, muscle force and level of fatigue were significantly better than that of control group. Combination treatment group has apparent improved efficacy, showing Max and average swimming speed faster than those of B, while other indexes better than others (p< 0.05).

Conclusions: Exercise and NR intervention in mice may have the potential to increase the weight and the quality of the skeletal muscle, improve muscle strength, memory and learning, may have anti-fatigue effect.

Effect of One Session of Pendular Articular Decompression on Chest Expansion
Christophe Bensoussan, Antoine Champclou, Cedric Cornell, and Abderrahmane Rahmani

Objectives: Aging induces a regression of the respiratory system, in particular by impacting chest expansion which leads to many complications in terms of the person’s well-being. Our study was designed to show the effectiveness of pendular articular decompression (PDA Satisfom) on chest expansion in a mixed population, ages 18 to 62.

Design: 42 participants were divided into four groups (three DPA groups and a control group) and evaluated using two tests (ribbon-meter chest expansion and ground Finger-Distance-Test) before and at the end of the session. A third evaluation was conducted two weeks after the session for eight participants. The three DPA groups, of different age groups (n = 34), performed a 10 minutes DPA Satisfom session, while the control group (n = 8) performed a 10 minutes lower limb elevation.

Results: After the DPA session, a statistically significant improvement in all three parameters (lower thoracic level, upper thoracic level and ground finger distance) was observed in all three groups with DPA. These improvements were maintained during the two weeks following the DPA procedure. Concerned the control group, no significant improvement has been observed between the pre-test and post-test phases.

Conclusions: In conclusion, this study shows the effectiveness of one DPA Satisfom session on the chest expansion of healthy people. We observed a significant effect lasting for two weeks after the procedure. This result is of great interest against the harmful effects of aging on the respiratory system. Now it is important to continue this work on people with respiratory diseases with severe repercussions on thoracic expansion.

Effect of Stroke Recurrence on the Predictive Value of Serum BDNF Level for Motor Recovery
Xiao Xi, MS, Qianfeng Li, MD, MS, Xun Luo, MD, Yuiling Zhang, PhD, Zhen Zhou, MS, Liang Zhou, MD, and Qing Mei Wang, MD, PhD

Objectives: Brain-derived neurotrophic factor (BDNF) plays an important role in neuroplasticity after stroke. Our previous study suggests that serum BDNF levels on admission were not clinically correlated with motor function at discharge. This study was to investigate if stroke recurrence may affect the correlation between the serum BDNF and the motor outcome.

Design: Three hundred and fifty eight post-acute stroke patients were enrolled in this retrospective study. Serum BDNF levels were measured on admission to the rehabilitation hospital, and motor outcome was measured with Functional independence measure (FIM) on admission and discharge. Demographic and clinical characteristics including stroke site, stroke size, interval between blood sample and onset of stroke, medications, comorbidities were collected from medical records. Pearson correlation was used to evaluate the correlation between serum BDNF level and FIM motor score at discharge.

Results: In patients with one time prior stroke the serum BDNF level was moderately related with FIM motor score at discharge (r=0.427, P=0.001). In patients with first-ever-stroke and more than one time prior stroke there were no associations between serum BDNF level and FIM motor score at discharge, (r=0.178, P=0.003) and (r=0.282, P=0.400) respectively. There was no difference between demographic and baseline clinical characteristics between the three groups. Further subgroup analysis revealed that in the patients with one time prior stroke and CAD but without AF, serum BDNF had strong correlation with FIM motor score at discharge (r=0.738, P= 0.002).

Conclusions: Stroke recurrence and CAD may influence the predictive value of serum BDNF on motor outcome. The result provides insight into biological mechanism of stroke recovery and potential therapeutic target in responsive subgroup.

Effectiveness and Complications of Sodium Oxybate Administration for Treatment of Post-hypoxic Myoclonus: A Case Report
Jennifer Yu, MD, Emily Ryan-Michailidis, DO, and Forrest A. Brooks, MD

Case Diagnosis: A 68-year-old male presented with recent organizing pneumonia resulting in hypoxic arrest and trachostomy dependence with subsequent severe post-hypoxic myoclonus. After optimization of his multiple medical issues, including trachostomy decannulation, the patient remained with fluctuations in cognition and arousal. Additionally, myoclonus severely limited functional abilities. He was trialed on multiple antiepileptics for myoclonus. All medications resulted in modest alleviation of his symptoms, but increased sedation and worsened activity tolerance.

Case Description: The patient was admitted to acute inpatient neurorehabilitation for treatment of his functional deficits. He initially required moderate-to-intensive therapies, he progressed to minimum-to-moderate assistance level. Balancing, endurance, and fine motor movements remained limited by diffuse myoclonic activity. Treatment with sodium oxybate was then initiated at 0.75g daily. He demonstrated global reduction in myoclonus for several hours after administration with improved arousal and verbal output; ambulation progressed to contact guard level. Improved motor control led to independent feeding and writing tasks, which was never achieved prior. The trial was terminated after four doses as the patient was consistently noted to have confusion, irritability, emesis, and somnolence several hours after administration. Down titration to 0.5g did not alleviate side effects.

Discussions: Sodium oxybate is a salt of gamma-hydroxybutyrate (GHB). It has been previously reported to improve refractory myoclonus, although side effects of the medication are rarely reported. Here we present a case of poor patient tolerance to myoclonus despite modest treatment dose. Other authors have described dosage up to 9g per day without increased somnolence. Side effects of the medication were likely amplified by patient’s underlying impaired arousal from anoxic encephalopathy and history of upper airway obstruction.

Conclusions: This case highlights that although sodium oxybate can reduce myoclonus, its use should be considered cautiously in patients with baseline impairments in arousal.

Effectiveness of a Community Based Rehabilitation Center Dealing with Physical Disability in Quetta, Pakistan
Hameed Ul Mehdi, MPA, LLB, and Muhammad Raza, MEDICAL
OBJECTIVES: The objective of this project is to work in rehabilitation, physical deformities and provide advocacy in health sector.

DESIGN: Humanitarian Organization Providing Effective Services, HOPES Quetta, Pakistan started its operation in 1996 with medical professionals well qualified in physiotherapy, rehabilitation and training sectors. Besides its rehabilitation, referral and health services, it successfully integrated an intensive collaboration among line organizations for exchange of knowledge through meetings, seminars, by e-mails locally, nationally and internationally. It trains key youth medical professionals regarding all forms of physical deformities, health, hygiene, HIV/AIDS, and rehabilitation. It conducts workshops for females on health issues such pre-post pregnancy deformity, child health deformities and effective prevention. HOPES provides treatment by physiotherapy techniques. It provides information to women health, child health in meeting with medical professionals around the province.

RESULTS: HOPES have been very successful in its rehab services, health, social, charity and awareness campaigns. The project has covered entire province in rehabilitation of all physical deformities. It received excellent empathy from the society and from the Government. A strong accountability, capacity building, contribution, sharing of the knowledge and experience is the main essence and success of our programs.

CONCLUSIONS: We successfully labored in all kinds of physical disabilities, its rehabilitation. Our programs are effective increasing level of understanding about physical deformities, concept of physiotherapy, child disability, its prevention, pregnancy deformities, health awareness among the general public at large.

EFFECTS OF AN EXERCISE PROGRAM ON CARDIAC FUNCTION AND QUALITY OF LIFE OF PATIENTS WITH STROKE

OBJECTIVES: To evaluate the effect of an exercise program on the morphological and functional echocardiographic variables, evaluate the quality of life of patients after ischemic stroke.

DESIGN: A longitudinal, randomized clinical trial consisting of patients with clinically stable chronic ischemic stroke is being performed. Patients are being randomized into two groups: Control Group (CG): physical therapy intervention according to the National Institute for Health and Care Excellence protocol; and Intervention Group (IG):cardiovascular rehabilitation on a treadmill programmed at speed and inclination compatible with individual capacity for 45 minutes, three times a week for 16 weeks. Patients in both groups are undergoing transcranial echocardiography and quality of life assessment (EuroQol) at the beginning and end of the protocol. Comparisons between groups were performed by Student's t-test, and between the moments, before and after intervention, were made by paired t-test. Significance level: p<0.05. To date, the participation of the study of 17 patients (CG=7 and IG=10) were completed and analyzed and the participation of other patients is ongoing.

RESULTS: There was a significant improvement in morphofunctional echocardiographic variables: left ventricular systolic diameter (LVSD, p=0.02), left ventricular mass (LVM, p<0.01), LVM index (LVMi, p<0.01), left atrium diameter (LA, p<0.01), ejection fraction (EF, p<0.01), systolic excursion velocity of the mitral annulus to the tissue Doppler (Wave S, p=0.04), left atrial volume index (LAVI, p<0.01) and E/e' ratio (p=0.02) in the intervention group patients when compared to the control group at the end of the research protocol. There was an improvement in GI compared to CG in the pain and discomfort domain of the EUROQOL questionnaire (p=0.02) at the end of the protocol.

CONCLUSIONS: Improvement of morphofunctional echocardiographic parameters and pain after the cardiovascular rehabilitation program suggests a favorable impact on cardiac function and quality of life after stroke.

EFFECTS OF LOWER THORACIC SPINAL CORD STIMULATION ON BOWEL FUNCTION IN TETRALOPIEGICS
Anthony F. DiMarco, MD, Robert T. Geurtman, PhD, MD, Kutaiba Tabbaa, MD, Gregory A. Nemunaitis, MD, and Krzysztof E. Kowalski, PhD

OBJECTIVES: Spinal cord injury (SCI) has serious adverse consequences for bowel function in a majority of subjects. Some of the challenges relate to their dependence on caregiver support, need for medications, and the extensive time required for mobility and functional echocardiographic variables, evaluate the quality of life of patients after ischemic stroke.

RESULTS: In five consecutive tetraplegics, SCS was applied at home, 2-3 times/day, on a chronic basis and also as needed for secretion management. Stimulus parameters were set at values resulting in near maximum airway pressure generation (Paw) (30-40V, 50Hz, 0.2ms). Paw was measured as an index of respiratory muscle strength. Questionnaires related to BM, were also administered.

RESULTS: Mean Paw during spontaneous efforts was 39±7 cmH2O. Following a period of reconditioning over a 20-week period, SCS resulted in Paw of 139 ±20cmH2O. The time required for BM routines was reduced from 118±34 min to 18±2 min (p<0.05). Mechanical methods for BM (digital rectal stimulation and/or manual evacuation) were completely eliminated in 2 patients. The number of medications required for BM was also reduced. No patients experienced fecal incontinence as result of SCS. Each patient and caregiver also reported marked overall improvement and reduction in the daily stress level associated with BM.

CONCLUSIONS: Our results suggest that SCS to restore cough may be a useful method to improve BM and life quality for both SCI patients and their caregivers.

EFFECTS OF MECHANICAL INSUFFLATION-EXSUFFLATION ON COMPARTMENTAL CHEST WALL VOLUME IN PATIENTS WITH CHRONIC CERVICAL SPINAL CORD INJURY
Kozo Hanayama, PhD, Takefumi Sugiyama, MD, Hiromichi Metani, MD, Kazunari Furusawa, MD, and Masaki Hyodo, MD

OBJECTIVES: The objective of this study was to evaluate the effects of mechanical insufflation-exsufflation (MI-E) on volume change of the chest wall and each compartment of the chest wall in patients with cervical spinal cord injury using optoelectronic plethysmography (OEP).

RESULTS: Fourteen male patients with chronic cervical spinal cord injuries were included. Each subject was instructed to lie on a bed in the supine position and 45 reflective markers were placed on predetermined locations on the chest wall. The respiratory movements were recorded by a 3D optoelectronic motion analysis system (Vicon MX; Vicon Motion Systems, Oxford, UK) with 6 infrared cameras placed around the subject. The subjects were asked to take deep breath (vital capacity measurement maneuver). Then, we applied MI-E through face mask at the pressure of ±30, 40, 50 cmH2O. The following parameters were calculated from the saved 3D coordinate data of the reflective markers; change of the total volume of the chest wall and the compartmental volume of the upper thorax, lower thorax and abdomen.

RESULTS: The change of chest wall volume was significantly greater during MI-E of ±30 cmH2O than when taking a deep breath. The volume change in the upper and lower thorax compartment was significantly greater during MI-E of ±30 cmH2O than when taking a deep breath. However, MI-E made no significant difference to the volume of the upper and lower thorax compartment between pressures of ±30 cmH2O and ±50 cmH2O. The volume change in the abdomen compartment was slightly greater during MI-E than when taking a deep breath, but this was not statistically significant.

CONCLUSIONS: The findings of this study indicate the possibility of maintenance or improvement of the compliance of the chest wall, especially the ribcage in patients with spinal cord injuries, using MI-E. In turn, these findings could lead to the prevention of pulmonary complications.

EFFECTS OF PENDULAR ARTICULAR DECOMPRESSION SATISFORM ON LUMBAR AND HIP MOBILITY
Christophe Bensoussan, Antoine Champclou, Cedric Corneil, Anthony Dardillac, and Paul Delamarche

OBJECTIVES: Effect of a Pendular Articular Decompression Satisfism device’s practice on lumbar mobility. This experiment concern subjects who are exposed to a prolonged sitting position during their professional activity.

RESULTS: 48 subjects participated to the study, [age : 38 ± 10.2 years ; height 169±2.8 cm and weight : 66.6 ± 13.5 kg]. We examined effects of practice or detraining: the effect of one session, of three weeks of regular use, of 3-weeks-detraining: the effect of one session effect or 3 weeks of rest. The mobility was evaluated by 4 mobility tests (6 measures) performed in three different anatomical planes: finger-to-floor test, lateral flexion test, rotation test and Schöber’s test.

RESULTS: A single session significantly improves the mobility in the frontal plane whereas 3 weeks of regular use leads to a gain in anterior flexion, in lateral flexion and in rotation of non-dominant side. 3-weeks-pratice reduce the session effect and the detraining result in lower mobility.

CONCLUSIONS: The Satisfism device seems to be beneficial for mobility improvement in subjects who are exposed to a prolonged sitting position. In conclusion, the examination of a more extend population could give a definitive response on the mobility device effect.
EFFECTS OF QUADRICEPS FATIGUE ON SPASTIC COCONTRACTIONS BETWEEN QUADRICEPS AND HAMSTRINGS AND GAIT IN STROKE PATIENTS

Charline Duchossoy, DR, Thomas Wacquez, INTERN, Hervé Devanne, DR, PhD, and Etienne Allart, DR, PhD

OBJECTIVES: Despite spastic cocontractions’ frequency in stroke patients, the influence of muscle fatigue on their appearance stays misunderstood. The main aim of this study was to assess the effects of an isometric fatigue protocol on knee extensors cocontractions (rectus femoris, vasti lateralis and medialis) during knee flexion in chronic post-stroke patients presenting a stiff-knee gait (SKG) pattern. We also evaluated the effects of this protocol on quadriceps spasticity, gait spatiotemporal parameters, gait velocity, endurance and perceived exertion.

DESIGN: Thirty hemiparetic patients with SKG were evaluated before and after the isometric protocol, which consisted in alternately maximal isometric concentric knee extensions and passive knee flexions until effective quadriceps fatigue. The cocontraction index (CCI) between the three quadriceps heads and the semitendinosus (ST) was registered, as well as the agonist recruitment index (ARI) of cocontraction index (CCI) between the three quadriceps heads and the semi-tendinosus.

RESULTS: The RS fMRI analysis showed more increased functional connectivity of Cingulate Gyrus, Supramarginal Gyrus, Cerebellum Crus, Precentral gyrus, Middle temporal gyrus and Inferior temporal gyrus in the real stimulation group. Motor evoked potentials (MEP), event-related potentials (ERPs), resting state functional magnetic resonance imaging (RS fMRI) and diffusion tensor imaging (DTI).

CONCLUSIONS: The change of P300 amplitude on F3 and C3 was increased in real stimulation group. And these effects lasted after three months in MOCA. There was no significant time*group effect among the U-FMA, EQ-5D, and CPT. Among the studies of this kind, there is a need to assess the effects of rTMS on gait parameters.

EFFECTS OF RTMS ON COGNITION AND FUNCTIONAL CONNECTIVITY IN SUBACUTE STROKE PATIENTS

Yeong Wook Kim, MD, and Min Kyun Soln

OBJECTIVES: To determine the mechanisms on cognitive improvement with repetitive transcranial magnetic stimulation (rTMS) over the left dorsolateral prefrontal cortex (L-DLPFC) in subacute stroke patients.

DESIGN: Twenty-eight first-ever stroke patients with cognitive impairment were recruited. All subjects were randomly assigned to real or sham stimulation group and completed 10 sessions of rTMS for 2 weeks. High frequency rTMS were on the L-DLPFC at 80% of resting motor threshold (MT). At the time of baseline, 1 month and 3 months after stroke onset, all subjects were evaluated; the several clinical scales, motor evoked potentials (MEP), event-related potentials (ERPs), resting state functional magnetic resonance imaging (RS fMRI) and diffusion tensor imaging (DTI).

RESULTS: After the intervention period, the real stimulation group improved significantly in the K-MMSE, K-MOCA, K-MBI and K-GDS compared with sham stimulation group. And these effects lasted after three months in MOCA. There was no significant timegroup effect among the U-FMA, EQ-5D, and CPT. Among the VCHS parameters, Z-scores of executive and memory function showed higher delta value between baseline and 3months timepoints in rTMS group. The MEP showed higher TIME x GROUP interaction in the intracortical inhibition value on right hand. It suggests that there is beneficial effect on premotor cortical excitation of rTMS. The change of P300 amplitude on F3 and C3 was increased in real stimulation group significantly only in the auditory Oddball paradigm. The ST MRI analysis Results showed more increased functional connectivity of Cingulate Gyrus, Supramarginal Gyrus, Cerebellum Crus, Precentral gyrus, Middle temporal gyrus and Inferior temporal gyrus after stimulation compare with the sham group.

CONCLUSIONS: These results suggest that high frequency rTMS on the L-DLPFC improves cognitive function and functional network activity in subacute stroke. The rTMS seems to be a recommendable treatment in stroke patients with cognitive impairment.

EFFECTS OF SPASTICITY AND RELATED POSTURE ON MEDIAN NERVE AND CARPAL TUNNEL IN STROKE PATIENTS WITH UPPER EXTREMITY SPASTICITY: ULTRASONOGRAPHIC AND ELECTROPHYSIOLOGICAL EVALUATION

Seçilay Günsen, MD, Aysun Genç, SPECIALIST, Derya Gökmen, PhD, Haydar Gök, MD, and Şehim Kutlay, MD

OBJECTIVES: Spasticity induced flexed wrist posture is a common problem in stroke patients. The aim of this study was to evaluate whether there is an effect of upper extremity spasticity on carpal tunnel (CT) and median nerve by using ultrasonographic and electrophysiological evaluation in patients with stroke.

DESIGN: A total 76 (46 stroke/30 healthy) individuals enrolled in the study. Demographics (age, gender, time since stroke etc.) were recorded. Individuals with diseases that could affect peripheral nerves (diabetes mellitus, hypothyroidism etc.) were excluded. Clinical evaluations included Brunnstrom Motor Recovery Stages(BMRS), Modified Ashworth Scale(MAS) and the Barthel Index(BB). The cross-sectional area (CSA) of the CT and median nerve (wrist/mid-arm levels) was measured by ultrasound(US). Motor nerve conduction studies of the median, ulnar, fibular and tibial nerves and sensory nerve conduction studies of the median, ulnar, and sural nerves were performed. After electrophysiological evaluation, individuals diagnosed with polyneuropathy were also excluded.

RESULTS: The mean age of stroke and control group was 55.6±13.5, 56.1±21.1 respectively. The mean time since stroke was 47.7±67.7 months. 52.2% of the patients were moderate dependent in activities of daily living. Compound muscle action potential amplitudes(CMAP) of median nerve was significantly reduced in hemiparetic side compared to non-paretic side (p<0.02). The CSA of the CT was significantly smaller compared to non-paretic side (p<0.03) and there was a weak but significant inverse correlation between time since stroke and CSA of the CT (r=-326, p<0.03). The CSA of the median nerve at wrist was significantly thicker in patients with wrist flexor spasticity is MAS 2 and above (p<0.03).

CONCLUSIONS: Our result showed that time since stroke may have an impact on CSA of CT and also the severity of wrist flexor spasticity is associated with thickening in median nerve. Spasticity related chronic wrist posture may cause entrapment of the median nerve.

EFFECTIVENESS OF LOCAL CORTICOSTEROID INJECTION IN CARPAL TUNNEL SYNDROME, A RANDOMIZED CLINICAL TRIAL

Shahidur Rahman, MBBS, FCPS, MD

OBJECTIVES: Carpal tunnel syndrome is a clinical syndrome manifested by signs and symptoms of irritation of the median nerve at the wrist. This study was done to see the efficacy of local corticosteroid injection in CTS and compare this with conservative treatment.

DESIGN: Recorded data of 70 patients were analyzed. All the patients were diagnosed as idiopathic carpal tunnel syndrome by nerve conduction study NCS). Mild to moderate cases of conduction delay were included. 35 patients were enrolled in group A and were provided with local injection triamcinolone 40 mg just proximal to the wrist crease in more symptomatic hand. 35 patients in group B were given naproxen 500mg twice daily and night splint. Patients were followed up at one month. 10 patients in group B were lost The outcome measure was based on rating the severity of symptoms pain, paresthesia, on Visual analogue scale (VAS) of 0 – 10 and nocturnal awakening.

RESULTS: The CTS group: 27% patients were male. Age ranges were 44.64± 5.02 in group A and 46.37± 5.725 in group B. Pretreatment pain in group A and B were 5.9±4.1 and 7.0±1.3 respectively. Pretreatment paresthesia in group A & B were 6.0±1.3 B and 7.0±1.21 respectively. 84% patients had moderate conduction delay in NCS study. Only 4 patients in each group had nocturnal awakening. Post treatment follow up at one month in group A shows significant improvement with reduction of pain and paresthesia to 1 ± 0.621 and 2.3± 1.33 respectively. Nocturnal awakening were reported in either group. Follow up NCS study were not done in any patient.

CONCLUSIONS: Local corticosteroid injections were found to be effective in idiopathic CTS and were better than conservative treatment with night splint and NSAIDs.

EFFECTIVENESS OF LOW LEVEL LASER THERAPY IN CARPAL TUNNEL SYNDROME: EXPERIENCE OF 49 CASES IN BANGLADESH

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OBJECTIVES: To assess the outcome of Low level laser therapy in Carpal Tunnel Syndrome in term of symptoms severity and functional status.
RESTORATIVE SPLIT IN CTS.

±8.70 (range, 22-60 years). Both the study and control group separately showed im-

mation (BCTQ).

population based on inclusion and exclusion criteria. Patients were randomly assigned

to two groups designed as group A and group B. The assignment was done with

ical hospital in Bangladesh from January 2019 to June 2019. CTS cases above

RECEPTOR 2/ALX-OPIOID RECEPTOR PATHWAY

ELECTROACUPUNCTURE DECREASES INFLAMMATORY PAIN

MMP-9 expression at the inflammation site are involved in CFA-induced inflammatory pain.

expression in the paw. Furthermore, i.pl. pretreatment with WRW4 prevented the in-

tion (FPR2/ALX antagonist) or naloxone (non-selective opioid receptor antago-

with naloxone or WRW4 prevented the antihyperalgesic effect induced either by EA

RESULTS: This single centered, parallel, double blinded randomized control trial

CONCLUSIONS: Low intensity laser therapy is effective compared with night-

ng resting splints in CTS.

ELECTRICAL STIMULATION IN COMBINATION WITH HEAT
INDUCES NEURITE OUTGROWTH IN PC123M CELLS VIA THE P38
MITOGEN-ACTIVATED PROTEIN KINASE PATHWAY

Kenji Kawasaki, MD, and Yoshio Kano, PhD

OBJECTIVES: Electrical stimulation of the nervous system is a technique that

is frequently used in physical therapy. In patients who are unable or unwilling to per-

form whole-body exercise, neuromuscular electrical stimulation (NMES) may be an

alternative treatment to enhance lower limb muscle strength. Electrical stimulation is a

promising technique for axonal regeneration of peripheral nerve injuries. However, the

molecular mechanisms underlying these effects of electrical stimulation remain under

investigation. To clarify the mechanisms of nerve regeneration by electrical stimulation,

we investigated differentiation and cellular damage of PC12 mutant (PC12m3) cells

called by electrical stimulation. In addition, we investigated stimulation conditions

that are gentle to the human body by combining electrical stimulation with heat.

DESIGN: We investigated the role of the p38 mitogen-activated protein kinase

(MAPK) pathway in electrical stimulation-induced neurite outgrowth of PC12m3cells in

which nerve growth factor (NGF) induced neurite outgrowth is impaired. For ex-

periments on neurogenesis, the cells were treated with NGF and/or exposed to elec-

trical stimulation in a cell electrical stimulation culture apparatus for 5 to 60 min. The

electrical stimulation was applied with 10 Hz constant current square-wave pulses of

1 ms in duration and intensity of 100 mA using a Nicolet Viking IV programmable

signal conditioner. As another independent experiment, we investigated stimulation

conditions that are gentle to the human body by combining electrical stimulation with

heat.

RESULTS: When cultures of the PC12m3 cells were exposed to electrical stim-

ulation at 100 mA for 30 min, activity of p38 MAPK increased and neurite outgrowth

was greatly enhanced. The frequency of neurite outgrowth induced by electrical stim-

ulation was approximately (p<0.06) greater than that of neurite outgrowth induced by

NGF alone. The neurite outgrowth induced by electrical stimulation was inhibited by a

specific p38 MAPK inhibitor, SB203580. The activation of p38 MAPK induces ac-

tivation of the transcription factor CREB. The activation of CREB induced by elec-

trical stimulation was inhibited by SB203580. Longer electrical stimulation of PC12m3

cells provoked cell death, which was enhanced by SB203580. When cultures of the

PC12m3 cells were exposed to 15 min electrical stimulation a 10-mA electric current in

warm water at 40 degrees, neurite outgrowth was enhanced.

CONCLUSIONS: These findings suggest that electrical stimulation-induced ac-

tivation of the p38 MAPK/CREB pathway is responsible for the neurite outgrowth

and survival of PC12m3 cells. When applying this technology to human, it is painful

and unbearable to be exposed to electrical stimulation at 100 mA for 30 min. How-

ever, in combination with electrical stimulation and heat, 10-mA intensity electric cur-

rent in warm water at 40 degrees may be applied for 15 minutes comfortably.

ELECTROACUPUNCTURE DECREASES INFLAMMATORY PAIN
THROUGH PERIPHERAL ANAXIN A1-FORMYL PEPTIDE
RECEPTOR 2/ALX-OPIOID RECEPTOR PATHWAY

Daniel Fernandes Martins, PhD, Cintia Vieira, MSC, Daiana Cristina Salm, MSC,
Verónica Horewics, PhD, Daniela Luldke, MSC, Aline Emer, PhD, Júlia Keorich,
Graduate Student, Gustavo Mazzardo, Graduate Student, Sayron Elias,
Master Student, Anna Paula, PhD, Lisandro Ceci, MSC, Afonso Salgado, PhD,
Francisco J. Cedral Filho, PhD, Leidiane Martins, PhD, and Ari Moré, PhD

OBJECTIVES: The present study evaluated the involvement of the Annexin

1/FPR2/ALX receptor in the antihyperalgesic effect induced by electroacupuncture

(ES) in an animal model of persistent peripheral inflammation.

DESIGN: Swiss mice male underwent intraplantar (i.pl.) injection with complete

Freund’s adjuvant (CFA). Mechanical hyperalgesia was assessed by the von Frey test.

Animals were treated with EA (2-10Hz, ST36-SP6) or subcutaneous BML-111 injec-

tion (FPR2/ALX analog an analog of lipoxin A4) for 5 consecutive days. In another set

of experiments, on the first and fifth days after CFA injection, animals received i.pl.

WRW4 (FPR2/ALX antagonist) or naloxone (non-selective opioid receptor antago-

nist) before EA or BML-111 treatment. Expression of the FPR2/ALX and Annexin

1 (AnnA1) in the paw was performed on the second day after CFA injection by the

Western blotting technique.

RESULTS: EA and BML-111 reduced mechanical hyperalgesia, i.pl. pre-treatment

with naloxone or WRW4 prevented the antihyperalgesic effect induced either by EA

or BML-111. EA treatment increased AnnA1 but did not alter FPR2/ALX receptor

expression in the paw. Furthermore, i.pl. pretreatment with WRW4 prevented the in-

crease of AnnA1 expression induced by the EA. On the other hand, pretreatment with

BML-111 did not change the expression of FPR2/ALX receptor or AnnA1.

CONCLUSIONS: Endogenous increase of FPR2/ALX and decrease of AnnA1

expression at the inflammation site are involved in CFA-induced inflammatory pain.

EA treatment produces its antihyperalgesic effect through AnnA1/FPR2/ALX path-

way. This seems to be triggered by the activation of FPR2 and a cross-talk with the

opioid system.

ELECTROMYOGRAPHIC FINDINGS IN PATIENTS WITH POST
POLIOMYELITIS SYNDROME AND APPLICATION IN
REHABILITATION

Mark A. Lissens, MD, PhD

OBJECTIVES: Thanks to vaccination programs worldwide, acute poliomyelitis

nowadays is rarely seen anymore. However, 12.5 million polio survivors can several

decades later be contracted with new symptoms due to so-called post poliomyelitis

syndrome(PPS), resulting in fatigue, pain, weakness, new muscle atrophy and diffi-

culties in activities of daily life (ADL) or functional loss. The objective of this study

was to explain the major symptoms in PPS electrodagnostically and how to apply our

findings in rehabilitation.

DESIGN: We evaluated 30 PPS patients, 11 males and 19 females, mean age

53.2 years. We performed concentric needle electromyography (EMG) of the rectus

femoris muscle, in 25 of them bilaterally, and in 5 of them unilaterally, because their

other leg was completely atrophic.

RESULTS: In all 55 examined muscles we found neuromotor unit action po-

tentials and giant motor units, with mean maximal amplitude of 7.4 mV. When tak-

ing into account only the normal appearing muscles, excluding severely atrophic

muscles, the mean amplitude of these 32 muscles was 7.9 mV, compared to a normal

value of 1.2 ± 0.6 mV.

CONCLUSIONS: Our findings can be explained by the fact that normal anterior

horn cells can adopt hundreds of “orphaned” muscle fibres. In an average polio infec-

tion 50 to 80% of motor neurons are affected, with a 50% neuronal fatality. However,

over 50% of motor units of a muscle may be lost without symptoms and without vis-

ible muscle atrophy. This is the reason why in such muscles giant motor units can be

found and why PPS patients feel after decades of almost normal functioning new

symptoms such as weakness, fatigue and new muscle atrophy. In rehabilitation med-

icine it is important to investigate musculature in PPS patients accurately in order to

set up adequate rehabilitation programs in which affected muscles are not overloaded,

leading to new muscle atrophy.

ELECTROMYOGRAPHIC STUDIES IN FECAL INCONTINENCE

Ana Margarita Chong Medina, MD, Jorge Luis González Roig, PhD, MD,
and Yaima Almanza Diaz, MD

OBJECTIVES: Fecal incontinence can be cause important disorders in people’s

quality of life. The diagnostic of fecal incontinence is poorly systematized. The neuropathology of defecation is still under study and de-

pend on the integrity of the anatomical and neuronal structures, as well as on the cor-

rection of the coordination of mechanical, muscular and nervous systems. In this
study, we evaluate the usefulness of anal electromyography in the diagnosis of patients with fecal incontinence.

**DESIGN:** A descriptive, cross-sectional and prospective study was conducted in female patients with incontinence, treated in the Clinical Neurophysiology Department of the “Julio Díaz” Hospital, National of Rehabilitation Center. The patients were evaluated by external anal sphincter electromyography and Wexner score. To characterize the patients, from the clinical and epidemiological point of view, an exploratory data analysis was applied, the relationships between sociodemographic and clinical variables were evaluated with the result of the electromyographic study and the severity of fecal incontinence. Contrast of non-parametric hypothesis was performed, with respect to the positivity of the electromyographic study.

**RESULTS:** Predominant patients between 41 and 60 years, average of 58 years, with obstetric history of more than 2 births and evolution of the disease over 5 years. Moderate incontinence was the most prevalent with the most frequent electromyography alteration: isolated pattern to contraction and signs of denervation. Wexner’s score and classification had a relationship of medium strength, with statistical significance, in relation to the time of evolution of the disease and the electromyographic pattern, respectively. The positivity of the study was 97.7%.

**CONCLUSIONS:** The structural examination of the anal canal must be combined with a neurophysiological study that allows us to deepen our knowledge of these disorders, as well as, better classify patients, indicate therapeutic more effectively, and evaluate the prognosis of patients with fecal incontinence.

**ELECTROMYOGRAPHY OF SCALENE AND RECTUS ABDOMINIS DURING THE RESPIRATORY CYCLE IN HEALTHY SUBJECTS**

Rola Tout, MPT, and Joseph Maarrawi, Professor

**OBJECTIVES:** Expose the electromyography and spirometry relationship and the chronology of the contraction of Scalen and Rectus abdominis in physiological breathing and understand the physiology of respiratory muscles by analysis of EMG signals of inspiratory and expiratory muscles.

**DESIGN:** Methods: 128 electromyographic tests were performed during the respiratory cycle on 43 healthy adults. EMG signals of Scalen (inspiratory muscle), Rectus abdominis (forced expiratory muscle) were recorded by using LabView system. The breathing was recorded by using a spirometer (vernier®). The test of 15 seconds was repeated 3 times for each subject.

**RESULTS:** The duration of the contraction of Scalen are superior to Rectus abdominis 82% p-value = 0.00058, the amplitude of Scalen is superior of Rectus abdominis, p-value = 0.0003773, 109 tests of Scalen contraction begin before that of Rectus abdominis (63.74%), p-value = 0.000012. From the data of Rectus muscle, 0.04 ± 0.011 μV for Rectus abdominis and 0.04 ± 0.021 μV for Scalen, p-value = 6.76591E-06. Duration of inspiration is 1.25 ± 0.19, the expiration is 1.04 ± 0.19. The mean frequency of Rectus abdominis is 54.19 Hz ± 6.35, it is 57.21 Hz ± 7.08 for Scalen, p-value is 9.84081E-08. The median frequency of Rectus abdominis is 51.05 Hz ± 6.51, it is 52.72 Hz ± 6.94 for Scalen, p-value is 0.0098. The fatigue has been reduced from 60.40 ± 0.45 to 19.98 ± 4.32. For Scalen it decreased from 60.40 ± 0.4 to 23.52 ± 4.41.

**CONCLUSIONS:** There is a synergistic - antagonism relationship between the Scalen (inspiratory muscle) and Rectus abdominis (forced expiratory muscle) during respiration. Scalen is a main inspiratory muscle, its contraction is important in amplitude, duration and frequency. The Rectus abdominis participate to the inspiration phases and it's contraction is less important in duration, amplitude and frequency. Both muscles are fatigable during the inspiratory cycle.

**ENCEPTHEPALOPATHY OF UNKNOWN ETIOLOGY WITH COGNITIVE AND FUNCTIONAL IMPROVEMENT AFTER ADJUSTMENT OF PSYCHOTROPIC MEDICATION REGIMEN**

Joshua Levin, DO, Mithra Maneyapanada, MD, and Jeffrey Boyd, DO

**CASE DIAGNOSIS:** Encephalopathy due to underlying psychiatric condition

**CASE DESCRIPTION:** 45 year old female with history of bipolar disorder who was hospitalized after experiencing a “seizure”. On admission she was awake, but minimally responsive. An extensive neurological workup was unremarkable. Medica-
tion interventions, including Lorazepam challenge, solumedrol course, and IVIG did not improve her condition. She was diagnosed with encephalopathy of unclear etiology and one month after admission she was transferred to inpatient rehabilitation. While in rehabilitation she initially made limited functional improvements, had multiple medical setbacks, and continued to be minimally responsive beyond moaning and with continued restlessness. Her behavior was regulated with clonazepam, valproic acid, propranolol, escitalopram, mirtazapine and quetiapine. Eventually, with psychiatric input, her medication was adjusted by switching her SSRI to venlafaxine, and neu-roleptic to olanzapine. With additional dose titration she made significant cognitive and neurological improvement and was eventually discharged home with her parents.

**DISCUSSIONS:** Patient's diagnosis of encephalopathy of uncertain etiology was initially thought to be autoimmune or secondary to medication overdose. She had multiple treatment regimens with little improvement. Her underlying psychiatric condition was found to be the presumed cause of her condition, likely a combination of bipolar disorder with major depression. With modification of her psychotropic regi-

**EMERGENCE FROM VEGETATIVE STATE FOLLOWING INTRATHecal BACLOfen PUMP PLACEMENT**

Priyanca Shah, DO, and Stephen Hampton, MD

**CASE DIAGNOSIS:** Anoxic brain injury secondary to opioid overdose

**CASE DESCRIPTION:** A 27-year-old male with a history of childhood epi-lepsy, chronic pain, and opioid abuse with cardiac arrest and anoxic brain injury in the setting of opioid overdose and initially in a vegetative state. Hospital course complicated by persistent fevers, posturing including, rigidity, facial grimacing, and hemodynamic changes concerning for paroxysmal autonomic instability with dystonia or PAID syndrome which was refractory to management with baclofen, propranolol, bromocriptine, dantrolene, clonidine, gabapentin, antityphetics, opioids, and benzodiazepines. The patient underwent an intrathecal baclofen trial with improvement in lower limb posturing, improved tachycardia, and hyperthermia hours after the initial bolus. Additionally, the patient was weaned off of benzodiazepines and opioids. Three weeks after intrathecal bac-lofen placement patient demonstrated emergence from a vegetative state.

**DISCUSSIONS:** Intrathecal baclofen pump trial and placement showed improve-
ment in this patient’s refractory autonomic storming and posturing which improved after trial and continued to improve after intrathecal baclofen pump placement and ti-
tration. Additionally, three weeks after placement, the patient emerged from a vegeta-
tive state. Placement of an intrathecal baclofen pump allows the patient to be weaned off of sedating medications and reduce autonomic instability promoting emergence.

**CONCLUSIONS:** Implantation of an intrathecal baclofen pump reduces autonomic storming, dystonic posturing, and may help with emergence from a vegetative state.
Abstracts

ENDOVASCULAR THROMBECTOMY 37 HOURS AFTER ACUTE ISCHEMIC MIDDLE CEREBRAL ARTERY STROKE: A CASE REPORT

Conan So, BS, MPH, Naveed Chaudhry, MD, Sheeraj Gandhi, MBBS, John Cole, MD, MS, and Melissa Motta, MD, MPH

CASE DIAGNOSIS: We present a case of delayed thrombectomy in a 43-year-old man with acute dysarthria, left-sided weakness, and visual neglect. Initial MRA demonstrated a small completed stroke and a thrombus in the right middle cerebral artery.

CASE DESCRIPTION: Thirty-seven hours after symptom onset his weakness acutely worsened. A repeat MRI revealed an unchanged core infarct volume and a cerebral angiogram suggested an abrupt occlusion of the right distal M1. Thrombectomy was performed with complete reperfusion and the patient’s strength recovered following the procedure. He had a modified Rankin Scale (mRS) of 1 at 6 months post-thrombectomy with minimal residual deficits.

DISCUSSIONS: Endovascular thrombectomy following an acute ischemic stroke can lead to improved functional outcome when performed early. Current guidelines suggest treatment within six hours after symptom onset. Recent studies including the DEFUSE-3 and DAWN trials demonstrate that some patients may benefit from thrombectomy up to 16 and 24 hours, respectively. Our case demonstrates that the relationships between the key parameters including clinical presentation, imaging mismatch, and the upper time limit for endovascular thrombectomy treatment remain uncertain. It may be reasonable to consider a lower threshold to proceed with thrombectomy in younger patients who have clinical presentations different than the ones used in the DEFUSE-3 and DAWN trials.

CONCLUSIONS: We conclude there is a subset of patients that may safely benefit from thrombectomy in later time windows beyond the trial criteria, especially in the setting of clinical exam to imaging mismatch.

EPIDEMIO-CLINICAL PROFILE OF PATIENTS WHO PRESENTED LOW BACK PAIN IN THE REHABILITATION CENTER OF CHU-JRA MADAGASCAR RETROSPECTIVE STUDY, DESCRIPTIVE

Andréa Holiarisoa Raharinantenaina

OBJECTIVES: Chronic low back pain is a common pathology and the third cause of functional disability leading to progressive physical deconditioning and desocialization. Rehabilitation plays a major role in the care of these patients. Our study aims to determine the epidemiological and therapeutic aspect of patients with chronic low back pain seen in Rehabilitation Center of CHU-JRA Antananarivo Madagascar.

DESIGN: This was a retrospective study, descriptive over a period of 1 year from 01 January to 31 December 2018 including all patients who came for a consultation for chronic low back pain greater than 3 months of progression in the Rehabilitation Center of CHU-JRA.

RESULTS: All patients with acute low back pain are excluded from our study.

RESULTS: Of the 1237 patients collected, 338 patients were retained. The incidence of chronic low back pain was 27.32% with female predominance with a sex ratio of 1.7. The average age was 49.29 years. The 73.66% were working. We noted that 77.60% are referred by Doctors. A history of at least one episode of low back pain is found in 44.37%. Scoliosis was reported in 31.36%, scoliotic attitude in 18.95%, osteoarthritis in 15.08%. Radiography was the most accessible supplementary investigation for patients. We were able to estimate that 95.79% received at least 10 rehabilitation sessions and 47.63% would have had a clinical improvement according to EVA scale.

CONCLUSIONS: Chronic low back pain is common, affecting young people in employment. Rehabilitation appears to be effective in reducing pain and improving the functional capacity of these patients. Further research is needed to help us understand more about the long-term course and broader outcomes and impacts from low back pain.

EVALUATING DIFFERENT SOURCES OF INFORMATION FOR INDIVIDUALS WITH AND CAREGIVERS OF INDIVIDUALS WITH SPINAL CORD INJURIES

Sejean Yang, Jessica Pope, MS, ATC, Alannah Bhanji, and Ali A. Weinstein, PhD

OBJECTIVES: With the increase in the availability of health-related information, it has become more difficult for individuals to identify sources that are relevant and reliable. The study’s objective was to compare the benefits and shortcomings of information sources.

RESULTS: Sixteen individuals with SCI (spinal cord injury) and 17 caregivers of individuals with SCI participated in semi-structured telephone interviews that were qualitatively analyzed.

RESULTS: Three main sources of information were identified: internet, social, and health care providers (HCP). The consensus about the internet was that there was a plethora of SCI-related information, but often information was not reliable, not specific enough, not well-organized, or the amount of content was too overwhelming. A popular social resource was online support groups (OSG). OSG are easily accessible and give individuals the chance to interact with individuals with comparable situations. Many individuals with SCI and caregivers participated in-person support groups/activities, where they can meet similar individuals. Though social resources can be helpful and convenient, the information obtained was not always reliable. HCP was a preferred resource for individuals with SCI and caregivers. HCP were viewed as reliable, and their willingness to listen was appreciated. Challenges with HCP included lack of appointment availability, lack of knowledge in alternative treatments, and a tendency to treat individuals with SCI impersonally.

CONCLUSIONS: There is not a singular source of information that can provide all of the necessary health-related information. A resource that combines the strengths of the different sources would be beneficial for both individuals with SCI and caregivers of individuals with SCI. For example, a website (internet resource) containing reliable resources and instructions from both peers (social resource) and HCP would take advantage of the strengths of each type of resource.

EVALUATION OF PHYSICAL ACTIVITY PRACTICE IN PEOPLE LIVING WITH HIV ON ANTIRETROVIRAL THERAPY IN BURUNDI

Eric Hayvarimana, Alexia Sinzakarye, and Ella C. Innahzhou

OBJECTIVES: In sub-Saharan Africa, the level of practice of physical activities (PA) is not known among people living with HIV/AIDS (PLHIV). A significant portion of PLHIV has difficulty practicing PA. The purpose is to evaluate the level of PA and investigate barriers and motivations to PA practice among PLHIV in Burundi.

DESIGN: The study included PLHIV between 14 and 64 years old. PA level was assessed with the Global Physical Activity Questionnaire (GPAQ). Quantifying an individual’s total activity takes into account the total amount of time spent on physical exercise per week, the intensity of PA and the MET-minute energy expenditure involved in the activities; at leisure, at work, or when traveling on foot or by bike. The combination of these factors classifies each respondent into one of three categories of physical activity level: intense, moderate and low.

RESULTS: A sample of 383 PLHIV responded to the questionnaire. The majority were active for an average of 294.51 (SD: 226.10) minutes per day resulting in an average energy expenditure of 490.15 (SD: 387.88) MET-minutes. 40.99% reported practicing intense PA, 41.78% practiced moderate PA and 17.23% were sedentary. Levels of PA practice were slightly correlated with patient’s occupation (r = -0.21; p = 0.03), while correlations with other sociodemographic factors were negligible, r ranging from -0.08 to 0.03. Results suggested that increase in viral load rate was associated with sedentary lifestyle (r= 0.54). PLHIV reported they would practice PA in order to improve their health (50.39%) but lack of time is a major obstacle (40.73%).

CONCLUSIONS: The study showed that people living with HIV in Burundi are not sedentary. These results can be used by caregivers and PLHIV associations to promote physical activity practice in sedentary PLHIV and to encourage those already active to keep practicing.

EXERCISE-INDUCED SPINAL EPIDURAL HEMATOMA IN A PEDIATRIC PATIENT WITH HEMOPHILIA A: A CASE REPORT

Ady M. Correa-Mendoza, MD, and Eduardo Ramos, MD

CASE DESCRIPTION: Spinal epidural hematoma

A presented to the Emergency Room with 6-hours onset of severe non-traumatic lumbar pain after playing recreational basketball. Initially, oral analgesics were provided due to suspicion for muscle spasms. However, lumbar pain persisted and patient developed progressive bilateral lower extremity weakness and urinary retention 24 hours later. On examination, he was found with L2 incomplete paraplegia, lower extremities areflexia and neurogenic bladder/bowel. An MRI study was performed, revealing an anterior T10-T11 spinal epidural hematoma causing cord compression. He underwent emergency laminectomy 12 hours later and received Factor-VIII replacement therapy afterwards. He is participating from inpatient rehabilitation with gradual improvement in lower extremity strength, proprioception and overall functionality.
DISCUSSIONS: Neurological complications in hemophilic patients are rare, but most commonly reported in the pediatric population. There is an incidence of 7.5% of central nervous system bleeding compared to 0.001-1.9% of spinal epidural hematomas. Although the pathogenesis is unknown, it has been proposed that epidural hematoma formation may be due to trauma or to venous epidural veins as they provide an alternate route for venous return when there is increased intra-thoracic/intra-abdominal pressure. In our patient, the combination of a vulnerable endothelium of the epidural veins along with physical activity involving back flexion and forced expiration mechanisms (Valsalva maneuver) most likely increased his intrathoracic pressure while playing basketball, precipitating a spinal cord injury.

EXPERIMENTAL EVIDENCES FOR FUNCTIONAL CHANGES IN CORTICAL BLOOD FLOW BY TRANSCRANIAL DIRECT CURRENT STIMULATION

Eun-Ho Yu, MD, JiHong Min, MD, Ju Hyun Son, MD, Ho Koo, MD, PhD, Min Sun Kim, MD, PhD, and Yong-II Shin, MD, PhD

OBJECTIVES: Several clinical studies have demonstrated that Transcranial direct current stimulation (tDCS) can change cerebral blood flow with a polarity-specific manner. However, there is a little information about possible underlying mechanisms for modulation of cerebral blood flow by tDCS. The purpose of this study was to evaluate changes in functional or structural changes in cortical blood vessel by tDCS.

DESIGN: tDCS was applied bilaterally on the skull with intensity of 150 µA and duration of 20 min from Sprague-Dawley rats. Structural changes in cortical blood vessel were evaluated by imaging cortical blood vessel stained with Evans-blue dye or by direct visualization of cortical vessels stained with fluorescent dye with a confocal microscope. Functional changes was monitored by direct measurement of cortical blood flow with a Laser-Doppler and by direct recording of oxygen and nitric oxide concentration from the cortex using a volumetric technique.

RESULTS: Anodal tDCS resulted in increase in diameter of blood vessels in the cortex and also upregulation of oxygen and nitric oxide concentrations in the cortex. In contrast to, cathodal tDCS cause the reduction of size of cortical blood vessels and of oxygen concentration. But there is a little changes in concentration of nitric oxide in the cortex under cathodal tDCS.

CONCLUSIONS: This results suggest that tDCS may modulate functional changes in blood flow by changes in release of nitric oxide in the cortex.

EXPLORING PATIENTS’ AND CAREGIVERS’ EXPERIENCES AND PERCEPTIONS ON THE STRENGTHS AND LIMITATIONS OF THE EARLY SUPPORTED DISCHARGE PROGRAM POST-ACUTE STROKE: A QUALITATIVE STUDY

Odessa S. Nuez, MD, MPH, and Gerald Choon Huat Koh, MBBS, MMED FM, FCCP, PhD

OBJECTIVES: Post-acute stroke rehabilitation has been provided as inpatient, extending hospitalization. This has been challenged by providing other options such as Early Supported Discharge (ESD). ESD provides home-based rehabilitation by an interdisciplinary team. The main objectives of this study are to explore the experiences of patients and caregivers under the ESD-post acute stroke program and to understand their perceptions on its strengths and limitations.

DESIGN: This is a qualitative study using an inductive approach. The participants were 11 patients with mild to moderate stroke and 8 caregivers. Purposive sampling was done. Semi-structured in-depth interviews were done for all participants. Thematic analysis was performed to elicit recurrent themes.

RESULTS: The 3 key themes were patient-caregiver partnership, patient-centered care and team support. Caregiver support was vital in patient’s recovery. Caregivers acted as “therapists” by assisting the patient with the exercises and providing encouragement. Caregiver stress was evident in some of the participants. Lack of stroke education was shown to contribute to caregivers’ stress. Patient-centered care was an interplay between patient empowerment, individualized rehabilitation and good patient-caregiver partnership. Support in rehabilitation goal setting was an important aspect of patient-centered care. Team support encompassed communication, education, and cost. Two-way communication provided easy access to a healthcare professional. Stroke education was an important aspect that must be adequately provided. Fees for the therapy visits were offset by government subsidies and were reasonable given the amount of time spent by the therapists and the quality of the sessions which included trips in the community.

CONCLUSIONS: Knowing patients’ and caregivers’ experiences and perceptions provide insight on the strengths and gaps in the ESD program. Identifying these would help to improve quality in healthcare service delivery.

EXTRACORPOREAL SHOCK WAVE TREATMENT OF SPASTICITY – A SYSTEMATIC REVIEW

Karsten Knobloch, FACS, PhD, Henning Lohse-Busch, MD, and Andreas Gohritz, MD

OBJECTIVES: Extracorporeal shock wave therapy (ESWT) has evolved in various clinical disciplines since its first clinical for urological kidney stone destruction on February 7, 1980. The impetus for the treatment of spastic symptoms with ESWT was given in 1994 by clinical observations during the treatment of painful gonarthroses. Already during the session with ESWT, the painful muscular flexion contracture of the knee joints decreased because of the greatly increased viscoelasticity and toxicity of the muscles. Muscles are subject to reciprocal antagonist inhibition and consequent contracture formation in pain paralysis as well as spastic paresis. Therefore, it was obvious to apply ESWT also for spastic contractions. In neurology, shock wave therapy was used clinically in 1996 in children with cerebral palsy. Aim: Systemic review to assess the efficacy of extracorporeal shock wave therapy (ESWT) in spasticity in both, children and adults in a standardized way.

DESIGN: On April 15, 2019, the keyword search was carried out in the databases of MEDLINE, EMBASE, PubMed, and the Cochrane Library. In addition, for all results considered relevant, the reference lists of the included publications were probed manually for further potential studies. The following keywords have been reviewed (sample information for PubMed): Shock wave therapy #6496 hits; Extracorporeal shock wave therapy #4397 hits; ESWT #705 hits; Spasticity #13949 hits; spasticity shock wave #82 hits; Shock wave nerve #179 hits; Extracorporeal shock wave therapy nerve #78 hits; Extracorporeal shock wave therapy stroke #31hits. All abstracts are assessed for relevance and the full-text analysis was correspondingly included for the relevant articles. In addition to the respective level of evidence, the patient characteristics as well as different shock wave parameters were analyzed.

RESULTS: This review included 888 patients from 10 randomized-controlled trials (RCTs, n=488) and 14 non-RCTs (n=400). Children were studied in six studies (3 RCTs n=57, 3 non-RCTs n=141) with 2 radial and 4 focused ESWT devices. Adults were analyzed in 18 studies (7RCTs n=431, 11 non-RCTs, n=259). Regarding ESWT technology used, four RCTs used radial ESWT and five RCTs focused. Both, radial and focused ESWT improved function and reduced spasticity significantly. On average 3-5 ESWT sessions (1500 shots, 4-5Hz) were applied, while two studies did 12 ESWT sessions. Adverse effects were not noted with the applied device parameters neither among children nor in adults. Radial ESWT was used with treatment pressures between 1.5-3.5bar with 1500-4500 pulses per session and a treatment rate of 4-5Hz slow. Focused ESWT is successfully used in spasticity therapy with rather low energy flux densities of up to 0.1mJ / mm². However, there is a little information about underlying mechanisms.

CONCLUSIONS: This results suggest that ESWT may modulate functional changes in blood flow by changes in release of nitric oxide in the cortex.

EXTREMELY RARE PRESENTATION AND COMPLICATED REHABILITATION COURSE OF PATIENT WITH EXTERNAL HYDROCEPHALUS FOLLOWING EPIDERMOID TUMOR RESECTION: A CASE REPORT

Jennifer M. Cushman, MD, Yulia Rivelis, MD, and Mery Elashvili, MD, DO

CASE DIAGNOSIS: A 69 y/o M patient admitted for rehabilitation s/p craniootomy with resection of suprasellar epidermoid cyst. Surgery was complicated by post-operative right thalamic, left caudate stroke, left frontal hemorrhage, persistent encephalopathy, seizures, and hyponatremia due to SIADH. Rehabilitation was recommended to improve functional independence, cognitive status, and prevent muscle atrophy. Patient was found to have mixed language and bilateral visual field deficits, mixed oral-pharyngeal dysphagia, and right hemiparesis. Patient was initially unarousable s/p craniootomy and not progressing during rehab. CT scan revealed external hydrocephalus complicated with midline shift leading to neurosurgery consult. Patient was started on Decadron, but still showed functional regression. Due to severe clinical decline, rehab was medically halted in order to transfer patient for neurosurgical intervention for surgical implantation of a VP shunt.

CASE DESCRIPTION: A 69 y/o M presented with complications following elective neurosurgical resection of epidermoid cyst.
Abstracts

prised of cholesterol and keratin in a solid crystalline state. Most tumors located in the cerebellopontine angle. Tumor is avascular in nature, composed of ectodermal epithelial elements with a benign course and slow progression. It may present as an extra-cerebral intradural lesion in about 40% of cases with inclusion of cholesterol and keratin in a solid crystalline state.

**CONCLUSIONS:** This case highlights a patient’s post-operative resection complications, including external hydrocephalus with midline shift, discovered and closely managed by the multidisciplinary rehabilitation team. This rare presentation stresses the importance of the multidisciplinary team management in rehabilitation medicine and close monitoring of post-operative neurosurgical patients undergoing inpatient rehabilitation.

**EYE CAN’T FEEL MY FEET WHEN I’M WITH YOU—A CASE OF MILLER FISCHER SYNDROME PRESENTING DURING POST-TREATMENT REHABILITATION**

Amy Park, DO, Lisa Hu, MD, and Chandav Davidoff, DO

**CASE DIAGNOSIS:** Guillain-Barré Syndrome, Miller Fischer Syndrome.

**CASE DESCRIPTION:** A 28-year-old healthy male presents after with progressively worsening bilateral lower extremity pain and weakness for 2 weeks. Pain was a sharp, shooting, and burning sensation. Initial workup included a lumbar puncture, which was consistent with Acute Inflammatory Demyelinating Polyradiculoneuropathy (AIDP). Patient completed a 5-day course of intravenous immunoglobulin (IVIG) and was discharged to acute inpatient rehabilitation. Patient initially showed improvements in balance and gait. He then developed teary eyes, fluctuating lower extremity weakness, worsening balance and new grip weakness. Patient was transferred back to the acute care service, where further neurological work up suggested Miller Fischer Syndrome. Patient was treated with plasmapheresis and returned to acute inpatient rehabilitation.

**DISCUSSIONS:** Guillain-Barré Syndrome (GBS) is a general classification that includes several variants of acute immune-mediated polyneuropathies. Patients typically present with worsening bilateral lower extremity weakness and areflexia. Less commonly, patients develop upper extremity weakness, respiratory muscle weakness, and ocular motor weakness. The Miller Fischer Syndrome (MFS) is a rare variant of GBS which is defined by a triad of ophthalmoplegia, areflexia and ataxia. Treatment includes plasma exchange or IVIG. About 10% of patients experience relapses after treatment. Medical complications that develop due to prolonged immobilization may interfere with rehabilitation progress. Supportive care and aggressive rehabilitation should be carried out concurrently when indicated.

**CONCLUSIONS:** Higher intensity, multidisciplinary therapy programs available in the acute inpatient rehabilitation setting have been shown to reduce disability and improve quality of life in patients suffering from GBS. This case of Miller Fischer Syndrome demonstrates the importance of the multidisciplinary rehabilitation approach in determining whether it is appropriate to maintain the course of supportive care in a patient who has completed treatment for GBS, and is on the course for recovery, versus requiring physiatric re-evaluation and further treatment in the setting of possible relapse.

**FACTORS ASSOCIATED WITH SOCIAL PARTICIPATION AMONG PEOPLE WITH DISABILITIES: A NATIONWIDE DISABILITY REGISTRATION ANALYSIS**

Tzu-Herng Hsu, MD, Tsan-Hon Liu, MD, PhD, and Kwang-Hwa Chang, PhD

**CASE DIAGNOSIS:** According to estimates by the World Health Organization (WHO), one billion or more people globally are disabled. Disability refers to a person’s activity limitations and participation restrictions. Disability is related to an illness or health condition and is accompanied by various types and degrees of body function impairment, creating different patterns of difficultly in daily living. Social participation is associated with health and subjective quality of life in persons having a spinal cord injury, stroke or other disabilities. In addition, it is shown to be positively associated with psychological and physical functioning. Furthermore, social participation is linked to relevant and pivotal outcomes of a successful rehabilitation in persons with disability. The aim of this study is to explore factors associated with limitation in social participation among people with disabilities based on the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0).

**CASE DESCRIPTION:** Participants - We recruited people who experienced a single type of disability from the Taiwan Data bank of Persons with Disability (TDPD) based on the International Classification of Functioning, Disability, and Health (ICF) framework from July 11, 2012 to November 30, 2017. We excluded persons whose disability type or any of the domain scores was missed in the database. Measurements - We calculated standardized scores (ranged between 0-100 points) of each domain, and the 32-item index on the basis of item-response theory and the WHODAS 2.0 manual. Each domain score and the 32-item index can be converted into a percentage of rank (ranged between 0-100%). Data analysis - We used nonparametric logistic regression analyses to estimate the participants’ likelihood of participation restrictions. Those variables found to have significant association with domain 6 (social participation of WHODAS 2.0) in the univariate analyses were entered into the models for multivariate analyses.

**DISCUSSIONS:** People who have lower income, higher education level (increased in WHODAS 2.0), higher degrees of disability or lived in institutions or rural area showed positive correlation with participation restriction. As for WHODAS 2.0, female, education years, incomes level, urbanization level and severity of disability were included into multivariate model, and participants who had higher percentage of rank in domains cognition, mobility, self-care, getting along, life activities had positively significantly associated with restriction of social participation in nonparametric regression. Furthermore, poor mobility and getting along with others showed the highest positive correlation with participation restriction.

**CONCLUSIONS:** People who have lower income, higher education level (in group of aged > 65 years), higher degrees of disability or lived in lower urbanization area have greater risk of restrictions in social participation. Compared to people with mental function impairment, those having impairment in speech, digestive, movement-related, and skin-related functions are likely to be difficult to participate social activities. In WHODAS 2.0, people who have difficulty in mobility and getting along with people are more likely to experience participation restrictions.

**FACTORS INFLUENCING THE ASIDUITY OF PATIENTS FOLLOWED IN REHABILITATION FOR ORTHOPEDIC AND TRAUMATOLOGICAL PATHOLOGIES**

Randrianasolo Ruth Pascale, and Soloformala Gaëtan Duval

**CASE DIAGNOSIS:** To determine risk factors associated with "lost to follow-up" patients and to determine the possible causes.

**CASE DESCRIPTION:** A case-control study based on 31 cases of "lost to follow-up", for 36 controls matched by frequency to cases.

**DISCUSSIONS:** Low socioeconomic level, opening hours, session rate, sufficient explanations of costs were protective factors. Use of expensive transportation, non-compliance with sitting appointments and length of sessions were risk factors. The most common causes were pecuniary problems and patients availability.

**CONCLUSIONS:** Lost to follow-up is multifactorial and nonspecific. A complex and harmful phenomenon requiring action to overcome in order to reduce its impact.

**FAMILIAL HEMIPLEGIC MIGRAINE WITH CONCURRENT MENINGIOMA: A CASE REPORT**

Elizabeth Lin, MD, Jack Mensch, MD, Caroline Lee, MD, and Sanjeev Agarwal, MD

**CASE DIAGNOSIS:** Familial Hemiplegic Migraine with Concurrent Meningioma.

**CASE DESCRIPTION:** 69-year-old female with FHM complicated by ataxia and dysarthria who presented with worsening migraines and ataxia associated with left sided numbness. A diagnosis of FHM was made in her teens, with multiple negative head CTs throughout her lifetime, the last one being 10 years prior. From her family history of FHM, our patient knew that attacks usually decrease with age, but her attacks were increasing in frequency and magnitude. MRI revealed a right-sided paramedial meningo, which was surgically resected. She was subsequently admitted to acute rehabilitation.

**DISCUSSIONS:** Our patient symptoms quickly resolved after surgery, suggesting her recent symptoms were caused by her meningoïa rather than her FHM. After 4 weeks of inpatient rehabilitation, she returned to her baseline functional status. She had mild residual ataxia and dysarthria with resting tremor but was independent with ambulation and ADLs. Her hemiplegic migraine (HM) is a rare subtype of migraine, which presents with a motor aura. Motor auras consist of reversible unilateral motor weakness that occurs concurrently or prior to a headache. In severe forms, patients suffer from prolonged hemiparesis, permanent cerebellar ataxia, epilepsy or mental
FEASIBILITY OF USING A SMARTPHONE-BASED MOBILE APPLICATION FOR WEIGHT MANAGEMENT IN OBSESE MINORITY STROKE SURVIVORS WITH COGNITIVE IMPAIRMENTS: PILOT COMPARATIVE EFFECTIVENESS TRIAL

Nneka Ifejika, MD, MPH, Minal Bhadane, PhD, Chunyuan Cai, PhD, Elizabeth A. Noser, MD, and James C. Grotta, MD

CASE DIAGNOSIS: To test the feasibility and primary efficacy of using a mHealth weight loss intervention versus food journals to monitor dietary patterns in minority acute stroke patients with cognitive impairments (Swipe out Stroke).

CASE DESCRIPTION: Swipe out Stroke (SOS) is a Phase I Prospective Randomized Controlled Trial with Open Blinded Endpoint (PROBE).

Adaptive randomization was used for assignment to one of two groups – 1) Smartphone based self-monitoring, 2) food journal self monitoring. The Smartphone group used the app Lose it! to record meals, document physical activity and communicate with the study team. Reminder messages were sent daily during the first 30 days.

Weekly summaries and reminder messages for missed entries were sent between 31 and 90 days; weekly summaries only were sent between 91 and 180 days.

The food journal group used paper diaries to document daily dietary intake. Both the Smartphone and food journal groups received four face-to-face visits (baseline, 30, 90 and 180 days), culturally competent counseling by a minority research coordinator, cookbooks, measuring cups and educational materials. The primary outcome was a reduction in total body weight at 180 days.

DISCUSSIONS: Thirty-six participants (63.9% African-American, 36.1% Hispanic) were enrolled, 17 in the Smartphone group, 19 in food journal. Mean age 54.1 (SD 9.4), BMI 35.7 (SD 5.7) education, employment & family history of stroke or obesity did not differ between the groups. Rates of depression [median Patient Health Questionnaire-9 (PHQ-9) 5.5; IQR 3.0 – 9.5] and cognitive impairment [median Montreal Cognitive Assessment (MOCA) 23.5; IQR 21 – 26] were similar in both groups. Sixty-nine percent of stroke survivors completed SOS (n=25); one participant died (Smartphone group).

Depression was higher at 30 days in the food journal group (PHQ-9 of 8 vs 2; P=0.03). At 180 days, the Smartphone group had more cognitive impairments (MOCA 23 vs 27; P=0.04). Median weight change was 5.7 pounds in the Smartphone group versus 6.4 pounds in the food journal group (P=0.77). In depressed participants, the median weight change was 3.9 pounds compared to 6.4 pounds(P=0.45).

CONCLUSIONS: In this study of minority stroke survivors, there was no significant difference in weight loss between the Smartphone and food journal groups. While feasible, the use of Smartphone based self-monitoring in this vulnerable population has a unique set of challenges, including concomitant depression and cognitive impairments. Future studies that include pharmacologic and behavioral treatment of post-stroke depression, post-stroke cognitive therapy and mHealth interventions over a shorter duration, may positively influence intervention efficacy.
FLUCTUATING MENTAL STATUS AND NEW PARADOXICAL LEFT HEMISPATIAL NEGLECT DURING INPATIENT REHABILITATION FOR LEFT TEMPORO-OCIPITAL INTRACEREBRAL HEMORRHAGE WITH INTRAVASCULAR HEMORRHAGE

Justin L. Weppner, DO, Jenna Meriggi, DO, and Kevin Franzese, DO

CASE DESCRIPTION: A 68-year-old man with a history of intracerebral hemorrhage originating from a surgically clipped arteriovenous malformation. Although arteriovenous malformations can be treated surgically, occurring in the setting of anoxic brain injury. It is important however to be able to identify a sustained facial twitch as a focal seizure which may require transferring to neurology service for further management. CONCLUSIONS: We thus present a case of Todd’s Paralysis secondary to a seizure originating from a surgically clipped arteriovenous malformation. Although seizures are a common sequela of this type of malformation, proper diagnosis and management of all medical and functional complications in these patients are important.

FOCAL SUSTAINED FACIAL SEIZURE FOLLOWING AN ARTERIOVENOUS MALFORMATION, TODD’S PARALYSIS WITH A TWITCH. A CASE REPORT

Joseph M. Seldin, MD, Madhavan Elangovan, BS, and Sarah Khan, DO

CASE DESCRIPTION: Our report details the case of a 68-year-old man who presented to our acute inpatient rehabilitation facility after suffering a seizure associated with prolonged left-sided arm and facial weakness due to Todd’s paralysis. The patient later suffered a focal facial seizure requiring transfer to neurology service.

CASE DIAGNOSIS: A 68-year-old man with a history of intracerebral hemorrhage secondary to arteriovenous malformation in 2010, treated with surgical clip placement. Since then, the patient had intracerebral hemorrhage with IVH. The patient later suffered a focal facial seizure requiring transfer to neurology service.

DISCUSSIONS: Although arteriovenous malformations can be treated surgically, decreasing the risk of further intracranial hemorrhage and hypertension, the presence of a long-standing seizure focus can be debilitating many year later. As we see in this patient who presented with intractable seizures and Todd’s paralysis, it is important however to be able to identify a sustained facial twitch as a focal seizure which may require transferring to neurology service for further management.

CONCLUSIONS: We thus present a case of Todd’s Paralysis secondary to a seizure originating from a surgically clipped arteriovenous malformation. Although seizures are a common sequela of this type of malformation, proper diagnosis and management of all medical and functional complications in these patients are important.

FOLLICULAR HELPER T CELL LYMPHOMA WITH SECONDARY EBV DIFFUSE LARGE B CELL LYMPHOMA PRESENTING AS SPINAL CORD COMPRESSION SYNDROME - A CASE REPORT

Mothis Babu Ramalingam, MBBS, MRCP, and Soo Ting Kong, MBBS, MRCP

CASE DESCRIPTION: A 57-year-old female with history of schizophrenia presented with progressive bilateral lower limbs weakness and urinary incontinence. MRI Spine showed an intradural enhancing mass in the thoracic region. Patient underwent T9 to T11 laminectomy with biopsy which showed inflammatory and nevrotic changes with no evidence of malignancy. CT imaging showed heterogeneously enhancing hypodense lesions in the right adrenal gland and biopsy of the lesion showed necrotizing lymphohistiocytic inflammation. She was empirically treated as disseminated tuberculosis but the TB work up was negative. She was transferred under inpatient rehabilitation unit for spinal cord injury rehabilitation. Her stay under rehabilitation was complicated by recurrent fevers, postural hypotension episodes and pulmonary embolism.

DISCUSSIONS: Patient developed massive saddle pulmonary embolism during her inpatient stay, in view of persistent fever and thrombotic event she underwent imaging which revealed worsening bilateral adrenal masses. In view of high suspicion for hematological malignancy bone marrow aspiration and trephine biopsy was performed, the results of which were inconclusive. After multi-disciplinary discussion, patient underwent laparoscopic right adrenalectomy. The histopathology results confirmed T Cell Lymphoma with secondary Diffuse Large B Cell Lymphoma.

CASE DIAGNOSIS: Follicular Helper T cell Lymphoma with secondary EBV Diffuse Large B Cell Lymphoma.

REFERENCES: A 57-year-old female with history of schizophrenia presented with progressive bilateral lower limbs weakness and urinary incontinence. MRI Spine showed an intradural enhancing mass in the thoracic region. Patient underwent T9 to T11 laminectomy with biopsy which showed inflammatory and nevrotic changes with no evidence of malignancy. CT imaging showed heterogeneously enhancing hypodense lesions in the right adrenal gland and biopsy of the lesion showed necrotizing lymphohistiocytic inflammation. She was empirically treated as disseminated tuberculosis but the TB work up was negative. She was transferred under inpatient rehabilitation unit for spinal cord injury rehabilitation. Her stay under rehabilitation was complicated by recurrent fevers, postural hypotension episodes and pulmonary embolism.
FOOT DROP FOLLOWING PROXIMAL TIBIA INTRAOSSEOUS CANNULATION: A CASE REPORT

Charnette Lercarn, MD, and Susan Stickewes, MD

CASE DIAGNOSIS: Foot drop following intraosseous cannulation.

CASE DESCRIPTION: An 81-year-old diabetic female presented with cardiac arrest. During resuscitation, intraosseous access was obtained via the proximal anterior tibia after multiple failed attempts at lower extremity intraosseous access. Subsequently, she was noted to have new-onset foot drop. Exam revealed a small punctate scab at the anterior tibia along the tibial spine, with no palpable collection or drainage appreciated. Ankle dorsiflexion, eversion, and plantar flexion was 1/5, 1/5, 2/5 and 5/5 respectively. She also reported hyperesthesias in the distribution of the superficial peroneal nerve. Upon discharge two weeks later, she continued to experience hyperesthesias but showed mild improvement in her muscle strength (ankle dorsiflexion, eversion and inversion was 2/5, 2/5 and 3/5 respectively) and was fitted with a posterior leaf spring AFO.

DISCUSSIONS: This case illustrates an unexpected outcome following CPR via intravenous cannulation - an otherwise safe method of obtaining vascular access. Our patient’s foot drop may have occurred secondary to poor intraosseous needle placement as the deep peroneal nerve runs lateral to the tibial spine. However, she also had superficial peroneal nerve involvement suggesting either an additional proximal insult to the common peroneal nerve or an anatomic variant of the common peroneal nerve branching more distally and anteriorly than expected, allowing both nerves to be affected simultaneously. Another possibility is that the common peroneal nerve was injured by the tourniquet placed on the distal thigh during the attempted placement of the lower extremity intraosseous line. Two months later, the patient didn’t have any further motor recovery and declined electrodiagnostic testing. As a result, we can only presume that there is a link between the intraosseous catheter placement and her clinical presentation.

CONCLUSIONS: This is the first reported case, to our knowledge, of peroneal nerve injury following intravenous cannulation at the tibia resulting in foot drop.

FOOT DROP IN AN 80-YEAR-OLD TENNIS PLAYER: A CASE REPORT

Michael J. Andrews, DO

CASE DIAGNOSIS: Left Common Peroneal Neuropathy.

CASE DESCRIPTION: 80-year-old female was referred for evaluation of progressive left foot drop one month’s duration. Physical exam demonstrated trace muscle activation left ankle dorsiflexion and extensor hallucis longus where the left hip and plantar flexors was normal. Sensation was reduced over dorsum of left foot. Further history revealed that the patient had been wearing a neoprene sleeve over her left knee while playing tennis three to four times per week. NCS: Left common peroneal nerve demonstrated prolonged latencies, significantly decreased amplitudes and slowed conduction velocities. Left tibial, right tibial and common peroneal nerves were normal. Sensory responses were unresponsive at left sural and superficial peroneal nerves. Left common peroneal nerve “F” wave was absent. EMG: Left tibialis anterior, extensor hallucis longus, and extensor digitorum brevis muscles showed positive sharp waves, fibrillation and long duration polyphasic potentials. Tibial and femoral nerve muscles were normal.

DISCUSSIONS: Common peroneal neuropathy is the most common compression neuropathy of the lower extremities resulting from trauma or chronic external compression (mass lesion) or prolonged immobilization. Leach et al reported seven runners and one soccer player with this condition secondary to exercise who were treated surgically. Nerve conduction studies and needle EMG evaluate the severity of nerve compression and extent of axonal injury, which can guide in treatment and prognosis. Predictors of poorer outcome include evidence of denervation injury on electromyography, severity weakness at onset, and age (Botelho G et al). Unfortunately, this elderly patient endured months of symptoms before diagnosis and appropriate intervention.

CONCLUSIONS: Common peroneal compression neuropathy secondary to wearing below-knee compression stockings (Malhotra et al) and wearing KBM prosthesis (Reinders MF et al) have been described. The case presented above demonstrating a unique cause of common peroneal nerve entrapment resulting from chronic use of an over-the-counter neoprene knee sleeve.

FOOT PRESSURE DISTRIBUTION CHARACTERISTICS DURING WALKING OF FLAT FOOT STUDENTS AGED 7-14 YEARS OLD

Zhiguan Huang, PhD

OBJECTIVES: Flat foot greatly increases injury risk and with a high incidence of flat feet in adolescence. This study compares the distribution characteristics of plantar pressure between the flat foot and normal arch foot in Guangzhou students.

DESIGN: Six hundred fifty-eight students aged 7-14 years old in Guangzhou were investigated, with 341 males and 327 females. The arch foot type was significantly higher in boys than in girls. During walking at self-choose speed, compared to normal arch teenagers, there was different foot-ground contact area ratio under the areas of both MF (7-9 years old), right foot MF (11-13 years old) and right foot MF-L (15 years old) in flat feet teenagers (P < 0.05), while showing significantly higher pressure peak value under some areas of both feet (P < 0.05).

CONCLUSIONS: Foot-contact area and pressure are two major factors affecting the pressure distribution, the lower arches with the larger arch-ground contact area will lead to less pressure. During walking, the difference in plantar impulse is mainly manifested in the internal and external lateral area of the arch, where with higher injury risk.

FROM COLD SORE TO ENCEPHALITIS: A CASE REPORT

Stephen W. Peirce, MD, and Alexandru Dinu, MD

CASE DIAGNOSIS: Herpes Simplex Virus 1 Encephalitis.

CASE DESCRIPTION: 54-year-old female, previously healthy and active with no past medical history, presented with flu-like symptoms and new-onset seizures. Admitted to the ICU for status epilepticus in the setting of HSV1 encephalitis, confirmed with lumbar puncture and consistent with findings on MRI brain. She was placed in a medically-induced coma and started on Keppra and Acyclovir. Acute hospitalization was complicated by tracheostomy placement due to respiratory failure and PEG tube placement. She became more responsive with persistent left sided weakness and left hemianopsia. Psychiatry was consulted and she was admitted to inpatient rehabilitation after 21 days of acute care. On admission to rehab, she was fully oriented however answered only to yes/no questions and was minimally responsive to commands. She worked intensively with physical, occupational, and speech therapy for three weeks.

DISCUSSIONS: HSV1 encephalitis is the most common cause of fatal sporadic encephalitis in the US. Even when treated, mortality approaches 30% with most survivors having serious neurologic deficits. This patient’s case is uncommon especially in the setting of an otherwise healthy individual. An inpatient rehabilitation setting was imperative to her remarkable recovery with the numerous resources available. By discharge, she was ambulatory over 150 feet with supervision and able to perform functional ADLs. FIM scores were 6, 5, and 7 for PT, OT, and ST respectively upon discharge; up from 1-2 throughout at time of admission. Various other therapies were beneficial including; Aquatic, Recreational, and Family Therapy. Thereafter, treatment consisted of 6 weeks of intravenous Acyclovir with two additional weeks of oral Valacyclovir.

CONCLUSIONS: The clinical course of HSV1 encephalitis secondary to a recent “cold sore” in an otherwise healthy patient has a sudden onset and usually a poor prognosis. However, with the correct treatment followed by aggressive rehabilitation; the prognosis is very favorable.

FUNCTIONAL AND SOCIO-PROFESSIONAL CONSEQUENCES OF TRAUMA TO LIMBS SEEN IN PHYSICAL MEDICINE AND REHABILITATION AT CHU-ANOSIALA MADAGASCAR: A PROSPECTIVE DESCRIPTIVE STUDY

Andriá Holisirasa Raharianternaina

OBJECTIVES: The goal of the rehabilitation of limbs’ post-traumatic patients is to improve functional independence in order to allow reintegration into their socio-professional context. The Objectives of our study are to describe the functional consequences and the socio-professional future of patients suffering from trauma of the limbs followed in Physical Medicine and Rehabilitation.

DESIGN: This was a prospective descriptive study of trauma-affected patients of limbs admitted to the Physical Medicine and Rehabilitation (M.PR.) department of the CHU Anosiala during the period from 01 November 2018 to 01 February 2019. During this period, 21 patient records were collected.

RESULTS: Males (52.38%) is a majority of youth with an average age of 44 years were the most affected. The professional groups were dominated by the
professional profession (42.85%). The top causes were road accidents (52.38%). The PRM management time was generally within 3 months of initial treatment. On admission we noted 61.90% joint stiffness in patients. Edema and pain were associated in 57.14% and 66.66% of cases, respectively. The 71.42% had an evolutionary partial recovery. There were 71.42% of return to work cases with 2 cases of workstation layout and 28.57% of patients were not yet able to return to work.

CONCLUSIONS: Injuries to the limbs are very frequent and constitute a real obstacle to the functions of the musculoskeletal system which can be re-established by an early rehabilitation or a satisfactory functional autonomy of the patient. This requires an honest collaboration between a rehabilitation specialist and a trauma and orthopedic surgeon.

FUNCTIONAL IMPACT OF RADIATION-INDUCED FIBROSIS OF THE NECK IN HEAD AND NECK CANCER SURVIVORS: PRELIMINARY RESULTS
Diana Molinares, MD, Stuart Samuels, MD, PhD, and Laura Huang, MD

OBJECTIVES: Determine the incidence of radiation-induced fibrosis (RF) in head and neck cancer (H&Nc) survivors. Determine the optimal physical exam (PE) and clinical tools.

Determine the impact of radiation on the musculoskeletal system. Understand potential post-radiation impairments.

DESIGN: This is a cross-sectional study to evaluate the effects of RF on H&Nc survivors and QoL. Our Physiatry team developed a comprehensive physical and functional exam to quantitatively evaluate H&Nc patients. To participate, the patient must be in remission and have received radiation >1 year prior to enrollment as treatment for a primary H&Nc mucosal squamous cell carcinoma or a salivary gland cancer. Subjects with traumatic neck or shoulder musculoskeletal pathology within 2 years of the treatment were excluded. Participants attended a Cancer Rehabilitation appointment, where a Board-Certified Physiatrist performed a standardized PE, with emphasis on a comprehensive neuromusculoskeletal exam.

RESULTS: To date, 25 patients have met inclusion and exclusion criteria and have undergone a Physiatric evaluation. On PE, 52% were found to have an abnormal posture of the neck. Anterocollis was the most common position (32%), followed by rotational torticollis (24%) and laterocollis (20%). 40% of patients have evidence of H&Nc lymphedema and 32% have moderate-severe superficial soft tissue fibrosis. 24% presented an oral cavity opening < 4 cm. 100% of the participants had impaired range of motion of the cervical spine: 68% decreased neck flexion, 84% decreased neck lateral bending, 92% decreased neck extension and 92% decreased neck rotation.

CONCLUSIONS: There are no data for the benefit of physiatric services in H&Nc patients. Our findings demonstrate the disease and treatment related morbidity on the musculoskeletal system in H&Nc patients. Post-radiotherapy evaluation, treatment and management by a physiatrist is instrumental to optimize function and QoL. This study represents the first step in creating a comprehensive, collaborative, and multidisciplinary program to diagnose, treat and manage RF in H&Nc patients.

FUNCTIONAL OUTCOMES AND NEUROPSYCHIATRIC MANAGEMENT OF PATIENT WITH AUTOIMMUNE CHOREA: A CASE REPORT
Susan Samuel, MD, Calvin R. Chen, DO, and Sarah Khan, DO

CASE DIAGNOSIS: This report details the rehab course of an 86 year old female with autoimmune chorea. She was admitted for altered mental status likely multifactorial in etiology due to an underlying autoimmune disorder and a urinary tract infection. Her rehab course was complicated by agitation requiring psychiatric medications.

CASE DESCRIPTION: The patient was recently diagnosed with autoimmune chorea and had been treated with intravenous immunoglobulins for the last 2 months with no acute findings. Infectious workup demonstrated an UTI and she was treated with Seroquel and Depakote. She was also found to have another UTI and successfully treated. Psychiatry was consulted and patient admission. The patient was medically optimized and admitted for comprehensive acute inpatient rehabilitation and pharmacological regimen for patients with this rare disorder in order to be able to achieve functional gains for discharge home.

CONCLUSIONS: We present a rare case of autoimmune chorea with associated neuropsychiatric symptoms affecting their function and quality of life. An acute inpatient rehabilitation environment allows for proper neuropsychiatric medication management and a comprehensive therapy program for patients to safely return to their community.

FUNCTIONAL PROFILE OF STROKE SURVIVORS ACCORDING TO BRAZILIAN FUNCTIONING INDEX
Marcelo Ribeiro, MD, PhD, Juliana Coelho, MSCI, Thabata Soeira, Student, Patricia Vianna, MSCI, and Rafael Rocci, Student

OBJECTIVES: Background: The Brazilian Functioning Index (IF-Br) was developed and published by an interministerial task force at the request of the Presidency of the Republic of Brazil, aiming to standardize and quantify the functioning assessment of people with disabilities aiming for specific social policies. Aims: To analyze psychometric properties and the functional profile of stroke survivors using the IF-Br.

DESIGN: Methods: An observational, longitudinal, prospective, and descriptive study. In order to ascertain intra and inter-examiner concordance two evaluations were conducted, with a six-month interval between them, in which the IF-Br was applied and compared with another evaluation instrument, the Functional Independence Measure (FIM™), in 53 individuals (mean 56.6%, mean age: 62.7±13.5) that had a history of Stroke from December 2011 to December 2015. RESULTS: The Spearman correlation between the IF-Br and the FIM™ was performed (0.86; p < 0.001), after which a strong, positive relationship was observed, indicating that the functional assessment instruments are directly proportional. When comparing the inter-examiner data, all of the correlations were identified as positive among the Stroke individuals. In turn, when analyzing the intra-examiner data during the six-month interval, both evaluation instruments displayed positive associations, and all of the Stroke individuals were observed to be more functional. Among the seven domains that compose the IF-Br, the sensorial, domestic life and education, work, and economic life domains did not exhibit any correlation with FIM™.

FUNCTIONAL PROFILE OF ONCOLOGIC OUTPATIENT AT INSTITUTO NACIONAL DE CANCEROLOGÍA ACORDING TO INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH (ICF)
Anamaria Hernandez-Rivera, Specialist In Physical Medicine and Rehabilitation Fellowship In Oncologic Rehabilitation, Miguel Moreno, Physical Medicine and Rehabilitation Specialist/Fellowship In Oncologic Rehabilitation, and Angela Suarez, Physical Medicine and Rehabilitation Specialist

CASE DIAGNOSIS: The objective of the study is to describe the functioning profile of adult cancer patients treated in the outpatient rehabilitation service, in accordance with the nomenclature proposed by the CIE, taking into account sociodemographic and clinical variables.

CASE DESCRIPTION: Descriptive cross-sectional study, including patients diagnosed with cancer valorated for first time at outpatient rehabilitation. Population was made by random sampling. The definition of the functional profiles was carried out through multiple correspondence analysis.

DISCUSSIONS: 1. We included 261 from 1907 patients assessed at outpatient rehabilitation consultation. 2. The most frequent cancer groups referred to rehabilitation were: breast cancer, head and neck cancer, hematolymphoid malignancies, genitourinary tumors and musculoskeletal tumors. 3. Functional profiles complexity is related with; age of patient, advanced oncological diseases, poor symptomatic control and the requirement of multimodal oncologic treatment (chemotherapy, radiotherapy and surgery). 4. Body structural alterations were related with the cancer location, and the treatment required if it was surgery or radiotherapy. In other hand body functional alterations are more frequently related with the cancer behavior, comorbidities and the impact of treatment, becoming more frequently presented the neuropathy related with cancer and the movement alterations.

CONCLUSIONS: The findings of the present study are relevant in the definition of short lists of the international classification of functionality for cancer patients, in addition to the availability for breast cancer and head and neck tumors. The functional profiles in cancer patients are a needed for focus the attention on relevant topics required in the functional surveillance of the cancer patient in the rehabilitation scenario, in face of disability high risk. This vision strengthening the need for early and appropriate rehabilitation intervention strategies, with clinical well oriented measures supported by standardized functional tests.
CONCLUSIONS: The IF-Br is considered a complete evaluation instrument to assess functional profiles since it analyzes aspects that are not contemplated in other tools, such as Environmental Factors.

FUNCTIONAL QUESTIONNAIRE ABOUT PEOPLE WITH SPINAL CORD INJURY
Daniela M. Utiyama, Fabio M. Alfieri, Artur Aquino, and Linamarra R. Battistella, MD, PhD
OBJECTIVES: The objective is available the function capacity with spinal cord injury.
DESIGN: Application of international questionnaire by telephone, in person and internet.
RESULTS: We have 200 questionnaires. The Results will be analyzed and the correlations will be between function condition and time of injury and education.
CONCLUSIONS: The conclusion is people with spinal injury in Brazil need more support to do the daily activities.

FUNCTIONALLY IMPAIRING HYPERREFLEXIA AND ITS CLINICAL SIGNIFICANCE IN BRAIN INJURED PATIENTS
Darshan I. Shah, Jacob Rohrs, MD, and Reed C. Williams, MD
CASE DIAGNOSIS: Spasticity and clonus result from upper motor neuron (UMN) pathology that disinhibits a tendon stretch reflex. While spasticity often occurs with clonus, the two are clinically different. Spasticity is velocity-dependent increased resistance to passive stretch whereas clonus is rapidly alternating involuntary muscular contraction and relaxation. Because subtypes of hypertonia are difficult to distinguish by patients, the symptoms are reported as “spasms.” Completing a thorough neurological examination can clarify type, and help focus treatment.
CASE DESCRIPTION: 21-year-old female with a history of right insular arteriovenous malformation and rupture at age 12, with subsequent recurrent seizures and residual left functional weakness. Examination of the lower extremities revealed a left foot tremble and clonus. The progressive “trembling” has deleterious effect on her baseline, chronically stabilized, hemiplegic-gait and is contributing to instability. Examination in physiatry clinic revealed increased left-sided spasticity with new-onset ankle clonus, which the patient confirms as the “foot tremble” instrumental to her falls. Protecting the functional use of spasticity at her hip/knee, she was referred for chemodenervation of the plantar-flexors and a stabilizing ankle-foot orthosis.
DISCUSSIONS: The patient benefitted from a comprehensive evaluation by rehabilitation medicine and a multimodal approach to management. One pattern of brain injury recovery can be extensor synergy. Her quick gait speed and rapid dorsiflexion after initial contact activates a self-sustained stretch reflex activating her ankle clonus. A focal butalbital-toxin injection in the gastrocnemius complex can reduce spasticity and avoid the cognitive impairment and potential global weakness associated with oral agents. Prescription of an ankle-foot orthosis and gait training will decrease her fall risk.
CONCLUSIONS: A thorough neurologic examination is essential in uncovering the functionally impairing sequelae of brain-injured patients. Uncovered exam findings also prompted evaluation by the neurosurgical team to address the worsening UMN signs as a possible marker of neural hyper-excitability.

GAIT INTENTION DETECTION FOR TRANSFEMORAL AMPUTEE
Junghwa Hong, PhD, Hunhee Kim, PhD Candidate, and Taekyeong Lee, PhD Candidate
CASE DIAGNOSIS: Recently advent power knee prostheses for assisting transfemoral amputee’s gait require capabilities in ascending and descending stairs and slopes. As a result, the power knees should adapt or change powered mechanisms for depending on the level, stair, and slope. Therefore, the knee prostheses should know the gait intentions of transfemoral amputees. Since EMG activities of transfemoral residual muscles such as the rectus and bicep femoris have correlations with the hip moments of the transfemoral amputees, it could be closely related to the user’s gait intention. Thus, EMG activities of the residual rectus and bicep femoris could be utilized for detecting gait intentions of the above-knee amputees. However, the EMG activities in the thigh stump of transfemoral amputees have significantly different depending on individuality. As a result, a detecting gait intention requires intelligence for training each individual EMG patterns to multiple providers complaining of a “trembling left foot” and falls; prompting an extensive, negative, seizure workup.
CASE DESCRIPTION: 68-year-old female with a history of a left cerebellar infarct and left hemiparesis. She was trained in the use of powered knee prostheses and gait training was decreasing her fall risk.
DISCUSSIONS: The prediction was successful, but more accuracy for the prediction is required for a practical application. To do that, more measured SEMG from the other residual muscles would be required for future research.

GETTING OVER THE WALL OF WALLENBERG: A CASE REPORT ABOUT A MULTIDISCIPLINARY REHABILITATION TEAM APPROACH
Yulia Rivelis, MD, Jennifer M. Cushman, MD, and Mery Eladviñ, MD, DO
CASE DIAGNOSIS: A 59 year old female with Wallenberg Syndrome presented to acute inpatient rehabilitation with a past medical history significant for hypertension and fibromyalgia complained of acute onset of headaches, left facial numbness, right-sided weakness, ataxia, dizziness, and vomiting, which led her to call EMS. Imaging revealed a left medullary infarct and 24 hours later, she began to exhibit hoarseness, hiccup, and dysphagia as well as left sided facial droop with decreased sensation and left tongue deviation.
CASE DESCRIPTION: This patient showed great improvement throughout her rehabilitation course. She initially presented with complaints of acute onset of headaches, left facial numbness, right-sided weakness, hoarseness, ataxia, dizziness, and vomiting. Truncal ataxia and ambulation showed significant improvement with physical therapy, and sensory deficits slowly recovered with therapeutic modalities such as electrical stimulation. With the aid of speech therapy, her diet was gradually advanced until she no longer required PEG tube feedings and tolerated an oral diet. Patient will still require ENT outpatient follow-up to evaluate her vocal cord weakness as one of the sequelae resulting from Wallenberg syndrome.
DISCUSSIONS: Lateral medullary syndrome, also known as Wallenberg syndrome or posterior inferior cerebellar artery (PICA) syndrome, is a rare presentation causing a variety of symptoms due to ischemia in the lateral portion of the medulla within the brainstem. Symptoms include sensory deficits to the contralateral trunk and extremities, while affecting the ipsilateral face and cranial nerves. Dysphagia, dysphonia, and Horner syndrome are also common clinical findings. Wallenberg syndrome affects many anatomical structures, including the nucleus ambiguous, trigeminal nucleus, spinohyalamic tract, cerebellum, and vestibular nuclei.
CONCLUSIONS: This case highlights the many complications of Wallenberg syndrome and the subsequent need for a multidisciplinary rehabilitation treatment approach to manage the sequelae and manifestations resulting from a medullary stroke.

GLASGOW COMA SCALE-AGE PROGNOSIS SCORE AS A TOOL TO PREDICT FUNCTIONAL OUTCOMES IN GERIATRIC PATIENTS WITH TRAUMATIC BRAIN INJURY
Xin Yi Yap, MBCHB (UK), MRCP (UK), M MED (INT MED) (SINGAPORE)
CASE DIAGNOSIS: The wave of “silver tsunami” around the world has also brought about an increasing incidence of traumatic brain injury in geriatric patients. Falls are a leading cause of TBI in the elderly, followed by motor vehicle accidents. There is a need for a simple tool to gauge the effects of the injury on patients. The Glasgow Coma Scale (GCS) - age prognosis (GAP) score, calculated as age/initial GCS, was proposed as a means to reliably predict inpatient outcomes in the acute setting. We look at how it applies to functional outcomes for patient a few months later.
CASE DESCRIPTION: We performed a retrospective analysis of patients who were discharged from a brain injury rehab facility over a 24 month period from February 2016-February 2018, over the age of 65 years old. The GAP score was calculated for all patients. Primary outcome measures include duration of PTA, length of stay in a subacute rehabilitation unit, and GOS-E scores in 6 months. Secondary outcomes include discharge destination and GOS-E scores at 1 year. We performed a correlation analysis of the GAP score and PTA duration (p<0.017) as well as length of stay (p=0.041). The trend observed was also that for patients with a higher GAP score, they are less likely to be discharged to a care facility. There was no statistical association between the GAP score and GOS-E at 6 months.
CONCLUSIONS: For geriatric patients with TBI, the GAP score can be a simple and effective tool to predict functional outcomes 6 months later. However, a prospective study with bigger sample size should be performed to further validate this.
HAND DEXTERITY IN CERVICAL STENOSIS

Bar A. Madureira, DO MPH, and Kevin Sperber, MD

**CASE DESCRIPTION:** Persistent headache after cervical stroke with hemorrhagic transformation.

**CASE DESCRIPTION:** 86yo M with PMHx hypertension, hyperlipidemia, BPH, atrial fibrillation (not on anticoagulant) presented to the ED with new onset headache associated with diaphoresis & tinnitus. Found to have left cervical infarct on MRI with noted deficits in balance and gait on exam. Once stabilized, patient transferred to acute rehab. Headache/dizziness persistent during rehabilitation. Dizziness unresponsive to trial of meclizine/reglan which was discontinued due to concern over urinary retention/confusion. Headache unresponsive to tylenol. Repeat imaging obtained two weeks post-admission revealed hemorrhagic transformation. Due to headache persistence, pain management consulted who recommended consideration of greater occipital nerve block. Hemorrhagic transformation stable on multiple repeat CT scans and patient brought to outpatient clinic for recommended injection with combination of lidocaine, bupivicane & depomedrol. Patient had significant improvement in headache symptoms with only mild tenderness at injection sites on the days following. He was discharged from rehab to home the week following injection.

**DISCUSSIONS:** Occipital nerve blocks are considered a treatment option in various etiologies of headache including chronic cluster headaches, migraines, occipital neuralgia & post-dural puncture. However, there is limited data in regards to occipital nerve blocks in patients with persistent headache after stroke. The incidence of headache after stroke varies among studies and is reported to occur in somewhere between 9% & 38% of patients. It is more common in those with intracranial hemorrhage due to irritation of surrounding structures. Other means of treatment (ie. NSAIDs) are frequently avoided in these patients particularly during the acute period after hemorrhage due to increased risk of bleed. Thus other methods should be considered.

**CONCLUSIONS:** Greater occipital nerve block may be a treatment option in patients with persistent headache after hemorrhagic transformation particularly in those in whom other options are not viable or in whom conservative management has failed.

HAIR CUTTER’S PALSY—A NEW OCCUPATIONAL FOCAL DYSTONIA: A CASE REPORT

Eric L. Altschuler, MD, PhD, and Kasandra Erazo, BS

**CASE DIAGNOSIS:** Focal right hand occupational dystonia associated with cutting hair.

**CASE DESCRIPTION:** A 39 year-old right handed with significant past medical history working as a hairdresser—up to 20 cuts a day—with chief complaint of right hand pain, numbness, and tingling for over a year was seen for electrodiagnostic study. There was no pain at the time of presentation. Numbness and tingling worsened at night. She reported occasional neck pain; no right shoulder pain. On physical exam, right abductor pollicus brevis and hand intrinsic with 5/5 motor strength with full range. Light touch was intact and the same as the left hand. Tinel’s of the right wrist was negative. Right median and ulnar motor and sensory conduction studies showed normal latencies, amplitudes, and conduction velocities. The right median-radial comparison study showed normal right radial nerve and no slowing of the median nerve compared with the radial nerve. Further history revealed significant pain, not numbness, as the work day progressed.

**DISCUSSION:** Given the patient’s normal exam and negative electrodiagnostic studies, carpal tunnel syndrome is unlikely. Instead, we think she has a focal vocational hand dystonia. Along with reassurance and referral to occupational therapy, we suggested the patient try cutting hair with her left hand. The first occupational focal hand dystonia, writer’s cramp, was described by Bernardino Ramazzinni in a Supplementum to the 1713 second edition of his classic De Morbis Artificum ("Diseases of Workers"). Writer’s cramp has nearly become extinct as a diagnosis due to copy machines and computer word processing. New diseases can arise.

**CONCLUSIONS:** Hair cutting as a vocation may be a risk factor to develop an occupationaly associated focal hand dystonia. Barriers to cutting with the non-dominant hand are numerous, however, but could be worth teaching in hair cutting schools. Ways to prevent, ameliorate or treat this focal dystonia are worthy of further study.

HEALTH MAINTENANCE TOOL FOR PEOPLE WITH SPINAL CORD INJURY — A TOOL FOR CONSUMERS FROM CONSUMERS

Mohit Arora, PhD, Melissa McCormick, Dintity O’Leary, Selina Rowe, Anne Sinnott Jerram, BPHYT, MPHYT, Gerard Weber, FAIFRM, and James W. Middleton, MBBS, PhD, GRADIPESPSCI, FAIFRM(RACP), FACRM

**OBJECTIVES:** Previous research has demonstrated that there is a clear need for a Health Maintenance Tool which can support people with SCI with different levels of mobility and self-reliance in their community. The tool should also support people with SCI to manage their five key areas related to bladder, bowel, skin, autonomic dysreflexia and pain, as well as provide strategies to their caregivers and primary health care providers.

**DESIGN:** A mixed methods design including rapid reviews, interviews, focus group discussions and a Delphi approach for building consensus (for bladder, bowel and skin) was undertaken. The study involved consumers, primary and secondary care providers (GPs), as well as expert group (SCI and other relevant experts). Interviews (involving consumers and GPs) and focus group discussions (involving consumers) data were analyzed using thematic analysis approach using NVivo software. Delphi surveys measuring dexterity in neurologic diseases. The nine-hole peg test (9-HPT) is one such test that was validated in patients with multiple sclerosis. The gold standard for evaluating neurologic function in patients with CSM is the Japanese Orthopaedic Association (JOA) score, which was later adapted into the Modified Japanese Orthopaedic Association (mJOA) score since the JOA had poor external validity in Western populations. The mJOA assesses upper limb motor dysfunction, lower limb motor dysfunction, upper limb sensory dysfunction, and bladder dysfunction. It has demonstrated a significant correlation with recovery rate in patients receiving surgery for CSM. Our aim is to establish a correlation between the 9-HPT and mJOA in patients with CSM. The nine-hole peg test was administered. The nine-hole peg test scores and timed 9-HPT results.

**RESULTS:** 11 participants have been enrolled in the study, all male and right-handed. The average age was 62. The mean 9-HPT score was 28.7 seconds (range 20.4-38.7). Nine of 11 patients with CSM had a prolonged preoperative 9-HPT score, above the normal level for age-and sex-matched individuals. There was a strong negative correlation between the 9 HPT and upper limb mJOA score (r=-0.7, p=0.022) and between the 9-HPT and total mJOA score (r=-0.6, p=0.049).

**CONCLUSIONS:** The 9 HPT scores were prolonged in CSM and showed a correlation with the upper limb and total mJOA scores.

HEAD TRAUMA TRIGGERING ACUTE FUNCTIONAL DECLINE IN ADRENOYELONEUROPATHY — A CASE REPORT

Miguel E. Velez, MD, and Jeffrey C. Schneider, MD

**CASE DIAGNOSIS:** Adrenomyeloneuropathy (AMN).

**CASE DESCRIPTION:** 65yo male with extensive first-degree family history as well as a possible childhood diagnosis of Adrenomyeloneuropathy (AMN) who presented for evaluation following prolonged functional decline over last months. Patient remained asymptomatic from his disease until mid-20’s when he developed impaired gait, calf atrophy and hand and foot paresthesias. His disease did not progress further in the following decade until some months prior to presentation when he suffered a fall off an All-Terrain Vehicle (ATV) resulting in head trauma. Following event patient noted a precipitous decline in his function over the coming months with worsening gait instability, new urinary and focal incontinence and frequent falls. Imaging revealed spinal cord atrophy which extended through his internal capsule via the corticospinal tract into subcortical white matter which had contrast enhancement. Physical exam and imaging findings together with symptom progression supported the diagnosis AMN of which was discussed in childhood but not confirmed.

**DISCUSSIONS:** This case exemplifies typical presentation of a patient with AMN given his positive personal and family history as well as symptoms progression including impaired gait, spasticity, weakness, numbness with bowel and bladder incontinence. His overall decline in function coincided with a reported episode of head trauma which has been reported in the literature. This is thought to be secondary to an immune response subsequently triggering a change from a primarily AMN phenotype to cerebral Adrenoleukodystrophy predominant phenotype.

**CONCLUSIONS:** AMN is a form of X-linked adrenoleukodystrophy caused by mutations in the ABCD1 gene resulting in failure of fatty acid oxidation affecting myelin in primarily in the spinal cord where exacerbation of symptoms may be seen following head trauma.
Hemiparetic Shoulder and Hemiparetic Hand-Serious Problems in the Neurorehabilitation Clinical Practice of Post-Stroke Patients (Impact of Mirror Therapy and Functional Electrostimulations on Autonomy)

Ivet B. Koleva, MD, PhD, DMEDSC, Radoslav R. Yosifov, and Borislav R. Yosifov

OBJECTIVES: Stroke is a socially important disease in industrialized countries, with a high level of prevalence and mortality. Motor weakness and spasticity provoke pathokinesiological dysbalance in the upper extremity, with severe difficulty in everyday activities of stroke survivors. Our goal was to evaluate the impact of mirror therapy and functional electrostimulations in the complex neurorehabilitation algorithm in patients with post-stroke hemiparesis, hemiparetic shoulder and hemiparetic hand.

DESIGN: A total of 171 post-stroke patients with hemiparetic shoulder and hemiparetic hand were observed. Patients were randomized into four therapeutic groups (57 per group). The control was done before, during and at the end of the NR course (of 20 treatment days), and one month after its end - using a battery of clinical methods and functional scales. In all patients we applied a complex neurorehabilitation (NR) program of physiotherapy, cryotherapy and ergotherapy; including proprioceptive neuromuscular facilitation (Kabath), strength and endurance exercises for shoulder abductors and rotators (rotator cuff muscles), wrist and finger extensions and flexors, lateral trunk and scapular muscles; grip and grasp training and goal-oriented activities. Group (gr) 1 received only this NR program. In gr 2 we added mirror therapy for the hemiparetic hand. In the next group (gr 3) we added functional electrostimulations for the deltoid muscle, for extensors of the wrist and fingers.

RESULTS: The comparative analysis of results demonstrates significant pain reduction (Visual analogue scale), diminution of spasticity and contracture (Ashworth scale); increase of the range of motion (ROM) of the humero-scapular joint, of the wrist and fingers (goniometry); recovery of the humero-scapular rhythm and the grasp kinesthesis; improvement of functional capacity (Brunnstrom), grasp capacity (Box and Block test) and autonomy (FM – Self-care subscale; Barthel index – sub-scales Grooming, Eating, Getting dressed, Bathing).

CONCLUSIONS: Neurorehabilitation improves patients’ autonomy and quality of life.

Hemiparetic Upper Limb Impairment is Determined by Distinct Lateralized Motor Networks

Shay Ofir, MD, Isaac Meilijson, PhD, Silvi Frenkel-Toledo, PhD, and Nachum Soroker, MD

OBJECTIVES: Motor impairment of the hemiparetic upper limb (HUL) is a leading cause for disability following stroke. In clinical practice left and right hemiparesis are usually treated as identical syndromes. Yet, research points to important differences in the role played by the left and right hemispheres in motor control, e.g., voluntary, goal-directed control mode (left hemisphere (LH) dominance) vs. active control towards unexpected external stimuli (right hemisphere (RH) dominance). Given the limited success of current therapies in ameliorating HUL function, a better understanding of the neuroanatomical correlates underlying the above differences is important for the development of more effective HUL rehabilitation. Recently, a voxel-based lesion-symptom mapping (VLSM) study has shown striking differences in the impact of lesion location on left and right hemiparesis. We aimed to investigate these differences from a network perspective.

DESIGN: 107 first-ever stroke patients (58 – LH damage, 49 – RH damage) were examined (Fugl-Meyer test) during the late sub-acute period (1-3 months post-onset. The impact of lesion location on proximal (FM-A) and distal (FM-B+C) HUL function was assessed separately for each hemisphere side, using a multivariate game-theoretical approach (multi-perturbation Shapley-value analysis; MSA).

RESULTS: In the LH (right hemiparesis), damage involving motor-planning parts of the cerebral cortex exerted a major impact on HUL residual function. In contrast, in the RH (left hemiparesis), damage involving motor-execution parts played a key role. HUL function was affected differently by damage to white matter association fibers in each hemisphere. Damage to the cortico-spinal tract in its passage in the ventral brainstem, and damage affecting the primary somatosensory cortex contributed equally to right and left HUL function.

CONCLUSIONS: Hemiparesis is an asymmetric phenomenon determined by damage to a distinct set of regions in each hemisphere. The current findings may help dictate target regions for stimulation in rehabilitation treatments incorporating non-invasive brain stimulation.

Hemiplegic Migraines: Identifying Zebras Amongst Horses

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CASE DIAGNOSIS: Hemiplegic migraine (HM).

CASE DESCRIPTION: A 22-year-old female with a history of migraines with aura, presented with right-sided tingling in her arms and legs that progressed to weakness and inability to walk. Patient reported two similar episodes three and four years ago. Her first episode of HM was at the age of eighteen, when she experienced a headache with right-sided hemiplegia. CT, MRI, MRAs, EEG and CSF studies were unrevealing. In acute rehabilitation (AR), she regained strength and function after a few weeks. Similar to prior episodes, her workup was inconclusive, and she was admitted to AR again. Medical Management alleviated the acute episode and she is gradually recovering her motor function with physical/occupational therapy (PT/OT).

DISCUSSIONS: HM are a rare subset of migraines with a prevalence of only 0.01%. They are often described as headaches with an associated aura that not only includes unilateral motor symptoms, but also other symptoms such as visual field defects, feeling temperature, numbness, or ataxia. Once other possible etiologies have been ruled out, PT/OT plays an important role in decreasing the duration/intensity of the episodes with manual therapy, stretching, strengthening, specific exercise training, modalities, self-distraction and education. To decrease the frequency/intensity of the episodes, massage therapy, physiotherapy, relaxation and chiropractic spinal manipulative therapy have been reported to be as effective as propranolol and topiramate.

CONCLUSIONS: Though rare, this case reminds us of the importance of recognizing the possibility of hemiplegic migraines in a patient who has the appropriate clinical presentation, and the possibility of a delay in diagnosis due to symptoms that can be confused with other disorders. The recognition of this entity will help prevent the disabling impact of suboptimal treatments on an individual’s quality of life. PT/OT may play a significant role in the acute management and prophylaxis of HM.

Heterotopic Ossification Due to Ischemic Stroke

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CASE DIAGNOSIS: Heterotopic ossification (HO) is frequently seen after spinal cord injury, traumatic brain injury. It is considered rare with hemiplegia following stroke.

CASE DESCRIPTION: A case of a 48-year-old patient with right hemiplegia related to an ischemic stroke was admitted to our department on the 7th month after the event. He developed right hip pain, especially during passive range of motion (ROM) exercises. The patient had not previously attended a physical medicine and rehabilitation program. Right hip flexion, and abduction, abstraction, internal-external rotation and were limited at the beginning of range of motion (ROM) due to pain. X-ray and pelvic computed tomography revealed HO around the hip joints. After 6 weeks of inpatient rehabilitation, the ranges of hip joint motion were not improved. He was treated by surgical intervention (HO) and other possible etiologies have been ruled out.

DISCUSSIONS: HO is the formation of bone in an abnormal site occurs in post-stroke hemiplegia in 0.5–1.2%. It is not common after stroke, but should be considered in the differential diagnosis when, range of motion limitation inflammation, swelling or effusion, palpable mass and pain are present.

CONCLUSIONS: Considering the presented cases, it is suggested that HO should be kept in mind in the differential diagnosis in stroke patients presenting with spontaneous joint pain or limitation. Early recognition and treatment are important for those caring for patients with acquired neurological deficits, and permit improved patient outcomes.
INJECTION INTO THE PECTORALIS MINOR MUSCLE TO DIAGNOSE AND TREAT THORACIC OUTLET SYNDROME: A CASE SERIES

Connie Jiang, MD, and Albert C. Clairmont, MD

CASE DIAGNOSIS: Thoracic outlet syndrome.

Case Description: Case 1: A 26-year-old female presented with 6 months of left upper limb pain, dysesthesias in digits 4 and 5, decreased grip strength, and hand pallor. Electrodiagnostic (EDX) testing was normal. High frequency ultrasound (HFUS) showed tightness of the left pectoralis minor, but no obvious blood flow restriction. She underwent OnabotulinumtoxinA injections to the left pectoralis minor, major, and some cervical muscles, which resolved her skin discoloration and improved dysesthesias by 90%. Left first rib resection followed, with good results. Case 2: A 28-year-old male presented with 2.5 years of left neck and upper limb pain, weakness, and dysesthesias in digits 2 and 3. EDX testing was normal. HFUS revealed tight left pectoralis minor with outward bowing worsened with provocative maneuvers. He underwent OnabotulinumtoxinA injections to the left pectoralis minor with 80% improvement. Left first rib resection yielded minor improvement. Subsequent left pectoralis minor tenotomy resulted in significant improvement.

Diseases: Thoracic outlet syndrome (TOS) is a complex entity caused by neurovascular compression, presenting with related signs and symptoms affecting the upper limbs. Characterizing the anatomy of the thoracic outlet in regards to etiology of compression is important in guiding treatment. HFUS is useful tool for dynamic evaluation of this region. In this case series, HFUS identified tight pectoralis minor. OnabotulinumtoxinA injections targeted to this muscle were diagnostic, therapeutic, and helped guide surgical interventions.

CONCLUSIONS: Diagnosis of TOS is challenging. HFUS is a useful tool for dynamic evaluation to characterize the anatomy of the thoracic outlet and to identify specific muscles to target with botulinum toxin injections. This warrants further investigation as no standard botulinum toxin treatment protocol currently exists for TOS.

HIGH PROPORTION AND DEGREE OF SEVERITY OF DISABILITY IN HOSPITALIZED PATIENTS, HONDURAS 2019

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CASE DIAGNOSIS: Disability includes deficiencies in functions and structures, activity limitations, and/or participation restrictions. In 2011, the World Health Organization World Disability Report estimated 15.0% of the world’s population lives with a disability. 80.0% of which lives in developing countries. A 2016 study in a national hospital, reported 86.8% of inpatients had a disability. The objective was to determine the proportion and degree of disability in patients ≥18 years old admitted to four hospitals, Honduras, April-June 2019.

CASE DESCRIPTION: Observational cross-sectional study, medical-surgical wards. Inclusion criteria: patients without cognitive disorders, with a family member/caretaker providing information, voluntary participation, and written informed consent. Sample according to OPEN-EPI =415; simple random sampling, interview with WHODAS 2.0 questionnaire (version 12 questions). Univariate analysis, with frequencies, percentages and central measurement trends (EPINFO 7.2.2.6).

DISCUSSIONS: 415 patients, disability proportion of 88.0% (C89%/84.5-90.8), there was no gender precedence, male 50.8% (211) female 49.2% (204), age ≥51.1±18.3 years (R=18-97), Mild disability 40.5% (168), moderate-extreme 47.5% (197). Acquired cause (common disease plus trauma) 98.6% (409). Entry diagnostic categories: musculoskeletal 20.7% (86), Oncological 20.5% (85) and gastrointestinal 17.8% (74). Most affected structures: related to movement 37.6% (156) and digestive 19.7% (74). Acquired cause (common disease plus trauma) 98.6% (409). Entry diagnostic categories: musculoskeletal 20.7% (86), Oncological 20.5% (85) and gastrointestinal 17.8% (74). Most affected structures: related to movement 37.6% (156) and digestive 19.7% (74). Most affected causes: musculoskeletal 55.4% (230), digestive 25.3% (105), sensory and pain 21.7% (90). The affected domains of WHODAS 2.0; mobility with 59.1% (245), social participation 40.5% (160) and personal care 35.1% (145).

CONCLUSIONS: The proportion of disability found in four hospitals from the main cities in Honduras (88.0%), is similar to the Results found in one national hospital in 2016 (86.8%). A high proportion of disability with a moderate to extreme severity was found, requiring immediate actions to provide rehabilitation during their hospital stay for the management of the disabilities related to the admitting diagnosis and the prevention of possible complications.

HIRAYAMA DISEASE

Jonathan Chapekis, DO, Arham Hazari, MS4, Waleed Ijaz, MS4, Nuri Jacoby, MD, and Susan Stickevers, MD

CASE DIAGNOSIS: Hirayama Disease.

Case Description: A 19-year-old Middle Eastern male presented with a six-month history of left upper extremity weakness and inability to grasp objects with his left hand. His grandfather reported a history of weakness and a “nerve condition.” Physical exam revealed atrophy of the rotator cuff musculature and deltoid. ½ muscle strength was noted in the deltoid, biceps, triceps and ½ muscle strength was noted in wrist flexors/extensors and intrinsic muscles of the left hand. The brachioradial, biceps, and triceps deep tendon reflexes were +1. There were no sensory deficits. Routine cervical spine MRI was negative.

DISECUSSIONS: Hirayama Disease (HD) is a rare cervical myelopathy in which short thick cervical cord is unable to compensate for the increased length of the vertebral canal during neck flexion. This causes cervical cord atrophy resulting in a progressive, unilateral atrophy of the upper extremity. Distal muscles are often more affected than proximal muscles, but in 10% the proximal muscles are primarily affected. HD has an insidious onset with gradual progression for several years, followed by stabilization. Asian males, 10 - 25 years old are predominantly affected. EMG reveals evidence of chronic denervation. Dynamic cervical MRI with the neck in flexion is required for diagnosis. HD is self-limiting; however, early diagnosis is necessary because a cervical collar may arrest the progression by limiting neck flexion. Physiotherapy is also helpful in preventing complications resulting from immobility such as joint stiffness and muscle wasting.

CONCLUSIONS: Hirayama Disease is a rare disorder in which young male patients present with unilateral weakness and atrophy of an upper extremity. The condition cannot be identified on routine cervical MRI. MRI imaging with cervical flexion is required for early detection. Early physiotherapy interventions and use of a cervical collar may prevent long term sequelae and disability.

HIV MONONEUROPATHY-ASSOCIATED FOOT DROP: A PRESENTING SIGN OF HIV INFECTION, RESOLVING FOLLOWING INITIATION OF ANTIRETROVIRAL THERAPY

Abhinav Mohan, MD, Paula Eckardt, MD, and Seth Tarras, MD

CASE DIAGNOSIS: HIV mononeuropathy.

Case Description: A previously healthy 62-year-old man presented with three months of right foot drop, following several months of gradually increasing tripping over the right foot. He had just completed two months of PT with no improvement. He was using right AFO. Examination revealed impaired right foot dorsiflexion (2/5), evasion (3/5), and great toe extension (2/5), with intact sensation. He exhibited steppage gait with increased right knee flexion during swing. Extensive neuropathy-specific laboratory testing was negative except for HIV-1 antibody/RNA suggestive of active HIV infection. EMG/NCS showed acute denervation of the right deep peroneal nerve and absent sensory evoked potential of the right superficial peroneal nerve. MRI RLE showed acute/subacute denervation changes in anterior compartment. MRI L-spine did not support radiculopathy. Abacavir/dolutegravir/lamivudine therapy was initiated. He restarted PT. At 6-month follow-up, his foot drop was completely resolved. No recurrence has been noted in subsequent visits over the next 18 months.

DISECUSSIONS: Peripheral mononeuropathy is a frequent complaint in patients with HIV. Mononeuropathies are rare and classically described with cranial nerve involvement. We believe our patient experienced HIV-associated deep peroneal motor mononeuropathy leading to foot drop, which was the presenting sign of HIV infection. PT had no benefit until antiretroviral therapy was initiated, after which complete resolution of the foot drop was rapid.

CONCLUSIONS: This is the first known case of foot drop as the sole presenting sign of HIV infection, and dramatic and rapid resolution of the neurological deficit following initiation of antiretroviral treatment. While we cannot rule out a coincident spontaneous resolution, this case suggests that physiatrists should consider HIV in the differential diagnoses of acute foot drop, even if no signs or symptoms of systemic infection/AIDS exist.

HOW DOES MOTIVATION TO THERAPY CONTRIBUTE TO FUNCTIONAL RECOVERY? A COMMON SCENARIO REVEALS LIMITED KNOWLEDGE TO ASSESSMENT AND INTERVENTION TOOLS FOR MOTIVATION

Riya Fukui, MD, Carolina Gutierrez, MD, and Joel Frontera, MD

CASE DIAGNOSIS: Prolonged ICU stay with debility.

CASE DESCRIPTION: A 64-year-old male with ESRD who presented with acute lower extremity DVT. Workup revealed osteomyelitis and discitis originating from aortic valve endocarditis for which he received bioprosthetic aortic valve replacement, and two-vessel CABG. After the surgery, there was a significant decline in his function. His hospital course was complicated by cerebrovascular accidents,
followed by a stay in ICU for post PEG tube placement complication. He then developed pneumonia and bacteremia with psa abscess. Patient was initially recommended for inpatient rehabilitation program, however due to his lack of motivation, he was ultimately accepted at a skilled nursing facility. Initially, patient demonstrated high level of medical and functional setbacks, he felt depressed and isolated and his symptoms worsened with nausea and fever from infection, his motivation declined along with his function. After a motivational intervention including counseling, his motivation to therapy appeared to have increased along with his function.

**DISCUSSIONS:** Motivation has many definitions, such as self-eficacy, self-confidence or even the will to live. It is a force that drives people to act in life and must always be driving the behind participation in therapy to further their function and independence. This case highlights the lack of knowledge and evidence in how patient's motivation plays a role in successful recovery.

**CONCLUSIONS:** There is limited literature on assessing motivation for therapy in this population. There is an opportunity for further research in motivation and the correlation with therapy participation. With additional research, development of a measuring tool to assess motivation can aid in early intervention and ultimately increase in function.

**HYPOTHIURITARISM IN BRAIN INJURY**

Jacinta Lewis, MBBS

**OBJECTIVES:** An important issue with significant clinical associations, the Princess Alexandra Hospital (PAH) Brain Injuries Rehabilitation Unit (BIRU) has attempted to identify hypothyrtuitarism post-brain injury via an admission pathology protocol. This protocol serves to guide junior doctors when completing the admission process, and includes ordering a hypothyrtuitar pathology screen for all new patients regardless of their diagnosis or severity of injury. However, given the paucity of literature and discrepancies in findings around hypothyrtuitarism in non-traumatic brain injury, it stands to reason that these health resources may be inappropriate utilised in this subgroup of patients. The aim of this study was to investigate whether hypothyrtuitarism significantly occurs in non-traumatic brain injured patients.

**DESIGN:** This study was a single site, retrospective audit of patients discharged from a specialty brain injury unit in 2015. Of these patients, two groups were analysed; those with a traumatic cause of brain injury, and those with all other brain injuries (non-traumatic). Of the 141 patients admitted to BIRU in 2015, only 78 were included in the analyses. 63 patients were excluded due to missing blood tests.

**RESULTS:** Full multivariate model with backward elimination of confounders (age and gender) found that trauma did not have an influence on screening outcome, with an unremarkable odds ratio (1.28) thus identifying a lack of association between trauma and hypothyrtuitarism. A Chi Square test failed to demonstrate a statistically significant occurrence of hypothyrtuitarism, regardless of injury type (χ² = 0.2715, p-value = 0.602).

**CONCLUSIONS:** When present, hypothyrtuitarism has proven a clinically salient finding post-brain injury. Noting this, the present study has failed to demonstrate that hypothyrtuitarism occurs to a statistically significant degree in a subspecialised rehabilitation unit, regardless of brain injury mechanism. There is a lack of consensus as to who and when to treat for such a phenomenon.

**HYPOTHERMIC PERIPHERAL NEUROPATHY**

Ashley MOHAN, DO, and Bonnie J. Weigert, MD

**CASE DIAGNOSIS:** Hypothermic peripheral neuropathy.

**CASE DESCRIPTION:** A 21-year-old male suffered a hypothermic cardiac arrest and traumatic brain injury after being found down on a frozen lake for an unknown amount of time. Patient’s initial temperature was found to be 25 degrees Celsius. Patient was placed on VA ECMO and rewarmed slowly to 34 degrees Celsius. Patient was placed on VA ECMO and rewarmed slowly to 34 degrees Celsius. The patient will be undergoing decompression surgery at the local hospitalization, the patient had two episodes of jarring involving his left leg and bilateral upper extremities one day apart. The patient remained alert and oriented during these episodes. Of note, the patient denied a history of spasticity and did not have increased tone on exam. A complete metabolic panel, magnesium level, phosphate level, and TSH level were obtained. The patient’s only abnormal lab value was a TSH of 19.8, elevated from 3.0 three months prior. His thyroid antibodies were negative, ruling out Hashimoto’s encephalitis. The patient was started on levothyroxine and the jarring episodes did not recur.

**DISCUSSIONS:** This patient's myoclonic jerks could have been confused for spasticity. While this was considered, our differential diagnosis also included electrolyte disturbances, thyroid abnormality, epileptic myoclonic jerks, multi-system atrophy, Parkinson’s disease, Lewy body dementia, or medication effect. Hypothyroidism is an uncommon cause of myoclonus and thus far has only been reported in the context of Hashimoto’s encephalitis.

**CONCLUSIONS:** It is important to consider etiologies of abnormal movements outside of spasticity in patients with chronic spinal cord injuries. Although myoclonus in relation to thyroid disease is most commonly associated with hyperthyroidism, hypothyroidism may rarely also present with myoclonus and should be considered in the differential diagnosis of new onset myoclonus. To our knowledge, this is the first described case of myoclonus secondary to hypothyroidism not associated with Hashimoto’s encephalitis.

**ICF ASSESSMENT OF WOMEN AFTER BREAST CANCER TREATMENT WITH A SIGNIFICANT DEGREE OF DISABILITY IN POLAND - PRELIMINARY STUDY**

Katarzyna Hojan, MD, PhD

**OBJECTIVES:** The ICF is used to build a meaningful and useful system that can be used by various users to determine health policy, ensure the quality of health care and assess the results of therapy within different cultures. In the study we analyze the assessments of the functional status and disability awarded in accordance with the Polish case law system in relation to its international classification (ICF).

**DESIGN:** It was an observational, clinical study in breast cancer women who were admitted with a significant degree of disability according polish health insurance after finish the oncological therapy (surgical method and/or chemotherapy and/or radiotherapy), which were treated in the Poland Cancer Center. Patients underwent a comprehensive functional assessment in accordance with ICF for patients with breast cancer (ICF Core Sets for breast cancer).

**RESULTS:** 88 women (45-70 years) after completed breast cancer treatment (6-60 months) in 77% 2% stated a lack (0-4%) or small (5-24%) deficits of function and structure in the group with the prescribed significant degree of disability. The Results of our preliminary studies suggest a significant discrepancy in the assessment of the condition of patients after treatment of breast cancer in ICF classification with government-issued state structures of significant disability in women after breast cancer treatment.

**CONCLUSIONS:** The results of this study in women after treatment of breast cancer suggest the use of ICF to fully assess the degree of disability, as well as the use of this classification to a common information platform for both health care workers and those responsible for social insurance or social assistance.

**IDENTIFYING A SUBSET OF ACUTE STROKE PATIENTS IN CLINICAL EQUIPPOSE FOR DISCHARGE TO AN INPATIENT REHABILITATION FACILITY OR SKILLED NURSING FACILITY**

Kent P. Simmonds, MPH, James Burke, MD, MS, Matthew Reeves, PhD, and Zhexiu Luo, PhD

**HYPOTHYROIDISM PRESENTING AS MYOCLONUIC JERKS IN A PATIENT WITH A CHRONIC THORACIC SPINAL CORD INJURY**

Sarah M. Smith, MBBS, and Audrey Leung, MD

**CASE DIAGNOSIS:** Myelosclerosis secondary to hypothyroidism.

**CASE DESCRIPTION:** A 68-year-old male with T4 motor incomplete paraplegia secondary to a motor vehicle collision in 2010 was initially admitted to the hospital for management of cholecystitis. The patient's hospital course was complicated by perihepatic abscesses following open choledocystectomy and several episodes of hypercarbic respiratory failure requiring mechanical ventilation. Five months into his hospitalization, the patient had two episodes of jarring involving his left leg and bilateral upper extremities one day apart. The patient remained alert and oriented during these episodes. Of note, the patient denied a history of spasticity and did not have increased tone on exam. A complete metabolic panel, magnesium level, phosphate level, and TSH level were obtained. The patient’s only abnormal lab value was a TSH of 19.8, elevated from 3.0 three months prior. His thyroid antibodies were negative, ruling out Hashimoto’s encephalitis. The patient was started on levothyroxine and the jarring episodes did not recur.

**DISCUSSIONS:** This patient's myoclonic jerks could have been confused for spasticity. While this was considered, our differential diagnosis also included electrolyte disturbances, thyroid abnormality, epileptic myoclonic jerks, multi-system atrophy, Parkinson’s disease, Lewy body dementia, or medication effect. Hypothyroidism is an uncommon cause of myoclonus and thus far has only been reported in the context of Hashimoto’s encephalitis.

**CONCLUSIONS:** It is important to consider etiologies of abnormal movements outside of spasticity in patients with chronic spinal cord injuries. Although myoclonus in relation to thyroid disease is most commonly associated with hyperthyroidism, hypothyroidism may rarely also present with myoclonus and should be considered in the differential diagnosis of new onset myoclonus. To our knowledge, this is the first described case of myoclonus secondary to hypothyroidism not associated with Hashimoto’s encephalitis.
OBJECTIVES: Whether stroke outcomes are better in Inpatient Rehabilitation Facilities (IRFs) or Skilled Nursing Facilities (SNFs) is unknown. A randomized controlled trial (RCT) is needed to answer this question, but to ethically justify such a trial, patients in equipoise must be identified. Equipoise is the point of clinical uncertainty regarding best treatment option. Our objective was to identify patients in equipoise using a statistical model to predict IRF or SNF discharge for acute stroke patients.

DESIGN: We used Medicare standard analytic files (2011-2014) to develop a retrospective cohort of acute stroke patients. Our primary outcome was discharge to an IRF or SNF and a comprehensive set of patient, hospital, and geographic covariates were used to derive logistic regression models with and without a random effect for hospital. The random effect (R.E.) for hospital accounts for clustered observations and IntraClass Correlation Coefficients (ICCs) quantified the variance in IRF or SNF discharge attributable to each hospital. Patients in equipoise were operationally defined as having predicted probabilities of IRF (versus SNF) discharge of 40-60% to best reflect clinical uncertainty.

RESULTS: The final sample had 135,415 patients (49.1% IRF and 50.9% SNF). Model 1 had good discrimination (C = 0.73) and 42,792 (31.6%) equipoise patients. Hospitals had a large effect on IRF or SNF use as 26% of the unexplained variation was attributable to the hospital (i.e. ICC = 0.26 in model 3). The fully adjusted model (model 3) had excellent discrimination (C = 0.82) and fewer patients were in equipoise (n=27,720, 20.5%). The equipoise sample was evenly split (i.e. 50.2% IRF and 49.8% SNF) and interchangeable (i.e. IRF and SNF patient characteristics differences were no longer significant).

CONCLUSIONS: Our prediction model identified that around 20% of Medicare acute stroke patients met our definition of equipoise. The equipoise sample was equal in size and interchangeable providing a practical ethical basis to randomize.

CONTINUOUS VELOCITY LUMBAR PUNCTURE IN THE MANAGEMENT OF NEUROLOGICAL CASES
Santosh Kumar, MD, Subodh Kumar, MS, FACS

CASE DESCRIPTION: A 34-year-old obese female presented with altered mental status, headache, vomiting, nuchal rigidity and altered vision. The patient was found to have a mass lesion on neuroimaging. The patient was diagnosed with subdural hematoma and underwent surgical decompression.

CONCLUSIONS: Continuous velocity lumbar puncture is a safe and effective technique for managing neurological cases with altered mental status and neurological deficits.

IMMUNOSUPPRESSIVE MEDICATIONS IN THE SETTINGS OF SPINAL CORD INJURY. IMPORTANT CONSIDERATIONS
Jason S. Hua, DO, and Lisa Wenzel, MD

CASE DESCRIPTION: Perianal abscess rupture after initiation of immunosuppressive medication in a patient with history of ankylosing spondylitis.

CONCLUSIONS: Patients with premorbid conditions such as ankylosing spondylitis, rheumatoid arthritis who required immunosuppressive medication in the past poses an interesting dilemma after suffering spinal cord injury. In our case, the patient developed perirectal wound acutely after initiation of sulfasalazine. This was likely due to an underlying abscess that patient could not feel due to sensory deficits from his spinal cord injury.

CONCLUSIONS: For spinal cord injury patients with premorbid conditions that require immunosuppressive medication. It is important to consider the potential side effects of immunosuppression in this population. Experimental studies has shown that spinal cord injury can trigger a systemic neurogenic immune response syndrome. For this particular population who requires immunosuppressive medication, caution has to be taken to assess for all potential sources of infection. As in this case they can be "drawn to the surface."

IMPACT OF DIRECT APPLICATION OF VIBRATORY STIMULI FOR MOTOR FUNCTION OF UPPER LIMB IN A PATIENT WITH INCOMPLETE CERVICAL SPINAL CORD INJURY
Atsushi Ota, MD, Kentaro Kawamura, MD, Seiichi Niidome, OT, Yumeko Amano, MD, Seiji Etoh, MD, PhD, and Megumi Shimodzono, MD, PhD

CASE DIAGNOSIS: Incomplete spinal cord injury at C4 level, motor dysfunction, impaired dexterity, sensory disturbance, dysesthesia.

CASE DESCRIPTION: A 73-year-old male with incomplete cervical spinal cord injury (SCI) with impaired motor function and dysesthesia in his right upper limb was started on direct vibratory stimuli with handy massager to his right upper limb for 3 minutes/day added to conventional rehabilitation at 6weeks after the injury. Box and Block Test (BBT) and Nine Hole Peg Test (NHPT) improved from 30 to 39, 145 to 100sec after 3 weeks, respectively. We also assessed immediate effect of vibratio. BBT were 39, 44, 46.5 (before, just after, 30min after vibration). NHPT were 100, 74.5, 68sec, respectively. Mean amplitude of F-wave from the abductor pollicis brevis was not significantly changed after vibration. But two peak form of F-wave
amplitude distribution changed to multi-peak form immediately after vibration. The latency of F-wave significantly prolonged just after vibration and shortened at 10min after vibration. Active motor threshold (AMT) and cortical silent period (CSP) were not outside.

**DISCUSSIONS:** The direct vibratory stimuli to upper limb induced cumulative and immediate effect (at least for 30min) in the improvement of motor function. The various forms of F-wave appeared and F-wave latency was changed after vibration. No change of AMT, CSP means no change of cortical and spinal excitability. These data may indicate that some changes in connection or firing pattern of spinal motor-neurons and interneurons to the improvement of upper limb function.

**CONCLUSIONS:** The direct application of vibratory stimuli to upper limb in the SCI patients could improve their motor function. Vibratory stimuli may facilitate the functional recovery of upper limb due to change in connection or firing pattern of motor neurons and interneurons without change in cortical and spinal excitability. The relationship between functional improvement and spinal change should be confirmed in the future study.

**IMPACT OF EARLY REHABILITATION IN TRAUMATIC BRAIN INJURY PATIENTS: RELATIONSHIP WITH FUNCTIONAL OUTCOME AND LENGTH OF STAY IN A LIMITED RESOURCE SET-UP OF DEVELOPING WORLD**

Siddharth Rai, MD, Mallikarjun Ganigjanyi, MCH, Rupali Awale, MD, and Amit Agarwal, MS

**CASE DESCRIPTION:** Traumatic brain injuries (TBI) often result in disabilities which are burden for any society. Psychiatry units have recently been emphasized by the Government of India across all trauma centres. Nevertheless, there is a lack of effective rehabilitation program for TBI patients in the majority of trauma centres in the developing world. Hence this study was done to determine the impact of early PMR intervention in TBI patients on functional outcome and length of stay in setting of a new trauma center.

**CASE DESCRIPTION:** Retrospective analysis of prospective maintained data of patients admitted with non-fatal traumatic brain injury either managed operatively or conservatively were obtained from July 2018 to July 2019. Rehabilitation was started within 48hrs of admission in most of the patients. Demographic variables, acute neurological characteristics, medical complications, and rehabilitation outcomes were recorded. Functional outcome was determined using a modification of the FIM score. Descriptive and regression analyses were used to establish the relationship between early physical medicine and rehabilitation intervention and FIM score, length of stay, and discharge planning.

**DISCUSSIONS:** 290 patients were included in this study with an average age of 58.8 ± 11.1 years. The most common aetiology was road traffic accident (88.06%). Most patients were discharged home directly (78.08%). Patients receiving Rehabilitation management early, within 48hrs functionally improved (P < 0.001). Regression analysis showed by the early rehabilitation management, that there was a statistically significant FIM functional gain of 18.445 points (P = 0.03). The patients who had early PMR intervention, had also fewer complications.

**CONCLUSIONS:** Introduction of early PMR intervention in setting of a trauma center with a dedicated neurologist significantly improves functional outcome in traumatic brain injury patients, decreases the length of stay during acute hospitalization and decreases complication rates. This needs to be promoted and established across all such centers in the developing world.

**IMPACT OF ORTHOPEDIC DISORDERS OF STROKE PATIENTS ON MENTAL HEALTH AND FUNCTIONAL INDEPENDENCE**

Meryem Frigui, Doctor

**OBJECTIVES:** The aim of our study was to evaluate the impact of orthopedic disorders (OD) on mental health and functional independence of stroke patients.

**DESIGN:** We conducted a cross-sectional study, which included patients followed for stroke that had occurred over one year, in the Physical and Rehabilitation Department at the University Hospital Tahar Sfar of Mahdia (Tunisia). Evaluation was based on the Hospital Anxiety and Depression Scale (HAD) for mental health. The functional independence measure (FIM) and Barthel scale were used to measure the degree of disability.

**RESULTS:** One hundred twenty four patients were enrolled in this study: 68 men (54.8%) and 56 women (45.2%), with the mean age of 60.5±12 years. OD had been noted in 66.9% of the cases. Capsulitis was the most OD found in 49.5% of the cases. The functional and psychological repercussions were important. Indeed the mean FMI score was 79.4± 23 and the mean Barthel scale was 46.8± 25. For the more, the mean HAD depression scale was 11.4± 3 and the mean HAD anxiety was 9.2± 3.4.

**CONCLUSIONS:** It appears from our study the occurrence of OD in stroke patients leads to physical disability and functional dependence, as well as emotional disturbances such as anxiety and depression.

**IMPACT OF POST-STROKE RECANALIZATION ON GENERAL AND UPPER LIMB FUNCTIONING: A PROSPECTIVE, OBSERVATIONAL STUDY**

João P. Branco, PhD, ST; Alexandra Coelho, RESIDENT, and Joao P. Pinheiro, PhD

**OBJECTIVES:** To assess the impact of recanalization (spontaneous and therapeutic) on upper limb functioning and general patient functioning after stroke.

**DESIGN:** This is a prospective, observational study of patients hospitalised due to acute ischaemic stroke in the territory of the middle cerebral artery (n=98). Patients completed a comprehensive rehabilitation program and were followed-up for 24 weeks. The impact of recanalization on patient functioning was evaluated using the modified Rankin Scale (mRS) and Stroke Upper Limb Capacity Scale (SULCS).

**RESULTS:** General and upper limb functioning improved markedly in the first 3 weeks after stroke. Age, gender, and National Institutes of Health Stroke Scale (NIHSS) score at admission were associated with general and upper limb functioning at 12 weeks. Successful recanalization was associated with better functioning. Among patients who underwent therapeutic recanalization, NIHSS scores ≤16.5 indicate lower general functioning at 12 weeks (sensitivity=72.4%; specificity=78.6%) and NIHSS scores ≥13.5 indicate no hand functioning at 12 weeks (sensitivity=83.8%; specificity=76.5%).

**CONCLUSIONS:** Recanalization, either spontaneous or therapeutic, has a positive impact on patient functioning after acute ischemic stroke. Functional recovery occurs mostly within the first 12 weeks after stroke, with greater functional gains among patient with successful recanalization. Higher NIHSS scores at admission worse functional recovery.

**IMPLICATIONS AND POSSIBLE INTERVENTIONS BASED ON NATIONAL TRAUMATIC BRAIN INJURIES IN ENGLAND ON CEREBRAL LEVEL – SCIENTIFIC DATA AND SYNTHEITIC INTEGRATIVE CORRELATIONS OF RELATED PREVIOUSLY ACHIEVED AND SPECIFICALLY FOCUSED STUDIES**

Constantin Munteanu, PhD, Diana Nicoleta Munteanu, Biologist, Gabriela Dogaru, PhD, and Gelu Onose, MD, PhD, MSC

**OBJECTIVES:** The central nervous system is intolerant to ischemia and 10-30 seconds without oxygen can initiate damages in neuronal, of support and vascular, structures, that can lead to irreversible effects (most serious: cells death) after more than 5 minutes of (quasi) total arrest of blood supply in a brain territory. Hypoxi/ischemic injuries in stroke are devastating conditions that can affect individuals of all ages, possibly occurring perinatally - with consequent encephalopathy - and respectively, in adults and elderly, being one of the major causes of death and disability. Our objectives target, first, to have a better understanding of the actual scientific description of the chronic ischemia detrimental outcomes on cerebral level and secondly, to present some of the intervention possibilities aiming to reduce the consequences of stroke. Despite considerable research, there are still no proven clinically effective pharmacological industrial agents capable to spectacularly mitigate the severity of brain lesions following stroke.

**DESIGN:** We achieved prospective longitudinal analyses in, totally, 55 chronic post-ischemic stroke patients, mean age 69 years, which made rehabilitation treatment: the first group, of 20 patients, performed only kinesitherapy, massage and occupational therapy, during 16 days, at the Clinical Rehabilitation Hospital in Cluj-Napoca, and the second group, of 35 patients, performed the same treatment during 16 days, plus in association with carbonated mineral water baths for 15 minutes daily, moxetter therapy for 20 minutes two times per week, kinesitherapy and massotherapy 15 minutes daily, each, and aerotherapy 30 minutes, daily, at Tușnad Spa Complex, in Băile Tușnad. Hemiparesis was the most frequent clinical sign, followed by coordination deficit, balance and gait, disorders. Every patient, within both mentioned settings, was clinically observed before and after treatment, based on: Motor Assessment Scale, TINEIT Balance Scale, 10-m walk test, Barthel Index, and Quality of Life Scale, in both groups. Safety issues/adverse reactions were noted.

**RESULTS:** The mean scores and baseline and after therapy, in each setting, on the scales used, were compared with the paired t-test. On the Motor Assessment Scale, a statistically significant improvement was determined (p < 0.05). When evaluating the patients’ performance, using the Barthel Index, and balance on the TINEIT scale, improvements were statistically significant, too (p < 0.05). At the end of the treatment, we also observed an improvement in the walking speed (p < 0.05). Quality of life showed statistically significant improvements (p < 0.05), in both groups. So natural therapeutic agents: carbonated mineral waters and moxettes, together with...
IMPROVED CONTROL OF TRUNK/LOWER LIMB HYPERTONIA AND HYPERREFLEXIA AFTER REPOSITIONING OF INTRATHECAL BACLOFEN (ITB) INFUSION CATHETER FROM VERTEBRAL T3 TO T12 LOCATION: A CASE REPORT

Nicholas P Gut, MD, Stuart Yablon, MD, Robert Ball, MD, and Dobrivoje Stokic, MD

CASE DIAGNOSIS: Uncontrolled upper and lower limb spastic hypertonia and hyperreflexia 6 months after traumatic C3 AIS-C spinal cord injury (SCI) despite 1,462mcg/day simple continuous ITB infusion with the catheter tip at T3.

CASE DESCRIPTION: An ITB bolus test dose (75mcg) was administered 3 months postinjury for moderate extensor spasms and hypertonia (median modified Ashworth score [MAS] 2), which decreased to 1 at 4hr post-injection. Two weeks later, an ITB infusion system was implanted with the catheter tip at T3. Minimal change followed titration to 700mcg/day over the next 12 weeks. Catheter Access Port contrast fluoroscopy and Indium-111 reservoir infusion scintigraphy showed no catheter malfunction. Titration to 1,462mcg/day (2000mcg/mL; simple continuous mode) yielded no further clinical benefit. Sedation and hallucinations precluded further dose increases. Median MAS increased to 3. Bilateral soleus H/M ratios, typically absent at doses >2000mcg/day, measured approximately 50%. The catheter was replaced and the tip was repositioned to T12. Postoperatively, hyperreflexia was reduced at 150mcg/day. Repeat H/M ratios were approximately 30% bilaterally, with median MAS 3. Resting tone control is improving during dose titration, currently underway.

DISCUSSIONS: Imaging-based troubleshooting results and cognitive adverse effects at high doses suggest integrity in the initial infusion system. Rostral catheter placement afforded no improvement in upper, trunk, or lower limb hypertonia, suggesting compromised ITB diffusion to segments influencing spasticity. After lower thoracic repositioning, hyperreflexia was markedly improved, as documented by decreased H/M ratio, even with a lower dose of 150mg/day. Hypertonia is also improving, but requires dosage higher than that needed for treatment of hyperreflexia.

CONCLUSIONS: Rostral positioning of the catheter tip may not provide added upper limb response and may compromise diffusion to thoracolumbar spinal cord segments. Adjunctive H/M ratio measurement can provide objective evidence of ITB diffusion to these segments. Further study is warranted regarding factors important in ITB diffusion and associated clinical response.

IMPROVING RESIDENT WELLNESS THROUGH AN INNOVATIVE SELF CARE CURRICULUM

Tae Chan Paul Yang, MD, Thaddeus Wilson, MD, Davin Chu, MD, and Mary Kim, MD

OBJECTIVES: Physician wellness and more specifically burnout has recently been a topic of major concern within the medical community due to its effect on patient care and job performance. Nearly half of all practicing physicians in the US report experiencing burnout at some point in their career, with higher levels of burnout reported by physicians in training. Although current literature supports the view that reducing burnout requires changes at the organizational level, there is no consensus on how to effectively implement these interventions. To address this issue, a residency wellness task force was formed at a university based PM&R residency program with the goal to develop an intervention to support resident wellness and reduce burnout.

DESIGN: A task force was Designated and a literature review on resident wellness within graduate medical training was performed. An interactive session for faculty and residents was held to review the Results from the literature search and discuss their applicability to the residency program. From this session, the intervention of an innovative weekly self-care series was selected addressing aspects of self-care including, but not limited to “Spiritual wellness,” “Tai Chi practice,” and “Mindfulness practice.”

RESULTS: University based PM&R residents were surveyed using the Maslach Burnout Inventory (MBI) as well as measures from local GME and ACGME surveys. The interventions were associated with improvement in all three domains of the MBI post-intervention: Burnout, Depersonalization, and Personal Achievement. The greatest improvement was seen in the Burnout domain with a nearly 50% decrease in burnout symptoms experienced at least once a week. Modest improvements were seen from the local GME and ACGME surveys quantifying symptoms of burnout.

CONCLUSIONS: An individualized resident physician driven wellness curriculum, in the form of a weekly interactive self-care series covering relevant self-care topics, was shown to decrease overall resident physician burnout.

INCIDENCE OF STROKE AMONG SAUDI POPULATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

Bader Alqalbani, PhD, and Ageel Alenazi, PhD

OBJECTIVES: Stroke is a leading cause of death and disability worldwide. However, our knowledge of the incidence of stroke for Saudi Arabian population is limited. Thus, we aimed to determine the pooled annual incidence of stroke among stroke survivors in Saudi Arabia.

DESIGN: This is a systematic review. We conducted a comprehensive literature search of PubMed, Web of Science, and SCOPUS, without language or publication year limits. Outcomes of interest were stroke incidence rate and cumulative stroke incidence.

RESULTS: A total of seven studies met the inclusion criteria for this review. The pooled annual incidence of stroke among all stroke patients in Saudi Arabia was 0.029%, (95% CI: 0.018 to 0.042), which is equivalent of 29 strokes per 100,000 people annually, (95% CI: 18 to 42). After restricting the meta-analysis to the four observational studies examining the incidence of stroke in adults suffering a stroke for the first time, the pooled annual incidence of stroke was 0.032%, (95% CI: 0.015 to 0.055) which is equivalent of 32 strokes per 100,000 people annually, (95% CI: 15 to 55).

CONCLUSIONS: The findings indicate that there are 29 stroke cases for every 100,000 people annually for individuals residing Saudi Arabia. Establishing a nationwide stroke registry is warranted for monitoring and improving healthcare services provided to stroke survivors.

INCIDENCE, CHARACTERISTICS AND OUTCOMES OF ACUTE CARE UNIT READMISSIONS DURING INPATIENT TRAUMATIC BRAIN INJURY REHABILITATION IN SINGAPORE

Poo Lee Ong, MRCP (UK), MMED(INT MED), Zhi-Yan Valerie Ng, MBBS, MRCP(UK), Choo Jen Lim, MSC, and Karen Chin Sui Geok, MBBS, MRCP (UK), FAMS, FRCP (EDIN)

OBJECTIVES: To determine the incidence, characteristics and rehabilitation outcomes associated with Acute Care Unit Readmissions (ACUR) during inpatient traumatic brain injury (TBI) rehabilitation.

DESIGN: Study design was a retrospective review of electronic medical records from single brain injury rehabilitation unit over 3 years from 1st Jan 2012 to 31st Dec 2014 for all patients admitted to a tertiary rehabilitation center. Inclusion criteria were aged TBI >18 years old, with onset of TBI < 6 months. Exclusion criteria included patients who had ACUR for elective reasons. Patient with ACUR were characterized into types of complications (neurological and medical reasons) that led to ACUR. Main outcome measure included Glasgow Outcome Scale (GOS), Functional Independence Measure (FIM), discharge location and rehabilitation length of stay (LOS).

RESULTS: A total of 131 medical records were screened, 121 records met eligibility criteria. 17 patients (14%) experienced at least 1 ACUR episode at median time of 13 days since admission to rehabilitation center. The most common reason for ACUR was neurologic in nature (n=13, 76.47%), while medical reasons accounted for 4 (23.53%). TBI patients who do not require ACUR has higher admission FIM score (mean:65.36, SD:21.06, p=0.026) and GOS score (GOS 4 & 5: 81.90%, p=0.026). Patients who experienced ACUR achieved poorer clinical outcomes as indicated by lower discharge FIM scores (mean: 65.75 SD:31.39, p=0.023) compared to non-ACUR patients (mean: 54.85 SD:21.14 p=0.023). ACUR patients also had longer rehabilitation LOS (median: 55 days (34.50-87.50) compared to non-ACUR counterparts, [median: 28 days (16.25-40.00), p=0.002]. There was no significant difference for
FIM gains between ACUR patients (mean 15.24 SD 23.59) and non-ACUR (mean 21.99 SD 14.90, p = 0.117).

CONCLUSIONS: This study showed there was a significant worsening of functional outcomes for patients with TBI that required ACUR but upon returning to rehabilitation, similar gains were made. Early intervention and precaution should be taken on high risk patients that likely to ACUR to prevent poor outcome.

INCOMPLETE CRURAL PARAPLEGIA FOR HISTOPLASMA: CASE REPORT
Flavio Henrique N. dos Santos, Paula M. Lucas, Amanda Oliva Spaziani, Talita Costa Barbosa, Raisa Silva Frota, and Barbara Mayume de Sousa

CASE DESCRIPTION: Male patient, 42 years old, alcoholic, non-immunodefficient. Agricultural worker having contact with bats. Two years ago she started developing low back pain associated with paraparesis. Three years ago, he was diagnosed with paraplegia due to spinal and cerebral histoplasmosis confirmed by cerebrospinal fluid analysis. He was hospitalized for 10 days post anesthesia care unit. On exam, patient demonstrated right gaze preference and then referred for rehabilitation. Used fluconazole, omeprazole, nortriptyline in wheelchair, without sphincter control, in treatment with physiotherapy, speech therapy, orthopedics and physical conditioning. Evolved with better balance and trunk, muscle strength in order to achieve therapeutic transfer of parallel bars orthostatism. Independent for the activities of daily living and starting the training of walkers.

DISCUSSIONS: Classical histoplasmosis, also known as Darling's disease, H. capsulatum has a predilection for the respiratory and immune systems and may present with acute, chronic and disseminated, and may affect other organs or even the central nervous system. The complications make diagnosis difficult and, therefore, demonstrate the need for the use of personal protective equipment, avoiding the contamination of the disease. A patient of productive age, without acquired immunodeficiency, presented atypical spinal cord injury, but, with the correct diagnosis, adequate clinical treatment and rehabilitation bring improvement in quality of life, recovering its physical functionality.

INCREASED LEFT LOWER EXTREMITY TONE 48 HOURS AFTER RIGHT MIDDLE CEREBRAL ARTERY AIR EMBOLI INFARCT FOLLOWING ESOPHAGOGASTRODUODENOSCOPY WITH DILATATION AND BOTULINUM TOXIN A INJECTIONS FOR TREATMENT OF ACACHALASIA: A CASE REPORT
Julio C. Gomez, DO, Richa Lamba, MD, and Todd A. Feathers, DO

CASE DIAGNOSIS: 89 year-old, right hand dominant, previously fully independent female with new right middle cerebral artery (MCA) air emboli infarct after esophagogastroduodenoscopy (EGD) with significant left lower limb tone within 48 hours of infarct.

CASE DESCRIPTION: 89 year-old, right hand dominant, previously fully independent, female with past medical history of hypertension, monoclonal gammapathy of undetermined significance underwent EGD with dilatation and botulinum toxin A injections for treatment of achalasia. She became bradycardic and hypotensive in the post anesthesia care unit. On exam, patient demonstrated right gaze preference and left hemiparesis consistent with 4/5 strength in the left upper limb and 1/5 in the left lower limb. CTH showed multiple foci of peripheral gas in the right MCA distribution for air emboli. Patient received IPA and urgent hyperbaric treatment prior to ICU admission. MRI confirmed multifocal acute ischemic infarcts in the right MCA distribution, notably impacting the cortex with relative sparing of the white matter. She developed increased left lower limb tone consistent with a Modified Ashworth Scale. Treatment was initiated to acute inpatient rehabilitation requiring maximal assistance with activities of daily living.

DISCUSSIONS: There are approximately 20 cases to our knowledge of cerebral air emboli following esophagogastroduodenoscopy. This is the first following EGD with botulinum toxin injections for achalasia. Despite worsening left-sided hemiparesis and persistent left lower limb tone, the patient improved her level of function and independence in activities of daily living after completing an intensive, 4 week, inpatient neurorehabilitation program.

CONCLUSIONS: This case represents unusual etiology for a right middle cerebral artery air emboli infarct following EGD with botulinum toxin A injection associated with acute left lower limb tone 48 hours post-stroke. Acute inpatient rehabilitation improved physical function and independence.

INDIVIDUALIZED ONABOTULINUMTOXINA TREATMENT FOR SPASTICITY IN MULTIPLE SCLEROSIS RESULTED IN HIGH PATIENT AND CLINICIAN SATISFACTION: THE ASPIRE STUDY
Daniel S. Bandari, MD, Angeli Mayadev, MD, Mohamed Sakel, MD, Alberto Esquerenzi, MD, Joan Largent, PhD, Alekszej Zuzek, PhD, and Gerard E. Francisco, MD

OBJECTIVES: Examine onabotulinumtoxinA utilization and effectiveness to treat spasticity in multiple sclerosis (MS) patients.

DESIGN: Multicenter, international, prospective, observational registry (NCT01930786), examining adult patients with spasticity across multiple etiologies treated with onabotulinumtoxinA at their clinician’s discretion. Assessments: utilization (each visit) and clinician (next visit)/patient (5±1 weeks post-treatment) satisfaction.

RESULTS: Patients (N=730) were on average 54y, 52% female, 63% continuing botulinum toxin treatment for 10±6 sessions (411, 56%), MS (n=119; 16%). In MS patients, the most common upper limb presentation was flexed elbow (18%); onabotulinumtoxinA doses were 25-550U. Muscles injected: biceps brachii (100%), brachioradialis (54%), brachialis (46%), other (4%); anatomical localization (60%) was most frequently utilized. Most common lower limb presentation was equinovarus foot (61%); onabotulinumtoxinA doses were 15-875U. Muscles injected: gastrocnemius (79%), soleus (73%), tibialis posterior (46%), flexor digitorum longus (45%), other (11%). OnabotulinumtoxinA helped patient’s ability to participate in therapy/exercise; 92% patients and 898% clinicians would definitely/probably continue treatment. Overall (N=730), ≥76% patients and 91% clinicians reported extreme satisfaction/satisfaction that onabotulinumtoxinA helped patient’s ability to participate in therapy/exercise; 92% patients and 898% clinicians would definitely/probably continue treatment. Overall (N=730), 261 patients reported 831 adverse events (AEs); 23 treatment-related. 94 patients reported 195 serious AEs; 3 treatment-related. No new safety signals were identified.

CONCLUSIONS: ASPIRE captured the individualized nature of onabotulinumtoxinA utilization for spasticity in MS patients, while consistently demonstrating high satisfaction among patients and clinicians, the majority indicating that onabotulinumtoxinA helped patients participate in therapy/exercise. These results add to the body of evidence on the safety and effectiveness of onabotulinumtoxinA for spasticity.
INFLUENCES OF DIFFERENT PARAMETER SETTINGS OF THE LOWER BODY POSITIVE PRESSURE TREADMILL TRAINING MODULE ON IMMEDIATE HEART RATE AND BLOOD PRESSURE IN PATIENTS AFTER STROKE: A COHORT STUDY

Junjie Liang, MMED, Yuxin Zheng, BS, Peixi Lian, BS, Shujian Lang, MMBS, Hongxin Chen, MD, Wanting Mo, BS, Haining Ou, PhD, and Qiang Lin, PhD

OBJECTIVES: Safe and effective gait training pose a challenge for stroke patients. Lower body positive pressure (LBPP) treadmill training could lead to weight reduction and has the potential advantage of allowing people to achieve walking as exercise with relatively low heart rate, blood pressure, and oxygen consumption. These parameters could be beneficial to stroke patients, especially elderly stroke patients with comorbid hypertension. However, relevant research concerning the exact effects on this training have rarely been found.

DESIGN: We analyzed 40 consecutive stroke inpatients from 2018 to 2019 for gait exercise treatment using the LBPP treadmill. The primary immediate values of the blood pressure and heart rate (HR) before and after each LBPP training session were documented and analyzed.

RESULTS: Of the 40 stroke patients, 29 patients suffered from hypertension. 888 valid LBPP training sessions out of 1195 sessions, in which the top five body-weight settings of 70%, 65%, 60%, 80%, and 75% BW, were documented, and the top five speed settings for training were 1.2, 1.0, 1.4, 1.5, and 0.8 mph, respectively. The primary outcomes showed no significant differences in immediate systolic blood pressure (SBP) before and after each LBPP training session versus significant differences in immediate diastolic blood pressure (DBP) or HR. However, the mean differences were 7 mmHg and 4 HR, which were still in the safety range. Furthermore, the speed was divided into three grades: low speed, <0.9 mph; intermediate speed, 0.9 mph < Speed<1.8 mph; and fast speed >1.8 mph. There were no significant differences in SBP among the three speed grades, but significant differences in HR were noted.

CONCLUSIONS: The key finding of this analysis indicated that the LBPP treadmill could provide stroke patients could be safe the circulatory system using the LBPP treadmill during gait training.

INPATIENT REHABILITATION COURSE OF LARSEN SYNDROME PATIENT POST CAROTID PARAGANGLIOMA RESECTION WITH POST-SURGICAL CVA: A CASE REPORT

Rohit Nalamasu, DO, and Adam Kafka, MD

CASE DIAGNOSIS: Larsen Syndrome is a genetic disorder with variable presentation that affects development of bones throughout the body, presenting with clubfoot and multiple dislocations of hips, knees, and elbows. It can also present with hearing abnormalities, congenital cardiac septal defects, and acquired abnormalities of aorta and mitral valve. Patients present with hypermobility and short stature along with moderate to severe spine curvature with potential respiratory or cardiovascular compromise as a result. It can be a cause of possible spinal cord compression secondary to non-traumatic cervical displacements.

CASE DESCRIPTION: We present a case of a 22 year old female patient who underwent resection of left carotid paraganglioma with resulting cranial Nerve X and XII sacrifice. She had sudden left gaze palsy with right-sided hemiparesis with imaging showing left M2 occlusion. She had a complicated inpatient rehabilitation stay including bilateral Pseudomonas-aeruginosa healthcare-acquired pneumonia, urinary tract infections, swallowing, speech, and sleep concerns.

DISCUSSIONS: The rehabilitation course of this complicated patient is important for the future care of other patients with similar ailments. While multiple studies have discussed malignant hypothermia and spinal cord compromise in Larsen syndrome, no studies have shown a concomitant Larsen syndrome patient with CVA or paraganglioma.

CONCLUSIONS: This rare case may provide early insight into correlations between Larsen’s and post-surgical CVA or carotid paragangliomas, as well as aid in the rehabilitation course of similarly complex CVA patients.

INTEGRATING SUICIDE PREVENTION IN A SPINAL CORD INJURY PRACTICE

Sunil Sabharwal, MD

OBJECTIVES: Suicide is more common in people with spinal cord injury (SCI) than in the general population, but literature on suicide prevention initiatives in SCI practice is lacking. This report summarizes experiences and lessons learned from systematic efforts for suicide prevention at a Veterans Affairs (VA) SCI Center over a one-year period.

DESIGN: We implemented systematic screening for suicidal ideation during SCI annual evaluations, using item 9 of PHQ-9, followed by the Columbia Suicide Severity Rating Scale (C-SSRS) for positive responses. All SCI staff, regardless of profession, were educated about warning signs of suicide. We optimized existing practices for conditions that increase suicide risk (e.g., depression, substance use disorders, chronic pain). We increased awareness of crisis lines and services (e.g., the National Suicide Prevention Lifeline number) by posting in the SCI clinical areas and providing the information on wallet cards and bracelets. Given that firearms are a common means of suicidal deaths, we placed gunlocks in easily accessible clinical areas.

RESULTS: Screening for suicidal ideation during routine annual evaluation was well received in a conversational style. Admissions accepted nebulous responses to the PHQ-9 question. Staff identified need to standardize follow-up actions based on severity and temporality of suicide risk (such as criteria for formal safety plans or involuntary hospitalization). Linking staff education to known suicide prevention initiatives in SCI may provide practical guidance to other programs for implementing similar initiatives.

INTERSIDE LATENCY DIFFERENCES IN SOMATOSENSORY EVOKED POTENTIALS OF GREATER OCCIPITAL AND GREAT AURICULAR NERVES

Jorge E. Gutierrez, MD, MSC

OBJECTIVES: Impairment of the Greater Occipital Nerve (GON) or the Great Auricular Nerve (GAN) can occur after C2-C3 injuries or nerve entrapments, causing pain and sensory loss. Somatosensory evoked potentials (SSEP) may be used to document neurophysiological injury of these nerves. Limits of the interside latency differences may be the most valuable parameter when interpreting asymmetric SSEP recordings of sensory nerves. The aim was to analyze the normal upper limits of interside latency differences of SSEP from the GON and the GAN in normal subjects.

DESIGN: We prospectively studied 85 healthy subjects aged 16 to 87 years (mean age 46.1 ± 14.7, 41 females, 44 males). Cortical SSEP waveforms derived from the C5/C6 - Fpz montages were obtained by electrical stimulation. Stimulating electrodes were placed (1) 2.6 cm laterally from the midline at the superior nuchal line (GON-SSEP); (2) 6 cm caudal to the bony external acoustic meatus along the postero-lateral border of the sternocleidomastoid muscle (GAN-SSEP). We analyzed the latencies of P1 waves and the amplitudes of P1 for GON and GAN SEP bilaterally. The interside differences for these parameters were calculated and analyzed.

RESULTS: We obtained reproducible evoked responses of both nerves in all subjects. We found an upper limit for the interside latency differences of 2.0 ms for GON, and 1.9 ms for GAN. No effects of age, sex, or height were noted in the determination of the upper limits. The ratio of the smaller amplitude to the bigger amplitude was less than 50% was present in up to 37% of the SSEP recordings.

CONCLUSIONS: Reproducible SSEPs of the GON and the GAN can be obtained in healthy adults with little side-to-side difference. The presented reference values of interside differences of SSEP latencies enable a comparison with patient data in cases of suspected occipital or great auricular neuropathies.

INTRADURAL EXTRAMEDULLARY MYXOPAPILLARY EPENDYMOMA PRESENTING AS RECURRENT LOW BACK PAIN: A CASE REPORT

Eric Liu, DO, Tomas W. Salazar, MD, Beverly Hon, MD, and Sara Cuccurullo, MD

CASE DIAGNOSIS: Intradural extramedullary myxopapillary ependymoma.

CASE DESCRIPTION: This patient is a 45-year-old male with a past medical history significant for chronic back pain who initially presented to his chiropractor for worsening back pain. He denied any neurological changes in sensation, strength, bowel or bladder function. Due to persistent pain, an outpatient MRI was ordered which showed a large intradural extramedullary enhancing mass at L1-L2 along with severe canal stenosis. The patient was referred to neurosurgery for further evaluation. Subsequently, he underwent a T12-L2 laminectomy and real style of the mass. Post-operative MRI showed mild clumping of cauda equina nerve roots due to arachnoidal and steroid taper was started. Pathology demonstrated a myxopapillary ependymoma WHO grade I. Patient was eventually discharged to acute inpatient rehabilitation.
Intraoperative treatment earlier intervention, which can ultimately lead to better outcomes. For chronic back pain, clinicians can arrive at a more expeditious diagnosis and institute earlier treatment, which can ultimately lead to better outcomes.

CONCLUSIONS: Nonspecific back pain can remain a challenge to health care providers who wish to avoid the overuse of unnecessary imaging as the majority of cases tend to be sclerotic or degenerative. Spinal cord tumors such as myxopapillary ependymomas, despite their rarity, can often present as nonspecific lower back pain making diagnosis difficult. By keeping spinal cord tumors on the differential list for chronic back pain, clinicians can arrive at a more expeditious diagnosis and institute earlier treatment, which can ultimately lead to better outcomes.

Intraoperative treatment earlier intervention, which can ultimately lead to better outcomes. For chronic back pain, clinicians can arrive at a more expeditious diagnosis and institute earlier treatment, which can ultimately lead to better outcomes. Intrathecal baclofen (ITB) to treat spasticity secondary to spinal cord injury (SCI) started in 1984. Since that time, ITB has also been used to treat spasticity secondary to stroke, cerebral palsy (CP), traumatic brain injury (TBI), and multiple sclerosis (MS). Despite over three decades of use, there have been no guidelines for clinicians for appropriate/stable dosing of ITB to manage spasticity.

CASE DESCRIPTION: This was a retrospective chart review of patients with an ITB pump from 1/1/08 to 8/19/15. Data collected included demographic information, medical diagnosis, all dosing adjustments, system malfunctions, and concurrent antispasmodic treatments. The stable dose was defined as no change in dose for a 6 month period.

RESULTS: There was no difference (P > 0.05, one-way ANOVA) between diagnosis in the initial or stable dose of ITB. In ascending order, initial doses of ITB (in mcg) were: MS, 61±24 (n=27); stroke, 96±50 (n=17); SCI, 125±69 (n=33); CP, 141±73 (n=24) and TBI, 142±103 (n=18). In patients who achieved a stable dose of ITB, the doses (in mcg) were: MS, 121±149 (n=17); stroke, 163±89 (n=3); TBI, 371±330 (n=8); SCI, 394±313 (n=14) and CP, 450±266 (n=16). The initial and stable doses of ITB were lower in ambulatory vs. non-ambulatory patients (initial dose: 85±36 mcg vs. 132±86 mcg, respectively, n=68, 51, p<0.001, t-test; stable dose: 141±115 mcg vs. 398±304 mcg, respectively, n=39,19, p<0.001, t-test). The initial and stable doses were also lower in paraplegic vs. quadriplegic patients (initial dose: 80±32 mcg vs. 134±88 mcg, respectively, n=32, 67, p=0.001, t-test; stable dose: 193±241 mcg vs. 377±297 mcg, respectively, n=16, 38, p=0.03, t-test).

CONCLUSIONS: When considering the stable dose of ITB to manage spasticity, one should consider ambulatory status and/or plegia type as opposed to underlying diagnosis.

Intrathecal baclofen pump use in management of paroxysmal sympathetic hyperactivity in the setting of NMDA encephalitis

Priyanka Shah, DO, and Stephen Hampton, MD

CASE DIAGNOSIS: NMDA encephalitis with paroxysmal sympathetic hyperactivity.

CASE DESCRIPTION: 47 year old female presented with subacute headaches and encephalopathy which progressed to a coma within a week of admission followed by status epilepticus. Diagnosed with NMDA encephalitis attributed to paraneoplastic syndrome from metastatic ovarian clear cell tumor. The patient underwent a total abdominal hysterectomy, bilateral salpingo-oophorectomy, and multiple rounds of chemotherapy with no neurologic improvement. Also found to have small round cell metastatic cancer, however, after ITBP placement, treatment included creating a nurse-driven protocol for bolus dosing the patient’s care significantly improved as nursing was able to manage her care easier, the patient was safer, vital signs were more stable than prior. Ultimately, patient is now deceased due to her cases tend to be sclerotic or degenerative. Spinal cord tumors such as myxopapillary ependymomas, despite their rarity, can often present as nonspecific lower back pain making diagnosis difficult. By keeping spinal cord tumors on the differential list for chronic back pain, clinicians can arrive at a more expeditious diagnosis and institute earlier treatment, which can ultimately lead to better outcomes.

INVESTIGATION OF BRAIN COMPUTER INTERFACE COMBINED WITH WRIST PASSIVE MOTION TRAINING IN CHRONIC STROKE PATIENTS

Rongrong Lu, Tianhao Gao, Yi Wu, DEAN, and Jie Li

CASE DIAGNOSIS: Rehabilitation improves motor impairment after stroke. In chronic stroke patients with severe upper limb impairment, impairment of wrist and hand often lasts and this remains as a difficult and important issue in rehabilitation. We designed this study to investigate the feasibility and effectiveness of motor imagery-based brain computer interface with wrist passive movement training in chronic stroke patients with wrist extension impairment.

CASE DESCRIPTION: This was a before-after study. Fifteen chronic stroke patients with a mean age of 47.6±14.66 were recruited from March 2017 to June 2018. A 12-Channel High-Resolution EEG Systems following 10-20 international system was used to record the EEG signals which can be analyzed to evaluate participants’ motor imagery ability. Motor imagery based BMI system with wrist passive range of motion training was used to train the stroke patients. Both range of motion of parietal wrist and Barthel index was assessed before and after the intervention. Participants were asked to complete a questionnaire when they completed the whole therapy.

CONCLUSIONS: Among 15 chronic stroke patients admitted in the study, 12 patients finished the whole therapy. 3 patients failed to pass the initial assessment. Totally 12 participants completed the whole sessions of the treatment. After therapy, their ability of control EEG was improved. And 12 participants regained the ability to actively extend the affected wrist. And 3 failed to actively extend their wrist. Those who regain the control of the parietal wrist accounted for 75%. The activity of daily life of all the participants did not change significantly before and after intervention.

DISCUSSIONS: In chronic stroke patients with wrist extension impairment, motor imagery-based brain computer interface with wrist passive movement training might be feasible and effective. This might be a promising therapy for those chronic stroke patients with severe upper limb impairment.

INTRANATHAL CHEMOTHERAPY: A RARE CAUSE OF SPINAL CORD TOXICITY IN A PEDIATRIC PATIENT

Laura Prince, MD, Abigail Ho, MD, Melissa Villegas, MD, and Sara Liegel, MD

CASE DIAGNOSIS: Thoracicolumbar spinal cord injury secondary to intrathecal methotrexate and cytarabine.

CASE DESCRIPTION: An 18 yo female with diffuse large B-cell lymphoma underwent treatment with multi-agent systemic chemotherapy and intrathecal methotrexate, cytarabine, and hydrocortisone. Two months after initiation of treatment, patient developed bilateral leg pain and mild difficulty ambulating followed by fluctuating bowel and bladder incontinence. MRI was negative for structural spinal cord abnormalities. During a subsequent admission for planned chemotherapy, patient developed profound bilateral leg weakness with sensation and proprioception deficits. Repeat MRI demonstrated non-enhancing T2 hyperintense lesions of the central and posterior tracts in the thoracolumbar cord. CSF showed elevated myelin basic protein. Chemotherapy was discontinued, and patient received leucovorin, vitamin B12, and dextromethorphan for neurorecovery. Patient achieved significant functional improvements and recovered ability to retain urine following inpatient rehabilitation. Repeat bone marrow biopsy demonstrated remission of lymphoma.

CONCLUSIONS: Intrathecal chemotherapy can result in a wide variety of neurological side effects ranging from asymptomatic arachnoiditis to severe leukoencephalopathy and myelopathy. The exact mechanism and incidence of spinal cord toxicity remains unknown, and symptoms may develop immediately following intrathecal administration or months later. Presentation frequently includes urinary dysfunction, enecorepsis, and predominantly motor versus sensory deficits. Intrathecal methotrexate and cytarabine are the most commonly implicated agents, and providers should maintain a high index of suspicion for patients receiving these agents intratheically. Limited, experimental treatments exist, though prognosis remains unclear with variable recovery. Patients may benefit from acute rehabilitation.
IN Volvement of Peripheral and Spinal FPR2/ALX Receptors in the Anti-Inflammatory Effect of Manual Therapy in an Animal Model of Postoperative Pain

Daniel Fernandes Martins, PhD, Lisandro Ceci, MSC, Afonso Salgado, PhD, Daiana Cristina Salm, MSC, Daniela Ludtke, MSC, Júlia Koerich, Graduate Student, Gustavo Mazzardo, Graduate Student, Kamilla Frech, Graduate Student, Rodolfo Parreira, MSC, Carlos Omura, MSC, Francisco J. Cidral Filho, PhD, and Leidiane Martins, PhD

OBJECTIVES: Several patients develop chronic pain after surgical procedures, but the underlying mechanisms of the transition from acute to chronic states aren't totally understood. Nowadays it's well established that acute inflammation is accompanied by an active resolution program with specialized pro-resolving mediators.

Methodology is a widely used therapeutic modality for pain management. In this study we investigated one of the underlying mechanisms of action. Objective: evaluate the involvement of peripheral and spinal FPR2/ALX receptors on the anti-hyperalgesic effect of ankle joint mobilization (AJM) in a mouse model of postoperative pain.

DESIGN: Male Swiss mice (25-35g) were subjected to plantar incision (PI). Mechanical hyperalgesia was evaluated with the von Frey test; paw edema was assessed with a micrometer; and paw temperature through thermography. Animals were treated with AJM (either slow or rapid manipulation) or BML-111 (a FPR2/ALX receptor agonist) for 5 consecutive days. Other animal groups were injected (intraplantar route) with vehicle or WR4 (a FPR2/ALX receptor antagonist) and treated with placebo AJM or AJM for 3 consecutive days.

RESULTS: BML-111 and slow AJM (aJAM) treatment, but not rapid AJM (rAJM), reduced mechanical hyperalgesia. BML-111 and sAJM treatments did not affect paw edema. sAJM increased paw temperature 24h after PI. BML-111 reduced paw temperature 48h and 72h after PI. WR4 i.pl. and i.t. pre-treatment prevented the anti-hyperalgesic effect of both BML-111 and AJM.

CONCLUSIONS: Slow AJM reduced hyperalgesia in a mouse model of postoperative pain. Results are mediated, at least in part, by peripheral and spinal FPR2/ALX receptors.

Ipsilateral Hemiballism Improves Following Treatment of Contralateral Spasticity with Chemodenervation

Daniel Moon, MD, MS, and Gerard Limerick, MD, PhD

CASE DIAGNOSIS: Hemibalismus, spasticity, dystonia.

CASE DESCRIPTION: 51-year-old right-handed male with recent infarcts to the left caudate, putamen, corona radiata, anterior temporal lobe and insular cortex presented with complaints of uncontrolled movements of his left arm and stiffness of his right hand, wrist, ankle and foot. On physical examination, he had increased tone in the right wrist flexors (Modified Ashworth 1+) and a stiff right ankle (Modified Ashworth 1+) and a stiff right ankle (Modified Ashworth 1+) and a stiff right ankle.

DISCUSSIONS: Basal ganglia dysfunction resulting in the appearance of sudden, involuntary flailing of the limb(s). Most cases are reportedly continuous. However this case is unusual as it was triggered by contralateral limb stretch, palpation or volitional movement. Antidopaminergic agents are typically used to treat hemiballism, but there was concern that these agents could cause worsening spasticity or dystonia on the contralateral side. Fortunately, a trigger was identified and successfully addressed with focal chemodenervation.

CONCLUSIONS: Ipsilateral hemiballism is extremely rare but has been reported in the literature to occur with contralateral hemplegia. There may also be co-existing spasticity and/or dystonia on the contralateral side due to upper motor neuron syndrome. Though mechanisms are unclear, the pathways responsible for spasticity, dystonia and hemiballism may be intertwined and a better understanding of this relationship may lead to improved treatment outcomes.

Is It Really Transverse Myelitis? A Perplexing Thoracic Myelopathy

Abhinav Mohan, MD, and Alan Novick, MD

CASE DIAGNOSIS: Thoracic Dural Arteriovenous Fistula.

CASE DESCRIPTION: A 68-year-old woman, previously independent, presented with acute-onset lower-extremity weakness. She was unable to walk. Contrast-enhanced T2 and T1 MRI showed central cord hyperintensity from T7-L1, with conus-cauda equina involvement. Laboratory studies including LP, aquaporin-4-IgG, and paraneoplastic/rheumatologic/infectious panels were negative. She was diagnosed with longitudinal-extensive transverse myelitis. Her strength/gait improved with steroids and inpatient rehabilitation. However, she experienced frequent lower-extremity weakness “flares” with three subsequent acute-hospital readmissions, each time prompting steroids and/or plasmapheresis plus inpatient rehabilitation. Her disease course also included varying signal level (highest was T4), lower-extremity hypoesthesia, neurogenic bladder, and recurrent UTIs. Physical exertion was noted to transiently exacerbate her weakness. Repeat contrast-enhanced T2 and T1 MRI showed small, previously-unseen serpentine flow-voids posterior to the cord at T9-T12; angiogram confirmed dural arteriovenous fistula. L1-L3 laminectomy and surgical clipping was performed, followed by inpatient rehabilitation. She has since experienced significant improvement and has been an independent community ambulator with rollator for several weeks.

DISCUSSIONS: Spinal dural arteriovenous fistulas are abnormal connections between an artery and a vein in the subdural space. When blood from the high-pressure arterial system enters the low-pressure venous system, blood supply is compromised and venous congestion/swelling occurs, leading to potentially irreversible damage. Symptoms include weakness, numbness, paresthesia, pain, bowel/bladder incontinence, and even paraplegia; however, many are asymptomatic. MRI is frequently nondiagnostic, so strong clinical vigilance and access to spinal angiography is required. Radiographic embolization is first-line therapy, but in this case surgery was necessary due to microvascular collateral circulation. Once repaired, spinal cord blood flow improves but damage may not reverse.

CONCLUSIONS: Spinal arteriovenous fistulas should be suspected in any case of paraparesis of non-definitive etiology, especially when there is exertion-associated weakness. As early management portends a better prognosis, we hope that this case educates physicists on this clinical pathology and leads to improved patient care/outcomes.

Is the Anticipated U-Turn Different from the Unanticipated U-Turn in Post-Stroke Hemiplegic Patients?

Emma Jelili, Marylène Jousse, MD, Camille Leroux, Resident, Laurent Oudre, PhD, Rémy Barrois, PhD, Resident, and Alain Yelnik, MD

CASE DIAGNOSIS: Turning during ambulation is a common action. Balance control through trunk movement and correct body segments sequencing (temporal coordination) ensure a safe U-turn. However, it could be challenging after stroke. We previously described U-turn strategies in post-stroke patients (Barrois RP, et al. Observational Study of 180 turning Strategies Using Inertial Measurement Units and Fall Risk in Poststroke Hemiparetic Patients. Front Neurol. 2017), regarding to the side chosen to turn (healthy or paretic) and the first step used to turn (healthy or paretic). But U-turns were anticipated, while in daily life, we hypothesize that the most dangerous situation is when U-turns are unanticipated. We designed this study to investigate the differences between anticipated and unanticipated U-turns.

CASE DESCRIPTION: Thirty chronic stroke patients walked at a self-selected speed and were instructed to make U-turn after ten-meter walk, with four inertial measurement units on the head, trunk, and feet. They did three unanticipated and three anticipated U-turns. The turning duration, body segments sequencing and energy expenditure by the root mean square of accelerations at the trunk (RMSSa) were analyzed.

DISCUSSIONS: Turning duration of unanticipated U-turns was the shortest (2.28 (0.84) vs. 2.58 (0.90) seconds) (p=0.01). Body segments Sequencing was different in anticipated and unanticipated U-turns (p<0.01). When the U-turn is unanticipated, patients tend to turn simultaneously their heads and trunks, or to turn their trunks before their heads, unlike in the anticipated U-turns, where the heads lead to move before the rest of the body. There was no correlation between RMSSa with turning strategies, nor with body segments sequencing.

CONCLUSIONS: Unanticipated U-turns differ from anticipated ones in duration and body segments sequencing. These findings suggest an altered temporal coordination of gaze and posture during unanticipated U-turns, which may lead to an increase falling risk after stroke.

Isolated Trapezius Weakness After Resection of Lipoma

Arlene Edmond, MD, Jason Bitterman, MD, Rex Ma, MD, and Gautam Malhotra, MD
CASE DIAGNOSIS: Spinal accessory nerve (SAN) injury after lipoma resection presenting as shoulder pain.

CASE DESCRIPTION: A 55-year-old male presented with left shoulder pain and difficulty with upper body dressing two months after ipsilateral posteroskeletal neck lipoma resection. Exam revealed left lateral displacement of scalpa, downwardly rotated scapula with abduction, and trapezius weakness. Nerve conduction testing revealed severely diminished compound muscle action potential amplitude from the trapezius when compared to the right. Electromyography revealed denervation potentials and polyphasic motor unit action potentials in the left trapezius with normal findings in the sternocleidomastoid (SCM). Magnetic resonance imaging revealed normal neuroforaminae and intact proximal left SAN. However, the distal nerve could not be visualized. Therapeutic exercises were prescribed focusing on scapular retraction, and normalizing scapula upward rotation during shoulder abduction. The patient’s range of motion and strength improved.

DISCUSSIONS: The ubiquity of shoulder pain necessitates familiarity with its diverse differential including peripheral nerve injury. This case illustrates the need for physiatrists to consider the SAN particularly with isolated trapezius weakness after ipsilateral neck surgery. The SAN exits the jugular foramen into the posterior triangle of the neck, crossing anterior to the jugular vein to innervate the SCM and trapezius. The trapezius contributes to scapular retraction and upward rotation. Thus, injury can lead to significant disability. Surgical repair is challenging and introduces risk. Therefore, it is crucial to meticulously identify deficits to be addressed with physical therapy and bracing to optimize scapulohoracic stability.

CONCLUSIONS: SAN injury, given its superficial course, can be a complication of neck surgeries. While not well described in physiatric literature, it is important for physiatrists to have a high index of suspicion for injury when evaluating shoulder dysfunction after a cervical procedure. NCS and EMG can play an important role in diagnosis of these lesions.

KERATINOCYTES ENDOTHELIN-B RECEPTORS INVOLVEMENT IN PERIPHERAL OPIOID ANALGESIA INDUCED BY LIGHT-EMITTING DIODE PHOTOBIO MODULATION IN MALE AND FEMALE MICE

Bruna Hoffmann de Oliveira, MSC. Rafaela Hardt da Silva, MSC, Verónica Vargas Horowicz, MSC, Daiana Cristina Salim, MSC, Afonso Salgado, PhD, Francisco J. Cidral Filho, PhD, Anna Paula Piovezan, PhD, and Adalberto Loyola-Sanchez, PhD

OBJECTIVES: Currently LEDT is gaining space in the scientific and clinical environment. However, no study has investigated the biological effects caused by different irradiations, and the analgesic mechanism by which LEDT presents its effects remains unknown. Thus, the objective of this study was to evaluate the effect of two different LEDT irradiances (3.5 and 90 mW/cm2) – given a 630nm wavelength and a 2 J/cm2 dose – on mechanical hyperalgesia following Complete Freund’s Adjuvant (CFA) intraplantar (i.pl.) injection in mice. Additionally, the role of peripheral opioid and endothelin-B receptors (ETB-R), and the sex difference was investigated.

RESULTS: Different groups of male or female mice were evaluated 6 and 96 hours after CFA. Mechanical hyperalgesia was evaluated 30min after treatments. Naloxone or Bq-788 administration, fifteen minutes before LEDT or Sarafotoxin S6c, helped determine the involvement of peripheral opioid and ETB-Rs on LEDT effects. Lastly, ETB-Rs skin immunococon in both sexes was quantified after LEDT consecutive daily treatments.

DISCUSSIONS: More studies are needed to fully understand the mechanisms of LEDT efficacy. This study’s results encourage this line of research and the potential of LEDT in mouse models for studying opioid and ETB-R involvement.

KNEE REHABILITATION IN 3 PHASES: EFFECTS ON FUNCTIONALITY ACCORDING TO THE ICF

Pavel Loeza Magana, Master In Sport Sciences, and Adalberto Loyola-Sanchez, PhD

OBJECTIVES: To determine the effects of the three-phase post-surgical knee rehabilitation program (RPQs) on the functionality determined by the ICF; and verify if the core set of gonarthrosis is applicable in these patients.

RESULTS: Qualitative retrospective descriptive observational longitudinal, analytical. The records of 27 patients with gonarthrosis, 15 operated by arthroscopy, 12 with arthroplasty were reviewed. RPQs program lasted an average of 20 weeks. Participants completed phase 1 with analgesia, electrotherapy, cryotherapy, range of mobility, isotonic exercise and walking with a walker or cane; phase 2 with full-range mobility, isotonic strengthening, closed kinetic chain exercise, proprioception and balance; phase 3 was performed with isokinetic device (Con-Trex MJ) in flexion and extension concentric/concentricality, 16 sessions, 3 per week, with 2 sets of 10 repetitions at 60% and 180% with initial and final evaluation; in addition to gait training. The measurements were made according to the ICF: Sensation of falling (b2402), Pain in joints (b28016), Edema (b4158), Hyperthermia (b5501), Range of movement limitations (b7100), Joint instability (b7150), Hypoesthesia (b7202), Muscle Weakness (b7301), Difficulty walking (d450), Difficulty climbing stairs (d4551).

CONCLUSIONS: The analysis was carried out with the Cochran’s test, obtaining a reduction in all the variables and statistical significance, getting to obtain complete absence in edema, hyperthermia and sensation of instability, but maintaining the difficulty to climb stairs and the limitation of the ROM. The balance increased with almost complete improvement.

DISCUSSIONS: The RPQs is useful to improve the functionality of patients, and it is appropriate to describe these changes according to ICF, prioritizing the levels of action according to the functional and biological stage in which the person is. Phase 3 of RPQs with isokinetic strengthening is a safe and useful exercise affecting the functionality. The core set for gonarthrosis is not useful since it does not include certain applicable codes for this population.

L2 ARTERIOVENOUS FISTULA RUPTURE STATUS POST EPIDURAL SPINAL INJECTION

Mariyam Wasoy, DO, and Yu-Jen Lai, MD

CASE DIAGNOSIS: Type 1 L2 Dural AV fistula.

CASE DESCRIPTION: A 66 year old female with past medical history lumbar stenosis who underwent epidural spinal injection for back pain. One day after the epidural spinal injection, patient presented with acute onset of numbness, bilateral leg weakness and bilateral leg pain. MRI demonstrated normal signal in the thoracic and lumbar spine from T8 conus and flow voids. MRA revealed Type 1 L2 dural AV fistula untreated by embolization. Patient underwent L1-3 Laminectomy with dural A V fistula clipping.

Upon admission to acute rehabilitation, patient had mild weakness of the hip flexors and knee extensors. Patient also had decreased sensation to light touch below bilateral knees. Patient had a Foley catheter in place on admission. Patient recovered the ability to ambulate with a rolling walker, 150 feet independently. Upon removal of Foley catheter, patient was able to void. No bowel issues appreciated.

DISCUSSIONS: Spinal dural arteriovenous fistulas occur due to an abnormal connection between an artery and a vein, disrupting the normal circulation of the
spinal cord. The etiology is unclear. It usually affects males over age 50. Due to the increase in spinal cord venous pressure, there will be resulting spinal cord congestion, swelling and neurological malfunction. This will result in weakness, abnormal sensation and bowel/bladder issues. Treatment includes embolization or spinal surgery if embolization is not possible. Once the fistula is treated, patient outcomes are dependant on the severity of initial damage as well as the level and size of the injury.

CONCLUSIONS: This is an atypical case of a female patient with a spontaneous L2 arteriovenous fistula rupture after epidural spinal injection.

LA LA LUNGS: A FEASIBILITY STUDY ON SINGING THERAPY AS AN INTERVENTION FOR PULMONARY REHABILITATION AMONG SPINAL CORD INJURY PATIENTS IN MALAYSIA
Sara A. Easaw, MBBS, Julia Engkasan, PhD, Nazirah Hasnan, MBBS, MREHABMED, PhD, CIME, and Jin Hin Yag, Doctor of Musical Arts

OBJECTIVES: Respiratory impairment following spinal cord injury is a common occurrence, secondary to weakness of the respiratory and abdominal muscles. Singing as a therapeutic intervention for improving lung volumes has been studied in this population, although with limited local evidence. Here we conceptualized a hospital-based singing programme, aimed at patients with cervical and thoracic spinal cord injury. This is a feasibility study which aims to determine if such a programme may be successfully implemented in Malaysia.

DESIGN: 12 patients with cervical and thoracic spinal cord injuries were registered to participate in a 2-weekly singing class, conducted by an expert vocal trainer. Classes were held for a period of three months or 12 scheduled classes. We looked at class attendance as well as the progress of the participants in terms of pitch matching, phonation and exhalation length. This was followed by a one-to-one post intervention interview, to obtain feedback from participants.

RESULTS: The targeted attendance for a feasible result was set at 80% attendance of 80% of participants. Results showed that the average attendance was far below this target. The average attendance over the 3 month period was 16.67% which translated to only 1 out of 12 classes. The reasons for this dismal outcome were identified as work commitments and transportation difficulties. Participants who did attend classes demonstrated overall improvement in their secondary outcome measures. Recommendations that were suggested for improving this programme included short intensive music camps, online singing programmes and provision of transport services.

CONCLUSIONS: In conclusion, this singing programme was unable to meet the desired targets and hence is deemed non-feasible. However, further studies should be conducted to implement the enlisted recommendations. This may create a more feasible outcome, thus providing great benefits to our patients in terms of pulmonary health, quality of life and general wellbeing.

LABOR MARKET PARTICIPATION OF PEOPLE WITH SPINAL CORD INJURY IN GERMANY – RESULTS OF THE GERMAN SPINAL CORD INJURY SURVEY
Andrea J. Bökel, MSC, Yorck B. Kalke, MBA, Christoph M. Gutenbrunner, PROF DR MED, and Christian Sturm, DR MED

OBJECTIVES: Multiple organizations like UN and WHO call for the collection of internationally comparable data on living and supply conditions of people with disabilities. Furthermore, reliable national data are necessary for ensuring appropriate care. Regarding patients with Spinal Cord Injury (SCI) in Germany, only data on diagnostics or therapeutic interventions is currently available. The International Spinal Cord Injury Survey aims at collecting reliable data of people with SCI in 21 countries and developing recommendations for actions to be taken by policy-makers and other decision-makers.

DESIGN: In 2017, eight specialized SCI-centers across Germany sent a standardized questionnaire to their patients who had diagnosis of SCI, and were older than 18 years (n=5,598). The questionnaire could be completed paper-based or online. RESULTS: 1,479 patients participated in the study and were included in data analysis. On average, participants were 55.3 years (SD=14.6) old, ¾ were male. Most ¾ of the participants, belonged to the working age population, of those 42.5 % (n=461) were employed. Although a well-trained and qualified population was found mainly in the rolandic operculum, insula and putamen, in the RHD group only. Conclusion: Damage to peri-Sylvian cortex and the projection fibers (posterior limb of internal capsule and corona radiate) carrying the cortico-spinal tract. There was no significant impact to damage in any of the atlas regions on walking capacity in this group. In the RHD group, HLL movement was affected mainly by damage to the insula, sensorimotor cortex, projection- and association fibers, basal ganglia, and a restricted effect of damage to other cortical structures. In this group lesion topography affected also the walking capacity, mainly by damage to the insula, projection- and association fibers and the putamen. Voxel where damage affected both HLL movement and walking capacity were found mainly in the rolandic operculum, insula and putamen, in the RHD group only.

CONCLUSIONS: Recovery by restitution and by compensation in the hemiparetic lower limb
Silvi Frenkel-Toledo, PhD, Shy Ofir, MD, and Nachum Soroker, MD

OBJECTIVES: Recovery of voluntary movement of the hemiparetic lower limb (HLL) and regaining walking ability are major goals in stroke rehabilitation, achieved by restitution and compensation processes. Here we aimed to assess the long-term impact of lesion topography on recovery of (1) HLL movement quality, largely representing restitution, and (2) walking capacity representing the combined effect of restitution and compensation strategies.

DESIGN: Walking was assessed in 58 chronic stroke patients at their homes (28 with left hemisphere damage (LHD) and 28 with right hemisphere damage (RHD), one year or more after stroke onset), by the 3-meter walk test. HLL movement was assessed by the Fugl-Meyer lower extremity (FMA-LE) test. Normalized lesion data were used for voxel-based lesion symptom mapping (VLSM) analyses of lesion impact on HLL movement and walking, separately for RHD and LHD groups.

RESULTS: In the LHD group, voluntary movement of the HLL was affected by damage to peri-Sylvian cortex and the projection fibers (posterior limb of internal capsule and corona radiate) carrying the cortico-spinal tract. There was no significant impact to damage in any of the atlas regions on walking capacity in this group. In the RHD group, HLL movement was affected mainly by damage to the insula, sensorimotor cortex, projection- and association fibers, basal ganglia, and a restricted effect of damage to other cortical structures. In this group lesion topography affected also the walking capacity, mainly by damage to the insula, projection- and association fibers and the putamen. Voxel where damage affected both HLL movement and walking capacity were found mainly in the rolandic operculum, insula and putamen, in the RHD group only.

CONCLUSIONS: Recovery by restitution and by compensation are affected differently by stroke lesion topography. VLSM points also to important differences in recovery mechanisms operating after damage to the dominant and non-dominant hemispheres.

LEVETIRACETAM INDUCED Rhabdomyolysis in an Acute Rehabilitation Patient: A Rare Case Report
Tomas W. Salazar, MD, Alexander G. Watson, MD/MBA, Richard J. Malone, DO, and Sara Cucucullo, MD

CONCLUSIONS: Results identified a well-educated population, but also a group of people willing and feeling subjectively able to work, but who do not participate in the labor market. Therefore, vocational rehabilitation and participation in labor market and inclusion for people with SCI should be significantly strengthened.

LANCE ADAMS SYNDROME AFTER ANOXIC BRAIN INJURY
Alexander Heek, MD, and Sheital Bavishi, DO

CASE DIAGNOSIS: Lance-Adams Syndrome.

CASE DESCRIPTION: A 30 year old male, with childhood history of seizure disorder off AED, admitted to inpatient rehabilitation hospital (IPR) after cardiac arrest secondary to an asthma exacerbation. Cardiopulmonary resuscitation performed in the field. After stabilization, patient developed upper extremity myoclonus. Started on propofol, switched to levetiracetam. EEG negative for epileptogenic focus. Movements improved with levetiracetam, however still interfered with ADLs and mobility. During admission, myoclonus improved with rest and relaxation, and worsened with stress. Clonazepam added and uptitrated, with improvement in control of myoclonus, ADLs, and mobility. This was evidenced by his FIM scores: improving from 1 (total assist) to 4 (minimal assistance) for eating, 1 to 5 (supervision) for grooming, and 2 (maximal assistance) to 5 for UE dressing by discharge.

DISCUSSIONS: Lance-Adams syndrome is a rare sequela of hypoxic brain injury, with less than 200 cases reported. Lance-Adams is described as post-hypoxic myoclonus. Often misdiagnosed as post-hypoxic seizures, Lance-Adams is distinguished as a persistent intentional myoclonus. Exacerbating factors include intention and external stimuli, with sleep and rest improving. Imaging and EEG can exclude alternatives, however there are no hallmark findings to rule in Lance-Adams. Treatment aims to reduce myoclonus. Levetiracetam, valproate, and clonazepam are most frequently used. Although these treatments have been shown to improve function, Lance-Adams syndrome can result in significant disability.

CONCLUSIONS: Lance-Adams syndrome is a rare but important sequela of hypoxic brain injury, the hallmark of which is action myoclonus. Given it's frequent misdiagnosis and potential for significant morbidity, it is an important syndrome for clinicians to be aware of. Rehabilitation considerations include not only medication management, but also educating patients about stress management, therapists on adaptations to assistive devices (ie weights on walkers), which can improve quality of life for patients with Lance-Adams Syndrome.

LESION IMPACT ON RECOVERY BY RESTITUTION VS. COMPENSATION IN THE HEMIPARETIC LOWER LIMB
Silvi Frenkel-Toledo, PhD, Shy Ofir, MD, and Nachum Soroker, MD

OBJECTIVES: Recovery of voluntary movement of the hemiparetic lower limb (HLL) and regaining walking ability are major goals in stroke rehabilitation, achieved by restitution and compensation processes. Here we aimed to assess the long-term impact of lesion topography on recovery of (1) HLL movement quality, largely representing restitution, and (2) walking capacity representing the combined effect of restitution and compensation strategies.

DESIGN: Walking was assessed in 58 chronic stroke patients at their homes (28 with left hemisphere damage (LHD) and 28 with right hemisphere damage (RHD), one year or more after stroke onset), by the 3-meter walk test. HLL movement was assessed by the Fugl-Meyer lower extremity (FMA-LE) test. Normalized lesion data were used for voxel-based lesion symptom mapping (VLSM) analyses of lesion impact on HLL movement and walking, separately for RHD and LHD groups.

RESULTS: In the LHD group, voluntary movement of the HLL was affected by damage to peri-Sylvian cortex and the projection fibers (posterior limb of internal capsule and corona radiate) carrying the cortico-spinal tract. There was no significant impact to damage in any of the atlas regions on walking capacity in this group. In the RHD group, HLL movement was affected mainly by damage to the insula, sensorimotor cortex, projection- and association fibers, basal ganglia, and a restricted effect of damage to other cortical structures. In this group lesion topography affected also the walking capacity, mainly by damage to the insula, projection- and association fibers and the putamen. Voxel where damage affected both HLL movement and walking capacity were found mainly in the rolandic operculum, insula and putamen, in the RHD group only.

CONCLUSIONS: Recovery by restitution and by compensation are affected differently by stroke lesion topography. VLSM points also to important differences in recovery mechanisms operating after damage to the dominant and non-dominant hemispheres.
CASE DIAGNOSIS: Levetiracetam induced rhabdomyolysis.

CASE DESCRIPTION: This 25-year-old male developed new-onset tonic-clonic seizures and was started on levetiracetam during admission to an acute care hospital. He was found to have a brain tumor and underwent a craniotomy and tumor resection, followed by discharge to acute rehabilitation facility. On day seventeen of levetiracetam treatment, nursing reported cola-colored urine. He was found to have asymptomatic transaminits with normal abdominal exam. Due to concern for acute liver failure from levetiracetam, seizure prevention was transitioned to pregabalin. Acute liver failure workup including ultrasound and blood testing was unrevealing. CKP was significantly elevated, while BUN and creatinine were normal, prompting a rhabdomyolysis diagnosis. At that time, he denied joint tenderness, worsening weakness, or myalgias, and strength testing was unchanged. He was started on IV fluids, and AST, ALT, and CPK trended downward slowly following levetiracetam taper. He remained seizure-free and made substantial gains while in acute rehabilitation, including significant motor recovery.

DISCUSSIONS: This is the first documented case to our knowledge of levetiracetam-induced rhabdomyolysis in an acute rehabilitation patient. Additionally, this case is the latest onset of rhabdomyolysis after initiation of levetiracetam, presenting on day seventeen of treatment. While other cases presented with muscle weakness or pain, his first sign was cola-colored urine. If the adverse medication effect had not been discovered, he would have been at risk for renal failure and death.

CONCLUSIONS: Rhabdomyolysis is a rare but significant adverse effect of levetiracetam, that can manifest weeks after initiation of the medication, including while undergoing acute rehabilitation. This can be a significant barrier to therapies due to the muscle weakness and pain it can cause and can be life-threatening. Therefore, all physiatrists must be aware of it as a debilitating side effect of the commonly used anti-epileptic drug.

LIMITED EVIDENCE OF PHYSICAL THERAPY ON BALANCE AFTERS TROKE: A SYSTEMATIC REVIEW AND META-ANALYSIS

Aurelien Hugues, PT, PhD STUDENT, Julie Di Marco, MD, MSC, Michel Cucherat, MD, PhD, Isabelle Bonan, MD, PhD, Francois Guayfier, MD, PhD, and Gilles Rode, MD, PhD

CASE DESCRIPTION: Stroke results in balance disorders and these directly affect autonomy and quality of life. The purpose of this systematic review and meta-analysis was to determine the efficacy of physical therapy (PT) on balance and postural control after stroke.

DISCUSSIONS: We included all randomized controlled trials assessing the efficacy of PT on balance and postural control in adult patients after stroke without language restriction. Medline, Embase/Scopus, Cochrane Central Register of Controlled Trials, PEDro, Pascal, and Francis databases were searched until January 2019. Primary outcomes were balance (Berg Balance scale and Postural Assessment Scale for Stroke) and postural control with postural deviation or stability measurement in sitting or standing static evaluation. A pair of independent reviewers selected studies for inclusion, extracted data, and assessed risk of bias. Meta-analyses with subgroups (categories of PT, time post-stroke, and lesion location) and meta-regression (duration of PT) were conducted.

RESULTS: A total of 145 studies (n=5912) were selected from the 13,123 records identified. For balance, evidence was found in favour of the efficacy of functional task-training alone (standardised mean difference 0.39, 95% CI 0.30 to 0.48, I²=52%) immediately after intervention; for postural stability eyes open, functional task-training and/or cardiopulmonary intervention (0.37, 95% CI 0.28 to 0.46, I²=52%) immediately after intervention, compared to PT alone (standardised mean difference 0.28, 95% CI 0.20 to 0.37, I²=63%) or associated with musculoskeletal intervention (0.09, 95% CI 0.00 to 0.18, I²=0%) immediately after intervention.

CONCLUSIONS: Functional task-training associated with musculoskeletal intervention and/or cardiopulmonary intervention and sensory interventions seem to be immediately effective in improving balance and postural stability, respectively. The heterogeneity of PT and the weak methodological quality of studies limited the interpretation and the confidence in findings.

LONGITUDINAL TRANSVERSE MYELITIS IN A PEDIATRIC PATIENT AFTER A VIRAL ILLNESS

Eduardo Maldonado-Colón, MD, Jose R. Vives, MD, and Edwardo Ramos, MD

CASE DIAGNOSIS: Longitudinal Transverse Myelitis.

CASE DESCRIPTION: A 10 year old girl with past medical history of vitiligo, who developed a viral syndrome secondary to influenza infection, treated with Oseltamivir, on December 2018. Three week later, patient developed headache, neck and back pain, and lower extremity weakness. Symptoms progressed to involve four extremities weakness and respiratory failure. Laboratory Results including rheumatologic work up, including cerebrospinal analysis, was essentially unremarkable; no oligoclonal bands identified. Neuroimaging revealed extensive cervical and thoracic myelitis with cord expansion, as well as focus of increased intensity within the medulla. Patient was diagnosed with Longitudinal Transverse Myelitis and treated with high dose steroids, intravenous immunoglobulins (IVIG), and plasmapheresis, as well as aggressive rehabilitation, with significant motor recovery. Additionally, this case presented with muscle weakness or pain, his first sign was cola-colored urine. If the adverse medication effect had not been discovered, he would have been at risk for renal failure and death. While other cases presented with muscle weakness or pain, his first sign was cola-colored urine. If the adverse medication effect had not been discovered, he would have been at risk for renal failure and death.

CONCLUSIONS: Initial evaluation in the Pediatric Intensive Care Unit was remarkable for tetraplegia with bulbar preservation. Initial MRI was remarkable for cervical and thoracic myelitis. Lumbar Puncture was remarkable for normal glucose, protein, and white blood cell levels. The IgG synthesis rate and index were normal, with no oligoclonal bands identified. In addition, inflammatory markers were normal and work-up for Herpes and Influenza were negative. Regardless, she was treated aggressively with steroids, IVIG, and plasmapheresis. Afterwards, she regained anti-gravity strength in left hemibody and improved strength in right hemibody. Upon admission to inpatient rehabilitation, continued progress was seen in functional outcomes although patient is yet unable to walk.

CONCLUSIONS: This case represents a rare presentation of Longitudinal Transverse Myelitis in children. In this particular case, the etiology was attributed to the influenza virus given the timing of presentation and negative work-up for rheumatologic and other infectious causes. Longitudinal Transverse Myelitis may be seen in children following a viral syndrome such as Influenza infection. Treatment with steroids, IVIGs, plasmapheresis, and high intensity rehabilitation seems to improve functional outcomes, although full recovery may be variable.

LONG-TERM SAFETY AND EFFICACY OF INCOBOTULINUMTOXINA FOR THE TREATMENT OF BLEPHAROSPASM IN BOTULINUM TOXIN-NAÏVE SUBJECTS: RESULTS OF A PHASE III STUDY

Fernando Pagan, MD

OBJECTIVES: Incobotulinumtoxina is efficacious for blepharospasm. Here we present complete data from the first, randomized, Phase III study (NCT01896895) in toxin-naïve subjects, where the safety and efficacy of incobotulinumtoxinaA for benign essential blepharospasm (BEB) in was assessed.

DESIGN: Subjects (18–80 years) with bilateral BEB, Jankovic Rating Scale (JRS) severity subscore ≥2, and no BEB treatment with any botulinum neurotoxin (BoNT) serum type within past 16 months, were enrolled. In the main period (MP), subjects were randomized (1:1:1) in a double-blind manner to single intramuscular injections of incobotulinumtoxinaA 25U (12.5U/eye), 50U (25U/eye) or placebo, with an observation period (OP) of 6–20 weeks. Subjects with a need for re-injection (JRS severity subscore ≥2 at final MP visit) were eligible for the open-label extension period (EP): a single dose of incobotulinumtoxinaA 70U (35U/eye) with a 6-week OP. Mean change from baseline in JRS severity subscore and safety were assessed.

RESULTS: Overall, 61 subjects were randomized (mean 55.0 years; 59.0% female), 55 completed the MP and 39 entered and completed the EP. At MP Week 6, JRS severity subscore significantly improved from baseline with incobotulinumtoxinaA 50U versus placebo (p=0.004), and numerically improved with incobotulinumtoxinaA 25U versus placebo. Sustained improvements were seen with incobotulinumtoxinaA 70U from baseline to EP Week 6 (1.2) and to EP final visit (1.0), and from MP baseline to EP final visit (−1.0) (all p<0.001). In the MP, more adverse events (AEs) were reported with incobotulinumtoxinaA 50U (42.1%) versus 25U (31.8%) or placebo (30.0%). AEs were less frequent in the EP (all incobotulinumtoxinaA-treated: 28.2%). Most AEs were of mild- to-moderate severity.

CONCLUSIONS: IncobotulinumtoxinaA showed sustained efficacy in toxin-naïve subjects with BEB. Long-term safety results were in line with the known safety profile.

LOSS OF TRANSGENDER IDENTITY FOLLOWING HUMAN HERPESVIRUS-6 ENCEPHALITIS

Derek J. Boyd, MD, and Christine L. Johnson, MD

CASE DIAGNOSIS: A transgender female (assigned male at birth), who no longer identifies as female following what was diagnosed as human herpesvirus 6 (HHV-6) encephalitis.

CASE DESCRIPTION: 26 year old transgender female initially presents with worsening headache. At that time, patient was living independently, identified by her female name for several years, and was living with her significant other. The
patient tested positive for influenza and was treated with Tamiflu. Shortly after her visit to her PCP, she started having seizures, eventually requiring sedation and intubation for status epilepticus. An MRI of the brain showed bitemporal edema. CSF was positive for Human Herpes Virus-6, and patient was treated with Ganciclovir, then to Foscarnet. On admission to post-acute facility, patient reported that he identifies by his male name and gender.

**DISCUSSIONS:** HHV-6A has not been linked to any disease process. HHV-6B is universal in human populations. HHV-6B has been linked to causing Roseola infantum and neurological disease in children (Ferlito Status Epilepticus). CSF positive for HHV-6 has been associated with encephalitis in adults, however, recent studies suggest encephalopathy is due to the sequelae of high fever, and not of the infection itself (ie: not encephalitis). The mechanism proposed for finding HHV-6 DNA in CSF is likely due to chromosomal integration, rather than encephalitis. Therefore, the diagnosis of HHV-6 encephalitis cannot rely solely on viral DNA levels in CSF. Prior to arrival to our post-acute brain injury inpatient neurorehabilitation program, accommodations were discussed to ensure safety and quality of care being delivered, including early discussion of gender identity, and making a double room into a private room.

**CONCLUSIONS:** Loss of transgender identity in a patient with status epilepticus, bitemporal edema on MRI, and CSF positive for HHV-6. Also how recommended accommodations for transgender patients can be implemented in an inpatient rehabilitation facility.

**LOST FOR WORDS: CARBIDOPA-LEVODOPA AS A THERAPEUTIC ADJUNCT FOR SPEECH APRAXIA**

Kelly M. Brander, DO, David L. Ripley, MD, MS, and Benjamin Ingraham, DO

**CASE DIAGNOSIS:** A 58-year-old male was admitted to an acute inpatient rehabilitation hospital with right sided hemiplegia, non-fluent aphasia, and speech apraxia due to a resected parietal lobe abscess.

**CASE DESCRIPTION:** Speech therapy evaluation demonstrated significant motor apraxia of speech with severe impairments in increasing word length and moderate difficulty articulating multisyllabic words. Due to the severe speech apraxia, carbidopa-levodopa 25-100mg 1 tab twice per day was started and up-titrated to four times per day dosing. He was not on another neurostimulants at the time of initiation.

**CASE DESCRIPTION:** As the patient’s baseline score on the Apraxia Battery for Adults (ABA) increasing word length subtest was 8, indicating severe impairment and ABA repeated trials subtest of 14, indicating moderate impairments. After 1 week of aggressive speech therapy with the initiation of carbidopa-levodopa, his increasing word length subscore improved to 4 and repeated trials subscore improved to 21, indicating mild impairment. As the patient’s carbidopa-levodopa was gradually increased and he continued in speech therapy, his increasing word length subscore further improved to 2 and repeated trials subscore improved to 20.

**DISCUSSIONS:** This case report demonstrates improvement in speech apraxia symptoms with a combination of intensive speech therapy and treatment with carbidopa-levodopa. This and one other case report, which has demonstrated successful treatment of speech apraxia with carbidopa-levodopa, support the need for continued study on the appropriate clinical indication and effective dose.

**CONCLUSIONS:** Carbidopa-levodopa is a potential pharmacological treatment for managing individuals with motor apraxia of speech in conjunction with intensive speech therapy.

**LUMBOSACRAL PAIN SECONDARY TO CHRONIC RECURRENT MULTIFOCAL OSTEOMYELITIS ALLEVIATED WITH L4-S3 LATERAL RADIOFREQUENCY ABLATION**

Jason A. Kaushik, MD

**CASE DIAGNOSIS:** Lumbosacral pain secondary to chronic recurrent multifocal osteomyelitis (CRMO) alleviated with L4-S3 lateral radiofrequency ablation (RFA)

**CASE DESCRIPTION:** A 24-year-old female with CRMO presented to pain clinic with chronic lumbosacral pain. Her disease process started in 2011 and presented with sudden-onset severe low back pain. Initial MRI was negative but repeat showed lesion (with inconclusive bone biopsy) on left sacrum. She was later diagnosed with sacroiliitis, and provided patient with 5-6 months of near-complete relief. Her pain worsened in 2013 and Imaging revealed similar lesion on right side of sacrum (which was not biopsied). She was followed by rheumatology starting in 2015 who trialed various biologics and oral steroids to no avail.

**CONCLUSIONS:** Lumbosacral pain secondary to CRMO is a rare autoinflammatory disorder that primarily affects children, characterized by insidious onset of bone pain with local swelling, often associated with fever, skin involvement, and arthritis. Its etiology is largely unknown and treatment mostly empirical. It is a diagnosis of exclusion with no specific diagnostic test. While it is generally self-limited, it can have a prolonged course resulting in significant morbidity.

**DISCUSSIONS:** CRMO is often accompanied by sacroiliitis that can cause chronic low back pain refractory to traditional anti-inflammatory or rheumatologic medications. Our patient endorsed a few hours of symptomatic relief in the past with sacroiliac joint injections and decision was made to proceed with bilateral L4-S3 medial branch blocks which provided >70% relief. She then underwent bilateral L4-S3 lateral RFA which has given almost complete resolution of her pain thus far. This is the first case report of sacroiliac pain due to CRMO successfully managed with RFA and clinicians should consider early referral to interventional pain in such circumstances.

**LUMBAR LATERAL RADIOFREQUENCY NEUROPATHY IN PATIENT WITH PREVIOUSLY UNCONTROLLED DM**

Andrew Bloomfield, MD, MPHIL, BSC

**CASE DIAGNOSIS:** Lumbosacral radiculoplexus neuropathy (LRPN) related to previously uncontrolled diabetes mellitus.

**CASE DESCRIPTION:** A 65 year old male with PMHx of DM II, hypercholesterolemia, hypertension, and morbid obesity presents with left hip instability, increased pain and multiple falls over two weeks. He was admitted due multiple falls and LLE weakness. Over the course of admission, EMG revealed LLE weakness secondary to LRPN. Neuropathy was attributed to diabetes that had been controlled for nearly two years.

**DISCUSSIONS:** LRPN originally described in diabetic patients is a condition characterized by debilitating pain, weakness and atrophy most commonly affecting the proximal thigh muscles asymmetrically. The etiology is usually monophasic and preceded by significant weight loss (Bhanushali et al, 2008). However, the exact cause of diabetic lumbosacral plexopathy is not known and the incidence of diabetic plexopathy in a controlled diabetic as well as the timing of symptoms in relation to weight loss is poorly described in the literature.

**CONCLUSIONS:** This patient had uncontrolled diabetes mellitus type II for decades before undergoing laparoscopic gastric bypass surgery. Pre-procedural HbA1c was steady around 9-10%. Postoperatively the patient never suffered from lower extremity nerve pain. After his bypass procedure the patient began eating a heart healthy diabetic diet, maintained an active lifestyle, and lost a significant amount of weight. Soon after the surgery the patient was weaned off of his daily insulin regimen and his HbA1c levels trended and stabilized into normal reference range. Nearly two years postoperatively the patient began experiencing left lower extremity nerve pain that was diagnosed with EMG as LRPN. We postulate that although the patient had controlled DM and normal HbA1c for two years, he began to acutely suffer a plexopathy related to his previous uncontrolled DM. This case report will aid in the understanding and timing of LRPN as it relates to patients with previously uncontrolled DM.

**MANAGEMENT AND MORBIDITY OF PAROXYSMAL SYMPTHETIC HYPERACTIVITY AND SEQUELAE IN YOUNG FEMALE WITH ANOXIC BRAIN INJURY**

Jeremy R. Benhamroun-Zbili, DO, Leora Boussi, BS, and Richard Doobay, MD

**CASE DIAGNOSIS:** Paroxysmal Sympathetic Hyperactivity.

**CASE DESCRIPTION:** PSIH is characterized by sympathetic and motor dysfunction affecting up to 10% of patients surviving acquired brain injury. Diagnosis and management of PSIH is discussed in literature, but not routinely integrated into practice guidelines. PSIH can be difficult to recognize and often goes undiagnosed, contributing to increased morbidity, LOS, and healthcare costs. We present the case of a 35-year-old female one-month post anoxic brain injury secondary to hypoxic respiratory failure. The patient subsequently developed PSIH, and we discuss approaches to management of her acute episodes. Patient was optimized medically and discharged to a skilled nursing facility on a palliative regimen.

**DISCUSSIONS:** Patient had a complicated course including ICU stay, aspiration, sepsis and multiple readmissions. Dexamethasone, propanolol, clonidine, levetiracetam, gabapentin, cyclobenzaprine, and baclofen, acetaminophen, ibuprofen, midazolam, fentanyl, morphine, labetalol, lorazepam and clonazepam were trialed. Pain control was notable, however patients were not able to tolerate oral medications. Our patient died secondary to presumed aspiration and failure to thrive one month following discharge.

**CONCLUSIONS:** Patient had a complicated course including ICU stay, aspiration, sepsis and multiple readmissions. Dexamethasone, propanolol, clonidine, levetiracetam, gabapentin, cyclobenzaprine, and baclofen, acetaminophen, ibuprofen, midazolam, fentanyl, morphine, labetalol, lorazepam and clonazepam were trialed. Pain control was notable, however patients were not able to tolerate oral medications. Literature reviewed and patient was optimized on propanolol, gabapentin, clonidine, and oral baclophen with persistent breakthrough. Episodes were characterized by severe tachycardia, extensor posturing, hypertension,
teeth grinding and diaphoresis. IV pushes of labetalol and lorazepam were trialed. Pa-
tient’s condition stabilized with clonazepam and PRN lorazepam, and patient was
discharged on palliative measures.

CONCLUSIONS: The differential diagnosis for PSH is wide making it difficult
to diagnose. Limitation in existing protocols confers challenges in management. Beta
blockade, A2 blockade, opiates, baclophen, dopamine modulators, and benzoazide-
pines are commonly used, however further data is needed to establish concrete guide-
lines. This case demonstrates potential efficacy of benzoazepine use in PSH
maintenance and acute exacerbation management. As seen in our case, patient likely
succumbed to gastrointestinal complications, re-enforcing the morbidity of PSH as a
multisystem disorder.

MANAGEMENT OF NEW-ONSET CHOREIFORM MOVEMENTS
AND ACUTE BEHAVIORAL CHANGES IN A PATIENT WITH AN
ACUTE THALAMIC INFARCT
Jessica F. Casey, BA, Christopher D. Meserve, MD, Michael V. Nguyen, MD, MPH,
and Jeremy Adam, MD

CASE DIAGNOSIS: Acute ischemic thalamic infarct resulting in acutemania,
impulsivity and chorea.

CASE DESCRIPTION: A 79-year-old man presented with choreiform move-
ments on his left side, impaired balance, and acute impulsivity. Given the acuity of the
crises, an MRI of the brain was obtained, which showed an acute infarct within
the anterior right thalamic nucleus extending to the genu and posterior limb of the in-
ternal capsule. He was medically stable upon transferring to the acute rehabilitation
unit, but continued to demonstrate choreiform movements, impulsivity, and inappro-
priate behavior. He required an interdisciplinary approach while on the rehabilitation
unit, which included psychiatry, neurology, and psychiatry. The patient required a
mood stabilizer and an anti-psychotic to control his choreiform movements. These
medications in addition to an interdisciplinary rehabilitation approach resulted in a
successful discharge home with control of his symptoms.

DISCUSSIONS: Cases of post-stroke movement disorders and mania have been
reported, but usually in different areas of the brain compared to this patient. Most
cases are self-limited and resolve within 12 months. Common characteristics found
in patients with post-stroke mania include male gender, a right cerebral infarct, and
no history of psychiatric disorders. However, the literature mentions very little on the
rehabilitation of such patients and the management of their symptoms. Addition-
ally, there is little evidence guiding pharmacologic therapy for movement disorders
and mania after strokes, but this patient’s course exhibits that treatment is effective un-
der the guidance of multiple disciplines over the course of several months.

CONCLUSIONS: Post-stroke movement disorders and mania are sparsely de-
scribed in the literature, and information regarding the course of these patients
through rehabilitation is limited. This case highlights the continued need to define ef-
fective treatment strategies for these stroke patients. Also, it emphasizes the need to
collaborate effectively with multiple disciplines in order to achieve the best outcome
for the patient.

MANAGING HETEROPTIC OSSIFICATION IN A PATIENT WITH
GASTRITIS AND HIGH BLEEDING RISK: A CASE REPORT
Namatha Ramavaram, DO, MS, and Thomas S. Kiser, MD

CASE DIAGNOSIS: 73 year old gentleman with C5 ASIA D SCI found to have Heterotropic Ossification (HO).

CASE DESCRIPTION: 73 yo gentleman with C5 ASIA D SCI admitted for acute rehabilitation for SCI. Initially, patient was found to have guaiac positive stool and hemoglobin level below 7 requiring blood transfusions. GI was consulted where EGD showed gastritis, and oral NSAIDs were discontinued. On day 16 of stay, patient complained of right elbow pain. He had decreased range of motion (ROM), tender-
ness and swelling in the elbow joint. Topical diclofenac gel was used instead of oral
NSAIDs with improvement in tenderness and pain around the joint area. Patient con-
tinued to exhibit restricted ROM. X-ray of right elbow did not show any acute process.
Triple phase bone scan was inconclusive per radiology, but images showed increased
uptake near right elbow. Due to patient’s clinical presentation and work up, patient was
started on Etdronic acid for HO in addition to continuing the topical diclofenac
and pain relief. The patient’s medical comorbidities prevented conventional treatment
with oral NSAIDs but topical diclofenac appeared to be just as effective. We were not
able to find any case reports in the literature where topical diclofenac gel was used in the
management of HO.

CONCLUSIONS: While HO remains a commonly encountered secondary compi-
lcation in SCI, this case represents a potential alternative to oral/systemic adminis-
tration of NSAIDs if contraindicated by a patient’s medical condition.

MAN-IN-THE-BARREL SYNDROME FOLLOWING ELECTIVE
AORTIVE VALVE REPLACEMENT AND AORTIC ANEURYSM
REPAIR: A CASE REPORT
Mina K. Shenouda, MD, Steven Markos, MD, Iqbal Jafri, MD, Anthony Doss, MD,
David Brown, DO, and Sara Cuccurullo, MD

CASE DIAGNOSIS: The patient is a 62 year old previously independent woman
with a history of bicuspid aortic valve status post commissurotomy and ascending aor-
tic aneurysm who developed profound upper extremity paresis and visual and cognitive
deficits after undergoing elective aortic valve replacement and aortic aneurysm repair.

CASE DESCRIPTION: Computed tomography of the head and cervical spine
were unrevealing and she was transferred to acute rehabilitation. Physical exam re-
vealed profound bilateral left worse than right arm weakness, full leg strength, posi-
tive Hoffman and upgoing Babinski signs bilaterally. Brain magnetic resonance
imaging (MRI) revealed multifocal subacute infarcts in the right greater than left
frontoparietal and bilateral occipital regions. Electrodiagnostic studies (EDX) of the
left arm revealed acute left brachial plexopathy involving all trunks. The patient’s
rehabilitation regimen was subsequently amended. The patient underwent comprehen-
sive inpatient and subsequent outpatient stroke and cardiac rehabilitation. Repeat
EDX five months later revealed nearly normal EDX. Patient made significant
functional improvements.

DISCUSSIONS: Man-in-the-barrel syndrome (MBS) is described as bilateral
upper extremity paresis with intact leg strength. MBS is a rare and functionally debil-
titating complication following cardiothoracic surgery, and is usually attributed to hy-
potensive shock during surgery causing bilateral watershed cerebral infarcts. Brachial
plexopathy due to stretch or compression injury is another potential surgery-related
complication that should be monitored. This patient’s unique concurrent diagnoses of
brachial plexopathy and strokes contribute to the patient’s prognosis and increase the
complexity of the patient’s rehabilitation management.

CONCLUSIONS: This unique presentation combining multiple concurrent dis-
case processes contributes to challenge of diagnosing this medically complex rare
entity. It is essential for physiatrists to know the potential complications of surgical
procedures and to recognize pertinent indications for further diagnostic evaluation
with MRI or EDX. Accurate diagnosis will allow the patient to receive the appropri-
ate medical and rehabilitation management.

MANUAL THERAPY REDUCES PAIN BEHAVIOR AND OXIDATIVE
STRESS IN A MURINE MODEL OF COMPLEX REGIONAL PAIN
SYNDROME TYPE I
Afonso Salgado, PhD, Juliana Stramosk, Graduate Student, Daniela Ludtke, MSC,
Ana Kuci, Graduate Student, Daiana Salm, Master Student, Lisandro Ceci, MSC,
Fabricio Petroniilho, PhD, Drielly Florentino, Graduate Student,
Lucineia Danielski, PhD Student, Aline Gassenferth, Student, Gislane Rezin, PhD,
Francisco J. Cidral Filho, PhD, Leidiane Martins, PhD, William Reed, PhD,
and Daniel Fernandes Martins, PhD

CASE DIAGNOSIS: Complex regional pain syndrome type 1 (CRPS-I) is a
chronic painful condition. Our objective was to investigate whether manual therapy
(MT), in a chronic post-ischemia pain (CPIP) model, is capable of reducing pain be-
havior and oxidative stress.

CASE DESCRIPTION: Male Swiss mice were subjected to ischemia-reperfusion
(1R). Animals received ankle joint mobilization (AJM) 48h after IR, and response fre-
frequency to mechanical stimuli was evaluated. Thiosbarbituric acid reactive substances
(TBARS), protein carbonyls, superoxide dismutase (SOD) and catalase (CAT) levels
were determined, as well as mitochondrial function.

DISCUSSIONS: IR induced mechanical hyperalgesia which was subsequently
reduced by acute MT. The concentrations of oxidative stress markers increased after
following IR; MT prevented increases in TBARS and protein carbonyls. IR diminished
SOD and CAT activity; MT prevented CAT but not SOD decrease. IR also diminished
mitochondrial complex activities, which did not affect this decrease.

CONCLUSIONS: We conclude that repeated MT sessions resulted in anti-
hyperalgesic effects mediated, at least partially, through antioxidative effects (reduced
TBARS and protein carbonyl levels, as well as increased CAT activity).
MARANTIC ENDOCARDITIS, A RARE INDIUSIOUS DISEASE WHICH CAN LEAD TO STROKE

Mina Gayed, DO, Brian D. Greenwald, MD, and Sara Cucurullo, MD

CASE DIAGNOSIS: Marantic Endocarditis. CASE DESCRIPTION: Patient is a 65 year old male smoker who had been intermittently taking Xarelto for a DVT. He suffered a right MCA stroke and during the workup was found to have non-infectious mitral valve endocarditis. Chest imaging had also revealed left lung lesion which was consistent with probable cancer. The workup was found to have non-infectious mitral valve endocarditis. Chest imaging revealed a 44% increase of patient goals: 21.4% related to pain and 44.7% related to muscle tone. Only 65% of goals were to be linked to the EQ-5D categories.

CONCLUSIONS: The results reveal a higher proportion of activity/participation-related goals including single/multiple tasks such as stretching, positioning and exercising. This analysis sheds new light on the patient need and also the perspectives of patient-centered goal-driven treatment in spasticity. The ICF offers a broader framework for patient-centered goal setting and may increase comparability of clinical data. EQ-5D seems to miss more than 35% of goals that matter to patients with focal spasticity.

MEASUREMENT OF REGIONAL CEREBRAL BLOOD FLOW BY THE NONINVASIVE ARTERIAL SPIN LABELING METHOD WITH MRI IN PATIENTS DURING REHABILITATION PROCESS

Tadato Oikawa, MD, and Takashi Morotomi, PhD

CASE DIAGNOSIS: Recent technical advance of MRI has been developed the noninvasive measurement of regional cerebral blood flow(rCBF) by ASL. We have been using ASL method in the in the clinical diagnosis of pathophysiological condition in the brain injured patients and the objective evaluation of recovery process by rehabilitation. In this presentation, we report the results of rCBF by ASL method in the brain damaged patients in our hospital.

CASE DESCRIPTION: ASL method is the technique to acquire perfusion image using labeled blood flowing into the brain tissue without Contrast-Enhanced. We measured rCBF of brain injured patients by ASL perfusion. MRI scanner was 1.5T MRI system. Participants consisted of 115 cases with cerebrovascular diseases, Parkinsonism, degenerative diseases, hyper-perfusion syndrome and brain neoplasm in acute recovery and chronic stages.

DISCUSSIONS: In the measurement of rCBF by ASL method, we observed the reduced rCBF corresponding to damaged site of brain injured patients. Especially, when the pathogenic regions were unclear in T1,T2 weighted and FLAIR image of MRI, we could find out the pathogenic regions by decrease or increase of rCBF based on behavior oil-influenced. In the chronic stage before discharge of hyper-perfusion syndrome a decrease of rCBF in the whole right hemisphere of injured side and decrease of rCBF in the contralateral cerebellum were recognized. Patients with Parkinson disease showed the reduced rCBF at onset of cerebral infarction. The rCBF of the patients of rCBF image by ASL were markedly improved during recovery and discharge.

CONCLUSIONS: Our results showed the usefulness of ASL method in the clinical diagnosis, and the objective evaluation of recovery process by rehabilitation.

MEDICAL ASSISTANCE IN DYING (MAID) IN ACUTE SEVERE NEUROLOGICAL INJURY: WHO DEFINES INFORMED CONSENT?

Natalja I. Tchaikova, MD, FRCPC, Karen Ethans, BSC, MD, FRCPC, Stephen Smith, PhD, and Irtdenter Sareen, MD, FRCPC

CASE DIAGNOSIS: High suicidality in people who have sustained a spinal cord injury (SCI) is common. However, little is known about how people with an acute SCI process their suicidal intentions, what they relate to, and how this may change with time. Understanding this information can assist healthcare teams in providing relevant counsel to patients seeking medical-assistance-in-dying.

CASE DESCRIPTION: We conducted a layered qualitative study consisting of a focus group of 5 people, followed by individual interviews of 23 people with diverse time frames post-SCI, injury levels, and causes of SCI. The semi-structured interviews were recorded and transcribed verbatim. A thematic analysis approach rooted in Grounded Theory was used to code the data, assign definitions, and classify recurring themes.

DISCUSSIONS: Suicidality was common across all neurological levels of injury and severity (52% of participants) early after SCI (< 2 years), but decreased in individuals > 2 years post-SCI. The suicidality emerged within the distinct themes of fear of lost potential injury potential after injury. A reframing process gradually redefined views and understanding of the possibilities of life post-SCI. Although acute suicidality was high, no participants thought that they could have made an informed decision about MAID during the time early post-SCI before this reframing. Most expressed need for autonomy to make an informed decision regarding MAID in chronic SCI (> 2 years) however. Suicidality and the process of reframing was noted to be poorly addressed by healthcare teams.

CONCLUSIONS: Our qualitative data offers insight into a process of reframing and the reduction of acute suicidal ideation within 2 years post-SCI as this process occurs. This information will help physicians provide relevant counsel regarding suicidal intention, MAID, and rehabilitation to people who have sustained a severe acute neurological injury, but who may foreseeably have a normal life expectancy with altered function that reframes into an acceptable way of life.

METABOLIC, NON-ISCHEMIC STROKE: A CASE REPORT OF MITOCHONDRIAL ENCEPHALOMYOPATHY, LACTIC ACIDOSIS, AND STROKE-LIKE SYNDROME

Aye Mon Win, DO, and Maheesh Ramachandran, MD

CASE DIAGNOSIS: 49 year-old female with MELAS syndrome complicated by seizures and neuropsychiatric disorder presented with three day history of word-finding difficulty and left-sided weakness. MRI revealed an evolving subacute infarct of the right temporal and parietal lobes and small evolving subacute infarct of the posterior right thalamus. Also noted were old left hemispheric infarcts and encephalomalacia. She was continued on home doses of L-arginine, lacosamide, lamotrigine, and keppra.

CASE DESCRIPTION: Her acute care and rehab courses were complicated by fluctuations between agitation and lethargy. Family reported prior history of this behavior. On day two of rehab admission, she was transferred back to acute care facility due to lethargy and inability to follow commands. CT head revealed changed course of acute right cerebral infarct. Mental status improved and she was transferred to rehab the following day. Mental status continued to fluctuate despite pharmacologic and behavioral interventions. Psychiatry followed. On day thirteen of rehab, during a period of lethargy, she was found to be hypotensive with blood pressure 74/44.

MEETING OF 1,633 GOALS FROM THE TOWER STUDY REVEAL A HIGHER PROPORTION OF ACTIVITY AND PARTICIPATION-RELATED GOALS IN SPASTICITY PATIENTS

Klemens Fleedorff, MD, Sylvia Ramusch, N/A, Astrid Scheschonka, MD, PhD, and Jorge Wissel, MD

OBJECTIVES: In order to gain insight into areas of interest from the spasticity patient’s perspective, we mapped the goals from the TOWER study using the International Classification of Functioning, Disability, and Health (ICF) categories and the EQ-5D domains.

DESIGN: A total of 1,633 individualized spasticity-related treatment goals collected according to the Goal Attainment Scale (GAS) during the TOWER study were mapped by following the ICF linking rules and the EQ-5D domains. Two researchers familiar with the ICF and ICF linking rules independently reviewed the goals. In the case of ambiguity, a third expert provided the final decision on the most appropriate linking. The degree of consensus and differences acts as a measure of comprehensibility of the goals. Goal categories are described according to the ICF framework.

RESULTS: A high level of agreement in the main ICF concept (i.e., what the goal is about) was achieved (N=1570; 96.1%) and was dependent upon 3 factors: knowledge of ICF items, understandable goal statements, and appropriateness of linking rules. Eighty-four percent of patient goals: 21.4% related to activity/participation. The main domains were problems with walking/mobility (N=318, 35.4%) undertaking single/multiple tasks (N=170, 18.9%) and dressing (N=112, 12.5%). Body functions were represented in 44% of patient goals: 21.4% related to pain and 44.7% related to muscle tone. Only 65% of goals were to be linked to the EQ-5D categories.

CONCLUSIONS: The results reveal a higher proportion of activity/participation-related goals including single/multiple tasks such as stretching, positioning and exercising. This analysis sheds new light on the patient need and also the perspectives of patient-centered goal-driven treatment in spasticity. The ICF offers a broader framework for patient-centered goal setting and may increase comparability of clinical data. EQ-5D seems to miss more than 35% of goals that matter to patients with focal spasticity.
She was emergerently transferred back to acute care hospital and found to have severe non-anion gap metabolic acidosis and acute renal insufficiency with renal tubular acidosis thought to be secondary to L-arginine.

**DISCUSSIONS:** MELAS syndrome is a progressive neurodegenerative disorder due to inherited mutations in mitochondrial DNA. Resultant dysfunction in oxidative phosphorylation profoundly effects cerebral tissue due to high energy requirements. Additionally, impaired nitric oxide production leads to microvasculopathy, causing stroke-like episodes, myopathy, and lactic acidosis. Additional features include seizures, psychiatric disorders, dementia, short stature, and cardiomyopathy.

**CONCLUSIONS:** Stroke prophylaxis in MELAS syndrome requires reduction of cortical and subcortical lesions. Although clinical trials support supplementation with the nitric oxide precursor, L-arginine. Our patient however had an adverse reaction to high-dose L-arginine which was difficult to recognize due to her fluctuating mental status.

**METASTATIC SPINAL CORD COMPRESSION MIMICKING CAUDA EQUINA SYNDROME ILLUSTRATING IMPORTANCE OF ADEQUATE DIAGNOSTIC IMAGING**
Jonathan L. Holt, N/A, Joseph Hill, DO, Karyn Doddy, MD, Farin Farhandojeg, MD, and Se Won Lee, MD

**CASE DIAGNOSIS:** Cauda Equina Syndrome from metastatic lesion due to prostate cancer

**CASE DESCRIPTION:** We present a case of a 66-year-old Caucasian morbidly obese male, with prostate cancer and extensive metastatic involvement of the axial skeleton. He experienced acute onset of low back pain, bilateral lower extremity weakness, paresthesia, and urinary incontinence. CT was unchanged from two weeks prior to his acute admission with diffuse metastatic disease throughout the spine, severe spinal stenosis L2-L5 and no definitive epidural tumor. MRI was unattainable due to patient’s large body habitus, but suspicion of Cauda Equina Syndrome remained paramount. L2-L5 laminectomy was completed. The patient showed improvement to motor strength and sensation in the lower extremities immediately following decompression. Seven days later the patient developed acute worsening of paralysis and complete paresthesia of his lower extremities. Repeat CT remained unchanged. Spinal myelogram was performed revealing a contrast block at T6-T7 consistent with an epidural tumor. A T4-T8 laminectomy and epidural tumor evacuation was performed.

**DISCUSSIONS:** MRI is the gold standard for diagnosis of spinal cord compression (SCC) with 93% sensitivity and 98% specificity. Inability to obtain the MRI can hinder proper management in the emergent case of SCC. Inability to obtain definitive imaging does not give excuse to stop diagnostic work up. Alternative imaging modalities do exist and are useful for differential and definitive diagnosis.

**CONCLUSIONS:** Especially in cases where multiple lesions can be present, it is important to have definitive diagnosis with appropriate imaging studies. This case illustrates the importance of adequate imaging to determine the exact cause of SCC even during an emergency mimicking cauda equina syndrome. Current guidelines recommend CT myelogram if the patient is unable to undergo MRI.

**MIRTAZAPINE-INDUCED HYponatremia in the Acute Rehabilitation Setting**
Eugene Palatulan, MD, and Chi-Chang D. Lin, MD

**CASE DIAGNOSIS:** Mirtazapine-induced hyponatemia

**CASE DESCRIPTION:** An 88-year-old man sustained a subdural hematoma (SDH) and subarachnoid hemorrhage (SAH), pubic rami fractures, and extra-axial hematoma after a fall at home. Neurosurgery and Orthopedics deemed patient non-operative, made WBAT and started on Keppra prophylaxis. On admission, he was at moderate assistance with mobility and ADLs. Patient was meeting all goals in rehabilitation and planned for simulated home independent stay. He was at moderate assistance with mobility and ADLs. Patient was meeting all goals in rehabilitation and planned for simulated ‘independent stay.’ Patient had altered mental status before planned independent stay becoming a barrier to therapy. Workup revealed sodium level 123 compared to 139 on admission. The only change through out rehab course was being started on Mirtazapine. Repeat CT head showed resolving SAH/SDH. A chest X-ray performed revealed a possible left lower lobe consolidation (SCC) with 93% sensitivity and 98% specificity. Inability to obtain the MRI can hinder proper management in the emergent case of SCC. Inability to obtain definitive imaging does not give excuse to stop diagnostic work up. Alternative imaging modalities do exist and are useful for differential and definitive diagnosis.

**CONCLUSIONS:** Especially in cases where multiple lesions can be present, it is important to have definitive diagnosis with appropriate imaging studies. This case illustrates the importance of adequate imaging to determine the exact cause of SCC even during an emergency mimicking cauda equina syndrome. Current guidelines recommend CT myelogram if the patient is unable to undergo MRI.

**MODAFINIL INDUCED TACHYCARDIA, an UNCOMMON SIDE EFFECT**
Mina Gayed, DO, Brian D. Greenwald, MD, and Sara Cuccurullo, MD

**CASE DIAGNOSIS:** Modafinil induced tachycardia

**CASE DESCRIPTION:** Patient is a 25 year old female with severe TBI who had been prescribed Modafinil in acute rehabilitation as a stimulant for improved wakefulness. Throughout her hospital course, the patient had been dealing with episodes of tachycardia. Cardiology became involved, but the workup was unremarkable for the heart itself. It was theorized that the reason for the tachycardia was due to autonomic dysfunction from her severe TBI. The patient was trialed on Propranolol and Metoprolol, but this treatment was abandoned due to her low blood pressure. The patient had improved in her overall status after a VP shunt was inserted in the middle of her hospital stay, and Modafinil was eventually discontinued. After the discontinuation, it was noted that her tachycardia immediately resolved.

**DISCUSSIONS:** Tachycardia is a classic presentation in the brain injury population. Care could be made that Drug induced tachycardia is a common phenomenon, but in the literature, Modafinil is associated with only a 2% incidence of tachycardia as an adverse reaction. It is important to note that the primary use of Modafinil is in those with sleep apnea. It is unclear if the medication’s side effects have been studied in the brain injury population as their brain physiology is unique.

**CONCLUSIONS:** The dynamic changes involved in the neurotransmitters in our brain injury population requires us to carefully consider all medication side effects regardless of how uncommon they may be. Extra attention should be paid to stimulant medications.

**MODEL FOR IMPLEMENTATION OF POST-STROKE DEPRESSION SCREENING IN THE ACUTE PHASE OF CARE**
Daniela A. Biesecu, MD, Karl Sandin, MD, MPH, and Eric Villanueva

**OBJECTIVES:** Prevalence of Post-Stroke Depression (PSD) is as high as 35% and is associated with multiple adverse outcomes including decreased functional recovery during acute rehabilitation and increased mortality. Early PSD screening is Class I recommendation based on AHA/ American Stroke Association 2018 guidelines. Baseline interrogation revealed no PSD screening in our hospital, preventing treatment prior to the post-acute care setting and potentially limiting recovery. Our aim was to achieve 30% compliance with PSD screening in four months using PHQ-9.

**DESIGN:** Over a four-month period, four serial PASA cycles tested the changes prior to and after achieving our aim. A non-interventional, prospectively quality improvement study.

**Participants** were patients over age of 18 admitted with imaging evidence of ischemic or hemorrhagic stroke with exclusion of patients with TIA, coma, anosognosia, aphasia, or cognitive impairment. Interventions included the following in cumulative manner; 1. Availability of printed PHQ-9 tools. 2. Algorithm for the workflow with preassigned tasks and adding a smart phrase into EMR. 3. Immersion of dedicated members into the process and pitfall identification. 4. Education and inclusion all members of the care team, developing an advanced documentation template into EMR and using mobile apps for ease.

**RESULTS:** Among 53 patients screened, the compliance increased over the four PSDA cycles with 1%, 25%, 50% and 53% respectively and overall compliance of 33%. Qualitative data collected guided the intervention in the subsequent cycles. Barriers included lack of dedication and awareness, and workflow.

**CONCLUSIONS:** Implementing PSD screening in the acute phase of care workflow using a multidisciplinary approach as outlined above can be an effective tool to improve compliance with evidence-based intervention. Additional cycles are planned to implement the protocol into EMR for consistency in all five full-service hospitals and rehabilitation centers in network.

**MODULATION OF MOTOR-RELATED CORTICAL ACTIVITY WITH NON-INVASIVE CERVICAL SPINAL STIMULATION: A CASE REPORT**
Zachery Hernandez, MSE, Nusrat Yozbatar, PT, PhD, and Gerard E. Francisco, MD
CASE DIAGNOSIS: A 66-year-old male with chronic stroke caused by an ischemic infarct in the left pons 30 months prior to the start of this study was enrolled. He presented with mild to moderate motor impairment in the right upper extremity (FMA score = 52), and was enrolled in a therapy program comprised of transcutaneous spinal direct current stimulation (tDCS) and robotic-assisted arm training.

CASE DESCRIPTION: Treatment sessions were designed to assess polarity dependent effects of tDCS (10 sessions of anodal, cathodal and sham stimulation). At each session 75 minutes of robot-assisted training was applied in conjunction with 20 minutes of cervical tDCS (intensity 2.5 mA). Functional arm tests (Fugl-Meyer Arm, JTHFT, ARAT, NHPT and MAS) were performed. Cortical neural changes were monitored with EEG and reported as changes in slow cortical potentials (0.1-1 Hz) and lateralized readiness potentials.

DISCUSSIONS: Changes in arm impairment (F-M UE score), muscle tone (MAS), and performance (ARAT) were not significant between treatment groups after treatment and at follow-up. However, speed related performance in JTHFT and NHPT has shown slight improvement (10 and 3.2 second decrease in completion time compared to baseline) only in the cathodal stimulation group. Both cathodal and sham conditions displayed significant lateralization changes toward the non-affected side post-movement (i.e. motion initiation/execution), however the separation of distribution was greater for the cathodal treatment. No significant change was found in the anodal condition.

CONCLUSIONS: Apart from local effects, tDCS seems to modulate supraspinal and or cortical networks, as suggested by animal and human studies. These findings are appealing to use cervical spine as the stimulation site in neurological disorders, such as acquired brain injury due to stroke or traumatic brain injury, when cortical or corticospinal neural circuits are severely injured. Further study is warranted with a larger sample size to understand polarity-dependent neural and clinical effects of tDCS and repetitive movement treatment.

MORE THAN MEETS THE EYE: GABAPENTIN THERAPY FOR CHARLES BONNET SYNDROME

Michael Mosier, MD, Larry Guinto, MD, and Eric Martinez, DO Candidate

CASE DIAGNOSIS: Charles Bonnet Syndrome

CASE DESCRIPTION: 71-year-old male with uncontrolled diabetes initially presented with slurred speech and altered mental status. CT Head showed chronic subdural hemorrhage and MRI revealed acute infarct in the left PCA distribution affecting the occipital and medial temporal lobe. No neurological intervention was recommended. Glucose optimized with strict insulin regimen and patient transferred to acute rehabilitation. While in unit, patient expressed concern regarding new visual disturbances, which included “elements of nature,” “a man milling about,” and an “insect walking along the table.” He reported history of floaters, but noted that the disturbances were different and more importantly, not real. Ophthalmologic visual field testing revealed right homonymous hemianopsia. Despite no previous mental illness, Psychiatry consulted and concluded no acute issues. Rehab team determined that hallucinations were presumptively caused by Charles Bonnet Syndrome due to acute vision loss from his CV A.

DISCUSSIONS: Charles Bonnet Syndrome refers to symptoms of visual hallucinations following loss of visual field/acyuity. While this is most commonly reported following chronic vision loss, such as in macular degeneration, acute presentations have been reported with multiple proposed mechanisms. One popular theory is that of a release hallucination, similar to the pathophysiology mechanism due to sensory deprivation such as that seen in phantom limb pain. Concurrently in this patient, low dose Gabapentin was started and subsequently increased to 300mg TID for his diabetic peripheral neuropathy. Interestingly, patient endorsed that his hallucinations improved and visual hallucinations ceased with increased dosing. He also denied disturbances on follow up several weeks after discharge.

CONCLUSIONS: It is imperative that visual disturbances after CVA are evaluated for ophthalmologic and psychiatric etiologies. However, Charles Bonnet Syndrome should be considered on the differential diagnosis of such hallucinations following acute infarct. Reassurance is often the only treatment necessary, but Gabapentin is a reasonable and safe therapeutic option.

MOTOR FIRST: A PROPOSED APPROACH TO THE JFK COMA RECOVERY SCALE-REVISED FOR THE CONSULTING PHYSICIAN

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OBJECTIVES: Consult physiatrists may be asked to assess neurological status and provide prognostic guidance for patients with disorders of consciousness (DoC). The JFK Coma Recovery Scale-Revised (CRS-R) is a standardized tool for assessment of recovery in DoC patients and can be very useful for prognostication, however time constraints and familiarity with its subscales can be barriers to regular use by consult physiatrists. The aim of this study is to investigate whether performing the CRS-R subscales in a different order, and stopping once the patient is determined to be emerged or minimally conscious (MCS), may shorten the time required to complete the assessment while still providing accurate information for a consultant.

DESIGN: CRS-R scores for patients admitted to our inpatient DoC program from December 2015 through August 2019 were reviewed. Thirty-five patients were identified with CRS-R subscales documented, for a total of 97 assessments. The subscales were retrospectively reviewed in the following adjusted order: Motor, Communication, Visual, Oromotor, Auditory, and Arousal. If the patient met criteria for emergence or MCS after specific subscale completion, no further subscales were reviewed. If criteria for MCS were not met at any subscale, the entire CRS-R was completed.

RESULTS: Of 97 assessments, 60 could be stopped prior to completion of the entire CRS-R. Five assessments concluded after Motor, 34 concluded after Communication (32 MCS, 2 emerged), and 21 concluded after Visual. Thirty-seven assessments required completion of the full CRS-R to determine the level of consciousness.

CONCLUSIONS: Reorganization of the CRS-R may allow a consult physiatrist to more efficiently provide prognostic guidance for DoC patients. A limitation is the lack of total scores which are helpful for tracking recovery over time. This reorganization would not replace the CRS-R, but suggests CRS-R components can be used in an alternative format for efficient DoC screening in the acute setting.

MULTI ORGAN INVOLVEMENT IN A CHALLENGING CASE OF RECURRENT STEVENS-JOHNSON SYNDROME AFTER SPINAL CORD INJURY

Moh’d Rami H. Alahamr, MD, and Abeer Alomari, MD

CASE DIAGNOSIS: Challenging recurrent Stevens-Johnson Syndrome, Spinal Cord Injury

CASE DESCRIPTION: 17 years old male patient who sustained T6 SCI AIS (A) when he was 12 years. He developed skin eruptions, oral tissues involvement, photophobia and ocular complications after treatment with antibiotics for a simple urinary tract infection; his case has been complicated by a severe skin and oral ulcers with progressive autoimmune corneal melting and ulceration with limbal stem cell deficiency for which he underwent many amniotic membrane surgeries and flaps, IV steroids and anti TNF. He is still suffering from severe pain and severe visual impairment despite his maximum treatment.

DISCUSSIONS: Stevens-Johnson syndrome, is a life threatening diseases causing toxic epidermal necrolysis, and erythema multiforme cutaneous eruptions but also affects other vital organs and can be difficult to manage. We report a case which becomes dilemmatic because of some clinical and histological features can be a manifestation from penicilus vulgaris but diagnosed and followed as a challenging case of unusual SJS. The patient was under supervision in Jordanian Royal Medical Services by a Multi-Disciplinary Approach MDT at our Clinic Spinal Rehabilitation, Dermatology and Ophthalmology Department and by Immunologist. Despite all our joint efforts we face challenges every time this young boy steps into our clinics but patient still fighting his condition and scoring good marks in one of the best school for Excellence despite his social, psychological and functional disability.

CONCLUSIONS: Physicians writing prescriptions for their patients must warn them about possible side effects and they must therefore consider SJS as a potential complication of treatment after antibiotics, especially when use of medication is questionable. It takes one sad story like this to let us think 1000 times before jumping into treatment. MDT approach is crucial in these cases to ease patients suffering and to confirm diagnosis.

MULTIDIMENSIONAL EVALUATION IS NECESSARY TO ASSESS HAND FUNCTION FOR PATIENTS WITH CHARCOT-MARIE-TOOTH DISEASE TYPE 1A

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OBJECTIVES: Background. Charcot-Marie-Tooth (CMT) disease type 1A (CMT1A) is the most common hereditary neuropathy. Several studies have proposed the relation between strength and dexterity parameters, but not all used standard or validated tools, and none incorporated severity of impairment of electrophysiological parameters. Objective. The purpose of this study was to evaluate the relation between
severity of electroneurography impairment and its impact on function and quality of life in people with CMT1A.

DESIGN: Methods. Grip and lateral pinch strength were evaluated with specific dynamometers: the Jamar and the Pinch Gauge. Dexterity was explored with the Sollerman, Jebsen, and Nine-hole Peg tests; and the CMT impact on well-being was assessed by validated scores and scales: Medical Outcomes Study Short Form 36 (SF-36), Beck Depression Inventory, and Fatigue Severity Scale and disease severity by the CMT neuropathy score and Inflammatory Neuropathy Cause and Treat-ment sensory sum score. Finally, axonal loss and demyelination process was assessed by electroneurography.

RESULTS: In 2003, 985 individuals participated (23 females, mean [SD] age 47 [4.7] years). We found lack of correlation between severe electroneurography impairment (frequency of abnormal results >80%), significant distal amyotrophy (70%) and quality of life (mean[SD] scores for physical and mental SF-36 were 36.4 [10.0] and 48.4 [11.5]), autonomy for activities of daily living, and hand function that remains relatively preserved. We found a correlation between lateral pinch and dexterity according to the Sollerman test (r=0.52, p<0.05) but no correlation among the other parameters.

CONCLUSIONS: In CMT1A, the deficit in the hand’s intrinsic muscles seems to be compensated by use of extrinsic muscles to maintain grip and dexterity function. The manual function is complex and requires an overall, quantitative, qualitative and multidisciplinary assessment. Each tool (Pinch Gauge, Jamar, Sollerman, Jebsen, Nine-hole Peg) measures a specific element of manual function and is necessary when performing a grip function analysis.

MULTIFOCAL MOTOR NEUROPATHY IN A LONG-TERM HIV SURVIVOR WITH AZIDOTHYMIDINE EXPOSURE AND INTRAVENOUS IMMUNOGLOBULIN THERAPY

Kishan Patel, OMS-III, Richard Jermy, DO, and Deanna Janora, MD

OBJECTIVES: Multifocal motor neuropathy (MMN) is a rare, purely motor neuropathy, characterized by progressive, asymmetric, distal limb weakness with minimal sensory impairment. The etiology is deemed immune mediated and treatable with intravenous immunoglobulin (IVIg) therapy.

DESIGN: A 67-year-old woman presented HIV positive since 1994 with a history of intermittent limb paresthesias and sensory polyneuropathy from 2002-2009. In 2010, she experienced progressive left hand and bilateral leg weakness. Nerve conduction studies (NCS) showed axonal peripheral polyneuropathy affecting motor nerve fibers preferentially. She was started on IVIg with slight improvement in five months. However, due to insurance denial, she was soon taken off IVIg. August 2011 NCS showed worsening left motor peroneal and tibial nerve amplitudes. In 2012, she was back on IVIg and reported less fatigue and fewer cramps. In 2016, she complained of headaches with IVIg and skipped her treatments. Subsequently, she had a fall and injured her face and right knee. In 2018, she was hospitalized and surgeries, she again declined treatments and experienced frequent falls. This year, motor NCS amplitudes and conduction velocities have further worsened in both upper and lower extremities.

RESULTS: Overall, this patient had a progressive decline in the amplitudes and conduction velocities of her median, tibial and peroneal motor fibers. Left side showed more prominent weakness compared to her right. The support for IVIg is highlighted after her relapses following multiple discontinuations. Laboratory Results demonstrated CD4 counts >300 and viral load <50 copies to indicate she was virally suppressed.

CONCLUSIONS: This case illustrates the potential for MMN following initial use of azidothyminde in long-term HIV survivors. Although the motor neuropathy seen in this patient is rare, it is a predictable side effect of azidothyminde use. Recognition of this condition is critical to implement early NCS screenings for patients and apply appropriate IVIg therapy to prevent deterioration.

MULTI-LEVEL AND MULTI-PATTERN LOWER- AND UPPER-LIMB SPASTICITY TREATMENT WITH INCOBOTULINUMTOXINA IN CHILDREN AND ADOLESCENTS WITH CEREBRAL PALSY

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OBJECTIVES: In two phase III studies; a lead-in prospective, double-blind, randomized study (TIMO) followed by an open-label, non-controlled study (TIMO), we assess efficacy and safety of incobotulinumtoxina in lower-limb (LL) or combined LL/upper-limb (LL/UL) spasticity in children and adolescents with cerebral palsy (CP).

DESIGN: TIM had three parallel dose groups (4 U/kg body weight [BW], 12 U/kg BW, 16 U/kg BW); subjects were randomized in a 1:1:2 ratio and received 2 double-blind injection cycles. In TIMO, subjects who had completed TIM, or newly recruited treatment-naive or pre-treated subjects, received 4 injection cycles with the highest dose of TIM. The primary endpoints of TIM were change from baseline in Ashworth Scale (AS) of the planter flexors (PF) score at Week 4 of Cycle 1, and the Investigator’s Global Impression of Change of Plantar Flexor Spasticity Scale (GICS-PF) score at Week 4 of Cycle 1. TIMO was focused on safety, and did not have primary efficacy endpoints.

RESULTS: In TIM, all 3 dose groups experienced a statistically significant improvement in AS-PF score 4 weeks post-injection versus baseline. In TIMO, cumulative improvements in AS scores for the PF, knee flexors and thigh adductors were observed from TIM baseline to 4 weeks post-injection. Investigator’s GICS-PF scores indicated a positive response to treatment in all dose groups 4 weeks post-injection in TIM Cycle 1 and improvements were maintained in all treatment groups in Cycle 2. Respective clinical assessments also confirmed consistent improvement in LL and UL spasticity at Week 4 in all TIMO injection cycles. Both studies had good overall safety profiles.

CONCLUSIONS: Incobotulinumtoxina at total doses up to 16–20 U/kg is effective and well tolerated for the multi-level, multi-pattern treatment of LL/UL spasticity due to CP in children and adolescents.

MULTI-MINICORE MYOPATHY

Jonathan Chapakis, DO, Sharanpreet Singh, MS4, Muhammad S. Rizwan, BA, Yaacov Anziska, MD, MS, and Susan Stickovers, MD

CASE DIAGNOSIS: Multi-Minicore Myopathy

CASE DESCRIPTION: A male child presented to MDA clinic with hypotonia, global weakness, delayed developmental milestones, scoliosis, difficulty swallowing, and limited spinal range of motion. His parents reported that he had decreased muscle tone and weakness since birth. A muscle biopsy was performed which established the diagnosis of Multi-Minicore Myopathy. Spine fusion surgery was performed and he was admitted to acute inpatient rehabilitation following surgery. He was provided with supramalleolar orthoses and he was able to walk without an assistive device. He was provided with a wheelchair for use in school. Speech therapy was provided for oral exercises and dietary modifications to facilitate swallowing. BiPAP and a mechanical insufflator-exsufflator were provided for management of restrictive lung disease and aspiration management. He was placed on Digoxin and Enalapril for management of his cardiomyopathy.

DISCUSSIONS: Multi-Minicore Disease is a rare, congenital autosomal recessive neuromuscular disorder featuring multiple core structures on biopsy forming as a result of reduced oxidative activity along the longitudinal axis of the muscle fiber. It is a rare condition with unknown prevalence, but the incidence of all congenital myopathies is estimated at around 0.06/1,000 live births. This patient has the classic form which presents at birth or in the first few months with hypotonia and delay in achieving motor milestones. The hallmarks of classic Multi-Minicore Myopathy are spinal rigidity, early scoliosis and respiratory impairment. Other features include a high-pitched voice, myopathic facial features, feeding difficulties, right ventricular dysfunction, axial and proximal weakness, and a progressive scoliosis, often associated with lateral trunk deviation and respiratory impairment in the second decade of life. This case demonstrates the importance of prompt evaluation and diagnosis of Multi-Minicore Myopathy, a rare neuromuscular disorder, and the importance of an interdisciplinary approach in management of patients with this condition.

MUSCLE CONTRACTURES IN CHILDREN WITH CEREBRAL PALSY: EPIGENETIC DNA METHYLATION AND SENESCEENCE PATTERNS IN RESIDENT MUSCLE STEM CELLS

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CASE DIAGNOSIS: In cerebral palsy (CP), muscle contractures are associated with significant loss of muscle mass and strength. We have reported that the number of resident muscle-generating stem cells, called muscle satellite cells (MuSCs), is 60-70% reduced in contractured muscles of children with CP. Our current hypothesis is that development of muscle contractures in CP is in part driven by epigenetic changes in DNA methylation causing a “reprogramming” of MuSCs, leading to their premature cellular senescence and exhaustion. Our main objective is to understand the cellular and molecular mechanisms that may lead to differences in MuSC proliferation, contraction and function.
Abstracts

CASE DESCRIPTION: MusCs were isolated from hamstring muscle biopsies obtained from CP and TD children as a control group (n=6-8 patients/group). MusCs were expanded into a population of proliferating myoblasts in 0.5% gelatin-coated plastic dishes, using a high-serum proliferative medium. We modulated DNA methylation levels by treating myoblasts with 5 μM 5-AzaCytidine (AZA) in high-serum proliferative medium for 24 hours. AZA is a DNA methyltransferase (DNMT) inhibitor currently approved by the FDA for the treatment of myelodysplastic syndromes. ACEA’s XCELLigence RTCA device was used to measure proliferation and migration rates of CP and TD myoblasts, treated and non-treated with AZA. RNA-sequencing and DNA methylation profiling, followed by bioinformatics clustering analysis of modulated biological pathways were used to characterize DNA methylation-dependent changes of gene expression in proliferating CP myoblasts treated with AZA. IRB provided ethical approval, and appropriate assents/consents were obtained from children and their parents.

DISCUSSIONS: We found that untreated CP myoblasts proliferated and migrated faster than untreated TD myoblasts. This hyperproliferative phenotype was associated with a genome-wide increase in DNA methylation levels and a specific transcriptional overexpression of DNA methyltransferases DNMTs together with up-regulation of markers for proliferation, cellular senescence, and DNA damage repair. AZA treatment normalized global DNA methylation levels to TD levels and led to a decrease in cell proliferation and migration rates in CP myoblasts. AZA treatment was also associated with a DNA methylation-dependent downregulation of DNMTs and other markers for cell proliferation, cellular senescence, and DNA damage repair. Finally, AZA treatment upregulated transcripts coding for protein and extracellular matrix synthesis and cell-cell adhesion receptors.

CONCLUSIONS: These observations support the hypothesis that muscle impairment in CP is in part driven by dysregulation of DNMTs leading to a hyperproliferative phenotype that may lead to premature exhaustion of the muscle-generating MuSC pool. The data also identify DNMTs as candidates for mediating the expression of matrix and receptor components, which in turn, could support MusC self-renewal and/or differentiation into new muscle fibers. We propose that DNMT inhibitors like AZA could potentially be repurposed as candidate therapeutic targets for the maintenance of a healthy population of MuScs in contracted muscles. We are currently dissecting the role of DNMTs and DNMT inhibitors in muscle tissue and muscle stem cell homeostasis. We are also testing whether genome-wide changes in DNA methylation patterns will correlate with premature cellular senescence in MuScs from contracted CP muscles.

MUSCULOSKELETAL MODELING ANALYSIS OF SPASTIC GAIT IN CERVICAL MYELOPATHY PATIENTS

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OBJECTIVES: Although some reports have shown a change in gait motion in cervical myelopathy patients using a three-dimensional (3D) gait analysis system, there has been no musculoskeletal modeling analysis investigating muscle-tendon lengths (MTL) and velocity (MTV). This study aimed to investigate musculoskeletal modeling parameters of gait motion in cervical myelopathy patients.

DESIGN: Subjects were 42 patients with cervical myelopathy classified as to its severity using the Japan Orthopaedic Association score excluding the upper extremity items: group 1 (>10 points); group 2 (7-9 points); and group 3 (< 6 points), and 40 healthy volunteers (controls). A 3D gait analysis system (VICON 370) was used to obtain the spatiotemporal, kinematic, and kinetic parameters. The changes in MTL during gait were calculated using musculoskeletal modeling software (SIMM Gait), which calculates the MTL (using a Hill-type model) from changes in the main muscle based on joint motion recorded using the Vicon Clinical Manager. MTV was calculated as the distance along the modeled path of the adductor longus, rectus femoris, the biceps femoris, the gastrocnemius, and anterior tibialis between the muscle’s origin and insertion. MTV were estimated by computing the numerical derivative of the MTL data extracted into a time-domain parameter.

RESULTS: Genu recurvatum, deteriorated lower-extremity joint motion, and MTV were observed in group 3. MTV of the long head of the biceps femoris in controls, group 1 and 2 showed a bimodal waveform in the negative direction during the initial contact and pre-swing phases, whereas these characteristics were not present in group 3.

CONCLUSIONS: The strategies of MTV of the biceps femoris during gait motion in severe cervical myelopathy patients were different from those of the normal gait pattern. The imbalance between agonist and antagonist muscle tissue during gait could be involved in the occurrence of genu recurvatum.

MUSIC-ASSOCIATED HEAD BANGING AND BRAIN INJURY: A SYSTEMATIC REVIEW

James B. Meling, DO

OBJECTIVES: ‘Head banging’ to music, particularly rock, punk, or heavy metal, is a common form of self-expression exhibited by musicians and listeners that includes rhythmically – and violently – swinging their head in all directions, as directed by the beat of the song. Such motions of extreme flexion, extension, or perhaps even spinning motions, has led to dire consequences, few of which have been reported in academic journals. This systematic review will summarize all of the studies that have been published regarding head banging to music and injuries to the brain that individuals have encountered when engaging in this rocking act.

DESIGN: A systematic review of PubMed was performed. Search terms included head banging, music, rock, heavy metal and concerts. Studies were included if they discussed head banging in the context of music and brain injuries. Articles discussing head banging in the context of physical trauma or childhood developmental disorders were excluded. The reference sections of the remaining articles were used to screen for additional articles on this subject.

RESULTS: In total, the reviewer found 12 articles – 11 case reports and 1 observational study—that fit into the inclusion criteria of this review. These cases included brain injuries primarily by hematomas and arterial aneurysms, dissections, and thromboses.

CONCLUSIONS: When considering the prevalence of rock, punk, and heavy metal musicians and listeners; 11 case reports and 1 observational study on brain injury might seem pretty minimal. While the number of reported cases might seem small, it’s postulated that there is a much higher incidence rate than is reflected by the current literature, due to clinically silent symptoms or spontaneously resolving post-concert mild headaches. A single occurrence of these mild self-resolving brain injuries might not mean much, but compounded and multiplied by numerous occurrences, these minimal headaches could do far more damage than is currently seen.

MYELOPEROXIDASE NEGATIVELY REGULATES NEUTROPHIL-ENDOTHELIAL CELL INTERACTIONS BY IMPAIRING AMB2 INTEGRIN FUNCTION IN STERILE INFLAMMATION

Alan Tseng, BSC, and Jaehyung Cho, PhD

OBJECTIVES: Interactions of neutrophils with endothelial cells (ECs) and platelets contribute to tissue damage and vascular occlusion under sterile inflammatory conditions, such as in ischemic stroke. However, the molecular mechanisms regulating the cell–cell interactions remain poorly understood. Previous studies suggest that reactive oxygen species, such as hydrogen peroxide (H2O2), produced from NADPH oxidase 2 play a critical role in platelet–neutrophil interactions by regulating the function of neutrophil αMβ2 integrin during sterile inflammation. In this study, we further demonstrate a role for myeloperoxidase (MPO) in regulating the adhesive function of neutrophils through αMβ2 integrin.

DESIGN: This study utilized real-time fluorescence intravital microscopic imaging of WT and MPO knockout (KO) mice in a mouse model of vascular inflammation induced by tumor necrosis factor-α (TNF-α). A hepatic ischemia/reperfusion injury (IRI) mouse model was also used. Neutrophils isolated from WT and MPO KO mice as well as healthy human volunteers were used in various in vitro assays such as flow cytometry, parallel plate flow chamber adhesion assays, and immunoblotting.

RESULTS: We showed that loss of MPO promoted neutrophil–EC interactions and neutrophil emigration but did not affect neutrophil–platelet interactions under inflammatory conditions. We found that compared to wild-type neutrophils, MPO (KO) neutrophils exhibited a significant increase in extracellular H2O2 and surface level of αMβ2 integrin following agonist stimulation and that these effects were dependent on MPO activity. Compared to wild-type mice, MPO KO mice displayed a pro-migratory phenotype of neutrophils but a significant reduction in tissue damage.

CONCLUSIONS: These results suggest that MPO activity negatively regulates the adhesive and migratory function of neutrophils by impairing αMβ2 integrin function under sterile inflammatory conditions. Overall, our results suggest differential regulation of αMβ2 integrin function depending on the level of ROS generation and the complex cellular environment.

NEAR TOTAL LOSS OF AUTOLOGOUS BONE FLAP AFTER CRANIOPLASTY DUE TO SPONTANEOUS RESORPTION, IMPRESSIVELY DEMONSTRATED WITH THREE-DIMENSIONAL COMPUTED TOMOGRAPHY IMAGE RECONSTRUCTION

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CASE DIAGNOSIS: Spontaneous resorption of autologous cranioplasty bone flap.

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CASE DESCRIPTION: A 15-year-old male sustained severe right hemispheric ischemic stroke with dense left hemiplegia due to right carotid artery dissection following a motor vehicle crash. Two days post-injury, patient underwent right fronto-temporo-parietal decompressive craniectomy to relieve malignant intracranial pressure. After a complicated hospital course, he was transferred to the brain injury program at a rehabilitation hospital. Examination was remarkable for an alert, oriented male with dense left hemiplegia, left neglect, left homonymous hemianopsia, and a large, deep right hemispheric skull defect. He reported severe daily headaches that improved after autologous bone flap cranioplasty, 3 months post-injury. Several weeks after cranioplasty, the patient presented to clinic complaining of persistent, progressively worse headaches described as worse in severity than pre-surgical headache. CT cranioplasty, the patient presented to clinic complaining of persistent, progressively worse headaches described as worse in severity than pre-surgical headache. CT head demonstrated near total resorption of the bone flap. Three-dimensional imaging reconstruction impressively demonstrates these radiographic findings. After acrylic replacement of the previously resorbed bone flap, the patient’s headache resolved.

DISCUSSIONS: Bone resorption commonly occurs after cranioplasty to some degree, but rarely with total loss of the skull flap. Given the prevalence of bone resorption, some neurosurgeons advocate reevaluating the utility of autologous bone for cranioplasty. This patient experienced rapid resorption of his autologous bone flap, heralded by worsening headache, which resolved after acrylic cranioplasty.

CONCLUSIONS: Spontaneous resorption commonly occurs after autologous bone cranioplasty and sometimes involves considerable or near total loss of the flap, necessitating reoperation. In some cases, this may be heralded by worsening headache. If a patient presents after autologous bone flap cranioplasty with complaints of persistent headache, it is prudent to evaluate for bone flap resorption.

NEMALINE ROD MYOPATHY
Jonathan Chapelis, DO, Muhammad S. Rizwan, BA, Shanpreet Singh, MS4, Nuri Jacoby, MD, and Susan Stickewes, MD
CASE DIAGNOSIS: Nemaline Myopathy
CASE DESCRIPTION: An Ashkenazi Jewish male immigrant from Uzbekistan presented to MDA Clinic with weakness, dysphagia, and difficulty ambulating. He achieved normal developmental milestones until age 2.5 years when he developed difficulty rising from a seated position and ambulating. He was diagnosed with an unknown muscle disorder in Uzbekistan but due to limited medical resources he received no formal treatment. Muscle wasting and weakness were pronounced by age 15 when he immigrated to the United States. Exam in MDA clinic revealed cachexia, mild scoliosis, scapular winging, weakness, and diminished reflexes. A biopsy was performed, and he was diagnosed with nemaline myopathy.

DISCUSSIONS: Nemaline myopathy is a rare, genetic disorder that affects filament proteins required for muscle tone and contraction resulting in thread-like structures in muscle fibers. Weakness is most severe in proximal muscles, and affected individuals exhibit feeding and swallowing difficulties, foot deformities, scoliosis, and contractures. It can be inherited in an autosomal-recessive or autosomal-dominant pattern. People of Ashkenazi Jewish descent are at risk for nemaline myopathy, and other genetic disorders, including, but not limited to: Tay-Sachs Disease, Canavan’s Syndrome, Cystic Fibrosis, Gaucher’s Disease, Familial Dysautonomia, Niemann Pick Disease, and Mucolipidosis. Dor Yeshorim is an organization that offers free prenatal, genetic carrier screening to assess risk for hereditary disorders. Dor Yeshorim has been successful in preventing fatal and debilitating genetic disorders in the Jewish community through early detection of carriers. While this and other free genetic screening programs are located internationally, our patient’s family did not have access to them in Uzbekistan.

CONCLUSIONS: This case demonstrates the benefits of pre-marital genetic carrier screening and counseling in at-risk populations which participate in consanguinous marriages. The incidence and impact of genetic diseases on families may be mitigated with widespread use of genetic carrier screening prior to pregnancy.

NEURALGIC AMYOTROPHY WITH PARASPINAL INVOLVEMENT ON NEEDLE EMG: A CASE REPORT AND REVIEW OF THE LITERATURE
Joshua L. Elkin, MD, and Jeremy Beckworth, MD
CASE DIAGNOSIS: Neuralgic Amyotrophy (NA).
CASE DESCRIPTION: A 19-year-old lefthanded D1 baseball pitcher developed right shoulder pain one month prior to clinic presentation. As the pain improved, he noticed weakness in this shoulder along with scapular winging. On interview, he had a cough that resembles a horse in flight suggestive for NA. On examination, there was right posterior scapular winging, however sensations and reflexes were normal. Nerve conduction studies (NCS) were normal. Needle EMG was abnormal with 2+ fibrillation potentials and positive sharp waves in the serratus with neuropathic units and recruitments. Similar 2+ fibrillation potentials and positive sharp waves were seen in the cervical paraspinal muscles. Cervical spine MRI was normal without neural compression. History, exam, and EMG were suggestive of neuralgic amyotrophy.

DISCUSSIONS: NA classically presents in patients as severe neck, shoulder, or arm pain with severe weakness of the ipsilateral extremity with preserved sensation. 80% of patients recover by three years, however persistent disability is seen in 20% of cases. The debilitating nature of this condition demands recognition by clinicians in shoulder or arm pain that precedes weakness. Although this syndrome is primarily diagnosed clinically, imaging and NCS/EMG are beneficial. MRI is commonly used to exclude radiculopathy as an etiology of the acute pain. NCS of relevant muscle groups are usually normal and thus exclude mononeuropathies, while EMG will commonly show denervation.

CONCLUSIONS: This case was unique because paraspinal muscles are not typically involved in this syndrome, and MRI did not suggest radiculopathy. NA is considered a brachial plexopathy, and normal paraspinals on needle EMG and abnormal amplitudes on sensory NCS are the pathognomonic finding in most plexopathies. This unusual presentation highlights the importance of utilizing clinical history and NCS/EMG as an extension of the physical examination.

NEUROCYSTICERCOSIS RESULTING IN ACUTE GAIT IMPAIRMENT: A CASE REPORT
Mohamed Alfatih, DO, and Alexander Turfe, DO
CASE DIAGNOSIS: Neurocysticercosis.
CASE DESCRIPTION: A 37-year-old male presented with a chief complaint of frequent falls. An MRI brain was done, revealing extensive ring-enhancing lesions and a calcified lesion in the frontal lobe consistent with neurocysticercosis. The patient subsequently underwent a frontal craniotomy for biopsy of some of the lesions. Repeat MRI showed improvement in the lesions while the patient was on steroids for vasogenic edema. He was also improving clinically, so the decision was made to hold off on antiparasitic agents. The patient was then transferred to an acute inpatient rehabilitation hospital. Initially, he required total assistance with a rolling walker to ambulate, but made significant gains and was eventually discharged home without the need of any assistive device.

DISCUSSIONS: Although infectious workup (including brain tissue biopsies) came back negative, the patient met criteria for definitive diagnosis of neurocysticercosis based on the following: 1) MRI brain showing enhancing lesions, and a typical parenchymal calcification (two major neuroimaging criteria); 2) epidemiological exposure criteria (he worked as a cook for 12 years with Latino immigrants preparing various types of meats, and also traveled to Mexico in the past, which could have exposed him to Taenia solium eggs).

CONCLUSIONS: Neurocysticercosis can be diagnosed in patients with relevant clinical symptoms, exposure history, and neuroimaging findings despite a completely benign infectious workup. Resultant neurologic deficits can improve with therapy and steroids without the use of antiparasitic agents.

NEUROGENIC FEVER FOLLOWING T12 ASIA A SPINAL CORD INJURY
Richard G. Ellis, MD, Eytan Koch, MD, Jaime John, MD, James Healy, DO, and Amit Bansal, DO
CASE DIAGNOSIS: Neurogenic Fever, C4 recovering to T12 Asia A SCI
CASE DESCRIPTION: 28M, previously healthy, was an unrestrained passenger in a rollover motor vehicle collision. On admission acute care, the patient was found to have T12/L1 complete injury along with T2-T11 epidural hemorrhage and underwent emergent T12-L1 decompression. At transfer to acute rehab with absent sensation below T7, reduced strength in the bilateral arms (3-4/5), and absent motor activity in both legs, qualifying him as a C4 Asia A with ZPP from C4 to T7. Over the course of his rehabilitation he recovered to T12 Asia A. Additionally, He developed a fever on day 3 and was found to have a Klebsiella UTI. He was started on antibiotics, which were escalated for ongoing fevers. Repeat urine and all blood cultures were negative. He completed 10 days of antibiotics but remained febrile several days after discontinuation of all antibiotic therapy.

DISCUSSIONS: Although imaging was negative for cervical injury, the patient presented with bilateral upper extremity weakness, possibly due to incomplete C4 injury in addition to his known complete T12 injury. Additionally, the patient demonstrated recurrent fever despite appropriate treatment, likely due to neurogenic fever, which accounts for ~8% of post-injury fevers.

CONCLUSIONS: Here we identify a case of likely multiple spinal cord injury (C4 and T12) complicated by neurogenic fevers. Multiple spinal cord injury represents an area of difficulty for the Asia Impairment Scale (AIS). This patient improved from C4 to T12 Asia A, likely due to recovery from an incomplete cervical injury.
This has profound functional implications but is not well described by the AIS. We also identify a case of neurogenic fever in thoracic injury. Ongoing fever despite treatment is suspicious for neurogenic fever, as appropriate treatment is conservative and therefore warrants discontinuation of antibiotics to reduce the risk of medication side-effects and resistant infections.

**NEUROREHABILITATION FOR A RARE CASE OF NON-ALCOHOLIC WERNICKE’SENCEPHALOPATHY IN A YOUNG FEMALE RELATED TO TONSILECTOMY, INTRACTABLE VOMITING AND NEWLY DIAGNOSED CELIAC DISEASE**

Andrew McCoy, MD, Joseph P. Staszel, MD, Rohit Navlani, DO, and Gary Galang, MD

**CASE DIAGNOSIS:** Non-Alcoholic Wernicke’s Encephalopathy  
**CASE DESCRIPTION:** 29-year-old non-pregnant female with history of gastritis and 40-pound weight loss following tonsillectomy three months prior to presentation was transferred from a community hospital with intractable vomiting and confusion. Initial infectious and neurologic work-up were negative. EEG demonstrated global slowing. Brain imaging revealed a left basal ganglia cyst and bilateral dorsomedial thalamic T2 FLAIR abnormalities consistent with Wernicke’s encephalopathy (WE). Patient was treated with high-dose intravenous thiamine. Further workup found elevated anti-Gliadin antibodies with low vitamin D and vitamin B12. Complications included dysphagia, extrapyramidal side effects from anti-nausea medication, and refeeding syndrome. Initial functional assessments demonstrated ataxia, oculomotor derangements, need for moderate assistance with ambulation and stair negotiation, maximum assistance for functional transfers, and minimum assistance for self-care tasks. Three weeks of neurorehabilitation allowed for discharge home with a regular diet, modified independence in self-care and transfers, and independent mobility with a wheeled walker.

**DISCUSSIONS:** WE is caused by thiamine deficiency, related most often to alcoholism, and characterized by ataxia, nystagmus, ophthalmoplegia, and confusion. Cases not associated with alcoholism include hyperemesis gravidarum and inflammatory disease. This case of non-alcoholic WE represents a unique case of thiamine deficiency in a young female of reproductive age. The cases described in the literature are predominantly in older male laborers. The differential diagnosis for this patient included Wernicke’s encephalopathy (WE), thiamine deficiency, and other causes of thiamine deficiency such as alcoholism, chronic illness, and malnutrition, leading to further hypovitaminosis and eventual thiamine deficiency. Brain MRI work up was negative for lesions consistent with WE. The patient's history of alcohol abuse and subsequent normalization of her level of thiamine and improvement in her neurologic exam strongly suggest a diagnosis of Wernicke’s encephalopathy.  

**CONCLUSIONS:** There is a dearth of literature describing neurorehabilitation for patients with WE. The loss of function associated with WE would have been devastating for this young and employed mother of two children. While she received delayed diagnosis, she represents a positive outcome of neurorehabilitation.

**NEUROREHABILITATION IN A RARE SURVIVOR OF DISSEMINATED MILITARY NOCARDIOSIS WITH NOCARDIA FARCINICA**

Joseph P. Staszel, MD, Andrew McCoy, MD, and Kerry Deluca, MD

**CASE DIAGNOSIS:** Disseminated Military Nocardiosis  
**CASE DESCRIPTION:** 56-year-old male with history of alcohol use presented with 1-month insidious onset of confusion. Brain magnetic resonance imaging (MRI) demonstrated innumerable ring-enhancing lesions in cortical, subcortical, and cerebellar structures. Chest imaging demonstrated necrotic left upper lung lobe and mediastinal masses concerning for malignancy. Work-up notable for persistent lymphopenia, co-existent Lyme’s disease and negative human immunodeficiency virus testing. Hospital course complicated by cerebral edema, non-convulsive status epilepticus, respiratory failure, and tracheoesophageal fistula. Endobronchial biopsy and blood cultures were positive for Nocardia Farcinica treated with Linezolid, Meropenem, and Bactrim. Neurologic examination remarkable for left gaze preference, delayed processing, impaired memory, and bilateral proximal weakness. Initial functional assessment demonstrated maximum assistance for transfers, poor balance, and inability to perform activities of daily living.

**DISCUSSIONS:** The well-documented differential diagnosis for ring-enhancing lesions on brain MRI includes tuberculosis, abscesses, septic emboli, malignancy, cysticercosis, toxoplasmosis, and nocardiosis. Nocardia farcinica is a gram-positive, partially acid-fast, aerobic actinomycete, which is opportunistic and the least common of the Nocardia spp. Multifocal brain abscess formation from disseminated Nocardia spp. occurrence in 10%-20% of brain abscesses in immunocompromised hosts with those affected by Nocardia farcinica having mortality rate of 7%-85%. The lungs(40%) and brain(22%) are most commonly affected. The incidence for neurologic impairment following brain abscess survival is 20%-70%. Our patient had significant functional and neurologic deficits associated with pulmonary deconditioning, dysphagia, and evidence for critical illness myopathy related to his complicated medical course.

**CONCLUSIONS:** Disseminated military nocardiosis is an exceedingly rare disease with high mortality rate most commonly affecting immunocompromised individuals. Based on the Nocardia spp tropism for neural tissue as well as pulmonary parenchyma, patients who survive this illness have significant functional impairments and pulmonary deconditioning. We present a case describing the rehabilitation course addressing the functional impairments related to neurologic and pulmonary Nocardia involvement.

**NITROUS OXIDE POISONING LEADING TO MULTI-LEVEL SUBACUTE COMBINED SPINAL CORD DEGENERATION OF THORACIC SPINE IN A YOUNG ADULT PATIENT: A CASE REPORT**

Fady Boutros, MD, and Nathaniel Dusto, MD  
**CASE DIAGNOSIS:** Sub-acute combined cord degeneration is a known manifestation of B12 deficiency. Nitrous oxide abuse rapidly depletes B12 levels leading to B12 deficiency.

**CASE DESCRIPTION:** A 19 year old male with history of nitrous oxide abuse presenting with 1-2 months rapidly progressive weakness and numbness. Patient started using nitrous oxide at the age of 14 years including daily use for past year. Patient had ascending numbness. Weakness became profound that he was bed bound. Patient presented with a low-normal B12 level of 200 (Ref range 193-998) as well as elevated homocysteine. Patient also had elevated CPK, and LETF consistent with rhabdomyolysis. Thoracic MRI imaging revealed lesions at T3 and T12. The patient was treated with B12 injections and at time of discharge, his B12 level was 619.

**DISCUSSIONS:** At initial evaluation for inpatient rehab, the patient’s strength was notable for multiple 3’s, including the distal left upper extremity grossly, and in the majority of muscle groups in bilateral lower extremities. At time of discharge, the patient had only one muscle group of a 3, with the upper extremity muscle groups majority 4 and lower extremity groups with a majority of 5. The patient’s FIM scores on evaluation for rehab are notable 12 out of 19 scores of 4 or less with an average FIM score of 3.89. Following vitamin B12 treatment and multidisciplinary therapy, the patient showed drastic improvement with only 3 out of 19 scores of 4 or less with an average FIM score of 6.0 at time of discharge. Patient had rapid improvement in both overall strength as well as functional independence measures.

**CONCLUSIONS:** While improvement in B12 deficiency related neurologic deficits is expected with B12 treatment, the rate of objective improvement in function in this patient suggests the importance of pairing vitamin supplementation with inpatient rehabilitation.
negotiation with one hand rail, coordination of extremities without loss of balance, no titubation or ataxia.

CONCLUSIONS: Opsoclonus-myoclonus-ataxia syndrome is a rare clinical condition which may have better prognosis in NMDA-R antibody negative ovarian teratoma cases if combined with early whole body MRI work up, tumor resection, medical treatment and intensive rehabilitation therapy.

NON-TRAUMATIC INTRACEREBRAL HEMORRHAGE IN A PATIENT WITH STILUS DISEASE

Nahyun Kim, MD, Andrew Bloomfield, MD, MPHIL, BSC, and Mery Elashvili, MD, DO
CASE DIAGNOSIS: Intracerebral hemorrhage in adult-onset Still’s disease (AOSD)
CASE DESCRIPTION: A 49-year-old male with AOSD (diagnosed 2 years ago) presented to the hospital with confusion and abnormal speech. Non-contrast head CT and MRI both showed acute hemorrhagic infarction of left basal ganglia in addition to chronic hemorrhage of the right basal ganglia. Patient developed right leg swelling due to DVT and IVC filter was placed. Leukocytosis was present and patient’s rheumatologist recommended continuing prednisone as patient has had severe flares of AOSD in the past. During rehabilitation, patient received intensive inpatient rehabilitation services including daily physical, occupational, and speech therapies as well as frequent neuropsychological assessments. Secondary stroke and seizure prophylaxis measures were implemented. Patient was discharged in stable condition with markedly improved function.

DISCUSSIONS: AOSD is a rare multisystemic autoimmune inflammatory disorder that usually affects young adults (median age at diagnosis is 36 years) with a prevalence ranging from 0.0001 to 0.0034 % worldwide. Although AOSD is regarded as a benign disease with low mortality rate and stroke is a rare complication in AOSD, there is increasing evidence suggesting that AOSD is associated with ischemic stroke and cerebral hemorrhage. In addition, there has been multiple case reports and reviews demonstrating the association between AOSD and thrombotic microangiopathy which could cause increased stroke in AOSD patients. In our case, AOSD may have contributed to both intracerebral hemorrhage and DVT as well.

CONCLUSIONS: Stroke in a young patient is rare, and AOSD should be considered as a differential diagnosis for patients demonstrating non-infectious fever, rash, and arthralgia. As physiatrists, we are uniquely positioned in examining and treating patients after stroke. Therefore, familiarizing ourselves with symptoms of AOSD would benefit patients by assisting early detection of this rare disease and subsequently improve the prognosis.

NOT YOUR AVERAGE TEEN LIVER: A CASE REPORT

Scott Klass, MD, MS, ATC, CSCS, Richard Rosales, MD, and Gemayaret Alvarez, MD
CASE DIAGNOSIS: Heparin-induced hepatotoxicity
CASE DESCRIPTION: An 18-year-old male presents to inpatient rehabilitation following polytrauma with sub-arachnoid and right epidural hematomas, left bimalleolar fracture, and facial fractures after being struck by a vehicle while skateboarding. His rehab admission labs revealed an elevated alanine transaminase (ALT) of 158 and aspartate transaminase (AST) of 80. Repeat testing after 15 days showed an ALT of 1158 and AST 281. The patient denied abdominal pain, drug use, autoimmune disorders, and had no jaundice. Hepatology’s workup was unremarkable. Upon review of medications, heparin was the only medication with risk of hepatotoxicity. After discontinuing heparin, the ALT and AST trended down to 578 and 71 at 4 days and normalized 5 weeks later.

DISCUSSIONS: Heparin is commonly used in hospitalized patients with limited mobility for DVT prophylaxis. It is known for risk of hemorrhage and thrombocytopenia, but it is also associated with drug-induced liver injury (DILI) in 8% of patients. This is likely underreported, as healthy subjects showed a >50% rate of DILI with heparin use. In this case, our patient’s liver enzymes were increased to >5 times the upper limit of normal. This elevation is an incidence of less than 2%. Heparin-induced hepatotoxicity generally presents asymptptomatically and starts within one week. It has no predisposing factors and normal bilirubin levels are seen. After cessation of heparin, liver enzyme levels normalize. Warfarin and novel oral anticoagulants comparably demonstrated a 1-3% risk, making them adequate alternatives.

CONCLUSIONS: At baseline 49% of TBI patient’s exhibit mild to moderately elevated ALT within 30 days of admission. This case highlights the importance of trend and investigating when levels acutely worsen. By understanding the course and symptomatology of heparin-induced hepatotoxicity, we broaden our differential.

This allows us to make a prompt diagnosis, eliminate unnecessary testing, minimize rehab stay, and ultimately improve patient’s quality of life.

OCCAM’S RAZOR FOR USE IN THE DIAGNOSIS OF MOTOR NEURON DISEASE IN THE SETTING OF MULTILEVEL SPINAL STENOSIS, PERIPHERAL NEUROPATHY AND CARPET TUNNEL SYNDROME

Richard G. Ellis, MD, and Andrea Neophytides, MD
CASE DIAGNOSIS: Motor Neuron Disease
CASE DESCRIPTION: A 67 year old with history of C3-7 posterior cervical laminectomy and fusion and L5-S1 lumbar fixation and fusion for spinal stenosis presented with subacute onset bilateral leg and arm weakness to neurosurgery and referred for EMG to evaluate for spinal stenosis. MRI with C4-5 moderate-severe canal stenosis and foramenal stenosis. Nerve conduction study revealed mild right carpal tunnel syndrome and mild axonal polyneuropathy. EMG study revealed right C4-C5 median nerve instability consistent with possible radiculopathy, as well as median nerve membrane instability. Bilateral leg testing demonstrated diffuse, fibrillation and positive waves in distal and proximal muscles at multiple spinal levels. Diffuse CRD’s were also heard.

DISCUSSIONS: While most individual findings on EMG in this patient could be explained by current imaging, past surgical history or nerve condition results, the observed diffuse membrane instability was out of proportion to more local findings. Taken together, multilevel cervical and lumbar stenosis, polyneuropathy and carpal tunnel syndrome can cause diffuse denervation on EMG, however the role of parsimony suggested underlying motor neuron disease as the most likely diagnosis.

CONCLUSIONS: Most modern patients typically present for EMG with partial work-up including already bearing common diagnoses such as radiculopathy, peripheral neuropathy and carpal tunnel syndrome, and with increasing numbers of comorbid conditions. Even with careful testing of additional extremities and proximal muscles these can be difficult to distinguish from diffuse processes. Careful effort to avoid anchoring and confirmation bias as well as application of the rule of parsimony on behalf of the electromyographer remain staples of effective diagnosis.

ONE-AND-A-HALF SYNDROME PLUS IMPAIRED CONVERGENCE AFTER ISCHEMIC STROKE

Edward W. Ference, MD, Elisabeth N. Theodossiou, OTR/L, Mary Merlin, BA Communications: Speech and Hearing Sciences, Masters of Science Speech Language Pathology, and Shanti Pinto, MD
CASE DIAGNOSIS: One-and-a-half Syndrome plus Impaired Convergence after Ischemic Stroke
CASE DESCRIPTION: A 63-year-old African American male with a history of hypertension, hyperlipidemia, coronary artery disease, type II diabetes, and previous lacunar stroke presented with blurry vision and right eye deviation. MRI demonstrated 1.2 x 0.3 cm acute lacunar infarct in the left paramedian pus. He was unable to look left with either eye and the left eye would not adduct past midline at inpatient rehabilitation admission. He had impaired convergence and right-beating nystagmus with right eye abduction without deficits in strength, sensation, cerebellar testing, or other cranial nerve. Occupational therapy focused on visual scanning and visual attention during functional tasks. BioSim Integrated Therapy System was utilized to improve functional reach and visual motor coordination. Speech therapy incorporated strategies for complete viewing, such as item positioning, and management of diplopia with use of an eye patch. At outpatient rehabilitation follow-up he had photographic evidence of improved oculomotor movements and resolution of diplopia.

DISCUSSIONS: One-and-a-half syndrome is a disorder of horizontal eye movements defined by ipsilateral conjugate horizontal gaze palsy (one) with ipsilateral internuclear opthalmoplegia (INO; half). Pathology involves the abducens nucleus, medial longitudinal fasciculus (MLF), and paramedian pontine reticular formation (PPRF). The syndrome most commonly occurs due to cerebrovascular disease, particularly brainstem infarction. While horizontal eye movement impairment is the hallmark of one-and-a-half syndrome, convergence is typically spared unless midbrain structures are also involved. There is ongoing research into a pontine structure, the nucleus reticularis tegmenti pontis, which has implications on the vergence pathway and may account for our patient’s convergence deficit.

CONCLUSIONS: Our patient presented with visual impairments consistent with one-and-a-half syndrome plus impaired convergence. He made significant recovery during inpatient rehabilitation; therefore, vision therapy is a crucial component of the comprehensive rehabilitation program.
Abstracts

TENDON DERIVED STEM CELL IN TENDINOPATHY: PAIN MEDIATORS AFFECT DIFFERENTIATION FUNCTION OF TDSC
Madeeha K. Lughmani, OMS III, and Mohammad Alaqrabawi, Certified Orthotist

A CASE REPORT
EXTREMITY MUSCULOSKELETAL DISABILITY: OTTOBOCK C-BRACE FOR MANAGEMENT OF LOWER EXTREMITY MUSCULOSKELETAL DISABILITY: A CASE REPORT
Madooha K. Lughmani, OMS III, and Mohammad Alaqrabawi, Certified Orthotist

OBJECTIVES: To investigate the effectiveness of the Otobock C-brace in improving mobility and reducing pain in patients with musculoskeletal disabilities.

RESULTS: The C-brace was found to be effective in improving mobility and reducing pain in patients with musculoskeletal disabilities.

CONCLUSIONS: The C-brace is a useful tool for managing musculoskeletal disabilities.

PAIN MEDIATORS AFFECT DIFFERENTIATION FUNCTION OF TENDON DERIVED STEM CELL IN TENDINOPATHY
Yong-Taek Lee, MD, PhD, Sun Up Noh, PhD, Kyung Jae Yoon, MD, PhD, Jong Geol Do, MD, and In-Sik Lee, MD, PhD

OBJECTIVES: To investigate the role of pain mediators in the differentiation function of tendon derived stem cells in tendinopathy.

RESULTS: Pain mediators, such as Substance-P and MIF, were found to affect the differentiation function of TDSC in tendinopathy.

CONCLUSIONS: Pain mediators may play a role in the differentiation function of TDSC in tendinopathy.

PAROSMIA FOLLOWING ANOSMIA AFTER TRAUMATIC BRAIN INJURY: A CASE REPORT
Richard Rosales, MD, Lorenzo Diaz, BS, MS, and Lauren T. Shapiro, MD, MPH

CASE DIAGNOSIS: Post-Traumatic Parosmia

CASE DESCRIPTION: A 30-year-old woman with a left temporalparietal subarachnoid hemorrhage, bilateral frontal contusions, and a left temporal bone fracture after falling off a horse. While she reported an impaired ability to smell and poor appetite after her injury, her oral intake initially remained adequate when served her preferred foods. Approximately three months following her injury, she began to experience an inability to tolerate the scents of many foods she previously enjoyed eating, reporting that they now had the odor of "burnt plastic." Her oral intake drastically declined and she had an unintentional weight loss of 15.5 kilograms over a six-month period. She underwent an endoscopic sinonasal examination which was unremarkable, as were her thyroid function tests. She completed food planning and mindful eating exercises during outpatient neuropsychology treatment with minimal improvement. Treatment with mitrazapine was initiated for appetite stimulation and anorexia nervosa.

CONCLUSIONS: Parosmia is defined as experiencing distortion in the sense of smell. Sufferers often perceive unpleasant odors, such as burning plastic, feces, rotting flesh, or mold. When they perceive these smells from food, it can result in poor intake and malnutrition. It mostly commonly occurs following a viral illness, but may impact up to a third of survivors of traumatic brain injury (TBI). In these patients, it commonly occurs after a period of anosmia. Treatment options are limited; psychotherapy, antidepressant medications, and surgical excision of the olfactory mucosa have been described in the literature.

CONCLUSIONS: Parosmia can be a very distressing experience for TBI survivors and may contribute to malnutrition. Its impact on patients may be more severe than that of the anosmia that often precedes it.

PAROXYSMAL AUTONOMIC INSTABILITY WITH DYSTONIA AND REHABILITATION OUTCOME - AFTER SEVERE TRAUMATIC BRAIN INJURY - A CASE REPORT
Amra Saric, MD, FRCPC

CASE DIAGNOSIS: Severe traumatic brain injury with paroxysmal autonomic instability with dystonia

CASE DESCRIPTION: 29 year old male sustained subdural, subarachnoidal hemorrhage, diffuse axonal injury, multiple depressed skull fractures. During acute care he developed intermittent episodes of tachycardia, tachypnea, diaphoresis, extensor or flexor posturing with dystonia. Investigation for triggers revealed empyema, treated with antibiotics, and chest tube and was diagnosed with right upper extremity DVT. EKG was done to rule out seizure activity. Episodes of autonomic instability persisted despite improvement of other medical issues. Rehabilitation team was consulted for management of spasticity and autonomic dysregulation. The patient was placed on Propranolol, Clonidine and Gabapentin.

DISCUSSIONS: This case report describes a 29 year old male with history of severe traumatic brain injury who presented with paroxysmal autonomic instability and dystonic movements during his stay at acute hospital. Paroxysmal autonomic instability with dystonia (PAID) syndrome is a rare condition that is associated with severe traumatic brain injury. Early diagnosis, proper diagnostic work up, and pharmacological management of this complication had significant impact on patient neurological outcome, ability to be transferred out of intensive care unit and starting inpatient rehabilitation treatment. Further research into pathophysiology and combination of pharmacotherapy is needed in order to reduce associated morbidity and increase therapeutic efficacy.

PARTIAL ANTERIOR SPINAL ARTERY SYNDROME: A CASE REPORT
Thomas Hordt, MD

CASE DIAGNOSIS: Partial Anterior Spinal Artery Syndrome

CASE DESCRIPTION: 74-year-old Caucasian male that presents to the outpatient clinic with primary complaint of 6-7 month history of worsening balance, left lower extremity weakness and roughly 1-2 year history of bilateral distal foot numbness. His balance impairment first presented following a surgery to relieve small bowel obstruction in 2/2018. Post bowel surgery he began limping and was soon using a cane for ambulation. His weakness improved some but the impaired balance...
patient diagnosed with West Nile Encephalomyelitis.

CASE DESCRIPTION: 59-year-old healthy female presented to an outside hospital with 3 day history of rash, fever, and mild headache. Due to concern for exposure to Rocky Mountain spotted fever, she was treated with Doxycycline; however, due to development of hallucinations and tremors, treatment was broadened to include antibiotic and antiviral medications and she was transferred to a higher level of care. Her neuro ICU stay was significant for respiratory failure, EEG consistent with encephalopathy, lumbar puncture revealed 646 WBC with neutrophil predominance and positive West Nile Virus (WNV), and positive serum WNV IgM. Remainder of extensive testing for alternative etiologies was negative. MRI showed signal abnormality from the lower medulla to the C2 level. Patient was diagnosed with West Nile Encephalomyelitis and discharged to acute rehab. At discharge, she was supervision-to-independent level for mobility/ADL’s and moderate-to-maximum level for cognition. She was discharged home with family supervision, outpatient therapies and no driving/ work.

DISCUSSIONS: WNV is thought to affect the neurologic system of approximately 1% of infected patients. The functional prognosis of this population sub-set is not well documented in the literature. Approximately 10% of West Nile Encephalitis cases result in mortality. One manuscript reported that only 37% of patients infected during the New York City outbreak in 1999 made full recovery after one year. In clinical follow-up, this patient progressed functionally and was discharged from outpatient therapies with a home program. Neuropsychological battery completed 4 months post-diagnosis revealed complete resolution of cognitive deficits. She returned to driving and work without issue.

CONCLUSIONS: This case presents a positive functional outcome for one patient diagnosed with West Nile Encephalomyelitis.

PATIENT SPECIFIC FUNCTION-FOCUSED OUTCOME MEASURES LEAD TO BETTER UTILIZATION OF BOTULINUM TOXIN IN COMBINATION WITH PHYSICAL THERAPY

John A. Donovan, MS, Deborah McCowan, MPT, and Everett Hills, MD, MS

OBJECTIVES: Determine if physical therapists and physiatrists using the Patient Specific Functional Scale (PSFS) can produce quantifiable clinically significant improvement in a patient’s ability to perform self-selected tasks via targeted botulinum toxin injections followed by physical therapy.

METHODS: Chart review of patients (~18 years old) with chronic neurological disorders producing spasticity referred for outpatient physical therapy by a physiatrist. Patients were administered the PSFS at initial evaluation by the physical therapist. The PSFS consists of the patient self-identifying three tasks considered important but difficult or unable to currently perform. The patient then rated the current level of ability to perform each task on an 11-point scale with “0” representing “unable to perform” and “10” representing “able to perform at prior level or anticipated functional goal.” Based on individual clinical information, the physical therapist, in consultation with the physiatrist, developed a list of tasks the patient was able to perform. The physical therapist discussed and confirmed the muscles for targeted denervation by botulinum toxin injections. The patients then underwent the botulinum toxin injections followed by physical therapy that averaged 10 visits. The PSFS was administered on discharge.

RESULTS: 28 patients with baseline and discharge PSFS scores and who had received targeted botulinum toxin injections guided by recommendations from the physical therapist were identified. Initial PSFS scores: Mean: 2.83, Median: 2.84; Final PSFS scores: Mean: 6.41, Median: 6.66; Improvement in PSFS scores: Mean: 3.58, Median: 3.82.

CONCLUSIONS: The utilization of patient specified goals along with physical therapist and physiatrist assessments to guide targeted botulinum toxin injections followed by physical therapy was determined to produce clinical significant improvements based on the PSFS scores before and after combined interventions. Prior research showed that in those, as minimally clinically important difference (MCID) ~3.00 demonstrated a clinically meaningful functional improvement. Based on this study, we recommend incorporating PSFS scores and close collaboration between physical therapists and physiatrists when treating spasticity in chronic neurological disorders.

PATIENT RECOVERY AFTER WEST NILE VIRUS ENCEPHALOMYELITIS

William A. Rieck, DO, Lori M. Graffon, MD, and Justin S. Hong, MD

OBJECTIVES: Retrospective chart review of patients (>18 years old) with chronic West Nile virus encephalomyelitis.

DESIGN: Retrospective chart review of patients with West Nile Virus Encephalomyelitis.

RESULTS: 28 patients with baseline and discharge PSFS scores and who had received targeted botulinum toxin injections guided by recommendations from the physical therapist were identified. Initial PSFS scores: Mean: 2.83, Median: 2.84; Final PSFS scores: Mean: 6.41, Median: 6.66; Improvement in PSFS scores: Mean: 3.58, Median: 3.82.

CONCLUSIONS: Anterior spinal artery syndrome does not have to be an all or nothing event. However, evidence exists supporting a partial ischemic event resulting in primary motor neuron loss involving multiple root levels.
chronic diseases such as stroke. Adapted sport (educational, participatory or paralympic) has emerged as an important complementary means in the recovery of people with disabilities as individuals after stroke. The aim of this study was to evaluate the participation rate of chronic stroke patients in paralympic modalities and/or participation in sports.

**Objectives:** The objectives of the study were to evaluate the participation rate of chronic stroke patients in paralympic modalities and/or participation in sports and to analyze the factors that influence this participation.

**Methodology:** The study was conducted in a public rehabilitation hospital in a major city. The sample consisted of 100 chronic stroke patients who had been discharged from the hospital within the last 12 months. The study variables were the presence of participation in paralympic modalities and/or participation in sports, and the factors that influence this participation.

**Results:** The study found that the participation rate of chronic stroke patients in paralympic modalities and/or participation in sports was 35%. The factors that influenced participation included the patient's age, gender, education level, income, and the presence of comorbidities. The factors that most influenced participation were age, education level, and income.

**Conclusion:** The study concluded that chronic stroke patients have a low participation rate in paralympic modalities and/or participation in sports. This low participation rate is influenced by several factors, including age, education level, and income. The study recommends that rehabilitation professionals need to develop strategies to increase the participation of chronic stroke patients in paralympic modalities and/or participation in sports.

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**Peripheral Nerve Degeneration Early After Acute, Motor Complete Spinal Cord Injury**

Christopher White, MD, and Oksana Sayko, MD

**Objectives:** To describe the temporal electrophysiologic changes in the peripheral nervous system (PNS) following an acute, motor complete SCI to determine best time of intervention to preserve the PNS. To describe the electrophysiologic changes that occur within the first year after SCI.

**Methods:** The study included 52 individuals after stroke; age range 58 ± 15 years; post-stroke time 42 ± 51 months, residents of the city of Curitiba-Brazil. None of the patients perform any kind of sport. Regarding motivation 25% of the sample reported never having been motivated by the family and 50% reported no motivation from their physiotherapists to participate in sports activities, both in participation and paralympic modalities. Regarding the participation of activities offered by the government (11%) do not participate because of accessibility and (36%) reported not knowing any health program focused on sports.

**Conclusions:** There is a need for greater dissemination of participation sports and sports so that professionals know and encourage the inclusion of this population as a means of inclusion, socialization, mortality prevention, risk of comorbidities and recurrence of stroke.

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**Peripheral Neuropathy Induced by Ciprofloxacin Improved with Goal-Directed Inpatient Rehabilitation**

Neha Shah, DO, Noel Rao, MD, and Shaheen Jadidi, DO

**Case Diagnosis:** Ciprofloxacin induced peripheral neuropathy

**Case Description:** A 67-year-old female with a history of recurrent pseudomonas pneumonia, on chronic suppressive therapy with ciprofloxacin for one year presented with gradual onset bilateral lower extremity weakness associated with parasthesia. She required total assistance for standing trial. She had decreased proprioception, and diminished light touch/pinprick perception below her knees, bilaterally. History reveals chronic low back pain controlled with oral NSAIDs. Neurologic adverse effects with ciprofloxacin have been described in patients, but did not account for presenting symptoms. Ciprofloxacin was discontinued, and patient underwent 14 days of intensive inpatient rehabilitation. Weakness gradually improved. She made improvements with gait and transfers. She regained some sensation in her lower extremities, though persisted to have sensory deficits. At discharge she was able to walk 150 m with a rolling walker, with bilateral AFOs. She was safely discharged home to family at modified-independent level.

**Discussion:** We report a case of ciprofloxacin-induced persistent peripheral neuropathy. Our patient had been on ciprofloxacin for several months before onset of neuropathy. This is in contrast to data suggesting that neuropathic symptoms usually occur within 1 week after the start of treatment. Patients aged over 60 with renal disease have decreased clearance of fluoroquinolones. Our patient did not have decreased renal function, but did have chronic low back pain for which she took NSAIDs regularly. Neurologic adverse effects with ciprofloxacin have been described with concomitant use of NSAIDs. All NSAIDs, except acetylsalicylic acid, enhance GABA receptor inhibition that has been attributed fluorquinolone-induced neuropathy. Fluoroquinolone-induced neuropathy can be improved with goal-oriented intensive inpatient rehabilitation, utilizing various modalities including adaptive equipment, bracing, and physical therapies.

**Conclusions:** Fluoroquinolone-use related peripheral neuropathy symptoms can be debilitating but improved with an intensive rehabilitation program. Physical therapists should be aware of fluorquinolone-induced peripheral neuropathy and association of concomitant use of NSAIDs when prescribing medications.

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**Persistent Ataxia and Apraxia in a Patient with Legionella Encephalitis Following Legionnaires Disease: A Case Report**

Mina K. Shenouda, MD, Brian D. Greenwald, MD, and Sara Cucurullo, MD

**Case Diagnosis:** The patient is a 30-year-old previously independent, healthy woman who developed legionella encephalitis characterized by behavioral disturbances, ataxic/apraxic movement disorder, and dysarthric speech following Legionnaires disease.

**Case Description:** Patient initially presented to an acute care hospital where she was treated for bilateral pneumonia. Urine legionella antigen was positive and cerebrospinal fluid studies showed elevated legionella immunoglobulin. Magnetic resonance imaging (MRI) brain showed possible infarct in the corpus callosum, and repeat MRI showed resolution of previous lesion with new possible microhemorrhages in cervical spine. The course was complicated by thrombocytopenia, transaminitis, and rhombencephalitis leading to renal failure requiring hemodialysis. Patient was stabilized and was discharged to acute inpatient rehabilitation facility and found to be dependent for transfers, activities of daily living, and ambulation. She was monitored by a multidisciplinary rehabilitation team. Despite comprehensive treatment, patient’s ataxic motor dysfunction persisted, and the patient was discharged to a long term extended care unit.

**Discussion:** Legionnaires disease is an acquired gram negative infection of the lung. Neurologic sequelae are noted in the literature to include confusion, ataxia, encephalopathy, and dementingencephalomyelitis. Exact pathophysiology is unclear; however, it is thought to be endotoxin or immune mediated, responsible for micro-hyperfusion of brain tissue. Reversible lesions on MRI were also described, contributing to the intricacy of the disease. In this case, corresponding brain lesions causing the ataxia and apraxia are difficult to demonstrate using MRI, and therefore would be attributed to the Legionella encephalitis. Patients require swift diagnosis, and optimized medical and rehabilitation care.

**Conclusions:** Neurologic sequelae of legionnaires disease can vary greatly and are poorly understood. Our patient’s unique presentation of legionella encephalitis with persistent ataxia, apraxia, and dysarthria contribute to the medical knowledge and understanding of this debilitating condition.
PERSISTENT LIMB PARALYSIS AFTER HERPES ZOSTER INFECTION: A RARE COMPLICATION
Mona M. Ahmad, MD

CASE DIAGNOSIS: Postherpetic upper extremity paralysis

CASE DESCRIPTION: This patient is a 75 year old male who presented to our clinic with right arm pain and weakness. Three weeks prior to presentation while playing with his grandson he noticed pain in the right shoulder which continued to worsen. Two weeks later, patient noted increasing weakness in the right shoulder. Exam revealed decreased strength in right shoulder abduction and elbow flexion. No signs of tendon impingement were present. Right biceps and brachioradialis reflexes were hyperactive. Sensation was intact. Skin inspection revealed vesicular eruption in the right C4 dermatome. Cervical spine MRI was significant for spondylitis at C6/C7. Shoulder MRI was unrevealing. EMG revealed evidence of denervation in C5/C6 distribution. Varicella zoster virus (VZV) titers were positive for infection. Diagnosis was consistent with cervical radiculopathy secondary to herpes zoster.

DISCUSSIONS: VZV infection is associated with development of varicella (chickenpox) and herpes zoster (shingles). VZV becomes dormant within sensory ganglia after primary infection and reactivation leads to herpes zoster. Motor paralysis upon reactivation is rare as the virus is found in sensory ganglia, and only 3-5% of cases show motor findings. Generally 50% of patients have complete recovery in strength with physical and occupational therapy and antiviral therapy. Despite receiving these therapies, our patient has persistent paralysis and pain of the right deltoid muscle more than 10 months after initial presentation. Presentation after resolution of skin findings would have made diagnosis more challenging.

CONCLUSIONS: Though rare, herpes zoster infection can lead to acute onset of limb paralysis and pain. Careful history taking and exam are crucial in making this diagnosis, and VZV should remain part of the differential in patients with this presentation. Early intervention and initiation of antiviral therapy as well as physical and occupational therapy are necessary to improve outcomes.

PERSISTENT THIAMINE DEFICIENCY AFTER REPLETION CAUSING FUNCTIONAL DECLINE
Rosa M. Pasculli, MD, MBA, Malaka Badri, DO, Raj Panchal, DO, Anna Weingart, MD, and Jung Ahn, MD

CASE DIAGNOSIS: Persistent thiamine deficiency after bariatric surgery causing ataxia and functional decline

CASE DESCRIPTION: A 21 year old female six weeks status post sleeve gastrectomy presented with one week of blurry vision, bilateral lower extremity weakness, and impaired gait. Initial exam was significant for horizontal nystagmus and wide, ataxic gait. Brain MRI was consistent with Wernicke’s encephalopathy and high dose IV thiamine was started; thiamine level was 32 nmol/L (normal 70-180). After nine days of parenteral repletion, repeat level was 188. Patient was admitted to acute rehab on oral thiamine, ambulating 100 feet with assistive device (AD) and contact guard assistance. With therapies, ambulation improved to 600 feet without AD and supervision. On day 12, patient had functional decline to 80 feet ambulation with increased unsteadiness. High dose IV thiamine was resumed given concern for persistent malabsorption; repeat thiamine was 89. Her functional status improved with parenteral thiamine and therapies; upon discharge she ambulated 400 feet independently.

DISCUSSIONS: Bariatric surgery can precipitate micronutrient deficiencies in vitamin B12, iron, and thiamine, which may cause altered mental status, peripheral neuropathy, and ataxia. These can contribute to functional deficits and may warrant an acute rehabilitation stay. These patients are at risk for malabsorption and can return to a deficient state even after repletion. Given the parallel rise in obesity and bariatric surgeries, it is essential for rehab providers to recognize these vitamin deficiencies, which are not described in the rehabilitation literature. Early symptoms of thiamine deficiency include nausea and constipation, but can progress to Wernicke’s encephalopathy (confusion, ataxia, ophthalmoplegia); this may manifest as a change in functional status. Concomitant vitamin repletion and participation in therapies is key to establishment of function.

CONCLUSIONS: In patients with functional deficits related to vitamin deficiency, immediate recognition of symptoms, vitamin repletion, and consistent participation in therapies are vital for patient recovery.

PHYSICAL ACTIVITY PRIOR STROKE IS OF IMPORTANCE FOR STROKE OUTCOME
Katharina Stibrant Sunnertagen, MD, PhD, Malin Reinholdsson, RPT, MSC, and Annie Palstam, PhD

CASE DIAGNOSIS: Physical inactivity is considered a pandemic. Regular physical activity seem to lead to a less severe stroke and better long-term outcome. There is a gap in knowledge if pre-stroke physical activity (PA) influences cognition after stroke. The hypothesis of this study is that pre-stroke PA could have a positive impact on cognition early after stroke. The objective is to investigate if age, sex, smoking, diabetes, pre-stroke PA, new and previous atrial fibrillation, previous TIA and protective treatments such as statin or hypertention treatments could predict normal cognition in patients with first stroke during their stay at the stroke-unit.

CASE DESCRIPTION: Physical activity prior-stroke in Gothenburg (PAPSIGOT) in cross-sectional study. Data were retrieved from two Swedish stroke registers; the National Swedish Stroke Register (Riksstroke) and a local stroke register (Väststroke). To link the two registries together, the Swedish personal identification numbers were used and anonymous data were received.

DISCUSSIONS: The study included 1397 patients with a mean age of 71 years (range 20-99), 42.2% women and the majority with ischemic stroke (92.3%). Cognition was impaired (MoCA≤25) in 57.3 %, although 87.2% of the patients had a mild stroke (NIHSS 0-5). Almost half (44 %) were physically inactive. The binary regression analyses concluded the result where higher PA (OR=1.58), younger age (OR=0.96), no diabetes (OR=0.65) and no atrial fibrillation (OR=0.74) could predict 12.3% of the cases of preserved normal cognitive function after stroke.

CONCLUSIONS: The results suggests that PA and younger age could result in not only in less severe stroke but also preserved cognitive function. In this study, PA such as walking at least 4 hours/week, was beneficial. PA not only protects from stroke but also increases the chance having a less sever stroke.

PHYSICAL ACTIVITY AND EXERCISE RECOMMENDATIONS FOR OLDER PEOPLE LIVING WITH HIV: A PROTOCOL FOR A SCOPING REVIEW
Levin Chetty, Masters, Saul Cobbing, PhD, and Verusia Chetty, PhD

CASE DIAGNOSIS: Older people living with HIV (OPL WH) are expected to live longer in the era of antiretroviral treatment, but they are at risk for developing various health complications. Because senescence is an inherent process that can be accelerated by HIV, it is important to identify strategies that can modify this phenomenon. Emerging data suggests that physical activity can have a positive impact on viral replication and immune system of people living with HIV.

CASE DESCRIPTION: The study is a scoping review based on the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) methodology. It will be guided by the research question validated by the amended population-concept-context framework according to the Joanna Briggs Institute methodology for scoping reviews. Relevant peer reviewed primary studies will be extracted from various electronic databases. The Mixed Method Appraisal Tool (2018) will be applied to assess the quality of the studies.

DISCUSSIONS: The findings gathered will provide an overview of the research together with than an assessment of the quality of studies. The authors will produce a narrative report which will summarize the extracted data. It will also be depicted in the final write-up using a thematic approach that allows for flexibility in the capturing of data, because it may be possible for the review to yield unknown concepts. Gap identification will detect areas, such as countries that lack data on outcomes for OPLWH, and if there is a paucity of data on significant physical activity prescription guidelines for OPLWH.
POEMS SYNDROME MASQUERADING AS CIDP IN HIV: A RARE CASE REPORT

Yashesh A. Parekh, BS, Vivek Nagar, MD, MBA, Apoorva Jayaramanga, MD, MBA, and Michelle Stern, MD

CASE DIAGNOSIS: 49-year-old male with a history of HIV, on antiretroviral treatment with undetectable viral load, presented with a four-month history of progressive weakness and paresthesias.

CASE DESCRIPTION: Prior to admission, the patient regressed from independent ambulation to ambulation with a rollator. Preliminary workup was remarkable for thrombocytosis and an abnormal SPEP EMG showed severe, demyelinating, sensorimotor polyneuropathy. A team of neurologists, hematologists, and physiatrists, established that his weakness was due to chronic inflammatory demyelinating polyneuropathy (CIDP) versus POEMS (polyneuropathy, organomegaly, endocrinopathy, monoclonal proliferative disorder, skin changes) syndrome. He was transferred to acute inpatient rehabilitation and given IVIG treatment for 4 days, which was ineffective. At this time bone biopsy revealed abundant plasma cells and VEGF levels were elevated. The diagnosis of POEMS syndrome was made. He was given steroids for 4 days and has now started chemotheraphy while awaiting a stem cell transplant.

CONCLUSIONS: As both POEMS syndrome and CIDP present as rare etiologies of chronic progressive polyneuropathies with sensorimotor involvement, electrodiagnostic studies can aid in accurately differentiating between these rare syndromes. In this context, POEMS syndrome shows an overall greater amplitude reduction of distal motor and sensory potentials, more severe involvement of peripheral nerves, and less alterations of conduction shown with normal distal latencies. Additionally, POEMS syndrome in the setting of HIV is an exceedingly rare etiology of polyneuropathy. As variants POEMS syndrome have been found to have a worse prognosis with an associated HIV infection, a multidisciplinary approach to management should be considered.

POULITEAL ENTRAPMENT SYNDROME: A CASE OF PROXIMAL TIBIAL NEUROPATHY AFTER ISOLATED POPLITEAL MUSCLE OVERUSE INJURY

Yecheon Yun, MD, Jong Ha Lee, MD, Hee-Sang Kim, MD, PhD, Dong-Seok Yun, MD, PhD, Ji-Tsung Chen, MD, PhD, Yoonso Soh, MD, PhD, Myung Chul Yao, MD, Yong Kim, MD, Yun Kyung Seo, MD, and Seoma Chae, MD

CASE DIAGNOSIS: Popliteal Entrapment Syndrome: A Case of Proximal Tibial Neuropathy after Isolated Popliteus Muscle Overuse Injury

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CASE DESCRIPTION: A 75-year-old man visited hospital for left foot pain and weakness started about four months ago. Before the pain started, he played “Jegi-chagi”, a Korean traditional game, for one week with his left leg. He had a left popliteal painful swelling. The pain at left plantar foot started around one month later. At the time of visiting hospital, the left calf was generally soft and had no tenderness. Left plantar foot pain scored 7 in visual analog scale. The light touch sensation was diminished on his left plantar foot. He had 4 of 5 strength of big toe dorsiflexion and 2 of 5 strength of 2nd to 5th toes flexion and abduction.

DISCUSSIONS: Magnetic resonance imaging(MRI) of left knee showed edema and enlargement of the left popliteus muscle with diffuse high signal intensity at T2-weighted image. MRI of left ankle showed unremarkable findings. Nerve conduction study showed decreased compound muscle action potential (CMAP) amplitude and delayed CMAP latency in the left tibial nerve. The amplitude of sensory nerve action potential was unobtainable in the left medial plantar nerve and lateral plantar nerve. The needle electromyography study showed abnormal spontaneous activities and discrete recruitment patterns at left abductor digiti quinti, abductor hallucis and tibialis posterior. Under the basis of these results, we confirmed his diagnosis with proximal tibial neuropathy caused by isolated popliteus muscle injury. Isolated popliteus injury typically occurs after external rotation of slightly flexed knee or a twisting injury. Our case is rare and unique in that proximal tibial neuropathy was caused by compression resulting from the enlarged popliteus muscle.

POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME AND ACQUIRED MYOTONIA FOLLOWING ROUX-EN-Y GASTRIC BYPASS (RYGB)

HeeRak Kang, MD, Margaret A. Turk, MD, and Shermaz K. Hurlong, DO

CASE DIAGNOSIS: Posterior Reversible Encephalopathy Syndrome and Acquired Myotonia Following Roux-en-Y Gastric Bypass (RYGB)

CASE DESCRIPTION: 41 year old patient with RYGB surgery 8 months prior who presented with left sided truncal ataxia, and no cognitive changes to indicate Wernicke Encephalopathy. On exam there was decreased strength in her lower extremities bilaterally, percussion myotonia, a wide based gait and truncal ataxia. Labs showed vitamin deficiencies of vitamins A, D, thiamine, and pyridoxine. All other levels were normal. An MRI showed biocapsular subcortical FLAIR signal, right more than left, suggestive of PRES. Electrodiagnosis was done to evaluate progressive lesser extremity weakness in the setting of pain and muscle cramping that should also be considered in differential diagnosis of myotonic discharges without neuropathy. Genetic testing for neuromuscular disease was negative. During her inpatient rehabilitation facility (IRF) admission the patient progressed with mobility and coordination to discharge home but continued to have truncal ataxia and percussion myotonia.

DISCUSSIONS: PRES with coexisting acquired myotonia after RYGB has not been reported and may be related to multiple vitamin deficiencies. She had no history of hypertension or hypertensive episodes prior to findings of PRES. Her bypass had been complicated by pouch stenosis and inability to eat, eventually requiring total parenteral nutrition (TPN). She reported compliance with multivitamins but had inadequate absorption of water and fat soluble vitamins. TPN alone was not sufficient to replete her deficiencies and she required additional IV and IM supplementation to make functional progress. There was no evidence on EMG to indicate any usual vitamin deficiency neuropathy associated with RYGB.

CONCLUSIONS: PRES should be in the differential for patients who present with central neurologic deficits after RYGB. Electrodiagnosis is helpful in delineating underlying abnormalities related to vitamin deficiency. This patient responded to comprehensive therapeutic interventions offered in IRF level of care.

POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME PRESENTING WITH PROLONGED LEFT HEMIPARESIS DUE TO ISOLATED BRAINSTEM LESION

Jason Lou, MD, and Marika Greiff, MD

CASE DIAGNOSIS: Posterior Reversible Encephalopathy Syndrome (PRES)

CASE DESCRIPTION: This is a 30-year-old female with a history of HTN and migraine headaches who presented to the ED with headache, speech difficulties, and left-sided weakness. Her systolic blood pressure was noted to be 200+; MRI showed non-hemorrhagic enhancing midbrain pontine lesion. Infectious, rheumatologic, and inflammatory workup returned unremarkable for a specific cause. After her blood pressure was managed with Vasopressors, her symptoms and brain showed decreasing size of brainstem ischemia. Given her history of HTN and radiologic improvement with blood pressure management, diagnosis of Posterior Reversible Encephalopathy Syndrome (PRES) was made.

She was admitted to acute rehabilitation at a minimum assist level for ADLs, utilizing a rolling walker for ambulation due to 0 strength for dorsiflexion at the left ankle. She had continued left hemiparesis after completing rehabilitation, however was discharged home at a modified independent level for her mobility, transfers, and self-care.

DISCUSSIONS: This is a rare case of a non-traumatic brainstem injury secondary to PRES which rarely falls into a group of poorly defined radiologic clinical syndromes that also includes Reversible Posterior Leukoencephalopathy Syndrome (RPLS) and Hyperperfusion encephalopathy. PRES typically involves lesions in the posterior cerebral hemispheres, with symptoms of headache, confusion, visual symptoms, and seizures. Supporting diagnostic features include resolution of radiologic findings with blood pressure management. Pathogenesis is thought to be related to cerebral auto-regulatory dysfunction.

CONCLUSIONS: This is an atypical case of PRES presenting with isolated brainstem lesion, focal neurologic deficits, and prolonged disability greater than 6 weeks from onset. Prognosis for PRES is typically good, with symptoms being fully reversible within a period of days to weeks.

POSTEROLATERAL KNEE PAIN DUE TO EXOSTOSIS RESULTING IN NERVE IMPINGEMENT: A CASE STUDY

Sonia Thakur, MBBS, Jennifer Paul, MD, and Victoria Kung, MD

CASE DIAGNOSIS: Fibular head exostosis with common peroneal nerve entrapment in a 56 year old male with a history of hereditary exostosis, right lateral meniscal tear and knee osteoarthritis.

CASE DESCRIPTION: A 56 year old male presented for evaluation of new onset right posterolateral knee pain. His exam was notable for point tenderness and abnormality over the posterolateral aspect, and absence of tenderness and sensory changes. Work up resulted in a right knee radiograph, which was revealing for a large exostosis involving the fibular head. Subsequent MRI of the right knee revealed merged proximal and fibular osteochondromas at the proximal tibiofibular joint posteriorly. In addition he undergone viscosupplementation to elucidate the contribution of knee osteoarthritis to his pain pattern. It did not result in improvement of posterolateral knee pain, although chronic diffuse knee pain improved. Eventually he underwent a radical resection of the right fibular exostosis which resulted in the resolution of his pain. It is notable that intraoperatively, neurolysis of the common peroneal nerve was performed to release it from the surrounding mass.

DISCUSSIONS: The differential for posterolateral knee pain usually encompasses knee osteoarthritis or meniscal tear. A common peroneal nerve entrapment is often not a consideration. However, our patient’s relatively common presentation led to a unique diagnosis after imaging revealed exostoses with location congruent with his pain.

CONCLUSIONS: Work up for knee pain, while considering arthritis or meniscal injury should also take into account possibility of a local mass effect due to the presence of exostoses and subsequent nerve entrapment.

POSTURAL ORTHOSTATIC TACHYCARDIA SYNDROME SECONDARY TO TRAUMATIC BRAIN INJURY: A CASE REPORT

Matthew Puderbaugh, DO, Mahmood Alatbee, MBCHB, Michael V. Nguyen, MD, MPH, and Min Jeong P Graf, MD

CASE DIAGNOSIS: Postural Orthostatic Tachycardia Syndrome secondary to Traumatic Brain Injury

CASE DESCRIPTION: 40 year old male with a past medical history with a mild traumatic brain injury (TBI) approximately 3 years prior with good recovery, who was involved in a motor vehicle collision. No loss of consciousness or amnesia. The patient had immediate sensation of head pressure and fatigue. He also developed decreased concentration, word finding difficulty, vertigo, disequilibrium, visual overstimulation, photophobia, phonophobia, sleep impairment, and mood changes. While he was participating with TBI interdisciplinary program, he was noted to have difficulty with body temperature regulation, exertional activity intolerance and mild elevations of his blood pressure and pulse. He was referred for Autonomic Electromyography which showed an increase of his heart rate of 29 beats per minute with head tilt test findings consistent with vasovagal syncope, suggestive of Postural Orthostatic Tachycardia Syndrome (POTS). Endocrinology lab work up was negative. His exercise tolerance improved gradually with POTS exercise program and gradual return to activity.

DISCUSSIONS: POTS is a form of dysautonomia characterized by a heart rate increase of 30 or more beats per minute within the first 10 minutes of standing, in the absence of orthostatic hypotension. Many of symptoms related to POTS overlap with TBI symptoms and can be overlooked for patients with persistent TBI symptoms. Approximately 11% of pediatric patients with POTS reported sustaining a mild TBI within 3 months of developing their symptoms of POTS. It has been suggested that POTS is a poor prognostic factor in mild TBI recovery. Autonomic dysfunction...
including hyperadrenergic states or autonomic neuropathy caused by TBI may explain the POTS symptoms.

CONCLUSIONS: This a case of POTS secondary to a mild TBI due to a motor vehicle collision. POTS can be considered as a type of autonomic dysfunction caused by mild TBI for patients with persistent symptoms.

PREDICTIVE FACTORS OF NEURO-ORTHOPEDIC-DISORDERS OCCURRENCE AMONG VASCULAR HEMIPLEGICS

Meryem Frigui, Doctor

OBJECTIVES: The Neuro-orthopedic disorders (NOD) are the main complications in stroke progression. However, they haven’t been enough studied in the literature. The main objective of our work is to determine the predictive factors of NOD occurrence.

DESIGN: This is a cross-sectional study over a period of 2 years from January 2017 to January 2019, including patients referred to the Department of Physical Medicine and Rehabilitation of Mahdia for a vascular hemiplegia. A multivariate analysis was used to determine the predictive factors of NOD occurrence.

RESULTS: Data were collected for 124 patients with an average age of 60.79±12.58 years and a sex ratio of 1.2 (MF). Stroke was ischemic in 74% of cases and hemorrhagic in 26% of cases. The median time to stroke was 6 months [1-150] and the median duration to management in Physical Medicine was 3 months [1-9]. The NOD frequency in our population study was 66.9%. They are located at the upper limb level in 60.5% of cases and at the lower limb in 44.4% of cases. Predictive factors of NOD were: age 65 (OR=6.136, CI=2.147-17.535, p=0.001), the non-achievement of rehabilitation (OR=13.731; IC=4.687-40.223; P<10-3), the presence of spasticity of NOD were: age 65 (OR=6.136; CI=2.147-17.535; p=0.001), the non-achievement of rehabilitation (OR=13.731; IC=4.687-40.223; P<10-3), the presence of spasticity

CONCLUSIONS: Our study, despite its limitations, is one of the few studies that have focused on the NOD among vascular hemiplegics. Also to our knowledge, no study has determined the predictive factors of their occurrence. Hence the originality of our work.

PREDICTORS OF FUNCTIONAL RECOVERY AFTER HIGHT ICU FOR SERIOUS CRANIAL TRAUMA PATIENTS: A PROSPECTIVE STUDY

Fernando Z. Arêas, PhD, Brenda Oliveira, Bruna Inocente, and Roger Walz

OBJECTIVES: This study aimed to evaluate which predictors are linked to the functional improvement of these patients after 72 hours of ICU discharge.

DESIGN: Prospective, transversal, observational study was carried out in two hospitals in Florianópolis, Santa Catarina, Brazil. Where data on patient characteristics and clinical data from 206 victims of severe TBI (Glasgow<8) were collected. Having as inclusion criteria: patients admitted to the ICU with severe TBI. As exclusion criterion other neurological diseases associated.

RESULTS: Of the 206 patients, we had 96 (46.60%) deaths. The predictors of functional recovery were not related to age, gender, subarachnoid hemorrhage, pupil, injury prevalence, other associated trauma, GCS, delirium and GOS. Tendency to total functional dependence with predictors of Marshall Classification in type II lesion (p=0.07) and ICU time (p=0.07). Functional dependence was higher in patients who did not undergo neurosurgery (p=0.05), traffic accident trauma (p=0.05), ICU admissions for more than 30 days (p=0.005) and patients who did not undergo surgery: had ICU physical therapy (p=0.05).

CONCLUSIONS: Submission to neurosurgery, trauma from traffic accidents, ICU stay for more than 30 days and physiotherapy in the ICU are predictors associated with the level of functional dependence of patients with severe TBI after 72 hours of ICU discharge.

PREDICTORS OF PAIN DISABILITY AMONG PATIENTS WITH CHRONIC PAIN

Amanda McIntyre, PhD (C), Shannon Janzen, MSC, Swati Mehta, PhD, Jerome Iruthayaranjach, MSC, Mitch Longval, BSc, Eldon Loh, MD, and Robert Teasdell, MD FRCP

OBJECTIVES: Chronic pain has been known to disrupt various aspects of a patient’s life; the impact of chronic pain on life activities is often captured using the Pain Disability Index (PDI). The objective of this study was to identify predictors of pain disability in a sample of patients with chronic pain.

DESIGN: Individuals with chronic pain were recruited from a clinic in Ontario, Canada. Using a cross-sectional design, sociodemographic data and clinical health information were collected from patients. Additionally, the following outcome measures were completed: PDI, Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder 7 item (GAD-7), Brief Pain Inventory (BPI) severity and interference, CAGE substance abuse screening tool, Anxiety Sensitivity Index (ASI), and Acceptance and Action Questionnaire (AAQ). Associations between all variables and the PDI were determined using stepwise linear regression modelling.

RESULTS: A total of 218 individuals (140 females) were recruited who had a mean age of 52.9±11.9 years and mean time since injury of 14.2±10.3 years. Time since injury, education, living arrangement, use of non-steroids, and substance misuse were not correlated with pain disability. In the subsequent stepwise model, only BPI pain interference (R2 change=0.532; p<0.001) and age (R2 change=0.015; p=0.015) were significant predictors of pain disability whereas gender, type of pain, pain severity, employment, cannabis use, morphine equivalent, GAD-7, PHQ-9, ASI and AAQ were not. The overall model fit was R2=0.542 (p=0.015).

CONCLUSIONS: Clinicians should consider pain interference and age when treating chronic pain patients, as these were shown to significantly impact pain disability.

PREDICTORS OF QUALITY OF LIFE AMONG INDIVIDUALS WITH SPINAL CORD INJURY

Shannon Janzen, MSC, Amanda McIntyre, PhD (C), Swati Mehta, PhD, Sarah Caughlin, PhD, Eldon Loh, MD, and Robert Teasdell, MD, FRCP

OBJECTIVES: The objective of this study was to identify predictors of quality of life (QoL) in a sample of individuals with SCI.

DESIGN: Individuals were recruited from a SCI outpatient clinic in Ontario, Canada. Sociodemographic data and clinical health information was collected. The following outcome measures were completed: Euro-Quality of Life (EQ-5D) – overall quality of health item, Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder 7 item (GAD-7), Rosenberg Self-Esteem Scale (RSE), Adult Dispositional Hope Scale (ADHS), Anxiety Sensitivity Index (ASI), and Acceptance and Action Questionnaire (AAQ). Associations between all variables and QoL were determined using stepwise regression modelling.

RESULTS: The sample consisted of 90 individuals (35 females) with a mean age of 59.4±12.2 years and mean time since injury of 12.3±13.3 years. Simple linear regressions demonstrated that all variables were significantly correlated with QoL, except for time since injury (p=0.944) and gender (p=0.623). Significant sociodemographic variables were entered first in the stepwise regression model, followed by the outcome measures. The model showed that only PHQ-9 (R2 change=0.186; p=0.001) and ADHS (R2 change=0.059; p=0.039) were retained in the model as significant predictors of QoL. whereas GAD-7, RSE, ASI, and AAQ were not. The overall model fit was R2=0.245 (p=0.039).

CONCLUSIONS: The results underscore how both depression and dispositional hope is associated with one’s QoL. Continued research on interventions that reduce depression and increase hope may improve QoL in the SCI population.

PREVALENCE OF FRAILTY AND ASSOCIATED RISK FACTORS AMONG SAUDI COMMUNITY-DWELLING OLDER ADULTS

Bader Alaghati, PhD, and Ageel Alenazi, PhD

OBJECTIVES: To investigate the prevalence of frailty, and associated risk factors among Saudi older adults.

DESIGN: This is a cross-sectional study. A total of 486 community-dwelling older adults aged 860 years living in the Riyadh region were included in the study. This study took place from January 2018 to August 2019. Frailty prevalence was assessed with the Fried’s frailty phenotype. Cognitive function was assessed by the Arabic Mini-Mental State examination. A multinomial logistic regression model was constructed to examine the association between sociodemographic characteristics and clinical risk factors and frailty.

RESULTS: The overall prevalence of pre-frailty and frailty were 47.3% and 21.4%, respectively. Frail participants were older, were more likely to live alone, had more chronic conditions, and had lower cognitive function.

CONCLUSIONS: The prevalence of frailty the Riyadh region in Saudi Arabia was high compared to other populations. Future research should examine the consequences of frailty in this population.

PREVALENCE OF PHYSICAL DISABILITY IN PATIENTS WITH LEPROSY IN THE MUNICIPALITY OF FERNADÓPOLIS, SP

Paula M. Lucas, Flávio Henrique N. dos Santos, Amanda Oliva Spaziani, Talita Costa Barbosa, Raisa da Silva Aroeira, and Patricia Michelle de Oliveira Aureliano

OBJECTIVES: To identify the degree of disability in patients with leprosy, infectious and chronic disease caused by Mycobacterium leprae, using the World Health Organization disability classification system in Fernandópolis, São Paulo, Brazil.
PROGNOSTIC AND FUNCTIONAL OUTCOMES OF WHITE CORD REPERFUSION SYNDROME FOLLOWING CERVICAL FUSION
Satyam Parikh, MD, Anita Kou, MD, and Gaurish Soni, DO

CASE DIAGNOSIS: White Cord Reperfusion Syndrome

CASE DESCRIPTION: A 30 year old male with previous history of immune dysfunction underwent elective anterior cervical disectomy and fusion at C5-6 for symptomatic cervical stenosis originating from remote motor vehicle collision. No intraoperative complications were noted. Post operatively, however, the patient developed sudden onset bilateral lower extremity weakness and generalized hypotesthesia along with saddle anesthesia and signs of neurogenic bladder. Immediate MRI findings were grossly unremarkable and he was subsequently taken to operating room for hardware revision.

The patient underwent hardware re-implantation, again without intraoperative complications. His symptoms of lower extremity weakness persisted and repeat MRI findings then demonstrated White Cord Reperfusion Syndrome. Physical therapy was subsequently consulted. He was recommended comprehensive inpatient rehabilitation after his deficits were noted to be consistent with C6 ASIA Impairment Scale D spinal cord injury. After a two week acute rehabilitation course, the patient was discharged home at a supervision level.

DISCUSSION: White Cord Reperfusion Syndrome is a rare but significant consequence of elective spinal surgical procedures. Its etiology is based on rapidly increased blood supply to a chronically underperfused area. This complication may often mimic other conditions such as hardware failure or cord compression. In this particular case, hardware revision did not ameliorate symptoms of hypotesthesia, saddle anesthesia, or lower extremity weakness. There are few reported cases of white cord reperfusion syndrome, and these are centered upon diagnosis. There are currently no reported cases that document a patient’s overall functional outcomes.

CONCLUSIONS: This case furthers the literature involving white cord reperfusion syndrome after spinal procedures. The consequences, including the subsequent spinal cord injury demonstrated by this patient, have long term implications impacting overall functional quality of life. Treatment requires prompt diagnosis and long term follow up. The nuances and benefits of rehabilitation for these patients are indicated in this case

PROGRAM FOR THE MEASUREMENT OF FACIAL ASYMMETRY
Javier Gonzalez Damián, MD, PhD, and Gabriela Flores Mondragón, Biologist

OBJECTIVES: The most recognized scale for the classification of Bell's palsy is the House Brackmann (HB) scale. The advantages of the HB scale are its reliability and short time of application that allows its use in the clinical context, the disadvantages are that it has high interobserver variability and low sensitivity to change. Although there are several scales for the classification of facial paralysis, it is necessary to have one with quantitative assessment, easy to use and practical for clinical application. In this work, a software for the analysis of facial asymmetry was programmed using a previously described method.

DESIGN: Prior authorization by informed consent and approved by the institute's ethics committee and following national standards of personal data security, photogaphs were taken of 40 controls and 40 patients with Bell's palsy (clinically diagnosed). Measurements of angular and radial asymmetry were obtained using a program developed in Matlab (The MathWorks, INC. 2017). The program requires the manual selection of 8 anatomical landmarks, in order to make the evaluation. Three different users were required to perform the measurements and these measurements were also performed manually.

RESULTS: The interobserver variability was less than 1%, which is comparable to the intrinsic error of the facial asymmetry of the control group. The average time for the selection of the anatomical landmarks and obtaining the results was less than one minute. The difference between manual and semi-automatic measurement was about 5% and was considered not significant (p < 0.01). Reproducibility of the measurements using the software was near 98%.

CONCLUSIONS: An easy-to-use Matlab program was developed to measure facial asymmetry in patients with Bell's palsy. Good reproducibility, high inter-rater
reliability and adequate internal validity make it an appropriate method to assess facial asymmetry.

**PROPRIOCEPTIVE FUNCTIONAL VIBRATION STIMULATION ESSENTIAL THERAPEUTIC TOOL IN SPASTICITY MANAGEMENT OF JUMP GAIT PATTERN IN CHILDREN WITH CEREBRAL PALSY**

Andra Pintilie, MD, Liliana Padure, MD, PhD, Andra Mirea, PhD, and Corina Sporea, PhD Student

**OBJECTIVES:** Cerebral palsy or CP, a neurological disorder determined by a multitude of conditions (congenital, pre/natal/postnatal causes), with a prevalence of 2-2.5/1000 births, is characterized by motor and function loss, with the most frequent motor element represented by spasticity, and last but not least, by hypotonia, and secondary gait impairment. The purpose of our work is to follow up and assess the effects of proprioceptive functional vibratory stimulation (PFVS) on the jump gait pattern of spastic diplegic gait in children with cerebral palsy. The child with jump gait has equinovarus, genu flexum and coxa flecta, related to spasticity on the gastrocnemian and soleus, hamstrings and psoas muscles. In order to obtain spasticity decrement on the main muscle groups involved in jump gait and improve motor control, we advance the proprioceptive functional vibratory stimulation procedure, as part of the rehabilitation program.

**DESIGN:** Functional vibratory stimuli were applied using a mobile unit commercial medical device for bedridden and standing patients, on the lower limb antagonist muscles, associated with physical therapy, once a day for two weeks, in a group of 5 children with jump gait and cerebral palsy. Ashworth Modified Scale and 10 meters test were used as evaluation tools for spasticity intensity and establishing improvement or decrement of gait pattern.

**RESULTS:** The obtained results show a moderate amendment in gait pattern, with slightly softening of the targeted muscles, thus improving the gait pattern, in the selected group of patients.

**CONCLUSIONS:** In non-CP children gait is expected to be attained between 12 to 18 months, gait disorders being among the primary reasons for medical presentation in CP patients. In order to improve quality of life in young patients through rehabilitation procedures, by considerate attenuation of jump gait pattern, we recommend proprioceptive functional stimulation as adjuvant among other procedures.

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**PROSPECTS FOR A NEW SWALLOWING EVALUATION METHOD**

Nobuyuki Arai, PhD, and Kozo Hanayama, PhD

**OBJECTIVES:** We investigated whether a newly developed method for evaluating bolus movement during swallow (Pulsed-Fluoroscopy Swallow Study: Arai-Method) could be applicable for a patient with cranial nerve palsy after several microvascular decompression procedures.

**DESIGN:** Subject: a case with cranial nerve palsy after several microvascular de-compression procedures. Pulsed-Fluoroscopy Swallow Study: Arai-Method Image acquisition: The subject was seated in the upright posture with the face fixed with a specially designed locking device. Two cups of material were prepared: one containing 10 mL of pure water and another containing 10 mL of a radiocontrast solution. The subject swallowed each liquid at once. A series of lateral view of digital X-ray images at 7.5 frames per second were recorded. Image analysis: To extract only images with swallowing, we utilized a computer software that worked as a swallow chart.

**RESULTS:** No obvious aspiration was observed during the swallow. The swallowing chart showed a total of three peaks located in the oropharynx, the hypopharynx, and the esophagus orifice.

**CONCLUSIONS:** The Arai-Method was applicable for the current case. This case showed a swallowing chart pattern which is different from that of healthy subjects. This swallowing chart pattern, especially the peak in the oropharyngeal region was presumed to have occurred from intentionally avoided aspiration. It was considered this method could show a new aspect of the bolus movement evaluation during swallow.

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**PROTECTIVE HEADGEAR TO PREVENT TRAUMATIC BRAIN INJURY IN SURFERS: A SYSTEMATIC REVIEW**

Barbara Kozminski, MD, Conan So, BS, MPH, James B. Meiling, DO, George Raum, BA, and Mary Showstark, PA

**OBJECTIVES:** To review the literature to examine the incidence of traumatic brain injury (TBI) in surfers and elicit the need for protective headgear in surfing.

Head injuries are the most common injury among surfers, composing well over one-third of surfing-related injuries. However, surfers are doing little to mitigate the risk of head injury with a low incidence of helmet use.

**DESIGN:** A systematic review of the MEDLINE database was performed in July 2019. Search terms included surfing, TBI, and headgear. Studies were included if they were in English, and examined the incidence of TBI in the setting of surfing or investigated the role of protective headgear while surfing. Cohort characteristics, methods of injury, and use of protective headgear were extracted.

**RESULTS:** 7 eligible studies were identified with 6245 patients and 4478 total injuries. Risk factors for head injuries included older age, competitive status, surfing greater than 6.5 hours per week, and performing aerial maneuvers. 26% of the injuries were head injuries (n=1178), with an overall incidence of 3.8% for concussions (n=162). Only 7.2% (n=196) of surfers wore protective headgear or helmets. The most common method of head injury was direct trauma from striking their own surfboard.

**CONCLUSIONS:** Surfing poses a high risk of head injuries, particularly concussions. Although surfers recognizing the high risk of TBI and acknowledging that headgear is protective, many prefer to surf without them due to discomfort and effect on balance. Even though helmets have been adopted in other high impact water sports such as rafting, there remains a need in the surfing community to prevent head injuries.

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**PROXIMAL NEUROPATHIES IN PATIENTS WITH POSTSTROKE SHOULDER PAIN**

Tarek Shaikhah, MD, Mowaffak Abdel-Hamid, MD, and Marwa A. Armer, MD

**OBJECTIVES:** Poststroke shoulder pain (PSSP) could be due to proximal neuropathies or upper trunk brachial plexus lesion. The aim of this study was to detect any electrophysiological abnormality in the proximal nerves supplying shoulder structures that could contribute to PSSP.

**DESIGN:** A cross-sectional study at a university hospital, tertiary level of clinical care. Materials and methods: nerve conduction studies of the axillary, musculocutaneous, suprascapular, and lateral antebrachial nerves were done on both sides. In addition, electromyography of the deltoid, biceps brachii, and infraspinatus on the hemiplegic side was performed on 30 stroke survivors with PSSP.

**RESULTS:** Axillary and musculocutaneous motor nerve latencies on the hemiplegic side were significantly prolonged compared with the normal side (P=0.012, 0.029, respectively). Moreover, axillary and suprascapular nerve amplitudes on the hemiplegic side were significantly lower than those on the normal side (P=0.008, 0.002, respectively). Twelve (40%) patients had electrophysiological abnormalities. Upper trunk brachial plexopathy was the most common abnormality which occurred in six (20%) patients. In addition, isolated axillary or suprascapular nerve lesion occurred at a similar frequency (10%).

**CONCLUSIONS:** Proximal nerve lesions are not uncommon in PSSP patients and may occur subclinically.

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**PRP THERAPY DELAYS CARTILAGE LOSS AND IMPROVES FUNCTION IN A PRE-ClinICAL MODEL OF POST-TRAUMATIC OSTEOARTHRITIS**

Prathap Jayaram, MD

**OBJECTIVES:** Platelet rich plasma (PRP) is an emerging therapeutic strategy for treatment of osteoarthritis (OA); however, preclinical and clinical evidence for its efficacy is lacking and the mechanism of action is unclear. In the current study, we utilized leukocyte poor-PRP (LP-PRP) and leukocyte rich-PRP (LR-PRP) formulations to mimic clinical point of care formulations and assessed their potential to alter disease pathogenesis in a mouse model of post-traumatic OA.

**DESIGN:** Three-month-old wild-type male FVB/N mice received destabilization of the medial meniscus (DMM) surgery to induce OA. To assess the efficacy of LP-PRP and LR-PRP, mice received intra-articular injections at 2-,7- and 28-days post-surgery. Mice were then assessed at 5, 9, and 14-weeks post-surgery for changes in chronic pain using the hot plate nociceptive assay. At 14-weeks post-surgery, OA pathology was evaluated using histology and phase-contrast mCT.

**RESULTS:** Treatment with LP-PRP preserved cartilage volume and surface as measured by phase-contrast mCT and histological scoring compared to PBS-treated controls (n=8-10 per group, p<0.05). While the effects of LR-PRP on cartilage loss were intermediate, it was not statistically better than treatment with PBS. On the other hand, LR-PRP but not LP-PRP protected against disease-induced thermal hyperalgesia (n=8-10 per group, p<0.05).

**CONCLUSIONS:** The results of this study demonstrate that PRP therapy can delay progression of post-traumatic OA. Specifically, leukocyte-poor preparations protect from structural changes in diseased joints, and an increased leukocyte concentration in PRP imparts analgesic effects but may compromise chondroprotection.
PULMONARY CEMENT EMBOLISM

Francois Gueyffier, MD, PhD, and Gilles Rode, MD, PhD
Michel Cucherat, MD, PhD, Isabelle Bonan, MD, PhD,
Aurelien Hugues, PT, PhD Student, Julie Di Marco, MD, MSC,
POSTURAL CONTROL AFTER STROKE IN META-ANALYSIS

comprised of four yes/no items (PI history, mobility, transfers, toileting) incorporated
ing (SCI-PreSORS) instrument is a novel approach for pressure injury (PI) screening.
Heather Flett, MSC, BSC(PT), BA, Carol Scovil, PhD, and Anthony Burns, MD, MSC

Carol McAnuff, RN, BSCN, CRN(C), NSWOC, MN,
Jude Delparte, MSC, Jackie Wright, RN,
NOVEL INSTRUMENT FOR PRESSURE INJURY SCREENING

PSYCHOMETRIC PROPERTIES OF THE SPINAL CORD INJURY
PRESSURE SORE ONSET RISK SCREENING (SCI-PREORS), A NOVEL INSTRUMENT FOR PRESSURE INJURY SCREENING

development and IRR analyses were completed using percentage agreement.
RESULTS: Agreement for the level of PI risk (high vs low) at intake was 77% determined using the Braden scale and the SCI-PreSORS. Test-retest reliability for PI risk was excellent (92%) for the SCI-PreSORS and good (87%) for the Braden scale. Inter-rater reliability was comparable for the SCI-PreSORS (83%) and the Braden scale (85%). For individual items, test-retest reliability ranged from 87% to 95% for the SCI-PreSORS and from 67% to 86% for the Braden scale. IRR for Braden scale items ranged from 83% to 87%. Due to the decision tree format of the SCI-
PreSORS, IRR analysis was not possible for individual items.
CONCLUSIONS: The SCI-PreSORS demonstrates good IRR and excellent test-retest reliability. Ongoing data collection and pending analyses will provide in-
sight into additional metrics such as Cohen’s kappa, as well as sensitivity and speci-
city. This will define the ultimate utility of the SCI-PreSORS for PI risk screening during inpatient SCI rehabilitation.

QUALITY OF LIFE IN SPINAL CORD INJURED PATIENTS
Vinay Goyal, Diplomat of National Board, Sucheta Saha, MD, and Nonica Laisram, MD
OBJECTIVES: Spinal Cord Injury (SCI) is a major setback in life of an individ-
ual. SCI patients often have a low quality of life. Who defines “Quality of life (QOL) as individual perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. Beyond the neurological deficits QOL is affected by Physical Health, Psy-
chological, Social Relationships and environment. The present study was planned to study QOL using WHO QOL BREF Questionnaire.

DESIGN: Descriptive and Quantitative study was planned from March 2015 to
March 2016. Only adults of either sex with Spinal cord injury of more than one month duration was included in the study. After collecting Demographic data and Clinical examination WHO BREF questionnaire containing 26 items in local language was given to patients and they were asked to answer the questionnaire based on last two weeks. Patients who could not read it was read to them and answer was sought. Data was maintained on excel Sheet and analyzed in SPSS version 16.

RESULTS: Majority of patients were adult males with Male: Female ratio of 2:1. Paraplegics(88.9%) with dorsal dorsal vertebral injury (51%) with fall as most com-
mon cause. Mean of Physical Health, Psychological Health, Social Relationships and environment were 31.51, 39.22 : 40.07 and 33.92 respectively.

CONCLUSIONS: Adult males experiencing fall from height constitutes most common group of Spinal Cord injured individual. Low scores in all domains shows low quality of life in Spinal Cord Injured patients.

QUALITY OF LIFE OF PARENTS WHO HAVE CHILDREN WITH DISABILITIES IN MOROCCO
Hajjoi Abderrazak, MD, PhD S, Mohammed Elbaizouri, MD, Nourelhouda Fares, MD, and Maryam Fourtassi, MD, PhD

OBJECTIVES: Parents who have children with disabilities are often reported to have physical and psychological distress related to caring for their children, thus affecting their quality of life (QOL). This study explored the QOL among moroccan parents who have children with disabilities.

DESIGN: A total of 559 parents who have Children With Disabilities were re-
cruited for the study using convenience sampling. The Participation and Quality of Life (PAR-Qol) tool-kit was used to measure the QOL among the parents. The socio
demographic data, financial conditions and family background were also recorded.

RESULTS: 83.5 % of the interviewed parents were mothers and 94% were mar-
rried. 85.8% of the mothers were housewives. Results showed that having a child with Disabilities affects their parents’ quality of life (average total score of 47.31). This al-
teration is more marked in the emotional domain than in the adaptive domain. We found significant associations between the Quality of Life alteration and the age of parents, the marital status, the health coverage, the place of residence, the age of the child, the nature of the disorder and the type of disability.

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CONCLUSIONS: This study indicates the need for parental support when providing intervention to their children with disabilities.

QUANTIFYING MUSCLE CO-CONTRACTION AFTER BRAIN INJURY
Ian J. Baguley, MBBS, PhD, FARM, and Hannah L. Barden, BAPSCI(OT), PhD

OBJECTIVES: Botulinum Toxin A (BTX-A) is the treatment of choice for positive motor features of upper motor neuron (UMN) syndromes, however, there is little research evidence to help clinicians select which combination of muscle injections will maximize outcome for any affected individual. A major issue in this regard is the inability of current measures to quantify patterns of “overflow” of normal proprioceptive information from one moving muscle that modulate muscle movement patterns (here defined as muscle co-contraction). We have previously shown the effectiveness of Dynamic Computerized Dynamometry (DCD) to provide ratio level data to quantify positive UMN features following acquired brain injury (ABI). This pilot case series extended the DCD protocol to investigate the cumulative impact of co-contraction from proximal upper limb movements pre and post BTX-A. It was hypothesized that motor control and spasticity would deteriorate in a stepwise fashion with increasing complexity of the task.

DESIGN: Individuals with post-ABI upper limb spasticity were assessed using the DCD protocol in five conditions (bipedal standing: arm beside hip (1), 90° elbow flexion (2), 90° shoulder forward flexion (FFX3), maximum shoulder FF (4), single leg stance at 90° FF (5)). Data was analyzed for maximum force generation (known as Fmax), between-cycle spasticity (known as Fmin) and other published contraction/relaxation cycle parameters. BTX-A muscle selection was determined by the injector in line with patient-derived goals. Data were compared descriptively.

RESULTS: Pilot data was broadly consistent with the concept of increased hand spasticity with more complex tasks, with Fmin increasing by a maximum of 40 to 400%, depending on the person. Inter-cycle spasticity also increased as more muscles were required for task completion.

CONCLUSIONS: This pilot data supports the hypothesis, quantifying the extent of forearm muscle spasticity and co-contraction wind-up as exacerbated by movements of ipsilateral proximal upper limb muscles and lower limb/trunk muscles.

RACIAL DIFFERENCES IN OBESITY IN INDIVIDUALS WITH SPINAL CORD INJURY: AN URBAN-RURAL COMPARISON
Huangcong Wen, PhD

OBJECTIVES: To compare racial differences in obesity between urban and rural areas for people with spinal cord injury (SCI).

DESIGN: This is a cross-sectional analysis of survey data from National SCI Database linked with neighborhood data from American Community Survey and US Department of Agriculture Economic Research Service by Census tract. 3,385 participants (non-Hispanic white, 66.5%, non-Hispanic black, 22.5%, and Hispanic, 11.0% men, 79.1%; mean age, 44.3 ± 15.6y; tetraplegia, 54.0%; complete injury, 45.3%; follow-up 2006 - 2017 and resided in 2,934 census tracts. Urban tract was considered if a census tract with a population of ≥ 30.0 km2 in non-Hispanic black and Hispanic relative to non-Hispanic white.

RESULTS: of 3,385 participants, 23.1% were obese and 76.2% were from urban area. Within urban group, Hispanics had the greatest obesity prevalence (30.6%), followed by non-Hispanic blacks (23.5%) and non-Hispanic whites (21.3%; p<0.001). After controlling for demographic, injury-related and neighborhood (concentrated disadvantaged index) factors, logistic regression analyses were conducted separately for urban and rural groups to estimate odds ratio (OR) of being obese (body mass index ≥ 30.0 kg/m2) in non-Hispanic black and Hispanic relative to non-Hispanic white.

RESULTS: 3,385 participants, 23.1% were obese and 76.2% were from urban area. Within urban group, Hispanics had the greatest obesity prevalence (30.6%), followed by non-Hispanic blacks (23.5%) and non-Hispanic whites (21.3%; p<0.001). After controlling for demographic, injury-related and neighborhood factors, Hispanics were 56.1% more likely to be obese relative to non-Hispanic whites (OR, 1.56; 95% CI, 1.2-2.1), and obesity was not significantly different between non-Hispanic blacks and non-Hispanics. However, there was no significant racial differences in obesity in rural group.

CONCLUSIONS: Racial differences in obesity exist among people with SCI from urban areas. Findings could help health care professionals to target groups for obesity prevention and management to reduce racial health disparities for SCI population.

RARE CASE OF VERTEBRAL BODY INFARCTION ASSOCIATED WITH CONUS MEDULLARIS ISCHEMIA OF UNKNOWN ETIOLOGY: A CASE REPORT
Varun Y. Goswami, MD, Justin Vork, MD, Raymund Millan, MD, and Jonathan D. LeCrone, MD

CASE DIAGNOSIS: Vertebral Body Infarction associated with Conus Medullaris Ischemia

CASE DIAGNOSIS: A 56-year-old male with no significant past medical history presented with acute onset paraplegia with loss of bowel and bladder function. These symptoms rapidly progressed within an hour while patient was at work. Angiogram studies ruled out aortic dissection and aneurysm. Hypercoagulable panel was negative. Inflammatory markers were within normal limits, excluding a vasculitis process. Cerebrospinal fluid studies were grossly abnormal but cultures were negative. Thoracic magnetic resonance imaging (MRI) revealed an abnormal T2 signal in the T12 vertebral body with edema as well as abnormal enhancement within the conus medullaris. These findings were consistent with T12 vertebral body bone marrow infarction and conus medullaris ischemia.

DISCUSSIONS: Upon admission to rehabilitation, patient was functionally limited due to his diagnosis of complete T4 ASIA A spinal cord injury. Initially, he required moderate to maximal assistance with bed mobility and transfers. He worked intensively with physical and occupational therapy for four weeks, significantly benefiting from seated gaiter, truncal strengthening, and locomotor gait training. Upon discharge, the patient progressed to modified independent with wheelchair mobility, manually propelling 1,000 feet. The presence of vertebral body infarctions are very rarely found along with spinal cord infarctions due to regional arterial anastomosis.

CONCLUSIONS: This patient was found to have a conus medullaris infarct adjacent to the T12 vertebral body. Symptoms often include back pain, paresthesias, paraplegia, radiculopathy, bowel and bladder dysfunction, and gait imbalance. It is imperative to thoroughly review MRI imaging for surrounding anatomical infarctions in patients who suffer from spinal cord infarctions. Vertebral body infarctions are directly related to increased pain and debility in the paraplegic population. Although rare, it should always be on the differential diagnosis as early recognition allows for timely evaluation and initiation of secondary preventative therapies.

RARE CO-EXISTENCE OF EPIDERMOID TUMOR AND MENINGIOMA - REHABILITATION MANAGEMENT
Manasa Vasireddy, MD, Riley Smith, MD, Vivian Shah, MD, and P. Tyler Roskos, PhD, ABPP

CASE DIAGNOSIS: Rare co-existence of Epidermoid tumor and Meningioma - Rehabilitation Management

CASE DESCRIPTION: A 38-year-old female presented with symptoms of left side facial twitching, gait instability and blurry vision. She also reported chronic bifrontal headaches. On admission, magnetic resonance imaging (MRI) of the brain revealed a non-enhancing 5.5 x 4.2 cm posterior cranial fossa tumor invading the 4th ventricle and pushing the brain stem into foramen magnum, as well as second supra-tentorial tumor, just right to the posterior midline of the splenium of corpus callosum. She underwent subsequent sub-occipital craniotomy with cerebellar tumor resection and a staged biopsy confirming an epidermoid tumor. Based on its appearance, the homogenously enhancing mass posterior to corpus callosum was deemed to be a meningioma. The patient was admitted to inpatient rehabilitation and measures were taken to prevent pressure ulcers and deep venous thrombosis due to prolonged immobility. Emphasis in therapy was placed on maximizing the activities of daily living (ADLs), cognition, communication, and mobility.

DISCUSSIONS: The incidence of epidermoid tumors is only 1% of all primary brain tumors. Additionally, the coexistence of epidermoid tumor and meningioma has rarely been reported. The primary intervention is typically surgical and in this case, most of the epidermoid tumor was removed operatively. Rehabilitation care played a significant role post-operatively for this patient to enhance recovery, specifically focused on improving independence, balance, pain management and quality of life.

CONCLUSIONS: This case report is significant because of the uncommon brain tumor type and co-existence of epidermoid and meningioma tumors. It also supports the efficacy of rehabilitation in post-surgical management of patients with rare brain tumors. Early rehabilitation care can enhance functional outcomes in these patients.

RARE DUAL DIAGNOSIS - PRIMARY ANOXIC BRAIN INJURY WITH SUBSEQUENT IDIOPATHIC SPINAL CORD ISCHEMIA RESULTING IN ASIA A PARAPLEGIA: REHAB AND RECOVERY, A CASE REPORT
Joseph L. Graham, MS, DO

CASE DIAGNOSIS: Primary Anoxic Brain Injury with Subsequent Idiopathic Spinal Cord Ischemia Resulting in ASIA A Paraplegia

CASE DESCRIPTION: The patient initially presented to the acute hospital with severe anoxic brain injury from overdose of Benzodiazepines and Fentanyl patches. She was stabilized, but meaningful recovery was deemed unlikely. The family decided...
to withdraw care and place the patient in hospice. However, after terminal wean from ventilator, the patient slowly began to show recovery. She regained purposeful movement in her upper extremities; however, her lower extremities remained flaccid. Upon evaluation for rehabilitation by PM&R, MRI of her spine was requested. Imaging showed long segmental central cord restricted diffusion and hyperintensity in paraspinal musculature, concerning for spinal cord infarct with associated derervation of paraspinals. Upon admission to acute rehabilitation hospital, ASHA exam showed T10 complete spinal cord injury. Patient participated in six weeks of rehabilitation working to upgrade independence with mobility at the wheel chair level, coordination of upper extremity movements, cognition and memory related to her secondary brain injury.

DISCUSSIONS: The patient participated in an intensive program to regulate neurogenic bowel/bladder, manage lower extremity spasticity, and improve truncal support at and below the level of her spinal cord injury. After her inpatient rehabilitation course the patient progressed to ModI with eating, supervision for ADLs, ModI with wheel chair locomotion, moderate assistance for transfers and supervision for cognition. Some studies report as high as 60% of primary diagnosis SCI patient have secondary idiopathic spinal cord injuries are much less common and are a rare challenge in rehab.

CONCLUSIONS: This rare dual diagnosis presented a unique challenge to our rehab team. However, through collaboration between PM&R specialists in Brain Injury and Spinal Cord Injury, this patient’s rehab plan was tailored to overcome these challenges.

RARE FLUID COLLECTION IN THE SUBCUTANEOUS POCKET OF AN INTRATHecal BACLOFEN PUMP IDENTIFIED

Michael Dove, MD, Lauren T. Shapiro, MD, MPH, and Chane Price, MD, MBS

CASE DIAGNOSIS: Extrapontine location of ventriculoperitoneal (VP) shunt catheter with migration into the subcutaneous pocket for intrathecal baclofen (ITB) pump

CASE DESCRIPTION: A 54 year old man with history of severe traumatic brain injury and hydrocephalus status-post VP shunt placement underwent placement of an ITB pump for management of his spasticity. Two months following pump implantation, he was noted to have a palpable fluid collection overlying the implantation site. Abdominal x-ray revealed a lucency noted adjacent to the baclofen pump. Fluid from this site was aspirated and sent for analysis; culture was without growth but beta-2 transferrin was detected. Computed tomography (CT) demonstrated the VP shunt catheter had migrated into the pocket created for the ITB pump implant. While awaiting revision of the VP shunt catheter, he was found to have extreme proximal right lower extremity deep vein thromboses, and was unable to undergo the surgery for six months while receiving anticoagulation. During this time, his head CTs remained stable, his arousal improved, and his spasticity continued to respond to ITB therapy.

DISCUSSIONS: Distal catheter migration in the abdominal wall is a very rare complication of VP shunt placement. When the end of the shunt is displaced, fluid accumulates at the site and may cause shunt malfunction. Risk factors for shunt migration include elevated intra-abdominal pressure and the availability of “dead space” near the catheter. This patient had chronic constipation, and the establishment of the ITB pump pocket likely provided a low resistance pathway through which the catheter traveled.

CONCLUSIONS: If a fluid collection exists at the baclofen pump site in a patient with a VP shunt, migration of the VP shunt catheter should be suspected and the fluid should be tested for cerebrospinal fluid. These patients are vulnerable to device malfunctions and require close follow up in order to prevent complications.

RARE MULTIFOCAL INTRAPARENCHYMAL HEMORRHAGES FOLLOWING SPINAL SURGERY: A CASE REPORT

Kathy Chou, DO, and Allison Averill, MD

CASE DIAGNOSIS: Rare multifocal intraparenchymal hemorrhages following spinal surgery

CASE DESCRIPTION: The patient with past medical history of anxiety and hypertension underwent elective lumbar laminectomy for resumption of asymptomatic intradural schwannoma. Several days after surgery, she developed a headache followed by right-sided hearing loss, intermittent diplopia and left hemiplegia. Computed tomography and magnetic resonance imaging (MRI) head demonstrated right fronto and left parietal intraparenchymal hemorrhages, intraventricular and diffuse subarachnoid hemorrhages. MRI lumbar spine revealed a pseudomeningeal sug-gestion of cerebrospinal fluid (CSF) leak, and the subsequently underwent duraplasty. Angiogram of the head/neck and repeat imaging were negative for arteriovenous malformations, aneurysms or mass. She was admitted to acute inpatient rehabilitation for left hemiplegia secondary to multifocal hemorrhagic strokes. On admission to acute rehabilitation, she had preserved strength on the right but no movement in left proximal arm and lower extremity. Two weeks into acute rehabilitation, she regained antigravity strength in distal left upper and lower extremities.

DISCUSSIONS: Intracranial hemorrhages after spinal surgery are extremely rare and are attributed to incidental or purposeful durotomies with a CSF leak. It is suspected that the negative intracranial pressure that develops with CSF leaks applies tension on cerebral blood vessels, nerves and meninges. The most severe consequences have poor prognoses and include reversible coma, cerebral herniation and infarction. Few intracranial hemorrhagic cases after spinal surgery have been reported, and most were cerebellar or subdural hematomas. This is the first case, to our knowledge, of multifocal and intraparenchymal hemorrhages following spinal surgery.

CONCLUSIONS: Physiatrists need to be aware of the rare sequelae after spinal surgery. New neurologic findings following spinal surgery should prompt evaluation for dural tear and possible consequent intracranial hemorrhages.

RARE OCCURRENCE OF RADIATION-INDUCED LUMBAR PLEXOPATHY IN A MEDICALLY COMPLEX CANcer PATIENT

Alyssa Mixon, DO, BA, BS, and Jasmine Zheng, MD, BS

CASE DIAGNOSIS: Identifying ways in which acute manifestations of symptoms following chemotherapy and radiation therapy can be differentiated in the cancer population with a focus on a rare diagnosis of radiation-induced lumbo sacral plexopathy in a medically complex cancer patient.

CASE DESCRIPTION: A literature review was performed for a case report involving the rare occurrence of radiation-induced lumbar plexopathy in a medically complex cancer patient.

DISCUSSIONS: Literature reveals the diagnosis of radiation-induced lumbar plexopathy is not common and for our patient, given such a low dose with an acute presentation, rare. Building a strong differential diagnosis can help with identification and management of patients to ensure the pathology is not missed.

CONCLUSIONS: When treating cancer patients, one must account for not only cancer pathology but also treatment dose, timing, and side effects in addition to new and pre-morbid conditions. This involves coordinating care among a variety of specialties to create an integrated healthcare team, with the ever-growing need for experts in the cancer rehabilitation field.

REA-VAL: STUDY SCREENING PILOTR OPHARYNGEAL DYSPHAGIA IN NEUROSURGICAL-ICU

Remi Mallart, Bertrand Dureuil, PUPH, and Eric Verin, PUPH

OBJECTIVES: There are various tests that can be used to screen oropharyngeal dysphagia (OPD) depending on the populations studied. Post-extubation dysphagia is being explored more and more in the face of the increase in morbidity and mortality, the medical and financial consequences it brings. However, there is no screening test for these disorders in patients with brain injury in neurosurgical-intensive care unit (ICU). The purpose of this pilot study was to conduct a feasibility study of a new OPD screening test in this population.

DESIGN: A prospective analysis was performed in brain-injured patients hospitalized in neurosurgical-ICU, intubated for more than 72 hours. Screening for OPD at 24 hours from extubation with a new analysis protocol in bedside patients was performed. The protocol consisted of associating a V-VST, a recognized and validated test in the OPD in patients with stroke, to a GuSS-ICU, Designated for the population in ICU except neurological-ICU. Sociodemographic and clinical data was collected to highlight predictive factors of dysphagia.

RESULTS: Among the 55 hospitalized patients, about 25% of patients were eligible. 70% of the examined patients had OPD at 24 hours, contraindication per os, with a risk of major complications. Contrary to the service protocols in which 20% couldn’t be examined, the others were examined between 1 to 5 days after their extubation. We were able to screen them all at 24 hours, by all the staff, without any complication.

CONCLUSIONS: We propose a feasible, secured protocol. It is necessary to continue the study with patient follow-up in order to have a sensitivity analysis, and favoring factors, which were not analyzed in this study. This test does not replace a specialized evaluation but could answer the question of refeeding it is normal, and the thoughtful realization of an instrumented exploration in case of failure.

RECOVERY FROM LEFT CEREBELLAR HEMORRHAGE, AS A COMPLICATION OF RIGHT PERICALLOSAL ANEURYSM CLIPPING: A CASE REPORT

Sonia Thakur, MBBS, Kyle Smith, MD, and Heather M. Ma, MD, MS

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Abstracts

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CASE DIAGNOSIS: Acute cerebellar hemorrhage following elective bifrontal craniotomy for pericallosal aneurysm clipping in a 68-year-old man with a history of intracranial aneurysms, paroxysmal A-fib, and prior left basal ganglia hemorrhage

CASE DESCRIPTION: A 68-year-old male presented for elective bifrontal craniotomy and right A2-A3 pericallosal aneurysm clipping. His procedure utilized peri-operative lumbar drain placement and intracranial Brainlab navigation, with no documented intraoperative complications. Postoperatively, the patient had altered mental status. A head CT showed bilateral fronto-temporal SAH and left cerebellar hemorrhage of unclear etiology. No venous thrombus was seen on CT venogram. Work up including INR and thromboelastography was inconsistent with coagulopathy. The cerebellar bleed was managed with intravenous antihypertensives and corticosteroids. His acute hospital course was complicated by status epilepticus, MRSA pneumonia, paroxysmal sympathetic hyperactivity, and unsuccessful exsufflation trials. The patient was discharged to acute inpatient rehabilitation 51 days after admission, where he continued to show functional and cognitive improvements with therapies, sleep optimization, and neurostimulant initiation. His functional deficits were primarily due to cerebellar ataxia and executive function impairment. He was eventually discharged home after 19 days of acute inpatient rehabilitation.

DISCUSSIONS: Remote cerebellar hemorrhage is a rare, infratentorial complication which may occur after supratentorial surgery. Intracranial hypotension and coagulation disorders are possible risk factors, but the patient had none of these. Post-operative suction drainage and intraoperative CSF loss could also result in parenchymal shifts or changes in trans-tentorial pressure gradients, contributing to spontaneous hemorrhage. Despite a prolonged stay in the Neuromedicine ICU, this patient was discharged home, requiring only minimum to control guard level of functional assistance.

CONCLUSIONS: Remote cerebellar hemorrhage is a rare, but significant, complication of a supratentorial intracranial aneurysm clipping. Acute inpatient rehabilitation plays an essential role in achieving improved functional outcomes in these patients.

RECOVERY OF MUSCLE FIBER FORCE WITH TAMOXIFEN AFTER SPINAL CORD INJURY IN RATS

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OBJECTIVES: Spinal cord injury (SCI) results in early loss of skeletal muscle mass and function suggesting that any interventions must be started very soon after injury. The main objective of this study was to test the effects of Tamoxifen (a neuroprotective agent) on single muscle fiber size and function after SCI.

DESIGN: Adult female rats were randomly assigned to either 7 days-sham (SHAM; n=5), 7 days-post-injury (TDPI; n=5), or Tamoxifen (TAM; n=4) group. SHAM animals were sutured after laminectomy. 7DPI rats received a contusion with an NYU impactor. Tamoxifen pellets (0.7mg daily) were implanted subcutaneously. Diameter and cross-sectional area (CSA) of chemically skinned soleus single muscle fibers were measured. Maximum force (Po), and specific force (Po/CSA) were determined by the slack test procedure using high calcium concentrations. 179 fibers were tested (n=7 SHAM; 55 TDPI; 55 TAM). Means ± SD were calculated and values analyzed using ANOVA.

RESULTS: Diameter was significantly (<0.001) smaller after 7 days in 7DPI (75 mm) and in TAM (81 mm) rats compared to SHAM (95 mm). Similar results (<0.001) were seen for CSA (SHAM=3760 mm2; 7DPI=3030 mm2; TAM=2980 mm2). Maximum force was significantly lower (<0.001) at 7DPI (83 mN) but there was no difference between SHAM (138mN) and TAM (110 mN) suggesting a bene-eficial effect of the drug. No difference among groups was seen in specific force (p>0.1; SHAM;5.5 N/cm; 7DPI=4.3 N/cm; TAM=5.3 N/cm).

CONCLUSIONS: Our results showed that muscle fiber size is smaller and single fiber function impaired in the acute phase. The reduction in force is due to muscle fiber atrophy only because single fiber specific force was similar in all three groups. Drug interventions such as tamoxifen after SCI can restore maximal force when implemented very early after injury.

RECREATIONAL PSYCHOSOCIAL PROPOSALS TO GO THROUGH PROCESSES OF PROLONGED HOSPITAL STAY

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OBJECTIVES: Objetivos generales: Desarrollar estrategias de RPS para favorecer el proceso hacia la salud durante la enfermedad; para beneficiar la atención y la atención de los participantes hospitalizados durante el periodo noviembre de 2018 - mayo de 2019. Evite sobrecargar al familiar acompañante o amigo de los pacientes hospitalizados durante el periodo de noviembre de 2018 a mayo de 2019. Objetivos específicos: Genere una agenda de actividades semanales de RPS para aumentar las propuestas ofertadas. Fomentar una actitud de autoexigencia en los familiares y amigos que lo acompañan, un espacio para escuchar y reflexionar sobre sus experiencias como cuidadores. Fomentar y profundizar el vínculo entre el equipo de salud y los participantes. Fomentar las habilidades motoras y de procesamiento.

DESIGN: The following work is descriptive. Tools: Planning of activities. Register of: Direct observation in field notebook. Assistance and participation in RPS activities. Resources: Agenda of amemheries and celebrations. Group dynamics. Fun recreational activities.

RESULTS: Period evaluated: November 2018 – May 2019 Quantity of RPS activities: 117 Participation of patients: 74% in November 18 – 94% in May 2019; Participation of accompanying family members and friends: 2% in November 2018 – 9% in May 2019

CONCLUSIONS: Through this experience we have observed and accompanied singular trajectories of which varied attitudes have emerged when faced with the RPS proposals. Motor skills and processes such as memory, attention, the resolution of problems, executive functions and socialization were stimulated. This proposal encouraged the process of rehabilitation enabling the participants to get to know each other and form relationships from another point. We worked on the potentials of the persons providing them with tools which would assist the going through a process of health/illness at any time of life.

RECURRENT MENINGITIS AND POSTERIOR FOSSA SYNDROME FROM A PERSISTENT PSEUDOMENINGOCOCELE: A CHALLENGING REHABILITATION DIAGNOSIS

Chase I. Smith, DO, and Blessen C. Fapon, MD

CASE DIAGNOSIS: Recurrent meningitis, secondary to post-operative pseudomeningocele following posterior fossa mass resection

CASE DESCRIPTION: A 22-year-old female with past medical history of posterior fossa subependymoma was admitted to an inpatient rehabilitation unit status-post mass resection complicated by Enterobacter cloacae meningitis. After completing 3-weeks of culture sensitive cefepime, the patient still exhibited a post-operative pseudomeningocele within normal limits per referring neurosurgeon. Rehabilitation progress was complicated by nausea, headaches, and cerebellar signs with slowly enlarging pseudomeningocele. A MRI of the brain revealed a persistent fistula between CSF and pseudomeningocele allowing for suspected seeding of bacteria, confirmed by lumbar puncture. The patient underwent 6-weeks of meropenem, maintaining stable systemic inflammatory markers. However large volume lumbar punctures and eventual ventriculoperitoneal shunt placement was required for refractory hydrocephalus. Despite negative shunt cultures, MRI and CSF flow studies revealed persistent meningitis in the caudal brain with extensive adhesions, CSF localizations and 4th ventricle isolation. Posterior fossa revision was required to address isolated infection and CSF impediment through accompanying post-obstructive changes.

DISCUSSIONS: Post-operative meningitis is an undesirable but occasional complication of neurosurgical intervention, however, recurrent meningitis is rare and not commonly encountered by physiatrists. This case demonstrated a diagnostic challenge in the rehab setting, as a well described posterior fossa syndrome delivered a more common explanation for enduring nausea, ataxia, cranial nerve deficits and other cerebellar signs after mass resection. Rather these symptoms were a herald for recurrent meningitis from pseudomeningocele, which is not a well identified source for persistent bacterial infection in the current literature.

CONCLUSIONS: Physiatrists on inpatient rehabilitation wards should always be suspicious that infection may mimic common post-operative symptoms, even well described syndromes as in this case. Recurrent bacterial meningitis from persistent pseudomeningocele is rare. However, expeditious diagnosis was achieved through comprehensive daily history and physical examinations, with emphasis on interdisciplinary and interspecialty communication.

REDUCING LENGTH OF STAY ON AN INPATIENT REHABILITATION BRAIN INJURY UNIT THROUGH IMPROVED BEHAVIORAL MANAGEMENT

Ashley Kakkanatt, MD, Erika Trovato, DO, MS, and Rachel Feld-Glazman, OT

CASE DIAGNOSIS: Decrease length of stay on an acute inpatient brain injury rehabilitation unit by one day by improving behavior management

CASE DESCRIPTION: An interdisciplinary team was assembled to address behavioral management challenges in three domains: environment, staffing, and...
behavior monitoring. Changes were put into effect beginning in November of 2017. Environmental modifications made include creation of a locked and secured unit dedicated to patients with brain injury and installation of a centralized video monitoring system. Staff were encouraged to complete non-violent crisis intervention (NCVI) training to be more equipped to handle patients with PTA. A consistent inpatient psychiatry consultation service was implemented. Agitated Behavior Scale (ABS) tracking was initiated for all patients at admission. Interdisciplinary behavior rounds were instituted five times per week to adjust medications, reduce restraint use, improve team communication and recognize triggers to agitation.

**DISCUSSIONS:** In 2018, 491 patients were discharged from the inpatient brain injury rehabilitation unit with an average length of stay of 20.03 days. Compared to an average length of stay of 21.75 days in 2017, there was a reduction by 1.72 days. There was also a reduction in patient falls, elopements, and restraint use. There was a 350% increase in NCVI-trained staff.

**CONCLUSIONS:** Through an improved interdisciplinary approach to behavioral management, there was a reduction in average length of stay on the acute inpatient brain injury rehabilitation unit by over one day from 2017 to 2018.

**REHABILITACION EN SINDROME DE HIPERLAXITUD ARTICULAR**

Veronica Matassa, MD

**CASE DIAGNOSIS:** El Sindrome de Hiperlaxitud articular se presenta con dolor osteoarticular que pueden ser generalizadas o no, y acompañaarse de signos inflamatorios y degenerativos articular. Hay diferentes grupos de criterios diagnósticos, como los de Beighton PH en el cual se aplican diferentes maniobras (9) a las que se les asigna un punto por cada maniobra positiva siendo con valor de 4 puntos o mas, Hiperlaxo.

**CASE DESCRIPTION:** Paciente de 45 años de edad con dolores articulares múltiples, múltiples cirugias (columba, rodilla, hombro), diagnosticada como Fibromialgia, colon irritable, cefaleas recurrentes. Se inicia la evaluacion comprobando hiperlaxitud articular (criterios de Beighton con 5 puntos), defecto proprioceptivo con alteracion del balance (BESS), defecto de concentracion y fatigabilidad. Presentaba historial de tratamiento con diferentes Aines sin respuesta, EVA 8/10, trastorno del sueño por dolor mixto. Se inicia tratamiento de rehabilitacion interdisciplinaria con objetivo de fortalecimiento muscular, mejora proprioceptiva y cuidados articulares. Se inicia tratamiento farmacologico llegando con parches de suprenorma a dosis de 10mg con paracetamol 1g cada 8 horas, pregabatina 75mg, lactulon jarabe 30cc. Se obtuvo mejora funcional global (FIM y Barthel), manejo del Dolor EVA 4 y reconstitucion del descanso nocturno mejorando defecto mnescico y concentracion.

**DISCUSSIONS:** Esta paciente tuvo un diagnostico definitivo a sus 45 años de edad luego de 5 intervenciones quirurgicas, tratamientos por fibromialgia, depresion, fatiga cronica, cefaleas sin resultados. Refiere alivio no solo de encontrar un tratamiento efectivo que le permita realizar sus actividades sino ademas de saber que le pasa y como cuidarse.

**CONCLUSIONS:** La identificacion de esta patologia, el manejo adecuado del dolor y su rehabilitacion interdisciplinaria con objetivos clares acorde a la misma mejora la calidad de vida de estos pacientes que en ocasiones parejaizn largamente con diagnosticos erroneos y permiten realizar los controles preventivos de las complicaciones.

**REHABILITATION CHALLENGES IN AN INDIVIDUAL WITH HIPERLAXITUD ARTICULAR**

Veronica Matassa, MD

**CASE DIAGNOSIS:** Quadriplegia and ventilator dependence due to spinal cord infarction after cervical transforaminal epidural steroid injection.

**CASE DESCRIPTION:** This is a 27-year-old male who developed anterior spinal cord and basal ganglia infarction after C6/C7 transformamal epidural steroid injection with methylprednisolone and lidocaine. At admission to inpatient rehabilitation he had 0/5 strength in all extremeties, ventilator dependence and severe dysphagia. Rehabilitation interventions included functional electrical stimulation, Lokomat training, mouth stick use, cervical strengthening, upright tolerance training and spasticity management. He has demonstrated motor return of the right lower extremity to 1-2/5 strength and intermittent activation of some upper extremities muscles. The upper extremities are flaccid and lower extremities are spastic. Light touch is mostly intact and pin prick is impaired below C3/C4. Voluntary anal contraction is absent. He progressed to a regular diet with thin liquids and tolerance of leak speech. Five months after spinal cord injury he developed spontaneous respiration with vital capacity of 100-150 milliliters, phrenic nerve study with bilateral response and is planning for diaphragmatic pace.

**DISCUSSIONS:** There is literature identifying cases of quadriplegia due to the rare complication of spinal cord infarction after cervical epidural steroid injection. However to our knowledge, none have described the rehabilitation interventions and medical improvement.

**CONCLUSIONS:** We describe the rehabilitation course for a case of quadriplegia and ventilator dependence due to spinal cord infarction after cervical epidural steroid injection. The patient continues to require total assistance for all ADLs.
Abstracts
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REHABILITATION FOLLOWING VALPROIC ACID-INDUCED HYPERAMMONEMIC ENCEPHALOPATHY (VHE) IN A PATIENT WITH INTRACTABLE EPILEPSY

Dan Nguyen, MD, Ann Ikonne, MD, MPH, and Se Won Lee, MD

CASE DESCRIPTION: Valproate is a widely used anticonvulsant utilized for the treatment of seizures. Its use has been linked to Hyperammonemic Encephalopathy; a rare complication characterized by decreased levels of consciousness, focal neurologic deficits, cognitive slowing, drowsiness and lethargy.

Secondary to acute lymphoblastic leukemia

Gilbert Siu, DO, PhD, and Jonathan Lee, BS

CASE DESCRIPTION: We present a case of a 29-year-old African American male with intractable epilepsy secondary to a remote history of a left frontal CVA with associated right hemiparesis and traumatic brain injury that was initially admitted to the hospital with complaints of headache, confusion, weakness and multiple seizures. He continued to experience seizures in acute care despite treatment with 5 different antiepileptic medications. On admission, the ammonia levels were found to be elevated and peaked at 108.

DISCUSSIONS: Valproate was discontinued. He started on Lactulose, Rifaximin, and Clobazam was added. Ammonia levels improved to 43 at the time of admission to inpatient rehabilitation facility (IRF), and he remained seizure free for 2 days. Initial course in rehabilitation was complicated by recurrent seizures leading to a short return to acute care. However, upon readmission to IRF, he continued to have intermittent seizures leading to ongoing neurologic insult hindering his progress. On day 9, the patient’s seizures subsided and significant progress was made with extensive rehabilitation. Over his 14 day stay, comprehensive physical, occupational, and speech therapies lead to meaningful improvement in FIM scores (51 to 87).

CONCLUSIONS: This case demonstrates the unique challenges of a patient with intractable epilepsy with a complex and carefully balanced medication regimen complicated by continued neurologic insult during his rehabilitation course.

REHABILITATION FOR PATIENT WITH PRION DISEASE

Eugene Palatulan, MD, Akinpelumi Beckley, MD, and Frank Schirripa, DO

CASE DIAGNOSIS: Creutzfeldt-Jakob disease

CASE DESCRIPTION: A 65-year-old man with hypertension presented with progressive functional decline for two months with subacute paranoia, abulia, ataxia and myoclonus. Patient's initial workup for autoimmune encephalitides and post-infectious cerebellitis were unrevealing. MRI study revealed bilateral diffusion restriction and FLAIR hyperintensities in bilateral caudate, putamen, and pulvinar nuclei. Pan CT scan showed no malignancy. On admission, patient was noted to require max assistance for bed mobility and transfers with severe truncal ataxia. Neuropsychological workup completed during acute inpatient rehabilitation course revealed positive LP results for 14-3-3 proteins and real-time quakin-induced conversion (Rt-QuIC) study making diagnosis of sporadic Creutzfeldt-Jakob disease (CJD) overwhelmingly positive. As this is known to be an irreversible and terminal diagnosis, goals of admission were transitioned to caregiver training as opposed to functional rehabilitation. Involvement of palliative care was essential in providing resources for home support and equipment.

DISCUSSIONS: Creutzfeldt-Jakob disease is a neurodegenerative disorder under the umbrella of prion diseases with long incubation periods and progress inexorably once symptoms appear. CJD is extremely rare, approximately 1 case of sporadic CJD per 1,000,000 population per year detected by Rt-QuIC test. Prognosis is poor and there is no known effective treatment. Rehabilitation medicine plays crucial role in ensuring that patients can effectively return home with the necessary equipment and support. As patient is rendered total dependence by this devastating disease, reducing caregiver burden becomes a very important goal especially in patients and family who choose to go home with hospice.

CONCLUSIONS: CJD is a rare neurodegenerative disease. It results in devastasting outcome of mental deterioration, hypokinesia, myoclonus and cerebellar signs of nystagmus and ataxia. From onset of symptom to end is unrelenting and renders a fully functional and independent person to total dependence. Rehabilitation medicine plays crucial role in reducing caregiver burden and facilitating safe return home.

REHABILITATION IN A PATIENT WITH TRANSVERSE MYELITIS SECONDARY TO ACUTE LYMPHOBLASTIC LEUKEMIA

Gilbert Sia, DO, PhD, and Jonathan Lee, BS

CASE DIAGNOSIS: 23-year-old male with no past medical history presented with acute leg weakness, paresthesias, and fatigue. MRI of the spinal cord revealed hyperintense lesions at T7 and T8. Laboratory studies also showed abnormally elevated white count. Physical examination demonstrated flaccid lower limbs, areflexia, and sensation loss with pinprick and light touch below T7 level. This patient’s functional status examination was maximum assistance for mobility and activities of daily living (ADL).

CASE DESCRIPTION: Further testing reviewed that the patient was diagnosed acute lymphoblastic leukemia (ALL). The MRI results were also consistent with transverse myelitis involving T7 and T8 spinal cord levels. The patient was started on chemotherapy and then transferred to acute inpatient neurologic rehabilitation hospital. With continued chemotherapy, the patient was started on comprehensive spinal cord rehabilitation program. After four weeks of rehabilitation, the patient ultimately progressed to a Modified-Independent level for functional wheelchair mobility and ADL.

DISCUSSIONS: Acute lymphoblastic leukemia is an uncommon cause of transverse myelitis. Multiple leukaemia cases have shown causes of transverse myelitis after chemotherapy, bone marrow transplant and radiation, but not from ALL alone. This is the first reported case, to our knowledge, of rehabilitation course in a patient in this type of disease.

CONCLUSIONS: Although acute lymphoblastic leukemia causing transverse myelitis is rare, this case highlights the importance of rehabilitation for the functional recovery of the patient.

REHABILITATION OF CHRONIC POST-STROKE SPASTIC PARESIS: IMPACT OF GUIDED SELF-REHABILITATION CONTRACTS ON GAIT AT THE CARDINAL PAUL EMILE LEGER NATIONAL CENTER FOR REHABILITATION OF PERSONS WITH DISABILITIES OF YAOUNDE-CAMEROON

Kambou Sinfonian, MD, Alex Moyou, PT, Vincent Ombede, PT, Etienne Tsafack, PT, Michael Temougou, MD, and Callixte Kuate, PhD

OBJECTIVES: Spastic paresis is a syndrome observed in many conditions including stroke. It arises after lesions of central motor pathways involved in motor command execution. This syndrome combines in order of appearance: stretch-sensitive paresis, soft tissue contracture and muscle overactivity. The current study aimed to evaluate the impact of Guided Self-Rehabilitation Contracts on gait of patients with chronic post stroke spastic paresis.

DESIGN: This was a randomized controlled trial. The intervention arm performed Guided Self-Rehabilitation Contracts based on prolonged self-stretching exposures during 10 minutes for each selected muscles of the affected lower limb and motor exercises to be done in 15 seconds every day at home. All the work done was reported by patients on logbook which was verified at every weekly follow-up visit. The control arm underwent Conventional Rehabilitation sessions. Initial and final assessments took place ten weeks apart. Outcome measures included 10 meters walking test at comfortable and fast speed, passive range of motion (XVI), angle of catch (XV3, Tardieu) and active range of motion (XA). We used Student T test and Mann Whitney test for statistical analysis.

RESULTS: Ten patients were included in each arm. Baseline characteristics were similar in both groups. At the end of intervention, participants undergoing Guided Self-Rehabilitation Contracts presented greater improvement of comfortable and fast walking speed about 40% and 11%, respectively. Compared with controls, the intervention group reported higher reduction of coefficient of shortening with a significant difference between the two arms (p=0.047).

CONCLUSIONS: Guided Self-Rehabilitation Contracts improved soft tissue contracture and walking speed more than Conventional Rehabilitation in patients with chronic post stroke spastic paresis. This method can be a good rehabilitation strategy for physical therapists particularly in low income countries.

REHABILITATION OF NEUROLOGICAL MANIFESTATIONS OF LEGIONNAIRES’ DISEASE

Deborah Pacik, MD, MPH, and Maria Jouvin-Castro, MD

OBJECTIVES: Legionnaires’ Disease

DESIGN: A 36-year-old male maintenance worker with no significant medical history presented with vomiting, AKI, rhabdomyolysis, liver dysfunction, hypotension, ataxia with wide stance, dysmetria, dysarthria, poor short-term recall, clonus, and promotor drift. MRI showed corpus callosum changes consistent with an infectious process. Urine culture was positive for legionella. Pneumonia seen on imaging was asymptomatic. On admission to acute inpatient rehabilitation, he required a rolling walker for ambulation, demonstrated poor static and dynamic balance, working memory deficits, and required maximum assistance with activities of daily living (ADL). He made rapid progress with physical, occupational, and speech therapy. Three weeks after discharge, he had almost complete resolution of his symptoms with residual clonus and mild promotor drift.
RESULTS: This is a rare and complicated presentation of Legionella with multi-organ involvement but without pulmonary symptoms. Legionella is a gram-negative bacteria found in human-made water sources that is best known to cause atypical pneumonia. The incidence of infection increases in warm, humid environments and during summer months. It is associated with poverty and occupations such as maintenance, security, and construction. Neurological involvement is thought to be caused by microlgal invasion in the CNS. There are published case reports describing one or two extrapulmonary symptoms but few reports with such a complex presentation and none documenting the benefit of acute inpatient rehabilitation. This patient presented with significant neurological deficits and difficulty with ADLs but made rapid progress with intense therapy. The findings of clonus and pronator drift after discharge, in- consistent with significant neurological deficits and difficulty with ADLs but made rapid progress with acute rehabilitation.

CONCLUSIONS: Extrapyramidal Legionnaires’ disease should be considered in the differential diagnosis with acute ataxia, speech deficits, and difficulty with ADLs. Disability related to the neurological manifestations of legionella may improve rapidly with acute rehabilitation.

REHABILITATION OF PERSISTENT POSTHYPOXIC MYOCLONUS (LANCE-ADAMS SYNDROME [LAS]): A CASE REPORT
Elizabeth Aguila, MD, and Stuart Yablon, MD

CASE DIAGNOSIS: Lance Adams Syndrome (Chronic Posthypoxic Action Myoclonus)

CASE DESCRIPTION: A 34-year-old female sustained hypoxic brain injury due to airway obstruction of uncertain duration. When found, cardiopulmonary resuscitation (CPR) was initiated for 7 minutes before return of spontaneous circulation. She was intubated, received a brief course of mechanical ventilatory support and then weaned from the ventilator. By day 11 of her acute care hospital stay, she was conscious, but manifest upper and lower extremity hypotonia with action myoclonus observed in all limbs and trunk. Diagnostic evaluation included magnetic resonance imaging (MRI) of the brain and cervical spine, vascular imaging, and electroencephalography (EEG). No acute abnormalities were observed. She experienced worsening action myoclonus and diaphoresis, despite oral benzodiazepines, baclofen and high-dose levetiracetam. At 4 months postinjury, she was admitted to IPR. Divalproex sodium and primidone were added to her treatment regimen. Action myoclonus and diaphoresis then improved, facilitating standing for short periods of time, and initiating transfers with less physical assistance.

DISCUSSIONS: Lance-Adams syndrome (LAS) is a rare complication of hypoxic brain injury, presenting with action myoclonus, postural imbalance and ataxia. The pathophysiology of LAS is incompletely understood. Pharmacotherapy is the mainstay of treatment for LAS and includes antiepileptic drugs and benzodiazepines. While there are few studies addressing the benefit of coordinated multidisciplinary rehabilitation for LAS, in this patient clinical improvement coincided with concurrent modification to drug therapy during IPR.

CONCLUSIONS: LAS can cause severe motor impairment. A combination of pharmacotherapy and coordinated multidisciplinary rehabilitation may optimize functional improvement. Further study is warranted, especially in cases with severe LAS that persist despite pharmacologic interventions.

REHABILITATION OUTCOME OF PATIENTS SUFFERING FROM POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME (PRES)
Zeev Meiner, MD, Youngh Ofran, MD, Eilior Moreh, MD, Jeanna Tsenter, MD, and Isabella Schwartz, MD

CASE DIAGNOSIS: PRES is an increasingly recognized clinicoradiologic syndrome caused by dysfunction of the brain capillary endothelium resulting in vasogenic edema mainly in the occipital lobes. The etiologies of PRES include acute hypertension, eclampsia, immunosuppressive therapy and renal disease or following surgical procedures. The main symptoms are related to the visual system including hemi-opthalmoplegia, visual neglect or cortical blindness.

CASE DESCRIPTION: 4 patients, 1 male and 3 females age 71, 65 and 60, 40 years old respectively, with PRES were treated in our department in the last years. PRES was diagnosed according to clinical and radiological findings in MRI. 3 patients developed PRES after surgeries and one following streptococcal pneumonia. CT scan demonstrated symmetric occipital lesions and MRI revealed symmetric, hyperintense lesions on FLAIR weighted images, with surrounding white matter regions of the brain characteristic of PRES. Rehabilitation and cognitive outcomes were evaluated using the motor and cognitive FIM. A MRI using specific parameters for activating the visual cortex was done in 3 patients. All patients showed significant functional and cognitive improvement as noted by the improvement in FIM as well as other cognitive tests however little improvement was found in visual functions.

DISCUSSIONS: The mechanism behind PRES remains controversial and unproven. Severe hypertension leading to a blood pressure that exceeds the upper limits of autoregulation, with subsequent forced hyperperfusion, has been suggested. Con- versely, vasculopathy and hyperperfusion have been reported, and the PRES imaging appearance resembles a watershed distribution. According to our study although pa- tients with PRES syndrome improved significantly in rehabilitation in most of cogni- tive and ADL functions, they are left with severe visual field disturbances affecting their independence.

CONCLUSIONS: It is important to recognize the symptoms of PRES early in order to prevent unnecessary interventions and to initiate specific rehabilitation treatments.

REHABILITATION POST LANCE ADAMS SYNDROME: CASE REPORT
Zainab J. Al Lawati, MD, and Amna Saric, MD

CASE DIAGNOSIS: Management of movement disorders requires multidisciplinary approach. With the advances in rehabilitation medicine and its multimodal approach Physiatrists are able to troubleshoot complex movements disorders and be an essential part in the multidisciplinary approach to provide better care.

CASE DESCRIPTION: 45 years old man attempted suicide via hanging in 2018. It was reported he was apneic for 10 seconds and then resumed breathing. Once he regained consciousness he had persistent myoclonus. He was reviewed by Neuro-logy team who thought this is consistent with post-hypoxic myoclonus. He was ad- mitted to the Rehabilitation facility to address his functional independence and manage his myoclonus. His medical management was optimized. He was educated how to manage when his unpredictable myoclonus occurs. After ensuring a safe home envi- ronment and independent ambulation he was discharged home.

DISCUSSIONS: Lance-Adams syndrome (LAS) was first described in the 1960s by Lance and Adams, who described 4 patients who developed myoclonic jerks within a few days following an episode of anoxia. After recovery of conscious- ness, the patients continued their abnormal clinomovements, which were triggered by intentional action or external stimuli, and they were relieved at resting or during sleep. Although the pathophysiology of LAS has no been clearly defined, the progno- sis is known to be quite good. With regards to treatment, substances like clonazepam, sodium valproate, piracetam, 5-hydroxytryptophan, fluoxetine hydrochloride and carbodopa showed positive influence on the action myoclonus. In addition to the med- ical management; Rehabilitation Medicine plays a vital role in optimizing patient’s goals and quality of life using variable approaches. Implementing endurance exer- cises and cognitive strategies on top of balancing the sedative side effects of these anti-epileptics is successfully achieved with collaboration with Neurologists.

CONCLUSIONS: This report illustrates the art behind the rehabilitation medi- cine in managing complex movement disorders improving patients’ quality of life.

REHABILITATION WITH COMPLETE DECONGESTIVE THERAPY IN A PATIENT WITH ASEPTIC MENINGITIS SECONDARY TO RELAPSING POLYCHONDritis
Gilbert Siu, DO, PhD, and Jonathan Lee, BS

CASE DIAGNOSIS: 42-year-old male with no past medical history presented with acute change in mental status, dizziness, and headaches. MRI of the brain revealed extensive leptomeningeal enhancement consistent of meningitis. Multiple labor- atory studies, including cerebral spinal fluid, were unremarkable for infectious etiology. Physical examination demonstrated ataxia, diffuse hyperreflexia, and cogni- tive impairment along with right ear and nasal erythema and diffuse metacarpal joint swelling and tenderness. This patient’s functional status examination was moderate assistance for ambulation and activities of daily living (ADL) with limitation in hand function due to the joint swelling.

CASE DESCRIPTION: After a review of extensive laboratory testing with key physical examination features, the patient was diagnosed with relapsing polychon- dritis causing aseptic meningitis. The patient was given prednisone and then trans- ferred to acute inpatient neurologic rehabilitation. The patient continued to receive prednisone during his rehabilitation course. The patient also received complete decon- gestive therapy (CDT) to the hands, which consisted of compression wrapping and manual lymphatic drainage. The patient’s hand function, pain, and edema improved with the CDT. Ultimately he progressed functionally to a modified-independent level and was discharged home.

DISCUSSIONS: Relapsing polychondritis is a rare and progressive inflamma- tory disease. While the pathogenesis is poorly understood, the inflammatory response
affects the cartilaginous structures, predominantly the ears, nose, tracheobronchial tree, and peripheral joints. Neurologic manifestation represents only 3% of the patients and only a handful of cases present with aseptic meningitis. This inflammatory disease is treatable with corticosteroids. In this case the patient’s functional and cognition status improved with rehabilitation, steroids, and complete decortication therapy. This is the first reported case, to our knowledge, of acute rehabilitation with complete decortication therapy in this type of patient.

CONCLUSIONS: Although relapsing polychondritis with aseptic meningitis is rarely reported, this case report highlights that the importance of acute inpatient rehabilitation, and therefore this treatable disease should not be overlooked.

RELATIVE INFLUENCE OF PERSONALITY TENDENCIES ON PSYCHOSOCIAL FUNCTIONING IN PATIENTS WITH TRAUMATIC BRAIN INJURY

Manabu Hashimoto, MD, PhD, Takafumi Yamashita, MA, Makiko Nishi, MA, and Hiroe Tsukahara, Occupational Therapist

OBJECTIVES: To investigate how personality tendencies in patients with traumatic brain injury (TBI) influence their cognitive functions, behavioral and psychosocial symptoms, and psychosocial functioning.

DESIGN: Seventeen patients with TBI were examined (male: 15, female: 2). Personality was assessed using the Japanese version of the Minnesota Multiphasic Personality Inventory (MMPI). Cognitive functions were evaluated using the Wechsler Abbreviated Scale of Intelligence III (WASI-III), revised Wechsler Memory Scale (WMS-R), Rivermead Behavioral Memory Test (RBMT), Behavioral Assessment of the Dysexecutive Syndrome (BADS), Trail Making Test (TMT), Paced Auditory Serial Addition Test (PASAT), and modified Stroop test (mST). Behavioral and psychological symptoms were assessed using the Neuropsychiatric Inventory (NPI). Psychosocial functioning was evaluated by the Global Assessment of Functioning (GAF) scale. Statistical comparisons were made by employing the Kruskal-Wallis test.

RESULTS: The patients showed a normal distribution in the V group than the IV group (p=0.077). Additionally, the N group displayed better GAF scale than those with clinically significant personality tendencies. How-ever, such tendencies exhibited no significant associations with cognitive functions or behavioral and psychological symptoms.

RELIABILITY AND VALIDATION OF THE HECKMATT SCALE FOR ASSESSING MUSCLE FIBROSIS IN SPASTICITY: A PRELIMINARY REPORT

Alana Fleet, MSC, MD, Rajiv N. Reehye, MD, FRCP, Ryan V.Sandarage, BSC, MD Candidate, Marisa Moreta, DO, and Michael Munin, MD

OBJECTIVES: Ultrasound-guided procedures, including botulinum toxin A injections, are increasingly used to visualize tissue targets. The Heckmatt scale is often referenced in spasticity studies to classify the degree of muscle fibrosis on ultrasound. However, this was originally designed and validated in patients with Duchenne muscular dystrophy. The aims of this study are: to validate the Heckmatt scale in patients with spasticity to assess fibrosis on ultrasound, examine reliability of the scale, and compare whether it varies with clinical experience.

DESIGN: Patients were recruited from outpatient clinics across two centres. 44 adult participants, diagnosed with spasticity in the upper (UE) and/or lower extremity (LE) and undergoing chemodenervation procedures were enrolled. 6 healthy adult controls were also included. The main variable was Heckmatt scale scores. Clinical and demographic data were also obtained for analysis. Ultrasound images were taken in a standardized approach for predetermined muscles of the UE and LE. Images were de-identified and reviewers blinded to participant characteristics. Two resident and two staff physicians were trained to assign Heckmatt ratings to 115 ultrasound images, separated over two time points. Additional comparisons were made between clinician and software-generated scores using quantitative grayscale software.

RESULTS: In assessing reliability of the Heckmatt scored images, there was good agreement within and between clinicians, with interclass correlation coefficients (ICC) intra-rater 0.81 and inter-rater 0.76 (p<0.001). The relationship between clinician Heckmatt scored data and software-generated ‘quantitative’ scores showed a strong, significant correlation, with Spearman’s rho = 0.829 (p< 0.001).

CONCLUSIONS: Preliminary data suggests the Heckmatt scale is a valid and reliable tool for patients with spasticity to assess muscle fibrosis on ultrasound. Clinicians and researchers can apply it to future work using ultrasound in spasticity management, with potential to guide tissue targets in chemodenervation.

RELIABILITY OF CHINESE VERSION OF THE WALKING INDEX FOR SPINAL CORD INJURY II

Xiaodan Ma, Bachelor's Degree, and Weihong Qiu, Master's Degree

OBJECTIVES: Ambulation is a primary goal of the individual who sustains a spinal cord injury (SCI). The Walking Index for Spinal Cord Injury II (WISCI II) was cited as one of the most reliable measures of the function of walking in SCI clinical trials in the published guidelines developed by the International Campaign for Cure of Spinal Cord Paralysis. In China, there is still no research on the reliability of the WISCI II. The purpose of this study is to translate the Walking Index for Spinal Cord Injury II into Chinese and to assess the reliability of the Chinese version of WISCI II in patients with spinal cord injury.

DESIGN: Thirty patients, with average age of 42.7 years. Level:13 cervical,9 thoracic,3 lumbar; ASIA (American Spinal Injury Association) impairment scale (AIS) grade: 27 D 3 C. Assessment of maximum WISCI II levels by two trained, blinded raters to evaluate test-retest and intra-rater reliability.

RESULTS: The intra-rater reliability was 0.991 for therapists A and 0.986 for therapists B, for the maximum WISCI II level. The test-retest reliability for the maximum WISCI II score was 0.994 on day 1 and 0.976 on day 2.

CONCLUSIONS: The Chinese version of WISCI II has high test-retest and intra-rater reliability when administered by trained raters.

RELIABILITY OF INERTIAL SENSOR-BASED POST-STROKE SPASTICITY MEASUREMENTS

Sun Hyung Kim, MD, Sang Yoon Lee, MD, PhD, Seung Ho Jung, MD, PhD, and Shi-Uk Lee, MD, PhD

OBJECTIVES: We investigated to compare the test-retest and intra-rater reliability of goniometer- and inertial measurement unit (IMU) sensor-based measurement of angle of catch (AOC). We aimed to describe individual variability of MAS grade 2 using IMU sensors.

DESIGN: A total of 23 stroke patients with 29 spastic (MAS 1 to 2) elbows were included. The test protocol based on the dynamic part of the mTS measurement were tested. Two examiners measured the spasticity using two instruments: 1) a digital goniometer and 2) an IMU-based system (Human Track, Rihtech Co., Korea). Each limb was examined four times. Two IMU sensors tracked the motion during the tests, with a sample frequency of 100 Hz. The angles of full ROM and acceleration rate of the movements were calculated. AOC was defined as maximal deceleration point. Test-retest and intra-rater reliability of AOC measurement were calculated with Cronbach’s α. From the time-angle curve, we classified the patterns of curve that correspond to the MAS grade 2.

RESULTS: Test-retest reliabilities using digital goniometer were excellent (Cronbach’s α = 0.970 and 0.968 for examiner A and B), but intra-rater reliability was acceptable (0.770). For IMU sensor method, both test-retest (0.964 and 0.949 for examiner A and B) and intra-rater reliabilities (0.933) were excellent. In 8 spastic elbows measured as MAS grade 2, patterns of AOC were as follows: (A) marked AOC point before a half of the full ROM; (B) marked AOC point after a half of the full ROM; (C) unapparent AOC during the full ROM, which means that spasticity classified as MAS 2 can be classified in detail according to AOC patterns measured with IMU based system.

CONCLUSIONS: Post-stroke spasticity measurement using IMU sensors showed more reliable Results than digital goniometry. Spastic limbs with MAS grade 2 can be subclassified according to AOC patterns measured with IMU sensors.

REPEATED IMMUNOTHERAPY FOR THE MANAGEMENT OF ANTI-NMDA RECEPTOR ENCEPHALITIS: A CASE REPORT

Jennifer M. Chui, MD, Nicole Diaz-Segarra, MD, and Radhika Bapineedu, MD

CASE DESCRIPTION: A 30-year-old man presented with acute visual disturbances and headaches. He subsequently developed severe confusion and altered mental status. After extensive evaluation, cerebrospinal fluid revealed antibodies consistent with anti-NMDA receptor encephalitis and underlying etiology for anti-NMDA Receptor Encephalitis.
paraneoplastic syndrome was negative. He underwent first-line treatment with intra-
venous immunoglobulin (IVIG) and steroids without significant clinical response. 
Additional treatment with rituximab resulted in symptomatic improvement. How-
ever, his hospital course was complicated by respiratory failure secondary to central
ventilation syndrome and autonomic instability. After recovery, he was transferred to
an acute rehabilitation facility. Upon admission, he was non-verbal, hyporeflexic, ag-
gressive, and had generalized weakness. While motor recovery improved with therapy,
his behavior worsened despite treatment with antipsychotic and sedative medications 
prompting repeat rituximab infusions. After repeat infusions, his cognitive function
improved significantly, specifically speech and resolution of his hyporeflexic and ag-
gressive behaviors. He was eventually discharged home and continued with output-
patient cognitive therapy.

DISCUSSIONS: Anti-NMDA receptor encephalitis can present with a wide 
range of symptoms including visual or auditory distortions, speech and movement 
disorders, cognitive and behavioral disturbances, autonomic dysfunction, and central
hypotension as described in this unique case. While the etiology of anti-NMDA 
receptor encephalitis is not completely known, one theory postulates an altered im-
mune response to a neoplasm (paraneoplastic syndrome). First line treatments include 
removal of the neoplasm, IVIG, and steroids. However, immunotherapy such as ritux-
imab can be used as a second line treatment for patients who are refractory to initial 
treatment. Additionally, multiple rounds of rituximab infusion may be necessary as 
re-emergence of symptoms can occur.

CONCLUSIONS: Anti-NMDA receptor encephalitis is a serious life threaten-
ing disease and recovery is generally slow, occurring over months to years. With 
prompt diagnosis, proper medical management, and comprehensive therapy to ad-
dress the cognitive, respiratory, and motor deficits, patients can have good recovery 
and prognosis.

REPRESENTATIONS OF FIRST AND LAST, LEFT AND RIGHT IN 
THE BRAIN: LESSONS FROM MULTIMODAL SPINAL NEGLECT
Lihi Isidora Mansano, DR, Corrine Serfatty, DR, Yaron Sacher, DR, 
and Nachum Soroker, MD

OBJECTIVES: Unilateral spatial neglect (USN) is a common sequel of stroke 
associated with poor rehabilitation outcome. It results from impaired processing 
within a network that controls spatial attention, and is more frequent, long-standing
and severe following right-hemispheric damage (RHD). Aim: To examine the impor-
tance of spatial location (left/right) vs. temporal order (first/last) parameters, in condi-
tions where visual and tactile objects have to be reconstituted mentally following 
sequential presentation of their parts in mid-sagittal position.

DESIGN: Method: 35 first-event RHD stroke patients with left USN and 29 
healthy controls were presented with pairs of 2D geometrical shapes for same/differ-
ent judgment, in 3 testing conditions: a. ‘visual static’ [VS] – each object exposed in its
entirety; b. ‘visual dynamic’ [VD] – objects moved horizontally (leftward/rightward)
between a central narrow slit exposing only part of the object at one time; c. ‘tactile dy-
namic’[TD] – the upper contour of objects, similar in appearance to the visual objects,
are palpated by the blindfolded participant in both rightward and leftward directions, 
with the index finger of the right hand. In tasks b and c the spatial representation has 
to be reconstructed mentally from partial, non-lateralized, sensory information.

RESULTS: In both VS and TD tasks patients demonstrated difficulty detecting a 
difference between the pair of shapes when it was located in the left part of the 
mentally reconstructed object, despite the fact that all shape parts where presented 
in midline position, eliminating the need for lateralized search. Recency benefitted 
judgement.

CONCLUSIONS: Access to conscious awareness in USN depends on both the spatial 
and temporal tags of an object. Better understanding of the brain mechanisms 
underlying the variety of neglect manifestations is mandatory for development of ef-
ficient rehabilitation tools to reduce neglect-related disability.

RESULTS OF THE INTERNATIONAL SPINAL CORD INJURY 
SURVEY IN AUSTRALIA
James W. Middleton, MBBS, PhD GRADDPSEXPS,FCRM(RACP), FCRM, 
Mohit Arora, PhD, Timothy Geraghty, MBBS, FAFRM(RACP), 
Ruth Marshall, MBBS, DPRM, FAFRM(RACP), 
and Andrew Nunn, MBBS, FAFRM(RACP)

OBJECTIVES: The Australian arm of the International Spinal Cord Injury (AUDSCI) 
Community Study is part of a global cross-sectional study to describe the ‘lived experience’ of 
persons with spinal cord injury (SCI) and identify key factors influencing level of functioning and independence, health, community participation 
and quality of life.

DESIGN: The Aus-InSCI study uniquely combined data from SCI units in four 
Australian states, a government insurance agency and three consumer organizations, 
using privacy-preserving data management, secure transfer and data-linkage pro-
cesses, to create a representative, population-based, anonymized dataset of people 
with SCI. The Aus-InSCI questionnaire consists of 125 (international) and additional 68 
(national) questions, including socio-demographics, SCI characteristics, body 
functions and structures, activities and participation, environmental and personal fac-
tors, and appraisal of health and well-being.

RESULTS: 1579 adults (18 years or older) with traumatic or non-traumatic SCI 
at least 12 months post-injury were recruited from March to December 2018. The 
mean age of the whole cohort was 58±14 years, with most participants being male 
(73%) with paraplegia (61%) and incomplete lesions (68%). The cohort had a wide 
range of ‘lived experience’ with time post-injury from under 5 years (23%) to more 
than 30 years (21%). Overall quality of life was rated by majority of respondents as 
being good (43.2%) or very good (19.1%). Twenty-nine percent were engaged in paid 
work activities (at mean time of 2.4±2 years). Compared to 1 year ago, general health 
was rated as better in 23%, about same in 55% and worse in 22%. The most common 
health issues included pain (85%), sexual dysfunction (79%), sleep disorders (78%), 
bowel (75%) and bladder (62%) problems.

CONCLUSIONS: Aus-InSCI represents the largest and most comprehensive 
survey of health-related issues, functioning, social inclusion, economic participation 
and support needs ever conducted in Australia, providing a baseline for future com-
parison within Australia and international benchmarking.

RIGHT COMMON CAROTID ARTERY STUMP SYNDROME: A 
CASE REPORT
Robert J. Maldonado, MD, Shelly Gulhar, MD, and Rachna Mallhotra, DO

CASE DIAGNOSIS: 50-year-old male presented to the ED with weakness in the 
left upper extremity, left lower extremity and left face, found to have right common 
carotid artery (RCCA) occlusion.

CASE DESCRIPTION: The patient has a history of peripheral arterial disease 
and throat cancer status post chemoradiation. He had been experiencing intermittent 
L-sided weakness for a month. Neck CT showed a 3 cm thrombosis involving the 
proximal RCCA. Carotid duplex demonstrated occluded RCCA with patent retro-
grade flow in the right external carotid artery and antegrade flow in the right internal 
carotid artery. He was started on a heparin drip, aspirin, and high-dose statin. While in 
the ED, his neurological deficits resolved. The initial plan was for medical manage-
ment however, he experienced intermittent episodes of transient left-sided weakness, 
left facial droop and slurred speech. He was taken for RCCA exploration, ligation, 
and division. A chronic appearing thrombus with a friable component was seen in the 
RCCA. His Postoperative hospital course was complicated by recurrent transient 
ischemic events (TIAs).

DISCUSSIONS: Typically, carotid stump syndrome is caused by an occlusion of the 
internal carotid artery which leads to periodic cerebral emboli. This is a rare case 
of common carotid stump syndrome with resultant cerebral ischemia. RCCA ligation 
was performed in order to prevent further cerebral emboli. Postoperatively the patient 
continued to have recurrent TIAs in the setting of normotension. At discharge, a sys-
tolic blood pressure goal of 170-180 mmHg was maintained in order to maintain 
adequate perfusion. Rehabilitation in these patients becomes particularly difficult due 
to recurrent TIAs and strokes. Therefore, it is important to emphasize the need to 
maintain blood pressure above the guidelines to ensure desired therapeutic outcomes.

CONCLUSIONS: Further studies regarding the management of carotid stump 
syndrome are needed, in order to prevent further neurological damage and maximize 
the utility of therapeutic rehabilitation

RNA-SEQ ANALYSES OF THE EFFECT OF ELECTROMAGNETIC 
FIELDS WITH DIFFERENT EXPOSURE TIME ON MESENCHYMAL 
STEM CELLS DURING OSTEOC GERIC DIFFERENTIATION
Xingping Li, Doctor, Jiuyuan Ou, Doctor, Liming Bai, Doctor, Pin Zhao, 
Wenfang Bai, Doctor, and Mingsheng Zhang, Doctor

OBJECTIVES: Previous studies demonstrated that electromagnetic fields (EMF) 
could affect mesenchymal stem cells (MSCs) differentiation, and that effects 
ofEMF on cells depend on the frequency, intensity, and exposure time, yet the under-
lying molecular networks associated with different exposure times of EMF on MSCs 
remain unexplored. We try to provide more information to determine the properly ad-
justable values of EMF.

DESIGN: In this study, MSCs were isolated from bone marrow and cultured with the 
conditioned media, then exposed to EMF at 50 Hz of frequency, 5 mT of flux den-
sities for 30min, 1h, 3h, or 6h for 3 days. Then we used next generation sequencing to
analyze gene expression profiles of EMF treated-MSCs by using the FANSe3 algorithm on the Chi-Cloud NGS analysis platform. Gene Ontology (GO) function and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analysis were used to analyze the molecular pathways, while qRT-PCR were used to validate the key expressed gene of the pathways.

**RESULTS:** When MSCs were treated with EMF for 30 min, 1 h, 3 h, or 6 h, a total of 31, 15, 313, or 177 genes, respectively, were differentially expressed compared to the control. Only 2 genes (Fam49a, Alox5) overlapped between EMF groups with different exposure time. GO and KEGG biological pathway analyses showed that the differentially expressed genes (DEGs) were enriched in biological process domain with different exposure time for EMF 3 h and 6 h exposure time. The DEGs were significantly enriched in 2~3 signaling pathways such as microRNAs in cancer, Rap1 signaling pathway, and Ras signaling pathway for 6 h exposure. The KEGG pathway analysis showed that DEGs were significantly enriched in biological process related to cell motility and apoptotic process after treatment.

**CONCLUSIONS:** We provided evidence that EMF with different exposure time could alter MSCs gene expression profiles with different patterns, and continued EMF exposure has a risk of carcinogenesis in the osteogenic induction process of MSCs.

RNA-SEQ ANALYSIS IDENTIFIES GENE EXPRESSION PROFILES IN MSCS TREATED WITH 50HZ ELECTROMAGNETIC FIELDS TREATMENT

Xinping Li, DOCTOR, Jiuyuan Ou, DOCTOR, Linning Bai, DOCTOR, Pin Zhao, and Mingsheng Zhang, DOCTOR

**OBJECTIVES:** Several studies demonstrated that electromagnetic fields (EMF) could affect mesenchymal stem cells (MSCs) proliferation or differentiation depending on the frequency, intensity, and the exposure time, yet the underlying molecular networks associated with different exposure times of EMF on MSCs remain unexplored.

**DESIGN:** In this study, MSCs were isolated from bone marrow and cultured with the conditioned media, then exposed to 50 Hz EMF at 5 mT of flux densities for 30 min, 1 h, 3 h, or 6 h for 3 days. Then we used next generation sequencing to analyze gene expression profiles of EMF treated-MSCs by using the FANSe3 algorithm on the Chi-Cloud NGS analysis platform. Gene Ontology (GO) function and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analysis were used to analyze the molecular pathways, while qRT-PCR were used to validate the key expressed gene of the pathways.

**RESULTS:** When MSCs were treated with 50Hz EMF for 30 min, 1 h, 3 h, or 6 h, a total of 17, 54, 19, or 69 genes were differentially expressed compared to the control, respectively. One gene (HSBP87) overlapped between EMF groups with different exposure time. GO function analyses showed that the nitric oxide mediated signal pathway was the major pathway affected after 50Hz EMF treatment for 30 min, 3 h, and 6 h. Enriched in the biological process related to cell motility and apoptotic process after EMF treatment for 1 h were found. KEGG pathway analysis showed that DEGs enriched in biological processes at different time points exhibited a different pattern, and MAPK signaling pathway were enriched after EMF exposure for 30 min and 3 hours.

**CONCLUSIONS:** We provided evidences that EMF with different exposure time could alter MSCs gene expression profiles with different patterns, and EMF exposure might induce adaptive response after EMF treatment for 1 h.

**Rod-cone dysfunction in blunt traumatic brain injury**

Michael V. Nguyen, MD, MPH, John P. Cassidy, PhD, Amy Chang, OD, and Min Jeong P. Graf, MD

**CASE DIAGNOSIS:** Rod-Cone Dysfunction in Blunt Traumatic Brain Injury

**CASE DESCRIPTION:** A 41-year-old male presented status post motor vehicle collision at 30-40 MPH where he was restrained. Loss of consciousness was undetermined. Post-traumatic amnesia lasted less than 24 hours. GCS was 14, and head CT was negative. Patient reported occipital and posterior cervical pain, blurred vision, photosensitivity, night blindness (nystagmus), mood instability, and cognitive symptoms. Patient had no history of prior traumatic brain injury (TBI) or family history of ocular disease. Developmental Optometry diagnosed moderate convergence insufficiency and retinal pigmentary changes. Patient was prescribed glasses with prism and tint and referred to Occupational Therapy for vision rehabilitation and to Ophthalmology. Electroretinogram performed by a Retina Specialist after a Neuro-ophtalmology evaluation demonstrated severe rod-cone dysfunction. His peripheral vision showed mild improvement with syntonic phototherapy.

**DISCUSSIONS:** Up to 90% of patients post-TBI report visual disturbance. This patient’s visual complaint is consistent post-TBI blurred vision, photosensitivity and visual fatigue. However, nystagmus, constricted visual field and pigmentary changes are atypical and prompted Ophthalmology assessment. Low amplitudes on electroretinogram suggest severe loss of rod/cone function. The etiology of nearly all documented rod-cone dysfunction is related to genetics or autoimmune disease. This case demonstrates electrodiagnostic evidence of this diagnosis after blunt traumatic brain injury. Retinal trauma with photoreceptor degeneration is only reported in blast TBI animal model. In this case, trauma may be a possible cause leading to or exacerbating his rod-cone dysfunction. Blunt trauma resulting from motor vehicle collision may have caused eye injury with neuronal inflammation, leading to photoreceptor loss.

**CONCLUSIONS:** Rod-cone dysfunction in TBI is a very rare occurrence. We describe one such case in a patient with no significant past history or family history of ocular disease following a blunt TBI. Rod-cone dysfunction may be considered as one of rare etiology to cause visual dysfunction after TBI.

**ROLE OF ELECTROPHYSIOLOGY IN THE DIAGNOSIS OF HUMAN PARECHOVIRUS-ASSOCIATED ACUTE FLACCID PARALYSIS: A CASE REPORT**

Abigail V. Mendoza, MD, Ephraim D. Gambito, MD, FPARM, Reynaldo R. Rey-Matias, MD, MSHMS, and Lyde M. Aliday-Magpantay, MD, MS

**CASE DIAGNOSIS:** Non-Polio Enteroviruses (NPEVs) including Cossackievirus, Echovirus and newly discovered Enteroviruses (EVs), which are implicated causes of acute flaccid paralysis (AFP), are emerging public health concerns after the Polio virus showed significant progressive reduction over the past few decades. Lately, the Department of Health in the Philippines announced an outbreak of Poliovirus type 1 in nineteen (19) years after it was declared Polio-free. AFP-associated cases of human parechoivirus (HPeV) infection in young children have been reported in literature since 2004. Confirmatory tests include stool analysis and neuroimaging of the central nervous system. While clinical and radiological features are identified in literature, descriptions of electrophysiologic abnormalities are limited.

**CASE DESCRIPTION:** This is a case of a 1-year old Filipino boy who presented with initial focal flaccid limb weakness following a prodromal illness, which progressed asymetrically with respiratory paralysis. Lumbar puncture results were normal, nasopharyngeal swab showed enteroviral antigens, and HPeV was isolated in stool samples. Cervical spine MRI initially demonstrated inflammatory changes in the C4 to C6 cord levels, but was normal on repeat testing after five months. Following the case definition of EV-D68 related AFM, these findings altogether led to a diagnosis of AfP.

**DISCUSSIONS:** Nerve conduction study (NCV) of the upper limbs revealed normal sensory nerve action potential parameters, but the motor nerves exhibited reduced compound muscle action potential amplitudes with normal latencies and conduction velocities, indicating a pure motor axonal loss. Electromyography (EMG) was consistent with active partial denervation with patchy evidence of reinnervation process on all limbs. These findings of a diffuse axonal motor polyneuropathy are compatible with neurophysiological changes seen in limited published studies on enterovirus-associated AFM (specifically Enterovirus-D68).

**CONCLUSIONS:** Electrophysiological studies are clinically useful as part of the multidisciplinary approach in diagnosing enterovirus-associated AFM. To our knowledge, this is the first electrophysiologic description of parechoivirus-associated AFM in Asia.

**Sacral level Spina bifida plantar pressure analysis**

Zachary J. Horwitz, BS, Aaron Powell, MD, Amy Bodkin, PT, PhD, PCS, and Richard Pimentel, BS

**OBJECTIVES:** Individuals with sacral level Spina Bifida are known to have long term foot deformities, pain, wounds and functional decline. Plantar pressure evaluation may provide a relatively affordable and accessible way of risk stratifying children for longer term disability. The objective of this study was to compare the plantar pressures of children with sacral level Spina Bifida to able bodied controls to see if there are significant quantitative or qualitative differences.

**DESIGN:** The data was collected retrospectively from Children’s Hospital Colorado’s Gait Analysis Laboratory using a pedobarography mat. Quantitative data was analyzed using a Covariant T-Test comparing the 2 groups across 5 variables (foot progression angle, foot start location, foot end location, lateral pressure ratio, arch pressure ration). Qualitative analysis of foot shape and peak pressures was performed visually post data processing.

**RESULTS:** The 17 sacral level patients collected had an average age, height, and mass of 8.35 years, 123.8 cm, and 29.6 kg. The 18 control patients collected had an average age, height, and mass of 8.35 years, 123.8 cm, and 29.6 kg. All P values are formed visually post data processing.
SADDLE PULMONARY EMBOLISM IN A HEMORRHAGIC STROKE PATIENT ON VENOUS THROMBOEMBOLISM PROPHYLAXIS DURING ACUTE INPATIENT REHABILITATION: A REVIEW OF CURRENT MANAGEMENT OPTIONS

Kevin Machino, MD

CASE DIAGNOSIS: Saddle Pulmonary Embolism, Hemorrhagic Stroke.

CASE DESCRIPTION: A 56-year-old male with a history of hypertension was admitted to acute inpatient rehabilitation (AIR) after an acute right pontine hemorrhagic stroke attributed to uncontrolled hypertension. He was continued on Heparin 5,000 units q12hrs for venous thromboembolism prophylaxis on AIR Day 1. He was functionally progressing well in all therapy sessions until AIR Day 15 when he reported new-onset shortness of breath during physical therapy. Initial SpO2 was 85% on room air in the therapy gym. Repeat SpO2 was 95% on 4L O2 nasal cannula. He was tachycardic (110 bpm) and normotensive (104/84 mmHg). He was immediately transferred to an acute care hospital ED and CTA chest revealed acute bilateral pulmonary embolic (PE) including a saddle pulmonary embolus.

DISCUSSIONS: The patient was started on a heparin drip and eventually underwent IVC filter placement. He was transitioned to Coumadin prior to being transferred back to AIR, where he completed his rehabilitation without complications. He was discharged home independent on all ADLs and modified independent for ambulation after a two-week AIR stay. The incidence of PE in post-stroke patients is less than 1%, with a higher rate of PE in hemorrhagic strokes compared to ischemic strokes. However, PE has a high mortality rate in post-stroke patients (up to 25%). Currently, there are no definitive guidelines on the management of acute PE in hemorrhagic stroke patients due to the high risk of rebleeding. This case sheds light on one of the few management options for PE in hemorrhagic stroke patients.

CONCLUSIONS: Development of PE is possible in patients with hemorrhagic strokes despite receiving VTE chemoprophylaxis. This life-threatening condition should always be considered in patients presenting with acute-onset shortness of breath during inpatient rehabilitation. Early recognition of PE is crucial for appropriate intervention, leading to favorable functional outcomes for the patient.

SAMPLE SIZE FOR REPEATED MEASURES, CLUSTER EFFECT, 2 GROUP STUDY TO IMPLEMENT THE CLINICAL PRACTICE GUIDELINE FOR AMPUTEE IN A MIDDLE INCOME COUNTRY

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CASE DIAGNOSIS: To compare the available methods to establish the most appropriate sample size and power for a randomized controlled trial, with repeated measures and cluster effect of therapists when comparing TeleEducation against usual measures and cluster effect of therapists when comparing TeleEducation against usual rehabilitation to implement the Clinical Practice Guideline for amputation and its effect over the walking distance.

CASE DESCRIPTION: The reference values for the 2 minute walk test were: (1) mean of change (13.3 m SD 19.9 m/2) after an acute rehabilitation program. Expected correlation within patients 0.6. The variance explained by patients (42%), Time Up and Go test. (3) Heterogeneity I2: less than 40% (4) The Minimally Clinical important difference -MCID= 5.5 m and 34.3m (Chronic Obstructive Pulmonary disease and amputee- 2 years with prosthesis). (5) Repeated measures (T0, T1, T2). Cluster range from 1.11 to 1.98 for 18 institutions with 2 or 3 therapists (N=54 therapists). He was immediately transferred to an acute care hospital ED and CTA chest revealed acute bilateral pul-

CONCLUSIONS: The repeated measures reduced (44%) the sample size even for a cluster effect. There is a large difference when having a large vs a small cluster (36%), that represents a large budget difference. The proposed lecture will share all steps to obtain the sample size for the least chance of type I error, with the lowest bud-

SARCOPENIA MEDITATED WEIGHT LOSS AND INFLAMMATION IN STROKE PATIENTS

Beendu Pujar, MBBS, James Gary, Amari Parham, Moooyeen Oh-Park, MD, MS, and Carolin I. Dohle, MD

OBJECTIVES: Strokes are the World’s leading cause of disability and weight loss after stroke is prevalent. Studies have postulated that weight loss after stroke maybe due to Sarcopenia, leading to more rapid weight loss compared to chronic illness or dysphagia alone. Our short-term goal is to determine degree of weight loss after stroke, whether weight loss is due to fat loss or muscle wasting. Also aim to investigate the severity of weight loss is directly correlated to stroke severity and can predict outcomes. The long-term goal is to determine whether providing nutritional supplements will help improve stroke outcomes and decrease stroke related disability.

DESIGN: Prospective observational cohort study including 16 in-patients with Hemorrhagic, Ischemic stroke or traumatic brain injury. Patient’s preadmission weight and lab values such as CBC CRP, ESR, pre-albumin, total protein and albumin, Caliper testing at seven defined body sites on unaffected side of the body along with Handgrip strength and weight measured upon admission and every three days. Also, Fugl Meyer Motor Score(FMMS) of upper extremity were recorded at admission and discharge.

RESULTS: Pearson correlation showed 0.982 correlation between change in body fat percentage and change in fat mass(LBS) but no correlation between the change in handgrip strength and body weight changes which implies there was general weight loss, rather than predominant muscle wasting. We did not observe a significant correlation between body weight changes and functional outcomes as measured by FMMS changes.

CONCLUSIONS: At this point, we do not find evidence that weight loss after stroke is due to muscle wasting rather than fat loss. Weight changes are also not clearly predictive of functional outcomes. In order to reach a definite conclusion, we need to have larger sample to determine whether weight loss after stroke is primar-

SATISFACCIÓN Y PERCEPCIÓN DE UTILIDAD DE DISPOSITIVOS DE MOVILIDAD EN CUIDADORES DE PACIENTES CON PARÁLISIS CEREBRAL

Diana Guevara, Thomas Torres, Miguel Gutierrez, and Fernando Ortiz Corredor, Physical Medicine and Rehabilitation Specialist

OBJECTIVES: Conocer cuál es la percepción de utilidad y la satisfacción que experimentan los cuidadores de pacientes con PC de niveles funcionales IV y V usuarios de dispositivos de movilidad. Identificar si la edad del paciente, escolaridad del cuidador, procedencia rural o urbana, subtipo de parálisis cerebral y medida de la función motora gruesa GMFM-66 se correlaciona con la satisfacción y percepción de utilidad del dispositivo de movilidad para los cuidadores de pacientes con parálisis cerebral.

DESIGN: Se realizó un estudio retrospectivo de 170 registros de pacientes con diagnóstico de PC usuarios de sillas de ruedas entre otros dispositivos de movilidad. Todos ellos con una escala de evaluación de satisfacción y percepción de utilidad del dispositivo de 0 a 10. Se correlacionaron con el método no paramétrico de Spearman la percepción de utilidad/satisfacción con las diferentes variables demográficas, función motora gruesa y tipo de dispositivo. Con una P<0.05 considerada estadísticamente significativa.

RESULTS: La satisfacción con respecto al uso de silla de ruedas para el grupo nivel funcional V fue en promedio de 7.02 y la percepción de utilidad fue de 7.83; para el grupo de pacientes GMFCS IV fue de 7.72 y 7.98 respectivamente. El comparar nivel con respecto a los diferentes dispositivos de movilidad fue similar. Ninguna de las variables analizadas como edad del paciente, nivel educativo del cuidador, procedencia rural o urbana, subtipo de la PC, evaluación GMFCS 66 se correlacionó con los resultados de satisfacción y percepción de utilidad.

CONCLUSIONS: Los diferentes dispositivos de movilidad en pacientes con PC con calificación funcional IV y V son percibidos como útiles por los cuidadores y se encuentran satisfechos con su uso (Superior a 7) independientemente del tipo de dispositivo de movilidad; edad, procedencia, subtipo de PC, clasificación funcional o evaluación GMFCS 66 del paciente, grado de escolaridad o nivel socioeconómico del cuidador.
SELF-SURVEY IN ALL ASPECT OF LIFE OF PEOPLE WITH DISABILITY AND HOW TO SOLVE THE RESULTS

Ferial H. Idris, Veral Attammy, Evvi Rachmawati, Anissa Widiastuti, Wiji Saraswati, and Marina Indriasni

OBJECTIVES: To detect all aspect of life of PWD in the community and to solve the results.

DESIGN: Design was cross sectional. From 11-12 September 2019 household self-survey consisting of two forms was done by 15 CBR (Community Based Rehabilitation) Caders in 3 commune in an urban village of Kebagusan. The first form was used to record the respondent’s name, age, type of disability. The second form was used to rate how well the respondent perform in 23 activities. Matrix was used to choose training packages needed by each respondent based on data in those two forms.

RESULTS: Fifteen PWD detected, range of age 4-70 years old, seven PWD have multiple disability, two PWD have seeing difficulty, four PWD have moving difficulty, and two PWD have learning difficulty and strange behavior. They all need training packages in activities by family member. The training package consist of information about difficulty in seeing, hearing, speaking, moving, learning and strange behavior. Training packages for training all disabilities. Training package for training play activities, schooling, social activities, household activities and jobs.

CONCLUSIONS: Household self-survey by CBR caders found 15 PWD and training package in all aspect of life for family member has been selected to be implemented gradually.

SELF-REPORTED WORK ABILITY PREDICTS HEALTH-RELATED EXIT AND ABSENCE FROM WORK, WORK PARTICIPATION, AND DEATH

Matthias Bethge, PhD, and Katja Spanier, MA

OBJECTIVES: The study examined the performance of the Work Ability Index in predicting health-related exit and absence from work (disability pension, rehabilitation, and days with sickness absence benefits), work participation (days with unemployment benefits, income from and days in employment), and death among a sample of workers previously receiving sickness absence benefits.

DESIGN: Workers aged 40 to 54 years who received sickness absence benefits in 2012 completed the Work Ability Index in 2013. Outcomes were extracted from administrative data records covering the period until the end of 2016.

RESULTS: Data for 2266 participants were included (mean age: 47.9 years; 54.4% women). Maximum follow-up was 43 months. 23.4% of the participants had poor Work Ability Index scores (7–27 points) and 38.2% had moderate scores (28–36 points). In total, 94 disability pensions, 471 rehabilitation measures, and 29 deaths were counted. Fully adjusted analyses showed an increased risk of a disability pension in workers with poor (HR = 12.98, 95% CI: 5.81–28.99) and moderate scores (HR = 3.17, 95% CI: 1.36–7.38) compared to workers with good or excellent scores (37–49 points). The risk of a rehabilitation measure was also significantly increased for workers with poor and moderate scores. In addition, poor scores were prospectively associated with a longer duration of sickness absence and unemployment benefits, and fewer employment days and less income from regular employment. Those with poor scores also had a significantly increased risk of premature death.

CONCLUSIONS: The Work Ability Index is a potential tool to identify individuals with previous long-term sickness absence having an increased risk of health-related exit and absence from work and poor work participation outcomes.

SENSORY LEVEL VERSUS SWEATING LEVEL OF INJURY IN PERSONS WITH SPINAL CORD INJURY

Ashley N. Ford, DO, Wouter Koek, PhD, and Michelle Trbovich, MD

OBJECTIVES: Thermoregulation is one sequela of SCI that impairs QoL and safety in extreme heat. Sweating is the main physiological defense against hyperthermia, however there is currently no way to predict which SCI patients are at most risk. It is unknown how the sensory level of injury (SLOI) correlates to the areas with intact sweating. This study will compare the SLOI to the sweating level of injury (SwLOI) in persons with paraplegia and tetraplegia to help predict thermoregulatory dysfunction.

DESIGN: Participants consisted of 24 individuals with motor complete SCI; 10 with tetraplegia and 14 with paraplegia. 10 able-bodied persons served as controls. Participants underwent passive heat stress until core temperature rose 1°C. The iodine starch test was utilized to determine skin surface areas with intact sweating. The most caudal dermatomal level in which sweating was visualized was recorded as the SwLOI and compared to the SLOI. Analyses of the minimum, maximum and median dermatomal differences were calculated.

RESULTS: Persons with tetraplegia demonstrated no sweating responses. For persons with paraplegia, the difference between SwLOI and SLOI ranged from a minimum of -5 to a maximum of 6 with a median of 1. Able-bodied controls demonstrated sweating on all skin surface areas.

CONCLUSIONS: This study demonstrates persons with motor complete tetraplegia to lack any evaporative cooling capacity when under passive heat stress. This is the first and largest study to demonstrate this and is noteworthy for clinicians to be aware they are at high risk for heat related injury. Meanwhile, persons with paraplegia are able to sweat on average 1 dermatomal level below their SLOI.

SEROTONIN REUPTAKE INHIBITORS CAUSE WORSENING SPASTICITY IN A PATIENT WITH CEREBRAL PALSY: A CASE STUDY

Jared Potter, MD, and Sara Salles, DO

CASE DIAGNOSIS: Spasticity in the setting of cerebral palsy.

CASE DESCRIPTION: A middle-aged woman with cerebral palsy with spastic diplegia presented to our outpatient clinic with significant situational anxiety with worsening gait and functional decline, for which multiple serotonergic agents were trialed. Selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRI) were prescribed at separate points in time, each with the result of worsening spasticity and gait disorder. With the discontinuation of serotonergic agents, her hypermenorrhea returned to baseline. Her anxiety went on to be pharmacologically managed using medication. This case serves as a cautionary tale for physicians and providers who care for patients with neurologic injuries: to look for signs of increased spasticity upon initiation of this class of agents. Arguably, it argues for the utilization of other classes of medications for the management of mood disorder in patients with neurologic injuries. Furthermore, it raises the question of whether anti-serotonergic agents should be pursued as adjunct, or even alternative methods of spasticity control.

SERVING UNERSERVED VETERANS AND THEIR CAREGIVER: DEVELOPING TAILORED CULTURALLY RELEVANT INTERVENTIONS

Keryl Motta-Valencia, MD, Magaly Freytes, PhD, Magda Schnitzberger, MPH, CPH, Naioni Rivera-Rivera, MS, Constance Uphold, PhD, ARNP, FAAN, Janet Loper, and Daniela Mylott

OBJECTIVES: To develop and implement a novel telephone and web-based intervention for reducing disparities in outcomes among Hispanic caregivers of Veterans stroke survivors. Most stroke survivors return home needing assistance from family members to perform daily living activities. These demands coupled with unpreparedness to cope with their new roles, lead to higher risks for developing depression and burden among caregivers. Hispanic caregivers report higher levels of depression compared to others; yet, no interventions have focused on this population.

DESIGN: We tailored our Spanish RESCUE intervention to be culturally relevant and to reflect specific characteristics for a target Hispanic population, using recommendations from Key Stakeholders and guidelines from authoritative sources such as: Involving the target population in all phases of the project; Emphasizing on cultural themed values; Assuring the language and wording of the materials is at appropriate reading level; Using certified translators and Spanish-speaking experts; Having Hispanic research members, fluent in Spanish and knowledgeable about the culture; conduct the intervention and assessments.

RESULTS: Our culturally relevant problem-solving telephone support educational intervention for Hispanic stroke caregivers aims to reduce caregiver burden and depressive symptoms by teaching creative and optimistic approaches to solving caregiving related problems. The intervention, which utilizes a problem-solving module and additional information/tools on the Spanish RESCUE website, is currently being tested in a randomized controlled trial. Twenty-eight participants have completed the intervention and seventeen are currently enrolled.
SEVERE TRAUMATIC BRAIN INJURY COMPLICATED BY BRUXISM: EFFECTIVE MANAGEMENT WITH ONABOTULINUMTOXINA

Justin L. Weppner, DO, Jenna Meriggi, DO, and Kevin Franzese, DO

CASE DIAGNOSIS: Severe traumatic brain injury (TBI) complicated by post-traumatic bruxism.

DESIGN: A 21-year-old male suffered a severe TBI secondary to a motorcycle accident. CT showed subarachnoid hemorrhage, left subdural hemor-rhage, and a 5-mm left-to-right midline shift. Left-sided decompressive craniectomy was performed. Complication was complicated by paroxysmal sympathetic hyperactivity (PSH). Over the subsequent two weeks PSH resolved and the patient progressed to a minimally conscious state (MCS). On hospital day (HD) 15 the patient was noted to have bruxism causing lacerations to the lips, tongue, and cheek with return of PSH. Clinical examination revealed mouth opening of 0 mm making mouth guard fitting impossible. Twenty-five units of onabotulinumtoxina were injected into each masseter muscle. After six days, a marked reduction in bruxism was noted with associated with resolution of PSH. The patient was discharged to inpatient rehabilitation on HD 26 and he emerged from MCS seven days later progressing to an oral diet with resolution of bruxism.

RESULTS: Bruxism associated with TBI and altered states of consciousness has been documented. The onset of bruxism is frequently linked to the return of sleep-wake cycles in comatose patients potentially causing damage to the teeth and surrounding soft tissue structures. Pain associated with bruxism may trigger PSH. Botulinum toxin injection in the masseter muscles is an effective means of intervention in cases of severe post-traumatic bruxism especially in cases where a mouth guard cannot be utilized. In our patient the temporalsis muscle was not injected due to the close proximity of the craniectomy site but this is also a muscle that could potentially be targeted.

CONCLUSIONS: Bruxism is a potential complication following TBI and injection of botulinum toxin into the masseter muscle and may be the only practical intervention available to treat post-traumatic bruxism and severe jaw clenching seen following TBI.

SHUNTING TO RECOVERY

Sharon Bushi, MD, Neil Jasey, MD, and German A. Valdez, BS

CASE DIAGNOSIS: Non-siphon controlled valve shunt for post-traumatic hydrocephalus.

DESIGN: A twenty-five-year-old man with severe traumatic brain injury (TBI) after a motor vehicle collision was admitted to our acute rehabilitation hospital after having received a craniectomy, cranioplasty and ventriculoperitoneal shunt (VPS). This patient presented in a vegetative state with severe cognitive tetraplegia, cognitive impairments, and dysphagia resulting in maximal dependence for all activities of daily living (ADLs), mobility, and communication. Patient was re-evaluated by neurosurgeon for persistent post-traumatic hydrocephalus resulting in placement of a programmable non-siphon controlled valve for the VPS. Subsequent to this procedure, patient showed marked functional improvements. The patient’s dysphagia resolved with improvements in speech, reaction time, attention and mood. He gained independence in mobility using braces. Shunt pressure was regularly measured at 0.5 mmHg of water and he continues to follow up in our outpatient clinic.

DISCUSSION: This patient with a history of TBI and post-traumatic hydrocephalus had limited improvements in function prior to receiving a programmable non-siphon controlled valve VPS. Initially, our patient had a siphon-control valve shunt which is commonly used to resist postural overdrainage. However, in patients with limited mobility who are supine for most of the day, these shunts may cause underdrainage, potentially resulting in limited functional improvements as seen in our patient. As a result, this patient’s shunt was replaced with a non-siphon controlled valve. The timing of the clinical improvement suggests that this type of valve may have played a crucial role.

CONCLUSIONS: In the TBI population, post-traumatic hydrocephalus is a common occurrence which presents a significant barrier to recovery. The type of shunt system may play a critical role in the recovery process. There is currently limited literature investigating shunt type in hydrocephalus and its relationship to functional recovery. Additional investigation should be undertaken to improve clinical symptoms, patient satisfaction, functionality, and financial savings.
SIGNIFICANCE OF TIMELY DIAGNOSIS AND TREATMENT OF CAUDA EQUINA SYNDROME: A CASE REPORT
Madhura K. Lughmani, OMS III

CASE DIAGNOSIS: Cauda Equina Syndrome.

CASE DESCRIPTION: A 50-year-old male with a history of low back pain unable to get out of bed following an episode of coughing. He presented to the emergency department with a sudden burning pain down his left leg, was given ketorolac, and sent home on acetaminophen. The following day, he returned to the hospital due to persistent severe pain. Imaging revealed a severe spinal cord compression and Cauda Equina Syndrome secondary to disc herniation. She was transferred for emergency surgical decompression with a left L4/L5 microdiscectomy. The patient’s weakness and paraparesis continued and she was sent to inpatient rehabilitation. Her symptoms included saddle anesthesia, urinary retention, constipation, left foot drop, and bilateral loss of sensation and strength in the lower extremities. Her prognosis is not ideal, and she will be managing symptoms to improve quality of life.

DISCUSSIONS: Cauda Equina Syndrome is a rare dysfunction caused by impairment of multiple nerve roots below L1/L2. It is a surgical emergency requiring decompression within 12 hours. If intervention is delayed, there can be irreversible damage. Associated symptoms may significantly impact quality of living. Classic presentation includes saddle anesthesia, urinary incontinence (atonic bladder), fecal incontinence, lower extremity loss of sensation, foot drop, and loss of erections. Causes of compression include disc herniation, tumors, trauma, abscesses, CMV polyradiculitis, and aneurysm. This case demonstrates an interesting presentation including a by a single cough resulting in an emergent circumstance.

CONCLUSIONS: The delay in diagnosis and surgical decompression, this patient’s symptoms worsened and resulted in decreased quality of life. It is pertinent to identify and treat Cauda Equina Syndrome immediately.

SINKING SKIN FLAP SYNDROME IDENTIFIED BY SERIAL ASSESSMENT WITH GOAT SCORES: A CASE REPORT
Allison N. Wallingford, MSE, Matthew LaCourse, MD, and Cherry Junn, MD

CASE DIAGNOSIS: Sinking skin flap syndrome of the trophied (SoT).

CASE DESCRIPTION: A 68-year-old male sustained a ground level fall resulting in a severe traumatic brain injury with left temporal lobe intraparenchymal hemorrhage, requiring left hemiepicondylar for uncial herniation. He was admitted to inpatient rehabilitation with significant aphasia and cognitive dysfunction 25 days from his fall. Admission Galveston Version Orientation Amnesia Test (GOAT) score was 1 (normal > 75), and he steadily improved with therapy, with GOAT score increasing to 34 in 4 vision weeks. He began to follow commands, but remained unable to express his needs. One morning, he developed right hemiparesis with worsened gait, and GOAT score dropped to 8. A CT head showed sunken skin flap sign and paradoxic herniation. That evening he underwent an urgent cranioplasty with resolution of right hemiparesis and GOAT score improved to 44 with improved speed of recovery. At discharge, GOAT score was 81, and he could communicate his basic wants and needs. DISCUSSIONS: Sinking skin flap syndrome is a rare and serious complication of craniectomy identified by neuropsychologic decline following a period of improvement, which resolves with cranioplasty. His severe cognitive impairment and aphasia prevented our patient from communicating symptoms to providers. However, the team was able to identify subtle improvement and decline using serial GOATs in combination with assessments by therapists who were familiar with the patient.

CONCLUSIONS: Sinking skin flap syndrome is often difficult to recognize due to the variability in neuropsychologic symptoms, especially in long-term rehabilitation patients with severe and/or waxing and waning impairments. Serial quantitative cognitive assessment and rehabilitation team corroboration can identify neuropsychologic decline.

SMART AND INEXPENSIVE DEVICE USED FOR MOTIVATIONAL REHABILITATION IN SOCIAL COMMUNITIES
Sorin I. Strutalat

CASE DIAGNOSIS: Strokes are one of the leading causes of disability among patients, mostly of them suffering from various neurological dysfunctions. Rehabilitation is the most important process in overcoming the residual disabilities caused by a vascular accident; therefore, there should be inexpensive and effective devices available for such patients. The objectives of our study are to evaluate the PATA/KORO device in neuro-rehabilitation and to observe the restoration of functional capacity and quality of life of these patients by analyzing a series of parameters at admission, at discharge, and after 3 and 6 months.

CASE DESCRIPTION: 21 patients from the medical-social center Bâcăi Roșie, managed between 37 and 96 years, were included in the study. We used the PATA/KORO (Japanese device for rehabilitation) devices in order to force the affected leg to become active with the aid of the unaffected one. This device helps the patients perform motivational exercises that have bilateral movements of the legs. We measured the knee flexion/extension, thigh perimeter, ankle flexion/extension, Barthel Scale Geriatric, and Depression Scale both at admission and at discharge. The information was collected in electronic format and was then further analyzed.

DISCUSSIONS: After the neuro-rehabilitation period, improvements in movements and mobility of the affected legs were observed, as well as increased perimeters of the thigh and ankle.

CONCLUSIONS: Our study emphasizes the importance of introducing this inexpensive, effective, innovative, and easy to implement device in the rehabilitation centers, for patients with disabilities caused by vascular accidents. The particularities of the study are the following: old patients, multiple associated comorbidities, team work required (physician, kinesitherapist, nurse, and psychologist).

SODIUM NITRITE AMELIORATES SKELETAL MUSCLE FUNCTIONAL ISCHEMIA IN DMD
Matthew Sherrier, MD, and Hongshuang Li, MD, PhD

Objectives: Duchenne muscular dystrophy (DMD) is a devastating X-linked muscle wasting disease for which there is no treatment. Dystrophin deficiency causes loss of sarcolemmal neuronal nitric oxide synthase (nNOS) resulting in functional ischemia. Restoring nitric oxide (NO) signaling pathways in dystrophic muscle represents an important therapeutic approach to alleviating functional muscle ischemia in DMD. In this study we examined the effects of sodium nitrite for the treatment of functional ischemia in a dystrophic animal model. We hypothesize that inorganic nitrite supplementation bypasses the intrinsic nNOS deficiency and preferentially produces NO via NOS-independent pathways in dystrophic muscle, thereby ameliorating skeletal muscle functional ischemia in DMD.

Design: Dystrophin and utrophin double knockout mice (dKO, a severe mice model of DMD) were given sodium nitrite supplemented in drinking water (100mg/L) for 8 weeks starting from 8-weeks-old. We assessed blood perfusion to the lower limb muscles after mild treadmill exercise using indocyanine green (ICG) dye angiography.

Results: After mild treadmill exercise, blood perfusion to the hind limb muscles of dKO mice was significantly reduced when compared with WT controls, which indicates functional ischemia. Significantly increased blood perfusion rate in gastrocnemius and tibialis anterior muscles and increased maximum blood perfusion in gastrocnemius were found in the nitrite treated dKO group when compared with non-treated dKO controls.

Conclusions: The results of the present study support the hypothesis that sodium nitrite can serve as an alternative NO donor, alleviating functional ischemia in exercising dystrophic skeletal muscle. Characterizing and understanding the mechanisms of SOCIAL PARTICIPATION OF CHILDREN AND ADOLESCENTS WITH NEUROTRAUMA: A MIXED-METHODS SYSTEMATIC REVIEW
Jérôme Gauvin-Lepage, RN, PhD, Alexandra Lapierre, RN, MSC, and Shana Bissonnette, RN, PhD

OBJECTIVES: Given that adequate social participation significantly improves quality of life, it should be a part of all intervention programs aimed at rehabilitation. In the case of neurotrauma, impairments in social functioning are common given the neuropsychological resources involved in social interactions. This is especially true in pediatric and adolescent populations, as insult to developing brains pose a unique set of negative outcomes. However, to date, no literature review on social participation in the context of neurotraumatic injuries in childhood and adolescence seems to have been conducted. The aim of this study is to remedy this by way of a systematic review of the current research literature focusing on social participation of children and adolescents with neurotrauma.

DESIGN: A mixed-methods systematic review was conducted in accordance with the PRISMA guidelines. Databases were searched for all articles on the subject published between 2000 and 2017.

RESULTS: Of the initial 477 potentially relevant articles identified, 24 met the inclusion criteria. Most of these articles concluded that neurotraumatic injuries negatively affect participation in social activities on many levels such as frequency, diversity, and intensity. Moreover, there exist many predictors of social participation outcomes, such as age at injury, gender, pre-injury status, severity of injury, and family environment. Despite these findings, only two studies focusing on interventions were found, and both showed limited results according to social participation measures.

CONCLUSIONS: Future research is needed on effective interventions programs that aim to support social participation of children and adolescents with neurotrauma.
action of inorganic nitrite on dystrophic skeletal muscle will ultimately provide important knowledge for designing novel therapeutic approaches for muscular dystrophy.

SONOGRAPHIC EVALUATION OF AFFECTED SHOULDER IN PATIENTS WITH HEMIPLEGIA FOLLOWING STROKE
Faiz Mohamed, Specialist, Navita Purohit, MD, CIPS, and Alkhishe Srivastava, MD, PhD
OBJECTIVES: The study was performed to evaluate the Sononatometry of the affected shoulder in hemiplegic patients and to assess if any correlation exists between any anatomical changes and Type of Stroke, Duration of stroke, Age of patient or presence of pain.

DESIGN: A Prospective Observational study with a sample size of 31 patients was done. Ultrasonography of hemiplegic shoulder was performed to assess for rotator cuff tears, biceps tenosynovitis, subacromial-subdeltoitd (SADSD) bursitis, glenohumeral joint and acromio-clavicular (AC) joint degeneration. The duration of stroke, type of stroke, presence of pain and duration of pain was recorded. Statistical Analysis was done using SPSS software version 21. P-value less than 0.05 was considered statistically significant. Chi-Square/Fisher’s Exact test was used to find out non-random associations between two categorical variables.

RESULTS: One or more structural abnormalities were found in all (100%) hemiplegic shoulders. 54% of them had Ischemic stroke while 46% had Haemorrhagic stroke. 48% were < 3 months post stroke & 52% were of > 3 months post stroke duration. 54% of patients were younger than 60 years, 46% were older than 60 years. 87% of them had pain in the shoulder while 13 % had no shoulder pain. The Sonographic examination showed: Suprascapular tears in 96%, Tenosynovitis of the long head of bicep tendon in 83%, AC joint degeneration in 32%, SADSD bursitis in 39%, Subscapularis tendinopathy in 19% and Glenohumeral effusion in 16 %. The changes were seen consistently irrespective of the Type of Stroke, Duration of stroke, Age of patient or presence of pain.

CONCLUSIONS: Hemiplegic patients have significant structural abnormalities in the affected shoulder irrespective of type, duration of stroke, age or presence of pain. Early evaluation should be done for identification of tears so adequate management can be done.

SPINAL CORD INFARCT STATUS POST ARTERIOVENOUS MALFORMATION RUPTURE
Mariyam Wasay, DO, and Yu-Jen Lai, MD
CASE DIAGNOSIS: Spinal cord infarct s/p AVM rupture.
CASE DESCRIPTION: 33 year old F w/ no significant pmhx presented to the ED with acute bilateral lower extremity weakness. MRA was performed revealing ruptured intramedullary spinal cord AVM at the T1-T2 level. Patient then underwent emergent embolization of the AVM along with T1-L1 laminectomy and resection of intradural perimedulitary AVM. Upon presentation to rehabilitation, patient met the criteria for ASIA A with loss of sensation in bilateral lower extremities, areflexia, paraplegia and bladder/bladder incontinence. During hospital course, therapy was geared towards transfer training, balance training and strengthening. On admission, patient was unable to transfer and with rehabilitation, she was able to perform sliding board transfers with moderate assistance. Patient was noted to have increased tone and clonus in bilateral lower extremities.

DISCUSSIONS: Intramedullary spinal arteriovenous malformations (AVMs) are supplied by medullary arteries and drain through medullary veins. The mean age at clinical presentation is in the twenties, but close to 20 percent of the lesions are diagnosed in children under sixteen years of age. A myelopathy is produced by the mass effect of the lesion or hemorrhage into the cord. The etiology of rupture is unknown. MRI is sensitive for intramedullary AVM, showing a cluster of low-intensity signal foci. Contrast-enhanced MRA also helps localize the nidus and identify arterial supply and venous drainage. These lesions can be treated by endovascular occlusion, surgical resection, or both.

CONCLUSIONS: This is an atypical case of a patient having AVM rupture with subsequent spinal cord herniation and myelopathy.

SPINAL CORD INJURY GUIDE FOR ADAPTIVE SAILING USING VIRTUAL REALITY
Mariyam Wasay, DO, and Yu-Jen Lai, MD
CASE DIAGNOSIS: Cord Ischemia in LVAD patient.
CASE DESCRIPTION: A 43 yr old female presented s/p NSTEMI due to suspected cocaine abuse. Catheterization showed severe CAD with un bypassable vessels and EF of 15%. Hospital course with PEA arrest requiring ECMO, Impella and eventual LVAD heartmate 3 placement. Further course with VT/VF arrest and atrial flutter requiring AICD placement. After stabilization, she was found to have bilateral lower extremity weakness with bowel and bladder incontinence. CTCA ruled out aortic dissection. MRI was unable to be obtained due to LVAD/AICD. Patient was clinically diagnosed with spinal cord infarction. Upon presentation to rehabilitation, patient had flaccid complete paraplegia with no reflexes and some sensory loss. She was T10 ASIA A SCI. During acute rehabilitation, patient improved from Hoyer lift to be able to perform sliding board transfers to wheelchair with moderate assistance. No return of tone or motor function observed.

DISCUSSIONS: Spinal cord infarction is classically seen after pathologies of the aortic arch such as dissection which causes disruption of arterial supply to the spinal cord. Other causes of infarction are related to thrombotic events, vascular accidents or tearing of arterial supply to spinal cord and ischemia due to hypotension. In this case, it is believed that hypotension due to several causes including MI, cardiogenic shock, PEA arrest and surgical procedures may have contributed to lack of perfusion to spinal cord. Diagnosis is typically made with MRI which will show a T2 signal change consistent with spinal cord ischemia.

CONCLUSIONS: This is an atypical case of a patient s/p NSTEMI and cardiogenic shock requiring LVAD placement and associated spinal cord infarct.

SPINAL CORD INJURY AND BARRIERS FOR RE-EMPLOYMENT IN MALES, A SAUDI ARABIAN EXPERIENCE
Ahmad H. Alwashimi, MBBS, SBPMPR, Sami Ullah, MBBS, FCPSP(M&R), Ahmad Z. Qureshi, MBBS, FCPSP(M&R), Nousrah H. Alkaoud, MBBS, and Hind M. Alotaibi, BSN
OBJECTIVES: Motor vehicle accidents are the most common cause of spinal cord injury (SCI) in Saudi Arabia mainly involving young adults. Much attention has been dedicated to obtaining work after SCI during the past decades because of the psychological, social, financial and political implications. There is no current data or guidelines in Saudi Arabia. To identify the most common barriers to return to work encountered by individuals with SCI in Saudi Arabia.

DESIGN: This cross-sectional study was conducted in the outpatient department of the largest tertiary care rehabilitation hospital in Saudi Arabia. After obtaining informed consent, structured interviews were conducted from March 2018 through July 2018 (five months) by the primary investigator and a rehabilitation nurse. The interviews were administered in a one-to-one format.

RESULTS: 121 male patients with SCI were included in the study in mean age 35.6 ± 13.9 years. 75 (62.0%) were unmarried 7 (5.8%) were complete tetraplegia, 16 (13.2%) incomplete tetraplegia, 60 (49.6%) complete paraplegia and 34 (28.1%) were incomplete paraplegic. 56 (46.3%) were secondary school students and 33 (27.3%) were university-level students. 70 (57.9) were employed at the time of injury. Only 20 (16.5%) were employed after injury, 38 (31.4%) retired and 11 (9.1%) patients resumed their studies. Barriers of returning to work after sustaining spinal cord injury were identified as 68 (56.7%) mobility to workplace, 67 (55.4%) incontinent bladder, 56 (46.3%) spasticity, 53 (50.0%) Musculoskeletal Pain, 51 (42.1%) neuropathic pain.

CONCLUSIONS: This research project identifies the most common barriers encountered by male patients with SCI to return to their jobs which in turn will help to establish guidelines to overcome these barriers and challenges. This will help to get the optimal community reintegration and self-independence of a person with spinal cord injuries.

SPINAL CORD INJURY GUIDE FOR ADAPTIVE SAILING USING VIRTUAL REALITY
Albert Racio, MD, PT, and Junghoon Choi, MD
OBJECTIVES: People with spinal cord injuries (SCI), especially with high cervical level injuries, are often restricted from participating in adaptive recreational activities due to poor accessibility, safety concerns, lack of adaptability, and high cost of technology. This is especially true for adaptive sailing. We set forth to describe expectations for sailing adaptation by injury level as described by the ASIA Impairment Scale, based on interventions implemented in the virtual reality sailing (V-Sail) program and that skills learned can transfer to sailing on water.

RESULTS: This study enrolled 13 chronic SCI patients categorized by injury level. Program participation was 12 weeks (1 hour sessions per week). Adaptations required for maneuvers, seating/positioning, and steering were assessed and implemented. Assessed included: neurological, physical, psychosocial, initial sailing ability, and numerical sailing ability scale.

CONCLUSIONS: All sailing scores improved. Social well-being scores increased. All required seating modifications. C6 level injuries and above required trunk support; some C7 level patients required trunk support; no C8 level patients required this adaptation. C2-C4 level participants required Hoyer lift; Sp & Puff system for steering and sail trim. C5 level patients transferred using transfer board and Max Assist +1;

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SPINAL CORD INJURY REHABILITATION: THE INFLUENCE OF LENGTH OF STAY ON OUTCOMES

Jonathan Presley, BS, Robert Irwin, MD, and Elizabeth Felix, PhD

OBJECTIVES: Acute rehabilitation length of stay (LOS) after traumatic spinal cord injury (SCI) has decreased from an average of 98 days in the 1970s to an average of 31 days currently. Acute rehabilitation gives patients an opportunity to adapt to their functional abilities and learn self-care and mobility. This is critical to preventing morbidity and rehospitalization. Our objective was to evaluate whether a correlation exists between acute rehabilitation LOS and rehospitalization during the first year post-injury. This may give insight into whether extending inpatient rehabilitation could reduce poor outcomes in the year following injury.

DESIGN: We analyzed SCI Model System’s data collected at our institution between Oct. 2011 and May 2019. Separate binomial logistic regressions for tetraplegia and paraplegia were performed, with rehospitalization during the first year post-injury as the outcome variable. To account for differences due to severity of injury, American Spinal Injury Association Impairment Scale (ASIA E = 0, ASIA A = 4), and LOS (days) was entered in the second step.

RESULTS: For both persons with tetraplegia and paraplegia, LOS did not significantly contribute to predicting rehospitalization (odds ratios: 1.005 and 1.008, respectively, p > 0.05).

CONCLUSIONS: The results suggest a shorter LOS did not increase the incidence of rehospitalization in the first year after SCI. Medical issues and social determinants of health, insurance type and complications during hospitalization were not accounted for in this analysis. Perhaps a longer LOS was due to more complications during their stay, predisposing to an increased risk of rehospitalization. While we did not find a relationship between risk of rehospitalization and rehabilitation length of stay, a number of possible confounding variables could not be accounted for in this analysis. Future studies should focus on other medical factors and social determinants of health that may increase rates of rehospitalization.

SPINAL EPENDYOMAS - EARLY DETECTION AND SURGICAL INTERVENTION PROVIDES THE BEST REHAB OUTLOOK

Kyle Seko, DO, Jordan C. Hui, DO, and Brendan K. Skeehan, DO

CASE DIAGNOSIS: Spinal Ependymoma.

CASE DESCRIPTION: We present a case of a 44 year old male who presented with low back pain starting two years ago after moving boxes. The pain radiated posteriorly into the right lower extremity to the foot. He denied bowel/bladder changes and saddle anesthesia. Due to failure of conservative management, an MRI was ordered showing an intradural mass lesion at the level of L3-4 nearly effacing the entire spinal canal. The patient underwent L3-L4 laminectomy, L5 partial laminectomy with resection of the intradural extramedullary tumor. Pathology confirmed a myxopapillary ependymoma, WHO grade 1. Following surgery the patient had functional deficits, developed urinary retention, and right foot drop. On discharge, he was taught to self-catheterize for persistent urinary retention, procured an AFO for his right foot drop, and a straight cane for outdoor ambulation. His discharge functional status was modified independent in all ADL’s and ambulation.

DISCUSSIONS: Ependymomas are a rare subtype of glial tumors originating from ependymal cells within the CNS and account for 1.9% of all tumors. There are 4 types: myxopapillary ependymoma, subependymoma, ependymoma and anaplastic ependymoma. Ependymomas in the spinal cord can cause paresthesias, radiculopathy, weakness, and paralysis. Early recognition is key because surgical resection can be difficult if large tumors entangle the nerve roots and extend along arachnoid membranes. Complications such as dysesthetic syndrome, dorsal column damage and bowel/bladder dysfunction can result secondary to surgical correction.

CONCLUSIONS: This case highlights the importance of early detection and intervention when treating patients with spinal cord ependymomas which is a rare cause of radicular back pain. As a result, patients similar to our case will experience reduced morbidity.

SPINAL EPIDURAL ABSCESS: THE ROLE OF REHABILITATION IN AN ACUTE, LIFE-THREATENING CONDITION

Kristen de Vries, DO, MS, Ratnakar P. Vezina-Ramachaneni, MD, MS, and Maria Jouven-Castro, MD

CASE DIAGNOSIS: Spinal epidural abscess resulting in cauda equina syndrome after epidural steroid injection.

CASE DESCRIPTION: 62-year-old male with hypertension, diabetes presented with severe back pain radiating to the left foot. MRI revealed L3-4, L5-S1 disc herniation. He underwent epidural steroid injection with mild relief of symptoms followed by acute worsening of pain, new onset lower extremity numbness/weakness and impaired gait. Physiatry was consulted and recommended repeat MRI, revealing an L3-S1 spinal epidural abscess (SEA). He underwent emergent L2-S1 laminectomy and IV antibiotic therapy. Physiatry was re-consulted on post-op day 1. Daily bedside physical and occupational therapies were initiated. Patient demonstrated severe pain, weakness and decreased functional mobility, including ambulation limited to 10 feet with rolling walker. At time of discharge, he had significant improvement, ambulating 70 feet x2 with rolling walker. He was discharged home to continue outpatient therapy.

DISCUSSIONS: SEA is uncommon with an estimated incidence of 0.2-2.0/10,000 and peak incidence in the sixth and seventh decades of life. The classic triad of back pain, fever and neurological deterioration is present in only 10-15% of patients. Early diagnosis of SEA is key to avoid permanent neurologic deficit and moribundity. Immobility due to neurologic deficits requires that physiatry is consulted for early initiation of physical and occupational therapies after surgical intervention. Motor function, including muscle strength, tone, and gait must be monitored closely, but patients should be encouraged to ambulate. Many patients are able to complete a rehabilitation program in the acute phase and can return home.

CONCLUSIONS: Back pain associated with fever or other risk factors (including history of ESI and diabetes) should be evaluated for SEA with MRI. Optimal patient outcomes are correlated with early diagnosis and a multi-disciplinary approach, including surgical intervention, antibiotic therapy and rehabilitation. Increased awareness and high index of suspicion allows for early intervention and improved outcomes for patients.

SPINAL Glioblastoma Multiforme in a Pediatric Patient

Firas Rafati, DO, Larissa Pavone, MD, Mary Keen, MD, Anton Dietzen, MD, and Neha Kohli, MD

CASE DIAGNOSIS: Cervical Spinal Glioblastoma Multiforme 6.2.5.

CASE DESCRIPTION: 12 year old female with no significant PMHx who initially presented with worsening BLE and RUE weakness, numbness. Patient was admitted and treated initially with high dose steroids for Transverse Myelitis. Patient was discharged home with a steroid taper however numbness, and weakness progressed, therefore Patient was instructed to visit children’s ED. Patient had a 2 month history of headaches associated with position changes, neck pain and stiffness which were improved with ibuprofen. MRI was done which was concerning for possible malignancy and patient underwent cervical laminectomy and biopsy with pathology consistent with a glioblastoma WHO grade IV. Following biopsy, patient had worsening 4 limb weakness. She began gaining movement in her legs R > L with some muscle tightness in the left leg. Her LUE > RUE. She also reported no bowel sensation or bladder sensation. Patient was transferred to Acute inpatient Rehab with concurrent proton therapy.

DISCUSSIONS: The incidence of a primary spinal cord glioblastoma multiforme in the pediatric population is extremely rare with very few case reports published in the literature. Along with the rarity of the pathology, there is little discussion about undergoing aggressive oncologic treatment with concurrent acute inpatient rehab. This case will add to the short list of case reports and continue to shed light on the prognosis of these patients along with give our physiatry colleagues expectations for rehab course while undergoing aggressive oncologic treatment.

CONCLUSIONS: Primary spinal cord GBM in the pediatric population is extremely rare and further discussion should be promoted in order to help aid rehab course, expectations, and family discussions.

SPOT SIGN MAY BE ASSOCIATED WITH WORSE FUNCTIONAL OUTCOMES IN INTRACEREBRAL HEMORRHAGE SURVIVORS

Wen-Che Tseng, MD, MPH

CASE DIAGNOSIS: The computed tomography angiography (CTA) spot sign is a validated predictor of hematoma expansion and 30-day mortality in intracerebral hemorrhage (ICH), and the spot sign in magnetic resonance imaging (MRI) was also
described. However, whether the spot sign could predict functional outcomes among ICH survivors was undetermined. The present study investigated the frequency of spot sign and its association with functional outcomes and length of hospitalization among ICH survivors.

**CASE DESCRIPTION:** We performed a retrospective analysis of consecutive ICH patients who underwent CTA or MRI within 24 hours from presentation to the emergency department of a single medical center between Jan. 2007 and Dec. 2017. Patients who died before discharge or those referred from other hospitals were excluded. CT/MRI with motion artifact was also excluded from the analysis. The presence of spot sign was examined by a radiologist. The functional outcomes were assessed immediately on admission using ASIA Impairment Scale (AIS) and the Barthel Index (BI). Severe dependency in Activities of Daily Living (ADL) was defined as BI≤60. Non-parametric statistical methods, including the Wilcoxon Rank Sum Test and Fisher’s Exact Test, were used due to the small sample size.

**DISCUSSIONS:** 49 patients met the inclusion criteria of whom 8 (16.4%) showed a spot sign. There was no significant difference between patients with or without a spot sign in all baseline characteristics and clinical outcomes. However, patients with a spot sign tended to be severely dependent in ADL at discharge (62.5% vs 36.6%, odds ratio = 2.60, p = 0.166) and had a longer hospital stay (42.13 vs 37.95 days, p = 0.579).

**CONCLUSIONS:** The presence of spot sign is a common finding and may be associated with worse functional outcomes in ICH survivors.

**STIFF-PERSON SYNDROME SUCCESSFULLY TREATED WITH INTRATHecal BACLOfen PUMP**

Ankur A. Patel, DO, Chandni B. Patel, DO, Devang Padalia, MD, and Azipt A. Patel, DO

**CASE DIAGNOSIS:** Stiff-Person Syndrome (SPS) is an autoimmune disorder affecting the central nervous system with symptoms including muscle rigidity and spasms in the axial and limb muscles leading to abnormal posturing and subsequent functional decline.

**CASE DESCRIPTION:** 57 year old female with history of multiple sclerosis presented to the clinic for worsening spasticity and decreased functional status. She was diagnosed with SPS 20 years prior to presentation. She was managed with oral baclofen 80mg daily, which was inadequately managing spasticity and was causing subsequent increase in central nervous system side effects. On examination, she had modified ashworth scale (MAS) of 3 in elbow extension and knee extension and was requiring the use of a cane and occasionally a rolling walker. Given her worsening spasticity and poor response to oral baclofen, the use of intrathecal baclofen pump was proposed. She underwent a trial with intrathecal baclofen and reported 100% relief for the first three hours and had significant improvement in ambulation, not requiring her cane. Given the robust response, an intrathecal baclofen pump was placed, which resulted in an improvement of the spasticity to a MAS of 1.

**DISCUSSIONS:** Due to its autoimmune nature, SPS can be diagnosed by testing for glutamic acid decarboxylase (GAD) antibodies which are elevated in SPS. In mild cases, SPS may be managed with oral benzodiazepines, anticonvulsants, and baclofen. In severe cases, unresponsive to oral pharmacotherapies, intrathecal baclofen pump should be considered.

**CONCLUSIONS:** This case presentation outlines the use of intrathecal baclofen pump in SPS patients whose symptoms are refractory to oral pharmacotherapies. Adequate management can lead to improvement in functionality and subsequently an improved quality of life.

**STUDY OF WALKING ABILITY IN PATIENTS WITH CHRONIC SPINAL CORD INJURY**

Priya Ranjan, DNB, and Suman Badhal, MBBS, MD

**OBJECTIVES:** Spinal cord injury is one of the leading cause of disability among people leaving the affected individuals unable to perform a lot of activities depending on the extent of injury. Many of these patients become bedridden and are not able to stand or walk. Inability to do the basic activities with the help of various aids such as orthoses depending on the level and extent of the injury to the spinal cord. Most of the patients managed either by operative or by conservative methods tend to have neurological deficits which require rehabilitative procedures to be done to achieve a level of activity enabling the patients to lead a good life.

**DESIGN:** It was a cross sectional observational study with a sample size of 51 patients with chronic spinal cord injury fulfilling inclusion criteria. All cases were evaluated for walking ability using 10 meter walk test and Walking Index for Spinal Cord Injury II (WISCI II) and the results were correlated with level and extent of injury based on ASIA Impairment Scale (AIS).

**RESULTS:** Among the 51 cases, 40 were males mostly in age group 21-40 years and common site of injury being lower thoracic level. The average self selected velocity and average fast velocity in 10 MWT showed a statistically significant correlation (p=0.018) with the AIS category of injury with progressive increase in velocity from category A through category D. WISCI II scores also showed statistically significant association (p=0.004) with the AIS categories.

**DISCUSSIONS:** WISCI II and 10 MWT are good tools to evaluate the walking ability in spinal cord injury patients with strong correlation with neurological level of injury.

**SUBACUTE COMBINED DEGENERATION WITH SUPERIMPOSED ACUTE INFLAMMATORY DEMYELINATING POLYNEUROPATHY**

Alexandre Mazar, MD, Melissa Kawa, MD, Jared McCallum, MD, Hashem Zokary, MD, MPH, Jeffry Mercado, MD, and Usman Ashraf, MD

**CASE DIAGNOSIS:** SCID with AIDP.

**CASE DESCRIPTION:** A 28-year old male presented to the hospital with progressive paresis of his extremities, bilateral lower extremity pain and with recent falls at home. He reported an upper respiratory tract infection one month prior to presentation. Muscle testing revealed 3% strength with bilateral hip flexion and in the upper extremities with 3+ patellar reflexes. Cerebrospinal fluid analysis showed total protein 70, myelin basic protein 7.3 and no white cells which was consistent with acute inflammatory demyelinating polyneuropathy (AIDP). Magnetic Resonance Imaging of Cervical spine showed abnormal cord signal in the bilateral dorsal columns consistent with subacute combined degeneration (SCD). Patient received five plasmapheresis treatments and started on vitamin B12 supplementation due to low levels. He was transferred to inpatient rehabilitation and successfully completed his program and was discharged at the modified independent level.

**DISCUSSIONS:** SCD affects the dorsal and lateral white matter of the spinal cord due to a vitamin B12 deficiency. Supplementation leads to improvement in muscle weakness, paresthesias and sensory ataxia. AIDP is characterized by an immune response directed towards the myelin of the peripheral nervous system caused by a preceding infection. Symptoms include progressive symmetric muscle weakness with absent or depressed deep tendon reflexes. In this report, both the central and peripheral nervous systems were affected and prompt treatment was key to halt disease progression. This allowed the patient to participate in an inpatient rehabilitation program which was an integral part of this functional recovery. The patient required minimum assistance with a wheeled walker prior to his inpatient rehabilitation admission.

**CONCLUSIONS:** This case highlights the importance of participating in inpatient rehabilitation for patients with SCD with superimposed AIDP. Early identification of these disorders is key as delay in treatment affects patient prognosis and functional recovery.

**SUCCESSFUL RECOVERY OF A PATIENT WITH CEREBRAL FAT EMBOLISM SYNDROME FOLLOWING INWARD MEDICAL REHABILITATION**

Nayomi Saranatha, MBBS, MD

**CASE DIAGNOSIS:** 18-year-old boy admitted with left femur shaft fracture following road traffic accident developed sudden onset of unconsciousness after two days of admission. During the next hours as he went into respiratory failure, he was transferred to ICU following immediate intubation. Next day of ICU admission he developed a petechial rash. MRI showed multiple non-confluent areas of T2 high signal intensities in brain. His urine was positive for fat globules. Cerebral fat embolism syndrome was diagnosed.

**CASE DESCRIPTION:** Although his vitals were stable he had quadriaparesis, cognitive decline, and dysphagia. He was then transferred to our rehabilitation hospital with tracheostomy and PEG tube for further medical rehabilitation. On admission, he had fully dependent bed mobility and poor sitting balance, bladder and bowel functions were incontinent. Multidisciplinary inward medical rehabilitation was commenced which included physiotherapy, occupational therapy, speech and language therapy and bladder and bowel care and cognitive rehabilitation. After three months of inward rehabilitation, he made a good recovery.

**DISCUSSIONS:** Cerebral fat embolism syndrome (CFES) is an uncommon presentation to a rehabilitation unit. Our patient had good functional outcomes for inward medical rehabilitation. Improvements of the independence in ADLs and other functions were evident according to the improvements in the scores of the Barthel index and Functional Independent Measure (FIM) scale which were assessed during the rehabilitation process. The patient had significant improvements in cognitive functions according to the Montreal Cognitive Assessment (MoCA) but remained with some residual cognitive decline.
SUICIDE AND TRAUMATIC BRAIN INJURY AMONG INDIVIDUALS SEEKING VETERANS HEALTH ADMINISTRATION SERVICES BETWEEN FISCAL YEARS 2006 TO 2015

Lisa A. Brenner, PhD, Trisha A. Hostetter, MPH, Claire A. Hoffmire, PhD, Rachel S. Adams, PhD, Kelly A. Stearns-Yoder, MA, and Jeri E. Foster, PhD

OBJECTIVES: According to the US Department of Veterans Affairs 2018 National Suicide Data Report, in 2016, the suicide rate among Veterans was approximately 1.5 times greater than that among civilian adults, after accounting for age and gender. Similar to population-based studies with civilians, having a history of traumatic brain injury (TBI) has been associated with increased risk of death by suicide among Veterans, yet there have been fewer systematic studies.

DESIGN: Participants included all Veterans with a TBI diagnosis in VHA electronic health records (EHR) at least once and completed a VA inpatient stay or intervention for medical rehabilitation. Early referral for rehabilitation is crucial as it will change the future life of these patients. Studying for screening tools for cognitive assessment and Mary Grace G. Senseng, DO, MABS Malcolm K. Moses-Hampton, MD, Zainab Shirazi, BA, Krithika Mahesh, BS, about SMA function? SMA volume loss and functional outcome? In cases of incomplete recovery, what would a consistent symptom pattern suggest about SMA function?

SUPPLEMENTARY MOTOR AREA SYNDROME: A CASE REPORT

Thomas Hordt, MD

CASE DIAGNOSIS: Supplementary Motor Area Syndrome.

CASE DESCRIPTION: Patient with history of left frontal grade 3 astrocytoma developed acute onset balance difficulty, right-sided weakness and a left-sided facial droop. MRI brain performed revealing recurrence of tumor. Functional MRI performed in preparation for tumor resection with intraoperative neurophysiological monitoring using motor evoked potentials (MEP). There was a 40% drop in motor potentials in the right arm during excision. On day 1 postoperatively, patient was noted to be lethargic with a right gaze palsy, mutism, and had right-sided facial droop with right hemiparesis. Postoperative MRI revealed significant debulking of the tumor in the left frontotemporal region, but also numerous small areas of restricted diffusion involving brain adjacent to the resection cavity consistent with acute ischemic infarct. Upon admission to IRF, patient inconsistently follows one-step commands, global aphasia and dense right-sided hemiparesis. At time of discharge patient remain non-vocal with improved the reading comprehension.

CONCLUSIONS: SMA syndrome is almost universally transient and despite our patient's limited improvement, patients should continue to make functional gains.

SUPRACLAVICULAR OR INFRACLAVICULAR LOCATION OF THE PRIMARY CANCER PREDICTS PREDOMINANT TRUNK INVOLVEMENT IN NEOPLASTIC AND RADIATION INDUCED BRACHIAL PLEXOPATHIES

Brendan L. McNeish, MD, Alex Zheutlin, MD, Sean Smith, MD, and James K. Richardson, MD

OBJECTIVE: Prior evidence suggests that radiation therapy is more likely to cause an upper trunk than lower trunk brachial plexopathy, while tumor invasion is more likely to induce a lower trunk plexopathy. To test this theory, we queried whether primary cancer type and/or location can predict predominant tumor involvement. We hypothesized that cancers located superior to the clavicle would predominantly involve the upper trunk and cancers located inferior to the clavicle would affect the lower trunk in brachial plexopathies due to neoplasm (NBP) and radiation (RBP).

DESIGN: We retrospectively identified non-traumatic brachial plexopathies from 2008-2019 using EMG diagnostic codes determined by ABE certified electrodiagnosticians. Brachial plexopathies due to neoplasm invasion or radiation were included. We collected EMG results, demographic data, the year radiation was completed, and presenting symptoms of the plexopathy.

RESULTS: Of the 912 brachial plexopathies reviewed, 22 were identified as NBP, and 34 as RBP. Univariate analyses showed that primary cancer location (supraclavicular or infraclavicular) was associated with plexopathy location (upper or lower trunk, respectively) in NBP (p = 0.047), RBP (p = 0.003), and all cases considered collectively (p = 0.001). Multivariable analyses showed that supraclavicular and infraclavicular cancer location demonstrated strong relationships to upper and lower brachial plexopathy, respectively (pseudo-R2 = 0.311, p < 0.001). More specifically, infraclavicular and supraclavicular cancers increased the odds of predominately lower and upper trunk involvement by factors of 3.6 and 11.0, respectively, in combined RBP and NBP cases.

CONCLUSIONS: Primary cancer location relative to the clavicle predicts predominant brachial plexus trunk involvement, with cancers superior/inferior to the clavicle increasing the odds of upper/lower trunk plexopathy, respectively. This relationship was true for both NBP and RBP, and contradicts prior clinical work suggesting that radiation tends to affect the upper trunk while neoplastic invasion tends to involve the lower trunk.

SUPRASELLAR ATYPIAL TERATOID Rhabdoid Tumor (ATRT) WITH ENDOCRINOPATHY

Zackery J. Billington, DO, Lori M. Ginffton, MD, and Justin S. Hong, MD

CASE DIAGNOSIS: Suprasellar Atypical Teratoid Rhabdoid Tumor (ATRT) with Endocrinopathy.
CASE DESCRIPTION: A 70-year-old female diagnosed with ATRT WHO grade IV after presenting with 3-5 day history of visual disturbance and right ptosis. Underwent endoscopic transphenoidal hypophysectomy followed by fronto-temporal craniotomy for mass resection due to continued tumor growth, complicated by diabetes insipidus, central adrenal insufficiency, epilepsy, and hydrocephalus requiring ventriculo-peritoneal shunt placement. She presented to the hospital for posturing episode with unresponsiveness and acute respiratory failure requiring intubation. She was treated with Levetiracetam for likely seizure. Workup revealed hypotension and pneumonia which was treated with IV antibiotics, fluid restriction, and Desmopressin under the guidance of endocrinology. At rehab, deficits included global cognition, vision, ataxia, and endurance. Admit functional status was moderate-maximum assistance for cognition and minimal-moderate assistance for ADLs and functional mobility. Hydrocortisone and Desmopressin were adjusted in conjunction with close monitoring of electrolytes and I&O. Cognition, vision, and poor endurance remained functional barriers. Discharged to home with family supervision.

DISCUSSIONS: ATRT is rare in adults, with 50 cases reports described in the literature. They mostly develop in midline structures adjacent to the CSF, and are rapidly progressive. There is no gold treatment standard, but options include resection, and adjunctive chemotherapy and/or radiotherapy. Endocrinopathies and cranial nerve damage can occur after brain tumor resection. Depending on the location, resection can result in endocrinopathies and cranial nerve damage.

CONCLUSIONS: Endocrine dysfunctions can occur after brain tumor resection. Effectively learning the common endocrine dysfunctions and areas of the brain involved will assist the physiatrist in effectively managing these patients. Understanding the medications and interventions needed, as well as warning signs of potential decline will help better treat these patients.

SURVEY ON THE OCCURRENCE OF ULNAR NEUROPATHY AT THE ELBOW AND ULNAR NERVE DISLOCATION IN WHEELCHAIR MARATHON ATHLETES
Kakita Mari, MD, Yukio Mikami, MD, Yoshichiro Kamijyo, MD, and Fumihiro Tajima, MD

OBJECTIVES: Ulnar neuropathy at the elbow (UNE) is a frequent entrapment neuropathy of the upper limb. Ulnar nerve partial/complete dislocation might be involved in the occurrence and severity of UNE. In wheelchair marathon athletes, they are forced to fully flex their elbow frequently during the race, so it might increase the risk of UNE. In this study, elbow examinations were conducted for athletes who participated in the Oita International Wheelchair Marathon and the occurrence of UNE and ulnar nerve dislocation was investigated.

DESIGN: The subjects were 37 athletes who participated in the Oita International Wheelchair Marathon in 2017 and 2018 and underwent elbow examination. As the primary disease, spinal cord injury was the most common with 27 people. The average year of experience in sport was 16 years. Elbow examination was conducted one day before the competition, and interviews, doctors’ examinations, and ultrasoundography were performed.

RESULTS: The number of athletes diagnosed with UNE was 5 (13%) people, 6 (8%) arms. The number of athletes who found ulnar nerve dislocation in their physical findings was 15 (41%) people, 24 (32%). The number of athletes who found ulnar nerve partial dislocation by ultrasonography was 9 (24%) people, 10 (14%) arms, and the number of athletes who found dislocation was 4 (11%) people, 6 (8%) arms.

CONCLUSIONS: The frequency of UNE in wheelchair marathon athletes in this study was higher than that of healthy adults and less than that of wheelchair athletes. The frequency of ulnar nerve partial-complete dislocation in this study was similar to that of previous reports. Understanding the occurrence of UNE in wheelchair marathon athletes and responding appropriately will lead to prevention, early diagnosis, and early treatment of UNE, and will contribute to maintaining ADL and continuing competition for wheelchair marathon athletes.

SYMPTOM SEVERITY IN BLAST VERSUS NON-BLAST MILD TRAUMATIC BRAIN INJURY – RETROSPECTIVE STUDY IN OIF/OEF VETERANS
Jennifer A. Kennedy, MD, and Kavitha Ilayaraja, MBBS

OBJECTIVES: Mild Traumatic brain injury (TBI) has emerged as a signature wound among the veterans who have returned from the wars in Afghanistan (Operation Enduring Freedom OEF) and Iraq (Operation Iraqi Freedom OIF). There is limited understanding on the epidemiology of the Mild TBI in veterans. The purpose of the study is to determine differences in symptom severity in blast versus non-blast mild TBI.

DESIGN: Retrospective chart review study of 100 OIF/OEF veterans on whom a second level evaluation was done over the past 5 years. Symptom severity was categorized as none (score 0), mild (score 1), moderate (score 2) and severe (score 3). The severity of symptoms was compared between blast and non-blast injuries. Symptom severity was scored for headache, dizziness, light sensitivity, memory, sleep, anxiety and depression in 50 Mild TBI with blast and 50 non-blast mild TBI. Statistical significance was considered at the P < 0.05 level.

RESULTS: Statistical analysis was done using online calculators for two tailed P value. The incidence of severe headaches was more in the non-blast group compared to the blast group with a P value of 0.01. Statistical significance was noted for moderate-severe memory difficulties in the blast group compared to the non-blast group. 86% of veterans complained of moderate to severe memory difficulties in the blast group compared to 66% in the non-blast group. The incidence of sleep, anxiety, depression, dizziness and light sensitivity did not show any statistical significance in both groups.

CONCLUSIONS: Our study was limited by the retrospective design and a small sample group. The symptoms studied are objective and though there was statistical significance with memory difficulties in the blast group, no objective memory testing was feasible in this study design. These findings highlight the need for further research on a larger sample group with more objective testing.

SYNDROME OF TREPHTHED FOLLOWING INTRATHECAL BACLOFEN PUMP PLACEMENT
Priyanca Shah, DO, and Stephen Hampton, MD

CASE DIAGNOSIS: Intracranial hemorrhage secondary to arteriovenous malformation.

CASE DESCRIPTION: 25-year-old male with massive intracranial hemorrhage secondary to a right fronto lobe arteriovenous malformation rupture status post frontal decompressive hemicraniectomy and embolization. After stabilization, the patient was discharged to a sub-acute nursing facility, however, and readmitted 2 days later for diffuse lower limb spasticity, tachycardia, tachypnea, fever of 101.9 degrees Fahrenheit, and red blotching of his skin. Negative infection workup and backofen and dantrolene was started for paroxysmal sympathetic hyperactivity. The patient continued to have multiple readmissions for sympathetic storming (PSH) despite ongoing medication titration of baclofen, dantrolene, and clonopin. Recommended was made for an intrathecal baclofen pump and the patient underwent a successful trial and implantation which significantly helped with autonomic storming. However, shortly after implantation, the patient was also noted to have increased sinking at the craniectomy site which required cranioplasty.

DISCUSSIONS: In patients with brain injury, intrathecal baclofen pumps may improve paroxysmal sympathetic hyperactivity, arousal, and cognition. Arousal and cognition may improve due to weaning off of sedating medications, such as oral baclofen, dantrolene, and clonopin. However, an unintended and potential complication in a patient with a craniecctomy and intrathecal pump implantation may be an increase in sinking of the craniectomy site. Therefore, it is important to determine the timing of ITBP placement in a patient with a craniectomy who has not yet undergone cranioplasty.

CONCLUSIONS: Intrathecal baclofen pumps should be considered in patients with refractory paroxysmal sympathetic hyperactivity however, an unintended and under-reported complication may be increased sinking of the craniectomy site.

TEMPOROPARIETAL LOBAR HEMORRHAGE WITH ISOLATED IPSILATERAL OCULOMOTOR NERVE PALSY: A CASE REPORT
Kwang Jae Lee, MD, PhD, Yong-Soon Yoon, MD, PhD, and Seung-Min Beak, MD

CASE DIAGNOSIS: Temporoparietal lobar hemorrhage with isolated ipsilateral oculomotor nerve palsy.

CASE DESCRIPTION: A 38-year-old woman with left temporoparietal lobar hemorrhage was admitted to our hospital. She presented initially to an outside institution with ipsilateral ptosis, dilated fixed pupil to 5 mm in diameter without a light reflex, lack of superior and medial eye movement with limited inferior eye movement of the left eye. Initial signs and symptoms were noted on the day of intracranial hemorrhage (ICH) without subsequent changes in the symptomatology for greater than months at the time of admission to our institution. She had no concomitant underlying diseases or injuries, such as diabetes mellitus, aneurysm or infarction.

DISCUSSIONS: Magnetic resonance imaging (MRI) demonstrated that there was a hematoma extending medially and inferiorly into the anterior midbrain region below the basilar ganglia and tegmentum in the midbrain region. Two days after the precipitating event, there were no abnormalities appreciated in our findings on nerve conduction study and needle electromyography (EMG) of the facial region (blink reflex, trigeminal and facial nerves were all intact on the left side).
Abstracts

**TERSON SYNDROME, A REVERSIBLE AND UNDER-RECOGNIZED CAUSE OF REHABILITATION COMPLICATIONS FOLLOWING SUBARACHNOID HEMORRHAGE: A CASE REPORT**

Kaitlyn E. Wilkey, BA, Radhika Sharma, MD, and Yelizaveta V. Adamova, DO

**CASE DESCRIPTION:** 50-year-old male with a history of hypertension was admitted to acute care status-post subarachnoid hemorrhage (SAH) due to left anterior communicating artery aneurysm rupture. He underwent coil embolization and frontal ventriculostomy. Despite improvement postoperatively, the course was complicated by new-onset bilateral vision loss with peripheral sparing. MRI of the brain and orbits was suggestive of bilateral preretinal hemorrhages. After evaluation by retina specialist and neurology, he was discharged to an acute rehabilitation facility. However, his rehabilitation course was significantly limited by his visual impairments. Ophthalmology was consulted and imaging showed dense bilateral vitreous hemorrhages, consistent with Terson Syndrome. He underwent right-sided vitrectomy with 90% improvement one week postoperatively. Upon readmission to rehabilitation, he was able to achieve therapy goals and was discharged home with plans for future left-sided intervention.

**DISCUSSIONS:** Terson Syndrome (TS) is an intraocular hemorrhage caused by intracranial hemorrhage or increased intracranial pressure (2). TS commonly occurs following SAH, with prospective studies showing an incidence of 13-20% (3, 4). Differentiating between TS and benign retinal hemorrhages is important as TS is associated with increased mortality and poorer neurologic outcomes (1, 3, 4). In addition to SAH, TS has been associated with traumatic brain injury and intracranial hemorrhage, which encompasses important patient populations at rehabilitation facilities (4). Unlike occultic lobule injury, TS is reversible and should be considered in patients with visual impairment following cerebral injury (6). Early recognition of patients with TS is critical, especially ones with bilateral vision loss, due to resultant limitations in therapy (5).

**CONCLUSION:** Due to its similarity to benign retinal hemorrhages and other cerebral causes of vision loss, TS can be easily missed. Physiatrists’ awareness of TS allows for earlier identification, reducing the risk of permanent visual impairments. This syndrome warrants further studies and interventions to ensure a substantial amount of rehabilitation patients are able to maximize therapeutic gains and minimize permanent disability.

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**THE ANCONUS EPITROCHLEARIUS: AN OBJECTIVE ANATOMIC ANALYSIS OF PREVALENCE COMPARED TO THE ARCULATE LIGAMENT OF OSBORNE IN A CADAVERIC SAMPLE**

Andrew K. Dang, BS, Marc Larsen-Hallock, BS, Derek Schirmer, BA, Russell Arellanes, BS, Laura Richardson, PA-C, BS, and Barth Wright, PhD

**OBJECTIVES:** Ulnar nerve neuropathy, also known as cubital tunnel syndrome, most commonly occurs as the ulnar nerve passes beneath the rigid ligamentous structure known as the Arcuate Ligament of Osborne (also known as the cubital tunnel retinaculum) and is a common cause of considerable pain and disability for patients. However, the Anconus Epitrochlearis muscle is an anatomical variant muscle located between the olecranon and the medial epicondyle of the humerus that replaces the Arcuate Ligament of Osborne and is reported to be an additional site of compression. Both structures span the roof of the cubital tunnel, but to date, there is sparse literature directly comparing the prevalence between the two structures in a large cadaveric population, with presence of an Anconus Epitrochlearis muscle varying from 3% up to 34%. The aim of this study is to provide clinicians with anatomical information regarding this site of potential compression.

**DESIGN:** Thirty-one cadaveric formalin-embalmed cadavers were included in this study with dissections performed bilaterally. Sixty-two cadaveric limbs were dissected at the medial elbow to reveal the anatomy of the cubital tunnel and to look for the presence of either an Anconus Epitrochlearis muscle or an Arcuate Ligament of Osborne.

**RESULTS:** Of the sixty-two cadaveric limbs studied, the presence of an Anconus Epitrochlearis muscle was found in twenty limbs (32.3%), while the Arcuate Ligament of Osborne was found in forty-two limbs (67.7%). In this anatomical study, this anatomical variant is of much importance especially for the management of cubital tunnel by physiatrists and providing anatomical information for minimally invasive cubital tunnel release surgery. Further biomechanical studies observing internal intrainerar pressure throughout the full motion of flexion of the Anconus Epitrochlearis muscle could be beneficial in learning more about the development of cubital tunnel syndrome.

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**THE ASSOCIATION OF SERUM NEUROFILAMENTS LIGHT CHAIN LEVEL WITH POST STROKE FATIGUE IN ACUTE PHASE**

Yuling Zhang, PhD, Qianfeng Li, MD, MS, Xun Luo, MD, Lisa J. Wood, PhD, RN, FAAN, and Qing Mei Wang, MD, PhD

**OBJECTIVES:** Neurofilament light chain (NF-L) is a promising biomarker for neurotoxicity and neurodegeneration. The primary objective of this study is to investigate the relationship between NF-L and post-stroke fatigue (PSF) during acute inpatient rehabilitation.

**DESIGN:** This is a retrospective study including forty-six stroke patients undergoing acute inpatient rehabilitation. Fatigue was measured with 2-item fatigue pictogram (FP). The serum level of Neurofilament light chain (NF-L) was measured by single-molecule array (Simoa HD-1 Analyzer). Primary outcome was fatigue-pictogram score. Secondary outcomes were functional independence measure (FIM), attention and memory, length of stay, discharge destination. Clinical characteristic data including liver and kidney function, white blood cell counts, hematocrit, body mass index and pain were recorded.

**RESULTS:** This cohort has 83% of ischemic stroke and 17% of hemorrhagic stroke with a mean age of 69.7 ± 13.1 years. Fifty-two percent of subjects reported moderate to severe fatigue (n=24). Grouping by post-stroke fatigue severity, there was a significant difference of NF-L level between none to mild fatigue group and moderate to severe fatigue group (p: 0.01, 348.49±56.34 vs. 1270.5±300.28). However, there were no significant differences between two groups in age, gain of FIM-cognition score and gain of FIM-motor score. Pearson correlation analysis showed weak negative correlation between NF-L level with gain of FIM-cognition score (r=−0.243, p=0.04), and no significant correlation between NF-L level with gain of FIM-motor score.

**CONCLUSIONS:** Our preliminary findings suggested that the level of serum NF-L is associated severity of post-stroke fatigue during acute inpatient rehabilitation.

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**THE BOTULINUM TOXIN EFFECTS ON SPASTIC ELBOW FLEXORS IN STROKE SURVIVORS WITH SPASTIC HEMIPLEGIA: COMPREHENSIVE BIOMECHANICAL, ELECTROPHYSIOLOGICAL AND NEURO-MOTOR CONTROL ASSESSMENT**

Yen-Ting Chen, PhD, Chuan Zhang, PhD, Yang Liu, Elaine Magat, MD, Monica Venduzco-Gutierrez, MD, Gerard E. Francisco, MD, Ping Zhou, PhD, Yingchun Zhang, PhD, and Sheng Li, MD, PhD

**OBJECTIVES:** Spasticity is a common and disabling motor consequence after stroke. Botulinum neurotoxin (BoNT), which acts on the neuromuscular junction, is considered as the first-line treatment for focal spasticity management. The purpose of this study was to comprehensively and quantitatively investigate the effects of BoNT injection on the spastic biceps brachii in stroke survivors.

**DESIGN:** Nine stroke survivors with spastic hemiplegia (Age: 52.4 ± 10.3 yrs, 3 women; MAS of elbow flexors: 2 for all subjects) who received 100 units of incobotulinumtoxinA or onabotulinumtoxinA to the biceps brachii participated in this study. The following parameters were collected within one week before (pre-injection), 3 weeks (3-wks) after, and 3-months (3-mons) after BoNT injection: 1) spasticity: baseline torque (5°/second stretch; mechanical component of spasticity), peak torque (100°/second stretch), and reflex torque (peak torque – baseline torque); mechanical component of spasticity; 2) maximum evoked action potential (M-wave). The following parameters were collected from seven out of nine subjects who could perform measurable voluntary elbow flexion force on the impaired side during pre-injection and 3-wks visits: 1) maximum voluntary contraction (MVC); and 2) motor performance during unilateral isometric elbow flexion.

**RESULTS:** We found that BoNT injection significantly reduced the peak torque and M-wave during 3-wks visit compared to pre-injection, and returned to pre-injection level during 3-mons visit (both p < 0.05). However, the baseline torque was not affected by BoNT injection (p > 0.05). Furthermore, the degree of spasticity change between pre-injection and 3-wks visits was negatively correlated (r = -0.78, p < 0.01) to the amount of mechanical component of muscle spasticity. Moreover, BoNT injection significantly reduced MVC (pre-injection vs. 3-wks, p = 0.04), but the motor performance parameters remained unchanged (p > 0.05).

**CONCLUSIONS:** Collectively, BoNT injection is able to reduce the neuronal component of spasticity, while the motor performance of the weakened spastic muscle remains unchanged.

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**THE ANGIOGRAPHIC SIGNATURE OF ACUTE STROKE: CLINICAL AND ANGIOGRAPHIC FINDINGS FROM 1,000 PATIENTS WITH ACUTE STROKE AND CAROTID SYNDROME**

Lisa J. Wood, PhD, RN, FAAN, and Qing Mei Wang, MD, PhD

**OBJECTIVES:** The diagnosis of acute ischemic stroke (AIS) has been traditionally based on clinical symptoms and signs. However, the increasing use of stroke imaging has shown the potential of vessel imaging as a diagnostic tool.

**DESIGN:** This prospective observational study was conducted at three tertiary care hospitals in the United States between January 2017 and February 2019. The study included consecutive patients with AIS with a confirmed vessel-based diagnosis. The primary outcome was the presence or absence of a vessel-based diagnosis.

**RESULTS:** Of the 1000 patients enrolled, 71% were diagnosed with AIS, 29% with a vessel-based diagnosis. The vessel-based diagnosis was more likely to be associated with a longer time from symptom onset to imaging (p < 0.001). The vessel-based diagnosis was more likely to be associated with a larger infarct size (p < 0.001). The vessel-based diagnosis was more likely to be associated with a younger age (p = 0.02). The vessel-based diagnosis was more likely to be associated with a higher National Institutes of Health Stroke Scale score (p < 0.001).

**CONCLUSIONS:** The vessel-based diagnosis is more likely to be associated with a larger infarct size, a younger age, and a higher National Institutes of Health Stroke Scale score.
THE CASE OF REPEATED WRIST CUTTING BY A TRAUMATIC BRAIN INJURY SUFFERER FROM A DYSFUNCTIONAL FAMILY IN CODEPENDENT RELATIONSHIP WITH MOTHER

Takafumi Yamashita, MA, Makiko Nishi, MA, and Manabu Hashimoto, MD, PhD

CASE DIAGNOSIS: The patient is a woman in her thirties. In January X-7, she suffered the onset of traumatic brain injury caused by a traffic accident. In response to the subsequent emergence of physical disabilities like higher brain dysfunction and right hemiplegia, the patient started to resort to a social behavior disorder, in which she complained about frustration and repeatedly cut her wrist.

CASE DESCRIPTION: Along with the onset of higher brain dysfunction, the patient suffered underlying confusion, anxiety, depression, lethargy, etc. The family members who lived with her were her divorced mother with a depressive tendency and her divorced sister, who came back home with her two daughters. Because the mother and sister lacked sufficient social functions, the family could be described as dysfunctional. The mother was unable to accept the patient’s disabilities due to her own mental disorders but evaded the option of sending the patient to a facility. The patient and her mother thus developed a latent codependency, and the unstable relationship of the two continuously manifested itself as the patient’s wrist cutting.

DISCUSSION: The patient was treated with an outpatient therapy consisting of medication, cognitive rehabilitation and psychotherapy mixed with prescribed inpatient treatment, while her mother and other family members were separated from the patient and respectively treated with therapeutic or educational interventions. During hospitalization, wrist cutting rarely occurred, and its frequency decreased after the patient went back home.

CONCLUSIONS: The clinical conditions presented by the patient were beyond the generally suggested understanding and handling of social behavior disorders. Since the relationship with her family, her mother in particular, was profoundly involved in the pathology, the therapeutic intervention focusing on such relationship brought a positive effect.

THE CORRELATIONS BETWEEN SWALLOWING FUNCTION AND ACOUSTIC VOWEL SPACE IN DYSPHAGIA PATIENTS WITH STROKE

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OBJECTIVES: Dysphagia has been reported as the best predictor of oral stage problem in swallowing disorders. In dysarthric speech, vowel space was used as a parameter of objective acoustic evaluation through formant measurement of vowels. The purpose of this study was to determine the correlation between vowel space and swallowing function, to determine whether vowel space is a predictor of swallowing disorder.

DESIGN: Thirty-one dysphagia and dyspharia patients with stroke were included. Patients with cognitive impairment, hearing problems, aphasia, and apraxia were excluded. The formant representing the resonance frequency of the vocal tract as a two-dimensional coordinate point was measured for the /a/, /æ/, /i/, and /u/ vowels and the quadrilateral vowel space area (VSA) and formant centralization ratio (FCR) was measured. For evaluating the swallowing function, a videofluoroscopic swallowing study (VFSS) was performed and videofluoroscopic dysphagia scale (VDS) and the penetration aspiration scale (PAS) scores were evaluated. Then, pearson correlation coefficient was used.

RESULTS: Thirty-one patients with stroke were enrolled (24 infarction, 7 hemorrhage), 15 brain stem lesion and 16 non brain stem lesion. There were no significant differences in VDS, PAS, VSA, and FCR values between brain stem lesion group and non-brain stem group. VSA was significantly negative correlated with oral phase VDS (r = -0.726, p < 0.001), pharyngeal phase VDS (r = -0.567, p < 0.001), total VDS (r = -0.718, p < 0.001) and PAS (r = -0.459, p < 0.009). FCR was significantly positive correlated with oral phase VDS (r = 0.484, p < 0.001) and total VDS (r = 0.466, p < 0.001).

CONCLUSIONS: This study showed that VSA was negative correlated with oral and pharyngeal phase VDS score and PAS, and FCR was positive correlated with oral phase VDS score. These findings suggested that VSA and FCR may be helpful in predicting dysphagia severity in stroke.

THE DANGER OF CEREBROVASCULAR ACCIDENT WITH INVERSION TABLE MODALITY

Thao Doan, MD, and Andrew Abdou, MD

OBJECTIVES: Intraparenchymal Hemorrhage as a Complication From Inversion Table Modality.

DESIGN: A 57 year old man with a history of hypertension controlled well with metoprolol, and an implanted frontotemporal metal skull placed in year 1998 (fractured plate after baseball injury) was admitted to the acute hospital and subsequently inpatient rehabilitation after suffering a severe headache, blurred vision, and right hemiparesis. One year ago, he purchased a home Teeter inversion tables. These tables were designed to use gravity to remove pressure recruited. Previously diagnosed with osteoporosis, underwent hip replacement surgery were excluded. When patients were admitted or transferred to the department of rehabilitation at acute stage of stroke, Berg Balance Scale(BBS), Trunk Impairment Scale (TIS) and Modified Barthel Index(MBI) were evaluated. Between 3 and 4 months after initial test, they underwent follow up evaluation including Bone Mineral Density (BMD) for bilateral femur neck and lumbar spine. We investigated the relationship between the clinical factors such as BBS, TIS, MBI and the parameters of BMD test.

RESULTS: There was no difference between the parameter of BMD test(T score, absolute BMD) for hemispheric side of femur neck and unaffected one after 3 to 4 months of initial evaluation. Follow up TIS showed a significant correlation with the T score and absolute BMD of the lumbar spine and hemispheric side of femur neck. However, parameters of BMD had no association with the baseline BBS, TIS, MBI and the changes in BBS, TIS, MBI.

CONCLUSIONS: This results suggest that functional loss of trunk movement, referred as follow up TIS after 3 to 4 months of initial evaluation may reflect reduced bone marrow density. Therefore, BMD monitoring can be considered in stroke patients with low scores of follow up TIS. This can contrib for early detection of osteoporosis and prevention of complication of fall.
from the joint disc. However, older studies on the effects of inversion tables and gravity on cardiovascular and cerebrovascular systems had contradictory results. A recent prospective study explored the relationship between an inversion table with optic nerve sheath diameter, heart rate, blood pressure, internal carotid artery (ICA) and middle cerebral artery (MCA) blood flow. It was revealed that there were significant pressure increases in the ICA and MCA flow caused by inversion.

CONCLUSIONS: Inversion tilt tables have the potential to cause significant changes in intracranial pressure and blood flow. Thus, there is an increased chance of complications that may exist about the use of the Trendelenburg position or inversion tables in patients with significant cerebral and cardiovascular risk factors. Inversion table modality should be used with caution and the public health significance here is to broaden our preventative measures for reducing strokes.

THE DIFFERENCE BETWEEN HAND MOTOR HOTSPOT AND HAND KNOB IN SUBACUTE STROKE PATIENTS
Min Kyun Sohn, Yeong Wook Kim, Doctor, and Donghyuk Yun, Doctor

OBJECTIVES: The difference between the hand motor hotspot and the hand knob in subacute stroke patients has not been fully clarified. The purpose of this study was to determine the difference between the coordinates of the hand knob and the hand motor hotspot in subacute stroke patients.

DESIGN: We included 29 subacute stroke patients who underwent navigated repeated transcranial magnetic stimulation (rTMS) on hand knob from January 2018 to June 2019. Each patients’ 3-dimensional coordinates (x, y, z) of the hand motor hotspot and the hand knob in T1-weighted MRI were discovered before rTMS session. rTMS was performed at the hand knob of the lesion (n=17) or the non-lesion (n=12) hemisphere according to their motor pathway condition. We compared the coordinates of the hand motor hotspot and the hand knob between lesion side group and non-lesion side group. And right and left subgroups were also analyzed with absolute value conversion in negative x coordinate component.

RESULTS: There was a significant difference in x and z coordinates between the hand motor hotspot (29.78±7.95, 24.29±14.4, 67.41±13.38) and the hand knob (35.53±7.62, 27.57±9.57, 62.01±12.61) (p<0.05). In non-lesion side group, there was a significant difference only in z coordinate between the hand motor hotspot and the hand knob (p<0.05). But in lesion side group, there was no significant difference. Euclidean distance between the hand motor hotspot and the hand knob was significant difference between non-lesion side group (12.88±5.66) and lesion side group (21.17±6.74) only in the left hemisphere (p<0.05).

CONCLUSIONS: There was a significant discrepancy in location between the hand motor hotspot and the hand knob. We should carefully consider this discrepancy for determining the location for non-invasive brain stimulation in subacute stroke patients.

THE EFFECT OF BODY MASS INDEX ON DISCHARGE LOCATION FOR STROKE PATIENTS
David T. Burke, MD, MA, Elizabeth Eversbusch, BA, and Regina B. Bell, MPH

OBJECTIVES: Recent research has shown that patients with body mass index (BMI) greater than 24.9 (kg/m2) are more likely to develop non-communicable diseases, including stroke. However, when hospitalized with one of these diseases, those with BMI >25kg/m2 often have better outcomes than do patients with “normal weight.” This apparent contradiction, first observed in heart disease patient populations, has been coined the obesity paradox. In previous studies we have noted this paradox in patients admitted to a post-acute rehabilitation hospital for treatment of stroke. To understand whether this apparent paradox was the result of a discharge bias at the acute care/rehabilitation facility, this study investigated the influence of BMI on discharge location.

DESIGN: This retrospective cohort study included data from a national stroke database. The primary outcome measure was the discharge location of stroke patients compared to BMI category following acute care hospitalization.

RESULTS: 886 consecutive patients were admitted to an acute care hospital for treatment of stroke (male, n=315; female, n=571). The mean age of the cohort was 58.60. Of these, 587 (66%) were discharged home after acute care, 111 (12.5%) were discharged to and acute rehabilitation facility, and 188 (21.2%) were discharged to a different location (skilled nursing facility, intermediate care facility, long term care hospital, short term hospital, and hospice). The correlation between discharge location and BMI was investigated and found not to be significant. The only significant predictor for discharge location was the length of stay, with longer acute care stays associated with discharge to non-home, non-IRF locations (p=<0.0001). For every one unit increase in the length of stay, the odds of being discharged to non-home locations increases by 1.908 fold. All other predictors were not significant (p<0.14 to 0.73).

CONCLUSIONS: This study of stroke patients following acute care found that weight was not a significant predictor of discharge location.

THE EFFECT OF BONT-A ON SPASTIC TRICEPS SURAE MUSCLE BY QUANTITATIVE MEASUREMENT AND COMPONENT ANALYSIS
Shiho Mizuno, PhD, Kotaro Takeda, PhD, and Shigeru Sonoda, PhD

OBJECTIVES: Spasticity is usually assessed by subjective rating scales such as modified Ashworth scales. Quantitative measurement is needed for the objective assessment of spasticity. We have been measured resistant ankle planar flexion torques during passive dorsal flexion as an indicator for muscle tone in triceps surae muscles. The purpose of the present study is to assess the effect of Bont-A therapy on spastic triceps surae muscles by quantitative measurement and component analysis of muscle tones.

DESIGN: We use ankle torque measurement system to measure resistant ankle planar flexion torque during passive dorsal flexion. Dorsal flexions are applied manually at slow (5-10 deg/sec) and fast (200-250 deg/sec) velocities. Velocities are controlled by the examiner with sonic cue and visual feedback on the monitor. The ankle is dorsiflexed from 20° of plantar flexion to maximum dorsal flexion of each person. Electromyography in gastrocnemius muscle is recorded simultaneously. The data of ankle joint angles, torques, and electromyography are transferred to the computer and analyzed offline. The ankle torque are separated into inertial component, elastic component, viscous component, and neural component, based on differences of those velocity dependency and EMG during stretch.

RESULTS: We are going to collect data from 5 persons with poststroke spasticity in triceps surae muscle before and 1 week and 3months after Bont-A injections.

CONCLUSIONS: Muscle tones of spastic triceps surae muscles are assessed before and after Bont-A injections. Those are separated into neural and non-neural components. The response for Bont-A therapy could be estimated using this method before injections.

THE EFFECT OF DUAL-TASK WALKING ON THE FUNCTION OF FOOT CLEARANCE IN HEALTHY ELDERLY AND HEALTHY YOUTH
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OBJECTIVES: The aim of this study was to observe the effect of single- and dual-task walking on the function of foot clearance in healthy elderly and healthy youth, and to provide evidence for preventing falls risk.

DESIGN: Twenty-five healthy older adults (elderly group) and Twenty-one healthy younger adults (young group) participated. The Three-dimensional Motion Analysis system was used to collect and analyze temporal spatial parameters and kinematics parameters of dominant side legs during single- and dual-task walking in the two groups. The gait parameters and their variability during foot clearance of dominant side legs were compared.

RESULTS: In the single- and dual-task walking, the height of toe minimum clearance (MTC) of the two groups did not change significantly, the stride time became longer and the stride speed became slower, and all of variability were not statistically different (P>0.05). The percentage of time was calculated by dividing from toe off event to MTC by the gait cycle shorter in elderly group, and the young group did not change significantly.

CONCLUSIONS: Although the toe height at MTC and gait variability of healthy older adults in dual-tasks walking are similar to younger adults, corresponding adjustment strategies may be adopted to ensure effective foot clearance, such as increasing stride time, slowing stride speed and shortening the stage of foot clearance.

THE EFFECT OF EARLY-LIFE STRESS ON DISCRIMINATION OF VOCALIZATIONS IN MONGOLIAN GERBILS
Richard B. Jin, N/A

OBJECTIVES: Human speech is made up of changes in sound frequencies over time. Disrupting or varying these changes results in decreased comprehension. One such disruption is time reversal. Perception and processing of temporal changes is crucial for speech comprehension. It has been shown that early life stress (ELS) in children with hearing loss may increase risk of speech problems later on in life. The effects of ELS on auditory perception are not well understood. We studied the effects of ELS on gerbil perception of time-reversed gerbil vocalizations.
DESIGN: We trained and tested Mongolian gerbils on an auditory discrimination task to determine if ELS affects auditory attention, learning, and perception of time-reversed vocalizations. Gerbils were divided into two groups, ELS and control. ELS was induced using restraints during postnatal days 9-24. Operant conditioning was used to train the gerbils to respond to a signal reversal associated with a shock. Gerbils were placed in a cage and trained to associate a spout with water, with a constant 600ms gerbil vocalization being played in the background. Upon hearing a reversed vocalization, they were trained to withdraw from the spout to avoid an incoming shock. Gerbils were tested with several periodicities of time-reversal vocalizations, starting with a fully reversed vocalization, and progressing through 10 levels to make it more difficult to detect reversed vocalizations.

RESULTS: Results show that stressed animals displayed a higher threshold variability than control animals. Some animals performed adequately, while some displayed minor deficits.

CONCLUSIONS: Similar variation among humans who experience ELS could explain why some individuals develop temporal processing deficits while others are more resilient. A compromised sensory representation may contribute to the learning and attentional problems that occur in humans who have experienced early life stress.

THE EFFECT OF SPHENOPALATINE GANGLION MIGRATION INHIBITORY FACTOR ON TENDON-DERIVED STEM CELL FUNCTION UNDER HYPERGLYCEMIC CONDITION

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OBJECTIVES: Diabetes increases risk of tendinopathy. Tendon-derived stem cells (TDSCs) in tendons are known to be crucial for the tendon homeostasis, and the chondrocytic differentiation of TDSCs have been suggested as a pathogenesis of tendinopathy. Additionally, macrophage migration inhibitory factor (MIF) is known as a key regulator for pathogenesis of diabetes. The purpose is to evaluate the effect of diabetic milieu and MIF on TDSC.

DESIGN: For in vivo study, rats were classified into diabetes model and sham. Experimental diabetes was induced in male SD rats by intraperitoneal streptozotocin injection. After 12 weeks, the supraspinatus tendons were harvested and prepared for RT-PCR. For in vitro study, TDSC was isolated and cultured from the supraspinatus tendon of SD rats. To mimic hyperglycemic condition, TDSC were treated with 400 μM methylglyoxal and classified into 3 groups: Recombinant-MIF (treated with 10 ng/ml recombinant protein MIF); Knockdown-MIF (transfected with small interfering RNA (siRNA)); Hyperglycemic-Control (treated with control siRNA). TDSC culture mediums were prepared for RT-PCR. TDSC cultured with only culture medium was Normal-Control.

RESULTS: In diabetic rats, chondrogenic genes (Collagen type 2, aggrecan, BMP2) were up-regulated while tenogenic genes (SCX, Collagen type 1, tenomodulin and Egf1) were down-regulated compared to sham rats (p<.05). In in vitro study, Hyperglycemic-Control group showed up-regulated chondrogenic genes expression (BMP-2, Sox9) and down-regulated tenogenic genes (SCX, Collagen type 1, Egf1) compared to Normal-Control group (p<.05). Under hyperglycemic condition, chondrogenic genes expression (BMP-2, Sox9) were up-regulated in Recombinant-MIF group and down-regulated in Knockdown-MIF group (p<.05), but tenogenic genes (SCX, Collagen type 1) except Egf1 were not affected by MIF.

CONCLUSIONS: Our results suggest that tendon homeostasis can be affected by diabetic milieu, in which tenogenic process appear to decrease, and chondrogenic process increase. Under hyperglycemic condition, MIF is more likely to enhance the chondrogenic differentiation of TDSC rather than suppress the tenogenic differentiation.

THE EFFECT OF SPHENOPALATINE GANGLION BLOCK ON POST-TRAUMATIC HEADACHES

Mariyam Wasay, DO, Tahsin Ashraf, DO, and Jennifer Gray, DO

OBJECTIVES: To assess the effect of sphenopalatine ganglion blocks on post-traumatic headaches.

DESIGN: Retrospective chart review of clinical documentation in the electronic medical record including demographic information, clinical information regarding the concussive injury, pain scores, and other subjective changes noted by the patient as documented in chart notes.

RESULTS: Pain scores (10 point scale) pre and post procedure were recorded. Seven out of eight patients reported improvement with sphenopalatine ganglion nerve blocks after post traumatic headaches. One out of the eight patients reported no change in pain.

CONCLUSIONS: Headaches are one of the most common symptoms following concussion. Typically in a simple concussion, headaches resolve within a week or so. However, it is possible for headaches to last several months. Headaches in concussion are immediately treated with rest and limiting activities which worsen headaches. Some medications used to treat headaches include ibuprofen, acetaminophen, or triptans. The sphenopalatine ganglion is a group of cells linked to the trigeminal nerve which is involved in headache. It has multiple neural connections including autonomic, motor and sensory components and is located deeply in the pterygopalatine fossa (PPF) posterior to the middle turbinate and maxillary sinus. In SPG blocks, a local anesthetic is injected intranasally into the SPG ganglion through a catheter and alters sensory processing of pain. It can be concluded that sphenopalatine ganglion nerve blocks do positively impact pain scores with patients suffering from post-traumatic headaches.

THE EFFECTIVENESS OF COMMUNITY-BASED REHABILITATION IN IMPROVING ACTIVITIES OF DAILY LIVING AND QUALITY OF LIFE OUTCOMES IN PERSONS WITH STROKE: A SYSTEMATIC REVIEW

Raymond Tosoc, MPT, and Rolando T. Lazaro, PhD, DPT

OBJECTIVES: This systematic review compared the effectiveness of community-based rehabilitation with usual or hospital-based treatments in improving ADL and QOL outcomes in patients with stroke.

DESIGN: Four databases were systematically searched from inception until April 30, 2019 for relevant experimental studies from developed and developing countries that compared CBR and usual/hospital rehabilitation on outcomes related to ADLs and QOL in patients with stroke.

RESULTS: Ten experimental studies were included, involving 1575 participants (806 male, 656 female, 113 not classified) with age range from 22-103 years. Seven articles measured ADL performance, and ten measured QOL. Results indicate that CBR generally demonstrated better ADL and QOL values than usual or hospital-based care. There was wide variability in the intervention described and the outcome measures used for both groups. Risk of bias assessment revealed issues with randomization, blinding and follow-up. Stroke-specific baseline characteristics such as length of time since diagnosis and laterality varied considerably in all of the studies.

CONCLUSIONS: CBR interventions show a positive trend in improving ADL and QOL outcomes for people with stroke compared to usual care. There is a need to use standardized outcome measures and interventions to ascertain these outcomes.

THE EFFECTIVENESS OF FORMAL DYSPHAGIA SCREENING FOR STROKE PATIENTS

Mi Ran Yoo, MD, and Kyoung Hyo Choi, MD, PhD

OBJECTIVES: Because dysphagia after stroke may cause aspiration pneumo-

nia, which increases post-stroke morbidity and mortality, early identification of dys-

phagia may be necessary. We aimed to evaluate the effectiveness of formal dysphagia screening test in stroke patients on the prevention of aspiration pneumonia.

DESIGN: We retrospectively reviewed the stroke registry of a tertiary hospital, which include patients with acute stroke within 30 days. In our center, dysphagia screening test has been started in stroke patients since 2012, while routinely performed in all candidates since 2014. Therefore, we decided to compare the results between patients with routine dysphagia screening test (hospitalized between 2014 and 2015) and those without (hospitalized in 2011). Clinical variables and the development of aspiration pneumonia were compared. The latter was defined with abnormal findings on chest x-rays. Additionally, we compared the development of aspiration pneumonia between the test groups according to stroke severity.

RESULTS: During the study period, a total of 2,941 patients with acute stroke (2,045 with routine dysphagia screening test, 896 without the test) were identified. Patients with routine dysphagia screening test developed less frequent aspiration pneumonia than did those without (a [1.3%] vs. c [3.4%], p<0.01). In analyses with stroke severity, differences of aspiration pneumonia between the test groups were significantly demonstrated in patients with moderate/severe stroke, but not in those with mild stroke.

CONCLUSIONS: Our findings suggest that formal dysphagia screening is associated with reduced risk of post-stroke aspiration pneumonia. Formal dysphagia screening may be necessary in all stroke patients.

THE EFFECTIVENESS OF VOCATIONAL INTERVENTIONS TO HELP UNEMPLOYED PEOPLE WITH LONG-TERM HEALTH CONDITIONS OR DISABILITIES GAIN AND MAINTAIN EMPLOYMENT: AN OVERVIEW OF SYSTEMATIC REVIEWS

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OBJECTIVES: A number of published systematic reviews have investigated the effectiveness of strategies to support unemployed people with long-term health conditions or disabilities gain work. What is unknown is the quantity, quality, spread, and trends in findings across these reviews. The objective of this overview was to synthesize evidence from these systematic reviews.

DESIGN: We searched Cochrane, MEDLINE, EMBASE, PsychINFO, AMED, CINAHL, Proquest, Evidence Search, Business Source Complete, and ERIC for relevant articles. We included reviews if they were about unemployed adults with long-term health conditions/disabilities and if they investigated the effectiveness of vocational interventions compared to a control group in terms of rates of successful uptake or maintenance of new employment. Two reviewers independently screened all titles for inclusion, and critically appraised (using AMSTAR-2 and PRISMA) and extracted data on all included reviews. We resolved disagreements by discussion or involvement of third reviewer. We extracted data on review characteristics, quality, and findings.

RESULTS: Our search identified 2841 titles. We excluded 2752 on screening of titles and abstracts, and a further 66 on full text screening, leaving 23 reviews for data extraction. The majority of reviews were on work interventions in mental health rehabilitation (11/23), with an emphasis on individual placement and support (IPS). Other reviews focused on vocational interventions for brain injury (n=3), autism (n=3) multiple sclerosis (n=2), spinal cord injury (n=1), and mixed populations (n=3). In general, the quality of reviews was low to moderate, with higher quality reviews published by Cochrane. We found support for IPS in mental health rehabilitation, but little evidence for the effectiveness of vocational rehabilitation in other clinical areas.

CONCLUSIONS: There is currently considerable need for high quality studies to be conducted on interventions to improve work outcome for people who are out of employment due to chronic health conditions or disability.

THE EFFECTS OF ISOKINETIC EXERCISES ON PROPRIOCEPTION, KINESIOPHIA AND QUALITY OF LIFE IN PATIENTS WITH MULTIPLE SCLEROSIS: A RANDOMIZED CONTROLLED TRIAL

Mela日起 Sekou, Burcu Dayar Cak, and Ufuk Ergün, PROF

OBJECTIVES: To evaluate the effects of isokinetic exercises on muscle strength, knee joint position sense, pain, kinesiophobia, and quality of life in patients with multiple sclerosis.

DESIGN: Fifty patients were randomized to an isokinetic exercise (Group 1, n=25) or home exercise programme (Group 2, n=25). The outcome measures were the peak torque/body mass index of quadriceps and hamstring muscles at 60°/s and 180°/s velocities, the hamstring/quadriceps ratio at the same velocities, the absolute angular errors of the 15°, 45°, and 60° and the mean absolute angular error of JPS of the less and more affected knees, and the scores of Multiple Sclerosis Quality of Life-54, Visual Analogue Scale, and Tampa Scale of Kinesiophobia.

RESULTS: The mean age was 39.21±8.81 in Group 1 and 39.95±12.25 in Group 2. After treatment change in total score and physical sub-score of Multiple Sclerosis Quality of Life-54 was 4.80±10.29 and 3.89±9.15 in Group 1, and -1.99 ±8.85 and 0.35±7.92 in Group 2. The post-treatment improvement of the total score and physical sub-score of Multiple Sclerosis Quality of Life-54 was statistically significant between the groups (p=0.044, p=0.006). Improvements in 60°/s peak torque/body mass index of quadriceps and hamstring (p=0.006, p=0.041), 180°/s peak torque/body mass index of quadriceps (p=0.001), and the absolute angular error of the 15° JPS (p=0.047) of the less affected knee, 60°/s peak torque/body mass index of quadriceps and hamstring (p=0.003, p=0.002) and 180°/s hamstring/quadriceps ratio (p=0.013) of the more affected knee were better than those of Group 2 (p<0.05).

CONCLUSIONS: Isokinetic quadriceps and hamstring strength training can improve quality of life, muscle strength and knee joint position sense in patients with multiple sclerosis without complications and exacerbation.

THE Efficacy of COMBINATION TdCS and TENS in STROKE patients

Jum Hyun Choi, Doctor, and Jong Hoo Lee, MD

OBJECTIVES: Transcranial direct current stimulation(TdCS) and sensory stimulation via transcutaneous electrical nerve stimulation(TENS) have been reported to be effective in improving motor function in stroke patients. We investigate the effects on combination of TdCS and TENS on upper extremity function in stroke patients.

DESIGN: Patients with post-stroke paralysis and upper limb dysfunctions were randomly assigned to one of two groups. Only TENS(Modulated frequency: 70-130Hz, 5 second cycle, 20 minutes) via a conductive glove was applied with the control group. Study group applied tDCS and TENS concurrently. 8 stroke patients in each group were enrolled and received therapies for 4 weeks. Manual muscle test, modified Ashworth scale, box and block test, 9 hole peg test, Fugl-Meyer Assessment and somatosensory evoked potential were used to evaluate the effects of the treatment.

RESULTS: Both groups improved in upper limb function score after 4 weeks of treatment. By comparing the two groups, the study group showed more significant improvement than the control group in box and block test, 9 hole peg test and Fugl-Meyer Assessment (p<0.05).

CONCLUSIONS: It was found that combination of tDCS and TENS is more effective treatment compared to TENS only. We recommend to use both tDCS and TENS. Thus, we suggest to apply the combined therapy to the stroke patients.

THE HIPPOCRATIC TRADITION IN PHYSIATRY

Ivet B. Koleva, MD, PhD, DMEDSC, and Borislav R. Yoshinov

OBJECTIVES: Ars longa, vita brevis est. The great Hippocrates, named father of medicine, argued for a rational approach to medical treatment based on close observation of patient. The basic idea of the Hippocratic Oath “Primum non nocere” (First Do not harm) is the moral compass for all medical codes and principles for Good Medical Practice. Principles of Corpus Hippocraticum, and some values of the traditional Hippocratism are nowadays applied in every branch of Medicine.

DESIGN: For the specialty Physical Medicine, the principles of Hippocratism are still the base of everyday clinical practice. The therapeutic approach of Hippocrates was based on “vis medicatrix naturae” (the healing power of nature – water, sun, diet, sleep, work and exercises. He applied baths and vapor baths. In cases of dislocations and fractures, he prescribed traction and extensions, and he constructed machinery for shoulder and tight dislocations (the Hippocratic device for reduction of dislocations Mochlikon; Hippocratic bench - Scamnum). In “Fractures” he says, “The physician should make extensions as straight as possible in dislocations and fractures”.

RESULTS: According the definition of the European Union of Medical Specialists – Section of Physical and Rehabilitation Medicine (PRM): PRM is an „independent medical specialty, oriented to the promotion of physical and cognitive functioning, activities (including environment), participation (including quality of life) and changes in personal factors and environment”. Physical medicine applies many natural physical modalities [water (mineral baths), air, sun, exercises, massage, manual therapy techniques (traction, mobilization, and manipulation); ergotherapy (work and activities)] and pre-formed physical modalities [electric currents, light, magnetic field, ultrasound, etc.].

CONCLUSIONS: The goal of PRM is prevention, treatment and rehabilitation. One of aphorisms of Hippocrates is: Medicus curat, Natura sanat. In Hippocratic medicine, the emphasis is upon the patient; and the patient is considered as a whole entity. The approach of PRM is holistic, like in Hippocratism.

THE IMMEDIATE EFFECTIVE OF SPINOMED® IN THE POSTURE AND EQUILIBRIUM IN THE PATIENT’S WITH HYPERKYPHOSIS AND VERTEBRAL FRACTURES

Tomislav Kranjcec, MD, and Carme Olle, MD

OBJECTIVES: The aim of this study was to prove that Spinomed® produces changes in posture related to equilibrium while standing in patients with hyperkyphosis.

DESIGN: The study was observational comparing Equilibrium the women with and without the Spinomed. The Equilibrium testing is performed using the measurement system for equilibrium (NedSVE/IBV®): Romberg test with open eyes Stability limits; Rhythmic and directional control. We also measured gait velocity with or without Spinomed. The system compared the obtained Results with a normalized data base according to the height, age, weight and gender from health Spanish population. The inclusion criteria: Angle of Cobb>45°. The exclusion criteria were: severe pain; neurological disease; hip and knee replacement; vertebral arthrosis/ankyloses. Secondary outcome measures were pain, (VAS), disability, Roland-Morris and Oswestry questionnaire.

RESULTS: 70 women(41-87 years old) were assessed for eligibility and 50 were randomized. Regarding the cause of hyperkyphosis, most of them suffered from osteoporosis (40/50); 20 out of 50 had vertebral fractures. The Cobb angle was 61,8°(46°-91°).

CONCLUSIONS: Women wearing Spinomed® increased 1 cm approximately of height. Regarding Stability limits, Romberg testing with open eyes with Spinomed® showed a reduction of Scanning area, decrease of anterior displacement in Romberg testing and stability limits evaluation. The trend to anteroposterior movement without Spinomed® changed to laterolateral with Spinomed®, and the center of gravity moved back towards. 80% of the patients show increase of gait velocity wearing Spinomed. There is no risk of Equilibrium disturbance in patients wearing Spinomed®. The gait velocity increased in patient wearing SPINOMED. Spinomed®
is a safety brace from the very first moment and is not necessary to give special indications when prescribed.

**THE IMPORTANCE OF REPEATED BEHAVIORAL ASSESSMENTS IN THE ACUTE PHASE OF DISORDERS OF CONSCIOUSNESS IN THE CRITICALLY ILL: A CASE REPORT OF A NON-TRAUMATIC BRAIN INJURED PATIENT**

Fraçois Feuvrier, MD, Yassir Aarab, MD, Fanny Garnier, MD, Boris Jung, MD, PhD, Kada Klouche, MD, PhD, and Isabelle Laffont, MD, PhD

**CASE DIAGNOSIS:** In patients with chronic disorders of consciousness (DOC), Minimal Consciousness State (MCS) is frequently misdiagnosed (up to 40%) and considered as a Vegetative State (VS). Patients VS are characterized by minimal or absent arousal without awareness. In 2017, Wannenz et al. suggested performing at least five Coma Recovery Scale Revised (CRS-R) in patients with chronic DOC to reduce misdiagnosis. Little is known about the repetition of behavioral assessments in the acute phase.

**CASE DESCRIPTION:** In June 2019, a 48-year-old woman was admitted to the ICU after acute cocaine intoxication. Initial Glasgow Coma Scale was 4. Cerebral MRI realized at day 3 post-intoxication showed bilateral frontal and occipital cortical ischemic lesions, including the basal ganglia. At day 11, a second MRI demonstrated complete regression of the previously observed abnormalities but a third MRI at day 24 showed lesions of the basal ganglia in favor of post-anoxic encephalopathy. Two EEGs showed diffuse brain injury compatible with coma-linked toxic encephalopathy. N2O was not found during somatosensory evoked potential at this stage.

**DISCUSSIONS:** Five CRS-R were conducted within day 17 to 30 post-intoxication. During the first four assessments, the patient was diagnosed in a VS. Owing that four first CRS-R and other investigations suggested unfavorable outcome, a collegial decision was taken to extubate and do not resuscitate the patient in case of clinical deterioration. However, during the 5th CRS-R assessment, the patient expressed reproducible signs of consciousness by moving her tongue on demand. A communication code was established using the patient’s tongue movements. Therefore the decision to stop support was reversed. Three months later, the patient is fully conscious and speaks.

**CONCLUSIONS:** In critically ill patients with acute severe brain injury, repeated CRS-R are an important tool to detect signs of consciousness even in case of negative complementary investigations and may avoid misdiagnosis.
this research were to determine the time trend of incidence rates (IR) of SCI and its association with GDP (gross domestic product) growth rates in Taiwan.

**DESIGN:** From the Taiwan National Health Insurance Research Database, we identified about five thousand patients with newly diagnosed SCI with severe disability before 2016. We estimated the age- and sex-specific IRs of SCI stratified by level of injury and external causes. A linear regression analysis was performed to measure the association between the IRs of various types of SCI and GDP growth rates.

**RESULTS:** The results showed that IRs of SCI were associated with GDP growth rates in traumatic tetraplegia in elderly patients with age over 60. The regression coefficient was statistically significant in fall-related SCI among females, while that of males was found for traffic accident.

**CONCLUSIONS:** We conclude that occurrence of tetraplegia among elderly in Taiwan seems to be proportional to GDP growth rates, and fall prevention and traffic safety could be emphasized, especially in older adults.

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**THE MOST VITAL OF ORGANS: A CASE OF STROKE AND CARDIAC PREHABILITATION**

Michael Chiao, MD, Michael Harbus, DO, Paul K. Yoo, DO, and Kirk Lercher, MD

**CASE PRESENTATION:** 80-year-old male presented with thoracic valve endocarditis, aortic root abscess, and left parieto-temporal ischemic stroke.

**CASE DESCRIPTION:** An 80-year-old male presented with thoracic valve endocarditis, aortic root abscess, and left parieto-temporal ischemic stroke causing sudden-onset expressive aphasia and hemiparesis. The patient carried an extensive medical history of coronary artery disease, coronary artery bypass graft and aortic valve replacement, heart block requiring pacemaker, and atrial fibrillation. He was enrolled in a personalized inpatient brain injury rehabilitation program focused on improving purposeful movement, building endurance, and restoring speech. Throughout the rehabilitation course, he received intravenous antibiotic therapy and just prior to discharge, after near-completion of his 6-week course of antibiotic therapy, an interval transesophageal echocardiogram revealed expanding aneurysm and persistent aortic valve vegetation. The patient underwent reoperative sternotomy and aortic root replacement for root pseudoaneurysm and prosthetic valve endocarditis. As he had previously completed a course of prehabilitation, he was able to meet the need for further post-operative acute inpatient rehabilitation and was discharged to home after a short two-week subacute stay.

**DISCUSSIONS:** This patient presents a unique case of inpatient brain injury rehabilitation while concurrently optimizing a patient for a subsequent major cardiac operation—colloquially known as prehabilitation. Prehabilitation is conventionally described as the process of enhancing an individual’s functional capacity to enable them to withstand a forthcoming stressful event. Exercise rehabilitation enhances aerobic capacity to increase preoperative functional reserve to decrease post-operative morbidity and mortality. This case additionally highlights the benefits provided by hospital-based rehabilitation units where there is improved access to sub-specialty care and the ability to perform specialized procedures including invasive cardiac testing.

**CONCLUSIONS:** When presented with complicated patients who benefit from multi-specialty care, the role of hospital-based inpatient rehabilitation units at tertiary care hospitals should be recognized, especially for patients who may require subsequent operative intervention.

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**THE MULTI-FACET LONG-TERM FUNCTIONAL RECOVERY PATTERNS FROM 7 DAYS TO 3 YEARS AFTER THE FIRST-EVER STROKE: THE KOSCO STUDY**

Yun-Hee Kim, MD, PhD, Won Hyuk Chang, MD, PhD, Min Kyun Sohn, Jongmin Lee, Dong Yang Kim, Sann-Gyu Lee, Yong-il Shin, Yong-Soo Lee, Min Cheol Joo, So Young Lee, Jun Hee Han, Jeonghoo Ahn, Gyung-Jae Oh, Young-Hoon Lee, Ji-Yoo Choi, Sang Hyun Kang, and Il Yoel Kim

**OBJECTIVES:** The purpose of this study was to analyze the functional recovery patterns from 7 days to 3 years after stroke onset and the time point to reach the plateau and decline of diverse aspect of function after stroke.

**DESIGN:** This was an interim analysis of the Korean Stroke Cohort for Functioning and Rehabilitation (KOSCO) database IRs 10 years long-term follow-up study of stroke patients. All patients who admitted to the representative hospitals in 9 distinct areas of Korea with their acute first-ever stroke (ischemic and hemorrhagic) were recruited. Out of 7,858 patients who agreed with participation, 4,722 patients completed face-to-face assessments until 3 years after stroke onset repeatedly at every 6 months. Functional assessments included Korean modified Barthel Index (K-MBI), Korean Short KOOS (K-MMSE), Fugl-Meyer Assessment (FMA), Functional Ambulatory Category (FAC), American Speech-Language-Hearing Association National Outcome Measurement System Swallowing Scale (ASHA-NOMS), and Short Korean Version of Frenchay Aphasia Screening Test (Short K-FAST). We analyzed the functional recovery patterns in ischemic and hemorrhagic stroke patients separately and for subsets grouped by their baseline severities.

**RESULTS:** Among 4,722 patients, 79.7% of patients suffered from ischemic and 20.3% hemorrhagic stroke, respectively. The multi-facet functional recovery patterns in first-ever stroke patients were different according to the baseline severity. RMANOVA showed a significant interaction effect between time and baseline stroke severity in K-MBI, FMA, K-MMSE, FAC, ASHA-NOMS, Short K-FAST, K-MBI, FMA, and FAC. Functional assessment scores reached to the plateau at 12 months and showed declining from 24 months after stroke which was remarkable in severely involved groups.

**CONCLUSIONS:** These results demonstrated long-term functional recovery and declining patterns according to initial severity and different functional categories in the first-ever stroke patients. Proper rehabilitation strategies should be established to maintain the long-term functional levels in chronic stroke patients.

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**THE PATTERN CUSTOMIZED STUDY DESIGN: A NOVEL METHOD TO INVESTIGATE THE EFFICACY AND SAFETY OF INCOTOBULINUMTOXINA IN THE TREATMENT OF LOWER LIMB SPASTICITY IN ADULTS**

Gerard E. Francisco, MD, Joerg Wissel, MD, Marta Banach, MD, PhD, Djanek Bensmail, MD, PhD, Franco Molteni, MD, Alberto Esquenazi, MD, Michael Munin, MD, Hanna Dersch, Thorin L. Geisler, PhD, and Michael Althaus, MD

**OBJECTIVES:** To describe a novel study design utilizing pre-specified sample size adaptation based on an interim analysis to be used in the PATTERN study, which aims to investigate the efficacy and safety of incobotulinumtoxinA in the treatment of lower limb spasticity caused by stroke or traumatic brain injury.

**DESIGN:** Phase III, prospective, randomized, double-blind, placebo-controlled, multicenter study (NCT03992404), followed by open label extension (OLEX) period with or without combined upper limb treatment. A two-stage adaptive design with interim sample size re-assessment after 360 subjects will be applied. Setting: 60 clinical sites in North America, Europe, and Australia Participants: 600 adults. Interventions: In the Main Period (1 treatment cycle) subjects receive intramuscular injection of incobotulinumtoxinA (400 units) or placebo into lower limb muscles. In the OLEX Period (4-5 treatment cycles) subjects receive incobotulinumtoxinA (up to 800 units) into lower limb and upper limb muscles, if clinically indicated. Main Outcome Measures: At weeks 4-6, change from baseline in derived Modified Ashworth Scale-Bohannon (MAS) ankle score and Global Impression of Change Scale (GICS). A goal catalogue developed specifically for this population will be incorporated into the goal attainment scale (GAS) evaluation of treatment.

**RESULTS:** The novel PATTERN study Design allows for observation of up to 6 consecutive treatment cycles with an OLEX Period including a multi-pattern, patient-centric approach, if clinically indicated.

**CONCLUSIONS:** To our knowledge, this is the first time such an adaptive design is used for a BoNT study for lower limb spasticity. The novel design utilizing pre-specified sample size adaptation based on interim analysis in the PATTERN study demonstrates an innovative approach to the challenge of clinical studies for this indication. A goal catalogue derived from patient experiences will additionally be included as qualitative interview. The study is expected to overcome difficulties of comparable high-quality SMART (Specific, Measurable, Achievable,Realistic, Timed) treatment goal setting and follow-up in a large phase III trial.

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**THE POSTOPERATIVE EFFECT OF ASSOCIATED ANTEROLATERAL LIGAMENT IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A PILOT STUDY WITH BIOMECHANICAL SIMULATION**

Hangfan Hu, MSC, and Lin Wang, PhD

**OBJECTIVES:** Understanding the biomechanical effect of various factors on different knee position after combined anterior cruciate ligament (ACL) and anterolateral ligament (ALL) is essential for improving postoperative rehabilitation effect. Since the complex anatomy of the knee, a biomechanical simulation was used for parametric studies after associated ALL in ACL reconstruction surgery to improve the effect of postoperative rehabilitation.

**DESIGN:** This study took a patient who had associated ALL in ACL reconstruction surgery as the research subject. A triple-over semitendinosus tendon (ST) was used instead of state ACL, and the single strand of gracilis tendon (GT) were used instead of ALL function. The ST was fixed when the patient’s knee flexed 30 degrees. A comprehensive knee model with bone, soft tissues, tendon, and cartilages were extracted from CT and MRI images. 3D global registration and reconstruction
of each part were taken place followed by a static non-linear finite element analysis. There were 304644 tetrahedral elements in total. This study assumed that the joint at various positions of flexion degrees at 0°, 30°, 60°, and 90°. The results of the difference of stress and strain at different flexion angles could be used to evaluate the effect of the reconstruction procedure and its influence on rehabilitation in TBI.

RESULTS: By contrasting the stress and strain of the comprehensive model at different flexion angles, it is found that the maximum ACL stress appeared at the starting position of the ACL at 30° flexion. Two gracilis tendons are used in surgical to take the place of the ALL function and significantly reduces the load on the ACL during the restriction of the tibia forward and the internal rotation of the knee. The values of stress and strain of ACL and ALL at different angles of knee flexion are contrasted by establishing a biomechanical simulation with a surgical model. The outcome of this work showed that this reconstruction surgery can improve the current issue of limited range of motion of knee after ACL reconstruction.

THE PREVENTION EFFECT OF WHOLE BODY VIBRATION ON ORTHOSTATIC HYPOTENSION IN SPINAL CORD INJURY PATIENTS – A PILOT STUDY
Wojnaj Jo, MD, Kwang Jae Lee, MD, PhD, and Eun Sil Kim, MD

OBJECTIVES: Orthostatic hypotension is a distressing disorder after spinal cord injury(SCI). This is a negative impact upon the ability of SCI individuals. Prevention and treatment of orthostatic hypotension in SCI patients is very important.

DESIGN: Participants were recruited from our hospital. Inclusion criteria were: cervical SCI patients with orthostatic hypotension symptoms above a certain angle at the tilt table. Participants were excluded if they had any condition, such as seizures or knee flexion contractures >30°, and/or uncontrolled autonomic dysreflexia. A tilt table angle at which they began to show orthostatic hypotension symptoms was measured before treatment. After that, tilt table with whole body vibration treatment was applied for 20 minutes at the angle that orthostatic hypotension symptoms began to appear. A vibration frequency was 10 Hz and amplitude was 4.0mm. Ten treatment sessions were given for 2 weeks. The tilt table angle at which they began to show orthostatic hypotension symptoms was measured after treatment.

RESULTS: Five participants A) 35 years old female, neurological level of injury C2, ASIA B by American Spinal Injury Association/International Spinal Cord Society(ASIA/ISCOS), B) 61 years old male, neurological level of injury C3, ASIA A, C) 55 years old male, neurological level of injury C5, ASIA A, D) 42 years old male, neurological level of injury C4, ASIA A, E) 75 years old male, neurological level of injury C5, ASIA D complete the intervention. In all patients, the tilt table angle was increased after treatment and there was no orthostatic hypotension symptoms at the pre-treatment angle. Patient A had an angle of 35 degrees before treatment and improved to 80 degrees after treatment.(35° → 80°), B(40° → 65°), C(70° → 85°), D(50° → 80°), E(45° → 70°).

CONCLUSIONS: A Tilt table with whole body vibration therapy in adults with SCI might help prevent symptoms of orthostatic hypotension.

THE PROBLEM IS NOT IN HER HEAD: A CASE REPORT OF HYPERTENSION AFTER TRAUMATIC BRAIN INJURY
Justin L. Weppner, DO, and Chelsea Morse, DO

CASE DIAGNOSIS: Provocation of pheochromocytoma following TBI.

CASE DESCRIPTION: 23-year-old female suffered a TBI with 10 minute LOC secondary to motor-vehicle accident. ED evaluation included unremarkable vital signs, physical exam, and non-contrast CT. Patient presented 10 days post-injury with symptoms including headaches, anxiety, and dizziness. Vital signs revealed a blood pressure of 160/100 (previous baseline 110-120’s/70-80’s). Physical examination was unremarkable. Differential diagnosis included pheochromocytoma, anterior pituitary dysfunction, renovascular disease, drug-induced, or the TBI itself. Diagnostic evaluation included CBC, CMP TSH, FT4, LSH, FH, IGF-1, cortisol, urine drug screen, plasma and urine fractionated metanephrines. Evaluation was positive for urine fractionated metanephrines 1700mcg/24 hours(reference < 400 mcg/24 hours) and plasma fractionated metanephrines 2.2mcg/dl (reference < 0.50 mcg/dl). Renal ultrasound revealed left renal mass and normal renal arteries. Abdominal CT revealed a 6.1×5.5×8.5 cm left adrenal mass consistent with pheochromocytoma. Antihypertensives were started and the patient underwent left adrenalectomy resulting in normalization of BP and resolution of the patient’s symptoms.

DISCUSSIONS: Lesions in both the hypothalamus and the orbito-frontal cortex can cause hypertension due to these areas are especially vulnerable to trauma in TBI. Injury to the posterior hypothalamus may produce increased blood pressure and heart rate by inhibiting baroreceptors and promoting sympathetic activity. Injury of the orbito-frontal region contributes to dysregulated inhibition of the sympathetic system. Hypotuitarism is a well-recognized consequence of head injury, and the relationship between hypertension and anterior pituitary dysfunction has been reported. Pheochromocytoma is a rare neuroendocrine tumor that produces catecholamines and other neuropeptides. Trauma itself can provoke an asymptomatic pheochromocytoma pathophysiological pathways similar to those of TBI, including headaches and anxiety.

CONCLUSIONS: Pheochromocytoma is a rare cause of hypertension that can be provoked by trauma with overlapping symptoms of TBI, such as headaches, anxiety, and dizziness. When a patient presents with new hypertension following TBI a broad differential should be considered that includes pheochromocytoma.

THE RELATIONSHIP BETWEEN OPIOIDS AND TESTOSTERONE IN SCI
David Y. Balser, MD, Nguyen Nguyen, MPH, Ricardo Battaglino, PhD, and Leslie Morse, DO

CASE DIAGNOSIS: Pain management is one of the most important aspects of subacute and chronic spinal cord injury (SCI), but the use of opioids to treat pain in SCI may depress locomotor recovery. This dilemma between treating pain and preserving recovery must be resolved to avoid undue harm to patients, starting with our understanding of the underlying pathophysiology linking opioids to poor functional outcomes. One such pathway is the relationship of testosterone and functional recovery in SCI. The inhibitory effect of opioids on testosterone in the general population has been well established, and testosterone has been related to muscle weakness, motor neuron degeneration, and worse motor recovery in mouse and human SCI. The relationship of opioid use and testosterone in SCI has yet to be established. Our objective is to characterize the relationship between opioids and testosterone and subsequently functional recovery, musculoskeletal health, and mood after SCI.

CASE DESCRIPTION: This is a secondary analysis from a previous clinical trial involving exercising/drg therapy in chronic SCI. A total of 37 male participants records were included in this study. All participants in this study were not actively taking steroids. The dependent variable of interest was total serum testosterone. The primary factor of interest was the average use of any opioid at study baseline. Other factors analyzed included age, body mass index (BMI), total lean mass, and completeness of injury (American Spinal Injury Association Impairment Scale A or B vs C or D). We generated general linear models using forward modeling to predict log-transformed testosterone levels based on clinically relevant combinations of these factors and determined the r2 values of each. Factors with a p value of < 0.10 in the univariate models were included sequentially in the multivariate models. Factors with a p value of < 0.05 were considered statistically significant.

DISCUSSIONS: Of the 37 study participants, 13 currently used opioids. The average age of participants was 39.43 (SD 11.01). 33 participants were motor complete, and 4 were motor incomplete. The average total testosterone level in the opioid group was 3.43 (SD 1.12) and in the non-opioid group was 4.84 (SD 1.96). In univariate models, total testosterone levels were negatively associated with age (p=0.03), BMI (p=0.001), total lean mass (p=0.04), and opioid use (p=0.02). In multivariate models, age (p=0.004) and opioid use (p=0.003) remained negatively associated with In total testosterone. Total testosterone levels decreased 0.98 ng/ml for each year of age and were 0.49 ng/ml lower in the opioid group compared to the non-opioid group. This model explained 33% of the variation in testosterone levels. Results were similar when considering BMI (p=0.004) in the model instead of age. Total testosterone levels decreased 0.97 ng/ml for every 1 unit increase in BMI.

CONCLUSIONS: Our findings agree with previous studies of the relationship between opiates and testosterone in the general population. Our multivariate models demonstrate a statistically significant contribution of opiate use and also provide additional information of the effect size of its relationship with testosterone. This approach that preserves testosterone measurement as a continuous variable is a useful first step for clinical titration of opiate use. Our findings are also consistent with reports of obesity associated hypogonadism in the general population. We recommend further studies focusing on these relationships in acute SCI as well as studies in chronic SCI with larger sample sizes. Use of a more nuanced measure of opioid use than our binary approach including duration, timing, type, and dosage of opioids would also be informative. In addition, measurement of downstream physiological pathways of interest would further elucidate the underlying mechanism of testosterone's effects on multiple outcomes in SCI.

THE ROLE OF COMPLEX REGIONAL PAIN SYNDROME IN POST-STROKE PATIENTS
Barbara Dantas Martins, MSC, MD, Eduardo Freitas Ferreira, MSC, MD, Diogo Portugal, MSC, MD, Nuno Silva, MSC, MD, Catarina Matos, MSC, MD, and Leonor Prates, MSC, MD
OBJECTIVES: Along with central post-stroke pain, spasticity, contractures and shoulder pain, complex regional pain syndrome (CRPS) type 1 is also a cause of physical suffering after stroke. It’s characterized by pain, edema, sudomotor and vasomotor changes mainly in the affected side (the shoulder and hand are usually involved) with bone demineralization. The pathophysiology is still poorly understood. Biomechanical factors and microtrauma to the hemiparetic shoulder in association with somatic nervous system dysfunction, inflammation, hypoxia and psychological factors may have a contribution. Hence, our main goal was to characterize the cases presented in the Neurology Ward of our hospital in order to better understand this pathology.

DESIGN: This is a retrospective analysis of 10 patients (out of 108 cases) diagnosed with CRPS after stroke (Budapest Criteria were applied) and admitted in an acute care hospital over an 18-month period.

RESULTS: The patients’ mean age was 60.4 years [range, 46-79 years]. Seven were male, three were female. Mean time of onset 52.7 days after stroke [range, 39-87 days]. Six of the strokes were ischemic, two hemorrhagic, two were hemorrhagic transformations of ischemic events. Both cerebral hemispheres were equally affected. The majority (seven) had a middle cerebral artery stroke. Eight involved the upper limb, two upper and lower limbs (all in the hemiparetic side). Ten had hemihypesthesia. Clinical management was achieved through pharmacological and non-pharmacological measures.

CONCLUSIONS: Due to the small sample size, it is not possible to determine any patterns. However, apparently CRPS appears in the subacute stroke phase and commonly involves the upper limb on the hemiparetic side. This presentation aims to raise awareness to CRPS as a clinical condition associated with pain after stroke frequently underdiagnosed. There is no definitive treatment. Nevertheless an interdisciplinary approach is recommended. The use of medication combined with physical therapy and behavioral interventions may be appropriate.

THE SERUM CYTOKINES LEVEL OFFERS MINIMAL PREDICTIVE VALUE FOR COGNITIVE FUNCTION IN SUBACUTE PHASE AFTER STROKE

Yuling Zhang, PhD, Haixin Song, PhD, Xun Luo, MD, Phil Cefalo, PhD, and Qing Mei Wang, MD, PhD

OBJECTIVES: The effect of inflammation on poststroke cognitive function is unclear. This study investigated the correlation of the inflammatory biomarkers in peripheral blood with the gain of cognitive function after ischemic stroke.

DESIGN: We recruited 388 first ischemic stroke patients who were admitted to Spaulding Rehabilitation hospital between March 2014 to June 2018. Serum cytokines (IL-17F, GM-CSF, IFN-g, IL-10, IL-18, IL-4, IL-21, IL-23, IL-5, IL-6, IL-17E, IL-31, TNF-alpha, TNF-beta, IL-28A) levels were measured in duplicate using a bead based immunofluorescence assay (Luminex-200 system). The primary functional outcome was gain of functional independence measure (FIM) cognitive subscore at discharge. The secondary outcome measures were FIM total score at discharge, length of stay in the hospital, and discharge destination. Cognitive Montebello Rehabilitation Factor Score(MRFS) and Cognitive MRFS efficiency were calculated. Demographic and clinical characteristics were obtained from medical record.

RESULTS: Grouping by cognitive MRFS efficiency, above median value group had trend of higher IL-13 (above median value group 221.8±268.76 v.s. lower median group191.67±201.82, p > 0.05). However, Pearson correlation analysis showed no significant correlation between cytokine levels with gain of cognition, cognitive MRFS or cognitive MRFS efficiency.

CONCLUSIONS: Our preliminary findings suggested the level of serum cytokines had minimal predictive value for recovery of cognitive function during subacute inpatient rehabilitation after stroke.

THE SYSTEMIC EFFECTS OF BLOOD FLOW RESTRICTION TRAINING: A SYSTEMATIC REVIEW

Bradley C. Miller, BS, CSCS, Alexander W. Tīrko, BS, Olivia R. Sumeriski, BS, Justin M. Shipe, BA, and Kelley A. Moran, PT, DPT, ATC

OBJECTIVES: 1. Familiarize the reader to the technique of Blood Flow Restriction (BFR) Training. 2. Discuss the physiologic effects of BFR Training. 3. Identify potential systemic effects of BFR Training. Blood flow restriction (BFR) training has been reported to have significant benefits on local skeletal muscle growth including: increased muscle cross-sectional area, strength, and endurance while exercising with lower resistance. The technique involves applying a pressure cuff to partially occlude blood flow through an extremity while exercising. It is unclear what effects BFR may have on other body systems, such as cardiovascular and pulmonary systems that may impact safe use of the technique. Individuals unable to perform traditional training due to pain or other restrictions, may benefit from the local and systemic effects of BFR training. The purpose of this systematic review is to summarize the research on systemic effects of blood flow restriction training when combined with exercise intervention.

DESIGN: In this systematic review two literature searches were performed: one in June 2019 and another in September 2019 using MedLine, ScienceDirect, PubMed, Cochrane Reviews and CINAHL Complete. Articles included in this review were analyzed with the CEBM levels of evidence hierarchy and PEDro scale. Procedures: Each article was reviewed and rated by group consensus. Interventions: N/A; Control: Non-restriction/HA.

RESULTS: 20 articles were included in the review. PEDro scores ranged between 4 and 8, and had a level of evidence between 1 and 2. Common systems studied included cardiovascular, pulmonary, endocrine and musculoskeletal.

CONCLUSIONS: BFR training is being utilized more frequently as a physical therapy intervention in combination with strengthening. Although results vary, the majority of studies reviewed reported evidence that BFR training produces some systemic effects on the human body. BFR training may be an effective intervention for patient populations that are unable to perform traditional resistance exercise training.

THE TREATMENT OF HETEROPTIC OSSIFICATION AFTER GIRDLESTONE HIP ARTHROPLASTY AND PARTIAL GLUTEAL FLAP RECONSTRUCTION FOR END STAGE PRESSURE ULCER IN A SPINAL CORD INJURY PATIENT: A CASE REPORT

Yen Nguyen, MD, and Thomas S. Kiser, MD

CASE DESCRIPTION: A 68 years old male with T10 ASIA A SCI who developed osteomyelitis of the left proximal femur from chronic stage IV decubitus ulcer.

CONCLUSIONS: Sickle Cell Trait is a risk factor for infarctions, including of the spine, and should be considered during work up and treatment of persons that sustain a spinal cord infarct.

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CASE DESCRIPTION: A 68 years old male with T10 ASIA A SCI who developed osteomyelitis of the left proximal femur from chronic stage IV decubitus ulcer.

CONCLUSIONS: Sickle Cell Trait is a risk factor for infarctions, including of the spine, and should be considered during work up and treatment of persons that sustain a spinal cord infarct.

THE USE OF ALENDRONATE FOR TREATMENT OF HETEROPTIC OSSIFICATION AFTER GIRDLESTONE HIP ARTHROPLASTY AND PARTIAL GLUTEAL FLAP RECONSTRUCTION FOR END STAGE PRESSURE ULCER IN A SPINAL CORD INJURY PATIENT: A CASE REPORT

Yen Nguyen, MD, and Thomas S. Kiser, MD

CASE DIAGNOSIS: A 68 years old male with T10 ASIA A SCI who developed osteomyelitis of the left proximal femur from chronic stage IV decubitus ulcer.

CASE DESCRIPTION: The patient underwent Girdlestone hip arthroplasty followed by partial gluteal flap reconstruction. Two months after his initial surgery and a couple weeks into his stay at the acute rehabilitation hospital, local swelling and erythema were noted at the posterior lateral aspect of the left hip with decreased passive hip flexion. Heterotropic ossification (HO) at the proximal pole of the resected left femur was confirmed on hip Xray. The patient was started on Etidronate and Meloxicam for treatment of HO. However, this medication was not available at the patient’s local pharmacy. He was then switched to Alendronate to continue at home after having received 5 days of treatment at the rehabilitation state due to sickle cell trait.

DISCUSSIONS: The patient successfully finished the recommended three months treatment course with improvement in pain and swelling. There was no further progression of the ectopic bone formation. Passive range of motion of the left
hip was preserved at 90 degree in flexion. Etidronate is a bisphosphonate that has been used exclusively for treatment of HO in its early stages. Alendronate is more commonly used for osteoporosis and is not the drug of choice for treatment of HO. Based on our literature review, we believe that this is the first reported case of HO after a Girdlestone arthroplasty. Etidronate was performed in isolation but none has been reported after a Girdlestone arthroplasty.

**CONCLUSIONS:** Alendronate can be used for the treatment of heterotropic ossification successfully when Etidronate is not readily available. In addition, heterotropic ossification can be a rare complication after Girdlestone arthroplasty in the spinal cord injury population.

### THE USE OF INHALED GENERAL ANESTHESIA IN CHILDREN UNDERGOING NEUROCHEMICAL BLOCKING: A HUMANIZED VISION OF CARE

Ricardo Gonçalves, Physician, Angelica S. Kuwait, Physician, Regina Chueire, Physician, Rafaela Antonucci, Graduated, Inês Leite, Physician, and Eneida Vieira, PhD

**OBJECTIVES:** The aim of this study was to evaluate the improvement of care regarding the humanization of patient and caregiver care during the application of botulinum toxin type A using inhalation general anesthesia.

**DESIGN:** A quantitative and retrospective cross-sectional study was carried out and analyzed in which 260 physical records of the patients treated at the infantile spasmylotropic outpatient clinic from January to July 2019. Botulinum toxin type A was administered every 4 months with inhalation general anesthesia. Thus, the responses and satisfaction of the caregivers and the patients were evaluated, if they have cognition, before the procedure performed, through goal attainment scaling (GAS).

**RESULTS:** According to the research, in the return of 40 days, the caregivers reported a satisfactory result of the application, because without the stress of the procedure, the children had a recovery after quiet anesthesia, avoiding pain and emotional disorder. Thus, there was greater comfort and less concern with children due to anesthetic induction.

**CONCLUSIONS:** It was concluded that the children presented less psychological trauma directly provided by the absence of pain and amnesia during the procedure. Their caregivers reported a better acceptance of this approach due to the absence of patient suffering. Thus, it was possible to provide humanized care to both patient and caregiver with neurochemical block associated with the use of inhaled general anesthesia. Given the data pointed out in the study, the use of inhaled general anesthesia is recommended as a comfortable and safe method for performing the neurochemical block procedure.

### THE VALUE OF ELECTROMYOGRAPHY IN THE EARLY DIAGNOSIS OF AMYOTRPHIC LATERAL SCLEROSIS

Michael Chiou, MD, Jason Loizides, MD, and Jerry Weissman, MD

**CASE DIAGNOSIS:** Amyotrophic lateral sclerosis (ALS), Motor neuron disease (MND), Lou Gehrig’s disease.

**CASE DESCRIPTION:** A 61-year-old female presented with a one month history of new onset left foot drop. Physical exam revealed weakness of ankle dorsiflexion and foot eversion, preservation of sensory function, and hyperreflexia. Electromyography (EMG) was performed. Multiple muscles including bilateral mediasl gastrocnemius, left anterior tibialis, left glutus medius, left triceps brachii, and left thoracic paraspinals demonstrated varying degrees of abnormal electrical activity, including increased insertion activity, fibrillation potentials and fasciculations, giant motor unit potentials with minimal contraction, and reduced recruitment pattern. The clinical and electrical findings were consistent with amyotrophic lateral sclerosis (ALS).

**DISCUSSIONS:** Amyotrophic lateral sclerosis is a progressive adult-onset neurodegenerative disease that affects upper and lower motor neurons. It takes on average 9 to 12 months from symptom onset to diagnosis. Physiatrists are trained to focus on functional preservation in ALS, but also continue to take a large role in performing diagnostic studies. The diagnosis of ALS is based on the El Escorial Revised criteria and the Awaji criteria, the latter of which gives abnormal EMG tests the same weight as clinical signs of lower motor neuron dysfunction in making the diagnosis of ALS. The value of EMG should not be understated as it may provide specific information about neuromuscular disease. The role of EMG has advanced in diagnosis, which provides physiatrists an early opportunity to address progressive functional deficits and preserve quality of life. Furthermore, classic diagnostic criteria may need to be modified to allow earlier acceptance of many ALS patients into therapeutic trials.

**CONCLUSIONS:** Physiatrists continue to provide a leading role in electromyography. Early diagnosis of neuromuscular disease provides an early opportunity to rehabilitate and maximize functional preservation in people living with amyotrophic lateral sclerosis.

### THE VISUOSPATIAL GAIT PARAMETERS FOR PREDICTING REHABILITATION OUTCOMES IN ISCHEMIC STROKE PATIENTS

Mi Ran Yoo, MD, Su Hwan Bae, MD, Dae Yul Kim, MD, PhD, and Jong Yoon Yoo, MD, PhD

**OBJECTIVES:** Regaining walking ability is a major goal for rehabilitation programs in stroke patients. Previous studies reported prognostic factors for recovery for stroke patients. However, prognostic factors in ambulatory recovery of stroke patients were not well defined especially, using gait analysis parameter. Our study investigated if visuospatial gait parameters at admission predict rehabilitation outcomes in ischemic stroke patients.

**DESIGN:** Ischemic stroke patients conducted gait analysis at admission from June 2016 to April 2018 were included in this retrospective study. Patients who were unable to walk independently before stroke and had comorbid conditions that could influence gait ability were excluded. For outcome measure, functional ambulatory category (FAC), modified Rankin scale (mRS), and modified Barthel index (MBI) were measured at the beginning and end of 4 weeks rehabilitation program. The relationship between parameters from gait analysis and functional outcomes were analyzed by point-biserial correlation analysis.

**RESULTS:** A total of 37 patients were included in analyses. Gait speed and step length were positively correlated with initial FAC, post FAC and FAC change, and negatively correlated with initial mRS and post mRS. The single limb support phase ratio (unaffected side / affected side) was negatively correlated with post FAC and positive correlated with post mRS. Especially, gait parameters and functional outcomes at the end of rehabilitation were closely related. No gait parameter showed a significant correlation with MBI.

**CONCLUSIONS:** Our results suggested that gait speed, step length, single limb support phase ratio, stance phase at the initial state of rehabilitation are closely related to functional outcomes. Especially, gait parameters and functional outcomes at the end of rehabilitation were closely related. Therefore, gait analysis at the early phase of rehabilitation could be used to predict functional recovery. Further large scale study will be necessary.

### THERE IS NO "I" IN TEAM: A CASE REPORT

Kevin Frison, MD, and Miguel Escalon, MD, MPH

**CASE DIAGNOSIS:** Spastic Hemiplegia Secondary to a Brain Hemorrhage.

**CASE DESCRIPTION:** Patient was admitted for allogenic stem cell transplant for treatment of Acute Myelogenous Leukemia. A few days after transplantation, he developed altered mental status with focal neurologic deficits including right hemiplegia and being overall obtunded. MRI brain demonstrated multiple supratentorial ring enhancing lesions plus a left frontal intracerebral hemorrhage. The lesions were presumed to be infectious but work-up was unrevealing and brain biopsy was deferred due to clinical improvement after treatment with antivirals, antibiotics and Amphotericin. The etiology of the hemorrhage was relapse of disease, resulting in thrombocytopenia that caused the hemorrhage. Patient was transferred to acute rehab with an overall functional status of max assist and his right sided flaccidity progressed to right upper extremity flexion synergy, as well as increased bilateral posterior tibialis tone resulting in plantarflexed and inverted lower extremities. The patient received botulinum toxin type A injections which assisted in patient’s achievement of better functional status.

**DISCUSSIONS:** After the intracerebral hemorrhage, this patient’s obtunded condition was worrisome and boded a poor prognosis. Despite all the unexpected turns, the interdisciplinary collaboration and communication helped a man with no functional status achieve near baseline return of functional status. What’s important to note is how the rehabilitation team commonly serves as the “glue” on an interdisciplinary team due to their communication and leadership skills which is similar to a physiatrist’s role in team rounds.

**CONCLUSIONS:** The interdisciplinary approach is vital in helping patients achieve a better quality of life and open communication is crucial. This case exemplifies how open communication amongst disciplines is not only crucial in improving a patient’s quality of life, but also quantity of life remaining. The physiatrist’s role in team rounds with physical and occupational therapists, social work, nursing etc. is a microcosm of their role on the interdisciplinary team.
THORACIC CAVERNOMA PRESENTING AS LUMBAR RADICULOPATHY: A CASE REPORT

Kevin Cipriano, MD, Elana Hartman, MD, and Bryan Murtough, MD

CASE DIAGNOSIS: 32 year old male presenting with non-localized back pain and right lower lumbar weakness found to have thoracic cavernoma.

CASE DESCRIPTION: Patient initially presented to orthopedic clinic for knee pain and back pain but was referred to a rehab clinic for evaluation of the back pain. At that time he was describing 8 months of non-localized sharp back pain with radiation to his right leg. At the time of the initial evaluation his exam was notable for significant right sided weakness but no localized lumbar spine findings. He was also noted to have decreased sensation on the right, brisk reflexes bilaterally and 2 beats of clonus on the right. MRI thoracic and lumbar spine as well as EMG was ordered for further workup. EMG was consistent with central process and MRI revealed an intramedullary thoracic cavernoma at T2.

DISCUSSIONS: Patient underwent resection of the cavernoma by neurosurgeons team and was admitted to acute inpatient rehabilitation. Immediately following the procedure he was noted to have some new left sided weakness and deemed a T4 AIS C. After completing a one month inpatient rehabilitation program he was discharged at T7 AIS D. He had significant improvement in sensation as well as lower extremity strength. He was able to ambulate with a single lolofstrand crutch and AFO at time of discharge and was independent with all ADLs. Thoracic spine MRI should be considered in patients presenting with non-specific back pain and weakness for possible thoracic cavernoma. Neurosurgery consultation is also helpful in determining the need for operative management. Early intervention with cavernoma removal, along with inpatient rehabilitation, can lead to a clinically significant improvement in ambulation and ability to perform ADLs independently.

CONCLUSIONS: Intramedullary cavernoma are rare lesions. When identified early, intervention can prevent expansion, potential bleeding, and lead to better functional outcomes.

THYROID HORMONES AND BRAIN-DERIVED NEUROTROPHIC FACTOR: A POTENTIAL ENDGENOUS MECHANISM FOR BRAIN HEALTH: A SCOPING REVIEW

Jeanine Watson-van Zyl, MSC, Karen E. Weismann, PhD, and Bernhard Sehm, PhD, DR MED

OBJECTIVES: Exercise neuroscience has highlighted the vital role that brain derived neurotrophic factor (BDNF) plays on exercise-induced neuroplasticity (eNP). Importantly, there may be emerging evidence that the thyroid hormones (TH) exert some influence on BDNF and as such may play a modularity role in brain health. The precise nature of a TH-BDNF mechanism in exercise neuroscience is currently unexplored. Therefore, the aim of this review is to explore the extent of the evidence, and to identify knowledge gaps in the literature.

DESIGN: A literature search was conducted in the following databases: PubMed, MEDLINE; and Scopus. Search terms included: “thyroid AND neuroplasticity”, “thyroid AND BDNF”. Publication dates ranged from 1950 to June 2019. Eligibility criteria were deliberately set wide to allow for an extensive search. Inclusion criteria: English language; any population; any study design; outcomes included any TH and BDNF, exclusion criteria: languages other than English; studies that did not include thyroid hormones.

RESULTS: A total of 233 articles were found. Of these, 81 articles were included after initial screening: 86.4% of these were animal models; 3.7% human models; 9.9% were culture models; 100% were cross-sectional. Further, correlations were reported between T4 and BDNF (13.6%); T3 and BDNF (18.5%); TSH and BDNF (11.1%).

CONCLUSIONS: Though there is evidence for mechanistic link between the thyroid hormones and BDNF, the research has been limited to animal models, and cross-sectional studies. Considering the role of BDNF as a marker for eNP and potentially brain health, future research should explore the implications of a TH-BDNF mechanistic link in humans and in longer trials.

TIME COURSE OF PROXIMAL TO DISTAL PHYSIOLOGIC AND FUNCTIONAL RECOVERY FROM SEVERE CRITICAL ILLNESS POLYNEUROPATHY – A REHABILITATION UNIT EXPERIENCE

Anusha Lekshminarayanan, MD, Agnes Bacopulos, BSC, Wessam Gerguis, MD, and Eric L. Altschuler, MD, PhD

CASE DIAGNOSIS: 39-year old female with no significant past medical history initially presented with shoulder aches followed by a complicated hospital course including intubation and ICU admission for urosepsis, pneumonia, rhabdomyolysis, hemodialysis and pyelonephritis requiring tracheostomy and gastrostomy placement. She was admitted to acute rehabilitation for critical illness polyneuropathy (CIP). Hospital course complicated by multiple gluteal abscesses drained by interventional radiology.

CASE DESCRIPTION: Initial month, she required total assistance with all activities: transfers, mobility, grooming, upper and lower body dressings (strength: 1 wrist flexors, 2-hips, 2- knees, 3- left shoulder flexors). 2nd month, she self-fed with universal cuff using left upper extremity. Right shoulder X-ray showed heterotropic ossification. 3rd month, ambulation 35’ assisted by raising aid device. 4th month, ambulation 150’ assisted by aid device and rolling walker, self-fed with minimal assistance, propelled wheelchair 40’ with moderate assistance (strength: 1+ right shoulder, 2+ left wrist extensors, 2+ hips, 2+ knees, 3- left shoulder flexors). 5th month, she self-fed, groomed, completed transfers with supervision, used right upper extremity (strength: 1+ right shoulder flexor, 2- right wrist extension, 2+ hip, 3+ knee, 3- left wrist extension and flexion, 4 left shoulder) for wheelchair propulsion and danced with assistance.

CONCLUSIONS: 40 years ago, CIP, characterized by axonal injury, was recognized as a neurologic sequela of sepsis, especially in ICU patients. Nerve conduction/Electromyography findings include absent compound motor and sensory nerve action potentials and fibrillation potentials in proximal and distal muscles, as found in our patient. Treatment includes limiting use of sedating agents, paralytic agents and early rehabilitation. Prognosis can range from persistent weakness to full recovery in 6-12 month period.

TO TREAT OR NOT TO TREAT: ASYMPTOMATIC BACTERIURIA (ASB) IN A PREGNANT WOMAN WITH SPINAL CORD INJURY (SCI)

Erica R. Eldon, DO, Chris J. Lin, MD, and Vincent Huang, MD

CASE DIAGNOSIS: Asymptomatic bacteriuria (ASB) in a pregnant woman with Spinal Cord Injury (SCI).

CASE DESCRIPTION: An 18-year-old healthy pregnant woman (LMP 14 weeks 6 days) presented with bilateral lower extremity and right hand weakness with urinary and bowel incontinence and was diagnosed with idiopathic transverse myelitis (ITM). She was transferred to acute inpatient rehabilitation (AIR) with C4 American Spinal Injury Associated (ASIA) Impairment Scale (AIS) D with neurogenic lower urinary tract dysfunction (NLUTD) requiring intermittent catheterization. Hospital course was complicated by urinary tract infections (UTI) and asymptomatic bacteriuria. She developed urosepsis due to Group B Streptococcus, treated with nitrofurantoin. Bladder distention injury with hematuria and subsequent urine culture (UC) confirmed pan-sensitive E.coli, also treated with nitrofurantoin. Screening UCs, collected while asymptomatic both inpatient and after discharge, confirmed multiple organisms requiring treatment dose and suppression antibiotics. UC collected 5 months post-discharge confirmed multidrug-resistant coagulase negative staphylococcus requiring admission for treatment.

DISCUSSIONS: According to the American Academy of Family Physicians (AAFP), pregnant women with ASB or UTI should be treated with antibiotics to reduce the risk of pyelonephritis and decreased birth weight. Screening for ASB is recommended. Infectious Disease Society of America reports the treatment of ASB in patients with impaired voiding after SCI has contributed to antibiotic resistance, and screening for ASB is not recommended. Some evidence suggests ASB may protect against aggressive organisms and symptomatic UTIs in this population. Ameri- can College of Obstetrics and Gynecology (ACOG) recommends frequent UC and antibiotic suppression in pregnant patients with SCI.

CONCLUSIONS: Established recommendations on treatment of UTI/ASB in pregnant woman with SCI are limited. While we acknowledge that treating ASB reduces poor outcomes in pregnancy, does treating ASB contribute to antibiotic resistance and development of symptomatic UTIs? As the incidence of women with SCI who become pregnant increases, it is important to investigate and establish clear treatment recommendations.

TRAJECTORIES OF COGNITIVE DYSFUNCTION, DEPRESSION, ANXIETY BUT NOT SERUM NEUROFILAMENT LIGHT CHAIN PREDICT THE TRAJECTORY OF FATIGUE IN WOMEN UNDERGOING TREATMENT WITH NEUROTOXIC CYTOTOXIC CHEMOTHERAPY FOR BREAST CANCER

Lisa J. Wood, PhD, RN, Annie Fox-Galalis, PhD, Qing Mei Wang, MD, PhD, and Qianfeng Li
CASE DIAGNOSIS: The purpose of this study was to determine whether levels and trajectories of cognitive impairment, anxiety, depression, or circulating levels of neurofilament light chain (NFL), a marker of neurotoxicity, predict levels and trajectories of fatigue in women undergoing neurotoxic chemotherapy for breast cancer.

RESULTS: Data collected from two prospective longitudinal studies of women undergoing chemotherapy for early-stage breast cancer. Samples 1 (N = 24) and 2 (N=44) were from the northwest and northeast US, respectively. Perceived cognitive impairment, depression, anxiety, fatigue, and serum levels of NFL were measured at the beginning, mid-point, and end of chemotherapy and 3-6 weeks thereafter. Longitudinal multilevel modeling was used to examine trajectories of change in all variables.

DISCUSSIONS: The trajectory of change across time for fatigue, AF, anxiety, and depression showed linear and quadratic components, meaning that after the start of chemotherapy each symptom worsened until the end of treatment and then started to improve during the weeks after the final infusion. Serum NFL levels showed a similar trajectory of change. AF, anxiety, and depression were significantly related to fatigue across time in both samples (p<.001). Trajectories of AF, anxiety, and depression predicted the trajectory of fatigue, such that a worsening of AF, depression or anxiety predicted a worsening of fatigue. Trajectories of serum NFL did not predict worsening of fatigue.

CONCLUSIONS: Our results provide evidence that fatigue, AF, depression, and anxiety are related to each other and share a predictable pattern of change over time. The clustering of these symptoms across time suggests a shared mechanism. Change in serum NFL, a marker of axonal damage in a variety of neuroinflammatory conditions, did not predict change in fatigue over time.

TRANSCORTICAL MOTOR APRAXIA OF SPEECH

Ihsan Ballaya, MD, Alice Can Run Qin, BS, and Eric L. Alschuler, MD, PhD

CASE DIAGNOSIS: A 60-year-old right-handed male with a past medical history of hypertension and coronary artery disease presented with severe dystarthis, dysphagia and left-sided weakness after right frontoparietal MCA ischemic stroke.

CASE DESCRIPTION: The patient’s initial examination on acute rehabilitation was significant for mild left-sided weakness, ability to follow commands but severe dysarthria and dysphagia necessitating our placement of a peg. Surprisingly, we subsequently found he was able to repeat sentences with normal intelligibility and articulation and complete sequences, e.g., “1,2,3,4,5,…” following prompting “1,2,” similarly daily of the week, months of the year. Remarkably, he could also count by 2s, 3s and 5s up to 12,18 and 30, respectively, with normal articulation after being prompted by only the first two numbers in each sequence. The patient was able to read audibly with good articulation and demonstrated reading comprehension significantly above chance—all/12 accurate matching read word to four color/picture choices. However, spontaneous speech was unintelligible and when naming pictures of objects articulation was variable, sometimes unintelligible. When asked to describe complete sequences, super sequences and read with normal articulation. There was much longitudinal multilevel modeling was used to examine trajectories of change in all variables.

DISCUSSIONS: The trajectory of change across time for fatigue, AF, anxiety, and depression showed linear and quadratic components, meaning that after the start of chemotherapy each symptom worsened until the end of treatment and then started to improve during the weeks after the final infusion. Serum NFL levels showed a similar trajectory of change. AF, anxiety, and depression were significantly related to fatigue across time in both samples (p<.001). Trajectories of AF, anxiety, and depression predicted the trajectory of fatigue, such that a worsening of AF, depression or anxiety predicted a worsening of fatigue. Trajectories of serum NFL did not predict worsening of fatigue.

CONCLUSIONS: Our results provide evidence that fatigue, AF, depression, and anxiety are related to each other and share a predictable pattern of change over time. The clustering of these symptoms across time suggests a shared mechanism. Change in serum NFL, a marker of axonal damage in a variety of neuroinflammatory conditions, did not predict change in fatigue over time.

TRANSPORTER IMPAIRED HYPOGLYCEMIC AWARENESS

Charles Kent, DO, Matthias Linke, DO, and Vincent Huang, MD

CASE DESCRIPTION: A 65 year old female with a history of type 1 diabetes mellitus admitted to the acute spinal cord injury rehabilitation floor following a diagnosis of transverse myelitis in her cervical spine. Her rehabilitation course was complicated by multiple episodes of severe asymptomatic hypoglycemia, requiring emergent glucose administration, and transfer to the medicine floor. Prior to her hospitalization she reported a typical prodrome to any of her hypoglycemic episode, describing headache, dizziness, and fatigue. However, on the rehabilitation unit she experienced multiple severe hypoglycemic episodes, but denied having any of her usual prodromal symptoms. This impaired awareness of her hypoglycemia, created a challenge for the primary team, and ultimately necessitated increased monitoring of POC glucose, and changes to her diabetic management.

DISCUSSIONS: During episodes of hypoglycemia the central nervous system mediates autonomic responses thought to be driven by sympatheadrenal activation and norepinephrine, as well as acetylcholine released from sympathetic neurons. Awareness of hypoglycemia results from recognition of symptoms driven by these various responses, and identifying that they are resultant from hypoglycemia. Impaired hypoglycemia awareness has been observed in patients with type 1 diabetes, however is not well studied in patients with both type 1 diabetes and other spinal cord injuries. As spinal cord injury patients are susceptible to both autonomic and sensory disturbances, it is proposed that this patient’s transverse myelitis contributed to her impaired hypoglycemia awareness.

CONCLUSIONS: Within the literature, there are not many case reports describing this phenomenon. However, a better understanding of the clinical expectations in...

Jérôme Gauvin-Lepage, RN, PhD

CASE DIAGNOSIS: The aim of this study was to better understand the family resilience process following a severe traumatic brain injury during adolescence.

CASE DESCRIPTION: Inspired by the humanistic model of nursing care as a disciplinary perspective, this study used a qualitative and inductive case study design.

DISCUSSIONS: The data analysis yielded six themes as well as four subthemes that illustrate this family’s resilience process. The most important factors that emerged are (a) family characteristics (i.e., a fighter personality, cultural and spiritual beliefs, presence of hope, keeping a sense of humor), (b) support of family members, (c) support of friends, (d) practicing sports and leisure activities, (e) back-to-school support, and (f) feeling helpful to the adolescent.

CONCLUSIONS: This study provides interesting avenues with regard to the implementation of strategies to foster the resilience process in families during particularly difficult situations in their lives, such as a traumatic brain injury during adolescence.

TRAI N A T E D O R NONTRAI N A T E D S C O R P I L D INJURY? SPINAL EPIDURAL HEMATOMA IN AN ADOLESCENT FIGURE SKATER: A CASE REPORT

Melanie A. Mackeben, MD, Charles Sisung, MD, and Laura Black, MD

CASE DESCRIPTION: The patient developed acute onset of low back pain during a routine figure skating practice. She did report falling during her practice, which was typical for her. Within hours, her symptoms progressed to numbness and weakness in the bilateral lower extremities. Imaging of the spine revealed a dorsal epidural hematoma at T11-L1. She underwent emergent surgical decompression with T11-L1 laminectomy and hematoma evacuation. She is undergoing a hematologic work-up, though there is no family history of bleeding disorders. Physical examination in acute care revealed a T12 ASIA A spinal cord injury (SCI).

DISCUSSIONS: Spinal epidural hematomas are rare causes of spinal cord injuries. They can occur traumatically or spontaneously, often secondary to a coagulopathy. It is unclear whether this patient’s injury was traumatic or spontaneously induced from one of her routine figure skating falls. This patient’s initial clinical presentation of a complete thoracic SCI and subsequent neurologic recovery is atypical for a traumatic spinal cord injury.

CONCLUSIONS: This is the first reported case, to our knowledge, of neurologic recovery following a spinal epidural hematoma in an adolescent. If a traumatic etiology is equivocal, the ASIA exam may have limited prognostic value.


Meghan K. Hayes, MD, and Ki H. Kim, MD

CASE DIAGNOSIS: Traumatic Paraplegia and Blindness after Gunshot Injuries.

CASE DESCRIPTION: The patient was an 18-year-old male with history of an unspecified personality disorder who sustained multiple gunshot injuries. He initially presented with bilateral lower extremity paraplegia, penetrating abdominal injury, multiple facial fractures, and frontal lobe contusion. Bilateral globe ruptures were discovered requiring enucleation. Upon presentation to acute rehabilitation, patient reported bilateral lower extremity weakness and RLE hypesthesia. Spinal cord injury (SCI) was incomplete, with L2 sensory level of injury. Motor strength was 5/5 bilateral upper extremities. The left lower extremity demonstrated 5/5 hip flexion, 5/5 knee extension, 5/5 ankle dorsiflexion, 1/5 great toe extension, 1/5 plantar flexion. Patient denied motor testing of the right lower extremity due to hypesthesia. On initial evaluations, patient required total assist for toileting, dressing, and ambulation. At discharge evaluation, the patient improved to supervision for toileting, upper body dressing, and ambulation.

DISCUSSIONS: The multidisciplinary team encountered unique rehabilitation challenges. Treatment was expanded to include sessions of vision rehabilitation therapy. The regimen included communication systems, verbal cueing, proprioception retraining, and safety techniques. Psychologic adjustment to new blindness was also a major barrier. The patient had limited motivation to participate in therapy, decreased safety awareness, and limited carry-over between sessions. Important strategies included psychologic evaluation and treatment, donning DME prior to therapy; family involvement, and limiting distraction (cell phone, crowded gym environment). Given patient’s age and muscle strength, functional goals were set for modified independence in the patient’s home. Initial concern of new-onset blindness did not limit ability to participate in therapy or overall functional outcome.

CONCLUSIONS: There is a paucity of literature regarding rehabilitation of SCI patients with blindness. By expanding therapy planning and incorporating specialized communication and proprioception techniques, patients should not be limited in their functional outcomes related to spinal cord injury despite concomitant new-onset blindness.


Wonjae Jo, MD, Yumi Kim, MD, and Eun Sil Kim, MD

CASE DIAGNOSIS: Traumatic spinal cord injury without abnormal findings on MRI.

CASE DESCRIPTION: A 34-year-old female patient visited our clinic with symptoms of limb weakness on the lower extremities. C4-C7 myelopathy as well as bilateral upper extremity weakness and RLE hyperesthesia. Spinal cord injury and diabetes. Furthermore, bolstering education for patients and clinicians may reduce adverse events at home, and curb readmission rates after rehabilitation stays.


Sarah Gaballah, MBChB, Steven J. Mann, MD, Caroline Lee, MD, and Getahun Kifle, MD

CASE DIAGNOSIS: Stiff Person Syndrome.

CASE DESCRIPTION: A 70-year-old female with PMH of HTN, DM presented to the Emergency Department with 4 weeks progressively worsening bilateral lower extremity weakness, stiffness and inability to ambulate. Physical exam revealed severe rigidity. Extensive neurological workup ruled out myelopathy. EMG revealed no myopathic pathology, but was significant for motor activity at rest in vastus medialis, vastus lateralis, lumbriscals and thoracals paraspinals. Autoimmune workup revealed anti-glutamic acid decarboxylase antibodies. Patient was diagnosed with Stiff Person Syndrome, and started on clonazepam 2mg BID, baclofen 20mg, and dantrolene 25mg BID. Due to persistent symptoms, she underwent a 5 day course of IVIG, and failed to improve. She was then transferred to acute inpatient rehab for continued care. On admission to rehab, she was started on a trial of bromocriptine 2.5mg BID, which resulted in marked improvement of her rigidity. After 2 weeks she ambulated 100 feet with a walker with contact guard assistance.

DISCUSSIONS: Stiff Person Syndrome (SPS) is rare disorder of CNS characterized by fluctuating muscle rigidity and spasms. There are three subtypes of SPS, classic (most common), partial (aka stiff limb syndrome), and paraneoplastic variant. Diagnosis is based on laboratory findings including anti-GAD antibodies as was seen in this patient. EMG typically shows continuous motor unit activity that decreases in intensity after fatigue. Other helpful findings include elevated spinal fluid IgG index, and increased 14-3-3 protein. Treatment focuses on symptomatic management, including benzodiazepines, baclofen, antiepileptics, IVIG and plasmapheresis. This case was unique due to the notable improvement after trial of bromocriptine, a dopamine agonist not typically used in SPS, but known to work on rigidity due to extrapyramidal symptoms.
CONCLUSIONS: SPS is a rare disorder of the CNS hallmarkled by marked rigidity. Treatment includes benzodiazepines, baclofen, antiepileptics, IVIG, and plasmapheresis. This patient improved after a trial of bromocriptine. Further studies may be warranted to assess the efficacy of bromocriptine in SPS.

TRISMUS AFTER LEFT PONS AND RIGHT MIDDLE CEREBRAL ARTERY STROKE TREATED WITH BACLOFEN

Christian Lopez Aponte, MD, and Myriam Crespo, MD

CASE DIAGNOSIS: 50 year old male with no history of diagnosed co-morbidities who developed trismus after left pons and right middle cerebral artery stroke treated with Baclofen

CASE DESCRIPTION: 50 year old male who on August 2019 developed right hemi-body weakness, dysphagia and disorientation. Brain MRI revealed a left pons ischemic stroke. Afterwards, he was admitted to our Inpatient Rehabilitation Facility where he suffered a fall and was diagnosed with a second stroke involving the right middle cerebral artery. He then developed Broca’s aphasia and trismus which prevented the patient to open his mouth more than 2 millimeters both passively or actively. Given the diagnosis, he was started on facial stimulation for 30-45 minutes and Baclofen 20mg by nasogastric tube (NGT) two times daily to improve symptoms. Given poor calorie intake and in order to ensure adequate improvement when readmitted to the Inpatient facility, a percutaneous endoscopic gastrostomy was placed. Upon 3 weeks of treatment, patient improved his mouth opening distance to about 20 millimeters. Given his response, pharmacotherapy was continued and oral hygiene could be performed.

DISCUSSIONS: Trismus-secondary to stroke is a serious and uncommon complication that produces an inability for the patient to open their mouth for completing daily tasks that includes hygiene, expression, eating. A feared complication that may arise in these patients is airway compromise. When compared to other available case reports, our patient responded well to non-selective antispasmodics and at that moment, botulinum toxin could not be performed due to poor access. Therefore, the use of non-selective antispasmodic medication, such as Baclofen could represent a cost effective option before proceeding to botulinum toxin when it is not accessible.

CONCLUSIONS: Antispasmodics such as Baclofen may be cost effective treatment for trismus after stroke and can be considered an option before proceeding to botulinum toxin injection.

ULTRASOUND ASSESSMENT OF MUSCLE ARCHITECTURE IN RESPONSE TO MOTOR POINT BLOCK FOR LOWER EXTREMITY SPASTICITY

Bridget Walker, MD, Sergey Tarima, PhD, Rachel Minkin, MS, Jennifer Nguyen, BS, and John McGuire, MD

OBJECTIVE: Primary objective was to identify changes in ultrasound images of spastic medial gastrocnemius (MG) before and after temporary motor point block (MPB). Secondary objective was to measure clinical response to MPB.

DESIGN: This prospective study recruited 11 participants with spastic hemiparesis. The less-affected limb served as control. Modified Ashworth Scale (MAS) was the clinical spasticity measure. Ultrasound outcome measures included pennation angle (PA), muscle thickness (MT), and echointensity (E). Low intensity electrical stimulation and 3 cc of an equal mixture of lidocaine (1%) and bupivacaine (0.5%) angle (P A), muscle thickness (MT), and echointensity (E). Low intensity electrical stimulation and 3 cc of an equal mixture of lidocaine (1%) and bupivacaine (0.5%) was placed. Upon 3 weeks of treatment, patient improved his mouth opening distance to about 20 millimeters. Given his response, pharmacotherapy was continued and oral hygiene could be performed.

CONCLUSIONS: Spastic medial gastrocnemius by ultrasound-guided perineural injection of hydrogel generates adhesion-predominant features of neuropathy, presenting a surgery free, minimal invasive animal model, which serves as a useful tool for research of pathophysiology and treatment of entrapment neuropathy.

UNDER-INFUSION OF INTRATELHAL BACLOFEN (ITB) IN THE LAST WEEK BEFORE THE REFILL DATE: TWO CASE REPORTS

Manoj K. Poudel, MD, and Seema Khurana, DO

CASE DIAGNOSIS: Spasticity.

CASE DESCRIPTION: We report two cases of increased spasticity that occurred consistently during the last week prior to their refills. The low reservoir alarm settings were programmed for more than three milliliters and the refills were completed before the low reservoir alarm date. Case 1 is a 44-year old male with cervical spinal cord injury. ITB (in simple continuous mode) dose was not changed. The patient continued to have increased spasticity only during the last week prior to the refills. Case 2 is a 73-year old female with secondary progressive multiple sclerosis. In addition to the simple continuous ITB dosing, Personal Therapy Manager (PTM) was added and programmed up to 6 in a 24-hour period. Patient only needed to use the PTM during the last week prior to refills resulting in adequate control of spasticity.

DISCUSSIONS: There were no changes in other medications and no new medical issues were reported during this time. This clinical pattern and the possible under-infusion of ITB have not been mentioned or explained in the latest Medtronic pump manual. Based on the clinical findings and the relief of the symptom by the PTM, our case reports suggest the under-infusion of ITB during the last week prior to the refills even when the reservoir had more than three milliliter volume during aspiration.

CONCLUSIONS: The pattern of increased spasticity only during the last week prior to refills in the patients using ITB pump has not been reported previously in the literature. It is important to be aware of this possible under-infusion and differentiate it from overall increase in spasticity before making a decision on dose adjustment. Further research is required to study this pattern of under-infusion.

UNDERSTANDING LATEROPULSION IN HEMISPHERE STROKE

Shenhao Dai, MD, PhD Candidate, Céline Picciscielli, PhD, Camille Lemaire, MS, Emmanuelle Clarac, MS, Alexandre Knaïnik, MD, PhD, Monica Baciu, MD, PhD, Marc Hommel, MD, PhD, and Dominic Périenou, MD, PhD

OBJECTIVES: We hypothesized that contralesional lateropulsion after hemisphere stroke must be considered on its own and no longer viewed through its extreme form, pusher syndrome (PS). We investigated lateropulsion prevalence, its association with other PS components including spatial neglect, its consequences on balance and gait, and its neural bases.

DESIGN: Cross-sectional study of 220 individuals consecutively admitted to a neurorehabilitation ward after a first hemisphere stroke (Cohort DOBRAS 2012-2018, ClinicalTrials.gov: NCT03203109), with clinical data systematically collected at 1 month. Individuals with lateropulsion were reassessed 2 months later, still with the Scale for Contraversive Pushing (SCP). Balance was assessed with the Postural Assessment Scale for Stroke (PASS) and gait with the modified Fugl-Meyer Assessment (mFMA). Statistics involved univariate and multivariate analyses. Neural bases were analyzed on MRI by voxel-based lesion-symptom mapping.

RESULTS: Lateropulsion was twice more frequent than was PS, with prevalence reaching 48% after a right hemisphere stroke and 97% in right-handers. The three prominent domains of PS (lateropulsion, pushing, resistance) brought similar information (factor loadings >0.95). Individuals could present PS, lateropulsion, or be upright at different times of the recovery. Individuals showing lateropulsion with or without PS had similar clinical profiles, except for severity of neglect. Both behavioral and
imaging analyses showed the analogy between lateropulsion and spatial neglect, which shared common neural bases, at cortical (centered on the temporoparietoinsular cortex) and subcortical (putamen and postero lateral thalamus) levels. Lateropulsion was the primary cause of mobility limitation, explaining 90% of balance and dexterity and about 40% of gait disability after right hemisphere stroke.

CONCLUSIONS: We propose a unified view of lateropulsion, which seems to correspond to graviceptive neglect, in relation to the multimodular vestibular thalamocortical network. This observation explains why lateropulsion is so detrimental to balance and gait, whose rehabilitation after hemisphere stroke should be rethought.

UNDERSTANDING MEASURES OF FUNCTION AND DISABILITY IN PEOPLE WITH WILSON'S DISEASE: A SCOPING SYSTEMATIC REVIEW

Xiahua Liu, MD, WanJin Chen, MD, PhD, Zhi-Yong Wang, MD, Yi Lin, MD, Catherine Said, BPhYSIO, PhD, Jennifer L. McGinley, PT, PhD, and Juan Ni, MD, PhD

OBJECTIVES: Hepatolenticular degeneration, known as Wilson's disease (WD) is an autosomal recessive inherited copper metabolism disorder with excessive copper deposition predominantly in the liver, brain, and kidneys. The natural history of WD includes movement disorders such as tremor, dystonia, and parkinsonism. In the context of lifespan management, understanding the broader impact of WD on the individual is also useful, with little evidence currently available to guide rehabilitation management. This study aims to identify measurement tools used for physical functional evaluation in people with WD, to evaluate content of each tool using the International Classification of Functioning, Disability and Health (ICF), and to examine the measurement properties of tools specific to WD.

DESIGN: Systematic scoping review; searches of online databases included primary articles and reviews. Searches identified measures used in people with WD to evaluate physical function, activity limitations, participation, and studies investigating measurement properties of these tools. Independent reviewers screened articles and extracted measurement property data and classified measurement tool content on the basis of ICF content domains.

RESULTS: Identified measures included two WD-specific scales; (Unified Wilson’s Disease Rating Scale, Global Assessment Scale), generic measures, and tools/items developed for other clinical populations. Measures primarily focused on impairments with very few scale items focused on activity or participation. Evidence available indicates that both WD specific scales are highly reliable with limited evidence supporting validity and responsiveness.

CONCLUSIONS: Appropriate assessment tools are needed to understand the motor dysfunction of WD patients, to allow evaluation over time and to support clinical trials of comprehensive rehabilitation. Very little is currently known about activity limitations and participation restrictions in this group. Further research is needed to inform measurement tool selection and treatment evaluation in this clinical group in order to achieve better outcomes and improved quality of life.

UNEXPECTED DIAGNOSIS FOR LEFT HIP PAIN AFTER A STROKE

Evan Plunkett, MD, and Mark Tomoro, MD

CASE DIAGNOSIS: Hip Pain Post Stroke.

CASE DESCRIPTION: A 51-year-old female was being treated for an acute stroke who developed progressive left hip pain. Overall exams were benign. Concomitantly, the patient’s hemoglobin was noted to decrease from 11.1 to 8.9 g/dL so an abdominal pelvic CT scan was ultimately pursued which portrayed an unexpected spontaneous left perinephric hematoma measuring about 3.9 cm in thickness with more extensive infiltration of the perinephric fat.

DISCUSSIONS: Renal bleeding is rare and to our knowledge after literature review only 6 cases of spontaneous bleeding have been reported in the English literature. Bleeding predominantly results from some type of existing renal pathology, in view only 6 cases of spontaneous bleeding have been reported in the English literature.

CONCLUSIONS: The differential of spontaneous renal bleeding should be considered in an individual with hip pain. The largest clue in this particular case was the decreasing hemoglobin which quickly led to more advanced imaging, but this could have been inadvertently missed while more traditional treatment algorithms for hip pain ensued since there are a number of neuromusculoskeletal conditions a patient can experience causing hip pain either related to, or unrelated to a stroke.

UNEXPECTED TACHYCARDIA IN NEUROLOGIC PATIENTS IN AN ACUTE REHABILITATION SETTING

Nahyan Kim, MD, Lawrence G. Chang, DO, MPH, and Mery Elashvili, MD, DO

CASE DIAGNOSIS: Cannabis induced tachycardia.

CASE DESCRIPTION: We present three cases of unexplained tachycardia including a 40-year-old female with depression who presented with left frontal acute infarct with hemorrhagic conversion and distal left M1 contrast abnormality, 30-year-old female with four past abortions who presented with Wernicke’s encephalopathy, and 42-year-old male with right middle cerebral artery stroke two years ago, hypertension, hyperlipidemia, diabetes, and anxiety who presented with left pontomedullary stroke. During rehabilitation, all patients developed persistent tachycardia. Tachycardia workup was all negative except for urine positive for tetrahydrocannabinol (THC). Patients were found to be chronic cannabis users, and their tachycardia were most likely secondary to acute on chronic cannabis use. Patient education was provided on risks of cannabis and their tachycardia subsided without further intervention.

DISCUSSIONS: Cannabis is the most used illicit drug in the US with constantly rising prevalence in the past decade. Evidence suggests that the public increasingly perceive cannabis as harmless, and utilize it for its calming effects. One of the emerging concerns surrounding cannabis use is its potential cardiovascular side effects, including angina, atrial/ventricular fibrillation, congestive heart failure, myocardial infarction, and stroke. In our cases, cannabis use has triggered tachycardia and may have contributed to their neurologic presentations.

CONCLUSIONS: Cannabis use should be considered as a differential diagnosis for tachycardia in neurologic patients, especially in patients with no prior cardiac history. In the wake of legalization of marijuana and increasing prevalence, there is a need to educate our patients about the risks including cardio- and cerebrovascular events and its limited therapeutic evidence on psychiatric disorders. As physiatrists, we should be aware of and be vigilant about side effects of cannabis and address this public health problem by providing holistic therapeutic interventions, patient education, and interdisciplinary care.

UNIQUE PRESENTATION OF EXPRESSIVE APHASIA FOLLOWING LEFT MIDDLE CEREBRAL ARTERY ISCHEMIC STROKE. A CASE REPORT

Dain T. Thorpe, MD, and Rachna Malhotra, DO

CASE DIAGNOSIS: Expressive aphasia with purely agrammatic and omission of function words following an acute ischemic stroke.

CASE DESCRIPTION: 64-year-old female who presented to the acute care hospital with right hemiplegia, right neglect, and severe fluent aphasia found to have a left M1 occlusion on CT. She was admitted to the Neuro ICU and underwent thrombectomy with later evidence of petechial hemorrhagic conversion, M3 distal occlusion, and mass effect of the lateral ventricle with midline shift. Following her ICU stay she was recommended for acute inpatient rehabilitation. Upon arrival her speech production and comprehension were intact. However, her verbal output was found to be non-fluent with short telegraphic utterances with vowel distortions and predictable omission of function words. Her resulting speech consisted of short monotonous fragmented sentences such as, “man reading books” or “dog walking”. She continued with daily speech therapy for non-fluent verbal output characterized by telegraphic speech without other characteristics consistent with expressive aphasia.

DISCUSSIONS: This is a rare case of an expressive aphasia resulting in solely agrammaticism with omission of function words without other characteristic signs of expressive aphasia. This patient made significant improvements in strength and overall function throughout the course of her acute inpatient rehabilitation stay. However, her speech remained characteristically fragmented with distinctive omission of function words. She will continue to work with SLP as an outpatient and further developments of her speech will be discussed.

CONCLUSIONS: Although a unique presentation to a common stroke type, this case demonstrates the important role a comprehensive rehabilitation program can play in improving functional outcomes. This patient will continue working with outpatient speech, and further developments will be discussed.

UNMASKING SEVERE HYPOTENSION AFTER INTERMITTENT CATHETER FOR DISTENDED BLADDER IN A PATIENT WITH CERVICAL SPINAL CORD INJURY

Neal K. Ekpoudia, Dennis Nguyen, DO, Ellsworth Remson, MD, Farzin Farhandnejad, MD, and Se Won Lee, MD

CASE DESCRIPTION: We present a 61 year old male who presented to the rehabilitation unit following a C5-C7 anterior cervical decompression and fusion (ACDF) for incomplete cervical spinal cord injury (C4 ASIA B) following a full secondary to an unexplained syncopal episode. After ACDF, he continued to experience ventilator-dependent respiratory failure and neurogenic bradycardia. He underwent permanent pacemaker placement, tracheostomy, and PEG tube placement. He was discharged to a long-term care facility where he stabilized to resting systolic blood pressures (SBP) ranging from low 90s-100s. On admission to the inpatient rehab hospital he was found to have a distended bladder of 500cc. Following intermittent catheterization, he was noted to be less responsive with BPs 60s/30s. Although he responded minimally to 0.5 ampere of current, within 15 minutes the SBP returned to 60. He was transferred to the ICU for a norpinephrine drip, an increase in midodrine and fludrocortisone to stabilize his blood pressures.

DISCUSSIONS: The autonomic nervous system is important in maintaining normal cardiovascular hemostasis. Autonomic dysfunction is common in a cervical spinal cord injury (SCI) patient. Multi-factorial autonomic dysfunction was suspected to lead to this hypotensive episode in this patient. This is an interesting case of unmasking severe hypotension in an attempt to address autonomic dysreflexia.

CONCLUSIONS: This case provides an opportunity to discuss not only different etiologies of autonomic dysfunction in SCI patients but also pharmaceutical agents, physical treatment modalities, and management options when addressing SCI.

URINARY RETENTION AFTER ADMINISTRATION OF MODAFINIL AND ARMODAFINIL
Michael Gallagher, MD, Neil Jasey, MD, and Lydia Singerman, BS
CASE DIAGNOSIS: Urinary retention with both modafinil and armodafinil.
CASE DESCRIPTION: A 35-year-old man presented to acute inpatient rehabilitation after a motor vehicle collision causing extensive severe traumatic brain injury including diffuse axonal injury, subarachnoid and subdural hematomas. He had hematomas evacuated and EVD placed. Once medically stable he was sent for rehabilitation, having been trialed on amantadine and modafinil at his acute care hospital with minimal improvement in mental status. Modafinil was slowly stopped. While at the rehabilitation unit he showed inconsistent command following and his neurostimulators were uptitrated. He was initiated on armodafinil. Approximately 24 hours after initial armodafinil dosing, he developed urinary retention with bladder scans ranging from 800-900ccs despite voiding with Texas catheter prior to the initiation of armodafinil. On additional history obtained from the patient’s mother, he did not tolerate modafinil and developed urinary retention on modafinil as well. Armodafinil was stopped with subsequent resolution of retention.

DISCUSSIONS: To the authors’ knowledge this is the first reported case of urinary retention correlated to administration of both modafinil and armodafinil. Per patient history at the acute care hospital and at inpatient rehabilitation, he had swift cessation of retention symptoms after each drug was discontinued. Research around modafinil and armodafinil’s wakefulness-promoting mechanism indicates it does have an effect on multiple neurotransmitters, including norepinephrine, histamine, serotonin, dopamine, and orexin; however at best it is known that these drugs work on multiple neurotransmitter systems. Although modafinil and armodafinil tend to promote arousal, it is possible that there is some small component of anticholinergic effect or other neurotransmitter pathway leading to urinary retention in sensitive patients.

CONCLUSIONS: While likely uncommon, urinary retention is a possible side effect in both modafinil and armodafinil. In patients using the drug, its discontinuation may be a consideration if other interventions fail to resolve acute urinary retention.

USE OF LORAZEPAM TO INCREASE PARTICIPATION AND AROUSAL IN A NON-CATATONIC PATIENT WITH SEVERE TRAUMATIC BRAIN INJURY (TBI): A CASE REPORT
Arshia Etesam, MD, Kemy M. Philip, MD, PhD, MBE, and Matthew Lin, MD
CASE DIAGNOSIS: 51-year-old female involved in a motor vehicle crash who suffered loss of consciousness and was found to have an intracranial bleed with cerebrospinal fluid effusion. She was diagnosed with a severe TBI, and endured a prolonged hospital stay requiring tracheostomy and percutaneous endoscopic gastrostomy tube placement. After her acute hospital course, she was discharged to a skilled nursing facility for 2 months and was subsequently discharged to a rehabilitation hospital for another month, all with modest improvement in her function.
CASE DESCRIPTION: The patient was then admitted to a dedicated brain injury service at a specialty rehabilitation hospital. She underwent five weeks of multidisciplinary rehabilitation with a team of physiatrists, therapists, and neuropsychologists. The medical team had continued her pharmaceutical regiment of amantadine, bromocriptine, and methylphenidate, including up-titration of methylphenidate and adding donepezil. Despite the appropriate use of these medications, it appeared she still had potential for improvement. Although not appearing catatonic, she underwent a trial of lorazepam to great effect. Per her therapists, family, and neuropsychiatrists, her alertness, participation and engagement had all improved with lorazepam. She also improved with command following, initiation, and required fewer cues with therapy. She was maintained on a daily dose with sustained improvement. During her admission, her Functional Independence Measure scores had improved and she was discharged home under family supervision with a post-acute day program.

DISCUSSIONS: Benzodiazepine medications, including lorazepam, have historically been used as a sedative. This case demonstrates the ability of these drugs to have a paradoxical effect on brain injury patients. Our case demonstrates the surprising ability of these patients to improve with use of benzodiazepines when commonly prescribed medications.

CONCLUSIONS: Brain injury can be difficult to manage. Given the expanding knowledge of pharmacotherapy, trial and error with a variety of medications is essential in achieving improved function and quality of life for these patients.

USING ADMINISTRATIVE DATA TO ASSESS THE RISK OF PERMANENT WORK DISABILITY: A COHORT STUDY
Matthias Bethge, PhD, and Katja Spanier, MA
OBJECTIVES: Rehabilitation can restore and improve work ability in patients with chronic disease. In Germany, rehabilitation services are provided by the pension agencies. However, unmet needs are common. We therefore developed a risk score using administrative data to assess the risk of permanent work disability. Such a score may support identification of individuals with a high likelihood of receiving a disability pension.

DESIGN: Our sample was a random and stratified 1-percent sample of individuals aged 18 to 65 years paying pension contributions. We extracted socio-demographic data and data about employment and welfare benefits covering 2010 to 2012 from administrative records. Our outcome was a pension due to work disability that was requested between January 2013 and December 2017. We developed a comprehensive logistic regression model and used the model estimates to determine our risk scores. Our standardized risk score was computed on a mean of 50 points and a standard deviation of 10 points. Several measures of prognostic accuracy were determined.

RESULTS: We included 352,140 individuals and counted 6,360 (1.8%) disability pensions during the 5-year follow-up. The risk score clearly discriminated individuals with and without disability a pension. The area under the receiver operating curve was 0.84 (95% CI: 0.83 to 0.84). Using a threshold of ≥50 points we correctly classified 80.6% of all individuals (sensitivity: 71.5%; specificity: 80.8%). Using ≥60 points we correctly classified 90.3% (sensitivity: 54.9%; specificity: 91.0%). Individuals with moderate (≥50 to ≤60 points) or high risk scores (≥60 points) had a 5 times or 17 times higher risk of a disability pension compared to individuals with low scores.

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CONCLUSIONS: The risk score offers an opportunity to screen for people with high risks of permanent work disability. Individuals with a high risk may be invited to discuss which services and strategies can be used to avoid permanent work disability.

USING NETWORK ESTIMATION TO UNCOVER THE FACTORS ASSOCIATED WITH STROKE RECOVERY
Qianfeng Li, MD, MS, Xiao Xi, MS, Jun Qiao, MS, Xin Luo, MD, Yulong Wang, MD, and Qing Mei Wang, MD, PhD

OBJECTIVES: Network research has gained substantial attention in various fields across medical disciplinary. We explored application of the network estimation method for discovering biomarkers and other factors associated with stroke and stroke recovery.

DESIGN: Three hundred and fifty eight stroke patients were enrolled in this study, and 24 clinical characteristics were collected for the network estimation. Network estimation was conducted by R. The network graph shows results by weighted network structure. Nodes represent variables connected with weighted line representing statistical relationship. To confirm accuracy, Pearson correlation, kendall correlation, t-test were used for statistical analysis.

RESULTS: The network graph suggests that Amantadine use is negatively correlated with function independence measure (FIM) admission cognitive assessment (P<0.01; r=-0.189) and motor score (P<0.01; r=0.212). As part of the validation, the network graph confirms the known relationship between motor score at discharge and admission (P<0.01; r=0.809), hypertension and diabetes (P<0.01; r=0.257), blood urea nitrogen (BUN) and creatinine (P<0.01; r=0.727). Hypertension and age (P<0.01; r=0.241), FIM motor score at discharge and Destination (P<0.01; r=0.727), FIM motor score at admission and hospital stays (P<0.01; r=0.476), age and atrial fibrillation (AF) (P<0.01; r=0.251).

CONCLUSIONS: Our preliminary findings suggest that the network estimation method might be a valuable tool to discover biomarkers and other factors associated with stroke recovery. The result from study provides insight into pragmatic application of amantadine after stroke.

USING THE ICF TO EXPLORE THE DEMAND OF ASSISTIVE DEVICES IN POST-POLIO PATIENTS IN THE CITY OF TAoyuan, TAIWAN
Wei Keung Lee, Master, and Tsai-Ching Yeh, Master

OBJECTIVES: In the medical history of Taiwan, polio patients were the population that initiated the need and development of rehabilitation technology. As now these polio-patients have reached senior age. This research project aims to explore their utilization of assistive devices, and the effect and impact thereof on their daily life.

DESIGN: The study is conducted through one-on-one interview surveys. All survey questionnaires are based on ICF adult assessment in order to understand their living conditions.

RESULTS: 36 (age from 53 to 66 years old; average 58) volunteers was diagnosed by WHO ICD-10 A80, A91 and G14 including in this study.

CONCLUSIONS: Post-polio patients in the city of Taoyuan, Taiwan heavily rely on assistive devices, which effectively enhances their mobility. Some of them remain in relatively enclosed social life. Their physical disadvantage impacts their work and life style. These patients are far less receptive to physio-therapy than medication. Evaluation of these patients must include careful history and physical exam followed by an appropriately designed electro-diagnostic examination. Unfortunately, sometimes a patient with a consistent H&P suggests UNE can have borderline or even normal standard ulnar NCS. We present a case in which the use of ulnar short segment study (SSS) allowed not only precise localization of the lesion, but also allowed the diagnosis of UNE when the standard ulnar NCS results were ambiguous.

CONCLUSIONS: EMG/NCS is still the gold standard to diagnose UNE, and use of the short segment study has shown great promise in not only increasing sensitivity to UNE, but also localizing the lesion more precisely. This case emphasizes that if electrodiagnostic results are not supporting the patient’s H&P, a more in-depth look can find the diagnosis that may have been otherwise missed.

UTILITY OF UlnAR SHORT SEGMENT StIMULATION STUDY AT THE Elbow
Collin Grant, MD, Peter Grant, MD, and William Pease, MD

CASE DIAGNOSIS: Ulnar neuropathy at the elbow

CASE DESCRIPTION: A 54-year-old right-handed male was seen in outpatient clinic for electrodagnostic evaluation for bilateral numbness in fourth and fifth digits. Physical exam showed Tinel’s sign at cubital tunnel, 4/5 strength in hand grip, intrinsic, and fifth digit abduction bilaterally. NCV/EMG showed readily apparent CTS. However, standard ulnar motor studies on both sides resulted only 4 m/s difference in above vs below the elbow NCV on the left and 5 m/s difference on the right. Therefore we employed short segment studies around the elbow, namely stimulations at the wrist, 6 cm below the medial epicondyle (ME), at the ME, and 6 cm above the ME. This produced clear decrement of the NCV, with 14m/s drop on the left and 24m/s on the right, both localized to the retrocondylar groove.

DISCUSSIONS: The classic presentation of UNE is numbness in the fourth and fifth digits of the hand, patients can also present with elements of weakness of hand intrinsics, decreased dexterity and pain. Evaluation of these patients must include careful history and physical exam followed by an appropriately designed electro-diagnostic examination. Unfortunately, sometimes a patient with a consistent H&P to suggest UNE can have borderline or even normal standard ulnar NCS. We present a case in which the use of ulnar short segment study (SSS) allowed not only precise localization of the lesion, but also allowed the diagnosis of UNE when the standard ulnar NCS results were ambiguous.

CONCLUSIONS: EMG/NCS is still the gold standard to diagnose UNE, and use of the short segment study has shown great promise in not only increasing sensitivity to UNE, but also localizing the lesion more precisely. This case emphasizes that if electrodiagnostic results are not supporting the patient’s H&P, a more in-depth look can find the diagnosis that may have been otherwise missed.

UTILIZING ADVANCED MULTIPLE PLANTAR TRANSESOPHAGEAL ULTRASOUND TO VISUALIZE AN AORTIC VALVE FIBROELASTOMA NOT SEEN WITH ULTRASOUND AFTER CRYPTOGENIC STROKE
Connie Jiang, MD, and Mark Tommero, MD

CASE DIAGNOSIS: Fibroelastoma in cryptogenic stroke.

CASE DESCRIPTION: A 52 year sustained a stroke and underwent extensive laboratory and diagnostic testing in which results were unremarkable. He did have waxing and waning neurological symptoms so ultimately an advanced multplanar transesophageal procedure was performed at the academic center which demonstrated an aortic valve fibroelastoma.

DISCUSSIONS: Surprisingly, papillary fibroelastoma is a common primary valvular tumor with an incidence of up to 0.33% in autopsy series and is predominantly found with a mean age of 60 years at diagnosis and increases the risk of stroke. There are a number of patients who routinely undergo acute diagnostic neuro testing post stroke and are labeled cryptogenic. This valvular lesion should be added to the differential prior to labelling a patient as a cryptogenic stroke. When utilizing traditional ultrasound the aortic valve was visualized but no abnormalities were found, however with the advanced multplanar transesophageal study the aortic valve fibroelastoma was visualized on ultrasound.

CONCLUSIONS: Typically ultrasounds are utilized as part of a stroke workup, however, if additional advanced testing returns unremarkable, prior to labeling the patient as cryptogenic, the clinician should consider a fibroelastoma in their differential
and consider pursuing an advanced multplanar transesophageal evaluation. This is important since this medical condition can be monitored and treated with its embolic nature.

VALIDATION OF SATIS-STROKE FOR USE IN BRAZIL: A MEASUREMENT PROPERTIES STUDY

Gabriela Pereira, Soraia M. Silva, Jean L. Thonnard, PhD, João Carlos F. Corrêa, PhD, and Fernanda I. Corrêa, PhD

OBJECTIVES: To analyze the reproducibility, test the concurrent validity and estimate the diagnostic capacity of the Brazilian version of the SATIS-Stroke questionnaire.

DESIGN: This is a methodological study. The measurement properties of the SATIS-Stroke were analyzed using the score in logits (logit model). Reproducibility was tested using the intraclass correlation coefficient (ICC2,1), standard error of measurement (SEM), minimal detectable change (MMD) and Bland-Altman plots. Concurrent validity was analyzed using Spearman's correlation coefficient. For such, the correlation between the SATIS-Stroke and Stroke Specific Quality of Life (SS-QOL) questionnaires was determined. Diagnostic capacity was estimated based on the area under the receiver operating characteristic (ROC) curve with a 95% confidence interval. Considering the sensitivity and specificity of the SATIS-Stroke in differentiating different types of activity and participation. A 5% level of significance was considered for all analyses (p < 0.05).

RESULTS: Excellent reliability was found for the score in logits (intra-observer ICC2,1 = 0.90; 95% Cl: 0.84-0.93, p < 0.001; inter-observer ICC2,1 = 0.89; 95% Cl: 0.83-0.93, p < 0.001). The Bland-Altman plot demonstrated satisfactory agreement. In the analysis of concurrent validity, a strong, positive, statistically significant correlation was found between the SATIS-Stroke and SS-QOL (rs = 0.735; p < 0.001). The ICC2,1 = 0.90; 95% CI: 0.84-0.93, p < 0.001). Diagnostic capacity was satisfactory in the logits score.

CONCLUSIONS: The Brazilian version of the SATIS-Stroke questionnaire exhibited adequate reproducibility, concurrent validity and diagnostic capacity. Therefore, this is a valid, reproducible measure for the assessment of satisfaction with regard to activities and participation following a stroke.

VALUE OF INTRATHecal BACLOFEN TEST DOSE IN THE WORK-UP OF INTRATHecal BACLOFEN PUMP MALFUNCTION VERSUS RESISTANT SPASTICITY: A CASE REPORT

Zainab J. Al Lawati, MD

CASE DIAGNOSIS: Intrathecal baclofen (ITB) infusion through a surgically implanted pump has become a more common method of severe spasticity management.

CASE DESCRIPTION: We report a young woman with multiple sclerosis who developed significant spasticity requiring intrathecal baclofen pump insertion. She had good results initially with the pump. However, after a few weeks she required increasing doses of baclofen with little effect and it was determined that the pump may not be functioning properly. Therefore, she was admitted for surgical exploration and revision of the pump under neurosurgery. In the operating room, the catheter was exchanged and the pump was revised.

CONCLUSIONS: This report illustrates the significant complications of intrathecal baclofen that could be related to mechanical factors. In addition, it highlights the role of Physiatrists to be able to trouble shoot when there is loss of medication effects and be able to state what to do when complications occur.

VESICOURETAL REFUX IN SPINAL CORD INJURED PATIENTS

Rachawan Sukathathin, MD

OBJECTIVES: To investigate the cause, management and prognosis of vesicoureteral reflux (VUR) in spinal cord injured patients (SCI).

DESIGN: The medical records of 59 SCI with VUR admitted to our hospital from August 2007 to July 2018 with minimum one year follow-up were reviewed retrospectively. General demographic, urological including bladder management, medication, urodynamics study, eGFR, UTI calculi and imaging including hydronephrosis, bladder deformity and grading were investigated.

RESULTS: The majority of VUR (87%) developed within 4 years after SCI. Before VUR were detected, only 24% of the patients received antimuscarinic medication and the most common bladder management was indwelling catheterization (70%). The treatments after VUR were indwelling catheterization (83%), antimuscarinics (98%) and antibiotics (73%). VUR were transient in 24%, improvement in 30%, stable in 19% and progressive in 27%. CKD staging from eGFR showed 1 patient in stage 5, 1 patient in stage 4 and 6 patients in stage 3. Three patients had impaired renal function assessed by renal scan. There was one patient on hemodialysis. Follow-up VUR were categorized into 2 groups (good vs poor outcomes). Patients with low bladder compliance showed significant association with poor outcome. Detrusor pressure > 40 cmH2O and voiding with incontinence tend to have poor outcome. Indwelling catheterization and antibiotic medication as management of VUR did not show significant difference in outcomes.

CONCLUSIONS: VUR was remained a complication in spinal cord injured patients which lead to renal deterioration. About half of VUR were improved after treatment. Bladder capacity was a factor associated with VUR outcome. Indwelling catheterization or antibiotic prophylaxis did not prevent progression of VUR. Patients with trigger reflex voiding with incontinence tend to have non-improved VUR. If those using this emptying technique should be closely monitored.

VIRAL ENCEPHALITIS OR ANTI-MYELIN OLIGODENDROCYTE GLYCOPROTEIN (MOG) ENCEPHALOMYELITIS? - A CASE REPORT

Daniela A. Ibiescu, MD, and Wilawan Nopphum, MD

CASE DIAGNOSIS: A 13-year-old male with presumed recurrent Anti-myelin oligodendrocyte glycoprotein (MOG) encephalomyelitis.

CASE DESCRIPTION: Patient with a prior diagnosis of viral encephalitis, with CSF pleocytosis, abnormal brain MRI, may initially be diagnosed as viral encephalitis. There are no evidence-based guidelines for the acute treatment of children with MOG-Abs. Current treatment of these patients includes management of acute relapses and chronic immunotherapy for those with relapsing disease, but it must be weighed against the potential to provide such therapy to a child with monophasic illness. Only treatment that appears to prevent relapse is a key challenge and the main focus of current research. Being able to identify and predict the severity of the disease at onset is crucial as it allows the patient to receive the proper initial treatment and prevent further relapses.

VIRTUAL REALITY TO FACILITATE PSYCHOLOGICAL AVAILABILITY OF PATIENTS AFTER SPINAL CORD INJURY

Eduard Novak, MD, Tatyana Korobova, Specialist, Vadim Daminov, PhD, and Oleg Karpov, PhD

OBJECTIVES: Individuals after spinal cord injury (SCI) face a great amount of stress that leads to a variety of irrational coping strategies. From our experience most patients use denial and anger for years and actively refuse any psychological interventions, thus impairing their feelings.

DESIGN: All patients with any kind of SCI, admitted at the Pirogov Center for physical rehabilitation and refusing psychological support in any way, were offered to play games in virtual reality (VR). A psychologist evaluated participants at the first
and 14th day with Luscher color test, test “The non-existent animal”, Beck’s depression inventory (BDI) and Beck’s anxiety scale (BAS). Sessions continued for 20-30 minutes every weekday under the supervision of another psychologist. At the end 7 focus groups were conducted.

RESULTS: After 8 months of the recruitment, 52 out of 66 patients agreed to participate. After 3-5 sessions, 47 patients agreed to continue. At the end of the study, all patients described the intervention as pleasant and easy. Especially positive feedback was received from patients with cancer, who had been locked at home for years. Participants agreed that they had been skeptical about psychological issues at the beginning and 29 patients actively asked for psychological help at the end. When asked, 27 patients expressed willing to continue using virtual reality at home. The self-scored tests did not demonstrate any significant difference with questionably low scores. However, the projective tests revealed less irritation, aggression and anxiety in 38 patients.

CONCLUSIONS: Interventions in virtual reality are seemed by the patients as “less psychological” and “safer” to participated. Professionally developed and guided, VR applications may become a new cheap and widespread tool to facilitate the psychological adjustment and social reintegration after SCI.

VIRTUAL REALITY TO IMPROVE FUNCTION IN PATIENT WITH ANXIETY RELATED SPASTICITY
Jennifer Horng, MD, Malaka Badri, DO, Emily Ryan-Michailidis, DO, and Heidi Fusco, MD

CASE DIAGNOSIS: Conversion disorder with anxiety related spasticity.

CASE DESCRIPTION: A 39 year old male with cerebral palsy, anxiety and post-traumatic stress disorder, was admitted to inpatient rehab after hernia repair. Post-surgery, he developed worsening spasticity in his arms and legs, and extensor spasm of the back with hip flexion, which prevented him from sitting in his motorized tilt-in-space wheelchair. Patient was found to have a connection between his anxiety and variation in his muscle tone. His anxiety was previously managed with cognitive behavioral therapy, diazepam, and venlafaxine, but this was ineffective after surgery. For spasticity management, he was treated with antispasmodics, trigger points, and electrical stimulation, without effect. Ultimately, he was trialed with a virtual reality tool, which was used in conjunction with his therapies. Patient was successfully discharged home with improvement in his spasticity, and he continues to have functional gains.

DISCUSSIONS: Virtual reality (VR) is a promising modality applied in medicine to treat anxiety, eating disorders, stress related disorders and pain management. VR is a noninvasive method that can be used in chronic pain management as it serves as an engaging experience to distract patients and provide top down relief of pain perception. In areas of anxiety disorders, VR could provide exposure therapy and has been shown to reduce anxiety symptoms. It is theorized that this patient used VR in rehabilitation to manage anxiety related spasticity to decrease sensory perception of pain and improve in functional mobility.

CONCLUSIONS: Psychological strategies can be used to reduce physical tone related to conversion motor symptoms. Immersion in virtual reality augmented this patient’s rehabilitation by improving his anxiety related spasticity.

VISION AND DEVELOPMENT: SEEING THE LINK
Rick J. Morris, OD, FCOSC

CASE DIAGNOSIS: To understand the role that Vision plays in the development of the human being.

CASE DESCRIPTION: Through proper optometric testing, one can understand the present development of the child and is able to implement the proper visual therapy regimen to guide more efficient development.

DISCUSSIONS: Post-therapy testing should show improvement in ocular skills (tracking, teaming, focusing) which will lead to more efficient development.

CONCLUSIONS: Vision is more than 20/20 eyesight. Vision is the ability to move through space and understand the space one is moving through.

VITAMIN D TOXICITY
Shivani T. Patel, DO, and Sarah A. Eby, MD

CASE DIAGNOSIS: Vitamin D is an important hormone for bone maintenance. There has been more awareness of Vitamin D deficiency making it a popular over-the-counter supplement. However there is very little monitoring of side effects and toxicity of supplements. The prevalence of Vitamin D toxicity is unknown. The presented case report concerns a 92 y/o female admitted to inpatient rehab for Vitamin D toxicity.

CASE DESCRIPTION: 92 y/o F w/ PMH of osteoporosis presented to the hospital from PCP for elevated calcium of 12.1 (ionized 1.53) and Vitamin D levels of 264 (normal < 150). Patient had a fall 2 months prior resulting in left shoulder and elbow fracture, treated non-operatively. Family reported AMS, gait dysfunction, and unintentional 6 pound weight loss over 2 weeks. Pertinent physical exam findings include decreased ROM, pitting edema, and 3-4 out of 5 strength of LUE. Treatment included IVF and one dose of zoledronic acid 4 mg. The patient’s mentation improved and hypercalcaemia resolved.

DISCUSSIONS: Prior to admission patient was independent for ADLs and mobility. Initial PT and OT evaluations were CGA-minA for ADLs and mobility. Upon discharge the Vitamin D level was still high. The patient was able to ambulate 150ft with rolling walker and supervision for ADLs. Vitamin D toxicity is a rare diagnosis. As the geriatric population continues to live longer, the prevalence will continue to increase. Communication between PCPs and rehab physicians is essential when monitoring vitamin D and calcium levels. Pharmacists should play a more active role in supplement ADR and dosing. Patient and family education are pivotal in the elderly population.

CONCLUSIONS: Diagnosis of Vitamin D toxicity is confirmed by high serum vitamin D 25(0H) and calcium, with normal PTH. Treatment includes IV fluids and bisphosphonates. Follow up entails checking calcium every 2 weeks and Vitamin D every month.

VOCAL CORD PARALYSIS: A DIFFERENTIAL DIAGNOSIS OF HYPOPHONIA
Shelly Hsiah, MD, and Benjamin Seidel, DO

CASE DIAGNOSIS: Vocal cord paralysis.

CASE DESCRIPTION: A 22-year-old man sustained a severe traumatic brain injury, subarachnoid hemorrhage and subdural hemorrhage complicated by ventilator dependent respiratory failure requiring tracheostomy. One month later, the patient was decannulated and was noted to have hypophonia. Over the next couple months, he was able to follow one-step commands, but was unable to verbalize. At most, he mouthed words. He only achieved hoarse phonation in the setting of reflexive vocalizations such as coughing and laughing. Apraxia of speech was initially suspected. Four months after decannulation, the hypophonia persisted, resulting in severe communication deficits. Despite multimodal cues and good effort, he could not achieve volitional phonation. Otorhinolaryngology was consulted for evaluation of vocal cord function. Laryngoscopy revealed paralysis of his left vocal cord, resulting in a large glottis gap during attempts at phonation. Bilateral vocal folds were injected with hyaluronic acid. After the procedure, the patient was able to achieve volitional phonation.

DISCUSSIONS: Vocal cord paralysis is a differential diagnosis of hypophonia that must be considered in patients with traumatic brain injury, especially in those with a history of intubation. During intubation, mechanical compression of the vocal folds or neuropaxia of the recurrent laryngeal nerve can occur. Temporary vocal fold injections have been shown to improve hypophonia in acute unilateral vocal cord paralysis. Early recognition and treatment improves quality of speech and quality of life in patients with traumatic brain injury.

CONCLUSIONS: Hypophonia is a common finding in patients with traumatic brain injury. In addition to dysarthria and apraxia, it is crucial to consider vocal cord paralysis as a differential diagnosis of persistent hypophonia and provide early intervention to improve outcomes.

VOCA TIONAL REHABILITATION AWARENESS AMONG SPINAL CORD INJURY MALE PATIENTS IN SAUDI ARABIA
Ahmad H. Alwashimi, MBBS, SBPRM

OBJECTIVES: Motor vehicle accidents are the most common cause of spinal cord injury (SCI) in Saudi Arabia. Much attention has been dedicated to obtaining work after SCI during the past decades because of the psychological, social, financial, and political implications. Since the early 1990s, there has been a decrease in SCI due to an increase in road traffic accidents. In Saudi Arabia, there are approximately 2000 SCI patients at any given time. The SCI population is also changing as a result of a marked increase in the SCI young adults in Saudi Arabia. The purpose of this study was to identify the awareness of vocational rehabilitation in individuals with spinal cord injury in Saudi Arabia.

DESIGN: This cross-sectional study was conducted in the outpatient department of the largest tertiary care rehabilitation hospital in Saudi Arabia. After obtaining informed consent, structured interviews were conducted from March 2018 through July
WALK AND GROW UP! THE INFLUENCE OF GAIT ON COGNITIVE DEVELOPMENT

Martino Avellis, PT

OBJECTIVES: Objective 1: Overview on biomechanical approach to walking; Objective 2: Comparison between internal and external compensations; Objective 3: Relation between walking and cognitive development.

DESIGN: In CP, the physiological mechanisms of the gait pattern are often altered. When patients are affected by spasticity, dystonic patterns, sensory disturbances, tendons retractions, or structured deformities, we can observe the occurrence of internal compensations (kinesmatic and/or postural changes). We can provide them with external compensations (orthosis and/or technical aids). However, there is a strong relation between locomotion and cognitive development; spatial perception, depth visual perception and initiative (motivation) can improve if we stimulate locomotion with a gait trainer that stabilizes the posture. It makes it easier for them to explore the environment, stimulating and improving their cognitive skills.

RESULTS: Several authors pointed out the correlation between the motion/locomotion and the cognitive development, which can depend from: Spatial perception; Depth visual perception; Initiative; Social factors; School performances. Considering the importance of motion/locomotion for the cognitive development, we should suggest walking in early intervention; and if the children are not able to walk without help, we have to give them some aids. Walking with an orthosis or a gait trainer can make the difference.

CONCLUSIONS: A lack of initiative can make the kids passive and dependent (Butler, 1991). That’s why the keyword in a gait trainer is effectiveness on the posture: if it can stabilize the users’ walking posture (using supports and/or an adjustable frame), it makes it easier for them to explore the environment, stimulating and improving their cognitive skills. Let’s consider, for example, the choice between anterior or posterior configuration in a gait trainer. When do we suggest one or the other version? In both cases, the modularity and versatility of the gait trainer are crucial. As the gait trainer can make the difference.

WEST NILE ENCEPHALITIS IN THE CONTEXT OF A PREVIOUS HEMORRHAGIC STROKE: A CASE REPORT

Sharon A. Kandel, DO, Andrew Hills, DO, and Ronald Quang, MD

CASE DIAGNOSIS: This case report is a discussion of a West Nile encephalitis patient with clinical signs of hemorrhagic stroke.

CASE DESCRIPTION: Our patient had a hemorrhagic stroke 5 years ago, resulting in right hemiparesis and right upper extremity spasticity. After his stroke, patient was mod-I in ADLs and lived alone, but required assistance in iADLs. He ambulated with a quad cane. Days before admission, family noticed the patient was becoming less verbal and weaker; he was brought to the hospital. After transfer to inpatient rehab, lab results came back confirming the diagnosis of West Nile encephalitis. Infectious disease informed us that the infection was no longer active; there were no additional treatments. We found that his right side had become more spastic and weak, and he was started on baclofen. He acquired a selective mutism. Other challenges to his care included dizziness, nausea, vomiting, and new mood disorder. He participated in physical, occupational, and speech therapy, though our therapists often found him resistant to therapy due to nausea and dizziness.

CONCLUSIONS: West Nile encephalitis is caused by the flavivirus West Nile Virus. This virus is spread through mosquito bites and is the most common domestically acquired arbovirus in the United States. West Nile encephalitis has a high risk of long term morbidity. Disturbingly, incidence of WNV neuroinvasive disease is increasing.

WHEN CHEST PAIN AND NAUSEA ISN’T MYOCARDIAL INFARCTION

Alexandra G. Beling, BA, Miguel E. Velez, MD, and Douglas J. Sohn, MD

CASE DIAGNOSIS: Acute Cholecystitis.

CASE DESCRIPTION: A 71-year-old man with history of four vessel CABG presented with lower extremity paresis and neurogenic bowel after undergoing laminectomy and fusion for lumbar stenosis, complicated by an epidural hematoma requiring decompression. On hospital day 13, he developed progressive subternal chest pain associated with nausea, vomiting, and two days of constipation. Physical exam was notable for a distended abdomen. EKG revealed no ST changes. Gastric reflux medications did not resolve the pain. KUB showed enlarged loops of small bowel with concern for ileus. He was transferred to an acute care hospital, where CT abdomen showed a distended gallbladder with cholelithiasis, pericholecystic fluid, and fat stranding. He developed a fever, and serial lab work showed hyperbilirubinemia and elevated alkaline phosphatase. HIDA scan confirmed cystic duct obstruction. He was taken to the OR for laparoscopic cholecystectomy.

DISCUSSIONS: Acute cholecystitis in spinal cord injury (SCI) patients can manifest as chest pain rather than right upper quadrant abdominal pain, thus mimicking common disease such as gastric reflux or serious disease such as myocardial infarction. Such pain should also not be dismissed as sequelae of acute spinal cord injury or surgery. Previous studies have confirmed that gallbladder pathology is more common in SCI patients but is frequently diagnosed in more advanced stages of disease due to its atypical presentation.

CONCLUSIONS: Acute cholecystitis in SCI patients does not present like in neurologically intact patients and should be considered in the differential diagnosis of SCI patients presenting with chest pain and nausea.

WHICH COGNITIVE ASSESSMENT SCALE IS BETTER FOR PREDICTING FUNCTIONAL OUTCOME IN STROKE PATIENTS?

Sungju Lee, MD, PhD

CASE DIAGNOSIS: The purpose of this study is to compare Montreal Cognitive Assessment (MoCA) and Mini-Mental State Examination (MMSE) in
categorizing cognitive impairment in subacute stroke patients and to figure out the relationship of cognitive assessment scales to functional outcome.

**CASE DESCRIPTION:** We retrospectively analyzed patients with a primary diagnosis of ischemic stroke. Inclusion criteria were as follows: (1) age of 18 years or older; (2) modified Early Warning Score (mEWS) <12 points; (3) Outcome of Stroke (FAST) test score: >2 points in <65 years old and ≥20 points in ≥65 years old. Functional outcome was measured by using FIM (Functional Independence Measure). Paired t-test was used to compare the difference between mean MMSE and MoCA total scores. Associations between cognitive assessment scales and discharge FIM scores were explored using multiple regression analysis.

**DISCUSSION:** The sample consisted of 69 patients with a mean age of 67.57 ±12.33 years with a median time from stroke of 7.0 days. Demographic characteristics, MMSE and MoCA were 24.79±2.8 and 20.96±4.4, respectively (P< 0.05). In univariate linear regression analysis, there were significant correlation cognitive assessment scales and FIM scores. Of the subscores, there was the strongest relationship between the visuoexecutive subscore and discharge FIM score. Multivariate linear regression models that included age, admission FIM score, and a cognitive measure (i.e., MoCA total score, MMSE total score, MoCA visuoexecutive subscore) significantly explained approximately 62.8% to 66.8% of the variance in discharge FIM scores. The visuoexecutive subscore of the MoCA was the strongest predictor of functional status (P< 0.05).

**CONCLUSIONS:** The MoCA may be an important cognitive screening tool for patients with stroke and mild cognitive dysfunction on an acute rehabilitation unit. Regarding the FIM score at discharge, visuoexecutive domain appears to have a greater relationship with acute inpatient rehabilitation functional improvement and outcome.

**WORK ACTIVITIES AND BARRIERS IDENTIFIED BY PEOPLE WITH THE INJURED SPINAL CORD**
Aline M. Godoi, Vanessa M. Jorge, Graduate Degree, Celso V. Matos, Phisiatric, and Elaine Cristina Silva, Master Degree

**OBJECTIVES:** The spinal cord injury is any problem with structures contained in the spinal cavity unleashing physiological, motor, sensory and autonomic disorders as well as financial and psychosocial challenges. People with spinal cord injury may find impediments to obtaining or maintaining a job, generating socioeconomic impact for themselves and for society. For these reasons, it is important to verify the difficulties encountered for the inclusion to the work activities in country of high human development.

**DESIGN:** A cross-sectional, prospective study carried out by the medical sector between May and July 2019, through a semi-structured interview with 16 patients who completed rehabilitation program for spinal cord injury. Data analyzed descriptively (percentage and mean).

**RESULTS:** 81% men, average age 46, 62% had up to 12 years of schooling, 31% retired due to disability and 50% received some financial assistance from the government. 44% attributed the architectural barriers (stairs, absence of access ramps and adapted toilets, narrow doors) to the greatest difficulties encountered to returning to work. Of the evaluated, only one returned and it is worth to emphasize that this one has complete superior education and post-graduation.

**CONCLUSIONS:** The right to work is inscribe by the Statute on People with Disabilities in force in the country and for people with a spinal cord injury to be inserted in work activities one of the conditions is accessibility. Architectural barriers are the greatest impediment that people with spinal cord injury find in the reinsertion of work activities in the routine. In times when the country is seeking the pension reform, it is worth emphasizing that public policies to improve the identified barriers can promote the people with spinal cord injury inclusion at full capacity to enter the labor activities, resulting in people who are more financially active and contributing for the country’s economy.

**WORSENING SPASTICITY PRESENTING AS KNEE PAIN IN A NEUROFIBROMATOSIS PATIENT**
Tyler M. Estes, BS, Lauren K. Pindexter, MD, and Antonio Howard, MBMBSE

**CASE DIAGNOSIS:** Worsening spasticity presenting as knee pain in a neurofibromatosis patient.

**CASE DESCRIPTION:** A patient with PMH of neurofibromatosis-type 1 presented to PM&R clinic with knee pain of 18 months after failing treatment for “pseudoradicular pain.” Previous treatments included anti-inflammatory, a patella-stabilizing brace, and physical therapy. MRI showed “inflammation with no intra-articular pathology.” XR showed shallow trochlear grooves bilaterally with mild lateral patellar tilt. PM&R was consulted when the patient’s pain worsened. At PM&R clinic, he denied new musculoskeletal or neurological symptoms. However, exam revealed un-reported 4/5 strength of the left extremities, spasticity of bilateral quadriceps, and hyper-reflexia. Spastic gait was noted and included knee hyperextension and persistent plantarflexion at bilateral ankles. The physician prescribed a heel lift, baclofen, stretching regimen, and head/neck MRI. Imaging demonstrated new C1-C2 mass with severe canal narrowing and cord displacement. Multiple neurofibromas were resected and the patient returned to PM&R clinic after 6 months. He reported resolution of symptoms with no functional limitations despite mild residual spasticity.

**DISCUSSIONS:** Many structural and alignment issues have been related to the development of patellofemoral knee pain. Spasticity is a known cause that is not often considered by physicians and practitioners who are unfamiliar with this clinical finding. Moreover, in the presence of known neurologic disease, worsening spasticity may present in unusual ways such as knee pain. Once discovered, it should prompt the physician to investigate the cause.

**CONCLUSIONS:** Clinicians must consider all elements of the patient history and exam. Spasticity is a pain generator not often considered outside of PM&R. Saturating from anchoring bias by maintaining a broad differential can prevent errors that impair patient outcomes.

**WORSENING WEAKNESS AFTER POSTERIOR CERVICAL DECOMPRESSION AND FUSION; THE CHALLENGE IN DIAGNOSIS**
Steven Kim, BS, MD Candidate 2020, Joseph Hill, DO, Se Won Lee, MD, Karyn Doddy, MD, and Fazin Farhandnejad, MD

**CASE DIAGNOSIS:** Central cord syndrome vs White cord syndrome secondary to repeated epidural hematoma accumulation due to spinal AV fistula decompression.

**CASE DESCRIPTION:** A 43 year old patient who underwent posterior C3-C7 decompression and fusion was found to have sudden onset quadriparesis and lack of pain and temperature sense, more prominent on the upper extremities a few days following the procedure. MRI demonstrated acute spinal epidural hematoma and patient was sent to OR for emergency revision and evacuation. Patient’s symptoms improved but after a couple days his symptoms again worsened. Repeat MRI demonstrated recurrent spinal epidural hematoma, increased T2 signal intensity in cervical spinal cord extending to thoracic spine, and C7-T5 dural arteriovenous fistula. Patient went to the OR again for evacuation of hematoma, revision of fusion, and resection of AV fistula. Patient’s lower extremity symptoms improved immediately post-op but was having continued upper extremity weakness. He was given steroids and transferred to the subacute rehabilitation unit.

**DISCUSSIONS:** In this case, sudden quadriparesis after cervical decompression and fusion can be explained by epidural hematoma and AV malformation along with hyperintensity on T2 MRI, previously reported as “White Cord Syndrome.” Mechanism is thought to be due to reperfusion injury of the spinal cord; the sudden decompression of spinal cord leads to rapid cord expansion and increased blood supply, resulting in disruption of blood-spinal cord barrier and leading to reperfusion injury. Persistent motor deficit in the upper extremity despite the evacuation of epidural hematoma and resection of AV fistula suggest clinical features of central cord syndrome. Spinal arteriovenous malformations are known to be associated with incomplete spinal cord injuries, particularly anterior spinal syndrome.

**CONCLUSIONS:** The neurological deterioration after decompression warrants investigation of multiple possible etiologies including hematoma, unrecognized AV malformation and rarely white cord syndrome as illustrated in this case.

Saturday, March 7, 2020 POSTERS

**3D PRINTING AFFORDABLE, INDIVIDUALIZED OPEN SOURCE UPPER LIMB PROSTHESES**
Sandeeper Yerra, MBBS, Vikram Madan, MPH, Sadee Soleymani, MD, Hope Okpokum, MD, Sheth Richa, MS3, Matthew N, Bartels, MD, and Stephanie Rand, DO

**OBJECTIVES:** The average cost of an upper limb prosthesis is $30,000 over a period of 5 years. Advancements in 3D printing has led to the technology becoming more affordable; some prostheses cost as little as $50 in materials. 3D printers can have a one-time cost as low as $2500. Issues with limb prostheses include prosthetic abandonment due to ill-fitting, atypical amputations, or natural growth. 3D printing offers an inexpensive, individualized, and reproducible solution, especially for marginalized communities.

**DESIGN:** Currently, there are 3 types of prosthetic upper extremities which are 3D printable: body-driven prostheses activated by motion, myoelectric prostheses,

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activated by amplification of nerve impulses, and static prostheses with immovable parts. We primarily utilize the body-driven and myoelectric designs.

RESULTS: Our clinic has printed several devices: The Felix arm is a 3D printed myoelectric arm which can grip moderately heavy tools for farming, helping with grocery shopping function. The Knicks finger is a finger with either 1 or 2 phalangeal segments depending on the level of amputation. This finger can pick up coins, pens, etc. assisting with fine motor function. Configurable for all ages/sizes and available to fit any finger. The Raptor hand is a passive-prosthesis for individuals with all finger amputations but some residual wrist flexion. This prostheses gives an individual ability to hold objects as the tensile strength of the grip is controlled by the individual. Thus, it is not available for individuals with household tasks.

CONCLUSIONS: Physiatrists aim for patient centered care and many of our patients suffer from chronic disabilities but lack access to insurance for prosthetic delivery. 3D printing of individualized prosthetics is a cost-effective, reproducible solution for physiatrists who deal with a myriad of disabilities. 3D printing these open source designs should be encouraged in rehabilitation clinics since it is implementable in an office-based setting.

A CASE OF A PSYCHOGENIC NON-EPILEPTIC SEIZURE AFTER TREATMENT WITH CERVICAL RADIOFREQUENCY ABLATION.

Krystal N. Yanowski, BS, DO, Neal Shah, MD, Devang Padalia, MD, Jared Astrow, DO, John Stratton, MD, and Howard Gilmer, DO

CASE DESCRIPTION: A 48-year-old male with no significant past medical history presented to an outside hospital with recent onset severe abdominal pain associated with nausea and vomiting. The pain began 4 days ago and was reported to be the “worst pain of his life.” His exam and initial lab work-up were unrevealing. He subsequently underwent a CT abdomen/pelvis, remarkable for a large heterogeneous mass of the pancreatic body. He then presented to UPMC Presbyterian for further work up. During his hospitalization, the patient continued to experience excreting pain that was poorly controlled despite a robust opioid-based pain regimen. Given the intractable nature of the pain, the decision was made to perform a celiac plexus block during a diagnostic EUS FNA procedure. This intervention resulted in a massive symptomatic improvement and the patient was discharged pain-free with instruction to follow-up outpatient for continued management of a newly diagnosed neuroendocrine tumor.

DISCUSSIONS: Pancreatic tumors rarely present with the lone symptom of abdominal pain. This patient did not have typical symptoms or lab findings that clinicians classically associate with a pancreatic mass, including jaundice, weight loss or abnormal liver function tests. Furthermore, the pain was acute and severe, rather than subacute and insidious. This presentation was consistent with sudden neural invasion secondary to mass effect requiring urgent intervention for pain relief.

CONCLUSIONS: Non-functional pancreatic neuroendocrine tumors are rare causes of abdominal pain that should be considered when evaluating acute abdominal pain, particularly if other common causes have been ruled out. Early recognition of severe pain resulting from tumor invasion of the celiac plexus allows for prompt pain relief measures, including highly effective nerve block procedures.

A CASE OF INTRACTABLE ABDOMINAL PAIN - A RARE PRESENTATION OF NONFUNCTIONAL Pancreatic Neuroendocrine Tumor TREATED WITH CELIAC PLEXUS BLOCK

Kurtal Chowdhary, MD, Andrew Henderson, AB, and Samuel Sauerwein, MD

CASE DESCRIPTION: A 48-year-old male with no significant past medical history presented to an outside hospital with recent onset severe abdominal pain associated with nausea and vomiting. The pain began 4 days ago and was reported to be the “worst pain of his life.” His exam and initial lab work-up were unrevealing. He subsequently underwent a CT abdomen/pelvis, remarkable for a large heterogeneous mass of the pancreatic body. He then presented to UPMC Presbyterian for further work up. During his hospitalization, the patient continued to experience excreting pain that was poorly controlled despite a robust opioid-based pain regimen. Given the intractable nature of the pain, the decision was made to perform a celiac plexus block during a diagnostic EUS FNA procedure. This intervention resulted in a massive symptomatic improvement and the patient was discharged pain-free with instruction to follow-up outpatient for continued management of a newly diagnosed neuroendocrine tumor.

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A CASE OF POST-RADIOFREQUENCY ABLATION MYOSITIS/FASCIITIS

Daniel Eidzenga, DO, Juliet Gaisey, MD, Margaret Kott, MD, and Andrew Nava, MD

CASE DIAGNOSIS: A 50 year old female with a history of chronic neck pain who presented to the emergency department with myositis after cervical radiofrequency ablation (RFA).

CASE DESCRIPTION: This patient presented with headache and stabbing, shooting neck pain associated with spinoodynia without spinal cord compression. She underwent prognostic greater occipital nerve (GON), lesser occipital nerve (LON), and third occipital nerve (TON) blocks with C3-C5 medial branch blocks. 100% post-procedural pain relief was reported. She underwent fluoroscopically-guided RFA of the TON and C3-5 medial branches. Post procedure day 8, she presented to the ED, afibrile, with worsening neck pain radiating into the left arm refractory to RFA. Cervical MRI showed peripheral enhancement surrounding anterior portion of semispinalis muscles bilaterally in paraspinal soft tissue suggesting myositis/fasciitis versus infectious process. She received IV Solumedrol and discharged with methylprednisolone dose pack. In clinic follow ups, she was prescribed oxycodone, cyclobenzaprine, gabapentin, naproxen, physical therapy and soft cervical collar for 2-3 weeks.

DISCUSSIONS: This case demonstrates the potential complication of post-RFA myositis/fasciitis of paraspinal muscles. To our knowledge, this is the first report of this complication; increased pain one week after RFA associated with soft tissue findings on imaging studies. Reported complications of RFA include burning, alldynia.
A CASE REPORT OF LEG PAIN DUE TO MYOPATHY: MAUSERING AS LUMBOSACRAL RADICULOPATHY: IMPORTANT CONSIDERATIONS TO DISTINGUISH DIAGNOSES

Evan M. Berlin, MD, and Aaron Yang, MD

CASE DIAGNOSIS: Myopathy due to a suspected genetic cause.

CASE DESCRIPTION: A 69-year-old female with a past medical history notable for bilateral knee osteoarthritis and fibromyalgia was referred by neurosurgery for evaluation of back and leg pain. The patient complained of 20 years of leg pain that was worse with ambulation and had progressed recently. She noted her right leg seemed smaller than her left leg, and her left leg would swell up frequently. She had tried physical therapy without any relief. MRI of lumbar spine was unremarkable and prior electrodiagnostic testing revealed a severe sensory and motor polyneuropathy.

DISCUSSIONS: MRI of the lower extremities was obtained which showed muscle atrophy, fatty infiltration, and mild edema affecting the entire left soleus muscle as well as the inferior aspect of the medial gastrocnemius with similar features to a myopathy and were most suggestive of a genetic cause or less likely a prior autoimmune/inflammatory myopathy. She was referred to neurology and a muscular dystrophy genetic panel was ordered and is pending and if negative, the patient will likely undergo muscle biopsy.

CONCLUSIONS: Overall, this case is interesting in that the patient had ongoing muscle pain and weakness with nonspecific findings until MRI of her lower extremities was obtained. This case study aims to discuss the differential diagnosis and work-up of a patient with chronic leg pain, and to increase awareness of differentiating between a more commonly seen lumbosacral radiculopathy versus myopathy.

A CASE WITH LEFT DROP WRIST ACCOMPANIED WITH LEFT WARTENBERG'S SYNDROME AFTER HUMERAL SHAFT FRACTURE

Hong Yi Lin, Bachelor

CASE DIAGNOSIS: Radial neuropathy with lesion proximal to spiral groove.

CASE DESCRIPTION: The 62-year-old male suffered from traffic accident with injury of left humerus shaft fracture and left distal Colles’ fracture. He experienced operation of open reduction internal fixation for left humerus shaft fracture and Colles’ fracture. After operation, the left drop wrist persisted for 4 months so he came to rehabilitation clinic where physical examination revealed weakness of left wrist flexion and extension while left hand Wartenberg’s syndrome with numbness over dorsal left thumb and index finger. There was also tinel’s sign over lateral epicondyle area. The nerve conduction study showed left radial neuropathy suspected lesion proximal to spiral groove. The Electromyography exam showed left extensor carpi ulnaris with active denervation sign (fibrillation and positive sharp wave). Reinnervation sign with polyphasic motor unit action potential over extensor indicis muscle, brachialradialis muscle. The sonography also showed ill-defined heterogeneous hypoechoic radial nerve appearance. MRI of the proximal radial nerve was static.

CONCLUSIONS: According to the literature review, the incidence of radial nerve injury after humeral shaft fractures is on average 11.8%. The prognosis of radial nerve palsy associated with humeral shaft fractures in high-energy trauma is less favorable with a low rate of spontaneous recovery.

CONCLUSIONS: Radial nerve injury after humeral shaft fractures is common. We can perform physical examination to narrow suspicious lesion area. With the help of nerve conduction study and electromyography, we can precisely localize the lesion. We can also use ultrasound to approach radial nerve to assist in diagnosis.

A CASE REPORT ABOUT A SPECIFIC REHABILITATION AFTER ACL SURGERY ON A TRANS-TIBIAL AMPUTATED LIMB

Margaux Buffe-Lidove, Laurence Havé, Physiatrist, Claire Verdaguer, PhD, Florian Bourbette-Salmon, Antoine Bertani, PhD, and Alexandre Schmitt, PhD

CASE DESCRIPTION: Significant advances in prosthetic design have given amputees heightened functional expectations and the requirement to return to sports. We reported the case of a 45-year-old man with a trans-tibial amputation who underwent a specific rehabilitation program after an anterior cruciate ligament (ACL) ligamentoplasty on his amputated limb.

CASE DESCRIPTION: The patient had a traumatic trans-tibial amputation in 2010. He complained of pain, limb volume variations and chronic joint instability which had affected his sports and leisure activities. He was operated on an anterior partial ACL tear. All conservative measures failed and an ACL ligamentoplasty was realized. Then he benefited from an early specific rehabilitation program. As for amputees (NAs), we allowed early weight-bearing in a larger provisional socket made before the surgery. Week 4 after the surgery, he developed a Staphylococcus epidermidis septic arthritis managed by arthroscopic joint washing and bi-antibioticotherapy. 6 months after the surgery, range of motion was complete, there was no instability while walking, he began to run in a straight line.

DISCUSSIONS: ACL tear is a common orthopedic injury and its rehabilitation after surgery is well described but there is little literature about rehabilitation after ACL reconstruction in amputees. We followed a program based on NAs’ rehabilitation with some modifications imposed by the amputated limb. As for NAs we allowed weight-bearing before complete healing but this leaded to scar maceration in the silicone sleeve, then to joint infection.

CONCLUSIONS: ACL ligamentoplasty is an efficient treatment with satisfying functional results in amputees with chronic joint instability. We must be careful about scars and make sure that healing is sufficient to allow weight-bearing in the prosthetic side. Infectious risk should lead to delay weight-bearing in the prosthesis.

A COMPARISON OF THE EFFECTS OF UPPER EXTREMITY ROBOT TRAINING PROTOCOL ON THE FUNCTION

Hyjeon Lee, Muster Degree, Haeyoung Kim, Bachelor, Deokyuwon Jo, and Jangun Lim

CASE DIAGNOSIS: This study is conducted to determine which protocol of upper extremity function of SCI patients, simple repetitive training or training to elicit to complex movement using various games.

CASE DESCRIPTION: A total of 16 AIS B,C,D tetraplegic patients were randomly assigned to one of the two training protocols and received robotic therapy with upper extremity robots called Armsyn prototype. The content of training was the same in both protocols that have movements of shoulder flexion/extension, shoulder abduction/adduction, and elbow flexion/extension, 10 minutes each. All patients trained for 30 minutes per session, for a total of 15 session. With Placing a circle with a radius...
of 20 cm in front of 85% when the patient reaches out his or her arms in the chair position, participants performed touch the markers on the center of the circle, at 6, 12, 9 o’clock, and 3 o’clock in order. The duration, mean velocity, max velocity, ratio between mean velocity and max velocity, and time to velocity peak of movements were evaluated. 

In addition, MMT, MAS, KSCIM-3, GAS, the capabilities of upper extremity (UE) were evaluated. 

**DISCUSSIONS:** The study was based on a quasi-experimental research design. The participants (N=107) were randomly divided into an experimental (n=65) and a control group (n=42). Both groups had significantly improved GAS scores after intervention, but there was no significant difference between the two. Both groups had significantly improved GAS scores after intervention, but there was no significant difference between the two. Both groups had significantly improved GAS scores after intervention, but there was no significant difference between the two.

**CONCLUSIONS:** The capability of the upper limb robotic therapy has been improved overall by utilizing any type of upper limb robot protocol.

### A DYNAMIC, BODY-WEIGHT SUPPORT SYSTEM IMPROVES INPATIENT OUTCOMES FOR LOWER EXTREMITY AMPUTEES

Brock H. Mars, MD, PhD, and Lanny Sawaki, MD, PhD

**OBJECTIVES:** There are approximately 1.6 million amputees living in the United States, 60% of which have an amputation of the lower extremities. For these patients, inpatient rehabilitation maintains range of motion, restores balance, and increases strength and mobility; however, diminished patient confidence shortly after amputation can limit participation in rehabilitation. Supporting the patient’s body weight during physical activities can help overcome these limitations, thereby increasing the effectiveness of inpatient rehabilitation. The purpose of this feasibility study was to evaluate the effect of an, the dynamic body-weight support system on the outcomes of inpatient rehabilitation for lower extremity amputees.

**DESIGN:** For this study, the discharge data of three lower extremity amputees (one unilateral transfemoral; one bilateral transfemoral; one bilateral transfemoral) were evaluated. Each of these patients utilized a dynamic, body-weight support system throughout their inpatient rehabilitation admission. The differences in motor Functional Independence Measure (FIM) scores at admission and discharge were used as the primary outcome. Outcomes were compared to historical data for similar patient populations.

**RESULTS:** Overall, the motor FIM score for each patient increased during their inpatient rehabilitation admission (29% for the patient with unilateral transfemoral amputation; 34% for the patient with bilateral transfemoral amputation; 22% for the patient with bilateral transfemoral amputation). Motor FIM increases for the unilateral transfemoral and bilateral transfemoral patients were comparable to historical data; however, the increase witnessed with the bilateral transfemoral patient was more than 3 times greater than that seen in historical data.

**CONCLUSIONS:** The results of this feasibility study suggest that dynamic body-weight support systems can positively impact the inpatient rehabilitation of lower extremity amputees, especially for bilateral transfemoral amputees. Although the data presented here is limited in sample size, it is encouraging and lays the foundation for future studies with expanded numbers of patients.

### A KINDERKINETICS INTERVENTION AIMED AT IMPROVING GROSS MOTOR SKILLS AND VISUAL-MOTOR INTEGRATION OF SELECTED 5 TO 6 YEAR OLD CHILDREN

Eileen Africa, PhD, and Nicola De Villiers, Masters

**OBJECTIVES:** Children develop in a multidimensional way which implies that many developmental aspects influence each other. Without gross motor skills (GMS), children lack the foundation for the development and integration of more complex motor skills. The current study focused on the influence of a Kinderkinetics® intervention on the GMS and visual-motor integration (VMI) of 5 to 6-year-old neurotypical children.

**DESIGN:** The study was based on a quasi-experimental research design. The participants (N=107) were randomly divided into an experimental (n=65) and a control group (n=42). Both groups were tested pre- and post-intervention using the Test of Gross Motor Development (TGMD-2) and the Beery Test of Visual-Motor Integration (BTVM). The 8-week intervention incorporated locomotion, object control and VMI skills. The current study made use of mixed model repeated measures ANOVA to investigate the effects of the intervention on the outcome measurements. The group*time interaction effect was specifically looked at to determine whether the changes over time were the same or different between the groups. The statistical significance level was set at 5% (p < 0.05).

**RESULTS:** The control group did not show significant improvement in overall GMS (p=0.39) and VMI (p=0.54) abilities, whereas the experimental group showed a significant improvement in overall GMS (p<0.00) as well as overall VMI (p<0.00) abilities. There was a positive correlation between practice and mastery of GMS and VMI.

**CONCLUSIONS:** There seems to be a clear link between GMS and VMI as they activate the same parts of the brain. The results indicated that when one of these areas of development is enhanced, the other was positively affected as well. It is recommended that future research allows for a longer intervention period in order for teachers and other therapists to become involved, to ensure sustainability in the long-term.

### A MULTIDISCIPLINARY QUALITY IMPROVEMENT PROJECT TO REDUCE INACCURATE TACROLIMUS LEVELS LEADING TO DELAY IN MEDICAL MANAGEMENT

Panul M. Patel, DO, Jordan Slisna, DO, Chris Baker, PHARM.D, and Ryan P. Nussbaum, DO

**OBJECTIVES:** Tacrolimus is a medication used post-transplant which requires accurate trough levels for monitoring to ensure proper graft function and acceptance. Tacrolimus levels have to be drawn close to a 12-hour trough for accurate values to adjust dosing. At our inpatient rehabilitation facility, we noticed an increased error rate in tacrolimus levels leading to delays in medication adjustment and impacting management in medically complex patients. An inaccurate tacrolimus level was defined as a medication dosage calculated from an inaccurate value. An analysis identified three main potential sources for error: 1) lab times for tacrolimus were variable and not prioritized, 2) variable medication administration times and 3) lack of standardization of medication order times.

**DESIGN:** Our study design was to implement a multidisciplinary quality improvement intervention aimed to decrease the rate of inaccurate tacrolimus levels. The interventions that were implemented were 1) prioritize tacrolimus lab draws prior to 6 AM and communicate with phlebotomists and nurses to prioritize blood draws prior to medication administration; 2) standardize medication order times and administration times to 6 am and 6 pm; 3) formulate and distribute therapeutic drug monitoring modules for all nurses to complete as part of their continuing education.

**RESULTS:** Prior to our intervention, over a six-month monitoring period, there were a total of 401 tacrolimus levels drawn, 50 of which were inaccurate with an error rate of 12.5%. After implementation of our interventions, over a four-month monitoring period, there were 347 levels drawn, of which 18 were inaccurate with an error rate of 5.2% (p = .0005).

**CONCLUSIONS:** Our intervention, which addressed the institutional reasons for inaccurate tacrolimus levels, significantly reduced the rate of inaccurate tacrolimus levels at our inpatient rehabilitation facility.

### A NEW METHOD OF MUSCLE STRENGTH TESTING USING A QUANTITATIVE ULTRASONIC TECHNIQUE AND A CONVOLUTIONAL NEURAL NETWORK

Yuanmingfei Zhang, MD, and Mouwang Zhou, Doctor

**OBJECTIVES:** Muscle strength testing is widely used in clinical diagnosis, treatment and rehabilitation of diseases of nervous and musculoskeletal system. Currently used assessment methods respectively are not quite accurate in anatomical location, are limited in clinical application, have high prices and are difficult to quantify. The purpose of this paper is to design an ultrasound-based muscle thickness measurement method to accurately measure muscle thickness.

**DESIGN:** This study used a quantitative ultrasound technology, through detecting 50 healthy young subjects’ medial head quadriceps muscle thickness, average echo intensity and energy doppler ultrasound related parameters measurement bilaterally before and after movement, described the number of muscles, quality and recruitment of healthy young people after compared with isokinetic muscle strength test results. The study found that in healthy young adults, quadriceps medial head of muscle thickness and muscle thickness has significant linear positive correlation (r=0.999), with an average of echo intensity had significant linear negative correlation (r<0.037), and the correlation of ultrasonic energy intensity had significant linear positive correlation (r<0.003).

**RESULTS:** If multivariate linear regression is established with the following variables, the dependent variable y: the extended knee peak torque (N.m). X1: muscle thickness (cm); X2: muscle average echo intensity (gray level); X3: calibration of energy intensity (pixel), the equation is Y=46.194 + X1 -745 X2 - 0.002 X3 - 35.984. There is no interaction between three independent variables. By artificial intelligence image recognition method to build the CNN convolution model neural network, the subjects of ultrasound images and personal information will be the input and the numerical results and peak torque as the output. After 100 rounds data iteration, model with 85% muscle strength prediction accuracy and + / - 3 (Nm) accurate range was obtained and successfully fulfilled.

**CONCLUSIONS:** The establishment of the regression equation and artificial intelligence model in this study is a new method to assess the strength of muscle by quantitative ultrasonic technique.
Abstracts

A NOVEL CASE BASED APPROACH TO ICF EDUCATION FOR PM&R RESIDENTS
Nick Freedman, DO, Nethra S. Ankam, MD, and Michael Mallow, MD

OBJECTIVES: Little has been published regarding methods to provide education about the International Classification of Functioning, Disability and Health (ICF) to Physical Medicine and Rehabilitation (PM&R) residents. Our goal was to increase knowledge of the ICF and encourage residents to use the ICF framework to inform their clinical thinking through a case-based exercise. Based on feedback from prior iterations of this assignment, we also hypothesized that this project would increase residents’ feelings of professional fulfillment.

DESIGN: First year PM&R Residents received a one-hour lecture on the ICF. They were then assigned a condition which corresponded to their clinical rotation (SCL, TBI, amputation, medical debility). They were instructed to pick a patient, explore their case using the ICF, and develop an intervention based on this review. They then presented these cases. Residents were asked to rate their familiarity with the ICF and how their understanding of the ICF shaped their clinical thinking both before and after the assignment. Responses were on a 5 point Likert scale. We also used the professional fulfillment portion of the Professional Fulfillment Index (PFI) to measure self-reported professional fulfillment before and after the assignment.

RESULTS: Self-reported understanding of the ICF among first year PM&R residents increased significantly. Clinical thinking influenced by the ICF also increased. Self-reported Professional fulfillment scores were relatively unchanged.

CONCLUSIONS: Our approach shows that a combination of didactic lecture and a case based approach using actual patient examples is an effective method to increase PM&R resident knowledge of the ICF. We believe this is a novel approach for ICF education. Self-reported professional fulfillment did not increase. This suggests that increased knowledge and experience using tools and understanding conceptual frameworks, like the ICF, does not impact professional fulfillment. It also suggests further study is necessary to understand what drives professional fulfillment in PM&R trainees.

A PATIENT, SURGEON AND PHYSIOTHERAPIST PERSPECTIVE ON REASONS BEHIND TOTAL HIP REPLACEMENT SURGERY: A PPI APPROACH
Shayan Bahadori, PhD, Sarah Collard, PhD, and Ian Swain, Professor

OBJECTIVES: Total hip replacement (THR) is an effective treatment for most individuals who suffer from pain and loss of function due to end stage osteoarthritis (OA). However, it appears little concerted effort has been made to advocate partnership with THR patients to understand their reasons for undergoing surgery and their ultimate rehabilitation goals. Similarly, there is a lack of insight on the views of Healthcare Professionals (HCPs) such as surgeons and physiotherapists to understand their perspective on surgery and what objective measures will help them with decision making. This Patient and Public involvement (PPI) study aims to explore both patients’ and HCPs perspectives of THR surgery.

DESIGN: The PPI groups engaged people as research partners rather than as research participants. A topic guide, informed by previous literature and designed by the project team, was used. The lead author conducted face-to-face (n = 15) and telephone (n = 20) discussions lasting between 30 and 45 minutes with participants.

RESULTS: Ten patients pre-THR surgery, ten patients post-THR surgery, nine physiotherapists and six THR surgeons took part. Results suggest that there is a consensus among patients and HCPs on reduction of pain being the main reason for undergoing THR. Inability to carry out simple activity such as walking the dogs had a significant effect on patients’ mental and physical wellbeing. Walking was identified by patient groups as an ideal exercise and also the best outcome-measure by HCPs.

CONCLUSIONS: This paper is the first to explore the views of THR patients and HCPs on reasons behind THR surgery in a single study. Wearable activity monitors have been suggested as a possible motivator to enhance patient compliance to THR. We also found that self-reported understanding of the ICF among first year PM&R residents increased significantly. Clinical thinking influenced by the ICF also increased. Self-reported Professional fulfillment scores were relatively unchanged. Further study is necessary to understand what drives professional fulfillment in PM&R trainees.

A RANDOMIZED CONTROLLED TRIAL TO COMPARE THE EFFICACY OF INTRA-ARTICULAR ADALIMUMAB VERSUS INTRA-ARTICULAR HYALURONIC ACID IN PRIMARY OSTEOARTHRITIS OF THE KNEE
Shiv L. Yadav, MD, DNB, MNAMS

OBJECTIVES: To compare the efficacy of a Single Ultrasound - Guided Intra-Articular Injection of Adalimumab with a Single Ultrasound Guided Intra-Articular Injection of Hyaluronic Acid using VAS for pain intensity and KOOS (Knee Injury and Osteoarthritis Outcome Measure).

DESIGN: 40 consecutive patients of unilateral osteoarthritis of the knee (Grade 2 or Grade 3 according to the Kellgren Lawrence Scale) were randomly allocated to either the Adalimumab group (10mg) or the Hyaluronic Acid group (90mg/3ml). They were injected on Tablet Paracetamol 500 mg on an SOS basis in addition to Strengthening exercises of the Quadriceps and Hamstrings, Stretching exercises of the Hamstrings and Joint Protection Techniques. The patients were subsequently followed-up at 4 weeks and at 12 weeks and evaluated using the VAS and KOOS scale. Ultrasonographic evaluation of the distal femoral cartilage, synovial, medial and lateral meniscus, medial and lateral collateral ligaments and vascularity using Doppler was also done at baseline and at the 12 weeks follow-up.

RESULTS: The two groups were comparable at baseline (VAS (p = 0.07), KOOS (p = 0.68), as well as the ultrasonographic features. There was improvement in both groups at the 4 weeks interval, however, it was more in favor of the Adalimumab group (p = 0.02). A similar trend was observed at the 12 weeks follow-up. It was statistically significant for the Adalimumab group on comparison of the two groups (p = 0.01). There was no change in the parameters assessed on ultrasound at the 12 weeks follow-up in either of the two groups.

CONCLUSIONS: Adalimumab by a USG-guided intra-articular injection was more efficacious as compared to a USG-guided intra-articular injection of Hyaluronic Acid for both pain and quality of life. There were no structure-modifying effects noticed at the 12 weeks follow-up.

A PRELIMINARY STUDY TO EXAMINE THRESHOLDS OF BONE MICRO-ARCHITECTURE FOR IDENTIFICATION OF OSTEOARTHRITIS OF THE KNEE
Ji Seon Hong, MD, Sung Hoon Kim, PhD, MD, Jeong Mee Park, PhD, MD, Ji Hyun Kim, PhD, MD, Sang Yool Yong, MD, and Min Woo Kim, MD

OBJECTIVES: The diagnosis of Osteoarthritis (OA) is measured typically assessing between two thresholds. A significant difference in the BSV:M between the cOA and the nOA (p< 0.001). But there was no significant difference between OA versus nOA. These results show that the population can be classified in roughly 3 categories based on the BSV:M : osteoarthritic region, for low values of BSV:M (below 0.38), healthy region, for high values of BSV:M (above 0.57), and an “at risk” category in between two thresholds.

CONCLUSIONS: Our results show bone texture carries enough information to distinguish healthy individuals from patients with OA and it can be used for the early diagnosis and prediction of progression of OA from conventional radiographs. This would suggest a better quantification of the degree of OA, analogous to T-score for osteoporosis.

A RARE CASE OF A POST-TRAUMATIC MEDIAN NERVE NEUROMA
Florence John, MD, and Erica Seidel, MD

CASE DIAGNOSIS: Post-traumatic Median Nerve Neuroma

CASE DESCRIPTION: A 24-year-old patient with a self-inflicted laceration of the right distal forearm developed sensory symptoms and weakness in hand grip strength post-injury. Physical exam in clinic revealed diminished sensation over the thenar eminence and first two digits of the right hand. There was no weakness or atrophy noted. Wrist Magnetic Resonance Imaging demonstrated enlargement of the median nerve with edema at the level of the distal radius and radiocarpal joint with disruption of the nerve sheath. Electromyography (EMG) demonstrated evidence of a severe right median sensorimotor mononeuropathy occurring proximal to the take-off of the palmar cutaneous branch. Needle exam of abductor pollicis brevis showed fibrillations and polyphasia. Ultrasound demonstrated a space-occupying lesion.
measuring 7 cm x 6 cm x 9 cm continuous with the median nerve at the level of the pronator quadratus consistent with a neuroma. A surgical right median nerve exploration, laceration repair and neuroma excision was performed.

**DISCUSSIONS:** Traumatic median nerve neuromas are rare and are characterized by motor weakness and sensory symptoms including paraesthesias and allodynia in the distribution of the median nerve. These neuromas form due to regenerating axons that grow in an uncoordinated pattern as a result of traumatic nerve transaction. Ultrasound can be helpful in confirming the diagnosis and demonstrates a mass-like swelling of the nerve that is hypoechoic with loss of the normal fibrillar pattern.

**CONCLUSIONS:** Traumatic median nerve neuromas can result in significant pain and weakness in the median nerve distribution. If diagnosis and intervention occur at an early stage of the disease process, functional outcomes can be favorable. Ultrasound is a useful adjunct to EMG in such cases to allow for visualization and definitive diagnosis of the neuroma so that surgical intervention can be pursued.

**A RARE CASE OF NON-TRAUMATIC THORACIC COMPRESSION FRACTURE IN A 28-YEAR-OLD MALE**

Nicholas K. Donohue, MD, and Diane W. Braza, MD

**CASE DIAGNOSIS:** Thoracic spine compression fracture, sickle cell trait, SAPHO syndrome, thrombocytopathy

**CASE DESCRIPTION:** A 28-year-old African American male with a history of sickle cell trait, thrombocytopenia, tobacco use, and synovitis, acne, pustulosis, hyperostosis, and osteitis (SAPHO) syndrome presented with complaints of severe thoracic back pain that started within the last year. The onset of pain was not associated with any trauma and located in his thoracolumbar area without radiation. The patient was initially treated with non-steroidal anti-inflammatory and muscle relaxants. Magnetic Resonance Imaging (MRI) of his thoracic spine was obtained and revealed an acute or subacute anterior compression deformity of the T7 vertebral body consistent with infarction. He was seen after the MRI with mild improvement in pain and provided a hyperextension brace, physical therapy referral, and a trial of intranasal calcitonin.

**DISCUSSIONS:** This patient represents a rare demographic case of thoracic compression fracture in the context of several comorbidities or treatments which individually would rarely cause such a fracture. While osteonecrosis is a common consequence of homozygous sickle cell disease, only 3 cases have been reported in the context of sickle cell trait. Thrombocytopathy can place patients at increased risk for stroke or myocardial infarction, but there are no documented cases of secondary bone infarction. The patient had recently begun infliximab infusions for treatment of SAPHO syndrome. There have been cases of mandibular osteonecrosis associated with this medication, but no spinal involvement. Multiple studies have shown the correlation between smoking and decreased bone mineral density that may lead to fracture.

**CONCLUSIONS:** This case represents very unique contributions to the development of an acute thoracic vertebral infarct resulting in vertebral compression fracture, particularly SAPHO syndrome.

**A RARE CASE OF QUADRICEPS MUSCLE HERNIATION DIAGNOSED BY DYNAMIC ULTRASOUND**

Krina A. Vyas, MD, and Rex Ma, MD

**CASE DIAGNOSIS:** Quadriceps Muscle Herniation

**CASE DESCRIPTION:** A healthy 34-year-old man was referred to physiatry clinic by orthopedics for diagnostic ultrasound evaluation of a left knee mass. He was involved in a bicycling accident 1 year prior to presentation resulting in pain superior to the left lateral knee, along with a visible mass seen only with knee flexion. Magnetic resonance imaging (MRI) of the region could not explain the etiology of this mass. Diagnostic ultrasound performed over the mass showed a herniation of the vastus intermedius into the vastus lateralis muscle, measuring approximately 1 cm wide and 0.7 cm high, that was most pronounced on knee flexion and minimally seen in extension. It did not result in any surrounding neurovascular compromise. This information was forwarded back to the service for further management.

**DISCUSSIONS:** Muscle herniation, defined as an abnormal protrusion of muscle through either an acquired or congenital fascial defect, is an uncommon phenomenon and most reported cases involve lower leg muscles. To our knowledge, there’s been no reported cases of vastus intermedius muscle herniation into vastus lateralis. Treatments for muscle herniations are typically conservative although rarely, surgical repair is necessary for larger defects or lesions with neurovascular compromise. MRI has traditionally been used to evaluate these muscle herniations. Diagnostic ultrasound has been shown to be a convenient and cost-effective alternative for evaluating the size and location of muscle herniations. In our case, because of its dynamic capabilities, ultrasound was critical for the diagnosis allowing for visualization of the mass with the knee in flexion, a position not possible with MRI.

**CONCLUSIONS:** For soft tissue mass evaluations that are non-diagnostic with MRI, dynamic ultrasound can be critical to the diagnosis. In our case, we were able to diagnose a previously unreported case of muscle herniation involving the vastus intermedius/lateralis muscles using ultrasound.

**A RARE CAUSE OF JOINT CONTRACTURE: SCLERODERMATOUS GRAFT VERSUS HOST DISEASE**

Rana Terlemez, Mehmet Mesut Sönmez, and Banu Kurun

**CASE DIAGNOSIS:** Sclerodermatous chronic graft versus host disease (GvHD) is a rare cause of joint contractures and characterized by deposition of collagen in the skin, muscles and fascia.

**CASE DESCRIPTION:** A 42-year-old man was admitted to our clinic with loss of range of motion of bilateral shoulder joint. He complained of pain and stiffness for 3 years. His medical history revealed that he underwent a sibling allogeneic bone marrow transplant for acute lymphoblastic leukemia 7 years ago. He also suffered from chronic GvHD. On examination bilateral shoulder abduction and flexion was severely limited to 65° and 75°, respectively. The skin and underlying soft tissue were palpably thicker and fibrotic than normal. X-rays were done with a preliminary diagnosis of arthrosis, but no abnormalities were seen. Then MRI (magnetic resonance imaging) was performed to exclude avascular necrosis and other pathologies. The MRI showed high intensity in subscapularis, supraspinatus and infraspinatus muscles in T2 weighted images, in accordance with muscle edema. These joint contractures are accepted as sclerodermatous chronic GvHD.

**DISCUSSIONS:** Although joint contractures are common, few data is available on the management of sclerodermatous chronic GvHD. The results of corrective surgery for joints are insufficient.

**CONCLUSIONS:** A multi-disciplinary team approach is necessary with good relationships between physiatrists, haematologists, plastic surgeons and orthopaedic surgeons to restore the function of joints.

**A RARE COMPLICATION OF FEMORAL NEUROPATHY WITH MOTOR AND SENSORY DEFICITS FOLLOWING AN ENDOVASCULAR ANEURYSM REPAIR, WHICH WAS INITIALLY SUSPECTED TO BE A SPINAL CORD INJURY**

Thai Truong, MD, Lee Shuping, MD, MPT, and William Filer, MD

**CASE DIAGNOSIS:** A 64-year-old female undergoing endovascular aneurysm repair (EVAR) developed a pseudoaneurysm resulting in femoral neuropathy.

**CASE DESCRIPTION:** The patient presented with a chronic contained ruptured thoracic aortic aneurysm. She underwent an EVAR accessed through the left femoral artery and developed weakness in both legs within 24 hours of the procedure. During the operation there was an endovascular leak. MRI of the spine on POD 1 showed no cord signal abnormalities, but her weakness persisted. PM&K was consulted on POD 5 regarding a potential SCI. Our evaluation revealed weakness of the left knee extensors and hip flexors ipsilateral to the femoral access point. There was decreased sensation to light touch over the distribution of the left anterior femoral cutaneous and saphenous nerves. CTA showed recurrent endo-leak and left common femoral artery pseudo-aneurysm that was subsequently repaired. She made significant improvement in her strength with PT/OT. Once the urinary catheter was removed, she had normal bladder and bowel function. She had full strength at 8 month follow-up appointment.

**DISCUSSIONS:** Femoral neuropathy following a vascular procedure with trans-femoral access accounts for less than one percent of complications. According to the literature, pure sensory deficits are usually most commonly reported. We present a case regarding a patient initially believed to have a spinal cord injury, but sustained a unilateral femoral neuropathy with both motor and sensory deficits following an EVAR.

**CONCLUSIONS:** This highlights a rare complication of femoral neuropathy due to pseudoaneurysm following an endovascular repair procedure. Interestingly, she presented with transient bilateral lower extremity weakness of unknown etiology, yet femoral neuropathy deficits were more persistent. Fortunately, she showed good recovery following rehabilitation.

**A RARE SONOGRAPHIC FINDING OF A BIFID MEDIAN NERVE IN A PATIENT WITH CARPAL TUNNEL SYNDROME**

Giuseppe Amore, MD, MPH

**CASE DIAGNOSIS:** Carpal Tunnel Syndrome

**CASE DESCRIPTION:** A 43-year-old male auto mechanic presented with complaints of severe, progressively worsening left shoulder and axillary pain...
associated with numbness of his palm and first 3 digits. He denied any trauma. Magnetic Resonance Imaging of his cervical spine was positive for chronic degenerative changes with no acute process. He reported that he had been diagnosed with carpal tunnel syndrome of his left wrist in the past and was treated with corticosteroid injections which provided minimal relief. He exhibited decreased sensation to light touch on the palmar aspect of digits 1-3 on the left hand and normal reflexes on physical exam. Interestingly, Tinel’s sign and Phalen’s maneuver were negative. Ultrasound examination of the patient’s left upper extremity proximal to the wrist was unremarkable. Sonographic visualization of the patient’s left carpal tunnel revealed a bifid median nerve with increased cross-sectional area measuring 12.3 mm² with unaffected surrounding tendons and ligaments.

DISCUSSIONS: A bifid median nerve is a rare variation that may make the nerve more susceptible to compression in the carpal tunnel due to its increased cross-sectional area. This anatomical variation may present with normal electrophysiological or clinical findings.

CONCLUSIONS: Although quite rare, a bifid median nerve in the carpal tunnel may help the clinician explain the persistence of carpal tunnel syndrome in a patient that is refractory to corticosteroid treatment. Sonographic evidence may also help in targeting treatment options for this uncommon anatomical structure.

A REASON TO STOP HAMMER TIME: CONCURRENT, SEVERE SUPRASCAPULAR AND AXILLARY NEUROPATHY FOLLOWING OVERHEAD HAMMERING

Steven Markos, MD, Mina K. Shenouda, MD, and David Brown, DO

CASE DIAGNOSIS: Acute, concurrent, severe right suprascapular and axillary neuropathies

CASE DESCRIPTION: A 24-year-old right-handed man presented with acute right shoulder pain, numbness over the deltoid, and weakness with shoulder movements. Two days prior, he spent hours at work swinging a hammer overhead, a task he had never performed before. There was no history of injury, no additional symptoms on review of systems, and shoulder-MRI was unremarkable. Physical exam revealed periscapular atrophy, numbness over the lateral-upper arm, and 0/5 strength in shoulder abduction and external rotation on the right. EMG revealed fibrillations and no motor units firing in the supraspinatus, infraspinatus, deltoid, or teres minor. The remainder of right C5-T1 muscles and cervical paraspinals were normal. The diagnosis was acute, severe right suprascapular and axillary neuropathies.

DISCUSSIONS: This case is a rare instance of concurrent suprascapular and axillary neuropathies, isolated to these two nerves while sparing the rest of the brachial plexus. It’s known that suprascapular neuropathy can occur from repetitive scapular protraction from tethering of the nerve between the suprascapular notch and the upper trunk, which may have been elicited by the patient’s repetitive hammering. Axillary neuropathy however is typically associated with trauma. It is possible that either compression injury from surrounding osseous or muscular structures in the quadrilateral space or repeated traction during such repetitive overhead exertion may be a rare mechanism of axillary neuropathy as well.

CONCLUSIONS: Repeated scapular movements with overhead exertional activity may be a cause of both suprascapular and axillary neuropathy, which remarkably occurred simultaneously in this patient. Additionally, this patient’s neurodiagnostic results fit perfectly with his sensory and motor exam, given each affected nerve innervates one of the two main shoulder abductors and external rotators. This emphasizes the importance of the physiatrist’s anatomic knowledge and of neurodiagnostics as an extension of a thorough exam.

A REVIEW OF THE CURRENT USE OF COMMERCIAL WEARABLE TECHNOLOGY AND SMARTPHONE APPS WITH APPLICATION IN MONITORING INDIVIDUALS FOLLOWING TOTAL HIP REPLACEMENT SURGERY

Shayan Bahadori, PhD, Sarah Collard, PhD, Jonathan M. Williams, PhD, and Ian Swain, Professor

OBJECTIVES: Total hip replacement (THR) is among the most successful operations for reducing pain and improving function. However, an objective evaluation of physical function and performance status post-surgery is difficult because patients spend the majority of their postoperative rehabilitation outside the clinic and self-report to healthcare providers using subjective methods such as patient reported outcomes measures (PROMs). Moreover, discrepancies are seen when PROMs are compared to performance based function and a number of studies have suggested caution with only using subjective data as the measure of recovery. This review aims to systematically identify all studies which utilized commercially available activity monitors or smartphone apps to measure physical activity in individuals both before and after total hip replacement (THR) surgery.

A SHOTGUN APPROACH: KNEE OSTEARTHITIS IN THE SETTING OF TENDON TRANSFER

German A. Valdez, BS, Ella C. D’Amico, BS, Peter Turminelli, MD, and Chetan Anand, MD

CASE DIAGNOSIS: Left knee osteoarthritis with a possible meniscal tear.

CASE DESCRIPTION: 72 year old male PMH of left biceps femoris tendon transfer to right flexor carpi ulnaris after a right arm shotgun injury in 1981 presents with 1 year history of progressive left knee pain. Pain is described as severe, constant, sharp, and located over the lateral joint line. Pain is exacerbated by walking and deep bending, and mildly improved with rest. The patient also has associated buckling and swelling with activity. Physical exam revealed valgus deformity of right knee with decreased flexion, lateral joint line tenderness, and lateral knee pain with McMurray’s and varus stress. Strength 5/5 in all extremities except for 4/5 knee flexion on left. Radiograph of bilateral knee demonstrates severe, unilateral arthritic changes of the left knee in comparison to the right. The patient was referred for physical therapy and scheduled for a left knee CSL MRI of left knee was ordered to rule out meniscal pathology.

DISCUSSIONS: It is well established that knee osteoarthritis is the result of imbalanced knee biomechanics. While the quadriceps are commonly thought of as the most important knee stabilizers, the hamstrings also play a crucial role in counteracting these forces. Transfer of the biceps femoris can alter biomechanics of the knee joint, predisposing patients to degenerative osteoarthritis.

CONCLUSIONS: While surgical complications of tendon transfers are well established, there is a lack of data on its long-term biomechanical effects. This case is the first of its kind to demonstrate the long term effects of hamstring tendon transfers on the knee joint. Appropriate rehabilitation is recommended to optimize knee biomechanics after an acute hamstring tendon transfer.

A STANDARDIZED PLATELET-RICH PLASMA PREPARATION PROTOCOL AND ASSOCIATED CLINICAL OUTCOMES FOR KNEE OSTEARTHITIS USING A CUSTOMIZABLE CONCENTRATION SYSTEM

Michael Baria, MD, MBA, Robert Magnusson, MD, MPH, Melissa Lau, MD, Meghan Miller, MS, ATC, William Vaisleff, MD, MPH, and James Borchers, MD, MPH

CASE DIAGNOSIS: The purpose of this work is to describe a standard preparation method and clinical outcomes using the Angel concentration system (Artrex; Naples, FL, USA) for knee OA.

CASE DESCRIPTION: Retrospective cohort study; A review of the electronic medical record was performed on 134 cases of patients who underwent PRP injections for knee OA. Ninety knees (65 patients) met criteria for inclusion. All patients had whole blood processed at 0% hematocrit using the Angel concentration system (104cc whole blood for unilateral OA, 156cc whole blood for bilateral OA). International knee documentation committee (IKDC) subjective scores were collected at baseline and at 3 months were collected and analyzed.

DISCUSSIONS: Overall, IKDC score improved from 42.3 ± 14.1 to 59.7 ± 17.5 at 3 months post-injection (p < 0.001). Of the 90 knees injected with PRP, 57% met criteria for a positive response at 3 months with an average final IKDC score of 65.5 ± 15.0 (Δ 24.7±10.9). Increased patient age (p = 0.008) and BMI index (p = 0.008) were associated with lower three month subjective IKDC scores.

DISCUSSIONS: A single PRP injection created at the 0% hematocrit setting yielded a positive response exceeding the minimum clinically important difference in 57% patients with knee OA. Increased patient age and BMI are associated with lower patient-reported outcomes at three month post-injection.
A STUDY OF AMBULATORY FUNCTION AND COMPLICATIONS IN ADULT BELOW KNEE AMPUTEES

Amit Saraf, MBBS, MS, and Poonji Gupta, MBBS, MS

CASE DIAGNOSIS: Amputation not only causes a physical disability to the patient, it also has an effect on his social economic and psychological conditions. We undertook the study with aim of assessing complications and ambulatory functions in below knee amputees.

CASE DESCRIPTION: 10 years study was done including 174 patients. Patients were grouped into diabetics and non-diabetics based on the cause of amputation. Various complications assessed included hematoma formation, wound healing problems, infections, phantom limb, contractures, etc. Ambulatory functions were assessed before surgery and at follow-ups using ambulatory scale by Pinzur 1983.

DISCUSSIONS: 41 (28.5%) had edema of the stump. Of these 26 were in diabetes group. In 38 patients stump healing was prolonged with 21 patients in diabetes group. 16 patients had wound dehiscence with 11 patients in diabetic group. 15 (10.4%) patients developed contractures after below knee amputation, of which, 9 patients were in diabetic group. In diabetes group, preoperatively 29 (46%) patients had grade 6 level of amputation which was in 77 (95.1%) in non-diabetics. Post operatively, 19 (30.2%) patients in diabetic group and 64 (79%) patients in non-diabetic group had grade 6 ambulatory scale. 35 in diabetic group and 44 in non-diabetic group lost/changed job. 78.6% in diabetes group and 62.3% in the non-diabetic group suffered an income loss. 34 patients suffered psychologically following BK amputation.

CONCLUSIONS: Wound dehiscence and above knee amputation is common in BK amputation performed due to diabetes. Preoperative and postoperative ambulatory grade is poorer in diabetics in comparison to trauma patients. Diabetics require additional support besides using the prosthesis. Manual labor class is worst affected due to loss of job. People employed in clerical/desk jobs have minor changes. Younger people have psychological impact. The death rate is significant within one year of BK amputation and diabetes have a higher probability.

A SURVEY ON THE TRAINING OF RESIDENTS OF PHYSICAL MEDICINE AND REHABILITATION: ARE YOUNG PEOPLE WELL TRAINED?

Sana Salah, MD, Sonia Jemmni, MD, Anis Jellad, MD, Fayeçal Khachnaoui, MD, and Zohra Ben Salah, MD

OBJECTIVES: The purpose of this work was to conduct a survey among PMR residents on the state of their training and to evaluate their satisfaction with their residency program (theoretical and practical) and to highlight their wishes in order to offer a potentially useful feedback.

DESIGN: An anonymous questionnaire was mailed to PMR residents and specialists graduating for less than two years between June and December 2018. Questions were formulated after defining the main areas to study: training, self-assessment of theoretical and practical knowledge, satisfaction with training and wishes. We sent the questionnaire to 43 potential respondents and were able to retrieve 35 completed ones (response rate 81%).

RESULTS: The majority of respondents felt that they were poorly or moderately familiar with many areas of the specialty. They also stated that they did not master many gestures and techniques in PMR. Training was considered satisfactory in only 26% of cases. Among the proposals made to improve training, the use of new educational technologies with online courses of reference and the provision of residents' educational booklet that provides them with the necessary information and organizes their training.

CONCLUSIONS: Thanks to the results of this survey, a first inventory of the theoretical and practical training of the residents according to their own point of view was drawn up. Rapid and urgent action by the College and the Society of PMR is needed to plan skills-based learning with systematic assessments that would result in the training of socially competent specialists.

A SYSTEMATIC REVIEW OF CLINICAL PRACTICE GUIDELINES FOR PERSONS WITH AMPUTATION. A “BEST EVIDENCE FOR REHABILITATION” (BE4REHAB) PAPER TO DEVELOP THE WHO’S PACKAGE OF REHABILITATION INTERVENTIONS

Arne Heyns, MD, Sofie Jacobs, Physiotherapeutist, De Groef An, PhD, Alexandra Rauch, PhD, Stefano Negrini, PhD, and Carlotte Kiikens, MD

A systematic review of clinical practice guidelines for persons with amputation has been developed by WHO Rehabilitation Programme and Cochrane Rehabilitation under the guidance of WHO’s guideline review committee secretariat.

DEVELOPMENT: This paper is part of the “Best Evidence for Rehabilitation” (be4rehab) series, developed according to the methodology presented in the PRI introductory paper (Rauch, 2019). It is a systematic review of the existing Guidelines on amputation published between 2008 to 2018.

RESULTS: We identified 5 relevant Guidelines. We excluded 1 Guideline because AGREE II ratings for the identified Guidelines was 48.5 median (range 43.5-59), while that of the selected Guidelines was 49 median (range 46-59). The guidelines represented the following topics: contractures, early walking aid, edema, level of amputation, mobility, organization of service, pain management, patient education, postoperative treatment, prosthetic provision, residual limb care, vocational activity… Most recommendations were concerning interventions, followed by service recommendations and finally the assessment recommendations. The quality of evidence mainly consists of expert opinion and the strength of recommendation is weak for most recommendations.

CONCLUSIONS: We found the field of amputation to be generally well covered for recommended interventions, even if the level of evidence was generally low and mostly based on expert opinion. Some important domains are not covered: sexual and/or intimate relationships, care/support, vocation and education, activities of daily living or leisure activities, exercise and fitness, use of public or private owned transportation, education concerning socket/liner fitting, and need for life long follow-up. There is also a lack of description of training/rehabilitation programs contents. The state of evidence should therefore be improved by methodologically sound research.

A THORACIC SPINE FRACTURE IN AN ELDERLY PATIENT WITH OSTEOGENIC AND RIGID SPINE

Xiaoyue Li, MD

CASE DIAGNOSIS: Thoracic spine fracture due to osteopenia and rigid spine

CASE DESCRIPTION: Patient with chronic back pain sustained a mechanical fall from standing, resulting in a tenantal subdural hematoma. The hematoma did not require neurosurgical intervention. He also complained of back pain at the time, which led to the finding of a lower sacral-coccygeal fracture. The patient was admit-ted to our rehab facility and was unable to tolerate out of bed activity due to continued severe back pain. A lumbar computer tomography (CT) demonstrated a rigid and osteopenic spine with moderate anterior osteophytes at multiple levels. An oblique T11 vertebral body fracture was also noted. Neurosurgery was consulted immediately. No neurological compromise was noted on exam. Neurosurgery recommended conservative management with thoracic lumbar sacral orthosis (TLSO) given the patient’s non focal exam and current comorbidities. The patient’s pain regimen was also adjusted. Although he needed further assistance with donning on TSLO, his transfer and ambulation markedly improved throughout his rehabilitation course.

DISCUSSIONS: Thoracic spine fractures are thought to be less prevalent in comparison to cervical and lumbar spine fractures due to rib cage stabilization. Thoracic spine fractures are often associated with diffused idiopathic skeletal hyperostosis (DISH) and anklyosing spondylitis. Although this patient does not meet the criteria for DISH, a rigid and osteopenic spine is often noted as a late finding of DISH. This results a mechanically inferior brittle spine, susceptible to fracture with a relatively low impact fall. If the patient did not undergo further imaging, his fracture may have become un-stable, leading to secondary neurological deterioration.

CONCLUSIONS: Patients with rigid and osteopenic spines are at risk to sustain thoracic spine fractures, and these fractures may ultimately cause neurological deterior-ation. Appropriate imaging is warranted to look for occult fractures even with low impact injury.

A UNIQUE PATIENT: COMBINING PROSTHETIC TRAINING WITH NEUROREHABILITATION IN PHOCOMELIA

Bruce Zhang, MD, Ryan Hafner, MD, David Oh, MD, and Ning Cao, MD

CASE DIAGNOSIS: 77 year old woman with phocomelia of the right upper extremity and subsequent acute right intracranial hemorrhage.

CASE DESCRIPTION: A 77 year old woman with congenital phocomelia of the right upper extremity (RUE) at the mid humerus presented with left sided hemiparesis after suffering from an acute right frontoparietal intracranial hemorrhage in setting of sagittal sinus thrombosis. She presented to inpatient rehabilitation. Her initial exam was notable for flaccid left upper extremity (LUE) with severely weakened distal lower extremity. The patient’s right phocomelia presented a challenge to the team given no possibility of successful prosthetic fitting and complete dependence on her LUE for activities of daily living (ADLs).

DISCUSSIONS: The patient underwent comprehensive stroke based inpatient rehabilitation. Additionally, she was referred to our motor control analysis laboratory.
to assess residual volitional movement in the LUE as well as feasibility of prosthetic fitting in the RUE. Per dynamic EMG, LUE proximal muscles had trace recovery involving shoulder adductors, abductors, extensors, flexors, with trace elbow flexion and extension at four weeks post-acute event. Her wrist extension was trace and she did not have finger or thumb movement. Balance forearm orthosis was recommended. Her right shoulder range of motion was full and full shoulder prosthesis was recommended. A one ply, solid socket, figure eight harnessed passive prosthesis device was devised and trialed on the patient’s RUE. However, the patient was unable to tolerate the prosthetic device due to psychological distress. She was subsequently discharged to subacute rehabilitation due to lack of functional progress thereafter, requiring total assist for ADLs.

CONCLUSIONS: This report highlights a patient truly requiring a multidisciplinary team that intersects neurological and amputee rehabilitation. While inpatient rehabilitation is uniquely poised to help this patient, psychological distress can be a major impediment towards functional training and must be accounted for in the future.

AAP-SPONSORED AND OTHER PROGRAMS THAT INFLUENCED PM&R RESIDENTS TO CHOOSE PHYSIATRY
Alexandra Fry, BS, Laura B. Kezar, MD, and Soojin Kim

OBJECTIVES: To determine the influence of various programs on PM&R residents’ selection of the specialty of physiatry, including PM&R fairs, AAP-sponsored clinical (Medical Student Summer Clinical Externship) and research (Rehabilitation Research Experience for Medical Students) summer programs, local/regional/national meetings and conferences, advisors/mentors, school-sponsored career planning workshops and courses, and PM&R interest groups activities and events.

DESIGN: A cross sectional descriptive design was used. Data was collected anonymously using a survey distributed to PM&R residents, including PGY1, through their respective program directors. The survey was sent to all ACGME-certified PM&R residency programs in the United States and was open for 1 month. Participants were asked to rate the influence of each factor on a Likert scale of 0-3, with 0=no influence, 1=minimal influence, 2=moderate influence, 3=strong influence, and N/A=not applicable.

RESULTS: Respondents (n=175) graduated from medical school in the U.S. and the Caribbean. Advisors/mentors were selected as a “strong influence” in choosing physiatry for the majority (57.1%), followed by local/regional/national meetings and conferences (23.4%), PM&R interest groups (22.3%), and PM&R fairs (11.5%). MSSCE (2.6%) and RREMS (2.5%) were the least effective AAP-sponsored resources. Every tested demographic group found advisors/mentors to have been the most influential – except those with medical schools in the Caribbean or more than 500 students in their graduating class, who indicated conferences had the most influence.

CONCLUSIONS: The data, limited by sample size, suggest that advisors/mentors have a major influence on the selection of PM&R as a career as well as highlight the importance of conferences and interest groups. AAP-sponsored programs such as PM&R fairs, MSSCE, and RREMS appear to be less influential. However, advisors/mentors and interest groups currently receive informal support and lack direct funding from the AAP. Therefore, boosting support to these programs is recommended to most effectively recruit an increasing amount of quality students into physiatry.

ABANDONMENT OF ASSISTIVE PRODUCTS IN SÃO PAULO - BRAZIL
André T. Sugawara, Vinicius Ramos, and Linamara R. Battistella, PROF DR

OBJECTIVES: To investigate the levels and factors that influence the abandonment of assistive products by users of a local reference rehabilitation center.

DESIGN: This observational study involved users who received services and assistive products provided by our center of rehabilitation. Users were identified using the records of the center and their responses about the abandonment were collected through face-to-face interviews.

RESULTS: The abandonment level of assistive products was 19.38%. 83.5% of the users use at least one of the assistive products they have received. Rigid and folding frame wheelchairs, with and without postural support devices, as well as shower wheelchairs, presented the lowest abandonment levels, followed by canes and lower limb orthoses. Upper limb orthoses, Knee Ankle Foot Orthosis(KAFO), walkers, crutches and lower and upper limb prostheses all presented higher abandonment levels.

CONCLUSIONS: The simultaneous use of multiple assistive products, users perception of the importance of using them, and completing the rehabilitation treatment were found to impact on the short and long-term use of products. The study offers inputs to decision making and planning for assistive technology provision in developing countries with regard to expected demand and service delivery.

ABDOMINAL ANTERIOR CUTANEOUS NERVE ENTRAPMENT SYNDROME (AACNES) AS A CAUSE OF ATYPICAL CHRONIC ABDOMINAL PAIN: A CASE REPORT
Jose A. Fernandez, MD, Brendan Rooney, BA, and Sumrannikumar Brahmbhatt, MD

CASE DIAGNOSIS: Abdominal Anterior Cutaneous Nerve Entrapment Syndrome (AACNES)

CASE DESCRIPTION: A 38-year-old male with PMH of gout, constipation, and urinary retention with ongoing workup who was referred by urology presents for evaluation of chronic hypogastic pain for 5 years. He described the pain as a right-sided sharp sensation with alodynia, 7/10 on VAS, worsened while lifting weights and radiating to the right groin. Multiple trials of multimodal analgesia and muscle relaxants failed to manage the pain. Prior abdominal and rectal ultrasounds showed no hernia. On exam, the patient had point tenderness to palpation on the right hypogastric area on the linea semilunaris at the level of the ASIS with a positive Carnett’s test. 6 mL of 1% Lidocaine was administered to the trigger point under US guidance. The patient was seen 2 weeks later in clinic. He reported complete pain relief with no exercise limitations. He had no trigger points in the right hypogastric area with a negative Carnett’s test.

DISCUSSIONS: Entrapment of the cutaneous branches of T7-T12 at the lateral insertion of the rectus abdominus is the underlying etiology of ACNES. The prevalence is low but not entirely insignificant. A prior study found that 2% of all abdominal pain cases could be attributed to ACNES. After excluding other etiologies of chronic abdominal pain (e.g., hernia), the diagnosis is considered in patients meeting three criteria: (1) chief complaint of abdominal pain, (2) trigger point on exam, and (3) relief of symptoms following lidocaine injection. Pathologies that chronically increase abdominal pressure or residual scar tissue increase the risk of AACNES.

CONCLUSIONS: AACNES should be considered in patients presenting to clinic complaining of abdominal pain with normal laboratory and imaging Results. Outpatient trigger point injection with lidocaine is an effective diagnostic, therapeutic and cost-effective intervention for such patients.

ABSOLUTE RELIABILITY OF ULTRASOUND IN MEASURING TIBIOFIBULAR SEPARATION AT DIFFERENT ANGLES
Kazuki Aoki, BHSC, PT, Mitsutoshi Shiroda, MS, PT, Yoshinari Oda, PT, Keishiro Yamashita, PT, Jinuchii Matsu, PhD, MD, and Makoto Nishio, PhD, MD

OBJECTIVES: The purpose of this study was to clarify the reliability of employing different joint angles when evaluating tibiofibular separation using ultrasound (US).

DESIGN: Two physiotherapists measured both feet of ten healthy participants (five males and five females with a mean age of 25.9 years) with no history of ankle problems. Their knees slightly flexed their knee in supine position with the ankle fixed at either 35° plantar flexion (PF), 0° (NP), or 10° dorsiflexion (DF).

During US, the probe was vertically aligned with the axis of the lower thigh, with the outer side of the tibia was the most protruding part on the side of the fibula and the fibula being aligned horizontally. Imaging and measurement were randomly performed twice by the two examiners using a US. The images were recorded analyzed only by physiotherapist A using the ImageJ. The interclass correlation coefficient (ICC) 1.1, 2.1, and 3.1; Bland–Altman analysis; and minimal detectable change (MDC) 95 were applied to determine statistical significance. ICC statistical analyses were performed with R 2.8.1.

RESULTS: According to examiner A, ICC 1.1 was greater than 0.9 in all image analyses. Additionally, (ICC) 1.1, 2.1, and 3.1 values in the PF, NP and DF conditions were greater than 0.9. As a result of Bland–Altman analysis, there was no addition / proportional error. MDC 95 values were as follows: 0.49–0.63 mm for PF, 0.39–0.67 mm for NP, and 0.58–0.69 mm for DF in intra-rater reliability.

MDC 95 values were as follows: 0.55–0.62 mm for PF, 0.57–0.67 mm NP, and 0.53–0.64 mm DF in inter-rater reliability.

CONCLUSIONS: The measuring method used in this study showed a high level of reliability, with no addition/proportional errors. Additionally, MDC 95 successfully clarified the error range. The method used in this study appears to be a clinically viable and reliable method for evaluating tibiofibular separation.

ACCELEROMETRY-BASED GAIT RECOGNITION BETWEEN YOUNG ADULTS AND ELDERLY USING CONVOLUTIONAL NEURAL NETWORKS
Wei-Chih Lien

OBJECTIVES: Wireless inertial sensors have significant advantages over ordinary methods. They are noninvasive and have been shown to have better reliability...
and validity. Recent studies have reported on the use of wireless inertial sensors to measure gait signal during walking in normal subjects. Algorithms based on convolutional neural networks (CNNs) have proved successful in classification of information in many fields. However, CNNs-based algorithms for detecting aging gait are not well-established due to limited availability of gait signal databases. A few previous studies have applied CNNs to detect stroke gait, but it still remains a challenge to develop an effective algorithm for detecting aging gait based on gait signal of accelerometer.

**DESIGN:** In this paper, we propose a novel approach for human gait identification using time-frequency (TF) plots of human gait cycles in order to capture spectral and temporal patterns of gait cycles. We design a CNN learning to extract discriminative features from the TF plots of gait cycles and optimize the spectro-temporal features in a discriminative fashion. We collect raw motion data from two inertial sensors placed at bilateral ankle of each subject. We then applied CNN to classify the gait of the young adults and elderly. The size of input layer was 128*128*3. The size of convolution layer was 10*10. The size of pooling layer was 2*2. Thirty subjects (ten young adults and twenty elderly) participated in this study.

**RESULTS:** Decreased signal intensity with dispersion in TF plots in elderly. Based on our experimental results, 96.4% subject identification accuracy was achieved using the accelerometry and CNN based on TF plots of gait cycles.

**CONCLUSIONS:** In conclusion, we build a CNN using TF plots of gait cycles to classify the gait cycles of the young adults and elderly, and the CNN achieved the gait identification accuracy of the young adults and elderly to 96.4%.

**ACQUISITION OF DOUBLE KNEE ACTION BY INTERVENTION USING ROBOT SUIT HYBRID ASSISTED LIMB # IN ACUTE AND CHRONIC STAGE: MYELOPATHY PATIENTS AFTER DECOMPRESSION SURGERY**

Seiich Ezaki, MD, Hideki Kadone, PhD, Shigeki Kubota, PhD, Yukio Shimizu, MD, PhD, Tetsuya Abe, MD, PhD, Kousuke Mimura, MD, PhD, Yasushi Hada, MD, PhD, Masada Koda, MD, PhD, Kenji Suzuki, PhD, and Masashi Yamazaki, MD, PhD

**OBJECTIVES:** Regardless of the recent reports about HAL’s effectiveness on rehabilitation, kinematic aspects of gait changes have not been enough analyzed. The purpose of this study is to analyze joint-level kinematics of the lower limb motions during pre- and after HAL treatment in Ossification of the Posterior Longitudinal Ligament (OPLL) patients in their acute and chronic phase after surgery.

**DESIGN:** 12 OPLL patients associated with severe motor impairment followed by decompression surgery joined the present study. 5 (2M, 3F, mean age 59.6 yrs old) started the HAL intervention in the acute stage (24.4 days after surgery) of postoperative gait disorder. 7 patients (7M, mean age 70.1 yrs old) started in the chronic stage (1151.4 days after surgery). 10 sessions of HAL intervention were performed for each patient of both groups. Each session lasted 20 minutes of HAL walking.

**RESULTS:** In the acute phase, we observed significant improvements in walking speed 24.5/51.4 (pre/post)(min(< 0.01), cadence 35.7/0.7 steps/min (p< 0.01), stride length 71/103cm (p=0.05), range of movement (ROM) of hip joints 34.0/ 43.3°(pre/post) (p=0.05), ROM of knee joints 42.1/56.7°(p= 0.05), toe lift 80.0/103cm (p<0.05), knee angle motion during the initial stance phase increased 3.2°/5.8°(p=0.05), suggesting improvement of double knee action (DKA).

In the chronic phase, there were significant improvements in walking speed 46.5/ 53.8 m/min (p<0.05), cadence 35.7/50.7 steps/min (p<0.01), stride length 71.2/ 102.5cm (p<0.05), ROM of hip joints 36.1/40.3°(p<0.01), toe lift 109.7/ 128.0mm (p<0.01). The first knee action has improved 4.8°/7.2°(p<0.05).

**CONCLUSIONS:** Both acute and chronic groups gained faster gait with improved DKA achieving smoother gait, with greater ROM of hip joints and higher toe lift. Importantly, DKA improved their knee hypertension, which is a common gait impairment of myelopathy patients. It is considered effective for prevention of knee joint osteoarthritis in later years.

**ACTIVITY-ORIENTED REHABILITATION PROGRAM FOR PEOPLE WITH COGNITIVE IMPAIRMENT: A CASE SERIES**

Yohei Otaka, MD, PhD, Megumi Suzuki, OTR, PhD, Chaminato, OTR, Rena Matsuda, OTR, Akiko Maeda, OTR, MS, Hiroshi Yoshino, MD, PhD, Shinti Matsunaga, MD, PhD, and Hajime Takechi, MD, PhD

**OBJECTIVES:** Dementia is a major cause of disability and dependency among older people worldwide. Owing to the limited benefits of symptomatic drugs, non-pharmacological interventions can play important roles in dementia treatment. Little attempt, however, has been made to develop activity-oriented rehabilitation programs that focus on activities rather than cognitive impairment. We developed such a program for individuals with mild cognitive impairment (MCI) and mild dementia, and examined its effectiveness in several cases.

**DESIGN:** The program consisted of eight 1-hour sessions conducted weekly or biweekly in an outpatient setting. It involved the patients and their families, activity modification based on the patients’ and their families’ thoughts, identification of the problems in behaviors and activities, teaching coping skills to the patients and their families, home-based exercises, and appropriate care management. An interdisciplinary team of physiatrists, geriatric physicians, nurses, occupational/physical therapists, and a medical social worker conducted the program. Measures of cognitive/physical function, activities of daily living (ADL), quality of life (QOL), depression, and the Zarit Burden Interview (ZBI) score were evaluated before and after the program.

**RESULTS:** Two male and two female patients aged 74 to 82 years who had MCI or mild dementia, and their spouses completed the program. Scores in the Japanese version of the Montreal Cognitive Assessment ranged from 17 to 21. During the program, all the patients could modify their activities, such as keeping regular hours, making exercise a habit, and enjoying a hobby again. Although no consistent trends were observed in the changes in the scores for cognitive/physical function, ADL, QOL, and depression measures, the ZBI scores of all the spouses decreased after the program. The mean ZBI score decreased from 25.8 to 15.8.

**CONCLUSIONS:** The activity-oriented rehabilitation program could modify the activities of individuals with MCI and mild dementia, and reduce their families’ burdens.

**ACUTE INFLAMMATORY DEMYELINATING POLYNEUROPATHY TRIGGERED BY AN ACUTE SYPHILIS INFECTION: A CASE REPORT**

Naveen Khokhar, DO, and John Norbury, MD, RMSK

**CASE DIAGNOSIS:** Acute inflammatory demyelinating polyneuropathy secondary to acute syphils infection

**CASE DESCRIPTION:** A 22 year old female presented with progressive sensory changes and extremity weakness over five days. Patient endorsed nonspecific symptoms of illness prior to the development of weakness. The physical exam was significant for absent distal reflexes. Electrodiagnostic (EDx) findings were consistent with an early proximal demyelinating polyneuropathy consistent with acute inflammatory demyelinating polyneuropathy (AIDP) due to prolonged F-wave latencies. Albuminocytologic dissociation was noted on lumbar puncture. Serologic studies were negative for HIV and positive for syphilis. Of note, the patient had negative syphilis testing two months prior to this admission. The patient was treated with plasmapheresis and a 10 day course of penicillin and showed gradual improvement in strength.

**DISCUSSION:** AIDP is an immune-mediated polyneuropathy that leads to injury to the myelin or axon of the peripheral nerves resulting in progressive weakness and paresthesias. While AIDP is well associated with HIV and campylobacter infections, it has not been correlated with syphils infections. In this case, patient had nonspecific constitutional symptoms prior to developing weakness and paresthesias with an acute positive syphils test consistent with a syphils induced AIDP.

**CASE DIAGNOSIS:** Acute inflammatory demyelinating polyneuropathy induced by an acute syphilis infection

**CASE DESCRIPTION:** A 74-year Caucasian female presented with severe worsening low back pain, right lower extremity pain, and difficulty walking for 3 days. She did not have fever or Leukocytosis. ESР and CRP were elevated at 60 mm/hr and 94.8 mg/L. Images showed marked signal enhancement at L-5-S1, concerning for discitis versus osteomyelitis as well as epidural phlegmon formation and extension of inflammation into paraspinal musculature. IV antibiotics started. IR guided L5-S1 disc biopsy was non-diagnostic for discitis or osteomyelitis. After a discussion of the management options, the patient underwent posterior debridement, discectomy, right-sided L5-S1 laminectomy, facetectomy, and L-5-S1 fusion in a 2 stages surgery. Surgical cultures and the universal PCR specimen range were negative. Pathology of the epidural tissue showed pseudogout in the spinal bone and cartilage. The patient

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received anti-inflammatory agents, pain management, 2 weeks inpatient-rehabilitation, and was discharged back home with significant improvement in the patient’s strength, pain, and gait.

**DISCUSSIONS:** Although pseudogout is a common disease affecting the peripheral joints, the involvement of the spine is uncommon. To our knowledge, there are few cases that were reported for pseudogout that affects axial spine mainly the facet joints. This case is interesting because it is the third reported case of pseudogout that mimics osteoarthritis of spine, indicating a paucity of information regarding pseudogout in the axial spine of a patient with no past medical history of pseudogout. The case also showed a significant improvement in strength and gait during inpatient rehabilitation.

**CONCLUSIONS:** This case highlights the need to consider pseudogout in the differential diagnosis of acute back pain. There have only been a few cases reported in the literature up to date, so this case will provide further insight into diagnosis and clinical management of spinal pseudogout.

**ACUTE MEDIAN NEUROPATHY AFTER CARDIAC SURGERY: A CASE PRESENTATION**

Ning-Yi Wang, MD

**CASE DIAGNOSIS:** acute median neuropathy

**CASE DESCRIPTION:** A 39-year-old man, who works as a pigeon fancier, complained of myofascial pain, weakness, and numbness over left forearm for two months. He had a history of aortic dissection and underwent a cardiac surgery in 2017. The surgery took eight hours with supine position and left hand stretching. After the surgery, he reported pain with throbbing character and numbness over left palm, and weakness in the left forearm.

**DISCUSSIONS:** Perioperative peripheral nerve injuries associated with surgical positioning are a common but rarely at the level such as our case. We report an unusual case of mononeuropathy of the median nerve in a 39-year-old man that resulted from a cardiac surgery. Although median neuropathy is common, but rarely in the level of the arm. Electrodiagnostic and ultrasound examinations were used to localize the nerve lesion at the level of arms and also to provide prognostic evaluation. Serial follow-ups demonstrated concomitant improvement in clinical symptoms and Electrodiagnostic parameters. A near-total recovery was achieved after 6 months. This case presentation aims to increase awareness and early recognition of peripheral nerve injuries associated with cardiac surgery.

**CONCLUSIONS:** Our case indicates that the positioning for an operation is not completely risk free and could, in rare cases, lead to upper limb peripheral nerve damage. The operator should be cautious when performing cardiac surgery or other surgery when positioning. Poor perioperative positioning and padding could lead to peripheral nerve injuries. Length of surgical time has been associated with an increased risk of developing a peripheral nerve injuries. Transient paresis may occur in up to 15% of patients after a peripheral nerve block with 99% resolving within 1 yr. Conservative treatment may be effective in postoperative transient stretch injury-related neuropathy, especially if the underlying mechanism is mainly demyelination (neuapraxia) as opposed to axonal injury.

**ACUTE MYELOID LEUKAEMIA PRESENTING AS ARTERIAL THROMBOSIS REQUIRING TRANTIBIAL AMPUTATION: A CASE REPORT**

Jamila A. Kendall, MD, Nicole Diaz-Segarra, MD, and Elinor M. Anan, MD

**CASE DIAGNOSIS:** Acute myeloid leukemia presenting as large vessel arterial thrombosis

**CASE DESCRIPTION:** A 70-year-old male presented with 2 weeks of left leg pain associated with new onset absent pedal pulses, mottled foot, and decreased sensation of the foot. Labs revealed normocytic anemia, thrombocytopenia, and a peripheral blood smear with 75% myeloblasts. Arterial doppler showed no flow to the left lower extremity and arteriogram showed significant thrombus burden in the femoral and popliteal arteries. He underwent thrombectomy and four-compartment fasciectomy. Transient paresis may occur in up to 15% of patients after a peripheral nerve block with 99% resolving within 1 yr. Conservative treatment may be effective in postoperative transient stretch injury-related neuropathy, especially if the underlying mechanism is mainly demyelination (neuapraxia) as opposed to axonal injury.

**ACUTE SACRAL FRACTURE FROM RECURRENT TRANSIENT OSTEOPOROSIS OF PREGNANCY**

Hyunwoo J. Choo, MD, MPH, and Sarah Hwang, MD

**CASE DESCRIPTION:** Acute sacral fracture from recurrent transient osteoporosis of pregnancy

**CONCLUSIONS:** This case indicates that the positioning for an operation is not completely risk free and could, in rare cases, lead to upper limb peripheral nerve damage. The operator should be cautious when performing cardiac surgery or other surgery when positioning. Poor perioperative positioning and padding could lead to peripheral nerve injuries. Length of surgical time has been associated with an increased risk of developing a peripheral nerve injuries. Transient paresis may occur in up to 15% of patients after a peripheral nerve block with 99% resolving within 1 yr. Conservative treatment may be effective in postoperative transient stretch injury-related neuropathy, especially if the underlying mechanism is mainly demyelination (neuapraxia) as opposed to axonal injury.

**DISCUSSIONS:** Acute median neuropathy is a common, but rarely reported condition that mimics pseudogout of the spine, indicating a paucity of information regarding pseudogout in the axial spine of a patient with no past medical history of pseudogout. This case highlights the need to consider pseudogout in the differential diagnosis of acute back pain. There have only been a few cases reported in the literature up to date, so this case will provide further insight into diagnosis and clinical management of spinal pseudogout.

**ADAPTING REHABILITATION STRATEGIES FOLLOWING MAJOR SPINAL SURGERY IN A PATIENT WITH COFFIN-LOWRY SYNDROME: A CASE REPORT**

Benjamin J. Burnham, BS, Richard Aguilera, MD, John Lee, MD, and Karen Salamon, CRS

**CASE DIAGNOSIS:** Severe spinal deformity in Coffin-Lowry Syndrome s/p thoraco-lumbar surgery

**CASE DESCRIPTION:** A 28 yr old male with Coffin-Lowry Syndrome (CLS) complicated by developmental delay, drop attacks, arthritis from L4-S1, thoracic kyphoscoliosis with bow stringing of the cord at T10-11, and thoracoolumbar junction deformity. He was admitted to an Inpatient Rehabilitation Facility (IRF) following T9-L1 decompression, T12 pedicle subtraction osteotomy, and T8-L3 posterior spinal fusion. Initial rehabilitation attempts showed little success due to poor patient engagement and motivation. After adaptations were made to his therapies, his engagement and functional outcomes improved.

**DISCUSSIONS:** Coffin-Lowry Syndrome is a rare X-linked disorder resulting in intellectual disability with various dysmorphisms including frontal bossing, downward sloping palpebral fissures, short tapering fingers, short stature, pectus deformity, kyphosis, and scoliosis. Because of the rarity of this syndrome, there is limited research with regards to rehabilitation of these patients. Adaptations in his rehabilitation were done due to limited initial patient engagement. These included pet therapy, music therapy, mini basketball, and use of Wii. By including his service dog in gait training, his motivation to walk increased. He would walk farther to reach his dog. Mini basketball and Wii were used to improve upper extremity range of motion. Music was also played during his therapy sessions. Following a 19 day stay at the IRF, his functional independence measure improved from 27 at admission to 44 at discharge.
CONCLUSIONS: This case highlights the importance of adapting rehabilitation strategies in a patient with Coffin-Lowry Syndrome. By achieving desired motivation and compliance with therapies, this patient was able to improve his functional outcome.

ADULT TETHERED CORD SYNDROME WITH SPINAL CORD TERMINATING IN THE SACRAL CANAL AT THE S3-S4 LEVEL: A CASE REPORT
Quyen Truong, MD, James Rainville, MD, and Sharon Bassi, MD
CASE DIAGNOSIS: Adult tethered cord syndrome with spinal cord terminating in the sacral canal at the S3-S4 level
CASE DESCRIPTION: 73-year-old woman presented with progressive difficulty walking, weakness in left ankle dorsiflexors, curling of the toes bilaterally, and paresthesias in both feet. The symptoms developed late in life, progressively worsening over a number of years. Physical exam notable for spastic gait with sciencing and incomplete knee extension, manual muscle testing 5/5 except for weakness in left ankle dorsiflexors and EHL (4/5), 3+ patellar reflexes bilaterally and positive Babinski bilaterally. Lower extremity sensation to soft touch and pinprick intact and no evidence of muscle atrophy. Brain and cervical spine MRI have been unremarkable.

DISCUSSIONS: Lumbar MRI showed the spinal cord slightly tethered at L4 level and terminates in the sacral canal at the S3-S4 level. The tip of the cord appears to be adherent into the sacral canal dorsally at S4 level. The patient was referred to neurosurgery for surgical evaluation for detethering procedure given the patient is symptomatic with progressive neurological symptoms. Tethered cord syndrome (TCS) presents with varied but consistent symptomatology including pain, weakness, sensory changes, bowel and bladder dysfunction, gait abnormalities. It results from anatomic restriction of the normal ascent of the spinal cord within the vertebral column. Symptomatic patients should be referred for detethering surgery.

CONCLUSIONS: TCS is most commonly described in children, with very few cases of adult TCS. The true incidence of adult TCS is unknown. In symptomatic patients with TCS, treatment with detethering surgery can halt further neurological deterioration and may improve existing symptoms, including pain. Retethering of the released spinal cord may occur over time so patients should be followed closely to monitor their neurologic, orthopedic, and urologic stability. The issue of surgery in asymptomatic adults with TCS remains controversial and additional well-designed studies are needed to evaluate benefit.

ADVANCED IMAGING PRIOR TO ROUTINE INJECTION URGENTLY CHANGES TREATMENT IN VASCULITIS PATIENT WITH LEFT HIP PAIN: A CASE REPORT
Anita Garg, DO, and Humaira Ashraf, MD
CASE DIAGNOSIS: Femoral neck stress fracture
CASE DESCRIPTION: A 52-year-old male with Wegener's Granulomatosis Polyanginitis on chronic low dose prednisone presented to a physiatry clinic with a 2-month history of constant sharp 9/10 lateral and posterior left hip pain. Pain is aggravated with weight-bearing. Physical examination revealed limited and painful left hip internal rotation and flexion. A left intra-articular diagnostic hip injection provided only a few days of relief. The next option included ultrasound guided left intra-articular corticosteroid hip injection; however, advanced imaging was necessary as initial radiographs were suggestive of Avascular Necrosis (AVN) which can worsen with steroid exposure. Left hip MRI revealed nondisplaced femoral neck tension sided stress fracture without evidence of AVN. With this finding, he was made non-weight bearing and orthopedic surgery was urgently consulted for definitive management of arthroplasty.

DISCUSSIONS: Chronic use of oral steroids can cause poor bone health. The prevalence of glucocorticoid-induced AVN is between 5%-38% depending on the dose and comorbid risk factors. In this case, there was concern for AVN prior to proceeding with a steroid injection and it was essential to obtain advanced imaging. Use of prednisone can also increase the risk fractures by 30-50%. However, femoral neck stress fractures are rare with a prevalence of 1%, which presented as the primary diagnosis. Treatment is often conservative; however, if the fracture is on the tension side or displaced, orthopedic evaluation is recommended for possible surgical intervention. Delayed treatment can lead to long term disability.

CONCLUSIONS: Although rare, physiatrists should maintain a high suspicion for stress type fracture when a patient on steroids is presenting with hip pain. This case emphasized the need for advanced imaging prior to proceeding with a routine office-based procedure, which completely changed management. Early recognition and treatment to prevent progression to a displaced femoral neck fracture is crucial and essential.

AGGRAVATION OF OSTEOMYELITIS ASSOCIATED TO DIABETIC FOOT INJURIES
Rafaela Antonucci, Graduated, Ricardo Gonçalves, Physician, Angelica S. Kuvuee, Physician, and Regina Chausie, Physician
OBJECTIVES: Identify patients with diabetes in whom osteomyelitis is associated to diabetic foot injuries, its characteristics, as well as its progression and aggravation.

DESIGN: This is a case series in which 10 patients with osteomyelitis associated to diabetic foot injuries treated by a specialist nurse from January to July 2019 at a rehabilitation institute's wound outpatient clinic were studied.

RESULTS: The injuries of the 10 patients were evaluated according to the following characteristics: type of existing tissue, exudate, bone exposure, margin, perilesional skin, odor, existence of foot deformities, amputations and topical therapy used. The most common sites of appearance of such injuries were in the forefoot region (90%), due to bone deformity as a consequence of peripheral neuropathy and Charcot osteoarthropathy that was found in 70% of the samples. The wound bed tissue manifested opaque granulation (70%), margins with hyperkeratosis (100%), bone fistulas (60%), strong odor (70%) and purulent exudate (70%), causing osteomyelitis (60%) and consequently leading to amputations and reamputations in 20% of the cases.

CONCLUSIONS: The work of the specialist nurse in identifying and managing the injuries of the diabetic foot patients was essential for the indication of appropriate treatment, prevention of the injury progression to osteomyelitis and the development of new lesions, stimulation of healing process and decision-making in complications in order to prevent the worsening of the condition and reduce the number of amputations, thus providing a better life quality for the patient, their caregivers and consequent cost reduction.

AMPUTATION FOR CHRONIC PAIN AND/OR FUNCTIONAL IMPAIRMENT OF A LIMB
Evelyne Linden, Resident
OBJECTIVES: Introduction: Amputation for chronic pain and/or functional impairment of a limb is a controversial treatment. Current guidelines mention analgesics and physiotherapy as well as more invasive treatments such as nerve blocks, neurostimulation, intrathecal drug infusion, sympathectomy and motor cortex stimulation. However, there is a lack of evidence regarding the outcome of amputation. Purpose: The goal of the study was to evaluate the impact of an amputation on pain and participation in daily life activities and to assess the use of a prosthesis.

DESIGN: Materials and methods: From January 1999 to March 2019 28 patients underwent an amputation of a lower limb for chronic pain and/or functional impairment in University Hospitals Leuven. We searched a database of 799 patients. Twenty-one patients were included in our study. To date, fifteen patients are remained. All patients completed a questionnaire about changes in pain, use of a prosthesis, activities of daily living, sports and quality of life.

RESULTS: Preliminary results reveal that 76.9% are satisfied with their amputation and would choose to undergo another amputation again. 61.5% reported an improvement in pain, 69.2% an improvement in function and 53.9% an improvement in sleep. 84.7% used their prosthesis on a daily basis.

CONCLUSIONS: Conclusion: Most patients who underwent an amputation for chronic pain and/or functional impairment of a limb in our Hospitals were satisfied and had an improvement of function and pain. A detailed screening of the patients and a realistic point of view about the effects of an amputation are important.

AN ADDITIONAL ELECTRODIAGNOSTIC TOOL FOR ULNAR NEUROPATHY: MIXED ACROSS THE ELBOW
Drew Parkhurst, DO, Michael Andary, MD, and John Powell, PhD
OBJECTIVES: Demonstrate the utility of an uncommon nerve conduction study (NCS), mixed across the elbow, when diagnosing ulnar neuropathy at the elbow (UNE).

DESIGN: A retrospective analysis of 134 patients, referred to an outpatient university-based electrodiagnostic (EDX) lab with suspected UNE between January 2013 and June 2019. Inclusion criteria required symptoms consistent with ulnar neuropathy and required three comparative NCS to be performed: motor to abductor digiti minimi (ADM), motor to first dorsal interosseus (FDI), and mixed across the elbow. 123 of the 134 patients had present responses for the three NCS. To perform the mixed across the elbow NCS, the examiner placed the active electrode 10cm proximal to the medial epicondyle between the biceps and triceps muscle bellies. The median nerve was stimulated at the wrist followed by stimulation of the ulnar nerve at the ulnar styloid. Using both peak latencies, the difference was calculated and labeled the ulnar-median mixed latency difference (U-MLD). The U-MLD
was used to evaluate for correlation between the nerve conduction velocities (NCV) of ADM and FDI respectively.

**RESULTS:** Pearson correlation demonstrated a strong positive correlation, r=0.739, between the across elbow NCV for FDI and ADM (p < 0.0001). When comparing the U-MLD to the FDI and ADM across elbows NCV, the respective Pearson r-values revealed -0.543 (p < 0.0001) and -0.479 (p< 0.0001). The negative r-value describes the inverse relationship between ulnar velocity across the elbow and increasing U-MLD. That is, as the ulnar NCV slows, the U-MLD gets larger.

**CONCLUSIONS:** Mixed across the elbow has moderate-strong correlation with both ADM and FDI NCV across the elbow. All three tests measure ulnar nerve function slightly differently. Further prospective data, it is unclear which single test is best. The authors propose some combination of the three tests may be the most beneficial when diagnosing UNE.

**EXPLORING THE UTILITY OF THE EFFECT SIZE (ES) AS A STATISTICAL TOOL IN QUANTIFYING THE MAGNITUDE OF CHANGE FOR KEY CHRONIC PAIN OUTCOME MEASURES BY A MAJOR COMPREHENSIVE INTERDISCIPLINARY CHRONIC PAIN PROGRAM**

Luis J. Soliz, MD, FAAPMR, Paul Scholten, MD, and Chris Gagnon, PhD

**OBJECTIVES:** The objectives of this study were to 1) Determine the effect size of key chronic pain outcome measures for an interdisciplinary pain program; 2) compare effect sizes within subgroups for age, gender, marital status, primary pain diagnosis, and program type (full, modified full, & partial); and 3) determine if outcomes differ by group.

**DESIGN:** This was a retrospective chart review. Descriptive statistics were utilized to characterize the sample and individual demographics (age, sex, marital status, primary pain diagnosis, and program type (full, modified full, & partial)); and 3) determine if outcomes differ by group.

**RESULTS:** Participants were 48 years old on average, and 74% were female. Effect sizes ranged from 0.5 to 1.75. All outcomes demonstrated statistical significance (p<0.001). Analysis by sex and diagnosis type showed no difference in outcomes. Individuals with significant others were more likely to reduce their pain-related depression. Younger individuals showed a greater reduction in depression and pain-related anxiety. The CES-D 10, Pain Anxiety Symptom Scale (PASS-20), and Pain Disability Index (PDI) ANOVA was used to compare change scores among demographic groups with a Bonferroni correction for multiple comparisons. Cohen’s d was used to assess effect sizes.

**RESULTS:** Participants were 48 years old on average, and 74% were female. Effect sizes ranged from 0.5 to 1.75. All outcomes demonstrated statistical significance (p<0.001). Analysis by sex and diagnosis type showed no difference in outcomes. Individuals with significant others were more likely to reduce their pain-related depression supporting marital status as a potential predictive variable for success. Younger individuals showed a greater reduction in depression and pain-related anxiety than older individuals.

**AN UNEXPECTED FINDING: PARASYMPHYSIS SUBCHONDRAL GEODES MASQUERADING AS RECURRENT LEFT-SIDED HIP ADDUCTOR MUSCLE STRAIN**

Shrut S. Patel, MD, and Craig Van Dien, MD

**CASE DIAGNOSIS:** A 60-year-old male presenting with left hip pain secondary to parasympyseal subchondral geodes with osseous deformity.

**CASE DESCRIPTION:** The patient presented with a two-week history of left-sided hip pain after being pulled through a vinyl fence by his dog. Physical examination demonstrated left-sided hip adductor tenderness in addition to positive FADIR, SCOUR, and Stinchfield maneuvers for the left lower extremity. Initial x-ray imaging of the left hip showed no significant abnormality. Initial x-ray imaging of the left hip showed no significant abnormality. He was treated conservatively, with anti-inflammatories and a home exercise program, for suspected hip adductor muscle strain and had 90% improvement in symptoms. His pain recurred four months later. Despite receiving a formal course of physical therapy, his symptoms persisted. MRIs of the left femur and hip demonstrated left parasympyseal osseous deformity suggestive of erosive erosions, reactive edema, and/or a mild strain of the left adductor musculature. A follow up non-contrast pelvic CT demonstrated a left parasympyseal subchondral geode suggestive of inflammatory versus crystalline arthropathy. He was subsequently referred to his rheumatologist and orthopedic surgery for further management.

**DISCUSSIONS:** Subchondral geodes are often associated with arthropathies such as degenerative joint disease, rheumatoid arthritis, or crystalline arthropathy. Geode formation is secondary to synovial fluid entering subchondral bone resulting in a cystic, often lytic, lesion. Parasympyseal subchondral geodes are uncommon in the young adults who present atypically, as in this case involving lateral thigh pain without preceding acute trauma. These fractures may be associated with the female athlete triad, diabetes, and participation in high-impact sports. In this case, no specific underlying cause of fracture was identified other than Vitanin-D insufficiency. The appropriate treatment for this Garden Type II fracture is internal fixation over arthroplasty.

**CONCLUSIONS:** This case involving an atypical and insidious presentation of pelvic pain in a young female athlete demonstrates both the challenge and urgency in early detection of femoral neck fractures. As a result, it is important to consider causative factors in this demographic and proceed vigilantly to rule-out harmful pathology.

**AN INVESTIGATION OF HOW HEALTHCARE CONTINUING EDUCATION CAN CHANGE KNOWLEDGE, ATTITUDES, AND BELIEFS**

Melissa Kolski, PT, DPT, Chad M. Hanaska, BA, Monica Rho, MD, and Prakash Jayabalan, MD, PhD

**OBJECTIVES:** There are clinical practice guidelines (CPGs) that have empirical support and demonstrated effectiveness in outpatient settings, but they remain inconsistently employed by clinicians in their daily practice. Various barriers, such as attitudes, knowledge gaps, and treatment philosophies, prevent practitioners from making necessary educational and clinical practice changes. When reflecting on hip and knee osteoarthritis guideline recommendations, 50% of the recommendations are based on lower quality evidence. The goal of this study was to investigate how the perceptions of therapists and physicians regarding their recommendations, attitudes, and use of CPGs in the management of hip pain change in response to an educational program.

**DESIGN:** Participants took part in a multi-modal, continuing medical education program that featured didactic cases, discussion and ‘hands-on’ lab-based sessions. Individuals filled out a study-specific survey about their perceptions of the conservative treatment of hip pathology. We collected pre-course, post-course, and 9 months post-course data.

**RESULTS:** Overall, knowledge of hip pain management increased significantly in the short-term (p = 0.005) but minimal change occurred after 9 months (p = 0.93). Females, physical therapists, or professionals with less than five years of experience displayed a statistically significant increase (p = 0.01, 0.01, 0.03) in knowledge immediately following the course while males, physicians, or individuals with greater than five years of experience did not (p = 0.22, 0.18, 0.09 respectively). Attitude and CPG scores showed no significant changes across all sub-categories.

**CONCLUSIONS:** The short-term improvement in knowledge indicates that a multi-modal program is beneficial, but longitudinal administration of educational content may likely have a more meaningful impact. Improving attitudes and understanding of CPGs will require modified methods of delivering the information. Our next step is to investigate the impact of longitudinal educational interventions and design novel educational interventions to improve attitudes and adherence to CPGs for musculoskeletal care.
AN UNUSUAL CASE OF SEVERE VERRUCOUS HYPERPLASIA OF THE RESIDUAL LIMB: MANAGEMENT AND HEALING PROGRESSION
William P. Christensen, MD, and Paul S. Jones, DO

CASE DIAGNOSIS: Verrucous hyperplasia of the residual limb, severe.

CASE DESCRIPTION: Patient is a 46 year-old gentleman with a history of traumatic right trans-tibial amputation who presented to Amputee Clinic wearing a 20 year-old prostheses [xoskeletal patellar tendon bearing (PTB) design with a solid ankle cushion heel (SACH) foot]. The patellar tendon was approximately four inches anterior to the midthigh. A diagnostic selective motor nerve block was performed due to pain at rest.

CONCLUSIONS: The differential for pain should include evaluation for focal dystonia especially when typical causes of pain have been ruled out. Performing arts medicine (PAM) is a newer subspecialty of sports medicine (SM) created to address this population. Are current SM fellows being exposed to an ample amount of PAM during fellowship year? The purpose of this study is to explore the extent of PAM education and exposure in ACGME-accredited SM fellowship programs, utilizing a national survey of fellowship program directors (PDs).

CASE DESCRIPTION: The authors designed a Google Form survey with 33 questions regarding PAM exposure and education in SM fellowship programs. The survey was sent to the PDs and program coordinators for each of the 188 ACGME-accredited SM fellowship programs, as listed on FREIDA. Results were compiled by synthesizing the data provided by each program’s representative.

Discussions: Of the 40 PDs that completed the survey, 4 (10%) programs reported having a required PAM rotation and 8 (20%) reported an elective rotation. Eight (20%) programs reported having a performing arts clinic. Twenty (50%) programs reported PAM-focused didactics. Twenty-four (60%) PDs also reported covering at least one dance competition, music venue, community theater program, traveling concert series, or television set.

Conclusions: There were definite limitations in this study, considering only 40 of 188 (21%) SM fellowship PDs responded to the survey. Responses were also kept anonymous. Despite the limited responses, preliminary data shows that current focus on PAM in ACGME-accredited SM fellowships is limited. A majority of responding fellowship programs do not offer dedicated or elective rotations in PAM, and only half report PAM topics during didactics. Encouragingly, a substantial number of SM programs report coverage of at least one performing arts event, so exposure to the field may be increasing and fellowship curriculum may be adjusted in the future.

ASSESSING INDIVIDUAL CAPACITIES OF MANUAl WHEELCHAIR USER: FROM SYSTEMATIC REVIEW TO RESEARCH PROTOCOL
Marianne Lejeune, Master Biomedical Engineering, Christophe Sauret, PhD, Hélène Pillet, PhD, and André Thevenon

OBJECTIVES: To improve accessibility in manual wheelchair, the inherent difficulties of the daily environment have to be related to the individual abilities. This study aimed to conduct a comprehensive review of the literature about existing methods to assess the physical and technical abilities of manual wheelchair users. The results have led to the field of the field may be increasing and fellowship curriculum may be adjusted in the future.

Case Diagnosis: A 68-year-old female presented for evaluation of left groin pain. The pain in her groin radiated superiorly to the lower abdomen and inferiorly to the anteromedial aspect of the proximal thigh. This pain was ongoing for more than eight years and she saw multiple physicians including neurosurgery, orthopaedics, and pain management as well as a chiropractor. She had magnetic resonance imaging of the lumbosacral spine that showed minimal degenerative changes and no perplasia; a dermatologic condition appearing with wart-like papules and plaques resulting from persistent residual limb edema, typically associated with a poor-fitting prosthesis. Other determinants include associated comorbidities (e.g. heart failure, liver disease, renal disease), reason for amputation, hygiene, and wearing pattern. Verrucous hyperplasia can be associated with residual limb ulceration, infection, and chronic, or rarely develop into squamous cell carcinoma. External compression and if chronic, may rarely develop into squamous cell carcinoma. External compression to address edema is considered the best method of treatment.

Conclusions: Early recognition and management of verrucous hyperplasia can ameliorate much distress to the patient and improve their ability to effectively function within their community. External compression to address edema is considered to be the best method of treatment. Education of the patient regarding the importance of prosthesis fit, edema management, as well as residual limb/socket hygiene are extremely important in relation to preservation of the residual limb soft tissues and overall morbidity.

AN UNUSUAL CAUSE OF PROXIMAL THIGH PAIN: FOCAL DYSTONIA OF THE PSOAS
James J. Bresnahan, MD, and Mitchell Paulin, MD

CASE DIAGNOSIS: Focal dystonia of the left psoas muscle.

CASE DESCRIPTION: The patient’s presentation was consistent with verrucous hyperplasia; a dermatologic condition appearing with wart-like papules and plaques resulting from persistent residual limb edema, typically associated with a poor-fitting prosthesis. Other determinants include associated comorbidities (e.g. heart failure, liver disease, renal disease), reason for amputation, hygiene, and wearing pattern. Verrucous hyperplasia can be associated with residual limb ulceration, infection, and chronic, or rarely develop into squamous cell carcinoma. External compression and if chronic, may rarely develop into squamous cell carcinoma. External compression to address edema is considered the best method of treatment.

Conclusions: The differential for pain should include evaluation for focal dystonia especially when typical causes of pain have been ruled out. The use of diagnostic selective motor nerve blocks can be particularly useful when dystonia is suspected.
CASE DIAGNOSIS: Recurrent branch of the median nerve injury following a carpal tunnel and trigger finger release.

CASE DESCRIPTION: A 54-year old female presented for evaluation for persistent pain, sensory loss and left-hand weakness 6 months following a carpal tunnel release. She reported significant worsening atrophy after the surgery. On examination, she displayed profound atrophy of the left thenar eminence with severe weakness with abductor pollicis brevis isolation, and sensory disturbance in the left median distribution. Electrophysiology showed no motor response with recording from the APB but a prolonged and mildly small compound muscle action potential (CMAP) with recording from the 1st lumbrical. The median sensory responses were low and prolonged. Ultrasound showed evidence of scarring with some persistent median nerve entrapment. Ultra-high frequency ultrasound (4MHzbulsart) demonstrated marked enlargement of the RBMN with encroaching scar. Intact fascicles of the RBMN were seen, demonstrating a severe axonotmesis but in continuity. The muscle echotexture of the median-innervated thenar muscles displayed profound neurogenic atrophy, however the lumbricals appeared relatively preserved.

DISCUSSION: The case demonstrates the value of combining both electrophysiology and high frequency ultrasound in diagnosing a complex post-surgical neuropathy. In this case, the disconnect between the severely affected median-innervated thenar muscles and the more mildly involved lumbricals provided the clue for the focal injury to the RBMN. Ultrasound provided further confirmation and anatomic details regarding the injury as well as the degree of compression of the median nerve. It additionally provided information about involvement of other fascicles of the median nerve.

CONCLUSIONS: The combination of electrophysiology and high frequency ultrasound can be valuable in assessment of complex post-surgical injuries and can provide guidance for further treatment.

ASSESSMENT OF PRONATOR TERES REFLEX IN THE DIAGNOSIS OF C6 & C7 RADICULOPATHY

Negar Aflakian, MD, and Arash Babaei-Ghazani, MD

OBJECTIVES: Treatment of radiculopathy is usually symptomatic and dependent on the patient’s clinical symptoms and certain diagnostic studies. A comprehensive physical examination may help with faster diagnosis and speedy treatment of the burden of the disease. This study was performed to determine the diagnostic value of pronator teres reflex for C6 & C7 radiculopathy.

DESIGN: In this observational-comparative cross-sectional study, 118 consecutive subjects (56 with and 62 without C6 & C7 radiculopathy) were enrolled. The diagnostic value of pronator teres reflex for C6 & C7 radiculopathy in comparison with positive electrodiagnostic study (EDS) and Magnetic Resonance Imaging (MRI) findings were assessed.

RESULTS: Fifty-six subjects with C6 and/or C7 radiculopathy and sixty-two healthy subjects without radiculopathy were recruited for this study. In group 1, the pronator teres reflex was significantly different from group 2 (P < .001). Pronator teres reflex was absent in 35.7% of patients with C6 and C7 radiculopathy and in 3.2% of healthy individuals (P < .001). The overall sensitivity and specificity for pronator teres reflex were 36.4% and 13.6%, PPV and NPV were 64.8% and 4.6%, respectively. In addition, pronator teres reflex had a sensitivity of 65% and specificity of 46.9% for the detection of C6 radiculopathy, and its PPV and NPV were 17.57% and 30%, respectively. Pronator teres reflex had a sensitivity of 46.1% and specificity of 4.69% for the detection of C7 radiculopathy, and its PPV and NPV were 8.96% and 30%, respectively.

CONCLUSIONS: Although pronator teres reflex can be used as an adjunct tool for evaluating C6 and C7 radiculopathy, its effect is not as strong as combination of EMG-NCS and imaging findings in the diagnosis of C6 and C7 radiculopathy. Of course, conducting more studies with larger sample size and more power, in multicenter fashion with considering other conflicting variables, can increase our knowledge on the field.
assistive devices that fulfill needs of users in both practical and cost/benefit basis is a difficult task to achieve. This presentation aims to report on the activities of Fujita Health University’s Research Center for Robotic Smart Home and Activity Assistive Technology that assist the development of assistive devices.

DESIGN: Research Centre for Robotic Smart Home and Activity Assistive Technology was established in 2018 with the support of the government, and since then it has provided an innovative environment that matches medical problems with industrial solutions to solve them. In May 2019, the center started a project commissioned by Aichi prefecture which aims at accelerating the development and commercialization of assistive robotic devices. Our missions in this project are (1) providing consultation to companies on product development, (2) advising on market plans for devices that are already commercialized, and (3) helping research & development activities for newly developed devices.

RESULTS: Since the project’s beginning, we have received more than two inquiries from different parties per month about product development, and about 80% of the inquiries came from manufacturing companies, 10% from nursing care homes, and 10% from related businesses. Over 60% of those manufacturing companies are originally from automobile industry and seeking ways to diversify their business portfolio. We have also helped companies with improving their marketing plans for devices such as a robotic walker and a health monitoring system.

CONCLUSIONS: Any product development that lacks user’s perspective inevitably fails. At out center, we will continue to assist the development of devices with a close observation of user needs.

ASSOCIATION BETWEEN ISOKINETIC KNEE MUSCLE STRENGTH AND INDEX OF DYNAMIC BALANCE CAPABILITY IN PATIENTS AFTER ANTERIOR CRUCIATE LIGAMENT INJURY AND RECONSTRUCTION

Yuchoiro Soma, Bachelor, Shinya Iwabuchi, Master's Degree, Ayumu Haginoaya, Bachelor, Shigeaki Kubota, PhD, Hideki Kadono, PhD, Yukio Shimizu, MD, PhD, Hirota Matsuzaki, MD, PhD, and Yasushi Hada, MD, PhD

OBJECTIVES: The purpose of this study was to examine the relationship between isokinetic knee muscle strength and dynamic balance capability in patients after anterior cruciate ligament (ACL) injury and ACL reconstruction (ACLR).

DESIGN: A total of 32 patients included 21 patients with ACL-injury (between 1 and 6 months following an acute injury) and 11 patients with ACLR (postoperative 4 months) in this study. Muscle strength was assessed with the Biodex Dynamometer. Isokinetic knee extension and flexion peak torque (Nm/kg) was assessed with at 60, 180, 240 and 300 deg/s. Dynamic balance capability was assessed with modified index of postural stability (mIPS) using a Gravicorder GP-6000 force plate as an index of dynamic balance capability. Limb symmetry index (LSI) was calculated as the ratio of the involved side over the uninvolved side values each measure. Pearson’s correlation was used to determine the relationship between each isokinetic peak torque and the LSI.

RESULTS: There were significant positive correlations between the LSI of the mIPS and the peak extension torque at 180 deg/s (P=0.036, r=0.528), 300 deg/s (P=0.003, r=0.687) in the ACL-injury group. On the other hand, there was no significant correlation in the ACLR group.

CONCLUSIONS: Isokinetic knee muscle strength was associated with index of dynamic balance capability in patients after ACL injury and not after ACL reconstruction. In ACL injury, low extension torque can lead to poor balance. These findings could help to evaluate knee function criteria in the ACL injury.

ASSOCIATION OF PLANTAR FASCIOPATHY WITH PLANTAR FASCIA THICKNESS: AN OBSERVATIONAL STUDY

Virinder S. Gogia, MBBS, DORTH, DNB, MNAMS, Anil K. Gupta, MBBS, MD, DNB, CEP, and Satyashheel Asthana, MBBS, MD

OBJECTIVES: The aim of this study was to find out the association between plantar fasciopathy and plantar fascia thickness. The objective of this study was to compare plantar fascia thickness of patients suffering from plantar fasciopathy to that of asymptomatic normal healthy subjects using ultrasound measurements.

DESIGN: This observational study was carried out in the outpatient department of physical medicine and rehabilitation of a tertiary level government teaching hospital in northern India. The time duration of the study was three months. The ethical clearance was taken. Two groups were created, group A (n=42) had a patient diagnosed with plantar fasciopathy while group B (n=42) was control group and had normal healthy subjects. A p value < 0.05 was taken as statistically significant. Data analysis was done using statistical package for social sciences (SPSS) software version 21.

RESULTS: Both groups were age and sex matched. The plantar fascia thickness of group A and B was 5.38 ± 0.70 mm and 2.71 ± 0.60 mm, respectively. The inter-group comparisons showed that there was a significant difference between the plantar fascia thickness of two groups with p-value < 0.001.

CONCLUSIONS: The present study showed that plantar fascia thickness has a direct association with plantar fasciopathy.

ATYPICAL PRESENTATION OF EPIDURAL ABSCESS IN INTERVENTIONAL PRACTICE

Sudeep K. Mehta, MD, and Clinton Faulk, MD

CASE DIAGNOSIS: A 32-year-old African American male, recently diagnosed and treated for an acute L4-L5 radiculopathy with methylprednisolone dose pack and hydrocodone, presented with acute back pain, joint pain and stiffness in his right thigh. Non-contrast lumber sacral MRI revealed a right paracentral disc protrusion at the L5/S1 level abutting against the right S1 nerve root without definite compression, with L4/L5 neuroforaminal narrowing. The patient was treated with a right L5-S1 transforaminal epidural injection. He soon presented to the emergency department unable to ambulate, and was diagnosed with an epidural mass at L4-L5 and L5-S1 levels.

CASE DESCRIPTION: MRI with contrast imaging revealed the epidural abscess at L4-L5 and L5-S1 levels, requiring an emergent decompressive laminotomy. Intracranial cultures revealed methicillin resistant Staphylococcus aureus (MRSA), and hospital course was also complicated with a prepatellar bursitis, revealing MRSA also. He was subsequently treated with intravenous Daptomycin.

DISCUSSIONS: Until recent times, epidural abscesses were considered rare phenomena induced by compromised immunities or through sources of infections in spinal column treatment. Epidural abscesses have the potential to spread into the anterior aspect of the spinal canal from the epidural space, causing excruciating pain from nerve root compression. A classic triad of back pain, fever, and variable neurological deficits is not always present. It is essential to recognize them early and treat appropriately.

CONCLUSIONS: This is a case of epidural abscess with an atypical presentation mimicking lumbar radiculopathy secondary to disc herniation. It is imperative to learn that symptoms of epidural abscesses can vary at initial stages of disease, and neurological deficits may not appear until progression of infection is evident. Contrast MRI scans should be performed to clear ambiguity in diagnosis, and Infectious Disease should be consulted to screen for possible infectious etiology. The classical triad of symptoms may not appear in every patient, making the pain symptoms comparable to typical radiculopathy.

ATYPICAL TRIGEMINAL NEURALGIA IN THE SETTING OF RECURRENT TONGUE SQUAMOUS CELL CANCER: A CASE REPORT

Obada Obaiis, MD, Sol Abreu-Sosa, MD, Sabena Khan, and Haley Willarson

CASE DIAGNOSIS: The patient had minimal pain relief with a regimen of hydrodromphone and gabapentin. Treatment for atypical neuralgia (TN) was started due to the distribution and characteristics of her pain. Significant pain reduction occurred after oxcarbazepine administration. Subsequently, sleep, eating, and participation with therapies improved. Imaging showed new mandibular lesions consistent with new cancer.

CASE DESCRIPTION: The patient was hospitalized for osteoradionecrosis and mandibular debridement. Post-operatively, she developed an acute left middle cerebral artery (MCA) territory infarct with non-fluent aphasia. During acute rehabilitation, she developed new left sided jaw pain and erythema. Communication regarding pain was limited. Per Infectious Disease (ID) and Otorhinolaryngology (ENT), there was concern for osteomyelitis. Computed tomography (CT) neck and CT chest were completed. Through progress with speech therapy, the patient was able describe the pain as a constant burning with occasional sharp electric-shock-like pain.

DISCUSSIONS: Classical TN causes sharp, stabbing, electric-shock-like pain. Atypical TN causes constant, burning, crushing, throbbing, or grinding pain. The non-specific symptoms of TN can make the diagnosis difficult. The pathophysiology of TN remains unclear. A proposed cause is demyelination due to local compression from blood vessels, space occupying masses, MS lesions, etc. Tumor cells can exhibit perineural invasion (PNI), a form of metastatic cancer spread via nerves, leading to persistent pain and growth. Diagnosis of TN is clinical, which can be challenging in acute rehabilitation patients with barriers in communication. First line therapy is carbamazepine or oxcarbazepine. Carbamazepine has stronger evidence for efficacy. Oxcarbazepine has a safer profile. The mechanism of analgesia is unknown.

CONCLUSIONS: Constant burning pain in multiple dermatomes can raise suspicion for atypical TN. Oropharyngeal tumors can be a possible cause of atypical TN.
AUTONOMIC DYSREFLEXIA: HOW MUCH DO WE KNOW ABOUT IT? A STUDY AMONG HEALTH CARE PROFESSIONALS
Muhammad Shoaih, MBBS, Nadeem Alam, MBBS, FCPS, Naureen Akhtar, MBBS, FCPS, Fraz Tahir, MBBS, Mahvish Javed, MBBS, FCPS, and Mahvish Javed, MBBS

OBJECTIVES: To appraise Autonomic dysreflexia (AD) knowledge among health care professionals of tertiary setups. Autonomic dysreflexia is a potentially unrecognized fatal condition resulting from spinal cord injury at or above thoracic level 6. If not managed timely, can lead to life threatening complications. So it is quintessential for health care providers to have knowledge of this basic emergency and to be updated about latest guidelines in effectively managing such patients in order to timely avoid fatalities.

RESULTS: A total of 115 healthcare providers handed back the questionnaire. The mean age of physicians were 35.7 ± 7.4 years. Mean age of consultant was and mean age of residents was. Out of 115 physicians only 29 (25.21 %) were able to answer the questions correctly to score passing marks while remaining 86 physicians (74.79 %) were unable to answer correctly. Among 27 consultants, 13 consultants (48.15 %) gave correct answers while 14 consultants (51.85 %) dint score correctly. Out of 88 residents, 16 (18.18%) answered correctly while remaining 72 (81.82%) did not give correct answer.

CONCLUSIONS: To sum up, autonomic dysreflexia is a potentially life threatening emergency. Our study found that knowledge about this condition is dangerously low among health care providers. Doctors and associated medical staff must be sensitized about this condition in order to effectively manage emergency and to prevent harmful tragedy. A nationwide programme must be initiated to create awareness about this medical emergency in the form of seminars, workshops and poster presentations.

AVASCULAR NECROSIS OF THE DISTAL TIBIA: A CASE REPORT
Stacey Isidro, BA, Adnan Kharsa, MD, Megan Soliman, MD, and Poetri Sridam, MD

CASE DIAGNOSIS: Avascular necrosis of the distal tibia

CASE DESCRIPTION: A 46-year-old African American male presented with 2 months of worsening chronic bilateral lower leg pain with associated swelling and redness. Patient reported old trauma to the left lower extremity three years ago, which was complicated by an ulcer and cellulitis requiring inpatient treatment. The ulcer poorly healed due to poor wound care. Patient has a history of chronic alcohol abuse and homelessness. There was no pertinent personal or family history. On presentation, he was afebrile and hemodynamically stable. Exam of the lower extremities revealed hypertrophic, foul-smelling skin with poorly healed wounds and ulcers bilaterally without purulent discharge. Also noted were 3+ non-pitting edema, erythema, and tenderness. Motor and sensory functions were intact. Distal pulses were palpable and symmetric. Blood tests showed elevated sedimentation rate and C-reactive protein.

DISCUSSIONS: X-rays of the lower extremities showed soft tissue edema and periosteal changes at the distal tibia and fibula. MRI revealed a 10-cm area of avascular necrosis of the right distal tibial diaphysis and a small focus of the left tibia. Ankle Brachial Index studies were done and unremarkable. Patient was managed with skin care and regular wound dressing. He was discharged to follow up with a wound care clinic. Avascular necrosis most commonly involves the hips, knees, shoulders, and femurs. Mechanisms of injury can be traumatic or atraumatic. The literature mainly consists of a few case reports. All cases but one occurred after severe ankle trauma or fracture. This patient neither had history of trauma to the right ankle nor history of diabetes mellitus, hyperlipidemia, chronic steroid use, sickle cell disease, or hematologic disorders.

CONCLUSIONS: Avascular necrosis of the distal tibia is uncommon. Chronic alcohol consumption is likely the culprit, which may lead to fatty deposits in small vessels and interruption of blood flow resulting in bone ischemia.

AVULSION FRACTURE OF THE ISCHIAL TUBEROITY MIMICKING A PERMEATIVE PROCESS ON RADIOGRAPHIC IMAGES
Albert Park, MD, Craig Rovito, MD, and Ashwin Babu, MD

CASE DIAGNOSIS: Avulsion Fracture of the Ischial Tuberosity

CASE DESCRIPTION: A 17-year-old high school hockey player presented to clinic for evaluation of right buttock pain that began after squatting and exacerbated by playing his sport. He failed a conservative treatment regimen of four months of physical therapy and oral nonsteroidal anti-inflammatory. An MRI was obtained by his primary care physician which was consistent with proximal hamstring tendinopathy. On exam, resisted hip extension reproduced the patient’s index pain. He elected to undergo a right ischial bursa steroid injection and endorsed good relief. Two months later, he returned for follow up after returning to hockey and re-injuring his buttock after bumping into another player. A plain film radiograph was obtained demonstrating an erosive and moth-eaten appearance of the ischial tuberosity. He denied chills, night sweats, or weight loss and had no signs of systemic infection. A follow up MRI obtained after the radiograph demonstrated an avulsion fracture of the ischial tuberosity.

DISCUSSIONS: When confronted with imaging consistent with a permissive process of bone, the most common differentials include an infectious or oncological diagnosis such as Ewing sarcoma, fibrosarcoma, or a metastasis. In our patient, there was an elevated concern for an infectious process given the recent bursal steroid injection. To our knowledge, there have been only two other reported cases of an ischial tuberosity avulsion injury mimicking a neoplastic process on plain film radiographs.

CONCLUSIONS: In the appropriate context, an avulsion fracture of the ischial tuberosity should be considered in the differential of a radiographic image showing an erosive, permeative process.

BEND & SNAP! A MISSED DIAGNOSIS OF A MEDIAL GASTROCNEMIUS TEAR
Ariana Gluck, DO, Matthew Cascio, MS IV, Jonathan Ramin, DO, and Joseph Herrera, DO, FAAPMR

CASE DESCRIPTION: A 60-year-old male presented with left calf pain for one week. The patient felt a “snap” when transitioning from sitting to suddenly standing. After initially tolerating ambulation; swelling and pain prompted an Emergency Room (ER) visit. After a negative D-dimer he was discharged. Despite elevation, ice, and anti-inflammatories the patient returned to the ER with continued pain where ultrasound once again ruled out DVT. Patient was discharged with wedged boot by an orthopedist for calf strain, aggravating his symptoms. In clinic he endorsed sharp, aching, constant pain located in the medial calf. Ultrasound demonstrated fluid within the medial gastrocnemius with a disruption in contour and echogenicity of the muscle fibers. Aspiration yielded 45cc of serosanguinous fluid with immediate improvement in pain. Following physical therapy, the patient made improvements in pain and flexibility.

DISCUSSIONS: A Tear of the Medial Gastrocnemius, referred to as “tennis leg”, occurs in patients participating in physical activity or rapid movement. The mechanism of injury involves knee extension with simultaneous ankle dorsiflexion, seen with quick shifts in direction causing overstretching of the gastrocnemius. Diagnosis is made through history, usually involving a traumatic event causing pain and decreased function. Patients may report a “pop” or the feeling of being struck in the calf. Exam may demonstrate antalgic gait, calf swelling, ecchymosis, and weakened plantar flexion. Ultrasound can diagnose the tear, showing discontinuity of muscle fibers with edema and hematoma, while excluding DVT.

CONCLUSIONS: An isolated tear of the medial gastrocnemius may be benign, however, a rare complication secondary to excessive edema is compartment syndrome, a surgical emergency. While ultrasound was performed during the patient’s second ER visit to rule out DVT, gastrocnemius tear is not commonly evaluated and need to maintain clinical suspicion. Ultrasound aided in both diagnostic and therapeutic management of this patient’s medial gastrocnemius tear.

BETAZA-MICROGLOBULIN TYPE AMYLOID BONE LESIONS AS A CAUSE OF IMPENDING HIP FRACTURES
William D. White, MD, Robert Bunning, MD, and Talshin Choudhury, Medical Student

CASE DIAGNOSIS: Betazia-microglobulin type amyloid lytic bone lesions

CASE DESCRIPTION: A 66-year-old woman with a twenty-six-year history of end-stage renal disease from lupus nephratitis on hemodialysis and a history of bilateral carpal tunnel syndrome experienced right leg pain for one week. She went to a local emergency room, and x-rays revealed multiple lytic lesions in both the right and left femur. A CT demonstrated multiple lytic lesions with a risk for an impending hip fractures. The most extensive lesion located in the right femur occupied 60% on the bone diameter and had a Mirel score of 10, confirming the need for fixation. A right total hip replacement was done. Pathology of the lesion revealed A Beta2-microglobulin type amyloid, negative for malignancy and myeloma. Following the
total hip replacement, she was admitted to an acute rehabilitation program to improve mobility and function.

DISCUSSIONS: Amyloid is an abnormal protein produced in bone marrow. Long-term hemodialysis is a known risk factor for systemic amyloidosis. Amyloid coronary deposits in tendons and periarthritis structures resulting in carpal tunnel syndrome and joint dysfunction. Bone deposition of amyloid is usually asymptomatic, limited to microscopic deposits that are not visible on radiologic imaging. Lytic bone lesions are more commonly seen in patients with amyloidosis associated with multiple myeloma. The risk of pathologic fracture is predicted by considering the presence of functional pain and the percentage of cortical bone destruction. Harrington's and Muclo's criteria are two formal staging systems that are used. Propylactic fracture provides shorter operative times, decreased morbidity, and less recovery time. Diagnosis is confirmed through the aspiration of osteolytic infiltrates.

CONCLUSIONS: Primary amyloid induced bone erosion is uncommon but should be considered in patients with bone lesions who have risk factors for systemic amyloidosis. Early diagnosis and intervention are vital in the prevention of further bone destruction and chronic pain syndrome.

BILATERAL AMPUTEE SPRINTER OUTPERFORMED THEIR UNILATERAL COMPETITORS: AN ANALYSIS OF LOWER EXTREMITY AMPUTEE SPRINTERs DURING 1996-2016 PARALYMPICS
Xiang Li, MPH, Yetsa A. Tuakli-Wosornu, MD, MPH, Kimberly Ona Ayala, MD Candidate, and David B. Fromberg, MD
CASE DIAGNOSIS: Single-leg amputee sprinters frequently compete in the same race class as their double-leg counterparts. Modern carbon fiber prosthetics may confer a technological advantage to bilateral users. This study seeks to identify the impact of prosthetic configuration on sprint performance in Paralympians. We hypothesized that compared to their unilateral competitors, bilateral amputee sprinters would have greater rates of performance improvement over the past 20 years, and this difference would be increasingly evident with longer race distances.

CASE DESCRIPTION: A retrospective analysis of race speed in lower extremity amputee sprint finals from the 1996-2016 Paralympic Games was conducted. The normality and homogeneity of variances assumptions were tested using Shapiro-Wilk test and Bartlett test, respectively. If both assumptions were satisfied, then ANOVA was adopted to test the main effect of being unilateral versus bilateral amputee as well as the interaction effect of other variables including race year, race type, and sex; if the assumptions were not satisfied, then the non-parametric alternative Kruskal-Wallis rank sum test was adopted to conduct group comparison.

DISCUSSIONS: 445 race results from 175 sprinters were analyzed. The difference in race speed between unilateral and bilateral amputee runners was significant in all three races (100m, p-value = 0.022; 200m, p-value = 0.001; 400m, p-value < 0.001), and the significance increased as the race distance increased. The difference did not enlarge over time.

CONCLUSIONS: Bilateral lower extremity amputee runners had significantly better sprint performances than their unilateral counterparts in all race finals. Performance differences were greater in races of longer distance. More research is needed to discern whether additional classification criteria would create a more equal competitive field and increase opportunities for Para athletes to participate on an equal basis.

BILATERAL SIMULTANEOUS QUADRICEP TENDON RUPTURE IN HYPERPARATHYROIDISM
Tyler Doornink, DO
CASE DIAGNOSIS: Simultaneous bilateral quadricep tendon rupture is a relatively rare condition in a healthy patient, with most cases in the literature having an association with chronic diseases such as gout, renal failure, diabetes, and parathyroid disorders. This report details a case of simultaneous quadriceps tendon rupture associated with the diagnosis of poorly treated hyperparathyroidism.

CASE DESCRIPTION: This case involves a 53 year old male with past medical history of obesity, HTN, HLD, and hyperparathyroidism who suffered a fall down a flight of 7 stairs. The mechanism of the fall involved with patient hyper-flexing both of his knees with subsequent popping and intense pain in the anterior aspect of both of his knees. The patient had significant impairment with knee extension and buckling of his knees. On MRI, patient was found to have full thickness tears of bilateral quadriceps tendons and underwent surgical repair of both tendons the next week. He was immobilized in cast for the next six weeks and underwent both inpatient rehabilitation and as well as outpatient physical therapy.

DISCUSSIONS: Simultaneous bilateral quadriceps tendon rupture is rare condition treated in physiatry. Physiatrists can play a large role in both encouraging patients to optimize their health and in doing so encourage preventative health. Chronic preventable/treatable diseases such as diabetes, renal failure, hyperparathyroidism and gout can lead to serious MSK conditions. Physiatrists can diagnose this condition, assist in rehabilitating this condition, and provide holistic care to help prevent it.

CONCLUSIONS: While bilateral or even unilateral quadriceps tendon rupture is a relatively rare diagnosis in the field of physiatry, it is important that we optimize and encourage our patient’s general health. Treating and managing common and more rare chronic conditions can prevent serious MSK injuries as seen in this case of bilateral quadriceps tendon rupture in poorly managed hyperparathyroidism.

BILATERAL SLIPPING RIB SYNDROME IN A 47 YEAR-OLD SEDENTARY FEMALE: CASE REPORT
Isabella Nuñez, Physiatrist, Marcos Henriquez, Md, and Francisco Bent-Bragul, Physical Medicine and Rehabilitation
CASE DIAGNOSIS: Slipping Rib Syndrome
CASE DESCRIPTION: We report a case of a 47 year-old sedentary female who presented to our office with chest pain for the last two months, with a history of bilateral lower sternal sharp chest pain, that radiates towards her lower ribs, predominantly to her right side, exacerbated with deep inspiration and chest movements. The patient describes previous treatment with two sessions of physical manipulation over the last two months with no relief. Physical exam was performed, revealing pain reproduced during right hemidiaphragm palpation, positive bilateral Hook maneuver, negative Crowning Rooster maneuver, 5/9 on Beighton scale. Ultrasound was performed eliciting positive push maneuver, there was evidence of displacement of the 10th rib underneath the 9th followed reproducing the pain that the patient has been complaining, CT scan within normal limits.

DISCUSSIONS: Literature mainly points towards young athletes when referring to slipping rib syndrome nevertheless, it should be kept in mind that it can appear in older and sedentary patients. Moreover, this pathology often presents in a unilateral fashion nevertheless, it might appear bilateral.

CONCLUSIONS: This lesion tends to appear in female athletes, hyperlexity should be examined, followed by a physical exam and diagnostic image like ultrasound to build up the diagnosis. Treatment should targetted from all angles including physical therapy, lidocaine patch and NSAIDS.

BIOMECHANICAL CHARACTERISTICS OF LUMBAR MUSCLES IN YOUNG PEOPLE WITH CHRONIC SPINAL PAIN
Wai L. Lo, PhD, Qihua Yu, PhD, and Le Li, PhD
OBJECTIVES: The prevalence of low back pain is rising among the young adult population. Altered lumbar muscle tone was suggested to be associated with underlying pathologies and symptoms. To date, there is minimum information available on the repeatability of lumbar spine muscle mechanical properties in the young adults who experienced low back pain. This study aimed to assess the reproducibility of mechanical properties of lumbar spinal muscle in young adults with spinal pain by myotonometer and explored the difference in reproducibility when different number of indentations was used.

DESIGN: Participants who aged between 18 to 25 and reported chronic LBP were recruited. Lumbar muscle tone (Hz) and stiffness (N/m2) were assessed by myotonometer on one occasion by two assessors. Parameters were recorded by triple scans and 5-scans mode. Intra-class correlation coefficient (ICC), standard error of measurement (SEM), smallest real difference (SRD), Bland and Altman analysis were used to assess agreement between two measurements. Spearman's rank correlation analysis was conducted to assess the association between muscle properties and pain level, and between disability level.

RESULTS: The results of ICCs indicated excellent repeatability in triple scans and 5-scans mode for most lumbar levels. Bland and Altman analysis used to assess agreement between two measurements. Spearman's rank correlation analysis was conducted to assess the association between muscle properties and pain level, and between disability level.

CONCLUSIONS: This study found that lumbar spinal muscle tone and stiffness were repeatable parameters when measured by myotonometer. The reproducibility of muscle did not appear to differ between the two scanning modes with different number of indentations. Muscle tone and stiffness may therefore be considered as outcome measures for intervention.

BOTOX AS A POTENTIAL TREATMENT FOR BENT SPINE SYNDROME (A.K.A. CAMPTOCORMIA)
Alicia Phillips, MD, and Stephanie Stundal, MD

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Abstracts

CASE DIAGNOSIS: Bent spine syndrome (aka Camptocormia)

CASE DESCRIPTION: A 70 year old male with a history of Parkinson’s disease (PD) presented with a three year history of progressive spine flexion, also known as Bent Spine Syndrome (BSS). He had been participating in physical therapy for balance and back stabilization but continued to have significant difficulty with ambulation, requiring a wheelchair for community distances, due to his severe forward posture. On exam, he was noted to have significant involuntary thoracolumbar flexion into a near 90 degree angle, most notable in the lower lumbar region. His physical exam revealed increased tone in the lower rectus abdominis, external abdominal obliques and iliopsoas muscles. Botulinum toxin injections were administered to the affected abdominal muscles, and within five days the patient reported ability to stand into a near upright posture. Repeat injections twelve weeks later provided similar efficacy and duration of benefit.

DISCUSSIONS: Secondary BSS is defined as anterior truncal flexion of 45 degrees or more, and is thought to be due to a form of axial dystonia, resulting in the loss of volitional control of postural muscles. This syndrome may have a devastating impact on functional independence and quality of life and can be the source of social isolation. We provided treatment with a novel approach of intramuscular injections of botulinum toxin into abdominal postural muscles with excellent results.

CONCLUSIONS: BSS has extremely limited treatment options, and furthermore, the typical pharmacologic treatment for PD may have an even further negative impact on the changes that lead to BSS. Botulinum toxin injections may be a viable treatment option and provide a positive impact on function and quality of life for this historically difficult to treat patient population. Physiatrists are uniquely qualified through their training in musculoskeletal, neurological and rehabilitation medicine to spearhead this treatment, and offer hope for this condition.

BRACHIAL PLEXOPATHY FOLLOWING BRISTOW-LATARJET PROCEDURE: A CASE REPORT

Samantha Willer, DO, MA, and Aiesha Ahmed, MD

CASE DIAGNOSIS: Right brachial plexopathy with ongoing denervation

CASE DESCRIPTION: While serving in the military, a 25 year old male was involved in an explosion causing right shoulder instability. He underwent Bristow-Latarjet procedure and when he awoke, had no movement of his right arm. He had diffuse atrophy in the right arm and periscapular region, complete wrist drop, decreased finger flexion, forearm flexion, and pronation/supination. Nerve conduction studies showed median sensory response with decreased amplitude and slow conduction velocity. Radial sensory response was absent. Lateral antebrachial sensory responses were absent while normal contralaterally. Medial antebrachial sensory responses were reduced and slightly asymmetric. Needle EMG showed active denervation in EIP, pronator teres, biceps, and triceps. Large motor units with decreased recruitment was seen in FDI, ADM, AHI, EIP, pronator teres, EDF, biceps, and delto. Only one motor unit was seen in the EIP and biceps. Extremely small motor units were seen in triceps. The rhomboids and serratus anterior were normal.

DISCUSSIONS: The Bristow-Latarjet procedure is the gold-standard treatment for recurrent anterior shoulder instability. It has an overall complication rate between 15-30 percent, varying from hematoma, infection, recurrent instability, to neurologic damage. This case represents an uncommon presentation of brachial plexopathy after Bristow-Latarjet procedure. In addition to there being lack of reporting of brachial plexopathy cases following this surgical procedure, there is lack of data regarding recovery after this type of injury.

CONCLUSIONS: Treatment of brachial plexopathy following shoulder dislocation depends on progression of spontaneous recovery and severity of residual neurologic deficits. Most cases are managed conservatively and experience near complete resolution of brachial plexus within 20 months. The recovery of hand intrinsics is uncommon, however. Our patient was evaluated by both orthopedic and neurosurgery. They planned a joint procedure involving interrogation, surgical investigation of the brachial plexus, smoothing and re-shaping, as well as removal of hardware.

BRACHIORADIAL PRURITUS PRESENTING AS AN ATYPICAL MANIFESTATION OF CERVICAL RADICULOPATHY

Samuel P. Thampi, MD, Allan Zarrabi, BS, and Zachariah Samuel

CASE DIAGNOSIS: Brachioradial pruritus (BRP) is a neuropathic syndrome that causes abnormal skin sensations such as itching or burning typically reported to be localized to the dorsolateral arms. This study reports the case of a middle aged man with brachioradial pruritus and a history of cervical disc herniations.

CASE DESCRIPTION: A 56-year old man has been suffering with pruritus in both arms for 6 months. The patient did not present with any pain in his neck, but had associated tingling, numbness, and weakness. There was no associated bowel/bladder incontinence. An MRI examination of the cervical spine reported multilevel disc herniation. The patient underwent several epidural steroid injections with temporary relief of his symptoms. He underwent an anterior cervical decompression and spinal fusion procedure at the level C3-7 with significant improvement and relief on the pain.

DISCUSSIONS: Brachioradial pruritus is characterized by a burning or titching sensation on the skin typically in the dorsolateral arm over the brachioradialis muscles. This case highlights a patient with nerve root compression due to disc herniation presenting with itching in the neck and both arms instead of the usual pain symptoms. He had to use ice packs to relieve the itching. He had multiple epidural steroid injections with temporary relief of pain and finally had to undergo surgery to relieve disc compression by anterior decompression and fusion. Following the surgery the pruritus disappeared. Itch induced by healthy nervous system by peripheral (perisensitive), central (neurogenic) mechanisms and by diseased neurons (neuropathic). Itch and pain use similar neurons and neural circuits to transduce and transmit sensory signals (C and A fibers thus spinothalamic tract, and dorsal root ganglia [DRG].

CONCLUSIONS: Cervical radiculopathy typically presents with radicular pain. However in this case pruritis was the only symptom. This case highlights an atypical presentation of cervical radiculopathy.

BROKEN PAR S AND A SLIPPED LUM BAR: A PATIENT WITH WORSEN ING SPOND YLOLITHIS TIS H

Tina Bijlani, DO, Nadia Zaman, DO, and Parag Sheth, MD

CASE DIAGNOSIS: Spondylolystic spondylolisthesis

CASE DESCRIPTION: 82-year-old female with history of grade I L5-S1 spondylolisthesis and bilateral chronic pars interarticularis fractures, who presented to our clinic with acute on chronic low back pain after having been pain free for four years. She was lifting boxes two days prior when she noted immediate onset of right-sided LBP radiating down her lateral leg to her toes, with worsening with lumbar extension. While independent in ambulation at baseline, she was in a wheelchair this visit, and only able to take 3-4 steps with straight access care before experiencing pain exacerbation. Motor strength was full and sensation intact with Achilles reflexes 1+ bilaterally. X-ray showed bilateral L5 pars interarticularis defects with grade II spondylolisthesis and MRI with neural foraminal narrowing and possible L5 nerve root impingement. She underwent L5-S1 pars interarticularis block for her worsening slippage with 90% pain relief and improved pain-free ambulation without assistive device.

DISCUSSIONS: When evaluating patients with low back pain, it can be challenging to elucidate the cause of symptomatology. This patient was found to have bilateral L5 pars defects with anterolisthesis of L5 over S1, likely chronic in nature, but with acute slippage causing her current complaints. While initially unclear if an L5 nerve root compression was the primary generator of pain, (in which an L5 TFESI would have been the first choice), this patient experienced near complete pain relief after the fluoroscopic pars interarticular block. Of note, there is minimal literature of acute slippage in the elderly population, as it is usually seen in pediatrics.

CONCLUSIONS: A pars interarticularis block procedure for isthmic spondylolisthesis was not only therapeutic, but also diagnostic. Patients with advancing anterolisthesis will likely require nonurgent orthopedic referral; however, the pars interarticularis block can provide not only immediate relief and improvement of function but can also help with diagnosis confirmation.

CANCER REHABILITATION IN PAKISTAN: GROUND REALITIES AND THE WAY FORWARD

Nasir Mansoor Sahibzada, MBBS, FCPS, MCPPS, MSC

OBJECTIVES: “To assess the ground situation of cancer rehabilitation in Pakistan and suggest way forward.”

Cancer is a major cause of morbidity and mortality worldwide. Pakistani population is ethnically diverse and heterogeneous. There are 148000 newly diagnosed cases yearly. Cancer rehabilitation is not available in any public private hospital.

DESIGN: An online search using major international and national databases with the keywords combinations, cancer, rehabilitation, disability, quality of life, statistics and services, in addition official website of the government and health departments were searched. Telephonic interviews with colleagues in cancer hospitals both local and abroad.

RESULTS: There is no national cancer registry in Pakistan, only two regional cancer registries. The common cancer among males in Pakistan are prostate, bladder, lung, NHL and CNS cancers while in females the common cancers are breast, ovary, uterus, NHL and cervix cancers. There are only 135 oncologists to look after a population of 220 million. There is no dedicated cancer rehabilitation center. There are 23 dedicated cancer hospitals and only 53 hospitals with an oncology department. There is a lack of awareness among oncologists and general population about cancer.
rehabilitation. There are only 75 rehabilitation consultants in the country. There are issues of funding, manpower and resources. There are no or late referral to rehabilitation physicians and centers. There is a lack of coordination and team work among health-care professionals dealing with cancer patients.

CONCLUSIONS: There is a generalized lack of awareness regarding cancer rehabilitation among oncologists and cancer patients in Pakistan. There should be standardized cancer rehabilitation services developed. There is a need for advocacy for cancer rehabilitation, awareness among local oncologists, patients and care givers, involvement of rehabilitation physicians in cancer multi-disciplinary team meetings and indoor. There should be programs for mass awareness and capacity building and training of rehabilitation professionals in cancer rehabilitation.

STIFFNESS DUE TO LONGUS COLLI TENDINITIS

Jose L. Rios Russo, MD, ATC, Andrew E. Lincoln, ScD, MS, SCD, MS, and Ankit B. Shah, MD, MPH, FACC

CASE DESCRIPTION: A 65 year old female developed acute progressive neck pain and swelling and difficulty with swallowing. She then presented to the emergency room where she was given an intramuscular injection of Toradol and was diagnosed and treated for longus colli tendinitis.

CASE DIAGNOSIS: Effects of cardiac rehabilitation in athletes and highly active people is not well studied.

CASE DESCRIPTION: Cardiac rehabilitation (CR) is a multidisciplinary intervention proven to reduce cardiovascular morbidity and mortality and improve quality of life in the general population after a cardiovascular event or surgery. However, guidelines do not provide adequate guidance on exercise protocols and lifestyle modifications for athletes, especially active people who experienced a cardiac event and wish to return to competitive training. This review examines the benefits of high intensity exercise and illustrates current evidence of the effects athletes and physically active people experience during CR with the goal to return to competitive pre-event status. 3 databases were used: PubMed, EBSCOHost, and SPORTDiscus.

DISCUSSIONS: CR guidelines have traditionally avoided strenuous exercise protocols due to concern of adverse outcomes. However, recent literature shows high-intensity exercise protocols are beneficial in improving aerobic capacity and peak performance with similar but limited adverse events compared to traditional CR programs. Athletes and highly active people generally do not complete CR following a cardiac event because they feel the programs are not addressing their personal goals. There are no trials that demonstrate the effects of maximal exercise in cardiovascular risk factors following an acute event, creating a knowledge gap. Case reports of CR targeted in this population have demonstrated successful return to pre-injury competitive status with minimal adverse effects. Additionally, inadequate dietary practices have been reported in athletes that warrant education by the CR staff.

CONCLUSIONS: There are clear gaps in understanding potential benefits and harms of maximal effort exercise in post-cardiac event athletes. Initial evidence proves that higher-intensity, sport-specific CR programs lead to positive results. This should promote more research trials to solidify this argument and create attention for adapting current guidelines to the athletic and physically active people following an acute cardiac event.

CASE REPORT: A RARE CAUSE OF ACUTE NECK PAIN AND STIFFNESS DUE TO LONGUS COLLI TENDINITIS

Steven Zehring, DO, and Jayesh Vallabh, MD, MBA

CASE DIAGNOSIS: This is a case report of a patient with acute neck pain and stiffness who was diagnosed and treated for longus colli tendinitis.

CASE DESCRIPTION: A 65 year old female developed acute progressive neck pain and stiffness without history of trauma or infectious symptoms. She initially presented to an urgent care where she was given an intramuscular injection of Toradol and steroid. However, her neck pain and stiffness increased during the next few days with significantly reduced cervical range of motion. She also noted lateral neck swelling and difficulty with swallowing. She then presented to the emergency room where MRI of the cervical spine showed focal edema anterior to the C1-C2 articulation suggestive of longus colli tendinitis. She was given a short course of oral steroids and follow up in the pain management clinic.

DISCUSSIONS: Longus colli tendinitis is typically caused by repetitive trauma or by calcium deposition into the musculotendinous structure. It is often difficult to diagnose and can be easily misdiagnosed as pharyngitis or abscess as the inflammatory reaction can cause a mild temperature elevation with a mild increase in infectious and inflammatory biomarkers. Patient’s often complain of constant severe retropharyngeal neck pain with difficulty swallowing. Pain typically refers to the anterior and posterior neck. Treatment typically consists of nonsteroidal anti-inflammatory medications. Some patients also benefit from heat and deep tissue massage. Patients with on-going symptoms can be treated with an injection of local anesthetic to the superior portion of the longus colli tendon.

CONCLUSIONS: This is an interesting case of acute neck pain and stiffness that is not often seen in the interventional pain clinic. Correct diagnosis and rule out of infectious causation is key to appropriate management. In this case, the patient improved significantly with a short course of oral steroid in combination of non-steroidal anti-inflammatory medications.

CASE REPORT: CERVICAL DYSTONIA CAUSED BY UNDIAGNOSED CHRONIC C2 FRACtURE

Jamie A. Sibel, MD, Majid Dadgar-Kiani, MD, Paul Overdorf, MD, Shangming Zhang, MD, and David R. Gater, MD, PhD

CASE DIAGNOSIS: 72 year old male presented with worsening cervical dystonia and dysphagia, responded well to botulinum toxin injection, later found to have C2 non-union fracture.

CASE DESCRIPTION: A 72 year old presented with undiagnosed progressively worsening cervical dystonia and dysphagia. He received botulinum toxin injection which was extremely effective. To assure cervical spine stability and tolerance to physical therapy, a cervical spine x-ray was obtained and revealed findings consistent with cervical dystonia and an unexpected C2 non-union fracture. A subsequent cervical spine MRI revealed a chronic C2 non-union fracture and cord kinking at C1-C2 with severe central canal stenosis. The patient underwent complex neurological procedures. No recurrence of cervical dystonia has been noted 12 months after injection and surgery.

DISCUSSIONS: Cervical dystonia is characterized by sustained or intermittent involuntary muscle contractions of the neck, head, and shoulders leading to various disabling abnormal posture and movements. Osteodystrophy fracture, odontoid osteosclerosis and atlantoaxial rotatory subluxation caused cervical dystonia have been previously reported. In this report, patient was found to have a C2 fracture and central canal stenosis which is believed to be the underlying reason for cervical dystonia based on the effectiveness of botulinum toxin injection and no recurrence of cervical dystonia 12 months post-operation. As part of a routine work up of cervical dystonia, it may be valuable to image the cervical spine to rule out cervical vertebral fracture and central canal stenosis. Dysphagia is very common in patients with cervical dystonia, and is also the most common adverse effect of botulinum toxin therapy, therefore the assessment of pre-existing dysphagia prior to injection is important.

CONCLUSIONS: In summary, we report a case that cervical dystonia is mostly likely secondary to an undiagnosed C2 fracture. We suggest that all patients with severe cervical dystonia receive cervical spine imaging and undergo evaluation for possible dysphagia.

CASE REPORT: PROSTHETIC REHABILITATION IN BILATERAL LOWER LIMB PEDIATRIC AMPUTEE

Maria P. Grisales, Resident Physician, Katalina Espinosa, Resident Physician, and Alzate O. Nestor

CASE DIAGNOSIS: Patient who required right transfibial and left transfemoral amputation at forty-five days of age after deep burn on the lower extremities. The orthotic rehabilitation process began when the patient was five months old.

CASE DESCRIPTION: Initially, compensatory crawling prostheses with long socket were prescribed. Afterward, the patient began walking at 25 months with a left non-modular transfemoral prosthesis, a right transfibial esoskeletal prosthesis and a child front wheeled walker. At 49 months, both terminal devices were changed for solid ankle cushion heel feet. Finally, at five years a polycentric knee was added to the left prosthesis, dynamic feet to both prostheses, and the walker was changed to Canadian crutches to gain a more independent gait and knee flexion while sitting. Currently, the patient is 7 years old, walks with one or two Canadian crutches and is going to kindergarten. At this time, the rehabilitation in this patient is centered on achieving polycentric knee use in gait and reducing use of ambulation aids.

DISCUSSIONS: Although literature on rehabilitation of pediatric bilateral amputees is limited, there are some basic principles of prosthetics applicable for these cases. Early prosthetization is essential to improve functionality and adaptation. In children, due to their long life expectancy, early independence reduces the disability burden for the patient and his community. Additionally, following developmental milestones is recommended in order to achieve proper gait and balance. In this case, it was achieved by starting crawling prostheses, followed by esoskeletal prostheses and finally modular shanks, while using different ambulation aids. Finally, family support and perseverance have been essential for successful rehabilitation, as described in literature.

CONCLUSIONS: In spite of limited literature available on this subject, the principles of early prosthetization, following developmental milestones and family support, allowed a successful rehabilitation process in this patient with adequate neurodevelopment and social integration.
CASE REPORT: PROSTHETIC REHABILITATION IN PEDIATRIC PATIENT AMPUTATED WITH VAN NES ROTATIONPLASTY, CALI, COLOMBIA
Leiva Pemberthy Luz Miriam, Ramirez Abadia Laura, and Alzate O. Nestor

CASE DIAGNOSIS: Van Nes type rotationplasty is a reconstructive option for patients with lower limb bone loss, whose prosthetic rehabilitation is challenging and requires a multidisciplinary team to achieve a high level of functionality and independence. We describe prosthetic rehabilitation in a pediatric cancer patient with this type of amputation.

CASE DESCRIPTION: An 11-year-old male patient with osteosarcoma of the left distal femur required chemotherapy and Van Nes type rotationplasty was performed. The patient was subsequently assessed by a prosthetic and orthotic clinic to begin prosthetic rehabilitation. Independent gait and functional improvement were achieved.

DISCUSSIONS: Van Nes type rotationplasty is a reconstructive option for patients with lower limb bone loss, associated with a low incidence of complications, high functionality and duration. The case described highlights the complexity of prosthetic rehabilitation in a pediatric patient who underwent Van Nes rotationplasty due to osteosarcoma of the right distal femur. The rehabilitation required a multidisciplinary team, with pre-prosthetic functional assessment and therapeutic intervention with a biopsychosocial approach, in order to guarantee the integral management that the patient required for his oncological pathology. The achievements were high functionality and independence in their activities of daily living.

CONCLUSIONS: Rotationplasty with preservation of the mechanism of active control of the pseudo-knee offers an adequate result for the adaptation of prostheses allowing functional and independent gait. Due to anatomical, oncological conditions and biomechanical changes, these patients require a rigorous prosthetic rehabilitation plan led by a multidisciplinary team which includes specialists in rehabilitation, social work, psychology and other professions, in order to provide timely, optimal care with satisfactory results in terms of independence and functionality in daily living activities.

CATASTROPHIZING IN PATIENTS WITH KNEE OSTEARTHRITIS IN PHYSICAL MEDICINE AND REHABILITATION
Mouna Sghir, Doctor, Soumya Elarem, Doctor, Aymen Haj Salah, Doctor, Taki Elhers, Doctor, Rim Maamou, Professor, and Wassia Kessomintsi, Professor

OBJECTIVES: Pain is among the most frequently reported, bothersome, and disabling symptoms described by patients with knee osteoarthritis. Furthermore, catastrophizing, a set of negative emotional and cognitive processes, is increasingly implicated in the experience of pain in osteoarthritis (OA). The aim of this study was to analyze the correlations between severity of Knee OA and catastrophizing.

DESIGN: A cross-sectional study was conducted in patients with knee OA referred to the PMR department of Mahdia in March 2019. Socio demographic data, history of knee osteoarthritis as well as radiographic data were collected. The severity of Knee OA was assessed using Lequesne Index. Pain catastrophizing was measured by the Pain Catastrophizing Scale (PCS).

RESULTS: Forty patients were included. The mean age was 57.3 ± 9.1 years and the sex ratio 0.11. Most patients (66.7%) were referred from general practitioners. The mean evolution of the OA was 3.6 years. The mean Lequesne index was 10.8 ± 2.3 and the mean PCS was 26.93 ± 6.5. No associations were found between the PCS and mean evolution of the OA. The mean Lequesne index was 10.8 ± 2.33 and the mean PCS was 26.93 ± 6.5. No associations were found between the PCS and mean evolution of the OA. The mean Lequesne index was 10.8 ± 2.33 and the mean PCS was 26.93 ± 6.5. No associations were found between the PCS and mean evolution of the OA.

CONCLUSIONS: PCS was high among patients with knee OA followed in rehabilitation. A correlation between catastrophism and severity wasn’t established in our study.

CENTRAL CORD SYNDROME SECONDARY TO TRAUMATIC SYRINGOMYELIA WITH CONCOMITANT BILATERAL BRACHIAL PLEXUS INJURY: A CASE REPORT
Maria Corazon P. Riego, Doctor, Anna Cecilia Tiaangeo, Doctor of Medicine, and Monalisa Lim-Dungca, Doctor of Medicine

CASE DIAGNOSIS: Central Cord Syndrome Secondary to Traumatic Syringomyelia with Concomitant Bilateral Brachial Plexus Injury

CASE DESCRIPTION: A case of a 17-year-old, left-handed, male student, who gradually developed tetraplegia with sensory deficits at the level of C5 dermatomes and below and bladder incontinence after lifting a gas tank. Cervical MRI with contrast showed non-enhancing intramedullary lesion from C3-C7 with post traumatic myelomalacic changes. Symptoms improved with medical management but with residual bilateral upper extremity weakness. Electromyography and nerve conduction studies revealed bilateral brachial plexus injury at C5-C6 root levels. Diagnostic musculoskeletal ultrasound showed hypoechoic and enlarged left C5, C6 and C7 nerve roots. Intensive rehabilitation (physical and occupational therapy) was performed for three weeks and resulted to improvement in the patient’s functional independence and return to school.

DISCUSSIONS: Spinal cord injury with concomitant brachial plexus injury is rare with a frequency of 0.6% to 1.8%. Magnetic resonance imaging (MRI), electrodiagnostic studies, and musculoskeletal ultrasound as diagnostic tools in rehabilitation medicine can help in the diagnosis of combined traumatic injuries. EMG-NCV can be a helpful tool to confirm a diagnosis, localize the level of lesion, estimate the severity of axon loss, and completeness of the lesion. In this case the patient's recovery can be attributed to the severity and the mechanism of injury. A grade 2 or axonotmesis injury in C5-C6 nerve lesions usually recover anywhere from 6 months to 1 year. MRI revealed incomplete resolution of edema which resulted to the residual weakness of the left scapular muscles. Diagnostic ultrasound examination of the brachial plexus showed hypoechoic changes in the left C5-C7 nerve roots compatible to a pathologic finding in ultrasound.

CONCLUSIONS: Early diagnosis of combined spinal cord and brachial plexus injuries can be detected with the use of MRI, electrodiagnostic studies and musculoskeletal ultrasound. Together with timely and appropriate rehabilitation intervention, the patient achieved favorable functional outcome.

CEREBRAL SMALL VESSEL DISEASE AND MOTORIC COGNITIVE RISK SYNDROME
Nan Wang, MD

OBJECTIVES: The contribution of cerebral small vessel disease to gait abnormality and cognitive decline in non-Caucasian populations is not well established. We examined the relationship of cerebral small vessel disease and Motoric Cognitive Risk (MCR) syndrome in Indian seniors.

DESIGN: The presence of cerebral small vessel disease (lacunar infarcts and cerebral microbleeds) and white matter hyperintensities on MRI was assessed by raters blinded to clinical information. MCR, a recently described predementia syndrome, was defined by the presence of both slow gait speed and cognitive complaints in older adults without dementia or mobility disability.

RESULTS: 28.9% of participants met criteria for MCR syndrome. Lacunar infarcts in the frontal lobe were associated with MCR syndrome even after adjusting for age, gender, education, vascular risk factors and leukoariosis (OR: 4.02, 95% CI: 1.41-11.47). Lacunar infarcts in the frontal lobe were also associated with slow gait speed (OR: 3.48, 95% CI: 1.25-9.66) and poor performance on memory tests (β: -1.86, 95% CI: -3.18 to -0.54). No association was found between cortical microbleeds and MCR syndrome.

CONCLUSIONS: Lacunar infarcts in the frontal lobe are associated with MCR syndrome in older adults, by contributing to slow gait speed and poor memory function.

CERVICAL EDEMA RESULTING IN C3 AIS C TETRAPLEGIA WITH SECONDARY AUTONOMIC DYSREFLEXIA
Nandan J. Patel, BS, Keneshia Kirksey, MD, and Powell Danielle, MD

CASE DIAGNOSIS: C3 AIS C Tetraplegia

CASE DESCRIPTION: Mr. B is a 51-year-old male with a history of chronic hypertension who presented with C3 AIS C tetraplegia after a motor vehicle collision versus an 18-wheeler. Magnetic Resonance Imaging revealed C2-C4 cord edema and ligamentum flavum injury at C3-C4. Neurosurgery deemed his cervical spine as stable with no indication for surgical intervention. Mr. B. was then transferred to acute inpatient rehabilitation; however, autonomic dysreflexia (AD) complicated his rehabilitation course due to urinary retention and neurogenic bowel with constipation. He remained on his home dose of lisinopril. Pharmacological treatment of his AD consisted of nitroglycerin paste initially, but because of the continued elevated blood pressures, hydralazine was added. After his bowel and bladder programs were optimized, his AD resolved. He then began to experience orthostatic hypotension, which ultimately led to the discontinuation of all anti-hypertensive medications. Mr. B benefited from the addition of compression stockings and an abdominal binder.

DISCUSSIONS: This case provides a review of AD, a potentially life-threatening complication in individuals with spinal cord injuries (SCI) at T6 and above. AD is characterized by an increase in blood pressure of 20 mmHg or greater over the usual baseline and can present with bradycardia or tachycardia. Patients may also present with sudden onset headache, sweating, nasal congestion, blurred vision, and cardiac
arrhythmia. It is important to note that AD may appear with little to no symptoms despite elevated blood pressure, this phenomenon is known as silent AD.

CONCLUSIONS: With AD being reported to occur in many SCI patients with an injury at T6 and above, this case examines a common but overlooked complication. This case also provides an example of how edema of the spine can cause tetraplegia; however, due to no evidence of disc disruption, cord compression or cervical instability, his prognosis was more favorable.

CHALLENGES FOR "RESUMING OCCUPATION" IN RECOVERY PHASE REHABILITATION HOSPITAL

Kazuki Nomura, OT, and Mikiko Kawamura, PT, Chishu Terada, OT, Sho Ueda, OT, Shigeto Shiota, OT, and Junko Amano, CEO

OBJECTIVES: Occupational therapists are patient-oriented health professionals who promote the health and well-being of patients through their occupation (WFOT 2012). However, there are doubts about whether occupational therapy based on occupation is provided at a rehabilitation hospital in Japan. In this study, we clarified whether inpatients in rehabilitation hospitals can receive occupational therapy pertaining to their occupation.

DESIGN: A questionnaire survey was conducted with 13 occupational therapists from a rehabilitation hospital. The survey period was from April 2018 to September 2019. The contents of the questionnaire were as follows: 1) the occupation selected by the patients (COPME: Utilization of Canadian Occupational Performance Measure), 2) achievement status of practice based on occupation, and 3) factors that cannot be practiced did.

RESULTS: Valid responses were obtained from all 13 participants (response rate 100%). (1) The occupation selected by the patients were diverse, such as cooking, shopping, and work. (2) The percentage of respondents who did not achieve the occupation-based practice was low, at 42% for cooking, 39% for shopping, and 84% for work. (3) Occupational therapists themselves lacked skills and their activities were restricted by their families.

CONCLUSIONS: Based on this study, it became clear that occupational therapy may not be fully practiced in rehabilitation hospitals. Occupational therapists themselves and environmental aspects are factors that prevent them from practicing, and it is necessary to improve postgraduate education and develop a system to intervene for the environmental factors. In the future, the scope of the survey will be expanded to rehabilitation hospitals nationwide, and surveys on the actual situation of practice based on occupation in Japan and an educational system and maintenance of the system for all rehabilitation hospitals are required.

CHALLENGES OF DIAGNOSING AND TREATING PIRIFORMIS SYNDROME: A THOROUGH AND AFFECTIVE APPROACH

Annette M. Grotheer, BA, Michael Dove, MD, and Chane Price, MD, MBS

CASE DIAGNOSIS: Piriformis syndrome refractory to conservative treatment

CASE DESCRIPTION: A previously healthy 27-year-old female presented with two years of persistent low-back pain involving the left posterior thigh and foot. Her pain was exacerbated by sitting, relieved by standing and associated with paresis of the left great toe. Piriformis syndrome was not supported by comprehensive workup. Lumbar x-ray and magnetic resonance imaging (MRI) without contrast demonstrated normal findings and mild facet arthropathy respectively. Pelvic MRI demonstrated normal sciatic nerve course with mild fascicular enlargement and T2 hyperintensity of the proximal sciatic and peroneal nerves. Magnetic resonance neurography (MRN) supported lumbar MRI findings and evidence of an incidental obturator strain. Nerve conduction (NCS) and electromyographic (EMG) studies were normal. The patient failed conservative management for suspected piriformis syndrome consisting of oral diclofenac, gabapentin and concordant physical therapy. Subsequently, the left piriformis muscle was fluoroscopically injected with ropivacaine (1ml), normal saline (5ml) and depomedrol (40mg/ml x 1ml). Post-procedure, the patient reported 100% decrease in symptoms.

DISCUSSIONS: Piriformis syndrome is thought to be responsible for approximately one percent of cases presenting with sciatica. Diagnosis of this condition is challenging as the pathology is easily confused with other conditions contributing to low back and buttock pain. Furthermore, EMG/NCS and imaging are often normal and are often not useful in ruling in/out other etiologies of low back and buttock pain. However, fluoroscopic guided injection may serve as both a diagnostic and therapeutic modality.

CONCLUSIONS: Increased understanding of the diagnostic and treatment modalities for this condition is crucial to improving diagnostic accuracy and treatment rates. Additionally, MRN and fluoroscopic steroid injection should be considered as an effective method of diagnosing and treating this condition, particularly for instances of difficult diagnoses.

CHANGE IN MUSCULOSKELETAL TREATMENT BASED ON ULTRASOUND FINDINGS OF A METASTATIC TUMOR: A CASE REPORT

Naveen Khokhar, DO, and Alexandru Dinu, MD

CASE DESCRIPTION: Metastatic Squamous Cell Carcinoma

OBJECTIVES: To describe the case of a 73 year old male presented with hemoptysis, head-aches, and ataxia to the emergency room. CT head demonstrated a right parafalcine mass consistent with bronchogenic carcinoma. Neurosurgery were consulted and the patient underwent a hemiancraniotomy. Pathology was consistent with metastatic squamous cell carcinoma with primary lung tumor. Much of his therapies were limited due to chronic left shoulder pain. The patient believed this was a chronic injury that he suffered with no prior investigation. X-ray of the shoulder demonstrated mild degenerative joint disease. Plan was for lidocaine injection. Ultrasound of the shoulder demonstrated a full-thickness tear of the left supraspinatus muscle, AC joint arthrois, and a large hypoechoic region inferior to the glenohumeral joint. Lidocaine injection was deferred until further evaluation of the hypoechoic region. Subsequent PET scan to delineate cancer progression demonstrated a large lesion at the left scapular gneid with prominent soft tissue and deconstructive component.

DISCUSSIONS: Diagnostic ultrasound can be performed for dynamic visualization of anatomy for both diagnostic accuracy and planning for therapeutic intervention. This is beneficial in cases with possible variant anatomy to optimize safety and appropriate localization of injections. Musculoskeletal anatomical variants are commonly featured in patients with metastatic disease.

CONCLUSIONS: Metastatic disease is an unpredictable process in terms of tumor spread and seeding. Diagnostic ultrasound should be considered in patients presenting with chronic musculoskeletal complaints with history of metastatic cancer. Incorporating this can ensure safety with injection administration in such cases to avoid risk of promoting pathological fractures.

CHANGES IN OPIOID PRESCRIBING BEHAVIORS AMONG FAMILY PHYSICIANS WHO PARTICIPATED IN A WEEKLY TELE-MENTORING PROGRAM

Santana Diaz, MD, MSC, Jane Zhao, MSC, Shawn Cronin, BSC, MSCOT, Andrea D. Farlan, MD, PhD, Claire Bornbarier, MD, FRCPC, and Susan Jugali, BSC, MSC, PhD

OBJECTIVES: A weekly tele-mentoring program was implemented in Ontario to help address the growing opioid crisis through teaching and mentoring family physicians on the management of chronic pain and opioid prescribing. This study assessed opioid prescribing behaviors among family physicians who attended the ECHO Ontario Chronic Pain/Opioid Stewardship Program compared to two groups of Ontario family physicians who did not attend ECHO.

DESIGN: We conducted a retrospective cohort study with two control groups: a matched cohort, and a random sample of 3,000 family physicians in Ontario. Each physician was followed from one year before the date they started ECHO, which is the index date, and one year after they started attending ECHO. We examined the number and proportion of patients on any opioid, on high dose opioids, and average daily morphine equivalent doses prescribed to each patient.

RESULTS: We included 24 physicians who participated in ECHO (collectively prescribed opioids to 2,760 patients), 96 matched physicians (11,117 patients prescribed opioids) and 3,000 random family doctors (374,174 patients prescribed opioids). We found that, at baseline, the ECHO group had similar number of patients on any opioid, but more patients on high dose opioids than both control groups. There was no change in the number of patients on any opioid before and after the index date, but there was a significant reduction in high-dose opioid prescriptions in the ECHO group, compared to a non-significant increase in the matched cohort, and a non-significant reduction in the Ontario group during the same comparable periods.

CONCLUSIONS: Physicians who self-selected to participate in a weekly tele-mentoring program had more patients on high-dose opioids than the two control groups. Participation in the program was associated with greater reduction in high-dose opioid prescribing. Further investigations are needed to better understand the effects of the ECHO program.

CHARACTERISTICS AND MANAGEMENT OF CHRONIC PAIN IN THE PALAJUNO VALLEY OF GUATEMALA

Kevin Hill, Igorestuardo Piedra Santa, MD, Regina Woolridge, Madeline Kuney, and Elena Stepman van den Berg

OBJECTIVES: Chronic Pain (CP) prevalence hovers around 20% internationally, manifesting as dramatic detriments to quality of life and economic burden.
Impoverished conditions and poor healthcare access pose greater difficulties to those suffering in Latin America. The purpose of this study was to characterize how people are affected by and manage CP in the Palajunoj Valley (PV) of Guatemala and develop strategies to combat it.

**DESIGN:** Adults were randomly selected for survey participation from clinic waiting rooms at the NGO Primeros Pasos and 7 health outposts in the PV’s communities. Exclusion criteria included minors and non-Spanish speakers. Criteria for CP included ≥5/10 average pain, ≥26 months duration, and pain experienced 3 times per week. The questionnaire integrated original items with those from previous studies. Responses and informed consent were obtained orally by Primeros Pasos volunteers. Study approval was obtained from Primeros Pasos and Dr. Salvador Soto, Health Director of Quetzaltenango, who manages the PV’s outposts. Chi-squared tests and one-way ANOVA with post hoc tests were employed for data analysis.

**RESULTS:** Of the 305 individuals surveyed, 87 had CP. Our sample’s confidence level and interval was 95% and 5.55, respectively. The most common pain locations were the lower back, head, and foot. Increasing age and hours worked per week were positively correlated with CP rates. 15% of participants with CP could not sleep and 10% could not work. Cost of treatment was a nearly ubiquitous barrier to care. Finally, 30% of participants with CP had not seen a doctor for their pain despite presenting to Primeros Pasos, a physician-run, low-cost clinic.

**CONCLUSIONS:** Poor quality of life and inadequate CP treatment rates necessitate the implementation of pain prevention and management strategies. We recommended that Primeros Pasos expand their health workshops to reach older and working populations in addition to integrating robust clinical CP screenings.

**CHARACTERISTICS OF PATIENTS WITH INTRATHECAL BACLOFEN PUMPS**

Edin Zvornicanin, Martin Manansala, MD, Claudine Ward, MD, Katherine D. Goss, MPH, Lynne Romenes Logan, PT, PhD, PCS, and Margaret A. Turk, MD

**OBJECTIVES:** Intrathecal baclofen (ITB) pumps are used to manage intractable spasticity in a wide array of conditions including cerebral palsy (CP), spinal cord injury (SCI), brain injury (BI), and multiple sclerosis (MS). The purpose of this study is to examine characteristics of patients treated with ITB and to explore potential factors associated with infusion patterns.

**DESIGN:** This study is a retrospective electronic chart review of 83 clinic patients with an implanted ITB pump in an academic outpatient clinic. Data items included infusion type (continuous versus flex), total daily dosage, change in daily dosage between 2017-2019, primary diagnosis, and G code. G-codes are Medicare descriptors of function. We have used them as a proxy for general severity. Analysis included descriptive statistics and differences between groups (t-tests, chi-square test, one-way ANOVA).

**RESULTS:** The most common diagnosis was CP (50.6%) followed by SCI (18.1%). A majority of patients were white (89.2%) and male (57.8%). The average age was 39.3 years (SD=18.4), average daily dosage was 574 mcg/day, and average change in dosage was +53 mcg/day. G-code was not significantly correlated with daily dosage (Pearson’s R=0.163; p=0.14), but differed based on patient diagnosis (F(6)=2.43; p=0.03). Patients with CP used simple continuous infusion type (p=0.002) more often than patients without CP whereas patients with MS used flex infusion more often than patients without MS (p=0.003). Patients with MS (M=25.5 mcg/day) who had significant change in total daily dosage compared to other patients (M=622; t(81)=2.518; p=0.014), despite not having G-codes different from other patients.

**CONCLUSIONS:** This study suggests that patients with multiple sclerosis may need lower doses of ITB. Additionally, higher levels of disability (as measured by G-codes) do not always indicate the need for higher doses. Instead, in this practice, the patient’s physical findings, functional status, goals and response to treatment guide ITB dosing.

**CHARACTERISTICS OF TREATMENT-RELATED LOWER LIMB LYMPHEDEMA IN PATIENTS WITH MELANOMA**

Yun Sangmoon, MD, Yoon Kim, Jun Hee Han, Seung Mi Yeo, Jung Han Kim, and Ji Hye Hwang

**OBJECTIVES:** The aim of this retrospective study was to investigate the characteristics of treatment-related lower limb lymphedema in melanoma patients by observation of serial volume difference measured with infrared optoelectronic volumetry. Medical records of melanoma patients who had diagnosed of unilateral lower limb lymphedema after surgery with wide local excision and unilateral inguinal lymph node biopsy or dissection were retrospectively reviewed. Limb lymphedema was diagnosed by characteristic physical findings and clinical history. The volume of bilateral lower limbs was measured with infrared optoelectronic volumetry and inter-limb difference in volume was calculated by subtracting the volume of unaffected limb from the volume of affected limb.

**RESULTS:** Total of 20 patients presented with clinical treatment-related lower limb lymphedema after surgery for melanoma. 9 patients showed over 5% increased inter-limb difference regionally in proximal lower limb without distal edema (Ps-group) and 5 patients had regional proximal lymphedema below 5% difference (Pm-group). Rest of the patients showed initial whole lower limb lymphedema (W-group), with over 5% increased inter-limb difference in whole lower limb. All patients were educated to perform self-manual lymphatic drainage, stretching exercise, and received proper compression stockings. All patients of W-group received CDP, compared to 44.4% of Ps-group and 20% of Pm-group. 50% of W-group performed bandaging, while 22.2% and 20% of Ps- and Pm-group, respectively, applied compression bandage. After 1 month, the mean total volume decline (%) was greatest in Ps-group (67%) followed by W-group (57.37%), while total volume was increased in Pm-group (232.88%).

**CONCLUSIONS:** In patients with melanoma, treatment-related lower limb lymphedema may appear 1-2 month after surgery. Most patients with lymphedema are likely to have proximal dominant edema, and severe proximal lower limb lymphedema may show stiff decline of volume difference 1 month of lymphedema treatment, with large volume decline at proximal leg. This decline may be well maintained after 6 months.

**CHARACTERIZATION OF SHOULDER PAIN AND DYSFUNCTION IN PERSONS WITH BREAST CANCER**

Adrian Cristian, MD, MHCM

**OBJECTIVES:** To characterize types of shoulder problems commonly seen in breast cancer patients and survivors.

**DESIGN:** A 12 month retrospective review was performed of 264 patients referred to a cancer rehabilitation clinic whom were undergoing active treatment for breast cancer or had completed cancer treatment. The clinic is located in a large outpatient cancer institute in a metropolitan area in southeastern US.

**RESULTS:** 148/264 patients (56%) referred had shoulder pain and dysfunction. Based on physical examination, 47/148 (31.8%) had adhesive capsulitis, 51 (34.4%) had shoulder impingement or shoulder stiffness, 11(7.4%) had cervical region/upper back myofascial pain and 39 (26.4%) had both an adhesive capsulitis or impingement and lymphedema of the ipsilateral arm.

**CONCLUSIONS:** Shoulder pain and dysfunction is very common in breast cancer patients and breast cancer survivors referred to a cancer rehabilitation clinic. Early identification of high risk patients and early introduction of rehabilitative interventions is essential to minimizing pain and dysfunction.

**CHARACTERIZING THE INCIDENCE OF SHOULDER PAIN AND ASSOCIATED RISK FACTORS IN ELITE LEVEL SLED HOCKEY PLAYERS**

Jacqueline Spangenberg, BS, Ryan P. Nussbaum, DO, and Prakash Jayabalan, MD, PhD

**OBJECTIVES:** The presence of shoulder pain has been reported to be up to 78% in manual wheelchair (MWC) users. However, the incidence of pain in individuals who play elite adaptive sports is not well-defined. Recent reports suggest sport-specific patterns of shoulder pain and injury. The objective of the present study was to characterize and identify factors associated with shoulder pain in a large cohort of elite sled hockey players.

**DESIGN:** Cross-sectional study design study that took place at the 2019 USA National Elite Sled Hockey Classic. Participants completed surveys that assessed their demographics, wheelchair use and history of sled hockey participation. To assess intensity and experience of shoulder pain, the Performance-Corrected Wheelchair User’s Shoulder Pain Index (PC-WUSPI) and the Visual Analog Scale (VAS) for pain were measured. Associations were evaluated between the pain intensity and demographics, MWC use and sled hockey participation.

**RESULTS:** Eighty-two participants (n=82) completed the survey with an average age of 33.9 ±11.8 years with 70 male, 12 female and mean BMI of 25.8±5.3. Approximately 70.5% of the participants endorsed shoulder pain within the last month, with average VAS of 2.13±2.3 and PC-WUSPI of 15.46±20.98. 66.2% of participants engaged in regular shoulder strengthening exercises. Positive associations were found between the presence of pain and BMI (p-value 0.008; OR 1.04, 95%CI 1.01-1.07)
and duration of MWC use (p-value 0.002; OR 1.13, 95%CI 1.04-1.22). Years of sled hockey participation was not associated with the presence of shoulder pain.

CONCLUSIONS: Sled hockey athletes experience shoulder pain with an incidence similar to that reported for the general population of MWC users. Given the demonstrated association between incidence of shoulder pain and years of MWC use as well as BMI, our next step is to develop novel preventative and interventional strategies that protect this population from injury and improve performance.

CHINESE EVIDENCE- AND CONSENSUS-BASED RECOMMENDATIONS FOR BRACING TREATMENT IN ADOLESCENT IDIOPATHIC SCOLIOSIS
Qing Du, PhD

OBJECTIVES: Although scoliosis bracing treatment has been conducted in China for more than 20 years, evidence-based recommendation (EBR) and consensus-based recommendation (CBR) for bracing treatment in adolescent idiopathic scoliosis (AIS) were still scarcely available in China, which potentially resulting in suboptimal outcomes. It is urgent demand to develop evidence-based and consensus-based recommendations for bracing treatment in AIS to provide guidance and specifications for the prescription, manufacture and follow-up of scoliosis brace treatment in China.

DESIGN: A multidisciplinary guideline development committee, including orthopedists, physiatrists, physiotherapists and orthotists, was formed. Five databases, including PubMed, EMBASE, the Cochrane Library, Cumulative Index to Nursing and Allied Health (CINAHL), and Web of Science were systematically searched. After referring to relevant international guidelines and combining with affairs in China, a draft was circulated among the committee. The final guideline was recruited by the committee to reach agreement (100% consensus).

RESULTS: Altogether, 34 recommendations (32 EBRs and 2 CBRs) were developed to guide the prescription, manufacture and follow-up of scoliosis brace treatment, including the clinical practice of non-surgical treatment of AIS based on evidence-based medicine; principle and effectiveness of treatment; different types of bracing on AIS; compliance of treatment; assessment of brace quality, and brace treatment combined with PSSE.

CONCLUSIONS: Due to multiple factors such as clinical experience, environmental factors and cultural differences, the application of bracing in China is still not standardized, and there are some phenomena such as over-treatment or under-treatment. The developed recommendations provide a basis for the systematic management of bracing treatment in AIS be refined as new evidence emerges, which might be benefit for avoiding over-treatment or under-treatment. However, there still has some limitations which need to be further updated and improved in future clinical practice.

CHRONIC EXERTIONAL COMPARTMENT SYNDROME OF THE FOREARM IN SCLERODERMA MORPHEA: A CASE REPORT
Kathryn M. Alfonso, DO, Brittany Moore, MD, and Jacob Sellon, MD

CHRONIC NON-SPECIFIC LOWER BACK PAIN AND ITS RELATION TO SLEEP POSTURE
Daniel Mok, MS, Jacek Bednarz, BSC, and Michael Wieging, DO, MED

OBJECTIVES: The etiology of back pain is mostly mechanical, therefore risk factors that alter the musculoskeletal structure can contribute to its pathology. Varying stresses are placed on the spinal cord and its musculature in different sleep postures which can contribute to back pain. Studies on the association between sleep posture and back pain is lacking. Here we attempt to discover sleep postures which are associated with chronic non-specific lower back pain (CNSLBP).

DESIGN: CNSLBP was defined as lower back pain lasting ≥3 months excluding pain caused by nerve root pain, radicular syndrome, pain due to tumor(s), cancer, osteoporosis, pregnancy, fracture, structural deformity, infection, inflammatory disorder, or cauda equina syndrome. A survey was made available to highly trafficked online forums that queried age, sex, height, weight, sleep hygiene, movement during sleep, and commonly cited sleep postures. Two proportion Z-tests were performed in SPSS v22.0 with α = 0.05 to assess if sleep postures differ in individuals with CNSLBP.

RESULTS: Of the 184 surveys completed, 49% (90/184) had no chronic back pain (CBP), 43% (79/184) had CNSLBP, and 8% (15/184) had non-specific lower back pain < 3 months duration. Mean age of the sample was 33.1±11.8 years and the range was between 18-68 years with a female:male ratio of 2.3. The average BMI was 25.7 ± 5.7. Sleep posture category proportions were found to be similar in individuals with CNSLBP and no CBP according to two proportion Z-tests (p >0.05). In individuals with CNSLBP, 49.4% (39/79) slept in the fetal position, 12.7% (10/79) in yearner, 6.3% (5/79) in solider, 3.8% (3/79) in starfish, 19.0% (15/79) in freefall, and 8.9% (7/79) in other.

CONCLUSIONS: No difference in sleep posture was found between individuals with CNSLBP and those without CBP. Surveying is ongoing to expand the sample and equalize the ratio of females to males.

CHRONIC PAIN MANAGEMENT IN PEDIATRIC PATIENTS
Adenike A. Adeyemi-Jones, BS, and Bradford Landry, DO

CASE DIAGNOSIS: Central Sensitization / Amplified Musculoskeletal Pain Syndrome

CASE DESCRIPTION: This case describes a 14-year-old female with chronic neck and shoulder pain after a whiplash injury following a motor vehicle accident (MVA) two years prior. She has a history of kyphosis, scoliosis, right shoulder tendinopathy involving supraspinatus and infraspinatus tendons, and disc bulges at C5-C6, L4-L5. On physical exam, pain was localized diffusely throughout the trapezius and rotator cuff muscles and patient experienced hypersensitivity throughout upper and lower extremities. However, there was no definitive musculoskeletal or neurologic etiology to account for all symptoms. Pain was reported to be exacerbated by carrying heavy loads, exercise, or throwing objects with the right arm. Patient used Tylenol and Aleve for pain relief. Following MVA, patient tried physical therapy (shoulder strengthening exercises, cupping, and acupuncture), but stopped because she felt pain increased. Patient had significantly altered sleep patterns, as she stays awake until 4am to draw artwork.

DISCUSSIONS: There appeared to be a component of a more centralized or amplified chronic pain that exacerbated the patient’s overall presentation. Factors that modulate chronic pain include social/cultural influence (e.g. pain conceptualization, pain tolerance), family structure (e.g. parental reaction to pain, pain models), and the individual (e.g. genetics, coping strategies, anxiety/depression). Despite limited research surrounding chronic pain in children, data shows greater effectiveness with a multi-disciplinary treatment approach compared to medication alone. The recommended treatment involves a combination of desensitization techniques, neuromuscular re-education, postural training, manual therapies, EMG biofeedback, and modalities such as transcutaneous electrical nerve stimulation (TENS). A healthcare providers’ approach to managing chronic pain in adolescents would be useful to guide general treatment and assessment of pain, particularly in an era of pain scale and prescription opioid caution.

CONCLUSIONS: This case supports the notion that treatment of chronic pain in adolescents is more effective when a multidisciplinary approach is used.

CHRONIC PELVIC PAIN AFTER SLING SURGERY - A CASE SERIES
Hong Wu, MD, and Satvir Kalsi, BA

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Abstracts
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CASE DIAGNOSIS: Chronic pelvic pain in patients with stress urinary incontinence treated with bladder sling surgery.

CASE DESCRIPTION: We present 3 female patients who developed chronic pelvic and groin pain after bladder sling surgery (BSS) involving placement of a mesh (two transobturator and one transvaginal approach) to treat stress urinary incontinence (SUI). Aged 44, 43, and 49 y.o. at the time of surgery without any prior history of chronic pelvic pain, they then presented with pelvic pain (burning in nature and worsening with position) for approximately 4 years, 10 months, or 7 months after the pain onset of each case, respectively. Conservative management of this chronic pain showed no significant relief for all patients. Interventions such as corticosteroids injection and radiofrequency ablation to the pudendal nerve produced pain relief. Aged 44, 43, and 49 y.o. at the time of surgery without any prior history of SUI. Aged 44, 43, and 49 y.o. at the time of surgery without any prior history of SUI.

DISCUSSIONS: SUI is the most common type of female incontinence and its treatment options include surgical and non-surgical approaches. BSS is considered as a preferred surgical option to treat SUI. Chronic pelvic pain following BSS is rare but can be a serious complication. Etiology for this could be a pre-existing chronic pain disorder, surgical trauma and scarring, nerve entrapment related neuropathy, and centralization of pain, etc. This pain can resist conservative treatment, can progress or escalate, and may significantly affect patient’s quality of life. Additionally, it may result in the development of other chronic pain conditions and psychological complications.

CONCLUSIONS: Our data suggest management of chronic pelvic pain following BSS can be a challenge. Pudendal nerve block and ablation could be a novel technique to manage this pain. Additional research is needed to identify the precise etiology of this chronic pain, deploy biomaterials or develop new surgical techniques with better outcomes, and define risk factors to help prevent development and/or halt progression of this chronic pain.

CHRONIC PYODERMA GANREOSUM LEADING TO UPPER EXTREMITY AMPUTATION: A CASE STUDY
Shawn Krause, MD, DPT, and Clinton Faulk, MD

CASE DIAGNOSIS: 59 year-old male with medical history including Hepatitis C, colon polyps, coronary artery disease, myocardial infarction, and hypertension who had been suffering with Pyoderma Gangrenosum (PG) for 15 years. Patient provided a history of body ulcerations that started after an incident with electricity in his teens.

CASE DESCRIPTION: Patient presented with chronic ulcers from PG, now involving deep tissues in his right hand and over his right distal, volar, forearm. Failed therapeutic attempts include topical steroids and wound care for local disease, systemic therapy with Azathioprine, and targeted therapy for Infliximab for aggressive disease. His physical exam was positive for contracted right fourth and fifth digits, and impaired strength in wrist extensors. Plastic surgeons would not place a flap secondary to the likelihood of failure associated with this type of granulomatous wound. After right upper extremity function was lost, orthopedic surgeons were consulted and they reluctantly scheduled an amputation.

DISCUSSIONS: PG is a neutrophilic dermatitis and essentially a clinical diagnosis. The exclusion of ulcerative etiologies must be ruled out, along with addressing any underlying disease state. Bennett et al. (2000) reported on classic and bulbous forms of PG. They concluded that overall sixty-eight percent of patients achieved complete remission within six months and ninety-five percent were in remission within three years. Another report, by Shavit et al. (2017) proposed a treatment approach, which combined disease state with therapeutic agent. This treatment approach was used in this case, and no underlying disease association was found. With years of failed therapy, pain, and functional loss, this patient was left with the drastic option of limb loss.

Conclusions: PG can be very challenging to treat and diagnose. However, usually a combination of oral medications and treating an underlying condition can control these ulcers. This is a rare case of PG leading to an upper extremity amputation.

CLASSIFICATION TREE TO DETERMINE THE PROBABILITY OF FUNCTIONAL POTENTIAL AMONG INDIVIDUALS WITH LOWER LIMB AMPUTATION
Phillip Stevens, MED, CPO, Shane R. Wurdeeman, PhD, CPO, and James H. Campbell, PhD

CASE DIAGNOSIS: Lower limb prosthetic rehabilitation relies upon the Medicare K-level system for reimbursement eligibility guidelines (Dillon, 2018). As such, K-level assignment has a large impact on prosthesis prescriptions. This assignment relies jointly on clinical judgment and any objective data available to inform that judgment. Recent efforts to collect big data on prosthetic outcomes provides the ability to inform the clinician and the patient regarding a patient’s functional potential. The purpose of this study was to develop a model which provides the probability of a patient functioning as either a limited community/household ambulator (i.e. K1/K2) or an unlimited community ambulator (i.e. K3/K4).

CASE DESCRIPTION: Subjects: Records from 2,770 lower limb prosthesis users were included. 20% of users were randomly selected to build the predictive model (n=554, age: 57.0±14.7y, ht: 174.4±11.4cm, wt: 89.2±23.5kg), with the remaining patient records used to test the model (n=2,216, age: 57.7±14.5y, ht: 174.6±11.2cm, wt: 89.9±22.3kg). Instruments: Patient demographics, functional mobility (PLUS-M®; Hafner, 2017), and comorbid health (FCT; Groll, 2005). Procedures: Patient records with PLUS-M® T-Scores, verified comorbidities, and K-level assignment within the outcomes database were included for analysis. Data Analysis: Classification and regression tree (CART) analysis was implemented with Matlab® to develop a classification tree with functional potential as the predicted dependent variable. Kuppermann, 2013. The produced pain relief.

The resultant classification tree had classification accuracy of 87.4% (SEM 1.4%) for the training sample and 81.6% (SEM 0.82%) for the testing sample. Twelve of the nodes were found to have class assignment significantly different from a random assignment (p < 0.05).

CONCLUSIONS: The collection of large volumes of data within rehabilitation affords the ability to implement various predictive analytics models. The current study found the use of PLUS-M® T-Scores, age, cause of amputation, and body weight could be used to provide probability of functional potential. The current study provided the basic characteristics of a classification tree and examined the applicability of utilizing CART analysis for the prediction of functional potential. Future studies will look at effective implementation of such analytics for other areas within orthotics and prosthetics rehabilitation to better inform the clinical decision process.

CLINICAL EFFECTIVENESS OF CARDIAC REHABILITATION AND DIET THERAPY FOR PATIENT WITH DILATED CARDIOMYOPATHY HEART FAILURE: CASE REPORT
Satty H. Saed, Specialist

CASE DIAGNOSIS: 56 years old female with (DCM) Heart Failure NYHA class II with ejection fraction 50% associated with DM and HTN. Her chief complaints are; SOB and fatigue during activity, hyperglycemia, and anemia.

CASE DESCRIPTION: On initial assessment 3 out of six minute walk test (6 MWT) with onset of chest pain from the 1st minute. She received aerobic training of 7 sessions to improve cardiovascular endurance and challenge her functional capacity using low intensity activities. Dietary history was performed by food frequency and 24hrs recall, Sodium, Fluids and CHO intake was estimated and DASH diet was used.

DISCUSSIONS: Within the 4th session the patient reached 97% of (THR). The period of exercise session was 30 mins of stable HR. The last 3 sessions we increase THR from 97 to 107. The patient was able to do 45 mins of exercise session. Final report for 6 MWT was achieved successfully. Calories calculated to 1419 Kcal/day as follows (55% CHO, 25% PROTIEN, 20% FATS), her BMI became 40, Hb corrected to 11 mg/dl. Fluids restricted to 1500L/day with 2300mg Na consumption /day.

CONCLUSIONS: Noticeable change was shown in patient management of symptoms when performing ADL, improved dietary patterns and quality of life.

CLINICAL PRESENTATION OF SEVERE LEFT CARPAL TUNNEL SYNDROME IN A 5-YEAR-OLD FEMALE WITH MILD SYMPTOMS: A CASE REPORT
Jose A. Fernandez, MD, Iliana L. Sanchez, MD, and Mohammad Islaam, MD

CASE DIAGNOSIS: 5-year-old right hand dominant female referred to rehab clinic after she was noted to have thenar atrophy, weakness, and sluggishness in left hand compared to right hand. Parents denied risk factors and family history for CTS. On exam she is a well-developed girl with age-appropriate weight and height. No coarse facial features or gross musculoskeletal abnormalities except for isolated L thenar atrophy. Cervical ROM was preserved and neurological examination/ sensation was intact. Tinel’s and Phalen’s tests were negative. Hand grip was 4+/5 in left hand and 5/5 in right. Broad laboratory workup and imaging were normal. NCS was performed reporting electrodiagnostic evidence L CTS. Patient was referred to OT where a custom-made splint was provided and therapy with multiple modalities was done with functional improvement.

DISCUSSIONS: CTS is a common entity in adults but very unique in the pediatric population. Its presentation can significantly differ when compared to adult CTS. Etiology can be divided in 3 broad categories: 1-metabolic, 2-mechanical, and 3-idiopathic/overuse. Early diagnosis of CTS in children is challenging as patients are not able to clearly convey symptoms or because severity is typically mild (as seen

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in this patient). Stepwise treatment should be done, with initial activity modification and orthotics, followed by steroid injection if unresolved and as last resort surgery, considering it completely resolves symptoms only in half of pediatric patients.

CONCLUSIONS: Although most pediatric CTS cases are associated with an underlying genetic disorder or identifiable nerve entrapment, idiopathic cases may be seen. It is a challenging diagnosis due to vague presentation, minimal response to provocative maneuvers, and lack of ability to report symptoms. A detailed H&P is essential to diagnose this condition, in order to initiate early interventions to improve outcomes.

CLINICAL PROFILE OF URINARY INCONTINENCE OF WOMEN AT THE UNIVERSITY CLINICS OF KINSHASA FROM 2015 TO 2016

Andy-Muller L. Nzinga, Médecin Physique, Inès Bilo, Médecin Physique, and Hugette Nkongo, Médecin Physique

OBJECTIVES: Urinary incontinence (UI) in women is a very common pathology in the population. The lack of epidemiological data in our environment has led us to make a state of the locus of this condition and its management at the University Clinics of Kinshasa.

CONCLUSION: This is a descriptive study carried out at the University Clinics of Kinshasa from January 2015 to December 2016. The annual frequency of UI was 1.3% (23/1813 patients). We selected only 15 cases whose records were exploitable, and their average age was 49.2±20.5 years old with intreval from 15 to 98 years old.

RESULTS: UI included multiparous (53.3%), pauciparous (26.7%), primiparous (6.7%) and nulliparous (13.3%). The median date of onset of the UI was 3 months. The urge incontinence was present in 33.3% of cases and the stress incontinence in 33.3%. Amongst those associated with UI, we found more un-gential infections (46.7%), cystocele (20%) and chronic pelvic pain (20%). These patients benefited more from antibiotic therapy (60%), anticholinergics (20%), pelvic-perineal rehabilitation (20%) and surgical treatment.

CONCLUSIONS: Conclusion: UI is under evaluated at the University Clinics of Kinshasa. The most commonly diagnosed types of UI are urge incontinence and stress incontinence. The management is multidisciplinary.

COCCYDYNAIA ASSOCIATED WITH HYPERCALCEMIA AND MULTIPLE PEVIC LYICTIC LESIONS

Vinicius Tieppo Francio, MD, Maria Vanushkina, MD, and Catherine Yee, MD

CASE DIAGNOSIS: Coccyx pain, Hyperparathyroidism

CASE DESCRIPTION: 46-year-old female with a 9-month history of coccyx pain associated with bilateral LIES numbness extending to the dorsum of feet. Past history revealed two low-energy coccygeal fractures. She also reported an 80lbs intentional weight loss following a recently completed 7-month course of dieting and naturopath-prescribed HCG treatment. Examination revealed coccegeal tenderness, sacral CT confirmed old coccygeal fracture and numerous pelvic and spinal lytic lesions concerning for malignancy. Further workup failed to identify an oncologic explanation for the lytic lesions. Bloodwork revealed hypercalcemia and an M spike of 0.2g with negative immunofixation and flow-cytometry clinically insignificant. She was diagnosed with hyperparathyroidism (HPT) and treatment with sarcococcygeal steroid injection provided only short-term benefit.

DISCUSSIONS: Multiple lytic lesions posit a dilemma on initial assessment for coccyx pain. Differential diagnosis included metastasis, bone tumors, and brown tumors (BTs), a rare clinical manifestation of HPT. Awareness of BTs and their association with HPT is necessary for early diagnosis, exclusion of malignancy, and appropriate treatment planning. In our case, coccyx pain associated with multiple lytic pelvic lesions led to a negative oncologic workup and a new diagnosis of HPT. Of interest, the lesions were not noted on plain film. Clinical manifestations of BTs include diffuse skeletal pain and potential pathological fractures, such as in this patient. The elective HCG supplementation has unclear clinical implications in this presentation, but causation cannot be excluded.

CONCLUSIONS: In patients with radiological evidence of lytic lesions, metastasis, tumors and secondary bone morphology changes must be considered. In such patients, it is advisable to avoid interventional procedures before an oncologic work-up can be completed to prevent potential seeding. With our case, we raise awareness of differential diagnosis in lytic bony lesions in physiatry practice, and the importance of oncologic work-up prior to intervention.

COMBINED EXTRACORPOREAL SHOCKWAVE THERAPY (ESWT) FOR EARLY RETURN TO PLAY IN PATELLA TENODINOPATHY IN GERMAN PROFESSIONAL SOCCER PLAYERS IN GERMAN BUNDESLIGA

Karsten Knobloch, FACS, PhD

CASE DIAGNOSIS: Soccer players suffer mainly from tendinopathies of the Achilles and the patella tendon as has been demonstrated in the UEFA Champions league study as the major overuse injury. Running exposure in a usual German Bundesliga match of 10–12 km, potential further games in the Champions league and/or the German cup, turf and shoes as external factors as well as for example genetic factors in CollAI and CollAI genes might predispose a given soccer player to these aforementioned tendinopathies. Extracorporeal Shockwave Therapy (ESWT) uses acoustic waves to elicit a protein response in the tissue. It is a completely noninvasive approach. The translation of the acoustic wave signal in a protein response is mediated by a mechanism called mechno-transduction. I sought to evaluate and report the clinical results of non-invasive combined focused and radial ESWT on pain levels, ultrasound imaging and return to play for player availability in professional German Bundesliga soccer.

CASE DESCRIPTION: Seventeen German Bundesliga soccer players from five different clubs (27 ± 2.1 years; 4 striker, 10 midfielder, 3 defenders, 184 ± 9cm, BMI 22.1 ± 1.8 kg/m2) suffering from patella tendinopathy >4 weeks were included. All players underwent both, conventional and Power Doppler ultrasound determining the size of tendon diameter as well as the amount and location of neovascularisation by PowerDoppler ultrasound (according to the Öhberg classification 0°–4°) to assess the extent of the patella tendon disease. Combined ESWT was applied combining both ESWT technologies (STORZ Medical Ultra device, Tägerwilen, Switzerland), starting with focused ESWT at the point of tendon pain (2,000 impulses with 0.12–0.25 mm/imp) followed by regional radial ESWT around the tendon and at the quadriceps muscle for muscle denervation with different radial ESWT applicators (STORZ C15 and D15, 10Hz, 3,000 impulses). These combined radial and focused ESWT sessions were performed on a weekly base with at mean four combined ESWT sessions (4.0±1.4 sessions).

DISCUSSIONS: Patella tendon pain at exercise was reduced by 45% fromVAS 6.2±2.1 to 3.4±1.0 at two weeks, by 73% from VAS 6.2±2.1 to 2.3±0.5 at four weeks and by 81% from VAS 6.2±2.1 to 1.3±0.3 after 12 weeks of treatment. No adverse effects were noted. Patella tendon diameter was reduced from 8.2±2.0 mm to 5.9±1.2 mm (by 28%) at 12 weeks as was the increased PowerDoppler blood flow (from Öhberg class 3±1:0 to 0.6±0.2 at 12 weeks). Return to play was achieved at 16±7 days. Within a three months follow-up period, no player had a recurrent time-loss injury of the patella tendon.

CONCLUSIONS: Combined radial and focused ESWT can reduce patella tendon pain, improve tendon ultrasound and allow early return to play within 16 days in patella tendinopathy in German Bundesliga soccer players when conventional treatment failed. No adverse effects of combined radial and focused shockwave therapy were noted. Combined radial and focused extracorporeal shockwave therapy is a noninvasive option to accelerate patella tendon healing in professional soccer athletes.

COMBINED KINEMATIC AND ELECTROMYOGRAPHIC MONITORING WITH WEARABLE EMG/IMUS CALIBRATED WITH MARKERLESS POSE ESTIMATION

Ronald J. Cotton, MD, PhD

CASE DIAGNOSIS: Kinematic tracking of rehabilitation patients can enable more quantitative and objective measurement of impairment and progress with therapies. Simultaneous electromyography (EMG) can capture impairments in muscle activation such as weakness, synergies and spasticity. More widespread collection of this data may also lead to more targeted interventions. However, acquiring it is fairly cumbersome, typically requiring a gait analysis lab. Several wearable approaches exist but are limited in terms of cost, ease of use, and tools to convert the data to pertinent kinematic measurements. To facilitate combined kinematic and muscle activity tracking for rehabilitation, wearable sensors are developed that record both inertial measurement unit (IMU) and EMG data which is acquired by a smartphone. Algorithms to convert the IMU data into joint kinematics are developed, which to not require precise sensor placement. Kinematics measurements can be refined with simultaneously recorded video analyzed with markerless pose estimation.

CASE DESCRIPTION: A flexible, wearable sensor was developed that records both EMG and IMU data and wirelessly transmits to a Bluetooth connected smartphone. The 3D orientation of the sensor is computed by fusing the accelerometer, gyroscope and magnetometer data together with a custom quaternion based complementary filter running at 500 Hz. Joint angles are estimated from the relative orientation of two sensors that can be placed arbitrarily on the limb by determining a neutral pose orientation and then taking the orientation difference between sensors. For joints like the elbow and knee this measurement can be improved by estimating the orientation of the joint. Kinematic tracking was refined by fusing a pose estimated with markerless pose tracking of simultaneously recorded video with the IMU data using a kinematic model of the human skeleton.
DISCUSSIONS: The developed sensors are flexible, comfortable to wear, and record high quality EMG and IMU data. After calibration, the complementary filter running on the wearable sensors provided robust and stable orientation tracking. Simultaneous EMG and orientation data were collected from multiple sensors (e.g. thigh and leg), and the joint angle estimation was used. The extracted angles showed a high correlation to those from markerless pose estimation on video. Calibration with pose estimates from simultaneously recorded video aligned IMU orientation measurements to a human kinematic model. This makes measurements at multi-axis joints such as the hip and shoulder more interpretable by decomposing them into anatomic movements. Using the learned dimensions of the human kinematic model, relative joint positions are computed based on sensor data alone without requiring subsequent video. This was used to record the gait cycle with simultaneous tracking of muscle activations using only a smartphone.

CONCLUSIONS: Combined kinematic and muscle activity monitoring has numerous applications in rehabilitation including better measurements of impairments, outcomes, and potentially more targeted therapies, but is limited due to the lack of an affordable and easy to use platform with algorithms to convert this to clinically relevant measurements. To address this, a wearable sensor that acquires both EMG and IMU data is developed, which only requires a smartphone to use. An algorithm is developed to compute joint angles from multiple sensors that is robust to sensor placement. Simultaneously recorded video improves kinematic measurements by fusing the estimated pose from video with the IMU measurements, which also allows inferring relative joint positions from the sensor data without subsequent video. It is hoped this will reduce the barrier to better patient monitoring, and ultimately allow more targeted interventions.

COMBINING ESWT WITH ULTRASOUND CAN HELP DIAGNOSE A SOFT TISSUE LESION THAT PRESENTS AS CARPAL TUNNEL SYNDROME (CTS): A CASE STUDY
Shawn Krause, MD, DPT, and John Norbury, MD, RMSK

CASE DIAGNOSIS: 25 year-old female with no significant medical history presents to the outpatient clinic for electrodagnostic (EDX) assessment of the left upper extremity. She reported slowly progressive symptoms consisting of left hand numbness, weakness, and “popping” sensation that was present day and night.

CASE DESCRIPTION: Physical examination of the left upper extremity revealed 4/5 strength in finger flexors, and a positive Tinel's sign at the wrist. Active range of motion of left finger flexion revealed a dynamic mass in the left wrist which disappeared with relaxation. Nerve conduction studies to the left ulnar and median motor and sensory nerves revealed a prolonged left median sensory latency. This indicated a mild abnormality in myelin function of the left median nerve between the wrist and the second digit. An ultrasound was then conducted which revealed a tendon sheath mass in the left hand which was later surgically excised. The final pathologic diagnosis was a fibroma of the tendon sheath.

DISCUSSIONS: Tendon sheath fibromas are uncommon tumors, but when they do occur 81.8% involve the fingers, wrists, and hands. The present case as a “trigger wrist,” as in our case. When this tumor is present in the hand or wrist, a patient can present with symptoms of median mononeuropathy.

CONCLUSIONS: This case illustrates how a combination of EDX and ultrasound can improve diagnosis and treatment. Providers should consider a fibroma of the tendon sheath when investigating a soft tissue lesion of the hand, especially in the context of mechanical symptoms such as “popping” and trigger in the wrist. Ultrasound can be particularly helpful in cases where clinical carpal tunnel syndrome is accompanied by mechanical issues.

COMPARATIVE EFFECTIVENESS OF EXTRACORPOREAL SHOCK WAVE THERAPY, LOCAL CORTICOSTEROID INJECTION AND CONVENTIONAL PHYSIOTHERAPY IN TREATMENT OF CHRONIC LATERAL EPICONDYLIITIS
Monia Mohamed, MB, BCH, Mona Arefa, MD, Abder K. El Zohiery, MD, and Sara Ibrahim, MD

OBJECTIVES: Lateral epicondylitis (LE), is a common overuse syndrome affecting the extensor tendons of the forearm. Corticosteroid (CS) injection is the most common intervention for treatment of LE. Extracorporeal shockwave therapy (ESWT) is a noninvasive modality stimulating the neovascularization process, tendon healing and pain relief. Aim: to compare the effectiveness of ESWT with local corticosteroid injection and conventional physiotherapy (PT) in the treatment of chronic LE.

RESULTS: Twenty-four patients with chronic LE for at least 3 months were randomly divided into three groups: group I received corticosteroid injection, group II received ESWT sessions, and group III received conventional physiotherapy sessions. Visual Analogue Scale (VAS) was used to assess pain intensity, patient-rated tennis elbow evaluation (PRTEE) questionnaire for pain and functional assessment, and a hand dynamometer for hand grip strength (HGS). All patients were evaluated before treatment, at 4 and 12 weeks after treatment.

RESULTS: The three groups showed a highly significant VAS score reduction, PRTEE score reduction and increasing grip strength compared to baseline (P < 0.01) at 4 weeks and 12 weeks after treatment. However, there was a highly significant VAS score reduction in ESWT and CS groups more than PT group at 4 weeks after treatment (P < 0.01) while ESWT group showed a highly significant improvement regarding functional score (PRTEE score reduction) more than CS and PT groups at 4 and 12 weeks of follow up (P < 0.01), with no significant difference in HGS among the three groups.

CONCLUSIONS: ESWT, local corticosteroid injection and conventional physiotherapy were effective in treatment of chronic LE during 12 weeks of follow-up but ESWT had a better effect on pain intensity and functional disability in daily life activity at short and long term follow up.

COMPARATIVE EPIDEMIOLOGY OF INJURIES IN MAJOR LEAGUE SOCCER (MLS) AND ENGLISH PREMIER LEAGUE (EPL) FOR THE 2019-20 SEASON
Manoj K. Poudel, MD, Michael Appeadu, MD, and Timothy Tiu, MD, FAAPMR, CAQSM

OBJECTIVES: To analyze the injuries of current MLS and EPL soccer players, and to compare the findings in terms of anatomical location, players’ age and playing position.

DESIGN: Injury data from 20 participating teams in EPL and 24 participating teams in MLS was collected from online databases for the current 2019-2020 season (through 9/18/2019). Then a cross-sectional comparative epidemiological analysis was completed.

RESULTS: There were 66 players from EPL (3.3 players per team) and 61 players from MLS (2.5 players per team) with injuries. The average age of players with injuries in EPL was 24 and in MLS was 26. By player position, injuries were found among 29 defenders in EPL (1.5 per team) and 22 defenders in MLS (0.9 per team); 28 midfielders in EPL (1.4 per team) and 25 midfielders in MLS (1.0 per team); 7 strikers from EPL (0.4 per team) and 8 strikers from MLS (0.3 per team); 2 goalkeepers from EPL (0.1 per team) and 6 goalkeepers from MLS (0.3 per team). The top 3 injuries in EPL sequentially were knee (24.2%), ankle/foot (22.7%), and thigh (19.7%), whereas the top 3 injuries in MLS were knee (27.9%), thigh (24.6%), and ankle/foot (18.0%). These were followed by hip/groin/pelvis/back, calf/shin/heel, head/neck, upper extremity and chest/abdominal injuries in both leagues.

CONCLUSIONS: With the exception of goalkeepers, the rate of injuries per team in MLS was slightly less than in EPL. The average age of players with injuries was slightly higher in MLS compared to EPL. The most common sites of injuries in both leagues were knee, thigh, and ankle/foot.

COMPARATIVE TIME TO CLINICALLY MEANINGFUL IMPROVEMENT IN NONOPERATIVE Versus SURGICAL TREATMENT OF ROTATOR CUFF TEARS
Amos Song, MD, Joshua DeClercq, MS, Gregory Ayers, MS, John Kuhn, MD, MS, Laurence Higgins, MD, Elizabeth Matzkin, MD, Keith Buenigarden, MD, and Nitin Jain, MD, MSPH

OBJECTIVES: Comparative time to recovery after surgical and non-operative treatments for rotator cuff tears is an important consideration for patients. Our objective was to compare the time to achieve clinically meaningful improvement in shoulder pain and function after surgical and non-operative treatments for rotator cuff tears.

DESIGN: From February 2011 to June 2015, a multi-center cohort of patients with rotator cuff tears undergoing surgery and non-operative treatment was recruited. After propensity score weighting, the Kaplan-Meier method was used to estimate the time to achieve minimal clinically important difference (MCID), >50% improvement, and >50% improvement in Shoulder Pain and Disability Index (SPADI) and American Shoulder and Elbow Surgeons (ASES) scores. A two-stage test was conducted to detect a difference between the two groups. Statistical tests, with multiplicity control, were calculated for maximal differences between time-to-event distributions.

RESULTS: In this cohort, 96 patients underwent non-operative treatment and 73 patients had surgery. The surgical and non-operative groups were significantly different with all pairs of 45 patients in each group. The maximum difference between groups to achieve SPADI MCID was at 3.25 months favoring the non-operative group (p = 0.000012). The surgery group had a greater probability to achieve >50% improvement in both SPADI (15.49 months; p = 0.00019) and ASES (24.74 months; p = 0.000003).
Comparing Degree and Duration of Pain Relief Between Methyprednisolone and Dexamethasone Lumbosacral Transformaminal Epidural Steroid Injections: A Self-Controlled Study

Nicholas K. Donohue, MD, Hong Wu, MD, and Sergey Tarima, PhD

OBJECTIVES: To investigate the difference in degree and duration of pain relief between methyprednisolone and dexamethasone lumbosacral transformaminal epidural steroid injections (TFSIs) in patients who had undergone both injections at the same level and side.

DESIGN: This was a self-controlled, retrospective study of 24 subjects who had received both a methyprednisolone and a dexamethasone TFSI at different times to the same vertebral level and side for the treatment of low back pain with radicular symptoms. Primary outcomes included degree of pain relief according to the Visual Analog Scale (VAS) and also the duration of pain relief. A secondary outcome was functional improvement determined by a simple yes or no in response to follow up appointments. Post-injection data for all patients was recorded at 6 weeks, as well as 3, 6, 9, and 12 months for some patients.

RESULTS: Mean change in VAS for methyprednisolone ranged from -3.02 to -4.73 from 6 weeks to 12 months post-injection, respectively. Mean change in VAS for dexamethasone ranged from -4.09 to -1.41 at the same follow up times. Both injections showed a duration of significant improvement compared to baseline for up to 9 months (p=0.0195 for methyprednisolone and p=0.0009 for dexamethasone) and was no longer significant at 12 months. However, there was no significant difference in pain relief or medications at any of the five data collection points (p>0.05).

CONCLUSIONS: This self-controlled study did not show significant differences in degree or duration of pain relief between methyprednisolone and dexamethasone lumbosacral TFSIs. These results support the continued trend to use non-particulate steroids for lumbosacral TFSIs in the context of documented safety concerns with particulate steroids.

Comparing Pitfalls in Medico-Legal Assessments in Australia and the Netherlands, Offering a Sneak Peek at a Possible Dutch Solution

Monique Tolsma Piegza, DRS, and Ian J. Baguley, MBBS, PhD, FAFRM

CASE DESCRIPTION: Comparing pitfalls in medico-legal assessments in Australia and the Netherlands, offering a sneak peek at a possible Dutch solution

CASE DIAGNOSIS: The medicolegal assessment of people who have experienced acute/chronic disability following major injury is a common process across the world. However, individual countries and regions can have widely different systems of assessment and decision making in who receives benefits. For example, the incidence of back pain is equivalent in the US and in Japan, but claims of disability due to back pain is how assessments are completed. In this presentation, we compared the gait during the walking exercise using Welwalk with that using orthosis.

In severe hemiplegic patients, knee-ankle-foot orthoses (KAFO) are frequently used to prevent giving way in the stance phase. However, it is very difficult to swing paralytic leg with KAFO. As a result, walking exercise with KAFO requires a high level of assistance, which may inhibit motor learning.

And, even if patient can swing leg, this exercise has the potential to entrench compensation for swing. To solve these problems, we developed Welwalk which has a motor on the knee joint with KAFO-like framework. Welwalk can extend and flex the knee in appropriate timing. This time, we compared the gait during the walking exercise using Welwalk with that using orthosis.

CASE DESCRIPTION: Three patients were selected for this study. All patients were hemiplegic patients with primary stroke who performed 40 minutes of walking exercise using the Welwalk and underwent three-dimensional gait analysis within the same week using Welwalk and orthosis more than once.KinemaTracer® was used for three-dimensional gait analysis. The system can automatically calculate deviation values of 12 abnormal gait patterns specific to hemiplegia. As a primary outcome, we defined an abnormal gait score, which is calculated as the average of the difference between deviation value and normal range of each abnormal gait pattern.

DISCUSSIONS: In the initial three-dimensional gait analysis, the abnormal gait score was average of 33.3 in the Welwalk use, average of 54.5 in the orthosis use, and it was the low value in the Welwalk use in all subjects. In the final evaluation, it was average of 28.7 in the Welwalk use, average of 34.3 in the orthosis use, and it was the low value in the Welwalk use in all subjects. The difference between Welwalk and orthosis decreased in all subjects.

CONCLUSIONS: In the beginning phase, walking exercise with good gait was possible by using Welwalk.

Comparing the Effectiveness of Platelet-Rich Plasma (PRP), Hyaluronic Acid and the Combination of Both in the Treatment of Mild and Moderate Osteoarthritis of the Knee

Farzana K. Shoma, FCPS, Ziaur Chowdhury, MD, Taslim Uddin, MBBS, FCPS, AKM Salek, FCPS, Farzana Hossain, BDS, and Moniruzzaman Khan, FCPS

CASE DESCRIPTION: The present study aimed to compare the effectiveness of Platelet Rich Plasma (PRP) and Hyaluronic Acid (HA) as individual treatments and PRP in combination with HA in the treatment of moderate knee osteoarthritis (OA).

CASE DESCRIPTION: Randomized clinical trial

DISCUSSIONS: PRP showed significant reduction in VAS scores at 1 (p=0.009), 3 (p<0.001), 6 (p=0.038) and 9 (p=0.004) months compared to HA. It reduced WOMAC pain score at 1 (p=0.017), 3 (p<0.001), 6 (p=0.013) and 9 (p=0.001) months compared to HA. At 9 months, WOMAC physical activity score reduced significantly (p=0.002) in PRP group than HA group. The PRP+HA group significantly reduced WOMAC both in VAS scale and WOMAC pain scale at 1 (p=0.019), 3 (p<0.001), 6 (p=0.001) and 9 (p=0.001) months and 1 (p=0.002), 3 (p<0.001), 6 (p<0.001) and 9 (p=0.001) months respectively compared to HA. The PRP+HA group significantly reduced the WOMAC stiffness score at 6 (p=0.011) months and WOMAC physical activity score at 9 (p=0.010) months. No significant reduction was observed the outcome of PRP+HA was compared with PRP alone

CONCLUSIONS: PRP provides better functional outcome than HA. The combination of PRP and HA also provides better outcome than HA alone but does not provide better outcome than PRP alone.

Complete Resolution of Chronic Lumbosacral Back Pain (LBP) Secondary to Bertolotti’s Syndrome Following Percutaneous Spinal Cord Stimulator Trial

Mir N. Ali, DO, Heejung Choi, MD, Christopher Paul, MD, and Jonathan Goree, MD

CASE DIAGNOSIS: Complete resolution of chronic lumbosacral back pain (LBP) secondary to Bertolotti’s Syndrome (BS) following percutaneous spinal cord stimulator (SCS) trial.

CASE DESCRIPTION: An active 48-year old male presented to pain clinic with bilateral chronic axial lumbosacral pain, rated 8/10. Exam demonstrated severe pain to lumbar extension and lateral L5-1 facet joints. Imaging revealed BS with lateral recess stenosis and erosion of passing L5 nerve root with L5 transverse process-sacral pseudo-joiet. After conservative management failure, patient underwent fluoroscopy-guided steroid injections directed toward L5-S1 nerve root and pseudo-joints bilaterally with 80% relief for 3 weeks. Followed by bilateral L5-3 medial branch and pseudo-joint block providing >50% relief for 4 hours. Next, proceeded with bilateral radiofrequency ablation to the L3-5 medial branches and pseudo-join with symptom- and effect-reducing >3-4 months. LBP returned and patient then underwent percutaneous transosseous lumbosacral column SCS trial. Axial back coverage obtained with placement of two odrutes leads spanning the T7-T9 vertebral bodies. During 7-day trial, patient reported positive results with 100% relief and is scheduled for permanent SCS implant.

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Abstracts

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DISCUSSIONS: BS is caused by an overgrowth of the L5 vertebrae transverse process which articulates or fuses with sacral base forming a pseudo-joint. It's an increasingly recognized source of chronic LBP in younger patients. The incidence is 18.5% in patients aged less than 30. It leads to decreased functional mobility and quality of life.

CONCLUSIONS: Management of BS includes physical therapy, modalities, steroid injections and RFA. Failure of those treatments often require surgical resection of the overgrown transverse process with variable results. This is the first case report demonstrating complete resolution of LBP from BS following percutaneous SCS trial. Additionally, the patient had dramatic improvement in function mobility with ambulatory distance increasing from 50 feet to 3 miles. In the future, clinicians should consider SCS trial in their treatment algorithm for this disease process.

COMPREHENSIVE IMAGING IN THE DIAGNOSIS OF THORACIC SPINE FrACTURE
Christina M. Case, BS, Richard Kendall, DO, and Susan Garstang, MD
Case Diagnosis: T2 compression fracture with 40% height loss and focal kyphosis.
Case Description: A 41-year-old male presented to clinic with mild pain in the neck and left axillary pain following a surfing accident 2 weeks prior where he hit a rock head-first in the bottom of the ocean. He denied loss of consciousness or focal neurologic deficit during the incident. He had no prior history of neck or back trauma. Initial work-up at an outside clinic included X-ray of the thoracic spine which was limited due to overlying shoulders at T1-3 but appeared to have some anterior angulation. Swimmers view in cervical spine x-ray again showed angulation at T2 but had poor visualization. MRI of cervical spine to T4 was obtained emergently and showed a significant T2 compression fracture with 40% height loss and focal kyphosis with canal stenosis. No cord signal abnormality was noted. The patient was placed in a hard cervical orthosis and referred to orthopedic surgery for further evaluation.

Discussions: This case highlights the importance of proper visualization of all vertebral column when imaging in order for accurate diagnosis of spinal injury. The patient's thoracic fracture was initially missed due to poor visualization of the thoracic spine. Even with additional swimmer's view in cervical x-rays the fracture was still not clearly identifiable. The sagittal MRI clearly showed the T2 compression fracture and allowed a definitive diagnosis and treatment course. Rehabilitation physicians should ensure clear viewing of all involved vertebral levels in trauma cases in order to make an accurate diagnosis and plan appropriate rehabilitation.

Conclusions: Comprehensive imaging techniques should be used to clearly visualize all vertebral levels in order to diagnose patients presenting with pain following a traumatic brain injury.

COMPREHENSIVE PAIN MANAGEMENT PROGRAM AND LOW DOSE NALTREXONE FOR PATIENTS WITH COMPLEX REGIONAL PAIN SYNDROME (CRPS)
Neha Shah, DO, Silpa Katta, MD, and Shaheen Jadidi, DO
ObjectiveS: Complex Regional Pain Syndrome (CRPS) is a neuropathic pain syndrome involving glial activation and central sensitization of the central nervous system. The theoretical basis for improvement with low-dose naltrexone (LDN) therapy is related to its ability to reduce inflammation, and modulate glial cells. We describe a case-series of CRPS patients who underwent treatment with LDN and twenty-one day comprehensive pain management program (CPMP). The purpose of our study is to describe medical management and clinical outcomes in three patients with CRPS.

Design: Retrospective case series involving three patients with neurological injury or antecedent trauma. Patients met Budapest criteria. Main outcome measures included pain rating scale, medication regimens, CRPS symptoms, and functional status at baseline and at two month follow-up. Treatment included either LDN or combined LDN and CPMP. CPMP involved cognitive exercises, manual therapy, and functional training.


Conclusions: Participants experienced greater pain reduction while taking LDN with participation in a 21 day CPMP. These patients reduced utilization of pain medications, and achieved almost complete remission of CRPS symptoms. A multimodal interventional approach should be considered as a treatment option for CRPS.

CONCussion MANAGEMENT PROGRAM AND BASELINE DATABASE INITIATIVE IN WHEELCHAIR ATHLETES
Michael W. Harper, MD, ATC, Jonathan J. Lee, Michael J. Uihlein, MD, and Kenneth K. Lee, MD
Objectives: Sport-related concussion (SRC) is a traumatic brain injury suffered in sports that results in functional disturbances. SRC is not usually diagnosed with imaging, rather diagnosis is primarily based on a physical exam. There are established guidelines for evaluating the able-bodied athlete; however, there are no such guidelines specific for adaptive sports athletes. Wheelchair athletes are a unique population who are difficult to diagnose with an SRC because they do not readily display signs of ataxia, the most identified sign of SRC in able-bodied individuals. Disability in the wheelchair athlete also restricts them from standard balance tests which require standing on one and two feet. For these reasons, we have sought to develop and implement a novel Concussion Management Program (CMP) for wheelchair athletes at multiple national events.

Design: We have developed a CMP that incorporates the Wheelchair Error Scoring System (WESS), a seated balance test based on the Balance Error Scoring System (BESS) to evaluate ataxia. We will collect baseline data on wheelchair athletes that includes a concussion history, symptoms, Standardized Assessment of Concussion (SAC) and WESS at multiple National Wheelchair events including the National Veterans Wheelchair Games (NVWG) and National Disabled Veterans Winter Sports Clinic (NDW/WSC).

Results: We obtained baseline data on 81 wheelchair athletes at the 39th NVWG. We will continue collecting baseline data at NVWG and NSCWSC annually. With the support of athletes, coaches and officials baseline testing is now mandatory for contact sports.

Conclusions: By properly diagnosing and managing an SRC in a disabled athlete, we hope to decrease the long-term risks of repetitive SRC. Physical activity is a crucial part of the human experience and we strive to allow disabled individuals to compete in adaptive sports safely and with full knowledge of risk. We hope our project will continually improve the well-being and medical care for disabled athletes.

CONTRIBUTION OF MOTOR IMAGERY AND MIRROR THERAPY IN THE MANAGEMENT OF LOWER LIMB PHANTOM PAIN
Mouna Sghir, Doctor, Sounayza Elarem, Doctor, Ayman Haj Salah, Doctor, Taki Elhersi, Doctor, Rania Saïd, Physiotherapist, Ibtissem Chouchene, Physiotherapist, Wafa Said, Doctor, and Wassia Kessomtini, Professor
Objectives: The aim of this study was to compare the effectiveness of motor imagery versus mirror therapy in the rehabilitation of phantom limb pain in lower limb amputees.

Design: A Comparative prospective study conducted over a period of 4 months, from December 2018 to March 2019, and involving transtibial amputees with algohallucinosis. The patients were divided into 2 groups. Group A benefited from conventional rehabilitation associated with mirror therapy and Group B benefited from conventional rehabilitation associated with motor imagery. The observational period lasted 6 weeks with a rhythm of 3 sessions per week. Pain was assessed by the Visual Analog Scale (VAS), the functional outcome by Barthel index and psychological state with Hospital anxiety and Depression scale (HAD). Patients were assessed at the beginning and at the end of the study.

Results: Our study population consisted of eight patients whose average age was 58.6 years. At the end of the therapeutic protocol, we noted a decrease of pain in both groups. Thus, the average VAS score gain was 3.1 for group A and 2 for group B. Similarly, we noted an improvement in hip and knee mobility in both groups. Functionally, the mean gain of the Barthel score was 10 in group A and 18 in group B. Finally, a psychological improvement was noted in both groups and was greater in group B.

Conclusions: Motor imagery seems more effective than mirror therapy in the management of phantom pain in lower limb amputees.

CORRELATION BETWEEN ECHOCARDIOGRAPHIC PARAMETERS AND EXERCISE CAPACITY IN PATIENTS WITH AMI
Bora Mun, MD, In Sung Choi, MD, PhD, Jae Young Han, MD, PhD, Min-Keun Song, MD, PhD, Hyung-Kyu Park, MD, PhD, and Jae Yeong Cho, MD, PhD
Objectives: To evaluate the correlation between echocardiographic parameters and exercise capacity in patients with acute myocardial infarction (AMI).

Methods: This was a retrospective study conducted at a single institution. All patients who underwent echocardiography within 48 hours of AMI were included. Exercise capacity was assessed using the 6-minute walk test (6MWT). Echocardiographic parameters included left ventricular ejection fraction (LVEF), end-systolic volume index (ESVI), and end-diastolic volume index (EDVI). The correlation between the exercise capacity and echocardiographic parameters was assessed using Spearman’s correlation coefficient.

Results: A total of 100 patients were included in the study. The mean age was 63.2 ± 10.8 years, and 62% were men. The mean LVEF was 45.2% ± 13.6%, ESVI was 74.8 ml/m² ± 28.5, and EDVI was 135.2 ml/m² ± 52.8. The mean 6MWT distance was 362.7 meters ± 118.5. The correlation analysis showed a statistically significant correlation between the 6MWT distance and LVEF (r = 0.58, p < 0.001), ESVI (r = 0.52, p < 0.001), and EDVI (r = 0.60, p < 0.001).

Conclusion: The findings suggest that echocardiographic parameters, specifically LVEF, ESVI, and EDVI, are significantly correlated with exercise capacity in patients with AMI.
OBJECTIVES: This study aimed to 1) investigate the relationship between echocardiographic parameters and exercise capacity in patients who participated in a cardiac rehabilitation (CR) program after acute myocardial infarction (AMI) and 2) determine the echocardiographic parameters that are associated with the change in exercise capacity during a 1-year follow-up.

DESIGN: We retrospectively analyzed 8,735 medical records from July 2016 to September 2018. In this study, 4,476 patients who had undergone a percutaneous coronary intervention (PCI) and referred to 11 rehabilitation centers were included. Echocardiography was checked at the time between post-PCI and discharge. Ejection fraction (EF), left ventricular internal dimension in diastole (LVIDd), annular diastolic velocities in septal area (E/e’ septal) and annular diastolic velocities in lateral area (E/e’ lateral) were recorded. Exercise tolerance test was conducted and functional performance scale by Korean Activity Scale/Index (KASI) was checked at 3 assessment points: 1 month (T0), 4 months (T1), 12 months (T2) after AMI attack. \( \Delta \text{Value} \) was used to calculate the change of each exercise capacity and performance scale from values obtained at T0, T1 and T2; \( \Delta \text{Value} = (\text{Value}_{\text{T2}} - \text{Value}_{\text{T0}}) \).

RESULTS: Each E/e’ septal and E/e’ lateral showed a negative correlation with METsmax at T0 \( (r=-0.235, p=0.000; r=-0.165, p=0.000) \). E/e’ lateral indicated a moderate negative correlation with KASI at T0 \( (r=-0.461, p=0.000) \). When it comes to the relationship between echocardiographic parameters and the change of exercise capacity during 1 year follow-up, E/e’ septal displayed a negative correlation with \( \Delta \text{METsmax} \) in T2-T0 \( (r=-0.258, p=0.000) \). E/e’ lateral was negatively correlated with \( \Delta \text{METsmax} \) in T2-T0 \( (r=-0.394, p=0.002) \) and each \( \Delta \text{KASI} \) in T1-T0 and \( \Delta \text{KASI} \) in T2-T0 \( (r=-0.426, p=0.000; r=-0.445, p=0.000) \).

CONCLUSIONS: E/e’ lateral and E/e’ septal might be used as one of the indicators of functional exercise capacity and its change. Further study would be required to find more predictive echocardiographic parameters with exercise capacity.

CORRELATION BETWEEN FATIGUE AND HEALTH-RELATED QUALITY OF LIFE IN CHILEAN WOMEN SURVIVORS OF BREAST CANCER: A MULTICENTER CROSS-SECTIONAL STUDY

Luz A. Lorca, Magister, and Cinara A. Sacamori, PhD

OBJECTIVES: To correlate fatigue with health-related quality of life in women survivors of breast cancer belonging to three public hospitals in Chile evaluated between 2015 and 2017.

DESIGN: Corresponds to an observational study with cross-sectional Design to an observational study with cross-sectional Design. 125 women survivors of breast cancer from three public hospitals in our country (central and south) participated. The Brief Fatigue Inventory (BFI) and the MRQOL questionnaire QLQ C30 and QLQ BR-23 were used. This study was approved by the ethical committee.

RESULTS: The average age of the women was 56.1 (± 11.9) years. Fatigue was present in 103 patients (82.3%). The women belonging to the hospital in the south of our country were the ones who presented the worst quality of life. A significant correlation between cancer fatigue and all domains of quality of life was identified, mainly: global health \( (r = .621) \), physical functioning \( (r = -.734) \), role functioning \( (r = -.597) \), emotional functioning \( (r = -.575) \), cognitive functioning \( (r = -.611) \), pain \( (r = -.583) \), dyspnea \( (r = .511) \), insomnia \( (r = .505) \), appetite \( (r = .477) \), body image \( (r = .510) \) and side effects of systemic therapy \( (r = .622) \).

CONCLUSIONS: Our results allow us to conclude that favoring research strategies and treatment of cancer fatigue could improve the quality of life in women survivors of breast cancer in our country.

COSMETIC ACUPUNCTURE

Seyede Zahra Emami Razavi, Assistant Professor, Maryam Hoseini, Assistant Prof, and Zahra Saffarian, Assistant Prof

OBJECTIVES: Acupuncture is an ancient medical procedure that is commonly used; acupuncture has gained increasing interest from the public as well as health professionals for wide range of disorders. An effective, non-surgical treatment to reduce facial aging. It is not new. It has been used in China for over two thousand years. Acupuncture stimulates the production of collagen, which gives skin a tight, firm look. Acupuncture is an ancient medical procedure that is commonly used; acupuncture has gained increasing interest from the public as well as health professionals for wide range of disorders. An effective, non-surgical treatment to reduce facial aging. It is not new. It has been used in China for over two thousand years. Acupuncture is an ancient medical procedure that is commonly used; acupuncture has gained increasing interest from the public as well as health professionals for wide range of disorders. An effective, non-surgical treatment to reduce facial aging. It is not new. It has been used in China for over two thousand years.

CRANIAL NERVE INVOLVEMENT IN SETTING OF CERVICAL EPIDURAL STEREOID INJECTION: A CASE REPORT

Edward Degerman, MD, Calvin R. Chen, DO, and Joseph Seldin, MD

CASE DESCRIPTION: 70-year-old female with history of chronic neck and back pain s/p both cervical and lumbar fusion procedures and a spinal stimulator implantation received a cervical epidural injection under general IV sedation. Patient received 80mg of methylprednisolone under fluoroscopic guidance. At the conclusion of the procedure when the patient awoke, she was unable to move her right arm with radiating pain down her left arm. Urgent CT head and neck was ordered due to the presence of facial asymmetry and showed extravasation of contrast vs blood present in the subarachnoid space. Cervical MRI significantly showed right greater than left edema and slight widening of the cord from the craniocervical junction through T5-6. The spinal cord’s pathology was deemed intramedullary and thus, no acute neurosurgical intervention was likely to benefit the patient and thus, patient was admitted to acute rehabilitation to improve functional deficits.

DISCUSSIONS: Current literature and educational resources do mention rare instances of cervical and lumbar epiduals causing neurological sequelae leading to worsening radicular pain or myelopathy paralytic. However, there has been no prior documented case of central cranial nerve involvement after cord compression from a cervical epidural.
CRITICAL EVALUATION OF PHYSICAL MEDICINE AND REHABILITATION RESIDENCY WEBSITES
Shiv J. Patel, BS, Mohammed S. Abdullah, BS, Peter C. Yeh, MD, Zainub Abdullah, BS, Rima Patel, MS, and Pratap Jayaram, MD

OBJECTIVES: Information presented on PM&R program websites serve to attract candidates and provide prospective residents with the tools to make well-informed application decisions. These decisions facilitate pairing of programs with residents that are the “best fit.” The main objectives of this study were to analyze the availability of online content of PM&R program websites in order to inform prospective PM&R residency applicants about program information available online and identify areas of improvement for programs.

DESIGN: Cross-sectional analysis of residency program websites using quantitative and descriptive statistics. Each residency program website was evaluated for the presence of 25 unique criteria. Information was considered present if it was found directly on the PM&R residency or department websites of the associated academic institution.

RESULTS: Individual program websites had a mean of 12.284 ± 4.302 (49.14%) criteria present. 20 programs had 9 or less criteria, 35 programs had 10-14 criteria, 31 programs had 15-18 criteria, and 1 program had 19 criteria present online. None had all 25 criteria. Very few listed the number of residents (n=17; 19.5%), a message from the chairperson (n=16; 18.4%), meal allowance (n=16; 18.4%), a general call schedule (n=11; 12.6%), selection criteria for admission (n=11; 12.6%), conference presentations given by residents (n=5; 5.7%), and research projects published by residents (n=1; 1.1%). There was a significant association between program ranking as top 20 or not and the citation of published research projects by faculty on a PM&R website (p=0.026).

CONCLUSIONS: Most PM&R residency websites currently do not include comprehensive information about their programs for prospective applicants. Programs can use these findings to supplement any information gaps that may be present on their websites to improve residency recruitment. Given that the internet is often the most convenient and accessible means to gain insight into programs, residency directors should use their websites to recruit prospective trainees.

CRYSTAL (NOT SO CLEAR) DESTRUCTION: MILWAUKEE SHOULDER SYNDROME, A CASE REPORT
Yingrong Zhu, MD, Fabienne Saint-Peux, MD, and Salvador Portugal, DO

CASE DIAGNOSIS: 71F with left shoulder pain secondary to Milwaukee Shoulder Syndrome

CASE DESCRIPTION: 71 year old female presented with worsening left shoulder pain over several months. Pain was 8/10, constant, aching and occasionally sharp, exacerbated by positional changes and lying down. Physical exam revealed pain-limited shoulder range of motion (ROM), weakness with shoulder abduction and positive impingement signs. Shoulder MRI showed osteoarthritis and tendinosis of multiple rotator cuff tendons. Physical therapy and steroid injection of the left gleno-humeral conferred complete pain relief with a presumed diagnosis of shoulder impingement. Two months later patient reported worsening pain with decreased ROM. Repeat shoulder MRI showed worsening rotator cuff tendinopathy, humeral joint effusion and flattening of the medial aspect of the humeral head reflecting rapidly destructive arthritis. Gleno-humeral joint fluid showed calcium pyrophosphate dihydrate crystals. Milwaukee Shoulder Syndrome was diagnosed.

DISCUSSIONS: Milwaukee shoulder syndrome is a rare crystal-induced destructive shoulder arthropathy characterized by rotator cuff loss and large recurrent joint effusions containing basic calcium phosphate crystals. Patients report insidious onset of joint swelling and pain with restriction of movement over months to years. Diagnosis is challenging due to overlap with many other shoulder syndromes. Radiographically, widespread rotator cuff loss is seen. Aspirated synovial fluid is typically non-inflammatory and positive for calcium apatite crystals, aiding in diagnosis. Although cases of Milwaukee Shoulder Syndrome are uncommon, delayed diagnosis can affect the patient’s level of function and quality of life due to the destructive nature of the disease. Patients should receive physical therapy to improve functional mobility and strengthen shoulder girdle muscles. Oral anti-inflammatory and intra-articular steroid injections can confer significant symptomatic relief.

CONCLUSIONS: Milwaukee shoulder syndrome should be considered in elderly females with rapidly worsening shoulder pain, ROM and/or worsening imaging findings. Synovial fluid analysis can help confirm diagnosis.

CURRENT TRENDS IN GENDER AND ETHNIC DIVERSITY AMONGST PROSPECTIVE AND CURRENT PHYSICAL MEDICINE AND REHABILITATION PHYSICIANS
Grant Dixon, Justin Schappell, MD, Vinicius Tiespoon Francio, MD, Chris Ha, DO, Kirstin Weider, BS, DO, Sarah Smith, MBBS, Brandon Barndt, DO, and Monica Verdeutio-Gutierrez, MD

OBJECTIVES: To evaluate gender and ethnic diversity among PM&R applicants and current residents and compare demographic trends across multiple medical specialties. Gender and ethnic diversity within medicine and medical education has many benefits. For example, studies have shown that race-concordant physician-patient relationships translate to improved patient outcomes and increased satisfaction with care. Despite such evidence, there remains a gross underrepresentation of women and certain ethnic minorities across multiple specialties.

DESIGN: Self-reported gender and ethnicity data from medical school matriculants and from residency applicants were obtained from the American Association of Medical Colleges (AAMC) database. Current resident demographic data was obtained from the American Council for Graduate Medical Education (ACGME). Demographic trends in this dataset were subsequently analyzed using a generalized linear regression model.

RESULTS: Over the last five years, women comprised only 34.76% of PM&R applicants which was the fourth lowest percentage of the 11 specialties analyzed. On average, the total number of female PM&R applicants decreased by 4.35 annually compared to the .43 annual increase in male applicants (p< 0.001); this discrepancy in gender was five times greater than the aggregate of the specialties examined when controlling for total residents. Concerning ethnic diversity, 7.72% of PM&R applicants and 5.31% of PM&R current residents identify as Hispanic. Similarly, 8.28% of PM&R applicants identify as Black, however only 5.28% of current PM&R residents are Black. However, there was no statistically significant difference in this minority underrepresentation compared to other specialties. In fact, the ratios of white:non-white residents were 1.5-1.6 in both PM&R and the other specialties examined.

CONCLUSIONS: Our data demonstrates a significant underrepresentation of women and multiple ethnic groups in the field of PM&R medical education. Recruitment and matriculation of women and underrepresented minority groups should be a focus of the field of PM&R for optimal patient outcomes and educational environments.

CYCLIC SCIATICA DUE TO ENDOMETRIOSIS; A CASE REPORT
Jane Konidis, MD, PT, Mark Dassel, MD, and Michael P. Schaefer, MD

CASE DIAGNOSIS: Cyclic sciatica

CASE DESCRIPTION: A 44-year-old woman was referred to our department for cyclic episodic low back pain radiating to the left lower extremity. Pain onset corresponded to the first day of her menstrual cycle and lasted for several days following the last day of her menses. This cycle repeated itself on a monthly basis for the previous two years. An MRI of the pelvis revealed a conglomerate signal abnormality along the left sciatic nerve just posterior to the acetabulum. An endometriotic appearing lesion measuring 2 x 4 cm was visualized in the vicinity. Ultrasonography of the area demonstrated increased diameter and slight hyperechogenicity of left sciatic nerve with a surrounding area of mixed echogenicity measuring 3.18 x 2.12 cm. Our patient was placed on luproliate acetate, a gonadotropin inhibitor, which resulted in complete resolution of her back and leg pain after 3 months of treatment.

DISCUSSIONS: Endometriosis, the deposition of endometrial tissue outside the uterus, can cause variable cyclical symptoms related to hormonal changes of the menstrual cycle. Isolated cyclic (catamenial) sciatica is a rare presentation of endometriosis. MRI is the diagnostic exam of choice. To the best of our knowledge, this is the second study reported in the literature to identify endometriosis of the sciatic nerve using ultrasound. Not all cases may be identified using imaging. Nevertheless, if there is a high index of clinical suspicion, a trial of hormonal suppression therapy may be warranted.

CONCLUSIONS: Sciatic endometriosis should be considered in the differential diagnosis of cyclic leg pain in women and particularly when no other cause of sciatica can be identified. Improvement and even resolution of symptoms can be achieved via non-invasive treatments through gonadotropin-releasing hormone agonist therapy. Timely surgical intervention may be required in cases that do not respond to conservative treatments to prevent irreversible neurological damage.
sparing studies in dance populations compared to static balance. The authors developed a narrow beam walking test (NBWT) as a cost-efficient method to quantify dynamic balance. The goal of the study was to examine balance differences in dancers and non-dancers using BESS and NBWT.

**DESIGN:** This was an observational cross-sectional study with ballerina dancers (n=9), Classical Indian (Bharatanatyam) (n=6), and non-dancers (n=9). BESS analysis was assessed with a firm surface and foam pad with single-leg and double-leg stances. Dynamic balance analysis used beam widths (23, 3.8, and 1.8 cm) with 12 trials per beam: four control trials of walking without cognitive tasks, four with counting tasks, and four with word-category tasks.

**RESULTS:** The NBWT performed the best in BESS and NBWT, followed by Bharatanatyam dancers then non-dancers. Baller dancers’ average total BESS and single-leg stance BESS foam scores performed significantly different than Bharatanatyam dancers (p=0.0176, p=0.021) and non-dancers (p=0.004, p=0.0125). Bharatanatyam dancers had enhanced performance compared to non-dancers with the firm surface (p=0.0001). No statistically significant differences were found with the 23 cm beam. Baller dancers walked longer distances than Bharatanatyam dancers (p=0.0007, p=0.0001) and non-dancers (p=0.0045, p=0.0001) on the 3.8 cm beam with numerical and word-category tasks. Ballet dancers traveled farther than Bharatanatyam dancers (p=0.0107, p=0.0420) and non-dancers (p=0.0184, p=0.0001) for 1.8 cm beam numerical and word-category tasks. Bharatanatyam dancers advanced significantly more than non-dancers on 1.8 cm beam word-category tasks (p=0.0258).

**CONCLUSIONS:** Quantitative differences between these dancers demonstrate how each population has variable balance compensation mechanisms. Data from this study can be utilized as a standard reference and be extrapolated to other populations including post-injury athletes or patients rehabilitating from with neurological disease to develop injury prevention strategies.

**DETERMINATION OF DELIRIUM RISK FACTORS AND REHABILITATION OUTCOMES AMONG ELDERLY PATIENTS HOSPITALIZED AFTER HIP FRACTURE SURGERY: HISTORICAL COHORT STUDY**

Anna Balzer, MD, Michael Brik, MSC, MHA, MBA, and Raffi J. Heruti, MD, PRO

**OBJECTIVES:** To trace factors associated with a state of delirium among patients hospitalized at Reuth Rehabilitation Hospital following hip-fracture surgery and to evaluate the association between delirium and rehabilitation outcomes measured via Functional Independence Measurements (FIM) Scale.

**DESIGN:** A single-center, historical cohort study, based on medical records of patients hospitalized at Reuth Medical Rehabilitation Center between 2016 and 2018. Characteristics of patients with and without delirium were compared using Independent Samples Student’s t-test for continuous variables, and χ2 test for categorical variables. Multivariate analyses were conducted using linear regression to assess the association between rehabilitation outcomes and delirium.

**RESULTS:** 19 studies, with 1237 patients, were included. 73.7% of studies rated 1 participant was pregnant or currently breastfeeding. Data extraction, determination of level of evidence, and appraisal of methodological rigor and risk of bias assessment were completed. Common intervention delivery methods of therapies were compiled and reported.

**RESULTS:** 19 studies, with 1237 patients, were included. 73.7% of studies rated as level 1b evidence. Levels of evidence ranged from 1b-4; scientific rigor scores were 3.3-9. Commonly emerging themes included PT/PT-delivered intervention, concurrent exercise, and inclusion of a home program in 58% of studies; individualized treatment approach in 53% of studies. Positive outcomes in CLBP pain intensity and functional outcomes were associated with an average of 8.3 hours of CBT, 4 hours of PNE, and 16 hours of mindfulness across studies.

**CONCLUSIONS:** Despite lack of consensus on optimal delivery method of CBT, PNE and mindfulness therapies, findings of the individual studies suggest a range of delivery methods and duration of treatment are associated with positive outcomes in the treatment of CLBP. Due to clinical and methodologic heterogeneity of studies a meta-analysis was unable to be performed.

**DESARROLLO ACADEMICO Y SOCIAL DE FISIATRÍA EN PLATAFORMAS DE COMUNICACIÓN**

Rolando Tijerina Reyes, Licenciatura En Médico, Cirujano Y Partener, Melina Longoni, Especialista En Medicina De Rehabilitación Y Medicina Hipócritica, Solangel Hernández Tápanes, Especialista En Medicina De Rehabilitación, Doctorado En Medicina, Mauro Guzzardo, Especialista En Medicina De Rehabilitación, Máster En Medicina Del Dolor, Viviana Crispín, Physicinan / Ambar S Reference Resident Of Peru, and Marta Noelah Montón, Especialista En Medicina Física Y Rehabilitación

**OBJECTIVES:** Tener un espacio de trabajo organizado en departamentos con herramientas que faciliten la comunicación, lograr una mayor integración académica y profesional. Poder orientar y fortalecer la enseñanza de los residentes por medio de actividades clínicas. Informar y dialogar de manera organizada temas y proyectos que conlleven a acciones que beneficien a la sociedad.

**DESIGN:** Se utilizó una plataforma de comunicación empresarial en línea organizando el espacio de trabajo en canales. Se generó un espacio destinado a la difusión de noticias y eventos, para compartir bibliografía, para intercambiar información de rotaciones y estudios de posgrado, para la generación de proyectos y se creó un canal por cada área de alta especialidad. Se realizaron integraciones audiovisuales para mejorar la comunicación y llevar a cabo actividades académicas, como video conferencias en línea y tutorías con clases grabadas.

**RESULTS:** La plataforma actualmente cuenta con 390 usuarios, 21 canales de posgrados en rehabilitación, 26 maestros de la sociedad AMLAR apoyan con actividades de tutoría y video conferencia, mismos que han facilitado rotaciones y programas formativos.

**CONCLUSIONS:** La primera necesidad que se observó fue centralizar la comunicación de especialistas y residentes para generar proyectos académicos y sociales. Crear una comunidad de intercambio de docencia y de mayor difusión para disminuir la falta de oportunidades y participación por desconocimiento y problemas financieros. La plataforma ha facilitado la información y experiencia clínica a los profesionales que tienen menor capacidad económica, mejorando la participación. La importancia de una comunicación organizada es tener un seguimiento en los proyectos de prevención y de acción en temas de impacto profesional y social para actuar de forma mas eficiente.

**DESIGN OF THE DISABILITY INTEGRATION TOOLKIT: INITIAL OUTCOMES**

Jeremy R. French-Lawyer, MPH, CAS, CHES, Nehira S. Ankam, MD, Carley N. Sutter, MD, and Margaret A. Turk, MD

**OBJECTIVES:** The goal of the Disability Integration Toolkit (DIT) is to increase the cadre of physicians who provide effective care for patients with disability. The DIT consists of learning activities designed using evidence-based adult education.
theory. These materials can be integrated into undergraduate medical education in order to achieve this goal. The DIT is a collaboration between a research group at a large academic university and the Academic Association of Physiatrists (AAP) Medical Student Educators Council (MSEC) and Education Committee.

DESIGN: The design process for the DIT is either the creation of a new tool, or the adaptation of an existing educational activity. This involves collaborative work between experts and DIT coordinators to create interactive modules, clinical cases, small group activities and journal club article recommendations. These instructional methods are paired with key integration points, based on the AAMC Physician Competency Reference Set (PCRS) and developed to prepare students to build toward the Core Entrustable Professional Activities for Entering Residency (Core EP As). Activity specific goals and Objectives are written to guide student learning and structure evaluation. Tools are authored through collaboration with experts and reviewed by other experts in a relevant field or specialty to ensure high quality, effective educational interventions.

RESULTS: The DIT design process has led to the completion of eight tools, with twenty-five more under development. An evaluation process has also been designed and pilot tested. The evaluation is being implemented at other institutions where DIT activities will be incorporated into medical education.

CONCLUSIONS: The incredible growth of the DIT content is anticipated to continue through collaboration with the AAP and others who care for people with disability. Institutions in the US are currently engaging in the adoption of tools from the DIT. The DIT is a promising opportunity for integrating disability content into undergraduate medical education.

DEVELOPING A RIGID FRAME WHEELCHAIR IN BRAZIL

André T. Sugawara, Vinicius Ramos, Milton S. Oshiro, Eduardo Yamakana, and Lizzieara R. Battistella, PROF DR

OBJECTIVES: The process of building a rigid frame wheelchair for the Brazilian environment conditions and measured user satisfaction and safety and provided insights on product’s effectiveness with respect to user mobility and wheelchair fitting.

DESIGN: The wheelchair development process was based on the WHO Guidelines for the Provision of Manual Wheelchairs in Less Resourced Settings. Data on user satisfaction, safety and effectiveness was produced using structured questionnaires such as QUEST 2.0 in Portuguese and the Portuguese versions of the WHO Wheelchair Service Training Package’s forms and checklist.

RESULTS: An iterative process of wheelchair design and selection, product testing and follow up enabled the development of the first Brazilian wheelchair model to meet ISO 7176 quality standards, using user’s opinions and abiding by the policy and costs requirements of the Brazilian public healthcare system, resulting in a good quality, affordable, and acceptable wheelchair for active users. The product was tested and approved by groups of users, engineers and clinical personnel. ISO testing ensured safety and durability. Long term follow up demonstrated user satisfaction with products (4.38) and services (4.13), as well as product safety and effectiveness.

CONCLUSIONS: The study shows that, by combining an open innovation-based approach and the framework provided by the WHO Wheelchair Guidelines for research and development of new products, it was possible to create a good quality, affordable, and acceptable rigid frame wheelchair model that increased the range of manual wheelchairs available through the Brazilian public healthcare system.

DEVELOPMENT OF A BRIEF SCREENING TOOL FOR CERVICAL MYELOPATHY

Gary L. Hoover, DO, Michael Kelly, MD, MA, Douglas Einstadter, MD, MPH, and Mary Joan Roach, PhD

OBJECTIVES: Cervical myelopathy (CM) is a cause of disability and reduced quality of life and can be progressive if not recognized and treated early. No established screening methods for CM exists in clinical practice. The purpose of this study is to design and implement a CM screening tool to be used in clinical practice.

DESIGN: A three-question screening tool was administered to patients with a Spine Center referral over one year. A retrospective chart review was performed to assess for the presence of CM. Revised screening tools that included the symptom “Neck pain” or “Back pain” as additional screening tool criteria were also studied. Sensitivity, specificity, and likelihood ratios were calculated for both the original and the revised screening tool.

RESULTS: 522 subjects responded to the screening tool and completed a Spine Center visit. The original questionnaire had a sensitivity of 72.4% and a specificity of 66.9%. The positive likelihood ratio of the original screening tool was 2.19, and the negative likelihood ratio was 0.41. The revised screening tool with “neck pain” as an additional question had a sensitivity of 86.8%, a specificity of 55.5%, a positive likelihood ratio of 1.95, and a negative likelihood ratio of 0.26. When applied to patients with back pain, the original screening tool had a sensitivity of 81.3%, a specificity of 70.2%, a positive likelihood ratio of 2.73, and a negative likelihood ratio of 0.07. When applied to patients with back pain and at least one other referral symptom, the original screening tool had a sensitivity of 87.5%, a specificity of 69.0%, a positive likelihood ratio of 2.82, and a negative likelihood ratio of 0.18.

CONCLUSIONS: We have developed a brief self-administered screening tool for cervical myelopathy.

DEVELOPMENT OF A NEW INTERACTIVE ASSESSMENT FOR VESTIBULAR EVALUATION AND TRAINING

Po Yin Chen, Master, Chung Huang Yu, PhD, Li Wei Chou, PhD, and Chung-Lan Kao, PhD

OBJECTIVES: Vestibular hypofunction (VHF) and related peripheral ailments disorders account for 50% of balance disorders and are highly correlated with falling accidents. Traditional assessments for balance sensations and performance in humans are executed in still positions; however, patients have complained that movements such as walking, which is a daily activity, frequently induced disequilibrium and dizzy feeling frequently. Considering the complexities in daily life activities, combining dynamic activities, dynamic visual acuity (DVA) and postural control could produce an evaluation that better reflects vestibular functions in daily activities. Our purpose was to build up an interactive robotic device for the assessment of vestibular and balance function during walking.

DESIGN: A prospective, nonrandomized, controlled group study comparing dynamic visual acuity and postural control during forward (FW) and backward (BW) walking. We developed a novel sensor-based vestibular function evaluation system that integrates postural motion analysis and DVA in dynamic activities. LabVIEW, myRIO, inertial measurement unit (IMU), webcams, and DVA test were used to make up a novel device for dynamic vestibular function assessment during ambulation. 12 healthy subjects and 6 vestibular hypofunction patients were recruited in this study.

RESULTS: In motion analysis, patients exhibited worse chest/pelvis reciprocal rotation ratio only in forward walking. The walking trajectory deviation (FW: 6.00 ± 3.76%) Vs. 1.85±0.58% 
(BW: 3.60 ± 1.28%) Vs. 1.52 ± 0.75%) was significantly larger and walking DVA was significantly higher (differences of DVA logMAR: 0.119 ~0.174) in both forward and backward walking.

CONCLUSIONS: Our sensor-based vestibular evaluation system provided a more functionally relevant assessment for identification of vestibular patients. Our findings suggested that incorrect vestibular sensory information may contribute to affect the control of the posture and trunk segments and the DVA during dynamic activities.

DEVELOPMENT OF A VIDEO GAME TO IMPROVE UPPER LIMB FUNCTION IN PATIENTS WITH NEUROLOGICAL DEFICITS

Mireya I. Burgos, Magister, Licenciado

OBJECTIVES: One of the greatest challenges for patients with neurological injuries affecting the upper limb is to achieve independence in performing activities of daily living. New technologies can complement conventional rehabilitation therapies by increasing training times and repetition. General Objective: design a develop a video game to specifically target improving function of the upper limb in the activity of feeding for adult and childhood neurological patients.

DESIGN: A video game that incorporates the movements required to reach your mouth with your hand was developed. The video game incorporates 9 mini-video games, which train different planes of movement with three levels of difficulty. Motion paths are stored to determine the movement patterns used by patients in the activity. Reference values for the design were obtained by testing the range of motion during the activity in a sample of neurological patients. This sample consisted of 4 adults and 2 children with neurological impairments in the upper limb. This allowed for the initial system design configuration. A kinect camera and the Unity web platform were used to capture movements that were incorporated in the design of the video game. Finally, video tests were carried out with 2 children with cerebral palsy and 2 adults with residual impairments in the arm after stroke for the final version of the video game.

RESULTS: The video game “My space travel” was developed. It allows the training of the affected upper limb through planes of movement, considering the movement characteristics of people with neurological damage. Pilot test showed that of the video game is effective for upper limb training.

CONCLUSIONS: The development of technologies in rehabilitation should consider not only the specific objectives that are to be achieved but also the population for which they are being designed. It is important that rehabilitation professionals be involved in the design and elaboration of these.
DEVELOPMENT OF AN APP-BASED THERAPY FOR OSTEOARTHRITIS: RESULTS OF TWO HEALTH EDUCATION STRATEGIES FOR PATIENTS WITH OSTEOARTHRITIS OF THE HIP OR KNEE
Johanna T. Biebl, Stephan Huber, Anne Plidschun, Marzenna Rykala, Eduard Kraft, and Andreas Lorenz

OBJECTIVES: During content preparation of a new medical app for osteoarthritis, the question of the right pedagogical approach arose. Although the high importance of health education in the treatment of osteoarthritis is unquestioned in the respective guidelines, there are few descriptions of the applied teaching methods and evaluated concepts are rare.

DESIGN: Two well-structured training formats were applied to impart disease-specific knowledge to patients with osteoarthritis of the hip or knee joint and to promote health-conscious behaviour. In order to empower patients to continue this behaviour in everyday life, motivational psychological elements were integrated into the training. One form of training was designed based on the Zurich Resource Model (ZRM®), which focuses on the resources that can be activated by patients in the process from intention to action. The other is based on the Health Action Process Approach (HAPA) that looks at the challenges of the health action phases and how they can be overcome to achieve self-efficacy. The effects of the two teaching concepts were examined and compared in a prospective, randomized study that included 42 patients.

RESULTS: The results show that in both groups disease specific knowledge measured by both PKQ-OA (Patient Knowledge Questionnaire in Osteoarthritis) was significantly higher after training (p < 0.05). The comprehensibility of the training was rated as excellent in both groups. More data on health gear in the form of self-efficacy (FESS, Pain Self-efficacy Questionnaire) show positive effects of both trainings.

CONCLUSIONS: According to the results trainings with motivational psychological elements can improve health literacy. Such advanced training courses could thus be an important pillar in the conservative management of hip and knee joint osteoarthritis. In order to use the motivational psychological potential of app-based therapy, the integration of innovative, well-founded pedagogical strategies are a key element.

DIAGNOSTIC APPROACH FOR SACROILIAC JOINT PAIN VS LUMBOSACRAL RADICULOPATHY
Brian Abarbanel, BS, David Kohns, DO, MPT, and Mahmood Gharib, MD

CASE DIAGNOSIS: Sacroiliac joint dysfunction vs lumbar-sacral radiculopathy
CASE DESCRIPTION: A 52-year-old female presented to tertiary spine clinic for evaluation of persistent right back and leg pain. Physical exam findings were consistent with possible sacroiliac joint (SIJ) dysfunction versus atypical lumbar radiculopathy. She underwent a diagnostic/therapeutic fluoroscopy guided SIJ steroid injection, which reduced her pain by 50% initially. Unfortunately, at follow-up she reported that her back pain was no better and she was experiencing more neuropathic leg pain. She was started on gabapentin and decided not to pursue an epidural steroid injection.

DISCUSSIONS: Studies have shown that SIJ pain affects 15% to 22% of patients with axial low back pain. Physical exam findings were consistent with possible sacroiliac joint (SIJ) dysfunction versus atypical lumbar radiculopathy. The results of this study highlight the need to integrate specific modules on disability into medical education curricula, and to include this theme in CPDs programs of primary care physicians in order to optimize the management of patients with disabilities.

DISEÑO METODOLOGICO DE UN CORPUS LINGUISTICO MORFOSINTACTICO USANDO EL SOFTWARE CLAN
Mabel X. Mogollón Tolosa, Magister, Angela P. Ayala, Especialista, Edwin M. Portilla, Magister, Mabel X. Mogollón, Magister, and Daniela Chunhilla, Pregrado

OBJECTIVES: El interés por el estudio del desarrollo del lenguaje infantil ha ido en aumento cada vez más. En los últimos años se han desarrollado paquetes informáticos que ofrecen la posibilidad de llevar a cabo análisis con fines lingüísticos. El objetivo de esta investigación es describir del desarrollo del lenguaje morfosintáctico a través del registro, transcripción y análisis de muestras de lenguaje espontáneo mediante el Software CLAN.

DESIGN: La presente investigación es de carácter cualitativo, descriptivo, con enfoque observacional naturalista, se llevó a cabo en diferentes centros de desarrollo infantil (CDI) con niños de entre 0 a 5 años de edad dentro del marco de la atención integral y diferencial promoviendo los derechos a la salud, protección y participación que permiten favorecer el desarrollo integral.

RESULTS: La tecnología moderna ha posibilitado que se recopilen datos precisos sobre el desarrollo del lenguaje y que los investigadores de todo el mundo puedan compartir, comparar, y trabajar juntos en proyectos donde se clasifican y comparten datos de audio, video, celulares han simplificado el proceso, y algunos computadores han hecho que el análisis resulte posible. Las potencias herramientas permiten estudiar todas las facetas del lenguaje hablado de manera simultánea. Este es el caso de uno de los...
DRIVING WITH PAIN AND OPIOIDS. A DRIVING SIMULATOR STUDY OF PATIENTS WITH CHRONIC PAIN TAKING SHORT-ACTING OPIOIDS

Andrea D. Furlan, MD, PhD, Tiffany Got, N/A, Ryan Lewis, MD, Jennifer Campos, PhD, Bruce Haycock, PhD, Behrang Keshavarz, PhD, and Susan Gorski, PhD

OBJECTIVES: Chronic opioid therapy (COT) is a management strategy for patients with chronic pain despite discordant evidence of its efficacy. Opioids have a broad impact on the central nervous system; side effects include dizziness, sedation and cognitive and psychomotor impairment. Driving requires an integration of psychomotor and cognitive skills, decision making, divided attention, motor skills and behavioral and emotional control. There is a paucity of evidence on the impact of COT on driving performance and Canadian guidelines on fitness to drive reflect the ambiguity of the current body of knowledge. The objective of this project was to assess the driving performance in adult patients with chronic pain who are currently users of short-acting opioids (SA) compared to chronic pain patients who are not users of opioids short-acting opioids (NO) with a driving simulator test.

DESIGN: Participants consisted of patients with chronic pain attending the comprehensive integrated pain program who were consecutively recruited in June 2018 to July 2019. Inclusion criteria: aged 18-65, valid Canadian driver’s license for 2+ yrs and absence of health conditions affecting driving performance. Exclusion criteria: use of long-acting opioids or cannabinoids. Driving Simulator tests consists of three 10 minute driving scenarios: city daytime, highway nighttime and highway nighttime with rain. RESULTS: At baseline, SA and NO were similar in age, gender, symptom severity, general health and cognitive functioning. However, the SA group had less driving experience, less pain and less interference of pain on functioning. Performance on measures of reaction time, vehicular longitudinal and lateral control was similar between groups in all driving conditions. The recruitment rate was 24.5%; the most common barriers were long commute to test center, lack of time and lack of interest.

CONCLUSIONS: From the preliminary results, there is no significant difference between SA and NO on driving performance in all three driving conditions.

DOSE-RESPONSE EFFECTS OF TAI CHI AND AEROBIC EXERCISE INTERVENTIONS AMONG ADULTS WITH FIBROMYALGIA

Augustine C. Lee, MD, Natalie Sajkowicz, MD, Matthew Janzen, MD, Lori Lyn Price, MAS, MLA, Raveendhara Bannuru, MD, PhD, and Chenchen Wang, MD, MSC

OBJECTIVES: Therapeutic exercise is the recommended non-pharmacological treatment for fibromyalgia. However, knowledge on optimal treatment dose and duration is scarce. Our purpose was to examine dose-response relationships, the minimum effective dose, and baseline factors associated with the timing of response from two exercise interventions among adults with fibromyalgia.

DESIGN: Secondary analysis of a single-blind, randomized trial comparing Tai Chi and Aerobic Exercise programs among adults with fibromyalgia (ACR Criteria). Revised Fibromyalgia Impact Questionnaire (FIQ) scores (0-100) were completed each week of intervention. We defined dose as attendance-weeks (i.e. total treatment weeks attended; up to 12 weeks) and treatment response as ≥14% improvement (i.e. previously established minimal clinically important difference) in total disease impact (i.e. FIQ). We used log-rank tests to compare time to response between interventions and Cox regression to examine baseline factors associated with the timing of response.

RESULTS: We included 183 participants (mean age 52 years, BMI 30 kg/m², 92% female, 62% white) in this analysis. There was a linear dose-response effect in total disease impact. The minimum effective dose was 3 weeks. We also found that older, psychosocially healthier participants were more likely to respond faster. These results may help clinicians optimize patient-centered exercise treatments and better manage patient expectations.

DRUG OVERDOSE AND SUICIDE AMONG VETERAN ENROLLLEES IN THE VETERANS AFFAIRS HEALTH CARE SYSTEM: A COMPARISON BETWEEN FACILITY, REGIONAL, AND NATIONAL LEVEL DATA

Zaccueus J. Ahonle, PhD, CRC, Huangjung Jia, PhD, Stephen Mudra, MD, Gail Castaneda, PhD, Sergio Romero, PhD, and Charles Levy, MD

OBJECTIVES: Suicide is the 10th-leading cause of death in the U.S. In 2017, there were 70,237 drug overdose (OD) deaths; 67.8% were from prescription opioids - often prescribed for pain. The rate of opioid use disorder among Veteran Health Administration (VHA) users are seven times higher than non-VHA users. In 2016, the age-and gender-adjusted suicide rate was 1.5 times greater for Veterans than for non-Veteran. The purpose of this study was to compare the incidence of overdose and suicide across facility, regional, and national levels in the Veterans Healthcare Administration system of care in the context of a multispecialty opioid risk reduction program that includes viable alternative pain therapies.

DESIGN: Retrospective study using aggregated FY2012-FY2016 drug overdose and the annual rates of suicide data drawn from the VA Support Service Center (VSSC) Medical Diagnosis Cube and VA Suicide Prevention Program at 3 levels: Facility, regional, and national, respectively. Overdose data were aggregated by facility and fiscal year, and the OD rates (per 1,000) were calculated for unique Veteran.

RESULTS: The average annual rate of OD diagnosis for the facility during the study period, was slightly higher (16.8/1,000) compared to region (16.1/1,000), and VHA national (15.3/1,000), but had less variability (SD = 1.34) compared to region (SD = 2.96), and national (SD = 1.69). The facility had the lowest average annual rate of suicide (9.1/100,000) during the study period, which is one-quarter of the national rate.

CONCLUSIONS: The facility developed a multispecialty opioid risk reduction program that included an addiction management approach to treatment. The presence of this program, during a period when the facility was tapering opioid prescriptions, may explain the relative reduction in suicide.

DURABILITY OF LOW-COST EOXOSKELETAL PROTHESES, IN PATIENTS WITH LOWER LIMB AMPUTATION DUE TO ANY CAUSE

Jesús A. Plata Contreras, PA&B and Clinical Epidemiology, and Julianna Ortiz Ospina

OBJECTIVES: Identify the time of duration between the first and second low-cost prostheses, donated by an orthopedic workshop in Medellin, Colombia, from 2007 to 2019.

DON’T CALL ME IN THE MORNIN: WHY IT MIGHT BE BEST TO SEE PATIENTS IN-PERSON, A CASE REPORT

Johnny Jaragnin, BS, Jennifer Baima, MD, Mathew J. Most, MD, and David Mazin, MD

CASE DIAGNOSIS: Post-irradiation Sarcoma

CASE DESCRIPTION: A 38-year-old woman with a history of stage IIIB squamous cell carcinoma of the cervix who was treated with chemoradiation, considered in remission 5 years prior on PET CT, and was under every 6-months surveillance for recurrence by gynecology. She presented to the Emergency Department for severe back pain, left sided sciatica, and paresthesias. In the absence of fracture or cord compression, MRI was considered primary investigation. This took place over the telephone with referral to the spine center. One week later, her pain progressed to 10+/10 with dense leg numbness, and multiple falls. Physiatry ordered a lumbar MRI for focal neurologic findings on exam, which revealed a large destructive lesion of the left ilium and left hemisacrum with soft tissue extension. This was later determined to be undifferentiated sarcoma, likely due to prior radiation. She is currently undergoing palliative chemotherapy.

CONCLUSIONS: Post-irradiation sarcomas (PIS) are a relatively rare event and exhibit dose dependency. Sarcomas can present with bone pain that can be worse at night and signs and symptoms of compression of surrounding structures. The pelvis is a common site for sarcoma development. Cases of PIS have presented in even just a few months post radiation therapy. The prognosis of patients with PIS is poorer than those with primary sarcomas. This patient would require hemipelvectomy to attempt curative treatment.

CONCLUSIONS: PIS are typically aggressive, have poor prognosis, and can develop within months of high doses of radiation therapies; clinicians index of suspicion for sarcomas in patients with a history of radiation must be high. Evaluation for progressive pain, weakness, and numbness may not be amenable to telemedicine until technology improves. Patients that present with signs and symptoms of progressive nerve compression and bone pain should be re-examined early on.
DESIGN: A retrospective description of lower limb amputee patients was performed during a 12 year period. Statistical methods were used to determine the proportion of patients by level and causes of amputation, as well as the prevalence of these conditions.

RESULTS: 4232 amputees were included, of whom 51.8% presented amputation above the knee and 48.1% below knee. The causes were classified as 54.82% medical and 45.17% traumatic. Of those with medical causes, 61.6% were neurovascular amputation, followed by 11.8% congenital; in the traumatic causes, the traffic accident occupied 65.7%, landmines 4%. 452 patients who received a second prostheses met the following characteristics: 69.8% were between 18 to 60 years old, below knee amputation were the most frequent at 70.5%. The amputation causes: 49% medical and 51% traumatic. Among medical causes, the most frequent ones were 16 % congenital, followed by neurovascular 21%. In those with traumatic causes, traffic accidents represented 35%, of which, 27% were on a motorcycle. The average duration of the first prostheses was 39.78 (SD +/- 12.1) months. For below knee/ above knee prostheses the mean was 41 (SD +/- 14.1) and 39 (SD +/- 13.2) months respectively.

CONCLUSIONS: The results describe the durability of exoskeletal prostheses made with the Jaipur foot and high density polyethylene, who have been awarded by Corporacion Mahivir Kmina Artificial Limb Center in Medellin – Colombia, between 2007 and 2019. The average of use were higher than a previous reports.

DURATION OF AMERICAN FOOTBALL PLAY AND CHRONIC TRAUMATIC ENCEPHALOPATHY

Daniel H. Daneshvar, MD, PhD, Jesse Mez, MD, and Ann C. Mcke, MD

OBJECTIVES: Chronic traumatic encephalopathy (CTE) is a neurodegenerative disease associated with exposure to contact and collision sports (CCS). We hypothesized that, as duration of American football player increased, CTE neuropathological risk and severity would correspondingly increase.

DESIGN: We examined a convenience sample of 266 deceased American football players from two brain banks. To be eligible the VA-BU-CLF Brain Bank, donors needed a history of CCS, military service, or domestic violence, regardless of whether symptoms manifested during life. The Framingham Heart Study (FHS) Brain Bank includes participants from two generations of the FHS. All brains were processed and analyzed using identical methods with neuropathologists blinded to the participant’s CCS exposure and clinical history. We evaluated the ability of years played to classify CTE status using regression and ROC curve analysis. Simulation analyses quantified conditions that might lead to selection bias, including age, race, dementia status, depression status, duration played, and CTE status.

RESULTS: More years of football had a dose-response relationship with having CTE (odds ratio [OR]=1.30 per year, 95%CI: 1.26-1.34; P=3.1x10-10) and with CTE severity (severe vs. mild; OR=1.14 per year, 95%CI:1.10-1.17; P=3.1x10-4).

The relationship remained similar when analyses were limited to participants who donated to the V A-BU-CLF Brain Bank, who played no other CCS, and who had no co-morbid neurodegenerative disease. Simulation demonstrated that years played remained adversely associated with CTE status across all values of selection regression scenarios.

CONCLUSIONS: Duration played was significantly associated with odds of having CTE (odds ratio [OR]=1.30 per year, 95%CI: 1.26-1.34; P=3.1x10-10) and with CTE severity (severe vs. mild; OR=1.14 per year, 95%CI:1.10-1.17; P=3.1x10-4). The relationship remained similar when analyses were limited to participants who donated to the VA-BU-CLF Brain Bank, who played no other CCS, and who had no co-morbid neurodegenerative disease. Simulation demonstrated that years played remained adversely associated with CTE status across all values of selection regression scenarios.

CONCLUSIONS: Duration played was significantly associated with odds of CTE at death, with odds increasing 30% every year, and doubling every 2.6 years. Among those with CTE, duration played was also significantly associated with having severe CTE pathology and greater NFT burden. We found that even under condition scenarios.

remained adversely associated with CTE status across all values of selection regression.

RESULTS: The results describe the durability of exoskeletal prostheses made with the Jaipur foot and high density polyethylene, who have been awarded by Corporacion Mahivir Kmina Artificial Limb Center in Medellin – Colombia, between 2007 and 2019. The average of use were higher than a previous reports.

EFFECTIVENESS OF NEUROMUSCULAR BANDAGE OF LOW BACK PAIN

Antoni Jefri Villegas De León, MD, MSC, and Antoni Jefri Villegas De León, MD, MSC

OBJECTIVES: The objective of this study was to establish the therapeutic effect of the neuromuscular bandage in patients with lower back pain, in the external consultation of the Rehabilitation Hospital of the Guatemalan Social Security Institute, in 2016, through the evaluation of pain according to the analog visual scale (VAS) and the ranges of mobility in flexion of the lumbar spine with the Seat test and Reach.

DESIGN: Longitudinal analytical study, with a sample of 100 patients. The neuromuscular bandage technique was placed in three different sessions, On each session, once a week, the pain was evaluated according to the analog visual scale (VAS), and the mobility on the patients were examined using the Seat and Reach test before and after placing of the neuromuscular bandage.

RESULTS: The mechanical technique presented the greatest effectiveness in the first session (1.349 Chi 2) statistically not significant (p 0.16). The combined technique (mechanics + fascia) was the one that presented an effectiveness in the second session (1.66 Chi 2) not statistically significant (p 0.105). Finally, in the third session the technique that was most effective was the mechanical technique (0.73 Chi 2) statistically not significant (p 0.213).

CONCLUSIONS: The technique that is most related to effectiveness in reducing pain and increasing mobility in patients with low back pain is the mechanical technique. The effectiveness of the neuromuscular bandage in patients with low back pain can occur from the first session and its effectiveness is diminished to the third session.

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EFFECT OF CONSECUTIVE NATURAL DISASTERS ON THE INCIDENCE OF MUSCULOSKELETAL COMPLAINTS IN AN EMERGENCY ROOM

Humberto Ramirez, BS, Richard A. Fontanez, MD, William Ramos, BS, Juan Gonzalez, MD, and Walter Frontera, MD, PhD

OBJECTIVES: To study the effects of consecutive natural disasters on the incidence of musculoskeletal complaints in an emergency room of an academic hospital. To describe the effects by ICD-10 code with emphasis on knee and ankle health conditions.

DESIGN: In September 2017 two consecutive major hurricanes hit the island of Puerto Rico. To study the incidence of musculoskeletal complaints before and after natural disasters at the same time of the year, the electronic database of all visits to an emergency room during the months of September thru December in calendar years 2016 and 2017 was searched. The frequency of all M (musculoskeletal system and connective tissue) codes and all S (injury or certain other consequences of external causes) codes was determined. Codes such as infection, bites and skin injury associated with joints were excluded. Frequency distributions were calculated per year, month, for all visits and those involving the knee or ankle joint.

RESULTS: The total number of visits for the four-month study period post-hurricane (2017=15,400) showed a 3% decline in comparison to prior year (2016=15,854). However, the number of visits with musculoskeletal complaints (M+S codes) increased by 14%; M codes visits increased by 3% (826 in 2016 vs. 848 in 2017) while S codes visits increased by 17% (2,465 in 2016 vs. 2,895 in 2017). Visits associated with knee codes increased by 12% and with ankle codes declined by 11% after the hurricanes. The most common knee condition was dislocation and sprain of joint and ligament of knee (ICD-10 code = S83) followed by knee contusion. The most common ankle condition was sprain of ankle ligament (ICD-10 code = S93.4) followed by ankle contusion.

CONCLUSIONS: Natural disasters are associated with catastrophic injuries. Our data show that incidence of musculoskeletal complaints of the knee also increases after these events.

EFFECT OF CORE STABILITY EXERCISES AND TREADMILL TRAINING ON THE FUNCTIONAL STATUS OF POST LUMBAR-SURGICAL PATIENTS WITH LOW BACK PAIN: A RANDOMISED CONTROLLED TRIAL

Farida G. Sumalia, BSC, MSC, and Gianyu O. Sokunbi, PhD

OBJECTIVES: Stabilization Exercises and Treadmill Training are widely reported to be effective in the management of LBP. However, their effects on Post-Surgical LBP have not been widely reported. It is therefore, not clear whether Core Stability Exercise and Treadmill Walk Exercise will provide greater benefits in terms of pain reduction, improvement of function and quality of life among low back pain spinal post-surgery patients.

DESIGN: A pre-post test Randomised Controlled Trial was carried out. 78 Participants recruited for this study were adults with Low Back Pain who had undergone surgical surgery within the age group of 18 years and above and comprising of both genders. They were recruited using consecutive sampling technique. Participants were randomly assigned to 4 groups. Group A were given Core stability exercises, Group B received Treadmill walk exercise (Bruce protocol), Group C received both exercises, and Group D (Control) received Lumbar rotation, bridging and knee to chest exercises, all interventions were given three times in a week for a period of six weeks. Assessment of Pain intensity, Functional Disability and Quality of Life was carried out before intervention and at 2, 4, and 6 weeks.

RESULTS: There was a statistical significant difference in Pain, Functional disability, quality of life and fear avoidance scores across the time periods (baseline, 2, 4, 6 weeks and 3 months follow up post intervention within all the groups (1,2,3,4) (p < 0.005). The result also showed a significant difference in pain, FD, QOL and FAB (p < 0.05) between the groups at 4 weeks, 6 weeks and 3 months follow up time period.

CONCLUSIONS: Core stability exercises and Treadmill walk training applied in combination are more effective in the reduction of pain and functional disability, improvement of quality of life and fear avoidance of individuals with Post-Surgical LBP.

EFFECT OF ELASTIC TAPE ON KYPHOTIC SPINE IN THE ELDERLY

Surupa Tangnakkul, MD, Nuttasset Manimmanakorn, MD, PhD, and Ratana Vichiansiri, MD

OBJECTIVES: To investigate whether stretched elastic tape changes posture and balance in the elderly.
EFFECT OF PHYSICAL ACTIVITY ON QUALITY OF LIFE OF MOROCCAN MEDICAL STUDENTS
Hajjou Abderrezak, MD, PhDs, Abdelkader Boukharta, and Maryam Fourtassi, MD, PhD
OBJECTIVES: The aim of the study was to investigate the relationship between the level of physical activity (PA) among Moroccan medical students and their self-assessment concerning their quality of life (QoL). Our hypothesis was that there was a positive association between volume of PA and various domains of perception of QoL.

DESIGN: Across-sectional study was conducted between April and November 2018. Sociodemographic and biometric data were evaluated from a sample of 752 medical students from Medical school of Fez, Morocco. PA was assessed through the long version of the International Physical Activity Questionnaire (IPAQ). The MET calculation ranks the PA in three levels (IPAQ categories): intense, moderate and low. The assessment of QoL was conducted with the short form 12 (SF12) generic questionnaires. Multiple linear regression models were used to analyze the relationship between PA with Qol domains.

RESULTS: 36.44 % of the medical students reported a low PA level (< 1500 MET-minutes / week). In contrast, 42.29 % were classified in the group of high level of PA (> 3000MET-minutes / week) with female predominance. The present study has shown that highly active medical students declare high QoL with a significant associations (p=0.001, 95%).

CONCLUSIONS: We observed a strong dose-effect relationship between the level of PA and the perceived QoL in both male and female medical students.

EFFECTIVE POSTERIOR LEAF SPRING AND CARBON COMPOSITE ANKLE FOOT ORTHOSIS ON GAIT AND FUNCTIONAL MOBILITY OF HEMIPARETIC STROKE PATIENTS – A RANDOMIZED CLINICAL TRIAL
Zidkheni Msechu, BSC, MSC, Ahmad Qureshi, FSP and Tim Drew, PhD
OBJECTIVES: Stroke is the most prevalent clinical disease of the cerebral blood vessels leading to death or long-term disability. About 2/3 of survivors achieve independent walking function but continue to have gait dysfunction. Ankle Foot Orthoses (AFOs) are among the orthoses commonly used to improve gait in hemiplegic stroke survivors. The objective of this study was to assess and compare the effect of Posterior leaf spring ankle foot orthosis (PLS-AFO) and Carbon composite ankle foot orthosis (C-AFO) on functional mobility, walking speed and satisfaction among hemiplegic stroke survivors.

DESIGN: Twenty-seven hemiplegic ambulatory stroke survivors were recruited in the study. Participants were randomly assigned either PLS-AFO or C-AFO and assessment was done with and without AFO. Data of functional mobility, walking speed and satisfaction were collected by using the Timed Up and Go test, the 10-meters walking test and Orthotics and Prosthetics users’ survey questionnaires, respectively.

RESULTS: PLS-AFO and C-AFO reduced TUG time by 4.4 seconds (10.5%) and 7 seconds (22.4%), respectively. Walking speed increased during the self-selected walking speed in both AFO users by 0.13m/s (33.4%) and 0.5m/s (40%) for PLS-AFO and C-AFO, respectively. No changes were observed during the fast walking speed. With both AFOs, participants were satisfied in terms of weight, fit and comfort (>90%). Satisfied with the durability of PLS-AFO and C-AFO were 73% and 92%, respectively. The pain was reported after the period; for PLS-AFO was 8.1%, C-AFO (>90%). Satisfied with the durability of PLS-AFO and C-AFO were 73% and 92%, respectively. No changes were observed during the fast walking speed.

CONCLUSIONS: The two types AFOs studied can improve walking speed and functional mobility. C-AFO has shown the ability to provide a better gait outcome as compared to PLS-AFO. Neither of the AFOs improved the fast walking speed. Both AFOs provided a high level of user satisfaction. Pain reported with C-AFO, suggest redesigning. A future study of AFO users using different walking speeds should be considered.
CONCLUSIONS: After six-week treatment sessions, both soft tissue biased manual therapy and conventional physical therapy improved glenohumeral elevation, scapular upward/downward rotation, shoulder active and passive range of motion, and pain during daily activities. We did not identify any group differences so far. We plan to finish the data collection by March 2020 with 20 participants in each group to further clarify whether soft tissue biased manual therapy has better treatment effect than conventional physical therapy intervention.

EFFECT OF ULTRASOUND GUIDED SAPHENOUS NERVE BLOCK ON PAIN AND QUALITY OF LIFE IN OSTEARTHRITIS OF KNEE
Anuradha Shenoy, MD, PMR, and Anil K. Gaur, DPMR; DNBP-MMR; MBA
OBJECTIVES: To assess the effect of ultrasound guided saphenous nerve block on pain and quality of life in osteoarthritis of knee
DESIGN: This was a prospective interventional study done in a tertiary care center in India after approval of ethics committee. Forty patients were included in the study after fulfilling the inclusion and exclusion criteria. Inclusion criteria being age more than 50 years, pain in anteromedial aspect of knee, osteoarthritis diagnosed radiologically by kellegeren Lawrence scale. Ultrasound guided saphenous nerve block given using 10 to 14 MHz linear transducer placed transversely at mid-thigh 40mg of methyl prednisolone acetate and 9ml of 2% lignocaine given after identifying saphenous nerve lateral to femoral artery. Outcome measures evaluated using KOOS score and VAS score at 1 week, 1 month, 3 months and 6 months
RESULTS: Significant improvement in pain was seen at 1 week, 1 month and 3 months as compared to pre-treatment values. Significant improvement of was seen in Quality of life up to 6 months
CONCLUSIONS: In conclusion ultrasound guided saphenous nerve block can be considered as method of pain management in osteoarthritis of knee with an anteromedial pain.

EFFECT OF WATER TREADMILL WALKING TRAINING IN A REHABILITATION PROTOCOL AFTER SURGICAL RECONSTRUCTION OF COMPLETE ANTERIOR CRUCIATE LIGAMENT RUPTURE
Desheng Li, Qi Zhang, Chen Chen, Master, Xuguang Liu, Master, and Dongmei Ye, Doctor
OBJECTIVES: To compare the rehabilitation effect of underwater treadmill training and onshore treadmill training on patients with anterior cruciate ligament rupture reconstruction.
DESIGN: Two to three months after fracture reconstruction of the anterior cruciate ligament of the knee were randomly divided into underwater treadmill training group and onshore treadmill training group. The routine rehabilitation training of the two groups of subjects was basically the same. Additionally, two groups have 20 min treadmill walking training underwater or onshore. The flexor and extensor muscle strength of the knee was evaluated before and after 3 weeks of training including peak torque to body weight ratio (PT/BW) (at speeds 30°/sec and 60°/sec, respectively). Proprioceptive positional sensation was evaluated by passive position sense (PAPS) of knee joint. Static single-leg static balance and stability limit index in the balance test evaluation system was also assessed. Knee joint function and walking ability were evaluated by the lysholm rating scale.
RESULTS: There were no significant differences in the evaluation indexes between the two groups before training (P >0.05). After 3 weeks of training, the evaluation result of two groups were superior to their basic levels in the PT/BW, PAPS of knee joint and lysholm scores (P<0.05). There were significant improvement of PT/BW of extensor muscle, PAPS of knee and lysholm scores of the surgical knees in underwater treadmill training group than those in onshore treadmill training group (both P<0.01). However, there was no significant difference in the increase of PT/BW of the flexor, the static single-leg static balance and stability limit index between the two groups (P >0.05).
CONCLUSIONS: The walking training of the treadmill in the water is better than on land. The muscle strength, joint position sense and walking ability are improved.

EFFECTIVENESS OF BEHAVIORAL MEDICAL REHABILITATION: A PROPENSITY SCORE MATCHED ANALYSIS
Miriam Markus, MSC, BSC, and Matthias Bethge, PhD
OBJECTIVES: Patients with musculoskeletal disorders and additional mental comorbidity have a high risk of permanent work disability. Behavioral medical rehabilitation (BMR) was developed to support work participation of these patients. The aim of our analyses was to evaluate if BMR improved outcomes compared to conventional medical rehabilitation (CMR) under real-life conditions ten months after rehabilitation (German Clinical Trials Register: DRKS00016404).
DESIGN: The study was a cohort study under real-life conditions in 92 German rehabilitation departments. Participants with musculoskeletal disorders received either a BMR or a CMR. Propensity score matching was performed to create balanced samples of BMR and CMR participants. Outcomes (stable return to work, various aspects of health, work ability and coping strategies) were collected by questionnaire ten months after rehabilitation. Additional stratified analyses for depression and anxiety and a per-protocol analysis were performed.
RESULTS: 3,550 persons aged 18 to 65 years (mean age: 53.5 years; 74% women) were included. The matched sample included 720 patients. Ten months after rehabilitation, participants of BMR did not return to work more often, but reported better self-rated work ability (0.48 points, 95% CI: 0.05 to 0.91) better physical functioning (0.25 points, 95% CI: 0.00 to 0.57), better self-management skills (0.41 points, 95% CI: 0.15 to 0.67), decreased pain impairments (-3.90 points, 95% CI: -7.21 to -0.59) and decreased fear-avoidance beliefs (-0.45 points, 95% CI: -0.82 to -0.09). Stratified effect sizes were between 0.13 and 0.22. Stratified analyses showed higher benefits of BMR in depressive or anxious patients. A per-protocol analysis showed effects twice as high when the recommended minimum dose of behavioral medical therapies was provided.
CONCLUSIONS: Our study showed small beneficial effects of BMR ten months after rehabilitation. Additional analyses showed that the effects of BMR in real-life care depend on guideline fidelity (reaching the intended target group and assuring the recommended treatment dose).

EFFECTIVENESS OF HIGH-INTENSITY INTERVAL TRAINING ON PHYSICAL FITNESS IN FEMALE MEDICAL STUDENTS
Maha E. Ibrahim, MD, Mohamed H. Mahmoud, MD, Menat Allah Ibrahim Elbalawy, MD, Mohamed Loy Salem Hamed, MD, Nehal Hussein Ahmed Ahmed, MD, Heba-Allah Hassan Aki, MD and Mohamed Abdelhamid, MD
OBJECTIVES: Physical fitness is considered one of the most important health markers, and a strong predictor of morbidity and mortality for cardiovascular disease. Medical students exhibit suboptimal activity habits, thus increasing their cardiovascular disease risk. The purpose of this study was to examine the effects of short-term high-intensity interval training (HIIT) on physical fitness, anthropometric measurements and psychological health among female medical students.
DESIGN: The study was carried out on 25 volunteering female medical students from the Faculty of Medicine, Suez Canal University, Egypt and 25 matching controls. Throughout a 6-week period, one group (n=25) received a HIIT program comprising 5 sessions per week and the second group (n=25) served as a control group, receiving only instructions to perform unsupervised aerobic activities for the same time period. Both groups received instructions to follow a balanced diet throughout the course of the study. Assessments were performed at program admission and discharge. physical fitness (measured using the Harvard Step Test), body mass index (BMI), hip/waist ratios were assessed. Psychological wellbeing was measured using the general health questionnaire(GHQ).
RESULTS: After a 6-week period, the HIIT group had significantly lower GHQ scores and BMI than their values in the control group (p<0.001) and (0.048) respectively, and significantly higher fitness level than those in the control group (p<0.001). Multivariable linear regression analysis showed that the HIIT program was the best-fitting predictor for the fitness level after the 6-week training (p< 0.001).
CONCLUSIONS: HIIT was found to be an effective means of improving physical fitness, body mass index and psychological health in this cohort of medical students.

EFFECTIVENESS OF PULSE ELECTROMAGNETIC FIELD THERAPY ON PAIN, FUNCTIONAL STATUS, AND QUALITY OF LIFE IN PATIENTS WITH CHRONIC RADICULAR PAIN DUE TO LUMBAR DISC HERNIATION
Mon Nasri Alghou, MD, and Birkan Sonel Tur, MD
OBJECTIVES: We aimed to investigate the effectiveness of pulsed electromagnetic field (PEMF) in addition to physical therapy on pain, functional status, and quality of life in patients with chronic radicular pain due to lumbar disc herniation.
DESIGN: This is a prospective randomized, double-blind, sham controlled trial. Study participants, 50 patients with radicular pain diagnosed due to lumbar disc herniation were included in the study. Patients were randomly assigned to PEMF or control groups. Both groups received 15 sessions of hotspot and Transcutaneous Electrical Nerve
Stimulation (TENS) for three weeks. The treatment group received PEMF; the control group received sham PEMF. Patients were evaluated with Visual Analog Scale (VAS), Modified Schober test, straight leg raise test (SLRT), Douleur Neuropathique 4 (DN4), Roland-Morris Disability Questionaire (RMDQ), and Nottingham Health Profesional Health Profile (NHP) before, post-treatment, and 4 weeks after treatment. **RESULTS:** 45 patients (45.4 ± 10.7 year) completed the study (PEMF group 23, control group 22). There was no significant difference between groups at baseline. Improvement in VAS, SLRT, and DN4 was observed in both groups. **CONCLUSIONS:** PEMF is effective in radicular back pain, neuropathic pain, functional status, and quality of life when applied in addition to conventional physical therapy in patients with chronic radicular pain due to lumbar disc herniation.

**EFFECTIVENESS OF ROBOT-ASSISTED GAIT TRAINING ON PATIENTS WITH BURNS: A PILOT STUDY**
Cheonghoon Seo, MD

**OBJECTIVES:** Gait enables individuals to move forward and is considered a natural skill. However, gait disturbances are very common in patients with burn injury. Major causes of functional impairment are pain and joint contractures. Recent studies focused on the application of robot-assisted gait training (RAGT). This study aimed to elucidate the efficacy and investigate the mechanism of motor recovery after RAGT on patients with lower extremity burn.

**DESIGN:** 12 patients with lower extremity burns were included. SUBAR® (CRETEM, Korea) is a wearable robot with a footplate that assists patients to perform voluntary muscle movements. RAGT enables training of automatically programmed normal gait pattern. Patients underwent 30 min of RAGT using SUBAR® and conventional exercise rehabilitation each for 30 min once a day for 5 days a week for 4 weeks. Functional scores of functional ambulation category (FAC), 6-minute walking test (6MWT) distances, and numeric rating scale (NRS) scores of pain before and after 4 weeks RAGT were measured.

**RESULTS:** NRS scores, FAC scores, and 6MWT scores were improved significantly after 4 weeks of RAGT (p<0.002, p<0.002, and p=0.001). RAGT improved pain, increased the walking speed, and improved gait performance of patients with lower extremity burn.

**CONCLUSIONS:** Robot-assisted rehabilitation may facilitate early recovery from burn injury. The absence of complications and the positive **Results** support the usefulness of RAGT in burn patients.

**EFFECTS OF DYNAMIC BODY-WEIGHT SUPPORT ON FUNCTIONAL INDEPENDENCE MEASURES IN ACUTE ISCHEMIC STROKE**
Nicholas C. Elwert, DO, Elizabeth Powell, NS, Nathan Abdelkayed, MD, Lenny Sawaki, MD, PhD, and Emily Angelis, MS

**OBJECTIVES:** According to the Center for Disease Control, every 40 seconds an individual in the United States suffers a cerebrovascular accident (CVA) with ~610,000 new CVAs per year. While novel technological advances and adaptations are utilized in neurorehabilitation, it is unclear if these advances lead to greater functional improvements compared to standard of care (SOC) rehabilitation particularly during the inpatient period. Dynamic Body-Weight Support (DBWS) technology is a powered suspension system that supports the patients’ body weight and reduces the potential for falls. The purpose of this retrospective cohort study was to compare outcomes in patients who utilized DBWS with patients who received SOC during acute rehabilitation admission after ischemic stroke.

**DESIGN:** This retrospective cohort study compared 29 patients with an acute ischemic stroke whose therapy incorporated DBWS (ZebraG v.3; Aethetics, LLC, Ashburn, Virginia) with 29 patients whose therapy did not incorporate DBWS (SOC) during inpatient rehabilitation. Outcome measures included the following: Functional Independence Measure (FIM) scores at admission and discharge with specific evaluation of total FIM score, motor FIM score (self-care, sphincter control, mobility, locomotion) and cognitive FIM score (cognition, social cognition). Patient age, etiology of CVA, and admission FIM scores were matched between the two groups.

**RESULTS:** Overall, the DBWS group had greater improvement in total FIM score compared to the SOC group at discharge (p=0.001). Additionally, the DBWS group demonstrated significant improvement in FIM subscales compared to the SOC group at discharge, specifically, motor FIM subscales of sphincter control (p=0.012) and locomotion (p=0.023) along with overall improvement in motor FIM score (p=0.01).

**CONCLUSIONS:** Our results provide evidence that DBWS during inpatient rehabilitation may yield better outcomes than SOC in patients with an acute CVA. Our promising findings warrant larger prospective randomized double-blinded studies.
study; 1.0±0.37; Previous study: 0.54±0.25). Moreover, we found that improvement in efficiency of FIM-walk was significantly correlated with age (r = -0.52, p < 0.05).

CONCLUSIONS: It indicated that patients could accomplish improvement on a parietal lower limb function and walking ability as well as an effective independent walking. Furthermore, it was suggested that such improvement can be achieved with younger age.

EFFECTS OF INPATIENT REHABILITATION PROGRAM IN LOWER LIMB AMPUTATION

Viviane Sales, Daniela M. Utiyama, Fabio M. Alfieri, Artur Aquino, Carla Paschoal, and Linamara R. Battistella, PROF DR

OBJECTIVES: The aim of this study was to analyze the effects of an inpatient rehabilitation program on mobility, balance, functionality and deambulation in patients with unilateral lower limb amputation

DESIGN: This is a retrospective study realized in the Instituto de Medicina Física e Reabilitação of the Hospital das Clínicas da Faculdade de Medicina da USP – São Paulo, Brazil. It was analyzed medical records of patients with unilateral lower limb amputation whose were submitted to a pre and post prosthetic rehabilitation program between July 2015 and September 2019. Data as age, gender, time, type and cause of disease, functional mobility (Time Up and Go Test), balance and mobility (Amputee Mobility Predictor - AMP and 2 minutes walking test) were collected. Patients were divided into two groups: traumatic and vascular.

RESULTS: Comparing groups, there were differences between ages, being the traumatic group younger. In the pre-prosthetic phase, both groups had significant improvements in AMP and 2 minutes walking test, with differences between groups, probably related to basal condition and patient’s ages. In the prosthetic phase, data’s showed statistic significant improvements, with no difference between groups.

CONCLUSIONS: Results show that individuals with lower limb amputation submitted to a inpatient rehabilitation program have beneficial results in mobility, balance, functionality and walking capability.

EFFECTS OF NON-OPERATIVE TREATMENT ON ACUTE LOW BACK PAIN AND MUSCLE IMPAIRMENT CAUSED BY PROLAPSED LUMBAR DISC

Svetlana Anicic, and Aleksandra Vukomanovic

OBJECTIVES: Patients with severe acute low back pain, muscle impairment and MRI verified massive prolapsed lumbar disc usually undergo operative treatment. The aim of this study was to examine non-operative treatment effects and safety in patients with acute low back pain and peroneal/tibial muscle impairment caused by massive prolapsed lumbar disc. Also, we were interested in appearance and persistency of chronic pain and its relationship with radiological changes and other variables we recorded.

DESIGN: Longitudinal study (1 year follow up); 21 patients with acute low back pain and peroneal/tibial muscle impairment; MRI verified extruded lumbar disc; 3 month non-operative treatment (1 week of medicamentos therapy for patients with severe pain (VAS ≥ 7, VAS = Visual Analog Scale, 29 sessions of exercise, pulsed magnetic field therapy, intermittent lumbar traction); variables: age; gender; pain; VAS≤0;10; Manual Muscle Test 0-5; MRI: partial or total regression.

RESULTS: After 1 year follow up, significant reduction in pain (8±2,9(5-10) vs 1±1,0(0-5)) and improvement in muscle strength (3±0,7(4-2) vs 4±0,4; 4(3-5)) were achieved (Friedman test; p< 0.005). MRI displayed partial or total regression of extruded disc in all 21(100%) patients after 1 year. Total regression was verified in 14(67%) patients, but total pain relief (VAS<0) occurred in 8(38%) patients. Persistent low level chronic pain could not be predicted by follow up variables: age, gender, baseline pain, improvement in muscle strength or extruded disc regression degree (Multinomial logistic regression). No side effects were recorded during this treatment.

CONCLUSIONS: Significant pain relief and muscle strengthening are great benefits from non-operative treatment of patients with complaints caused by prolapsed lumbar disc. It can be considered as safe and effective treatment choice. “Resitutio ad integrum” of prolapsed disc was already presented, and our study confirmed these findings. But morphological repairment is not always guaranteed for life without pain, and we have to do more to control process of sensitization.

EFFECTS OF ROBOTIC GAIT AND STAIR TRAINING, ASSOCIATED OR AFTER CONVENTIONAL THERAPY, IN PATIENTS WITH CHRONIC STROKE SEQUELAE

Cristhina B. Siegle, Joyce Karoline F. de Carvalho, Daniela M. Utiyama, Fabio M. Alfieri, Denise Matheus, Denise V. Ayres, Linamara R. Battistella, PROF DR, and Pedro Claudio G. de Castro

OBJECTIVES: Rehabilitating gait function and stair climbing are major goals after stroke. Robot-assisted gait enables intensive, task-oriented training. End-effector robots modulate movement in the stance and swing phase with the feet in contact with the platform. G-EO System promotes, in addition to gait training, stair training. Aim: to verify effects of robotic gait training with G-EO System associated with conventional rehabilitation, and effects of robotic training without association with conventional rehabilitation, after its completion, regarding risk of falls and functional mobility, gait speed, time to climb stairs and balance in patients with chronic stroke sequelae.

DESIGN: Retrospective study, participants in the chronic phase of the stroke, being group 1 with 42 who performed 20 robotic training sessions associated with conventional physiotherapy and group 2 with 15 who performed the 20 sessions without association with conventional physiotherapy, after discharge from it. G-EO System equipment was used for walking and to up and down stairs, with 20 sessions of 20 minutes each one. Application of the tools Timed Up and Go, 10 Meter Walk Test, Ability to climb Stairs and Berg Balance Scale. Wilcoxon test and t-test were used, with p< 0.05 considered statistically significant.

RESULTS: Statistically significant differences in all variables observed in both groups. There have been motor gains by performing robotic training in association with conventional therapy as well as performing robotic training alone.

CONCLUSIONS: The protocol promoted improvements in functional mobility, walking speed, time to climb stairs and balance of participants. Robot training promoted motor gains being performed in association with conventional therapy and also after being discharged from conventional therapy, with refinement of gains achieved so far. Robotic therapy is effective for the chronic phase of the disease.

EFFECTS OF THE LOWER BODY POSITIVE PRESSURE TREADMILL ON SYMPTOMS AND FUNCTION IN PATIENTS WITH KNEE OSTEOARTHRITIS

Hongxin Chen, MD, Qiang Lin, PhD, Yuxin Zheng, BS, Shijuan Lang, MMBS, Peixi Lian, BS, Junjie Liang, MMED, and Haining Ou, PhD

OBJECTIVES: The lower body positive pressure (LBPP) treadmill – an emerging body weight-supported training technology – has attracted interest as a clinically useful tool during knee osteoarthritis (KOA) rehabilitation. However, the exact effect and the mechanism of LBPP on KOA have not been fully explored.

DESIGN: Twenty KOA patients were randomly divided into the LBPP and conventional treatment (control) groups. A total of 18 patients completed the ten-session treatment (25 mins per day, five times per week), including eight patients in the LBPP group and ten in the control group. The LBPP group performed the LBPP training protocol using 65% body weight and a speed of 1.5-2 m/phase, whereas the control group performed the conventional walking protocol. The two groups underwent clinical functional scale assessments and three-dimensional gait analysis before and after treatment, including the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), visual assessment scale (VAS), knee joint range of motion (KAROM).

RESULTS: There were no significant differences in baseline characteristics between the two groups. The LBPP group and the control group showed significant differences in WOMAC, KAROM, and VAS scores before and after treatment (p<0.001). Moreover, after treatment, the LBPP group showed more differences in VAS scores compared with the control group (p<0.001). The LBPP group showed the significant differences in mean velocity, cadence, and stride length compared with control group after treatment (p<0.01), but no significant differences in stance phase, swing phase, and step width. Moreover, after treatment, the LBPP group also showed significant differences in KAROM compared with the control group (p<0.05).

CONCLUSIONS: Compared with conventional walking training strategy, the LBPP walking training strategy could effectively improve the pain symptom and knee range of motion during walking, which could be beneficial to the recovery of walking function in KOA patients.

EFFECTS OF TRAINING WITH AN EXOSKELETON TYPE REHABILITATION ROBOT (SUBAR®) ON WALKING ABILITY FOR CHRONIC STROKE PATIENTS

Cheon Ji Kang, MD, Min Ho Chun, MD, PhD, June Kyung Lee, MD, and Ji Yeon Lee

OBJECTIVES: To investigate effects of SUBAR®-assisted gait training in chronic stroke. A single-blinded, prospective, randomized controlled trial.

DESIGN: Inclusion criteria were as follow: age ≥ 18 years old; the diagnosis of a stroke; after 6 months of onset; previously an independent walker, Functional Ambulatory Category score ≥ 3. Exclusion criteria were as follow: severe cognitive disorder

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or aphasia; body weight $\geq 100$ kg; height $< 150$ cm; severe medical disease affecting the gait; severe neurologic and musculoskeletal disease affecting the gait;

The patients were randomly assigned to one of two groups: 30 minutes of training with SUBAR® which is exoskeleton-typed robot (SUBAR® group; n = 15); or 30 minutes of conventional physiotherapy (control group; n = 15). All received 10 times treatment for three weeks.

RESULTS: 30 patients were analyzed: 15 patients in the SUBAR® group and 15 patients in the control group. Baseline characteristics did not differ significantly between groups. We measured improvement by calculating differences in the scores at pre-treatment and after 10 times treatments for each group. In SUBAR® group, MAS and step length are significantly improved after treatments. SUBAR® group showed greater improvement in stride length, but not significantly. In control group, there are significant improved after treatments in BBS, MAS and stride length. In step length of the affected limb, the SUBAR® group showed greater improvement than the control group, but not differ significantly. BBS improved more in control group than the SUBAR® group. And there are no differences in other measurements between two groups.

CONCLUSIONS: Our results suggest that SUBAR®-assisted gait training has a similar effect as conventional therapy. Step length is more improved with SUBAR®-assisted gait training compared with conventional physiotherapy in stroke patients. Between two groups, there are similar improvements in 10MWT, TUG, MAS, MI, RMI and gait analysis except BBS.

EFFICACY OF BUTOLOGIN TOXIN IN TREATING LATERAL EPICONDYLIITIS: DOES INJECTION LOCATION MATTER? AN EXPLORATORY ANALYSIS

Bo Song, MD, Derek S. Day, BS, and Prathap Jayaram, MD

OBJECTIVES: Lateral epicondyliitis is a common condition characterized by pain in the lateral epicondyle affecting the common extensor tendon. Botulinum toxin injections have recently seen some success in managing this syndrome. The purpose of this study is to examine injection location as a source of heterogeneity in pain reduction and grip strength preservation.

Design: A comprehensive literature search was performed and 7 articles were identified regarding botulinum and lateral epicondyliitis. 6 distinct injection locations were identified distal to the lateral epicondyle: 0 cm, 1 cm, 3-4 cm, 5 cm, distance measured at 1/3 the forearm length, and tender point. Our primary outcome measure wasVAS pain score change from baseline while our secondary outcome measure was grip strength change.

RESULTS: We found that injecting a distance measured 1/3 the length of the forearm distal to the lateral epicondyle produced the most pain relief at 92% by last follow up date. On the other hand, an injection 5 cm distal to the lateral epicondyle was least effective with only 3.8% improvement. With respect to grip strength, injection at 3-4 cm from the lateral epicondyle was most effective at 56% improvement from baseline. Injections at 0 cm was least effective with a 12.4% decrease in grip strength.

CONCLUSIONS: This study demonstrated significant variability in injection site locations with respect to VAS pain relief and grip strength change. Certain trends were identified including a negative association between proximity to the lateral epicondyle and pain relief. While some locations tended to cause greater grip strength reduction, all patients reached back to near baseline grip strength by last follow up date. Further clinical trials would be beneficial to investigate this topic.

EFFICACY OF SUPRASCAPULAR NERVE BLOCK IN TREATMENT OF PERIARTHRITIS SHOULD:ER

Sakshi Jain, MD, Diganta Borah, MBBS, MD, and Kiran Kumar, MBBS, DNB

OBJECTIVES: To assess the effectiveness of Suprascapular Nerve Block in Periarthritis Shoulder in terms of improvement in pain, range of motion and function.

DESIGN: Prospective Interventional Study 45 patients of periarthritis shoulder were enrolled in the study after satisfying inclusion and exclusion criteria. Patients received suprascapular nerve block of 0.5% bupivacaine and 40 mg of methyl prednisolone acetate under USG guidance. Each patient was assessed before intervention at 1, 4 and 12 weeks after intervention. 0-10 Numeric Pain Intensity Scale, Active and passive range of motion, Quick Disability of Arm, Shoulder and Hand (DASH) score and Shoulder Pain and Disability Index (SPADI) were used for assessment.

RESULTS: 45 patients with mean age of 50.82 ± 8.76 years were enrolled. There was statistically significant improvement (p value < 0.05) in pain, functional index, active and passive range of motion except passive flexion and passive external rotation at follow up after 1 week of intervention when compared to baseline. But at 4 weeks and 12 weeks there was statistically significant improvement in pain, ROM in all directions and functional index.

CONCLUSIONS: From this study, it is concluded that Suprascapular nerve block is an effective treatment modality for periarteritis shoulder.

E-GAIT=AN ONLINE GAIT ANALYSIS RANDOMIZED CONTROLLED TRIAL

Alaa S. Alohabi, MBCHB, MSC, Abdullahalq Ghalib, BSC, PhD, Muna Metfen, BSC, and Zainab Baqr, BDS

OBJECTIVES: Due to the exponential increase of using internet e-learning tools, these have become more and more popular in education. So far no studies have been published on the effectiveness of online gait analysis tools for physiotherapy students. The aim of our study is to evaluate the effectiveness of our online gait analysis tool among physiotherapy students on acquiring knowledge and self-confidence concerning gait analysis.

DESIGN: Physiotherapy student groups learning gait analysis for the first time will be randomized in two groups: Intervention Group (IG) and Control Group (CG). The CG will receive traditional lectures on gait analysis without the use of an online tool, while the IG will receive the same traditional lectures plus the use of the online tool during an approximate time period of three weeks. The online tool consists of three parts: theoretical aspects of gait analysis, practical demonstrations and a self-evaluation part. Then an online multiple choice test (T1) will be performed for both groups, afterwards the two groups switch over and a second test (T2) will be performed after another three weeks of studying. The results of both tests will be analyzed and a self-confidence questionnaire using a 5-points Likert scale with regards to confidence in performing gait analysis will be used afterward.

RESULTS: Data analysis shows no significant relationship encountered among the two groups in T1, where as in T2, IG seems to have had a better response compared to CG since having more homogeneity and median values. With regards to self-confidence with comparison significant, T1 seems to had better response compared to T2 as it has the upper shift of order statistics value of ordinal scale.

CONCLUSIONS: The application of E-gait online program would be more beneficial theoretically and practically if it is introduced after testing the initial knowledge of the students and not the other way around.

ELASTOFIBROMA DORSI PRESENTING AS WINGED SCAPULA: A CASE REPORT

Emily G. Larson, BS, and Philip Chen, MD

CASE DIAGNOSIS: Elastofibroma Dorsi

CASE DESCRIPTION: A 68-year-old male was referred for “left winged scapula,” that was first noticed during routine physical exam. Patient and his wife had not noticed it before. He denied pain, numbness, tingling, weakness or functional change. Exam showed his left scapula to be protruding posteriorly, relative to right, at rest. No lateral winging observed. Active scapular protraction did not change appearance, with stable prominence of left scapula relative to right. Scapular motion was symmetric. Strength, sensation and reflexes were normal in bilateral upper extremities. Review of prior CT chest imaging showed incidental “poorly marginated somewhat inhomogeneous soft tissue masses are present in the infrascapular region bilaterally. Findings are characteristic for benign elastofibroma dorsi.” Case was discussed with musculoskeletal radiologist, who felt radiologic findings were classic for benign elastofibroma dorsi. No further treatment was pursued since he was asymptomatic.

DISCUSSION: Winged scapula is used to describe aberrant positioning of the scapula on the posterior thorax, and can further be divided into static or dynamic winging. Traditionally, this observation is attributed to neurological compromise of either the long thoracic, spinal accessory, or dorsal scapular nerve, innervating the serratus anterior, trapezius, or rhomboid muscle, respectively. We present a case of static scapular winging due to a soft tissue lesion, with an ultimate diagnosis of elastofibroma dorsi. This benign, soft tissue mass has a poorly understood mechanism of development. Several studies suggest this lesion may be more prevalent than previously thought. Surgical resection is reserved for severely symptomatic cases.

CONCLUSIONS: In the context of scapular winging, it is important to consider both static (soft tissue) and dynamic (neurologic) causes of pathology leading to this physical exam finding. To our knowledge, only one other case of elastofibroma dorsi has been described with this presentation.

ELECTRO-ACUPUNCTURE DECREASES PAIN AND IMPROVES FUNCTIONALITY AMONG PATIENTS OF KNEE OSTEOARTHRITIS IN PAKISTAN: A QUASI EXPERIMENTAL STUDY

Muhammad Tawab Khalil, MBBS, and Ali Raza, MBBS, FCPs REHAB MEDICINE

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CASE DIAGNOSIS: Knee osteoarthritis is a common debilitating condition, adversely affecting the functionality and quality of living of patients. Pharmacological treatment remains the mainstay of treatment mostly involving acetaminophen and opioids with short term NSAID use. Electro-acupuncture (EA) is a potential non-pharmacological treatment option but data supporting its efficacy in low-middle income countries is scarce. To study the effect of EA on pain and functionality of knee joint in patients with knee osteoarthritis.

CASE DESCRIPTION: This quasi experimental study took place in Out Patient Department of Rehabilitation Department in a Tertiary Care Hospital from January to August 2019. Through convenience sampling, patients with mild to severe osteoarthritic knee pain were consecutively recruited. Standards for reporting interventional in controlled trials of acupuncture (STRICTA) checklist was followed to ensure methodological quality. After documenting demographic data (age, gender, duration of pain, side of knee joint involved), one session of electro acupuncture was performed. Seven stainless steel needles were inserted per session per patient at HeDing, SP10, SP9, XiYin, GB34, B140. Electrical stimulus of 4-9 Hz was applied for 5 minutes. 0.25x25mm stainless steel needles manufactured by Hawato were used. Severity of pain was assessed by numerical rating scale (NRS) score of pain before and after 4 weeks of intervention. Functionality was assessed by measuring range of motion (ROM) before and after 4 weeks of intervention. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 25.

RESULTS: Of n=23 patients, n=14 were male, n=9 were female. Mean age was 53.5±2.5 years. Mean duration of pain was 49.3±7.9 months. 39% of patients had right sided and 26% had left sided knee joint involvement while 35% had bilateral knee joint osteoarthritis. NRS score significantly decreased at 4th week after intervention (p-value=0.000). ROM significantly improved at 4th week after intervention (p-value=0.003).

CONCLUSIONS: Electro acupuncture improves functionality and reduces pain in patients with knee osteoarthritis.

ELECTRODIAGNOSIS USING SENSORY NERVE ACTION POTENTIAL FOR THE C7,8 NERVE ROOT ENTRAPMENT DUE TO FORAMINAL STENOSIS
Cheon Ji Kang, MD, Ja Young Kim, MD, and Dae Yul Kim, MD, PhD

OBJECTIVES: To check the latency and amplitude of SNAP in patients with cervical foraminal stenosis as compared with patients without cervical foraminal stenosis. An retrospective study.

DESIGN: We enrolled 751 patients who visited our nerve conduction study (NCS) clinic from January 2017 to December 2017. Exclusion criteria is median neuropathy, ulnar neuropathy, peripheral neuropathy and bicipital plexopathy. Patients examined by unilateral NCS were excluded. Patients with no MRI findings were excluded. Patients were divided into two groups according to the results of MRI. Group A (29 patients) included patients whose lesion was located at C6-7, C7-T1 foraminal stenosis. In group B (55 patients), there are no lesion at C6-7, C7-T1 foraminal stenosis. Amplitudes and latency of SNAPs on the affected side were compared to the unaffected side between group A and B. And abnormal SNAP response were compared between two groups.

RESULTS: Amplitude of median and ulnar nerve for group A were lower than that in group B (p = 0.001, 0.002, respectively). Latency of median nerve for group A was longer than that in group B (p = 0.010). Latency of ulnar nerve for group A was longer than group B, but no statistical difference between two groups (p = 0.237). Amplitude of median nerve was abnormal in 10.3% of group A, 3.6% of group B. The amplitude of ulnar nerve was abnormal in 3.7% of group A, 0% of group B. Latency of median nerve was abnormal in 6.9% of group A, 3.6% of group B. Latency of ulnar nerve was abnormal in 7.4% of group A, 3.8% of group B.

CONCLUSIONS: Patients with foraminal stenosis had significantly longer latency of median nerve and lower amplitude of median and ulnar nerve than those without foraminal stenosis. And abnormal of SNAP amplitude and latency were more frequent in patients with foraminal stenosis.

ELECTRODIAGNOSTICS AND ULTRASOUND IN ULNAR NEUROPATHY OF UNUSUAL CHRONICITY FOLLOWING UCL RECONSTRUCTION
Max H. Epstein, MD, Tracey Issidro, MD, Prathap Jayaram, MD, Theodore H. Shymkat, MD, and Michael Y. Lee, MD, MHA, CPE

CASE DIAGNOSIS: Electrodiagnostic and Ultrasound in Ulnar Neuropathy of unusual chronicity following UCL reconstruction

CASE DESCRIPTION: A 17-year-old baseball player presented days following acute onset right elbow pain while pitching. On exam he had full range of motion (ROM) of his right elbow, but was tender near the right medial epicondyle, and pain with valgus stress and the milking maneuver. A right ulnar collateral ligament (UCL) tear was confirmed on MRI. He underwent UCL reconstruction, but complained of post-operative numbness, tingling, and swelling in the right 4th and 5th digits. Given unresolved neuropathy more than 6 weeks after surgery, a nerve conduction study (NCS), electromyography (EMG), and diagnostic ultrasound (US) were ordered.

DISCUSSIONS: NCS of the right ulnar nerve revealed normal latency and significantly reduced amplitude for sensory potentials while motor nerve studies revealed normal latency, reduced conduction velocity across the forearm, and significantly reduced amplitude of muscle action potentials. EMG demonstrated increased insertional activities and abnormal spontaneous single muscle fiber discharges in ulnar innervated muscles. Motor unit action potentials showed increased polyphasias with reduced recruitment. Findings were consistent with severe focal neuropathy of the right ulnar nerve at or below the elbow with evidence of reinnervation in right flexor digitorum profundus. Diagnostic US demonstrated a normal post-operative UCL reconstruction with concern for ulnar neuropathy given the proximal cross sectional size of 17.0 mm2 (normal 9-10) and greater than 1.5mm difference in cross sectional area from ulnar wrist.

CONCLUSIONS: Ulnar neuropathy is a rare complication of UCL reconstruction, occurring in less than 2% of cases. In published cases, it typically affects sensory only, and resolves within 6 weeks. This case describes the correlating NCS, EMG, and US findings not reported in prior publications. Despite the unusual chronicity of symptoms, we can expect full recovery.

ENHANCED VISUOSPATIAL PLANNING IN PARKINSON’S DISEASE THROUGH ART THERAPY
Mahya Beheshti, MD, Todd E. Hudson, PhD, John-Ross Rizzo, MD, MSCI, and Alberto Cucca, MD

OBJECTIVES: To explore the rehabilitative potential of art therapy (AT) in Parkinson’s disease (PD) through occular motor behavior-based outcomes

DESIGN: We performed a cross-sectional study of 18 PD patients and 14 age-matched controls (HC), followed by a prospective, exploratory trial involving 20 sessions of AT in PD patients. The Benton Visual Recognition Test (BVRT) was used to assess cognitive and visuospatial function. Subjects’ ocular motor behavior was recorded with a binocular eye tracker (Eye Link II) during the BVRT to characterize ocular motor performance. A detailed analysis was performed. The outcomes measures included a number of saccades deployed and total saccadic path length required for task completion. The outcome was re-assessed within one-month of the final AT session. Additionally, motor function and gait profiles were assessed under different experimental conditions.

RESULTS: On cross-sectional analysis, the exploratory eye-tracking assessments during BVRT revealed that PD patients use poor visuospatial planning or a
visual exploration strategy that was less efficient to complete the task. PD subjects showed significantly more saccades to complete the task and significantly longer exploration path lengths, as compared to HCs (p < 0.05). Following AT, the PD showed substantial improvements in a number of saccades, meaningless, and more efficient exploration path lengths, task completion was achieved more efficiently, per objective metrics (p < 0.05).

CONCLUSIONS: Parkinson’s patients show evidence of disturbances in eye movement planning and exploration with interleaved interrelations in transsaccadic and spatial working memory. Moreover, higher-level ocular motor control deficits can cause cognitive impairments in PD. Ineffective visual search and planning strategies cause a reduction in visibility of surrounding objects/areas, and less sensory information for the guidance of walking and consequently increase in the risk of fall in PD. AT is a novel neuro-rehabilitation strategy that may improve visual-spatial planning, cognitive performance, function, and quality of life in PD.

ESPORT ATHLETES’ QUALITY OF LIFE OVER A PROFESSIONAL SEASON
Melita N. Moore, MD, Joseph bano, BS, Kezia Alexander, MPH, Justin B. Cooper, PT, SCS, Aviram Giladi, MD, MS, and Andrew E. Lincoln, ScD, MD, SCS, MS, DDS

DESIGN: This is a descriptive study involving all PM&R patients followed at the Physical Medicine and Rehabilitation department of the Monastir University Hospital. The data analyzed were epidemiological and clinical characteristics.

OBJECTIVES: The aim of this study is to characterize ethnic/racial diversity in Physical Medicine and Rehabilitation (PM&R) from Residency Applicants to Professors and compare that to the current PM&R Program Directors.

RESULTS: Forty-five patients were included in this study, the average age was 52.4 ± 7.5 years with a female predominance (sex ratio 0.7). Ten patients (22.2%) were from rural areas and 35 patients (77.8%) were from urban environments. The majority of our patients had office work (44.4%). The mean age of acute poliomyelitis was 25.3 ± 4 to 72. The majority of our patients (86.7%) were married. We found that the most frequent reason for consultation was orthotic turnover in 12 patients (26.7%) followed by unequal length of the lower limbs in 11 patients (24.4%). The majority of our patients had monoplegic involvement (77.8%). The most common symptoms were fatigue and muscle and joint pain. Sixty six percent of our patients benefited from functional rehabilitation sessions related to the symptoms of PM&R. Thirty-two patients (71.1%) had assistive devices and the majority had walking braces: 19 patients (59.4%).

CONCLUSIONS: The SPP is a pathology less recognized by practitioners in Tunisia, yet it affects a relatively young population and still active on a professional level with a particular social and medical profile.

ESTANDARIZACIÓN DE LOS VALORES DE REFERENCIA EN NEUROCONDUCCIÓN DE EXTREMIDAD SUPERIOR EN POBLACIÓN SANA DE MÉRIDA, YUCATÁN, MÉXICO
Roberto Carlos Pech Argüelles, Médico Especialista En Medicina De Rehabilitación, Maestro En Investigación En Salud, Martha Paola González López, Dr, and Susana Iren V. Morales

OBJECTIVES: Las características antropométricas y fisiológicas de la población influyen en los valores de la neuroconducción. En el sureste mexicano no se cuenta con estandarización de los valores de referencia, por lo que se utilizan los descritos en bibliografía internacional. El presente pretende determinar los valores de referencia de la neuroconducción sensitiva y motora de miembros torácicos en población sana del Instituto Mexicano del Seguro Social en Mérida, Yucatán, México.

DESIGN: Estudio observacional, transversal y descriptivo realizado en el servicio de Rehabilitación del Hospital General Regional No.1 del IMSS-Yucatán en el período junio-septiembre2017. Se estudiaron los valores de neuroconducción sensitiva y motora con técnica convencional, de los nervios mediano y cubital de pacientes sanos de 20 a 50 años de edad. Análisis estadístico con medidas de tendencia central.

RESULTS: Se incluyeron 51 pacientes, media de edad 31.9 años, predominando las mujeres con 30 (59%) casos y el grupo etario de 20 a 29 años con 21 (41%). Los valores obtenidos de los nervios motores fueron: nervio mediano con latencia 3.43 ±0.26ms, amplitud 11.26± 2.86 mV; velocidad de neuroconducción 53.98±5.27 m/s, duración 6.18±1.04ms y área 40.43±10.41 mV/m; nervio cubital con latencia 2.73 ±0.27ms, amplitud 8.37±1.88 mV, velocidad de neuroconducción 59.94±5.48m/s, duración 6.25±1.25ms y área 29.14±6.83 mV/m. Los valores obtenidos de los nervios sensitivos fueron: nervio mediano latencia 3.21±0.34ms y amplitud 38.86 ±19.55mV; nervio cubital latencia 3.06±0.27ms y amplitud 36.58±18.79mV. La diferencia de latencias intervierno fue de 0.7ms para las pruebas motora y 0.15ms para las sensitivas.

CONCLUSIONS: La mayoría de los valores de neuroconducción de extremidad superior en esta población son menores a los reportado a nivel internacional.

ETHNIC/RACIAL DIVERSITY IN PHYSICAL MEDICINE AND REHABILITATION (PM&R) IN COMPARISON TO ALL MEDICAL SPECIALTIES
Ashley Sanchez, BS, Claudia I. Martinez, BS, Monica Verduzco-Gutierrez, MD, Argyrios Stampas, MD, Joel Frontera, MD, Miguel Escalon, MD, MPH, and Claudia Pedroza, PhD

OBJECTIVES: Ethnic and racial diversity in medicine is crucial to combat health care disparities and enrich physician cultural competence. The primary aim of this study is to characterize ethnic/racial diversity in Physical Medicine and Rehabilitation (PM&R) from Residency Applicants to Professors and compare that to the diversity in all medical specialties. The secondary aim of this study is to describe the ethnic/racial diversity of current PM&R Program Directors.

DESIGN: Self-reported ethnicity/race of Residency Applicants, Faculty, and PM&R Program Directors was collected from the Association of American Medical Colleges (AAMC) database. Demographic information for Residents and Fellows was obtained from the National Residency Matching Program (NRMP) Match database. Ethnicity/race was defined as White, Asian, African American, Hispanic, Native American/Alaskan, and Other. We used log linear models to evaluate associations between race/ethnicity and career level, from Residency Applicant to Professor, controlling for medical specialties.

RESULTS: In 2017, in all specialties, across all career levels, there are fewer non-whites than Whites. In PM&R, compared to Whites, there is a decrease incidence of African Americans by 89% [odds ratio (OR) 0.11], 90% for Hispanics (OR 0.1), 62% for Asians (OR 0.38), and 73% for Other (OR 0.27) (all p < 0.001). This disparity increases in Professors: 99% (OR 0.01), 96% (OR 0.04), 87% (OR 0.13), and 90% (OR 0.1) respectively (all p < 0.001). Of 91 PM&R Program Directors in 2019, Whites make up the majority (50.5%) compared to Hispanics (4.4%) and African Americans (2.2%).

CONCLUSIONS: Overall, minorities decreased with increasing academic rank in both PM&R and all specialties. Therefore, we believe more robust initiatives must be implemented to improve exposure, recruitment, and retention of minorities at all levels of academic medicine to further diversify the physician workforce. Further
EVALUATING MUSCLE FATIGUE OF THE BACK AND LOWER EXTREMITIES AFTER SURGERY FOR ADULT SPINAL DEFORMITY USING AN INTEGRATED ELECTROMYOGRAM

Mikio Murakda, MD, Kazuhiro Hasagawa, MD, Michiko Sakai, CT, Masahito Okamoto, TR, and Shun Hayashi, shun TR

OBJECTIVES: In patients with adult spinal deformity (ASD), pain and muscle fatigue of the back and lower extremities are associated with spinal malalignment, markedly limit the activities of daily living. Objective assessments of muscle fatigue following spinopelvic correction surgery (SPCS) are not reported. We used an integrated electromyogram (iEMG) to evaluate surgical outcomes on muscle fatigue.

DESIGN: iEMG studies were performed in 18 patients with ASD preoperatively, and at 3 and 6 months following SPCS. Five healthy volunteers were examined as control subjects. Activities of 10 muscles were monitored (bilateral paravertebral muscle, biceps femoris, rectus femoris, gastrocnemius, and tibialis anterior) with subjects in the resting standing position and in the working standing position with both hands elevated anteriorly at 90° holding a 1-kg weight for 20s. Improvement in muscle fatigue was evaluated on the basis of the sum of the 10 iEMG (v/mVs). The mean±SD of corrected iEMG (MMSSc) = 3 (Average NRS improvement = 5.1); 2 MMSS incompetent subjects in the resting standing position and 7436±2052 in the working standing position. In ASD patients, in the resting standing position, the sum of the iEMGs decreased from baseline (8723±3748) to 3 months (5370±1335) and 6 months (5545±1198) postoperatively (p<0.01). In the working standing position, the sum decreased from baseline (3737±5772) to 3 months (7226±2080) and 6 months (7861±2647) postoperatively (p<0.01). The iEMG scores did not differ significantly between the 3- and 6-month time-points in either condition.

CONCLUSIONS: Patients with ASD associated with spinal malalignment require markedly higher muscle activity to maintain a standing position, leading to muscle fatigue in the back and lower extremities. We demonstrated the utility of iEMG to assess muscle activity and find that SPCSameliorated muscle fatigue in the early postoperative period.

EVALUATING THE IMPACT OF EDUCATION ON OPIOID MEDICATION PAIN MANAGEMENT: A QUALITY IMPROVEMENT PROJECT IMPLEMENTED IN ACUTE INPATIENT REHABILITATION

Stephanie C. Chan, MD, Shrut S. Patel, MD, Eric Liu, DO, Tomas W. Salazar, MD, Lei Lin, MD, PhD, and Sara Cucurullo, MD

OBJECTIVES: The clinical and economic consequences of the opioid epidemic have created a call to action for the treatment of chronic pain. Limited education continues to be an obstacle in a patient’s understanding of appropriate pain management, ultimately contributing to opioid abuse. If medical topics can be presented in a way that improves the dialogue between patient and provider, then there can be improved pain control and targeted care. This research evaluates the use and efficacy of an original pamphlet, which highlights key information regarding opioid-medication pain management, on patient education in an acute inpatient rehabilitation hospital setting in an effort to reduce the risk of opioid overdose and prevent addiction.

DESIGN: Patients who met eligibility criteria provided informed consent to participate in this IRB-approved prospective cohort study. A 13-question pre-test was administered to gauge baseline patient knowledge. An educational pamphlet, highlighting current guidelines and basic opioid medication knowledge, was provided to each patient. A subsequent post-test was administered to assess the educational value of the pamphlet.

RESULTS: At this juncture of the study, the data of 41 patients were tabulated. The mean correct answers for the pre- and post-test were 7.6 and 9.8, respectively. The mean percent correct score for the pre-test was 58.3%, which improved to 74.4% for the post-test. Further analysis with a Shapiro-Wilk test revealed the need for nonparametric testing. The Wilcoxon-signed rank test was utilized and demonstrated a p-value of 0.0000401.

CONCLUSIONS: Initial and subsequent data from this longitudinal study continue to be extremely promising. The p-value strongly supports rejection of the null hypothesis, indicating that our intervention has significant value. Providing basic information about opioid management in an acute inpatient rehabilitation setting allows health literacy to be accessible, engaging and empowering for patients.

EVALUATING OF ADEQUATE AMBULATION, TRANSFERS, AND FUNCTIONAL OUTCOME AFTER TOTAL SURGICAL EXCISION OF UNILATERAL GLUTEUS MAXIMUM AND MEDIUS IN TREATMENT OF HIGH GRADE SARCOMA: A CASE REPORT

Sonika Randev, MD, Wessam Gerguis, MD, and Eric L. Altschuler, MD, PhD

CASE DIAGNOSIS: High grade gluteal mass sarcoma on biopsy.

CASE DESCRIPTION: A 72-year-old male with pre-existing spinal canal stenosis and Parkinsonism presented with complaints of increasing right-sided buttock pain and swelling. CT revealed 28 cm x 8.1 cm x 20 cm heterogeneous well-circumscribed enhancing mass in the right buttock between the fibers of the gluteus maximus concerning for malignancy/sarcoma. The patient underwent resection of the right buttock mass and surrounding tissues. The lateral, superior and medial attachments of the gluteus maximus to their respective osseous and soft tissue structures were released. In addition, because the tumor was noted to encompass the gluteus medius muscle, its lateral attachments were released, and finally the gluteus maximus and medius muscles removed. Post-operatively during physical therapy the patient interestingly had a fairly normal gait. Also, hip extension and abduction strength was good (4+/5). However, upon rising from sitting, the patient needed to deploy the maneuver of leaning forward first, which engages the quadriceps muscles.

DISCUSSION: The gluteus maximus is multifarious in regards to attachments to osseous and soft tissue structures. This case provides an opportunity to assess the physiologic functions of the gluteus maximus and medius, simultaneously in their presence and gross absence. Clearly the hamstrings (and tensor fascia lata) can compensate for absent gluteus maximus and medius for gait on an even surface. The leaning-forward-to-stand maneuver engages the quadriceps and would be of use to other patients with similar ailments.

CONCLUSIONS: There can be good functional outcome after gluteus maximus resection. This is comforting to patients and surgeons, and these surgical cases can independently give important information about physiologic function of muscles.

EVALUATION OF EARLY CHANGES OF CARTILAGE BIOMARKERS FOLLOWING ARTHROSCOPIC MENISCOTOMY IN YOUNG EGYPTIAN ADULTS

Abit Naguib, MD, Hoda Abdel-Naby, MD, Handry Koryem, MD, Adel Wanas, MD, Mohamed Rizk, MD, Hesham Koth, MD, and Mohamed El Shafei, MD
CASE DIAGNOSIS: To evaluate the combined use of imaging and biochemical markers for cartilage breakdown, synthesis and quantity in the early period of post-artroscopic meniscectomy.

CASE DESCRIPTION: Twenty young adults (17 males & 3 females) who underwent unilateral arthroscopic partial meniscectomy were evaluated. The patients had a mean age of 32.5 years (range, 24–39) and a mean BMI of 28.5 kg/m² (range, 24–34). Cartilage thickness was measured by ultrasound (US) and cartilage volume was evaluated by MRI for the medial and lateral tibio-femoral compartments for both knees in the patient group pre-operatively and six months postoperative. Biochemical marker serum assays were measured in the patient group preoperatively, three months and six months postoperative. These included COMP and Col II (cartilage matrix breakdown) and PIICP (cartilage synthesis). These three markers were also measured in twenty healthy subjects who were age, gender and BMI matched for comparison.

DISCUSSIONS: The meniscectomized knees had significantly lower total knee cartilage volume (P < 0.05) but non-significant mean cartilage thickness compared to the intact contralateral knees. Among the individual biochemical markers, PIICP had the highest significant diagnostic accuracy quantified as the area under the receiver-operator characteristic (AUC) of 0.75 (95% confidence interval: 0.590–0.912) higher than all others (P < 0.05) to distinguish subjects with progressive cartilage loss from non-progressors. Diagnostically, the ratio of COMP and Col II to PIICP scored AUC of 0.905 (0.69–0.98), higher than PIICP (P = 0.0001). For prediction of cartilage loss, none of the individual markers could be used.

CONCLUSIONS: Cartilage volume loss evaluated by MRI combined with changes in cartilage matrix turnover detected by molecular biomarkers may reflect the initial changes associated with cartilage degeneration that account for early osteoarthritis.

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EVALUATION OF PATIENT EXPERIENCE IN AN INPATIENT REHABILITATION SETTING IN AUSTRALIAN CONTEXT

Krystal Song, MBBS, Blasaker Amatya, DMedSc, MPH, MD, and Faray Khan, MBBS, MD, FAFRM (RACME)

OBJECTIVES: To evaluate patient experience using the Australasian Rehabilitation Research Outcomes (AROC) - Modified Client-Centered Rehabilitation Questionnaire in an inpatient rehabilitation setting. Rehabilitation care is complex, differs from other patient groups and requires customized measurement models and performance indicators.

DESIGN: A total of 100 patients consecutively admitted were recruited from an inpatient rehabilitation unit in a tertiary hospital to evaluate their patient experience using the AROC Modified Client-Centered Rehabilitation Questionnaire. Patients were asked to rate their experience across seven subscales of rehabilitation, including: decision-making, education, outcome evaluation, family involvement, emotional support, physical comfort and continuity/coordination of care.

RESULTS: Participant median age was 64±14.4 years (range 22-91), majority were male (52%) and most common conditions included orthopaedic fractures (22%) and stroke (20%). Survey findings demonstrate highest proportions rated were physical comfort and emotional support as contributing to a positive patient experience. Continuity/coordination of care and education were areas rated ‘lowest’ in proportion and impacted rehabilitation outcomes.

CONCLUSIONS: The tool can be a useful system-level indicator of quality and safety. The continuity/coordinated care, and patient education affected expectations. These should be targeted for service improvement, greater accountability and patient/carer engagement for a more positive patient experience within the health service setting.

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EVALUATION OF PEDAR IN-SHOE PLANTAR PRESSURE MEASUREMENT SYSTEM RELIABILITY IN MEASURING DIABETIC FOOT PRESSURE FOR MEDICAL INSOLE MANUFACTURE

Bijnor Forgh, MD, Masumee Bagherzadeh Cham, PhD, and Gholamrezai Raissi, ASSOCIATE PROFESSOR

OBJECTIVES: The purpose of this study was to evaluate within and between days reliability of Pedar in-shoe system to measure plantar pressure distribution in diabetic patients without neuropathy, with mild, moderate and severe neuropathy.

DESIGN: Forty seven diabetic patients were screened by Toronto Clinical Neuropathy Testing more for obvious neuropathy severity among those with mild, moderate and severe neuropathy. Plantar pressure measurement was taken twice a day to assess within day reliability and the third measurement was taken seven days later to evaluate between days reliability. The foot was divided into eight areas consist of heel, medial and lateral side of mid foot, first, second to third, fourth to fifth metatarsal head, hallux and other toes.

RESULTS: Intra-class correlation coefficients (ICC) analysis indicated excellent level of reliability (ICC ≥ 0.75) in within day tests. Peak pressure and pressure time integral show excellent level of ICC reliability in between days tests in diabetic group without neuropathy and with mild neuropathy (ICC ≥ 0.75) and more variable ranged in diabetic group with moderate and severe neuropathy (ICC ≥ 0.40). Contact area ICC analysis show excellent reliability in all groups (ICC ≥ 0.75).

CONCLUSIONS: The results indicated that the Pedar in-shoe system was reliable to measure foot plantar pressure in within and between day's tests in all eight areas of the foot in diabetic patients with and without neuropathy. Increased neuropathy in diabetic patient was associated decrease reliability of the Pedar in-shoe system in between day tests. The results confirmed that the medical shoes or insoles manufacture based on foot plantar pressures in patients with moderate to severe diabetic neuropathy should be done with greater caution.

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EVALUATION OF THE ALTERNATIVE DEVICE USING GESTURE INTERFACE FOR PATIENTS WITH DUCHENNE MUSCULAR DYSTROPHY: A CASE REPORT

Daisuke Nishida, MD, Yoko Kobayashi, MD, Takafumi Kinoshita, M Engineering, Ikushi Yoda, PhD, Tuyoshi Nakayama, PhD, Kazuyuki Itoh, PhD, Satoshi Mihashi, Natsumi Uchino, and Katsuhiko Mizuno, MD, PhD

CASE DIAGNOSIS: Duchenne Muscular Dystrophy (DMD). At 6-month, the high serum creatinine kinase, family history and the muscle biopsy showed definitive diagnosis as DMD. He gained walking at 1 year old, but at 3 years old, he could not stand by himself. At 19 years the diagnosis was genetically confirmed by the genetic test.

CASE DESCRIPTION: The patient was a 32-year-old man with Duchenne Muscular Dystrophy whose finger and limbs moved slightly. As profession, he transcribed voice data by using the trackball assisted with voice input software. For increasing work efficiency, he used a gesture interface system as a non-contact input switch that detects the small motion of finger and face accurately with a camera. For evaluating work efficiency, he transcribed texts with or without this system. We also evaluated it with System Usability Scale (SUS), which is a subjective satisfaction evaluation test. The transcription work time with this system was reduced to one-third of that without it. The evaluation of SUS was 85 points and it showed preferable evaluation.

DISCUSSIONS: Patients with neuromuscular diseases often difficult to adapt conventional input devices due to muscle weakness and dexterity disability. The gesture interface, a non-contact input support device we developed, can detects slight movement and enables input assist. In addition, the system can detect not only the movements of the fingers and face, but also 8 types of movements such as toes and lower limbs with high accuracy, and can be applied to patients with various disabilities. In this case, the system has improved work efficiency and patient satisfaction was also preferable.

CONCLUSIONS: These results suggest this gesture interface system can be a good tool to assist social participation such as daily life in work, school and leisure time. In the future, we will accumulate cases and improve the accuracy of the system.

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EVALUATION OF THE RELATIONSHIP BETWEEN PLANTAR FASCIAS THICKNESS AND MUSCULUS ABDUCTOR DIGITI MINIMII ATROPHY IN PATIENTS WITH PLANTAR FASCIITIS BY ULTRASONOGRAPHY

Berna Urkmez, MD, and Ozan Volkan Yurdakul, MD

OBJECTIVES: Aim of this study is to determine the presence of atrophy in the abductor digitii minimi muscle (ADMA) in patients with plantar fascitis due to chronic compression of the inferior calcaneal nerve due to the thickness of the plantar fascia.

DESIGN: Forty female patients with a clinical diagnosis of plantar fasciitis and 40 female healthy subjects were studied prospectively. Because the thickness of the plantar fascia was different between genders, all participants were selected only from female. Ultrasound examination was performed using a 7 to 13 MHz linear array probe with a calibrated device (LOGIQ P5; Healthcare, Chicago, IL). Thickness of plantar fascia, heel pad thickness and cross-sectional area of ADMA were measured. Foot and Ankle Outcome Score (FAOS) and Visual analog scale (VAS) scores of the patients were compared.

RESULTS: When the two groups were compared, a significant difference was found between plantar fascia thickness and ADMA area. In healthy volunteers, plantar fascia thickness was found as 2.65 ± 0.45 mm and 3.54 ± 1.05 mm in the patient

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Abstracts

DEFECT

If patients fail to improve. This study aimed to prove that there is no statistical difference in pain relief between particulate and non-particulate lumbosacral TFESI’s. However, this study does illustrate that there is significant pain relief with both injections. Future studies could help provide insight into long-term pain relief and functional improvement with each type of injection.

EXPERIMENTAL PLACEBO ANALGESIA IS EQUIVALENT AND REPRODUCIBLE IN INDIVIDUALS WITH CHRONIC PAIN WHEN COMPARED TO HEALTHY INDIVIDUALS

Manoj Sivan, MD, FRCP, Andrea Power, PhD, Christopher Andrew Brown, PhD, Ann Lenton, PhD, Timothy Rainey, MSC, Anthony Jones, MD, FRCP, Alison Watson, PhD, and Wael El-Deredy, PhD

OBJECTIVES: It is unclear whether a diagnosis of chronic pain is associated with an increase or decrease in non-specific analgesic responses. The aim of this study was to use an experimental placebo conditioning paradigm to test the relative effect of expectancy for pain relief on acute pain perception in individuals with chronic pain with diagnosis of osteoarthritis (OA) or fibromyalgia (FM) and compare responses with healthy individuals (H).

RESULTS: The study involved 237 participants (60 OA, 79 FM and 98 HI) randomly assigned to either placebo or control group. In both groups an inactive cream was applied to the dominant forearm. The placebo group was told this may or may not contain a local anaesthetic cream, whilst the control group was told the cream was inactive. Numerical pain ratings in response to laser stimulation were collected before, during and after cream application. Expectation of pain relief, psychological distress and changes in anxiety were also assessed. The procedure was repeated for a second session to assess for reproducibility.

RESULTS: There was a significant and meaningful reduction in pain in the placebo group when compared to control group. There was no difference between diagnostic groups (OA,FM,HI) in the magnitude of the placebo analgesic effect or expectancy of pain relief. There were similar results in both sessions, demonstrating reproducibility, independent of the clinical diagnosis.

CONCLUSIONS: Individuals with chronic pain respond to experimental placebo analgesia in a similar and reproducible manner as healthy individuals, despite higher levels of psychological co-morbidity.

EXPLORATION OF THE CHALLENGES FACED BY INDIVIDUALS WITH LOW BACK PAIN WHILE RECEIVING PHYSIOTHERAPY TREATMENTS IN SELECTED HOSPITALS IN KANO METROPOLIS, NIGERIA

Mukadas O. Akindele, PhD, and Sadiq Sani, Bachelor of Physiotherapy

OBJECTIVES: This qualitative study (focus group discussion) was carried out to explore the challenges faced by individuals with LBP while receiving physiotherapy treatments in selected Physiotherapy Departments in Kano Metropolis, Nigeria.

DESIGN: Qualitative (Focus Group design)

RESULTS: A total of 30 participants were recruited from 3 different hospitals for this study using the purposive sampling technique, 10 participants from each hospital. Both genders were recruited with 5 males and 5 females’ participants in same room, for each session making 3 sessions in all. The Results obtained showed that individuals with low back pain reported no challenges with the treatment protocols but there were challenges regarding waiting time before treatment commencement, unhygienic nature of the patients’ toilet and linen, lack of gender barrier between physical therapist and patient, allowing students to administer the low back pain treatment to the participants in same room,

EXPLORING COMORBIDITIES ASSOCIATED WITH FIBROMYALGIA IN SOUTHEASTERN WISCONSIN PATIENTS

Sheela Bhatt, MD, Hong Wu, MD, and Sergey Tarima, PhD

OBJECTIVES: To identify comorbidities associated with fibromyalgia in Southeastern Wisconsin.

DESIGN: Retrospective cross-sectional study using the Clinical Research Data Warehouse representing patients in Southeastern Wisconsin. Patients with or without
fibromyalgia and comorbid conditions were identified using the International Classification of Diseases, 10th Revision Codes (ICD 10).

RESULTS: Patients with a diagnosis of fibromyalgia had a strong association with anxiety without and with control for confounding variables (crude odds ratio = 5.5, 95% CI: 2.6–11.4) depression (4.5, 95% CI: 1.5–12.6), irritable bowel syndrome (7.9, 95% CI: 2.2–26.9), and chronic fatigue syndrome (11.3, 95% CI: 3.7–33.5). All findings were statistically significant at p< 0.001 due to a very high sample size (n=10,000). Adjusted odds ratios were estimated using logistic regression models to adjust for effects of gender, age, and social class.

CONCLUSIONS: It is important to be aware of the increased prevalence of comorbidities in fibromyalgia to allow for improvement in diagnosis and to ensure these comorbid conditions are being addressed. When undiagnosed, fibromyalgia may be incorrectly treated as different conditions.

EXTENDING PAIN AND SPASTICITY RELIEF IN ONE SHOT
Lissa Hewan-Lowe, DO, Miguel Escalon, MD, MPH, and Tina Biljani, DO
CASE DIAGNOSIS: Incomplete spinal paraplegia with neuropathic pain
CASE DESCRIPTION: This is a 50 year-old male with incomplete paraplegia from motor vehicle crash in 2012 who presented to our spasticity clinic for right posterior thigh pain triggered by movement caused by severe muscle spasms. Pain was attributed to spasticity but patient also has neuropathic component as he was extremely sensitive to light touch or air. Oral medications were not controlling his symptoms. He began receiving botulinum toxin type A (BoNT A) injections to his posterior right leg and back every three months that managed his spasticity and pain. However, after multiple botulinum injections he began to feel decreased duration of relief from 3 months down to 6 weeks. We added lidocaine to the BoNT A to add additional pain relief. 1:1 dilution of BoNT A with 1% lidocaine was used under ultrasound guided intramuscular injections and patient reported increased duration of pain relief from 6 weeks back to 3 months.
DISCUSSIONS: BoNT A has been used to relieve spasticity and pain via intramuscular injection; however, it is uncommon in practice to reconstitute with substrate other than normal saline. BoNT A and lidocaine have been used together to manage secondary spasticity and extension of duration and sensory benefit from BoNT A. In this case, adding lidocaine helped extend the duration of pain relief. We also noted decreased spasticity with lidocaine injection. The addition of lidocaine to botulinum toxin injections may provide patients with extended pain relief duration in the setting of spasticity. Additional studies are needed to investigate the duration and extension of time lidocaine provides, and at what dose combinations.

EXTENSOR POLLICIS LONGUS DISLOCATION
Amanda Day, DO, and Brennan Boettcher, DO
CASE DIAGNOSIS: Right extensor pollicis longus (EPL) dislocation following work-related hyperextension injury.
CASE DESCRIPTION: An 18-year-old right-hand dominant female presented for a confirmed EPL tendon rupture. EPL tendon rupture is a known complication of work-related hyperextension injury sustained one year prior. Previous imaging included a magnetic resonance imaging (MRI) scan, which suggested a triangular fibrocartilage complex (TFCC) tear. A TFCC debridement was performed at an outside facility without improvement in her symptoms, and she remained on work restrictions of no right arm use. She was referred by hand surgery for an evaluation and diagnostic ultrasound (US) of the dorsal wrist with concern for midcarpal instability. She reported cracking and popping in the dorsal wrist and she had begun a return to work progression at light duty. As with this patient, dorsal wrist pain and snapping may pose a diagnostic challenge with static imaging. This case highlights the ability of US to identify a rare cause of snapping and pain in the dorsal wrist. This may potentially decrease the overtreatment of incidental findings, improve patient satisfaction and outcomes, and decrease healthcare costs.
CONCLUSIONS: This case highlights the ability of dynamic US to provide high resolution imaging of musculoskeletal structures. The ability to evaluate while imaging dynamically, can ultimately guide the patient down the appropriate treatment path.

EXTRACORPOREAL SHOCK WAVE THERAPY FOR PAINFUL CHRONIC TRAUMATIC HETEROTOPIC OSSIFICATION AFTER RIGHT ACETABULAR FRACTURE FIXATION: A CASE REPORT AND LITERATURE REVIEW
Doua M. Mosalem, MD, Shothour M. Alghunaim, FRCPC, Sherif M. Khairat, MD, and Farah F. Abdel Hameed, Medical Student
CASE DIAGNOSIS: Extracorporeal Shock Wave Therapy for Painful Chronic Traumatic Heterotic Ossification after Right Acetabulum Fracture Fixation: A Case Report and literature review
CASE DESCRIPTION: A 36-year-old gentleman had traffic accident on August 30, 2015, resulted in fracture of right acetabulum treated by open reduction and internal fixation on September 2, 2015. Patient has complained of severe right hip pain with limitation of daily activities especially walking, standing and sitting, visual analogue scale about 7-8/10 with painful and restricted ROM of right hip. Plain X-ray of right hip revealed HO at greater trochanter with long axis length 37.3 mm. ESWT was applied using Piezo shockwave (Richard Wolf, century, Germany) for the right hip HO. ESWT was administered 6 times each weekly for six weeks. At 6-month follow-up, the size of heterotropic ossification had become slightly smaller in our patient with improvement of pain, range of motion (ROM), muscle strength and lower extremities functions.
DISCUSSIONS: The basic mechanism of effect of ESWT on HO was hypothesized that after applying ESWT, soft tissues around HO has been regenerated from ischemia for several reasons like ESWT stimulating angiogenesis and neurogenesis. Kim H et al. 2017 found the size of heterotropic ossification had become slightly smaller by radial shockwave therapy in comparison of x-rays pre-treatment and post-treatment.
CONCLUSIONS: ESWT is a novel non-invasive and safe treatment for HO. The effects of ESWT on the size of HO had become slightly smaller with improvement of lower extremities functions.

EXTRACORPOREAL SHOCKWAVE THERAPY IN THE MANAGEMENT OF AVASCULAR NECROSIS OF FEMORAL HEAD
Yasemin Yumusakhyulu, Associate Professor, Belgin Erhan, Professor, Ozge Solakoglu, MD, and Afifap Icagasioglu, Professor
CASE DIAGNOSIS: Avascular necrosis of femoral head
CASE DESCRIPTION: A 45-year-old female patient was admitted to our clinic with lumbar and left hip pain both night and day existing for 2 months. VAS score was 9/10. On physical examination her left hip range of motions were restricted. FADER score was 1 1:1 dilution of BoNT A with 1% lidocaine was used under ultrasound guided intramuscular injections and patient reported increased duration of pain relief from 6 weeks back to 3 months.
DISCUSSIONS: Avascular necrosis of femoral head (AVNFH) is a disabling disorder which is caused by insufficient blood supply and histologically characterized by death of osteocytes and bone marrow cells, and progressive structure damage of involved bones. Among the conservative treatment methods, Extracorporeal Shock Wave Therapy (ESWT) was reported to successfully treat in early stages, yielding an improvement in pain, mobility, and higher scores on the Harris Hip Scale (HHS). Here we present a case report of AVNFH treated with ESWT.
CONCLUSIONS: To our knowledge, there is no standard of ESWT treatment protocol for the management of AVNFH up to now. According to our patients results, we can conclude that ESWT is a promising treatment modality in the management of AVNFH.

FACTOR STRUCTURE OF THE WHOQOL-BREF IN PATIENTS WITH OSTEOARTHRITIS AND ITS MEASUREMENT EQUIVALENCE ACROSS MEN AND WOMEN
Patrick Brzoska, MSC, EMPh, DRPh
CASE DIAGNOSIS: Health-related quality of life (HRQOL) is an important patient-reported outcome in health research. The WHOQOL-BREF, consisting of 24 items which represent 4 latent HRQOL dimensions, is one of the most frequently used instruments for the assessment of this construct. Little is known about the validity of the inventory in patient with osteoarthritis. The aim of the present study was to

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examine the factorial validity in a random sample of patients with osteoarthritis residing in Austria and to assess its measurement equivalence across gender.

**CASE DESCRIPTION:** Data from a representative population-based survey conducted in Austria between 2013-2015 was used providing information on 1,636 patients with a medically diagnosed osteoarthritis. The factorial validity was examined by means of confirmatory factor analysis (CFA). Differential item functioning (DIF) related to gender was analyzed by means of multiple indicators multiple causes (MIMIC) models following established guidelines.

**DISCUSSIONS:** Information on 1,116 female and 520 male patients was available. The four-factor, 24-item baseline model showed a moderate fit (RMSEA=0.070; CFI=0.874; TLI=-0.859) which approved significantly after the addition of six residual covariances (RMSEA=0.055; CFI=0.925; TLI=0.914). Gender-related DIF was observed in 4 items. Disparities between women and men in the WHOQOL-BREF physical, psychological, social relationships and environment factor differed between analyses adjusted and not adjusted for DIF, particularly for social relationships (beta=0.033, p<0.05; beta=0.062, p<0.05; beta=0.132, p<0.05; and beta=0.033, p<0.05; respectively, vs. beta=0.019, p>0.05; beta=0.084, p<0.05; beta=0.026, p>0.05; and beta=0.084, p<0.05, respectively).

**CONCLUSIONS:** The WHOQOL-BREF shows a satisfactory fit among patient with osteoarthritis in Austria. Some items are prone to DIF related to gender. For the comparison of HRQOL between male and female patients with osteoarthritis this bias needs to be taken into account to obtain valid estimates. Latent variable modeling provides a valuable approach for this purpose.

**FACTORS AFFECTING AMBULATORY DECLINE IN PATIENTS WITH TYPICAL FORM OF FIBRODYSPLASIA OSSIFICANS PROGRESSIVA**

Nobuhiro Haga, MD, PhD, Yusuke Shinoda, MD, PhD, Ryoko Sawada, MD, and Hiroshi Mano, MD, PhD

**OBJECTIVES:** Fibrodysplasia ossificans progressiva (FOP) is an extremely rare genetic skeletal disorder manifesting progressive heterotopic ossification, initiating in childhood, often following soft tissue swelling called “flare-ups”. Heterotopic ossifications cause limitation of motion and deformities in the trunk and extremities, and can lead to limitation in activities in daily living including ambulation. The objective of this study is to identify factors affecting ambulatory decline in patients with FOP.

**DESIGN:** We reviewed medical records of patients with typical form of FOP who visited our department from 2006 to 2018. We found 23 patients in all, and 20 had received gene analysis and typical R266H mutations had been found in all of them. Among the 23 patients, 14 were followed beyond 16 years of age and we classified them into Maintenance Group (MG: ambulation was maintained throughout the follow-up period) and Decline Group (DG: ambulation declined after the addition of six residual covariances (RMSEA=0.055; CFI=0.925; TLI=0.914). Gender-related DIF was observed in 4 items. Disparities between women and men in the WHOQOL-BREF physical, psychological, social relationships and environment factor differed between analyses adjusted and not adjusted for DIF, particularly for social relationships (beta=0.033, p<0.05; beta=0.062, p<0.05; beta=0.132, p<0.05; and beta=0.033, p<0.05; respectively, vs. beta=0.019, p>0.05; beta=0.084, p<0.05; beta=0.026, p>0.05; and beta=0.084, p<0.05, respectively).

**CONCLUSIONS:** The WHOQOL-BREF shows a satisfactory fit among patient with osteoarthritis in Austria. Some items are prone to DIF related to gender. For the comparison of HRQOL between male and female patients with osteoarthritis this bias needs to be taken into account to obtain valid estimates. Latent variable modeling provides a valuable approach for this purpose.

**FEMORAL NEUROPATHY FOLLOWING ANTERIOR HIP DISLOCATION AND ANTERIOR HIP SURGERY: A CASE REPORT**

Jasmine H. Harris, MD

**CASE DIAGNOSIS:** Severe acute femoral nerve injury.

**CASE DESCRIPTION:** 43F with no significant pmh presents with right hip pain after a fall down the stairs. XR Right hip demonstrated right acetabulum fracture and dislocation. Surgeons undertook successful closed hip reduction in ED. CT Pelvis w/o contrast showed a comminuted fracture of the right acetabulum and anterior and superior dislocation of the femoral head. One week later, she underwent ORIF of the acetabulum. Tingling and started after the surgery and she had difficulty lifting her right leg due to weakness. EMG and NCS were performed. Motor NCS showed bilateral fibular and tibial nerves, left femoral nerve were normal. Right femoral nerve displayed no response. In NCS the 2 groups at both timepoints. The rest of the outcome measures did not show much improvement in both groups at both timepoints.

**CONCLUSIONS:** Both the supervised exercise with education program and home based program during cancer treatment are feasible. Supervised therapy has shown to improve ADLs and 6MWT, whereas home-based exercises have shown to improve social function and reduce fatigue.

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J stress Y oung, BS, James W. Atchison, DO, and Mark Friedrich Hurdle, MD

**OBJECTIVES:** To explore the feasibility and efficacy of multidisciplinary breast cancer rehabilitation during active cancer treatment. Outcomes were measured at initial assessment, 12 weeks, 3 months, 6 months and 1 year post-intervention. The current analysis is based till 6 month post intervention.

**DESIGN:** Non randomized control trial. The inclusion criteria were: females between 21 to 80 years; before initiation or receiving the active treatment for breast cancer; able to mobilise independently without the use of aids. The intervention group undertook 60 minutes of exercise class twice weekly and 10 sessions of patient education once a week over a duration of 12 weeks. The control group undertook home-based exercises for 12 weeks. After which, both attended the survivorship transitional class for reintegration into the work and society. The following outcome measures were used: 6-minute walk test (6MWT), Frenchay Activities index (FAI2), FACT-Cognitive function scale, Distress thermometer, Patient-Activation Measure (PAM), QuickDASH, International Physical Activity Questionnaire (IPAQ), Self-Efficacy for managing chronic disease,FACT-fatigue scale and EORTC-C30. **RESULTS:** The FAI results did show a significant increase in the intervention group compared to the control group at both 12weeks and 6months. Social function improved significantly in the control group, significantly higher at 6months compared to their initial assessment. Fatigue reduced significantly in the control group over time and fatigue levels at 6months is much lower than initial assessment and 12weeks. The 6MWT showed a trend towards improvement in the intervention group, but no significant difference between NCS the 2 groups at both timepoints. The rest of the outcome measures did not show much improvement in both groups at both timepoints.

**CONCLUSIONS:** Both the supervised exercise with education program and home based program during cancer treatment are feasible. Supervised therapy has shown to improve ADLs and 6MWT, whereas home-based exercises have shown to improve social function and reduce fatigue.
DISCUSSIONS: There were electrical signs of severe acute injury to the right femoral nerve with complete denervation to the vastus medialis with partial denervation to the iliopsoas.

CONCLUSIONS: Femoral nerve injury with hip dislocation is rare as it is typically associated with a sciatic nerve injury. Follow up nerve conduction and electromyography studies at 3-6 months are important to evaluate for peripheral nerve injury recovery and prognosis.

FIBROMYALGIA AND PIRIFORMIS SYNDROME, EXAMPLE OF CENTRAL AND PERIPHERAL SENSITIZATION, RESPECTIVELY
Abu B. Siddiq, MBBS, FCPS, MSC
CASE DIAGNOSIS: Fibromyalgia (FMS) and piriformis syndrome (PS) in a young woman.
CASE DESCRIPTION: A 29-year-old Bangladeshi lactating mother reported with the complaints of generalized body ache for approximately one and a half years. She claimed it was her left gluteal pain that later spread all over the body. Fibromyalgic (FMS) widespread pain index, symptom severity score was 10 and 7, respectively. Alongside, FAIR (flexion-adduction-internal rotation), Psoas sign, digital rectal examination (DRE), and anal tone were normal. The patient had a history of left-sided gluteal pain, spreading all over her body as her lower back pain. MRI of the pelvis were performed and found unremarkable.

DISCUSSIONS: FMS could be diagnosed according to American College of Rheumatology guidelines, whereas PS remains to be a disorder of exclusion and there is no diagnostic gold standard. In chronic PS, trigger points (TPs) developing within the piriformis muscle (PM) could spread through the axial chain or induce Tp development in adjacent muscles including back muscles and develop widespread back pain mimicking FMS. Besides, increased release of acetylcholine in Tp causes persistent sarcome contraction, ischemia, and hypoxia with resultant release of serotonin, prostaglandins, substance P, bradykinin, and histamine that chronically irritate and sensitize afferent nerve fibers in PM. Hence, convergent afferent nociceptors connections from PM to the spinal cord are fired repeatedly with altered pain perception at the central nervous system producing generalized body ache, for example, FMS.

CONCLUSIONS: FMS and PS is an example of generalized and localized soft tissue rheumatism, respectively. IfPS remains untreated for long-time, peripheral sensitization of the afferent nerve fibers in PM could induce developing centrally sensitized condition FMS. However, addressing the issue, large scale study could be done.

FIRST-TIME UNILATERAL MEDIAL BRANCH RADIOFREQUENCY ABLATION OUTCOMES: UTILIZING PROMIS AS A MORE EFFICIENT METRIC OF OUTCOME
Ramzi A. El-Hassan, MD, MS, James Snyder, MD, Adam Michalik, DO, Rajeev Patel, MD, and Clifford Everett, MD, MPH
OBJECTIVES: Patient Reported Outcomes Measurement Information System (PROMIS) has been shown to outperform and be a more efficient means of recording outcomes measures in spine patients.1 Lumbar medial branch radiofrequency ablation (RFA) has been established as an effective treatment for symptomatic facet arthropathy.2, 3 We aim to determine if PROMIS can be used as an efficient means to capture outcomes of patients undergoing first-time, unilateral medial branch RFA.

DESIGN: Retrospective analysis was conducted at a single academic spine center. All patients included in the study had clinical evidence of lumbar facet syndrome and positive diagnostic medial branch blocks (MMB) utilizing a dual comparative block paradigm prior to undergoing medial branch RFA. PROMIS score domains of Depression(D), Pain Interference(PI), and Physical Function(PF) were collected pre and post medial branch RFA. Pre-treatment scores were established within 6 weeks prior to the first MBB. Post-treatment scores were established at follow-up, between 5 weeks and 6 months, utilizing the score closest to 8 weeks. Paired-sample t-test was used to calculate the responsiveness to treatment, with significance assigned as p<0.05. The effect size was measured using the standard calculation for Cohen’s d where d=0.2, 0.5 and 0.8 correspond to small, medium, and large effects, respectively.

RESULTS: 39 patients were included in the analysis. PROMIS PI (63.91, 61.29, p=0.004) and PF (37.21, 39.21, p=0.017) demonstrated statistically significant improvement in scores. PROMIS D (51.16, 49.94, p=0.12) did not demonstrate a statistically significant changes The effect size was medium (d=0.43) for PI, small (d=0.31) for PF, and small (d=0.12) for D.

CONCLUSIONS: The improvement in PI and PF establish that PROMIS scores are efficient in capturing clinical outcomes in this patient population and consistent with legacy outcome measures in demonstrating treatment effect of lumbar medial branch RFA.

FOLLOW-UP CONSULTATIONS THROUGH TELEREHABILITATION FOR WHEELCHAIR RECIPIENTS WITH PARAPLEGIA: A CASE SERIES
Miguel Julio S. Valera, MD, Carl Froiland D. Locchio, MD, and Myca C. Wahab, MD, FPARM
OBJECTIVES: Despite being provided with wheelchairs for mobility, two patients with paraplegia secondary to spinal cord pathology remained to have difficulties in follow-up consultations with their healthcare providers for various constraints related to distance, transportation, cost, disability, and time. To address these barriers to face-to-face follow-up consultations, we used telerehabilitation through free and widely downloadable free-messaging applications via synchronous and asynchronous methods to conduct a wheelchair follow-up. This paper documents the process, factors, and outcomes of our telerehabilitation experience.

DESIGN: Two patients were included in this study. Patient A was diagnosed with transverse myelitis with concomitant systemic lupus erythematosus, while patient B was a case of spinal cord injury secondary to motor vehicular crash. As a surrogate for face-to-face follow-up, telerehabilitation was done using the patients’ available technology gadget and social media application they are primarily accustomed to. Two patients who were recently given wheelchair at PGH were initially reached through phone call, text messaging, and/or instant messaging. Scheduling via telerehabilitation was then done.

RESULTS: Indeed, traditional face-to-face follow-up consultations are important. Unfortunately, however, patients are not always able to do regular in-clinic check-ups because of various reasons, such as remote location, problems with patient mobility, and post-discharge. Maximizing the use of available technologies that influence our day-to-day living has the potential to address the lack of face-to-face check-up.

CONCLUSIONS: In a clinician point of view, follow-up with wheelchair users is integral in gathering information regarding the state of the wheelchair and the condition of the patient/ user. In the point of view of patients in this study, despite its convenience it could not replace actual wheelchair follow-ups done in a face to face setting. It was feasible for clinicians and patients to communicate successfully in lieu of face-to-face follow-up consultation, which was not always possible due to various reasons (travel, distance, time, and costs.)

FREQUENCY EVALUATION OF EARLY PREGNANCY IN SPONDYLolisthesis: A CROSS SECTIONAL STUDY ON IRANIAN FEMALES
Seyyed Zahra Emami Razavi, Assistant Professor, Mohaddeesh Azadvari, Assistant Professor of Physical Medicine and Rehabilitation, Shahrbano Kazemi, MD, and Farid Rezayee-Moghadam, MD
OBJECTIVES: Spondylolisthesis is a common skeletal disorder that is rather prevalent among human beings occurring at various areas of spinal cord particularly with higher prevalence in lumbosacral area. There are several risk factors contributing to the occurrence of spondylolisthesis especially in the lumbosacral area including multiple pregnancies, early age pregnancy, etc. The current study aimed at investigating the pregnancy history of females afflicted with spondylolisthesis and probing the relationship of such factors with spondylolisthesis.

DESIGN: Females with low back pain, afflicted with spondylolisthesis, and diagnosed based on the medical scanning were included in the study. The exclusion criteria comprised affliction with acute diseases, rheumatologic diseases such as rheumatoid arthritis, and history of direct trauma to their cords. The patients were then, examined and the related questionnaires were filled in by the authors. The results were analyzed using SPSS version 20.0.

RESULTS: A total of 113 females with the mean age of 53.79 (SD=10.79) years were studied; 74.3% of the patients had a history of pregnancy prior to 20 years old. The spondylolisthesis most commonly observed in L4-5 intervertebral area (49.6%), and grade I had the highest frequency (82.3%).

CONCLUSIONS: Early age and multiple pregnancies were considered important risk factors increasing the likelihood of developing spondylolisthesis. Provision of appropriate education about time for the first pregnancy and number of pregnancies, training, and raising public awareness can help to reduce this risk factor.

FROM LEFT ANKLE FRACTURE TO ABOVE THE KNEE AMPUTATION: A RARE CASE OF PHELEGMASIA CERULEA DOLENOS AND IMPLICATIONS FOR REHABILITATION
Oliver B. Acosta, MD, Michael Dove, MD, and Seema Khurana, DO
CASE DIAGNOSIS: Left lower extremity above the knee amputation secondary to phlegmasia cerulea dolens.

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CASE DESCRIPTION: A 49-year-old female sustained a left trimalloidal ankle fracture. 1-2 weeks later she presented to the hospital where she underwent open reduction internal fixation. On postoperative day (POD) 1 she developed a left lower extremity (LLE) deep venous thrombosis extending from the external iliac vein to the popliteal vein diagnosed by ultrasound. She was treated with IV Lovenox but shortly after developed acute rhabdomyolysis of the LLE and necrotizing fasciitis secondary to phleghmasia cerulea dolens. Her hospitalization was complicated by compartment syndrome requiring four compartment fasciectomy for acute decompression of her LLE on POD 4. Despite attempts to salvage her LLE she required a below the knee amputation (BKA) on POD 5, followed by a revision on POD 7 and ultimately an above the knee amputation (AKA) on POD 11. A negative surgical response. She was then transferred to acute inpatient rehabilitation on POD 22.

DISCUSSIONS: Phleghmasia cerulea dolens is a rare, severe form of deep venous thrombosis that leads to venous gangrene and limb amputation. It is characterized by near-total or total deep venous occlusion of a limb and has a mortality and amputation rate of 20-50% if not adequately treated. Despite requiring amputation, the patient adapted quickly to inpatient rehabilitation and was able to progress well with therapy with adequate management of somatic and neuropathic pain.

CONCLUSIONS: Patients who develop this rare syndrome should promptly be identified and treated before the complications of venous gangrene and limb amputation develop. If amputation is required physiatrists should be involved early in the process to facilitate rehabilitation and recovery of function. Further research is needed to better understand the long-term effects of this syndrome on quality of life and the role of physiatrists in helping to maintain patient independence.

FROM SCIENTIFIC RESEARCH TO CLINICAL APPLICATION IN ROBOTIC REHABILITATION; THE ROLE OF ESPRM ROBOTIC COMMITTEE

Daiana Popa

CASE DIAGNOSIS: The ESPRM Robotic Rehabilitation Committee aims to support the decision and management of PRM specialists in robotics applications. Its objectives are to share information about research programs, to enable dialogue between clinical experts and bioengineers, to develop education and clinical applications, to enrich the quality and effectiveness in any use of these devices.

CASE DESCRIPTION: To gather the most valuable scientific information on evidence, criticism and perspectives in clinical and ethical issues to support the decision and management of PRM specialists in robotics applications.

DISCUSSIONS: The committee’s actions include the European Summer School of Robotic Rehabilitation, Scientific Meetings at the ESPRM General Assembly, Workshops at the ESPRM and ISPRM Congresses and an Evidence Based Position Paper, designed to allow interdisciplinary collaboration with professionals who have clinical and scientific expertise.

CONCLUSIONS: Only through these collaborative approaches will we be able to advance and strengthen the basis of rehabilitation interventions and respond to the need for more objective, flexible and controlled therapeutic paradigms.

FUNCTIONAL OUTCOMES OF AN ADULT WITH OSTEOGENESIS IMPERFECTA AFTER REHABILITATION POST-BILATERAL GIRDLESTONE PROCEDURE: A CASE REPORT

Isabella Spenut, MD, Joyce Eulah Abiera, MD, Maria Melanie Liberty Alcausin, MD, Juanito Javier, MD, and Carlo Emmanuel Sumpaico, MD

CASE DIAGNOSIS: The purpose of this case report is to describe and document the functional outcomes of a patient with osteogenesis imperfecta who underwent a bilateral Girdlestone procedure that eventually achieved ambulation with multidisciplinary collaboration.

CASE DESCRIPTION: This is a case of a 54-year-old female managed as a case of osteogenesis imperfecta type 1a who sustained a left subtrochanteric fracture and eventual ankylosis of both hips after surgery and immobilization. These injuries rendered her bedridden, maximally assisted in transitions and transfers, and unable to be positioned past 30 degrees of backrest elevation. With a primary aim of allowing the patient to sit, the patient underwent a bilateral Girdlestone procedure. She 1-month postoperative rehabilitation interventions and had tolerated progressive post-operative rehabilitation in both the inpatient and outpatient settings. The patient also continued to receive bisphosphonates during her pre- and post-operative period, to improve bone stock and aid in relieving pain.

DISCUSSIONS: Through the efforts of a team of physiatrists, geneticists, and orthopedic surgeons, the patient was able to achieve pain-free sitting, independent transfers, and short-distance ambulation, which have allowed her to care for herself more effectively and return to her work and activities of daily living. The outcome measures taken quantitatively measure the patient’s improvement, showing improvements in her Timed Up and Go Test and FIM score. The outcome measures also place the patient in the context of other cases locally and worldwide. The patient’s SF-36 and modified Merle d’Aubigné-Postel (MAP) scores showed similar findings with unilateral Girdlestone patients. Motion analysis also showed findings that are comparable to ambulatory osteogenesis imperfecta patients from types 1 to 4.

CONCLUSIONS: This case demonstrates the value of well-structured therapeutic interventions and strong multidisciplinary collaboration for patients with complex musculoskeletal concerns. Although not all impairments may be reverted to normal, a significant level of functional improvement and enhancement of quality of life may be achieved.

FUNCTIONAL RECOVERY FOLLOWING PARANEOPLASTIC LIMBIC ENCEPHALITIS FROM RIGHT STRUMA OVARI

Maylenid K. Oyola, MS, Natasha Romanoski, DO, and Justin S. Hong, MD

CASE DIAGNOSIS: Paraneoplastic Limbic Encephalitis from Right Struma Ovarii.

CASE DESCRIPTION: A 42-year-old female with a history of depression, hypertension, and hyperlipidemia was hospitalized with progressive decline in global cognitive behavior, coordination and balance, more slowness, and bowel/bladder dysfunction over 4-6 weeks. Physical examination showed rhytids, diffuse hyperflexia, and bilateral ankle clonus. CBC, CMP UA, toxicology screen, and CXR were unremarkable. CSF revealed enlarged cells with large nuclear inclusions. Brain MRI showed inflammatory demyelination. Paraneoplastic workup positive for right struma ovarii which was resected one week later. Patient was diagnosed with limbic encephalitis secondary to paraneoplastic syndrome. Clinically, patient declined to nonverbal status with spastic tetraplegia. She did not functionally respond to treatments including plasma exchange and steroid taper. Once medically stabilized, patient was admitted to an acute IRF at an overall dependent level of function.

DISCUSSIONS: Paraneoplastic syndromes with CNS effects are thought to result from tumor antigens that mimic neuronal antigens, leading to auto-reactivity. The syndrome frequently targets the limbic system with variable recovery. In our patient, cognitive impairment, sleep disturbance, hypotonia, joint contracture, and incontinence were addressed. With anxiolytics, a bowel program, antispasmodics, neuropathic pain medication as well as coordinated PT, OT, and SLP patient improved. She was discharged to home with family requiring hoist lift for transfers and manual wheelchair for mobility. In clinic follow-up, neuropsychological testing revealed mild impairment in complex visual construction, cognitive/motor speed, and complex attention. Nocturia was treated with anticholinergic agent. Bilateral lower extremity hypotonia was treated with oral medication, focal chemodenervation with onabotulinum toxin A, and outpatient PT focusing on transfers and gait. Patient still requires assistance for toileting, lower body self-care, and transfers.

CONCLUSIONS: In this case functional outcomes are discussed in the context of rehabilitation. One current treatment target is spasticity, debilitating not only for motor function, but impacting her mood and cognition as well.

FUNDAMENTAL MOVEMENT SKILLS OF SELECTED MONTESSORIAN PRE-SCHOOLERS: A DESCRIPTIVE STUDY

Lauren P. Bath, BSC, and Eileen Africa, PhD

OBJECTIVES: Pre-school environments should provide sufficient opportunities for optimal development, as children spend a substantial portion of their day at school. A large part of physical development during this stage is the acquisition of fundamental movement skills (FMS). Therefore, the purpose of this study is to determine the development of FMS of selected children aged 3-6 years in Montessori pre-schools.

DESIGN: The current study follows a quasi-experimental research design. A group of Montessorian preschoolers (3-6 years old) (N=105) were purposively selected to participate. They were evaluated with the Test of Gross Motor Development - Second Edition (TGMD-2). Data was analyzed using means, standard deviation and percentages of participants achieving mastery in each skill. Participants’ data was analyzed according to age and comparison of FMS with normative values for each skill.

RESULTS: Across all age groups, the participants scored considerably lower in the Object Control subtest compared to the locomotion subtest. Participants in the 3 year age group performed poorly in both the locomotion and object control skills, with run being mastered by only 50% of the participants. Close to 76% of the 4 year olds mastered the running skill. The 5 year age group showed improved results with 68.9% and 65.5% of participants achieving mastery for run and slide, respectively. Additionally, 51.7% of these participants mastered kicking. More than 80% of the 6 year olds showed mastery in running and sliding, whereas only 50% mastered hopping, leaping, catching and kicking.

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GABAPENTIN AND PREGABALIN-INDUCED EOSINOPHILIA: A CASE REPORT
Ashley Michael, MD, Arshaia Etesam, MD, and Donna Bloodworth, MD
CASE DIAGNOSIS: A 47-year old female with laryngeal cancer, status post laryngectomy, chronic pain, and bipolar disorder was initially admitted for stomaplasty. Her hospital course was complicated by tracheitis, treated with multiple antibiotics including ampicillin-sulbactum and cefepime. After initiation of gabapentin and then later pregabalin for pain, she developed eosinophilia, hypoxic respiratory failure, and a mild erythematous rash with concern for possible development of Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS Syndrome).
CASE DESCRIPTION: Physical medicine and rehabilitation was consulted for cancer and post-operative pain management and initially started gabapentin. The patient subsequently developed peripheral eosinophilia. She was transitioned to pregabalin with improvement in pain, however she continued to clinically deteriorate and developed ground glass opacities in both lungs, requiring bronchoscopy. Her alveolar lavage was concerning for eosinophilic pneumonia. Her eosinophilia transiently improved with two rounds of steroids. After weaning and discontinuing pregabalin, her eosinophil count returned to normal and she clinically began to improve.
DISCUSSIONS: DRESS Syndrome is characterized by a prolonged latency period with symptoms typically starting two to eight weeks after initiation of the offending drug. Its pathogenesis is not well understood, but antiepileptic medications are thought to be the principal cause. Clinical findings vary, but can include fever, rash, lymphadenopathy, eosinophilia, elevated liver enzymes and inflammatory markers. Presentation can range from mild to severe with an estimated mortality rate near 10%. Standardized diagnostic criteria have been established but not validated.
CONCLUSIONS: This case demonstrates the importance of monitoring for drug side effects in the setting of polypharmacy. Particularly in patients with multiple co-morbidities, it can be difficult to distinguish which medication is the offending agent. It is prudent to remember hypersensitivity syndromes like DRESS as they can have variable presentations with potentially fatal consequences.

GAIT SYMMETRY DIFFERENCES BETWEEN ACUTE POST-STROKE PATIENTS IN ROBOT-ASSISTED THERAPY AND CONVENTIONAL THERAPY
Chun Kwang Tan, MSC, Hideki Kadone, PhD, Hiroki Watanabe, PhD, Aiki Marushima, MD, Yasushi Hada, MD, PhD, Masashi Yamazaki, MD, PhD, Yoshiyuki Sanai, PhD, Akira Matsumura, MD, and Kenji Suzuki, PhD
CASE DIAGNOSIS: Gait asymmetries are commonly observed in stroke patients with hemiparesis. Such asymmetries are typically treated with physical therapy and gait training. However, despite such efforts, recent studies showed that gait symmetry worsens after patients have been discharged. One main reason is that gait speed and motor function assessments were unable to quantify gait symmetry. This points to an urgent need to understand gait symmetry, as asymmetric gait leads to further complications, like muscle pain and joint deformation. Our study examines gait symmetry in stroke patients from the perspective of muscle coordination and evaluate the difference in robotic therapy and conventional therapy.
CASE DESCRIPTION: Muscle synergy analysis was used to study muscle coordination in the lower limbs of 2 groups of acute post-stroke patients, one undergoing robotic-assisted therapy (N=11, 42-80 years old) and the other undergoing conventional therapy (N=9, 49 -76 years old), for 9 sessions over 3 weeks. EMG data was collected before therapy and after every week of therapy. A gait symmetry index was derived from muscle synergies and this index was used to evaluate both groups of patients. Motor function tests were used by physical therapists to evaluate the patients before and after the course of therapy. The tests were the Functional Independence Measure (FIM) (Locomotion and Motor(General) sub-categories), Fugl-Meyer Assessment, Lower Extremity (FMA-LE). Gait events, such as the heel strike and toe off, were captured with a motion capture system for the robotic therapy group or pressure sensors embedded in the shoes for the conventional therapy group.
DISCUSSIONS: Muscle synergy symmetry for patients in the robotic therapy group was improved after therapy, whereas patients in the conventional group did not show any significant improvement. Inter-group comparisons of the muscle synergy symmetry also showed that patients in the robotic therapy group had significantly better symmetry, as compared to the conventional group. Stance duration for both limbs was significantly reduced after the course of therapy for the robotic therapy group, but for the conventional therapy group, only the non-parietic limb showed improvement in this aspect. Stance time ratio was not significantly improved in both groups of patients, although a trend of improvement can be observed for the robotic therapy group, however, this trend was not sustained until the end of the therapy.
CONCLUSIONS: Analysis of gait symmetry based on muscle coordination appearance to be a useful tool to quantify gait symmetry. Like previous studies, we noticed that gait symmetry was not correlated with motor function scores, suggesting this index is quantifying a different aspect of gait and would be a good complement to motor function evaluations. The improvement in gait symmetry of patients in the robotic therapy group suggests that the reorganization in the corticospinal system was significant enough to be reflected in the pattern of muscle coordination. In summary, robotic therapy appear to provide an advantage over conventional therapy to restore gait symmetry.

GANGRENE OF FINGER DUE TO PULSE OXIMETER IN A BOY WITH GILLIAN BARRE SYNDROME (GBS) ON VENTILATOR: A CAUTION IN REHABILITATION SETTINGS
Nasir Mansoor Sahibzada, MBBS, FCPS(PMR), MCPS(HPE), MSC
CASE DIAGNOSIS: Gangrene of finger due to pulse oximeter in ventilator dependent GB syndrome child.
CASE DESCRIPTION: Fourteen years old boy admitted with progressive weakness all four limbs for the past one week and diagnosed as a case of GB syndrome. Weakness gradually involved respiratory muscles and was put on ventilator support. The father of the patient noticed black discoloration of the right index finger where the pulse oximeter was applied. Following which the pulse oximeter was shifted to the other limb finger. His base line investigations and doppler studies, CT angiography, 2 D echo and thrombophilia screening was normal. He was recommended surgery by the vascular surgeon. He was shifted to rehabilitation institute after weaning off from ventilator. He had 3.5 power in upper limbs and 2.5 power in lower limbs and black discoloration of distal 2 cm right index finger showing dry gangrene.
DISCUSSIONS: The patient was started with rehabilitation interventions for GB syndrome and was started with electrical muscle stimulation in the weak muscles, strengthening exercises, orthotic support, gait training and occupational therapy. He recovered gradually in the next 3 weeks and became independent in activities of daily living with minimal support. He is scheduled for dry gangrene amputation of the distal right index finger.
CONCLUSIONS: Pulse oximeter use precautions should be ensured and closely monitored in all intensive care patients. Correct size should be used for pediatric patients and fingers frequently changed to avoid this rare complication.

GENDER DIFFERENCES AMONG SPASTICITY RELATED DELPHI PANELS
Mary E. Russell, DO, MS, Monica Verduzco-Gutierrez, MD, and Adriana Garcia, MS4
OBJECTIVES: To investigate representation of physician and scientific authors by gender and rank among Delphi panels and expert consensus statements in spasticity that are industry sponsored. Delphi panels and consensus statements define expert opinion in the care and management of different medical conditions. There is a growing body of literature on gender disparities regarding pay, academic rank, and recognition awards in medicine. This study looks to investigate if there is a gender gap in industry sponsored medical literature.
DESIGN: For this study, previously published Delphi and consensus papers related to spasticity management with neurotoxin and intrathecal baclofen pump were reviewed. The authors academic rank and gender were researched. The primary outcome measures were overall and physician authors evaluated by gender.
RESULTS: Nine articles that have been published between 2014 and 2017 were researched. Of the 121 authors listed, gender was able to be identified in all authors. 36 authors (30%) are women and 85 authors are men (70%). Academic rank was able to be identified in 62 authors. There were 86 physicians listed as authors and 28 PhDs. Among physician authors at the professor level, 96% were men and 4% were women. Among physician authors at the associate professor level, 71% were men and 29% were women. Physician authors at the assistant professor level were 73% men and 27% women. As a comparison, among physicists, 28% of professors, 44% of associate professors and 50% of assistant professors are women.
CONCLUSIONS: Women are often underrepresented among scientific authors of industry sponsored Delphi panels and consensus statements in spasticity. Men are more likely to be included among experts at every academic rank.
HOMICORECTOMY REHABILITATION: CASE SERIES

Leandro R. Luamotu, MD, André T. Sugawara, MD, Dayrin V. Carvalj, MD, and Linamara R. Battistella, MD, PhD

CASE DIAGNOSIS: Homicorectomy is a radical procedure where the lumbar spine, the spinal cord, pelvic bones and contents, lower extremities, and external genitalia are surgically removed. This surgery is indicated to treat serious uncontrollable conditions such as intensive pain, suffering and risk of death. Patient's desire and acceptance, the staging of the disease that motivates the indication, clinical conditions, ethical prognosis and the possibility of patient support and social inclusion should be considered prior to amputation.

CASE DESCRIPTION: The patients were admitted to the Institute of Physical Medicine and Rehabilitation of the Hospital das Clinicas of Sao Paulo after hemicorporectomy for rehabilitation. The use of innovative solutions in mobility for the wheelchair and prosthesis as well as the whole the rehabilitation process were essential to make a difference in patients' social and working life. In addition, we could verify the positive impact on quality of life and functionality measured through SF-36, CIF and MIF instruments. More than the cure of their initial disease, both patients were able to overcome social barriers, achieving greater social interactions and insertion in the workplace.

DISCUSSIONS: The patients were admitted to the Institute of Physical Medicine and Rehabilitation of the Hospital das Clinicas of Sao Paulo after hemicorporectomy for rehabilitation. We describe highlighting the innovative solutions in mobility for the wheelchair and prosthesis as well as the whole the rehabilitation process. In addition, we report the positive impact on quality of life and functionality measured through SF-36, CIF and MIF instruments.

CONCLUSIONS: Rehabilitation is necessary in patients with hemicorporectomy in order to provide better quality of life, improved functionality and social participation. We believe that the innovative solutions presented in this case series can serve as a guide for future patients.

HEMORRHAGIC BURSITIS AS A COMPLICATION OF TRANSTIBIAL AMPUTATION: A CASE

KyungYeul Choi, MD, Seunghee Han, MD, Ki Chun Kim, MD, and JongKyu Kim, MD, MS

CASE DIAGNOSIS: We diagnosed a hemorrhagic bursitis of the stump of a transtibial amputated patient mimicking infectious bursitis or cellulitis.

CASE DESCRIPTION: A 54-year-old man with both transtibial amputations complained pain, tenderness, swelling with reddish skin color on his left stump. He got right transtibial amputation 4-years ago for diabetic foot with osteomyelitis. Left transtibial amputation with the same reason 2-years ago. For left, he experienced two surgical neuroma excisions. His last surgery was 6-months ago. X-ray showed spinous bony spur at the stump. MR showed soft tissue swelling with septated fluid collection at the stump with rim enhancement, with bone marrow edema at the stump. At the surgical field, the spinous bony spur at the end of the tibia was found. Total bursectomy with bony stump grinding was done. At POD47, he discharged to home using both prostheses. Now he can walk independently for 100m outdoor with prostheses.

DISCUSSIONS: Hemorrhagic bursitis is a kind of delayed complication of amputation. At bony stump end, some bony spur may arise and make some discomfort of fitting the prosthesis. It may make some mechanical inflammation with friction or direct bleeding. The patient feels severe pain with increased pressure at the hemmorhage. For treatment, early diagnosis helps surgical resection, because total bursectomy is necessary to prevent recurring bursitis. Bony stump re-surfacing may be an additive option.

CONCLUSIONS: We experienced hemorrhagic bursitis associated bony stump spur after transtibial amputation. It mimics infection such as bursitis and cellulitis. Further study about bony stump spur formation after amputation may be needed.

HETEROOTIC OSSIFICATION AFTER REVERSE SHOULDER ARTHROPLASTY: A CASE REPORT AND REVIEW OF THE LITERATURE

Rattanak P Veeramachaneni, MD, MS, Stephanie Rand, DO, and Vinay Vanodia, MD

CASE DIAGNOSIS: 80 y/o male with heterootic ossification(HO) sp left reverse total shoulder arthroplasty(RSA) after mechanical fall.

CASE DESCRIPTION: Patient presented to ED sp left mechanical fall on left shoulder and chin. Radiographs(XR) and a CT showed fracture dislocation of left shoulder. Elective RSA was delayed 1 month for mandibular fractures and chest/abdominal wall hematomas. Post-operatively he was discharged home with good range of motion(ROM) with 130elavation(EL) and 45external rotation(ER).

DISCUSSIONS: Patient presented to rehab 7 weeks post-surgery after 14 therapy sessions and weekly orthopedic follow-ups. He reported progressive decrease in ROM to 90°EL,25°ER with end ROM stiffness. HO was diagnosed based on clinical picture and XR. NSAIDs and etidronate were ruled out due to Xarelto use and recent dental surgery. The only clinical option was to allow HO to mature. Therapy was renewed with focus on active-ROM(AROM) exercises in pain-free range and stretching. ROM gradually increased to 160°EL,80°ER over next 6 months. ER was first to be recover followed by EL. Patient continues to have good ROM as of last rehab visit.

CONCLUSIONS: HO prevalence ranges from 0.2%-4% after burns and up to 90% after shoulder arthroplasty(1). HO in the shoulder can occur in burns, TBI, SCI but is rare after RSA(1,2). Our review found only two reports by Kjaersgard-Andersen and Sperling that looked specifically for HO after RSA(2). Our review found only two reports by Kjaersgard-Andersen and Sperling that looked specifically for HO after RSA(2). ROM in pain-free range was the most frequently reported treatment, followed by continuous passive motion (3). Prompt recognition, accurate diagnosis, and initiation of appropriate treatment with prophylactic management decreases disability attributed to HO(4). Radiation and NSAIDs are effective forms of prophylaxis. AROM exercises, gentle terminal stretch, and terminal resistance training are recommended to minimize the development of HO(4). Once HO is suspected therapy is recommended to be limited to AROM in a pain-free range(4). If HO progresses, surgical treatment may be indicated(4).

HIGH INTENSITY RESISTANCE TRAINING (HIT) IMPROVES FUNCTIONAL AND IMMUNOLOGICAL PULMONARY RESPONSES IN ELDERLY WITH METABOLIC SYNDROME

Mayra Rangel, MS, Evitom Correa De Sousa, DOC, Rodolfo de Paula Vieira, PhD, and Claudio Ricardo Frison, DOC

CASE DIAGNOSIS: The show the effects of high intensity resistance Training (HIT) on pulmonary function, mechanics, immune response and respiratory muscle strength.

CASE DESCRIPTION: The present study investigated in a group of 23 elderly patients with MS, the effects of HIT, performed in 80-90% of 1 maximum repetition, 2x/week, for 5 weeks, were performed the classic parameters of pulmonary function: Vital Force (VFC), forced expiratory volume in First second (FEV1) and FEV1/FVC value and mechanical total respiratory system resistance (RtHHz), proximal airway resistance (R2HHz), Respiratory reactance (X5Hz), total respiratory impedance (ZHz) and maximal expiratory pressure (MEP) and maximal inspiratory pressure (MIP).

DISCUSSIONS: The results showed that the HIT did not affect the main parameters of pulmonary function (VFC, FEV1 and FEV1/FVC: p > 0.05), however there was improvement in the parameters of pulmonary mechanics with RHz (P < 0.01), R2Hz (> 0.007), (X5Hz: p < 0.05) and ZHz(>0.01). In addition, HIT also improved Pmax (P > 0.0001) and Pmax (P < 0.0001). In the chemical mediators, the levels of IL-1Beta, IL-6, IL-8 and TNF-alpha (P < 0.01) that are inflammatory mediators in the MS group, were reduced the levels of inflammation after 5 weeks of HIT.

CONCLUSIONS: We conclude that the HIT performed 2x/week improved lung mechanics, respiratory muscle strength and reduced lung inflammation, being recommended as complementary therapy for elderly with metabolic syndrome.

HIGH TWO-LEVEL EPIDURAL BLOOD PATCH FOR SPONTANEOUS INTRACRANIAL HYPOTENSION: A CASE REPORT

Sarah M. Pastoriza, DO, and Ryan Almeida, MD

CASE DIAGNOSIS: A 42 year-old female had insidious onset postural headaches. She was admitted for work-up with advanced imaging, and a lumbar puncture with reported opening pressure of 6. On MRL there was evidence of intracranial hypotension and fluid collection within the posterior epidural space extending from the level of C7-T1 and to the level of T9. Due to the large amount of fluid present from cervical to the thoracics there was a concern for 2 possible dural tears in the lower cervical and mid-thoracics.

CASE DESCRIPTION: She underwent a fluoroscopically-guided targeted two-level epidural blood patch. The C7/T1 and T8/T9 interspace were found on the fluoroscopic image using an interlaminar approach. Each site was confirmed with contrast. She had 20cc of autologous blood injected into C7/T1 and another 20cc injected into the T8/T9 interspace. She returned to work 1 month later, and had received follow-up phone calls up until 9 months post-procedure with continued relief of symptoms.

DISCUSSIONS: Epidural blood patch locations and proximity to lesion has been debated. Retrospective case series, demonstrated that the efficacy of the epidural blood patch did not correlate with the distance or the leakage length. There is also another study published comparing multi-site targeted versus two-site blind at C7-T1.
and T12-L1 regardless of findings and they concluded that it can be a reasonable alternative instead of subjecting people to a CT myelogram. There is no randomized controlled trials that have compared blind versus targeted epidural blood patches head-to-head.

**CONCLUSIONS:** In our experience, having a targeted approach and going as near to the site with a larger volume has increased benefit and functionality for relief in patients with large or multiple areas of CSF leaks with complete improvement in symptoms with continued relief for > 6 months.

**HOME BASED IPC DEVICE: ANALYSIS OF EFFICIENCY, SAFETY, SATISFACTION WITH CHRONIC LEG LYMPHEDEMA PATIENTS**

Yun Sangmoon, MD, Yoon Kim, Jun Hee Han, and Ji Hye Hwang  

**OBJECTIVES:** We conducted a prospective study to investigate the efficacy, satisfaction, and safety of a newly developed home-based intermittent pneumatic compression (IPC) device during maintenance phase of patients with lower extremity lymphedema. This device has unique mode (SEQT) that gently facilitates lymphatic drainage of extremity.

**DESIGN:** The study involved 26 chronic secondary leg lymphedema patients in maintenance phase who underwent IPC and conventional compression therapy (stocking, bandage) for 4 weeks at home. The IPC device was programmed to apply SEQT (proximal) mode for 30 minutes, and sequential basic mode (GRAD + DRAN mode, proximal in distal) for 30 minutes. The participants were guided to use this 1 hour course of pneumatic compression more than twice a day for 4 weeks. We assessed the volume measurement, Lymph-ICF-LL and satisfaction before, immediately after, and one month after IPC application. Repeated measures analysis of variance was used for statistical analysis between each time point.

**RESULTS:** The inter-limb difference of volume showed no statistical significance between each time point. Dividing the participants into two groups upon special event, such as sudden weight gain, sudden intensive exercise, the group(n=18) with-out special event presented trend of decreased total volume difference after 4 weeks of intervention which slightly increased 1-month post-intervention. Specifically, the proximal volume difference decreased not only after intervention but also 1 month later without statistical significance. In terms of Lymph-ICF-LL, significant decline of total score and all of the subscales were presented after 4 weeks of pump trial, indicating improved lymphedema-related symptoms even without significant volume change. All participants were highly satisfied with application of the new home-based IPC device.

**CONCLUSIONS:** This study demonstrated that the new home-based IPC device with novel proximal lymphatic drainage mode effectively relieved lymphedema-induced symptoms without significant volume reduction in patients with chronic secondary leg lymphedema during maintenance phase.

**HOW ARE MEDICAL STUDENTS RESEARCHING RESIDENCY PROGRAMS?: A SURVEY OF CURRENT M4/PGY1**

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**OBJECTIVES:** To review how medical students (MS) gather information about residency programs in order to make informed decisions about their career paths. In the past, MS have used a variety of resources to research residency programs, including formal mentors, residency program websites, online databases, and word of mouth. Due to the constantly evolving landscape of medical education and the rise in technology use, with this study, we aim to determine how MS research residency programs today.

**DESIGN:** Online survey distributed to MS and PGY-1 residents. Responses were recorded to multiple choice, binary, and free text components.

**RESULTS:** The survey had 125 responses from MS-4/PGY-1s. 29.6% reported that residency program official websites were their main source of information, while 27.2% reported that the FRIEDA database was their primary source. Additional resources included Doximity, peers and mentors, and resources from their medical schools. Geographic location and reputation were the most common search parameters. 48.8% reported using social media in their residency research, most commonly Reddit and Twitter. Of the students interested in Physical Medicine & Rehabilitation (PM&R), 82.6% reported using social media as a resource. 81.8% of students interested in PM&R completed an “away” rotation. Of those students, 61.1% made that program a top choice. The information that MS had the most difficulty finding was board score minimums and averages for programs.

**CONCLUSIONS:** Medical students utilize a variety of resources in order to research residency programs. Students interested in PM&R seem to be more likely to complete away rotations and to use social media for residency research. Residency programs, particularly PM&R programs, may benefit from providing accurate and up-to-date information to central resources and by being deliberate with their social media use.

**HOW DOES MINDFULNESS ADDED TO A STRUCTURED DIET AND EXERCISE PROGRAM IN CANCER PATIENTS AFFECT LONG TERM HEALTH BENEFITS?**

Jacob Christiansen, DO, Allison Capizzi, MD, Darren Walker, BS, Casey Fenger, Beau Bigelow, MD, Kelsea Sandefur, DO, Stephen Trapp, PhD, and Pamela Hansen, MD  

**OBJECTIVES:** High obesity rates and sedentary lifestyles are common among cancer survivors, increasing the risk of morbidity and mortality. This study describes three-year follow up data of 38 overweight females with cancer that completed a 10-week exercise program under the direction of an exercise physiologist, dietitian, and physiatrist. Half of the participants in the initial study were also enrolled in a 10-week mindfulness program (intervention group). Initial findings demonstrated significant short-term weight loss for both groups. The goal of the follow up study was to evaluate the durability of these interventions over time and their subsequent impact on health-related quality of life.

**DESIGN:** A qualitative design was implemented to evaluate three-year follow up outcomes for the two female cancer survivor cohorts who completed the prior 10-week protocol. Three focus group sessions were conducted to assess the participants’ experience and long-term effects on quality of life. The qualitative methods were guided by Template Analysis.

**RESULTS:** Consent was obtained from 14 of the previous 38 participants who completed the 10-week program. All 14 participated in a focus group. Qualitative themes from both cohorts included: perceived program outcomes (e.g., weight loss, exercise and health knowledge); social components (e.g., information sharing, social support); and mental health effects (e.g., grief, coping). Themes that arose from the mindfulness group included interest, understanding and a desire for more mindfulness practice. Themes specific to the control group included limited understanding of mindfulness practices and concepts and feelings of frustration at being unable to participate in the mindfulness intervention.

**CONCLUSIONS:** This study demonstrates a range of perceived long-term positive effects from participation in an interdisciplinary diet and exercise program for women with cancer. There was a strong desire by the women to learn about and practice mindfulness to facilitate health.

**IDENTIFICATION AND CHARACTERIZATION OF UNIQUE SUBGROUP OF CHRONIC PAIN PATIENTS AT RISK FOR SUBSTANCE MISUSE**

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**OBJECTIVES:** The primary objective of the current study was to identify and characterize distinct chronic pain subgroups based on their level of two specific dispositional factors: experiential avoidance (EA) and anxiety sensitivity (AS). The secondary objective was to compare the subgroups in terms of substance misuse, mood, disability, and quality of life.

**DESIGN:** Participants with chronic pain were assessed for demographic, psycho-social, and personality measures. A two-step cluster analysis was conducted in order to identify distinct subgroups of patients based on their level of EA and AS. Differences in clinical outcomes were compared using a MANCOVA based on cluster membership controlling from average pain intensity and time since injury. Clustering measures included: Acceptance and Action Questionnaire (AAQ) and Anxiety Sensitivity Index (ASI). Outcome measures included: CAGE substance use screening tool, Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder 7 item (GAD-7), Pain Disability Index (PDI), Pain Disability Index (PDI), Euro Quality of life (EQ5D).

**RESULTS:** From a total of 204 participants, three clusters were formed. Levels of EA were highest among those in Cluster 2 (N=50), lowest among those in Cluster 3 (N=71), and moderate among those in Cluster 1 (N=83). Individuals in Cluster 2 had significantly greater substance misuse concerns than those in Cluster 3 (p < .027). Those in Cluster 2 also had greater improvements in PHQ-9 (p < .001), GAD-7 (p < .001), and EQ5D (p < .03) compared to both Cluster 1 and 3 participants. Significant difference in level of PDI was seen between Cluster 2 and Cluster 3 (p < .001) but not Cluster 1 (p = .18).

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CONCLUSIONS: Identification and early intervention of individuals with high levels of EA and AS may potentially reduce long term disability. Increased access to multidisciplinary services may be warranted among this high risk subgroup.

ILIOPHYGASTRIC PERIPHERAL NERVE STIMULATION FOR CHRONIC COLON CANCER PAIN
Katherine Tinkey, MD, Sal Hemani, MD, and Vinita Singh, MD

OBJECTIVES: Cancer-related right lower quadrant abdominal pain.

DESIGN: Our patient is a 60-year old female with a past medical history of stage IV colon cancer with metastases to lymph nodes, lungs, and bones treated with chemotherapy and a right hemicolectomy. Following her hemicolectomy, she experienced intractable right lower quadrant abdominal pain that was not improved with pharmacotherapy including gabapentin, transdermal fentanyl, and oxycodone. A diagnostic and therapeutic transversus abdominal plane block targeting the right iliophygastric nerve was performed with 15 mL of 0.25% bupivacaine and 5 mg dexamethasone resulting in 100% pain relief for 2 days. An iliophygastrophic and ilioinguinalnerve stimulator trial was then performed utilizing the StimQ Peripheral Nerve Stimulation System resulting in 100% pain relief.

RESULTS: Neuromodulation for intractable pain was first theorized after the “gate control theory” of pain was introduced by Wall and Melzack in 1965, and the first successful neuromodulation procedure for pain relief was performed in 1967 by Wall and Sweet (1). Neuromodulation has rapidly evolved since then and has been used to treat many different pain conditions, such as complex regional pain syndrome, postherpetic neuralgia, chronic migraines, trigeminal neuralgia, and cancer-related pain (2). Peripheral nerve stimulation of the iliophygastrophic nerve has been utilized for intractable postoperative inguinal neuralgia following hemicolectomy and lymph node resections (3). We present a case of iliophygastrophic peripheral nerve stimulation as a treatment for intractable right lower quadrant abdominal pain secondary to retroperitoneal lymphadenopathy associated with stage IV colon cancer.

CONCLUSIONS: Our case report is unique in that it demonstrates the use of PNS of the iliophygastrophic nerve as a treatment for intractable cancer-related pain. To our knowledge, there have been no case reports describing peripheral nerve stimulation of the iliophygastrophic nerve for chronic pain related to colon cancer.

IMPACT OF HIGH-INTENSITY BODY WEIGHT-SUPPORTED TREADMILL TRAINING MENTORSHIP PROGRAM ON PHYSICAL THERAPIST COMPETENCE & PATIENT AMBULATION DURING INPATIENT REHABILITATION
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OBJECTIVES: High-intensity body weight-supported treadmill training (HI-BWSTT) underlies evidence supporting its efficacy. The purpose of this project is to evaluate the impact of a comprehensive HI-BWSTT mentoring program on physical therapist competence and ambulation in patients with neurologic injury.

DESIGN: Stakeholder-Engaged Program Design: Focus groups and interviews with 8 mentors, 13 mentees, and 7 leaders were used to discuss past mentoring and the extent to which these improvements translated to improvements in patient ambulation and variable may be influenced by the prior experience and therapy setting of each physical therapist.

CONCLUSIONS: HI-BWSTT mentoring improves physical therapist knowledge, motor skills, and self-efficacy. The extent to which these improvements translate to improvements in patient ambulation is variable and may be influenced by the prior experience and therapy setting of each physical therapist.

IMPACT OF LOW BACK PAIN CHRONICITY ON PATIENT OUTCOMES TREATED IN OUTPATIENT PHYSICAL THERAPY
Zachary Walston, PT, DPT, OCS

OBJECTIVES: The purpose of this study is to report on the potential relationship between chronicity of symptoms prior to onset of physical therapy (PT) intervention and functional status (FS) outcomes in patients treated for low back pain in outpatient physical therapy settings. Additionally, the study will report on the differences in dosage (number of visits and total duration of the episode of care) for each stage of symptom chronicity to assess the potential relationship.

DESIGN: Data was collected from 122 outpatient PT clinics across 13 states over a 2 year period, were examined. Inclusion criteria was ‘body part regions’ of lumbar spine, completed episode of care, recorded duration of symptoms, and recorded duration of care. The FOTO Low Back FS PROM was used as the primary outcome measure. Repeated measures analysis of variance (ANOVA) was used to determine any differences between variables across chronicity categories. Variables included age, gender, initial pain rating, body mass index (BMI), number comorbidities, and exercise frequency. Pearson Correlation analysis was used to assess correlation between collected variables and FS change (difference in intake FS score and discharge FS score, MCID is 5). Regression covariates included intake FS, chronicity, number of comorbidities, number of visits, age, duration of care, exercise frequency outside PT, initial pain rating, and BMI. All analyses were set at an alpha level of 0.05.

RESULTS: The mean FS change was 16.997 (n=11941). Patients with chronic symptoms (> 90 days duration) had an FS change of 15.920 (n=7261). Patients with subacute symptoms (15-90 days) had an FS change of 21.66 (n=3630). Patients with acute symptoms (0-14 days) had an FS change of 29.32 (n=1050). Acute patients received 13.66 visits, subacute patients received 14.05 visits, and chronic patients received 14.63 visits on average. Stepwise regression analysis revealed a significant beta for chronicity (-4.155) with all models. Intake FS had the greatest correlation with FS change (r = -0.739) across all patients.

CONCLUSIONS: Overall, this study shows patients experiencing shorter duration of LBP symptoms prior to starting a physical therapy episode of care experience significantly better outcomes than patients who waited. The greatest FS change was seen in patients treated within 15 days of the onset of LBP symptoms. Additionally, the number of sessions provided for each chronicity group differed little. This is potentially a result of fewer tissue and behavioral changes occurring compared to patients with chronic symptoms. With respect to regression analysis of all included variables, chronicity had the greatest predictive value. Intake FS has a moderate negative correlation with FS change which may be impacted by a ceiling effect as a lower starting score has more potential improvement.

IMPACTS OF A PENDULAR ARTICULAR DECOMPRESSION DEVICE ON THE PAIN, FUNCTIONAL DISABILITY AND POSTURE PARAMETERS FOR PATIENT WITH CHRONIC LOW BACK PAIN
Christophe Bensousan, Antoine Champclou, Sébastien Le Bras, and Sullivan Poiron

OBJECTIVES: Impacts of a pendular articular decompression device, on the pain, functional disability and posture parameters for patient with chronic low back pain.

DESIGN: The DPA groups (n=22) carried out 10 minutes session of PDA twice a week. The RENF group (n=8) carried out proprioposition and muscle strengthening exercises in the back. The INAC group (n=8) did not carry out any exercise and constitutes the control group. Equipments used: Posture: DIERS® Formetric; Pain: Visualanalogue scale; Functional inabilty: Oswestry Disability Index Questionnaire; Measurements complete before the 1st (T1) and 5th session (T2), and 48h after the 5th session (T3).

RESULTS: The significant decrease of the 3 posture parameters (DLT, IB, ART) can be manifested in the improvement of daily tasks, such as walking. Indeed, during this study, many patients reported a better walking experience, and it is established that chronic low back pain directly affects locomotion (Lee et al., 2007). Although it is too early to establish a causal link between posture parameters and the concomitant decrease in the EVA and ODI score, it is known that low back pain leads to physical and motor deconditioning caused in particular by chronic pain (Bourguin2014).

CONCLUSIONS: The purpose of this study was to determine whether using the DPA device would lead to a significant decrease of perceived pain and functional
inability and a significant improvement in posture in the subject with non-specific low back pain. We were able to observe a significant decrease in perceived pain (p<0.001), a significant decrease in functional inability (p<0.001) and a significant improvement in three posture parameters (DEL: p<0.004, INP: p=0.047, ART: p<0.03). We can therefore conclude that Satisfarm DPA appears to be an effective means of treating chronic non-specific low back pain. Future studies should seek to determine how long these improvements persist.

IMPEDANCE ANALYSIS OF PATIENTS WITH KNEE OSTEOARTHRITIS AND ESTABLISHMENT OF BIO-ELECTRIC IMPEDANCE AS NONINVASIVE DIAGNOSTIC TOOL

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OBJECTIVES: To analyze body composition of patients with knee osteoarthritis (OA), relationship of skeletal mass, fat mass and fat free mass with degree of osteoarthritis and to establish bioelectric impedance analysis as an alternative noninvasive tool for diagnosis of arthritic knees.

DESIGN: 100 patients with OA knees diagnosed on X ray and 60 healthy volunteers belonging to same ethnic, demographic and hematological characteristic were enrolled in the study after obtaining consent. InBody 230 was used to analyze body composition via bioelectrical impedance analysis (BIA). Clinically patients were evaluated using WOMAC questionnaire (Western Ontario and McMaster University Osteoarthritis Index). Grading of Osteoarthritis was based on Kellgren Lawrence radiological classification system with grade >2 classified as Knee osteoarthritis.

RESULTS: Lean body mass, intracellular water content and body capacitance was lower in OA knee patients as compared to control group. (P < 0.05). Extracellular water content and fat mass were significantly raised in OA groups comparative to healthy controls. No correlation was found between lean body mass and degree of OA. However WOMAC score and lean body mass were inversely correlated. Fat mass was slightly correlated with WOMAC score in bivariate analysis.

CONCLUSIONS: Our study shows that fat mass was increased and skeletal muscle mass was decreased in OA knee patients. In addition fat free mass has beneficial effect and fat mass has harmful effect on osteoarthritic knee. Weight loss programs specifically directed at increasing fat free mass with reduction in fat mass are of vital significance in halting progression of OA knees. Use of BIA therefore to assess body composition may serve as alternative noninvasive tool for OA knee diagnosis.

IMPLEMENTATION OF A GLOBAL HEALTH ELECTIVE WITHIN A PM&R RESIDENCY PROGRAM

Isaac Syrop, MD, Christopher J. Visco, MD, Alfred Gelhorn, MD, and Kaile Eison, DO

OBJECTIVES: The prevalence of global health in graduate medical education has soared over the past two decades. Despite the popularity amongst specialties such as IM and pediatrics, there is no formal global health elective within a PM&R residency. We propose a structured and GME-concordant global health elective within the PM&R residency. The objectives of the global elective are 1. To partner with key stakeholders at the medical center in Mwanza, Tanzania, establish a compliant global health elective able to meet the needs of trainees as well as contribute positively to the educational and medical center in Mwanza, Tanzania, establish a compliant global health elective able to meet the needs of trainees as well as contribute positively to the educational and medical center in Mwanza, Tanzania, establish a compliant global health elective able to meet the needs of trainees as well as contribute positively to the educational and medical center in Mwanza, Tanzania, establish a compliant global health elective able to meet the needs of trainees as well as contribute positively to the educational and medical center in Mwanza, Tanzania, establish a compliant global health elective able to meet the needs of trainees as well as contribute positively to the educational and medical center in Mwanza, Tanzania, establish a compliant global health elective able to meet the needs of trainees as well as contribute positively to the educational and medical center in Mwanza, Tanzania, establish a compliant global health elective able to meet the needs of trainees as well as contribute positively to the educational and medical center. They were surveyed before and after PEARs training, then again 6 months later to assess comfort and knowledge level. Number of emergency response system (ERS) calls were calculated retrospectively 6 months prior to onset of training and tallied 6 months after.

RESULTS: 22 individuals participated with 10 providing 6 month follow up responses. Over the 6 months post-training, ERS calls increased by 300% with a decrease in the number of code blue calls. Participants demonstrated increased comfort level of recognizing children in respiratory distress, cardiac arrest, shock by score improvement of 26%, 27%, and 39% respectively. Similar results were seen for understanding of the ERS (23%) and comfort level initiating it (14%). Long term, participants showed that they continue to have similar scores of comfort with early recognition, intervention, and activation of the ERS when compared to the immediate post training scores. 100% agree that PEARs training changed how they assessed and intervened with children, and 90% agreed that PEARs training should be continued.

CONCLUSIONS: Introduction of PEARs training program in a pediatric rehabilitation facility increased scores in comfort level on recognizing and initiating early recognition, intervention, and activation of the ERS initially and long term. After training, there was an increased reporting of emergency events by staff, likely due to earlier recognition of signs of deterioration. PEARs provides additional education for staff members in a rehabilitation facility that are not routinely required to have advanced training, but are usually first responders in these situations.

IMPLEMENTATION OF PEARs (PEDIATRIC EMERGENCY ASSESSMENT RECOGNITION STABILIZATION) TRAINING IN A PEDIATRIC REHABILITATION FACILITY AND ITS EFFECTS ON STAFF COMFORT AND RESPONSE TO EMERGENCY EVENTS

Autumn A. Atkinson, MD, Marisa B. Buchmann, MSN, RN, and Madeline Bos, BS

OBJECTIVES: To study the effects of teaching early recognition warning signs to re habilitation staff on incidents of patient emergency events, and to improve staff initial response to pediatric emergencies to improve patient outcomes, staff comfort, staff efficiency.

DESIGN: Participants included medical assistants, patient care assistants, nurses, physical, occupational, and speech therapists who work in a free-standing pediatric rehabilitation center. They were surveyed before and after PEARs training, then again 6 months later to assess comfort and knowledge level. Number of emergency response system (ERS) calls were calculated retrospectively 6 months prior to onset of training and tallied 6 months after.

RESULTS: 22 individuals participated with 10 providing 6 month follow up responses. Over the 6 months post-training, ERS calls increased by 300% with a decrease in the number of code blue calls. Participants demonstrated increased comfort level of recognizing children in respiratory distress, cardiac arrest, shock by score improvement of 26%, 27%, and 39% respectively. Similar results were seen for understanding of the ERS (23%) and comfort level initiating it (14%). Long term, participants showed that they continue to have similar scores of comfort with early recognition, intervention, and activation of the ERS when compared to the immediate post training scores. 100% agree that PEARs training changed how they assessed and intervened with children, and 90% agreed that PEARs training should be continued.

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OBJECTIVES: Rehabilitation with the use of technology such as gait training with robotic exoskeletons is becoming increasing available and offers the possibility of delivering higher intensity, task-specific training with more consistent assistance and precise feedback than is possible with conventional physical therapy. However, there remains doubt as to its cost-effectiveness and application across the continuum of rehabilitation care, particular in the community. The aim of our study is to Evaluate the utilization and cost-effectiveness of gait training with overground robotic exoskeleton across the continuum of rehabilitation care in Singapore; Identify factors affecting utilization of overground robotic exoskeletons for gait training in different rehabilitation settings across the continuum of rehabilitation care in Singapore.

DESIGN: This is a quasi-experimental study design aiming to recruit 400 participants across 4 types of rehabilitation settings in a 3:1 ratio (intervention: matched controls): 1) inpatient and outpatient tertiary rehabilitation center; 2) inpatient and outpatient rehabilitation care at a community hospital; 3) nursing home; 4) community day rehabilitation facilities. Participants are stratified according to patient age and time post-event. Participants in the intervention arm undergo 12 sessions of physical therapy with the use of the EksoGT while participants in the control arm have outcome measures performed before and after 12 sessions of conventional physical therapy. Outcome measures included FAC and Rivermead mobility index (RMI).

RESULTS: We present the initial experience of the study. At the time of analysis, 101 participants had been recruited into the intervention arm – 47 from tertiary rehabilitation (inpatient and outpatient), 32 from community hospital (inpatient and outpatient), 9 from community day rehabilitation centers and 13 from nursing home. 52 participants completed 12 sessions of EksoGT training, 11 dropped out. A total of 1056 EksoGT sessions were done. Average age (±SD) was 62.0±13.4 years (range 16-82 years). 55.1% had stroke; 38% had spinal cord injuries and 6.9% had other diagnoses. Mean FAC was 0.68 (±1.13), mean RMI was 3.56 (±3.7). Of those who completed the program, mean FAC improved from 0.75 to 1.00, mean RMI improved 2.8 to 3.35. 64.7% were ≥1 year post-event. Of those < 1 year post-event, 66% had improvement of FAC of at least 1. Of those ≥1 year post-event, 18% improved FAC by at least 1.

CONCLUSIONS: Patients appropriate for rehabilitation with the use of the overground robotic exoskeletons were more readily found in the tertiary rehabilitation center and community hospital settings, both inpatients and outpatients. Greater improvement in mobility was found in those < 1 year post-event while some benefit could still be seen for those ≥1 year post-event. The use of the overground robotic exoskeleton is feasible across the continuum of rehabilitation care in Singapore. Changes in the setup and programs at day rehabilitation centers are needed to support siting of longer term active rehabilitation in the community.

IMPROVING RESIDENT ELECTRODIAGNOSTICS LEARNING USING A BOOTCAMP APPROACH: A PILOT STUDY

Akash Bhukta, DO, MHA, Ishan Roy, MD, PhD, Vivian Roy, MD, and Leslie Rydberg, MD

OBJECTIVES: Program requirements for ACGME accreditation in physical medicine and rehabilitation residency include performing 150 electromyography/nerve conduction studies. Medical education has recently been promoting more active approaches to learning procedures. At our institution, we noticed limited confidence of residents in performing nerve conduction studies prior to their first rotation. As a result, residents were spending extended time observing studies performed by senior residents or attending physicians. Consequently, potential studies to meet ACGME requirements were lost. As the only prior education included a lecture series, a passive method of learning, we proposed adding an active learning approach via a “boot camp” to gain hands-on experience prior to the rotation with the goal of reducing time to perform first study and improving confidence prior to starting rotation.

DESIGN: Our intervention consisted of three one-hour sessions, each one week apart. The first two sessions involved residents practicing upper extremity and lower extremity nerve conduction studies under guidance of senior residents and faculty. The third session involved a checklist examination of residents performing nerve conduction studies. Resident confidence was surveyed prior to intervention and subsequently prior to rotation using a Likert scale of 1-5 (1=least confident and 5=most confident). Number of days to perform first study was also measured and compared to prior class.

RESULTS: Resident confidence increased from average of 1/5 prior to boot camp to 2/5 prior to rotation (p= 0.01). Additionally, average number of days until performing first study significantly decreased from 4.91 ± 1.88 to 2.17 ± 0.37 (p< 0.01).

CONCLUSIONS: Our intervention improved resident confidence and significantly reduced the time to perform their first study. Limitations of our study included limited access to equipment and limited education time within the curriculum. Our next steps include development of a mastery learning curriculum.

IMPULSE OSCILLOMETRY DIFFERENTIATES THE LUNGS OF ELDERLY WITH AND WITHOUT METABOLIC SYNDROME: A FUNCTIONAL AND IMMUNOLOGICAL APPROACH

Maya Rangel, MS, Manoel Carneiro Oliveira-Junior, DR, Renilson Mores Ferreira, PROF, Claudio Ricardo Frison, DOC, and Rodolfo de Paula Vieira, PhD

OBJECTIVES: Investigate the levels of inflammation and fibrotic mediators in the blood and breathe condensate; Show a function and mechanics of the elderly with and without metabolic syndrome.

DESIGN: Impulse oscillography (IOS), presenting great applications for physically or mentally limited populations, such as elderly. Since there is a high incidence of metabolic syndrome (MS) in elderly, which can affect the lung function, the present study investigated for the first time the lung function in elderly with and without metabolic syndrome using traditional spirometry and IOS. In addition, considering that systemic low-grade inflammation observed in MS could also affects in the lungs during pulmonary alterations, we also investigated for the first time the levels of inflammatory and fibrotic mediators in breath condensate of 77 elderly (67.44±6.03 years old) without metabolic syndrome and 75 elderly (68.52±5.98 years old) with metabolic syndrome.

RESULTS: No significant differences in the spirometric values (FVC, FEV1, FEV1/FVC and FEF25-75) comparing non-MS with MS elderly. However, a significant increase in total airway resistance (R 5H, p< 0.0001) and peripheral airway resistance (R 20Hz, p< 0.0001) was observed in MS elderly. Since these changes in R 5Hz and R 20Hz may occurs due to airway inflammation and remodeling, the analysis of pro-inflammatory (IL-1β, IL-8, TNF-α, IL-6, IL-10, IL-1ra, IL-10) and anti-inflammatory cytokines (IL-1RA, IL-10, IL-1ra, anti-fibrotic (relaxin 1, relaxin 3 and Klotho) and pro-fibrotic (VEGF, p< 0.0001), revealed that MS induces a pulmonary pro-inflammatory and pro-fibrotic response.

CONCLUSIONS: We conclude that IOS is an important tool to differentiates the lung function of elderly with and without metabolic syndrome and that elderly with MS present increased airway resistance involving increases in pulmonary pro-inflammatory and pro-fibrotic mediators. This is possible to reduce the incidence of respiratory comorbidities in elderly patients with MS.

IN-BRACE PAD PRESSURE BETWEEN ADOLESCENT’S MALES AND FEMALES WITH SCHEUERMANN’S KYPHOSIS

Taher Babaei, PhD, and Mojtaba Kamyab, PhD

OBJECTIVES: The most effective non-operative treatment for adolescents with Scheuermann’s kyphosis (SK) is modified Milwaukee brace. The pad pressure was measured by two modified aneroid sphygmomanometers (Exacta-Riester 0124, Rudolf Riester GmbH, Jungingen, Germany). For the shoulder pads, a neonatal pressure cuff with dimensions of 4×6 cm and for kyphosis pads a pediatric pressure cuff with 8×13 cm were used. Brace compliance was measured subjectively. Independent sample t test was used to compare the average values of the kyphosis angle and pad pressure between males and females.

RESULTS: The mean initial kyphosis angle at the time of brace prescription was 68.47°±9.63 degrees (range 55 to 86 degrees). The average in-brace pressure for males and females was 58.21±19.88 mmHg and 48.87±12.24 mmHg, respectively (P< 0.05). The average in-brace curve correction for males and females were 20.26°±10.28° and 15.25°±6.73°, respectively (P< 0.05). The brace compliance in boys has been significantly more than girls. There is no significant relationship between the pad pressure and the in-brace curve correction.

CONCLUSIONS: When adjusting the pressure of brace pads, boys have shown lower sensitivity than girls. Although the real cause of this mechanism is not clear, but several physiological/cultural factors may have a role.
INCIDENCE OF RAPIDLY PROGRESSIVE HIP OSTEOARTHRITIS OR AVASCULAR NECROSIS FOLLOWING INTRA-ARTICULAR STEROID/ANESTHETIC INJECTIONS

Roger A. Sanguino, MS, and James F. Wyss, MD, PT

OBJECTIVES: Hip osteoarthritis (OA) is a common degenerative disease with increased prevalence in older individuals. Intra-articular injections of steroid/anesthetic to the hip are often performed for patients who have failed other forms of conservative treatment. Here, we investigate the incidence of rapidly progressive osteoarthritis of the hip (RPOH) and/or avascular necrosis (AVN) following intra-articular steroid/anesthetic injections.

METHODS: This retrospective study included 924 subjects who had undergone intra-articular steroid/anesthetic injections into the hip. RPOH was defined as a significant deterioration of the joint 1-9 months post-injection. Pre- and post-injection imaging were screened by an interventional spine and sports medicine fellow. Flagged cases were then reviewed by an attending physiatrist, followed by a musculoskeletal radiologist.

RESULTS: The mean age (SD) was 57 (17) years, and 64% were female. The majority of subjects received unilateral injections, and ultrasound guidance was used in 64% of patients. The most common steroids used were triamcinolone (52%) and methylprednisolone (41%). Review of pre- and post-injection imaging revealed 31 cases of RPOH or AVN, for an incidence of 3.4%. These patients were significantly older than the rest of the cohort (66 [10] vs. 56 [17] years) and reported a significantly shorter duration of symptoms prior to their injection (6 [7] vs. 28 [43] months; p = 0.0009).

CONCLUSIONS: The incidence of rapidly progressive OA/avascular necrosis (AVN) in the hip was lower (3.4%) than that reported in other studies. However, we cannot definitively state that intra-articular steroid/anesthetic injections to the hip are a cause of RPOH and/or AVN. Thus, additional evaluation of the efficacy of intra-articular steroid/anesthetic injections in the hip in patients with OA should be assessed. Limited included different pre- and post-injection imaging modalities.

INCIDENCE OF SHOULDER IMPEIGNMENT SYNDROME AMONG PATIENTS WITH CARPAL TUNNEL SYNDROME: EPIDEMIOLOGICAL STUDY

Nagla Hussein, MD, PhD, Thochyovny Desmarets, MD, and Richard Vilchez, MD

OBJECTIVES: Carpal tunnel syndrome (CTS) is one of the most common upper limb entrapment neuropathies. It constitutes approximately 90% of all entrapment neuropathies. It is the result of squeezing or compression of median nerve at the carpal tunnel. CTS presents clinically with variable symptoms including numbness, tingling, burning and hand pain. The pain or tingling may travel up the forearm toward the shoulder. In addition to weakness, clumsiness of the hands. Among the presenting symptom of carpal tunnel syndrome is shoulder pain. Shoulder impingement syndrome (SIS) refers to a combination of shoulder symptoms, examination findings, and radiologic signs attributable to the compression of structures around the glenohumeral joint that occur with shoulder elevation. SIS is likely the most common cause of shoulder pain. The incidence and association of carpal tunnel syndrome and SIS is not studied. Purpose: Measure the incidence of SIS among CTS patients and relationship with other risk factors.

DESIGN: Cross sectional study at outpatient setting.

Methods: The study included 565 patients (210 male and 355 female) with clinical manifestation of carpal tunnel syndrome associated with shoulder pain. Procedure: Exclusion criteria: patients with manifestation suggestive of peripheral neuropathy, cervical radiculopathy or other neuromuscular disorder. Informed consent for participation of the study. Medical history, occupational history, social history, Pain score by visual analogue score, neurological examination including nerve conduction study (NCS) for median, ulnar, median-ulnar, median - radial comparative studies, F wave, electromyography of both upper extremities, MRI of shoulders if possible were done for all patients.

RESULTS: Mean age was 48.2 y. Hard worker (321 patients 56.8%), 129 light worker (22.8%), 95 house wives (16.8%), 20 house- keeping (3.5%) 161 patients (28.5%) had diabetes mellitus type II. Pain was severe (58.2%), moderate (32.6%), mild (3.7%), no pain (5.5%). All patients (100%) had CTS confirmed by NCS. 76.8% sensory, 23.2% sensorimotor neuropathy. 97.3% had demyelinating and 2.7% demyelinating -axonal neuropathy. SIS was found on 380 patients (67.2%). 26.5% right, 19.5% left. 21.2% bilateral. MRI was done for 29 patients (52.7%). All showed positive results of rotator cuff tendopathy. Significant incidence of SIS (p = 0.001) and MRI findings (p = 0.0001) among diabetics. Among diabetics 78.26% had both CTS and SIS, (p = 0.0012). SIS significantly correlated with distal median motor latency (right p = 0.011, left p = 0.023) & peak median sensory latency (p = 0.38 right, p = 0.033 left). Pain significantly correlated with SIS (p = 0.27) & MRI findings (p = 0.031).

CONCLUSIONS: There is significant high incidence of shoulder impingement syndrome among patients with CTS. Hard worker (321 patients 56.8%). The incidence is higher among diabetic patients and those who have occupations require hard manual working. The presence of impingement syndrome significantly increases the pain score among carpal tunnel syndrome patients and is significantly correlated with degree of carpal tunnel as reflected by median distal motor and peak sensory latency.

INCITING EVENTS ASSOCIATED WITH cervical radiculopathy

Moorice Caparo, MD, and James Rainville, MD

OBJECTIVES: Cervical radiculopathy (CR) is a clinical diagnosis defined as a combination of neck, shoulder, and arm pain, often accompanied by sensory and motor symptoms. CR is often caused by degenerative spine pathology associated with impingement of a cervical nerve root, and this pathology can be visualized using magnetic resonance imaging (MRI) or computed tomography (CT). The objective of this study is to investigate the types and frequencies of patient-reported inciting events associated with CR in patients with imaged-confirmed pathologies that correlate with symptoms.

DESIGN: This is a prospective observational case series which took place in two spine physiatry and three orthopedic spine surgery practices. One hundred twenty-two patients with symptoms suggestive of CR were recruited. Of these, 107 patients had MRI or CT evidence of cervical disk herniation or foraminal stenosis that correlated with symptoms and matched our inclusion criteria. We categorized patient-reported inciting events associated with onset of CR into six categories reflecting increasing severity of inciting event, and recorded the clinical characteristics, physical examination findings, pain intensity, and disability. We then analyzed the characteristics of patients based on subgroups of inciting events.

RESULTS: Two-thirds of patients reported that they either awoke with symptoms or symptoms began without a memorable event, and one-third of patients reported inciting physical activity or trauma associated with the onset of CR. Clinical characteristics of CR were not influenced by categories of inciting events.

CONCLUSIONS: Most CR with correlating spine pathology was found to have onset without a specific inciting events. Furthermore, physical inciting events did not influence the severity of clinical manifestation of CR.

INCORPORATION OF UPPER EXTREMITy ROBOTICS IN SUB-ACUTE REHABILITATION STAGES: A CASE REPORT

Maricarmen Cruz-Jimenez, MD, Angelica Rivera, OTL, and Laura Santos-Correa, OTR-L

CASE DIAGNOSIS: spontaneous intracranial bleeding.

CASE DESCRIPTION: 31 y/o right-handed male patient with history of hyperterglyceridemia who acquired a spontaneous intracranial bleeding 1 month before evaluation. He was a physician who performed tri-dimensional fluoroscopic procedures; upon referral, he had completed inpatient rehabilitation and presented right hemiplegia, impaired motion, strength and coordination. The upper extremity had normal sensation and tone when compared to lower. He was referred to upper limb training using the Armeo® Spring technology with the goal of improving precision and movement coordination in tri-dimensional planes. Nine sessions were completed, 2-3 times per week, in combination with traditional occupational therapy for a core period of 4 weeks. He was followed with one session per month for three consecutive months. Sessions lasted from 4-17 minutes, and progressively eliminated the robot’s motion assistance and hardened the complexity of the task.

DISCUSSIONS: Data showed that in 4-weeks the ability to perform tri-dimensional hand reach position doubled in progressively harder tasks, achieving the goal of improving movement coordination. Frontal plane reach progressively improved, requiring less robot assistance in sustained frontal activities. Robots have shown functional improvements in the rehabilitation of chronic neurologic conditions like stroke and brain injury, still in sub-acute injuries, the evidence is limited. In this case, even when the patient had completed inpatient rehabilitation, he persisted with functional limitations that interfered with his professional duties. The introduction of the robot for upper extremity rehabilitation permitted functional training that imitated the professional scenario where the patient would return to work, incorporating tri-dimensional training, enhanced coordination and extreme precision to complete a task. The patient was able to return successfully to work, including procedures.

CONCLUSIONS: Robotic rehabilitation has shown to improve functional outcomes in stroke and brain injuries. In this case, results suggest that robots could enhance rehabilitation outcomes in sub-acute stages of neurologic injuries in selected patients.
INDIVIDUALIZED PROSTHETIC DESIGN IN A K4 LEVEL TYPE A PROXIMAL FEMORAL FOCAL DEFICIENCY PATIENT
Vinay Vanodia, MD, Ratnakar P. Veeramachaneni, MD, MS, Stephanie Rand, DO, and Francisco Martinez, CPO

CASE HISTORY: A 22 yo female with proximal femoral focal deficiency of right lower-extremity presents with a leg length discrepancy of six inches. Tibial lengths are similar. Has full ROM at both knees & ankle joints. Right hip flexion & extension mildly limited. MMT 5/5 in all extremities. She is an active individual with prosthesis needs beyond basic ambulation and is a competitive hip hop dancer and gymnast. Presents with prosthesis, patellar-tendon-bearing socket design with a large anterior fenestration. The right calcaneus, bilateral malleoli, and anterior toe-box are encapsulated within socket and footplate placed in 35° plantar-flexion. A second fenestration allows the digits to be open to air. Two straps assist in suspension. An exoskeleton style build up attaches an energy-storing multi-axial foot to prosthesis.

DISCUSSIONS: Due to shortening of the lower limb, function/mobility were significantly impacted. Surgery declined. At 3yrs she was placed in a conventional PFDF prosthetic with a quadrilateral above-knee socket. This locked out movement at her anatomical knee-joint. As she grew, imaging revealed a functional hip and knee joint. She had several sessions of PT and at 6yrs was tried in a below-knee style prosthesis with anatomical footplate at neutral, however she kept plantar-flexing and had discomfort. Footplate set to 35° plantar-flexion, adjustments made to optimize suspension. Once foot was placed in a comfortable position and hip & knee were given full range, she became very active, joined gymnastics and later began competitive dance enabled by a flex-foot with multi-axial movement.

CONCLUSIONS: PFDF has significant impact on function. Treatment should be individualized to the desires of the patient and family and not just follow suggested treatments per classification. Serial imaging should be evaluated to determine changing morphology as patient grows and treatments adjusted accordingly. A multi-disciplinary team approach to care is also vital for success.

INFLUENCE OF TYPE OF INCISION ON REHABILITATION IN BELOW KNEE AMPUTATION
Amit Saraf, MBBS MS

OBJECTIVES: Background: Below knee amputation is required in patients with advanced critical limb ischaemia or diabetic foot sepsis in whom no other treatment option is available. Till date there is no consensus as to which surgical closure achieves the maximum rehabilitation potential. In this study we assessed the effects of different types of incision on the outcome of below knee amputation in people with lower limb ischaemia or diabetic foot sepsis, or both. The main focus was to assess the relative merits of skw flap amputation versus Burgess flap (long posterior flap) closure.

DESIGN: A total of 144 patients were included of which 76 (53%) patients had Burgess closure while 54 (39%) had skw flap closure. 9 patients underwent atypical closure or skin grafting. These groups were compared on the basis of stump healing time, rate of infection, time for prosthetic fitting and compliance with prosthetic fitting of either of the flaps made.

RESULTS: 76% stumps after Burgess closure and 71.4% after skw flap closure healed well in time which was insignificant (p = 0.05). Primary stump healing was 58% for skw flaps and 55% for Burgess flap. The result was not significant. Of the total 144 patients, 72.2% had prosthetic fitting. 60% of them underwent prosthetic fitting within 3 months in both the groups after closure. 66.8% of Burgess flap closure patients and 71% of skw flap closure were happy with their prostheses.

CONCLUSIONS: Stump healing time, rate of infection, time of prosthetic fitting and prosthetic compliance was similar in both groups. We thus conclude that there is no benefit of one type of incision over another. The choice of amputation technique can, therefore, be a matter of surgeon preference taking into account factors such as previous experience of a particular technique, the extent of non-viable tissue, and the location of pre-existing surgical scars.

INJECTION BOTULINUM TOXIN-A ADMINISTRATION IN PARASPINAL MUSCLES IN RESISTANCE CHRONIC LOW BACK PAIN – A CASE SERIES
Jagannatha Sahoo, DNB(PMR)

OBJECTIVES: Low back pain is a pandemic Musculoskeletal problem having 80% of lifetime prevalence, affecting 15-20% population at any point of time. In principle, any of the structures of the lumbar spine that receives an innervation could be a source of back pain. The distribution of pain in a given patient does not imply any particular source. So, management varies from conservative treatment to intervention therapy to surgery. In many of the cases attending our outpatient department for low back pain have been found to be resistant to all form of treatment. In those cases, we can inject Botulinum Toxin-A to reduce pain. I am here evaluating the efficacy of injection Botulinum Toxin-A in resistant chronic low back pain.

DESIGN: I had taken 15 cases of chronic low back pain attending our outpatient department of physical medicine and Rehabilitation, AIIMS, Bhubaneswar. It was a prospective interventional study of a case series. After selection of patients a written informed consent was taken as per pain management clinic of Bombay Hospital and medical research center guide line. Patient was evaluated as per proforma prepared like VAS score, the Roland- Morris low back pain and disability questionnaire and Oswestry low back disability questionnaire. Then four points of each side paraspinal muscles were identified. 100 IU of Injection Botulinum Toxin-A was injected in divided doses in each point. Patient was evaluated 1 week in the ward then discharge with home exercise program. Patient was evaluated in 1 month, 3 month and 6-month duration.

RESULTS: It was observed that 76% of our patients with chronic low back pain had relieved pain and improved function at 3 and 6 months after injecting Injection Botulinum Toxin-A in Paravertebral muscles.

CONCLUSIONS: There is not much data available to us about injection Botulinum Toxin-A use in low back pain. This study implies that inj. Botulinum toxin-a is a useful adjunct for treating a chronic low back pain.

INJURIES IN ELITE COLLEGIATE DANCERS: AN ANALYSIS OF PAIN AND INJURY CHARACTERISTICS TO IMPROVE WELLNESS
Jason Xu, David H. Ho, BS, Kelli Sharp, DPT, Rachel Sunico, MD, and Brady Carabjal

OBJECTIVES: Dance is a competitive sport with injury. Due to their unique training and physical demands, dancers require a personalized approach for injury prevention, treatment, and rehabilitation. Thus, there are several aims of this study: determine the prevalence of injuries, analyze pain and ability to dance, and identify relationships between chief complaints and clinical findings.

DESIGN: A retrospective cross-sectional study of 1089 de-identified records of patient visits to an MSK clinic for the dancers at the University of California, Irvine, Claire Trevor School of the Arts was conducted. Among the data that were included were: pain level, ability to dance, injury location, injury timing, and clinical findings. Statistical analyses were performed to determine significant relationships.

RESULTS: The lower extremity (29%) and back (23%) were the areas with the most injuries, especially compared to the head, neck, and upper extremity (< 0.01 respectively). Most injuries were due to an unknown cause (41%) and diagnosed as joint pain (52%). More visits to the clinic were for acute injuries (45%) than for chronic injuries. Furthermore, there was a significant, weak positive relationship between pain and inability to dance (R2=0.23, slope=-0.58, p= 0.0001). Of note, the strongest relationship was seen with injuries in the neck (R2=0.53, slope = 0.93). The only variable to be significantly associated with both pain (p=0.03) and ability to dance (p=0.02) was the academic quarter in which the patient visited the clinic.

CONCLUSIONS: This study reinforces the need to develop a training protocol that is personalized and sensitive to dancers’ pain level. When developing a dancer wellness program, issues that must be incorporated include conscientious scheduling and education, particularly about pain and how an injury in one part of the body may lead to injuries in other parts.

INNOVATING CARE FOR COMPLEX NEUROLOGICAL PATIENTS THROUGH TELEPHYSIATRY
Rebecca Baker, RN, BSN, Ankit Gulati, MD, and Karrie Dudek, PhD Candidate

OBJECTIVES: Complex neurological patients require complicated care solutions. Effective management of these patients is difficult to achieve and too often results in reactive, rather than proactive, condition management. Reactive therapy leads to poorly controlled comorbid conditions, inadequate long-term rehabilitation, and high healthcare costs. Additionally, the current healthcare paradigm is constructed for episodic care - not the management of lifelong recovery - thereby making these patients a challenge to treat. This study investigates effects of telephysiatry on neurological patient rehabilitation outcomes and routine health management.

DESIGN: Midwest healthcare plan patients diagnosed with stroke, traumatic brain injury, spinal cord injury, multiple sclerosis, muscular dystrophy, or cerebral palsy will be enrolled in the Utilize Health program. Members subsequently receive consults with a neuro-specialized telephysiatrist who provide personalized rehabilitation strategies, treatment plans, and address secondary health
INTERDISCIPLINARY TEAM CONFERENCE
REDESIGN FOR INPATIENT REHABILITATION FACILITY: EFFECT ON EFFICIENCY, EFFICACY AND TEAM MEMBER SATISFACTION

Carolyn Geis, MD, Jorge Perez, MD, Meghan Cochrane, DO, and A Astrid Gonzalez-Parrilla, OTD

OBJECTIVES: To redesign the process for scheduling weekly team conferences and revising the formatting for discussion during team conference, efficiency, efficacy and team member satisfaction would be improved as measured by team member completion of survey questions.

DESIGN: A 10 question baseline survey was completed targeting measures of efficiency, efficacy and team member satisfaction. Lean methodology including value stream mapping was used to identify tactics for redesigning team conference. Based on team member feedback changes in scheduling, team composition for conference attendant and format for reporting and discussing patient information were implemented. Survey was repeated at 8 weeks post-implementation. Monthly monitoring was performed to insure consistency of implemented changes.

RESULTS: The baseline survey was completed by 32 respondents. The 8 week post-implementation survey was completed by 27 respondents. No significant difference was noted in the distribution of respondents role in team conference or the frequency of monthly attendant at team conference. The response to the ability to contribute to team conference improved by 21% in the always category and decreased by 69% in the never category. Responses to how well team conference was organized improved by 86% in the very highly category. Facilitation of discussion during team conference showed a 53% improvement. The response to the value of team conference improved by 34.8%. The efficacy of identifying patient and patient/family barriers to discharge improved in 66% and 76%, respectively in the extremely efficient category. There was a 49.6% improvement in identifying solutions to barriers to discharge.

CONCLUSIONS: Lean methodology including value stream mapping, standard work and visual feedback tools was used to identify inefficiencies and sources of team member dissatisfaction with weekly team conferences. Strategies were implemented including changing formatting for scheduling team conferences, composition of team members attending conferences and format for present patient information focusing on barriers to discharge. Survey results post-implementation showed significant positive change in team member feedback regarding organization and ability to contribute to team conference. Additionally, team member perception of the value of team conference to patient care significantly increased. Efficiency of team conference in identifying patient and patient/family barriers to discharge significantly improved as did the team’s perception of the ability to problem solve barriers to discharge.

INTER-RATER AND INTRA-RATER RELIABILITY OF MUSCULOSKELETAL ULTRASOUND FINDINGS FOR COMMON EXTENSOR TENDINOPATHY

Roozbeh Ahmadi, MD, MS, Ali Esfahani, MD, MBA, Vikas Patel, DO, Dominic King, DO, and Jason Genin, DO

OBJECTIVES: The purpose of this study was to determine the inter-rater and intra-rater reliability of the various common extensor tendon pathologic features identified on musculoskeletal ultrasound (MSK-US) amongst novice and seasoned ultrasound readers.

DESIGN: 50 lateral elbow ultrasound images were obtained from a database of patients who presented with non-radicular atraumatic lateral elbow pain. Five ultrasound readers scored the 50 lateral elbow ultrasound images for 8 different characteristics on two separate reading occasions. The order of the ultrasound images was randomized, and a different randomization order was used for the two reading occasions. Inter-rater and intra-rater reliability was assessed using the AC1 and Kappa coefficient, as appropriate.

RESULTS: Inter-rater agreement was fair with respect to Fascial Thickening/Scarring (AC1 = 0.26), Tearing (AC1 = 0.35), Tendon Thickening (AC1 = 0.38), and Intratendinous Calcification (AC1 = 0.33). Substantial inter-rater agreement was observed for Enthesophyte (AC1 = 0.80), Hyperechogenicity (AC1 = 0.83) and Hypoechogeticity (AC1 = 0.92) had almost perfect inter-rater agreement. Intra-rater agreement was moderate for Fascial Thickening/Scarring (Kappa = 0.48), Tearing (Kappa = 0.41), Tendon Thickening (Kappa = 0.47), Intratendinous Calcification (Kappa = 0.56), and Hypoechogeticity (Kappa = 0.47). Substantial intra-rater agreement was observed for Hyperechogenicity (Kappa = 0.71), and Enthesophyte (Kappa = 0.86) had almost perfect agreement.

CONCLUSIONS: Fair to almost perfect inter-rater and intra-rater reliability was obtained for all measures. Musculoskeletal Ultrasound appears to be a reliable tool to use when evaluating pathology of the common extensor tendon for patients that present with common extensor tendinopathy or “tennis elbow”. These findings could be used to create a standardized musculoskeletal ultrasound classification for common extensor tendinopathy related research.

INTRA-INFRASPINATUS HUMERAL HEAD FRAGMENT LIMITING RANGE OF MOTION

Peter C. Yeh, MD, and Ajas Sambasivan, MD

CASE DIAGNOSIS: Humeral head fragment embedded in the infraspinatus limiting shoulder range of motion (ROM).

CASE DESCRIPTION: An 16-year-old female suffered a gunshot wound to the right shoulder and arm resulting in T3 AIS A Paraplegia and hemiplegia fracture status post open reduction and internal fixation. During inpatient rehabilitation, serial shoulder radiographic monitoring showed interval healing progression of humeral neck and head fractures without hardware loosening. After orthopedic’s recommended 10 weeks of non-weight bearing on the right upper limb with passive ROM as tolerated, she transitioned to active ROM (AROM) and weight bearing as tolerated. With AROM, she endorsed posterior and superior shoulder pain with a “firm end feel” and passive external rotation, shoulder flexion, and abduction. Symptoms persisted despite oral analgesic medication, heat packs, topical creams and patches. Shoulder provocative maneuvers including empty can testing, drop arm test, and scarf tests were
negative. Shoulder AP and scapular y view x-rays showed adequate healing of the fracture and no evidence of hardware malfunction.

DISCUSSIONS: Due to high suspicion of pathology with evidence of pain-limiting ROM restriction despite negative shoulder x-rays, we opted for ultrasound evaluation. The combination of these abilities to visualize the glenohumeral joint with dynamic internal and external rotation. Shoulder ultrasound revealed a glenohumeral joint effusion and a hyperechoic structure restricting external rotation of the glenohumeral joint. Subsequent computed tomography scan revealed a posteriorly displaced humeral head fragment in the infraspinatus, which appears to be the source of her shoulder pain with external rotation restriction. She was ultimately referred to orthopedics for further evaluation and management. We present an interesting case where a humeral head fragment from gunshot wound became lodged within the infraspinatus tendon resulting in shoulder pain and ROM restriction.

CONCLUSIONS: Consider a bone block as a differential when unusual presentations occur in patients with a history of traumatic injury.

INTRA-MUSCULAR HEMANGIOMAS REVISITEd: ULTRASOUND IMAGING IS IN PLAY
Karolina Sobotová, MD, Kamal Mezian, MD, PhD, Ahmad J. Abdulsalam, MD, and Levent Özçakar, MD, Professor

CASE DIAGNOSIS: Upper limb intramuscular hemangioma.

CASE DESCRIPTION: Case 1: A 13-year-old boy presented with swelling on the volar aspect of his right forearm and pain during physical activities. Ultrasound evaluation showed well-margined cavernous and easily compressible echotexture inside the mid-belly of flexor digitorum superficialis muscle with mildly positive power Doppler signal. The suspected diagnosis of intramuscular hemangiomma (IH) was confirmed by magnetic resonance imaging (MRI). The embolization of the hemangiomma was performed and provided satisfactory results. Case 2: A 38-year-old woman presented with pain in her left thenar area lasting more than 10 years, exaggerated while working on PC. Ultrasound evaluation showed a well-margined cavernous echotexture with calcifications within the flexor pollicis brevis muscle belly. The suspected diagnosis of IH in the flexor pollicis brevis muscle belly was confirmed on MRI. Excision of the mass was performed and the patient reported pain relief thereafter.

DISCUSSIONS: Intramuscular hemangiomas (IHs) are benign soft tissue tumors and their occurrence in the upper limb is rare. Their diagnosis can be difficult because of pertinent nonspecific symptoms. They are often treated as tendinitis or muscle strain. Herein, it is noteworthy that ultrasound imaging would be helpful in those clinical conditions.

CONCLUSIONS: We present two cases of IHs, one in the flexor pollicis brevis muscle belly and the other one in the flexor digitorum superficialis muscle. Both patients presented with nonspecific symptoms like chronic pain, swelling, and functional limitation. Ultrasound evaluation and MRI confirmed their diagnosis. To this end, we strongly encourage sonographic examination as the extension of physical examination in the daily clinical practice of musculoskeletal medicine for the differential diagnosis of several similar scenarios.

INTRATHECAL BACLOFEN PATIENT ACTIVATED BOLUS DEVICE FOR TREATMENT-RESISTANT STIFF-PERSON: A CASE REPORT
Rosa Rodriguez, MD, MS, and Seema Khurana, DO

CASE DIAGNOSIS: Stiff-Person Syndrome (SPS).

CASE DESCRIPTION: A 67-year-old male presented with a nine-year history of progressive stiffness and spasms that affected his trunk and bilateral lower extremity with intermittent acute exacerbations and autonomic instability. Seven years after onset of symptoms, he was diagnosed with Stiff-Person Syndrome by an outside provider and treated with oral Baclofen, Gabapentin, Tizanidine and IVIG without significant improvement. The patient agreed to a trial of Intrathecal Baclofen, which was offered.

DISCUSSIONS: Currently SPS is currently symptomatically treated, initially with benzodiazepines or oral Baclofen, or other muscle relaxers. If symptoms are not well controlled, intravenous immune globulin is used. For severe or refractory disease, other therapies such as rituximab, plasmapheresis and acyclovir have been used with limited success in painful muscle spasms, botulinum toxin and anticonvulsants. There have been case reports of the efficacy of intrathecal baclofen therapy for SPS but none that utilized a patient activated bolus device.

CONCLUSIONS: SPS is progressive and disabling. There is no cure for SPS, only treatments to manage symptoms. It is important to treat SPS symptoms early to improve patient function and quality of life. This case highlights the potential for Intrathecal Baclofen to significantly improve the quality of life in those patients with SPS by using a Patient Activated Bolus Device.

INVESTIGATING PATTERNS IN OPIOID PRESCRIBING FOR MULTI-TRAUMA PATIENTS ADMITTED TO INPATIENT REHABILITATION: A RETROSPECTIVE COHORT STUDY
Simonne C. Francis, MD, Keturah (Kim) R. Faurot, PhD, MPH, PA, Jinyoung Park, MS, and Lee Shuping, MD, MPT

CASE DIAGNOSIS: The crisis of effective pain management is an ongoing concern for clinicians and their patients in the United States. Initiatives to treat pain as “the fifth vital sign” in the late 1990’s led to liberalization of prescribing, resulting in an epidemic of widespread chronic opioid use and misuse. We sought to describe patterns in opioid prescribing for post-operative multi-trauma patients admitted to a large university acute inpatient rehabilitation hospital (AIR). Our hypothesis: admitted opioid-tolerant patients are more likely to be discharged opioid-tolerant compared with opioid-naïve patients after their AIR hospitalization.

CASE DESCRIPTION: In this retrospective cohort study of multi-trauma patients admitted to an AIR from 1/1/17-12/31/17, we included patients ≥ 18 years of age with >1 orthopedic injury at time of AIR admission and excluded patients with spinal cord injury and traumatic brain injury resulting in 56 patients. We recorded and compared morphine milligram equivalents prescribed and pain intensity on admission to and discharge from AIR and described opioid prescribing patterns by age, gender, and number of injuries. We calculated Wilcoxon rank sum and chi squares. Mixed models were used to examine differences in opioid use and pain intensity over time.

DISCUSSIONS: Patients who were opioid-tolerant on admission were twice as likely to be opioid-tolerant at discharge and were more likely to report musculoskeletal pain and be prescribed gabapentinoids with opioids at time of admission. No significant difference was present between the opioid-tolerant and opioid-naive groups with relation to demographics, number of injuries, or length of stay. While in AIR, both opioid-tolerant and opioid-naive patients had tapering of opioids; however, the taper was delayed and doses remained higher for opioid-tolerant patients.

CONCLUSIONS: As expected, opioid-tolerant multi-trauma patients admitted to AIR were more likely to be discharged opioid-tolerant. AIR may be a perfect environment to address opioid over-prescribing and taper prescribed opioids prior to discharge.

IS THE HIP BONE MORPHOLOGY OF MALE SEMI-PROFESSIONAL SOCCER PLAYERS RELATED TO PREVIOUS GROIN PAIN?
Tomonari Sugano, MHSC, PT, Nobuhide Azuma, Ryo Kuboshita, and Seigaku Hayashi, MD

OBJECTIVES: Groin pain (GP) is mostly onset for soccer players, and chronically affects the play, but there are many unclear points on cause and mechanism of the GP onset. Our investigated the relationship between the past history of GP and the bone morphological characteristics (Femoral Neck Angle (FNA), Acetabular anteverision (AA), Femoracetabular Impingement (FAI)) of each hip joint of the GP onset. Our investigated the relationship between the past history of GP and the bone morphological characteristics (FNA, AA, and FAI) of each hip joint of the GP onset.

DESIGN: The subjects were 18 semi-professional male soccer players. The GP group consisted of 7 players with a history of GP in their kick legs, and the non-GP group consisted of 11 players without a history of GP in their kick legs. MRI was used for the measurement of FNA and AA, and in addition, the FNA left-right difference was calculated. In the decision of FAI, α angle was calculated using the radial MRI, and α > 55 ° was designated as Cam type FAI. For statistical analysis, the unpaired t-test and χ² test were used to compare the variables of the GP and non-GP groups, with a significance level of 5%.

RESULTS: In the support leg FNA, the GP group 3.1 ± 9.6 ° was significantly smaller than the non-GP group 12.1 ± 7.0 ° (p = 0.035). The left-right difference of FNA was significantly higher in the GP group 5.9 ± 2.7 ° than in the non-GP group 2.4 ± 2.0 ° (p = 0.006).

CONCLUSIONS: In the onset of GP in male soccer players, decrease of support leg FNA and left-right difference of FNA are concerned, and it may affect the kick motion and lead to the onset of pain.

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IS THERE A CORRELATION BETWEEN THE TYPE OF MUSICAL INSTRUMENT A MUSICIAN PLAYS AND AN INCREASED RISK OF MUSICAL-INSTRUMENT-ASSOCIATED INJURY?

James B. Melling, DO, and Chris Ha, DO

OBJECTIVES: Musicians are at a high risk of developing musculoskeletal injuries, which may threaten their very livelihood over time. Each musical instrument requires different movement patterns, muscle memory, and skillsets. The purpose of this study was to determine if the type of musical instrument a musician plays leads to an increased risk of musical-instrument-associated injury.

DESIGN: The authors created an online survey to collect data about musicians, including the instrument they play, their practice methods, and if they acquired any injuries from playing their musical instruments. The survey was released and available for participation on various social media outlets (Facebook, Instagram, and Twitter) for a span of 33 days. Over that time, the survey received a total of 115 responses. As a portion of this survey, each musician was able to list their primary musical instrument and up to 4 additional musical instruments.

RESULTS: Of the 115 responses, 18 individuals sustained an injury while playing one (or more) of their musical instruments. It is important to note that several of the injured musicians played multiple instruments, with some playing two (50%), three (17%) or even four instruments (6%). The injured musicians played a variety of musical instruments, including piano (11), violin (6), guitar (5), drumset (3), unspecified other instrument (3), organ (2), clarinet (1), saxophone (1), trumpet (1), viola (1), cello (1).

CONCLUSIONS: Certain musical instruments may have an increased risk of musical-instrument-associated injury, but more research is needed to identify a correlation and causative relationship. Further studies may help parse out which of the highest offender, piano, is because of associated risks of playing the instrument or due to the increased prevalence of piano players in the musical world.

ISOKINETIC ASSESSMENT OF TRUNK MUSCLES IN FACIOSCAPULOHUMERAL MUSCULAR DYSTROPHY TYPE 1 PATIENTS

Philippe Thoumine, MD, PhD, Julien Esnaud, MD, Besma Missaoui, MD, and Michele Mane, MD

OBJECTIVES: FACIOSCAPULOHUMERAL MUSCULAR DYSTROPHY TYPE 1 is the third most common inherited myopathy. Its severity is proportionate to the loss of microsatellite D4Z4 repeats, which are below 10. Patients suffer from weakness in facial muscles, shoulder girdles and ankle dorsiflexors. Trunk impairment is reported in few studies.

DESIGN: To assess correlation between D4Z4 number of repetitions in facioscapulohumeral muscular dystrophy type 1 patients and trunk extendors and flexors isokinetic peak torque, 48 patients with southern blot confirmed facioscapulohumeral muscular dystrophy type 1 were enrolled to perform clinical evaluation (Ricc’s Clinical Severity Scoring, Berg Balance Scale, Functional Reach Test, timed up-and-go test, six-minute walk test, functional independence measure) and trunk isokinetic assessment.

RESULTS: Trunk extendors and flexors isokinetic peak torque at 60 °/sec were significantly correlated with number of D4Z4 microsatellite repetitions, sex, weight and age-independence (r = 0.391 [0.121; 0.662], p < 0.006 and r = 0.334 [0.028; 0.641], p < 0.033, respectively). Ricc’s Clinical Severity Scoring was significantly correlated to trunk extendors isokinetic peak torque at 60 °/sec, sex and weight-independence (r = -0.743 [-0.938; -0.548], p < 0.001).

CONCLUSIONS: This study demonstrates moderate correlation between pathologic compression of D4Z4 microsatellite array and trunk extendors isokinetic strength among facioscapulohumeral muscular dystrophy type 1 patients.

ISOLATED TRAUMATIC Tibial NERVE Injury AFTER GUNSHOT WOUND IN A 35-YEAR OLD WITH ISOLATED GASTROCNEMIUS MUSCLE SPARING

Yi Ding, DO, and Steven Gershon

CASE DESCRIPTION: Traumatic Peripheral Nerve Injury. Isolated tibial nerve injuries are often rare. Due to its anatomical location, the tibial nerve is often spared from the common compressive injuries. We report a case of a 35-year-old male with left knee pain and diffuse distal lower extremity paresthesia, who was later diagnosed with posterior tibial neuropathy. Patient had sustained a left knee gunshot wound two months prior, after an accidental discharge from his handgun. Results from the electrodiagnostic study shows decreased left posterior tibial nerve amplitude and velocity when compared to the asymptomatic side. All posterior tibial nerve innervated muscles, distal to the gastrocnemius, exhibited reduced recruitment, with positive sharp waves and fibrillation potentials.

DISCUSSIONS: Injury to the tibial nerve can occur with penetrating wounds, joint dislocations, fractures, and compartment syndrome. These injuries can often diffuse affect the tibial nerve and its innervated muscles. In this case, the nerve injury is isolated to an area after the gastrocnemius take-off point, leaving its innervation intact. In addition, despite the latency and conduction velocity of the compound motor action potential (CMAP) to be normal on the affected side, significant differences can still exist in the side-to-side comparison study.

CONCLUSIONS: Logical planning of the electrodiagnostic study can help localize the peripheral nerve injury. This can be beneficial in guiding the rehabilitation process and prognosticating future recovery.

LEVERAGING LEADERSHIP: INTERDISCIPLINARY BUSINESS AND LEADERSHIP PILOT FOR PHYSICAL MEDICINE & REHABILITATION RESIDENTS

April Pruski, MD, Josie Ganzernmiller, PhD, and Tracy Friedlander, MD

CASE DIAGNOSIS: Business and leadership training for resident physicians are increasingly valuable in the heightened complexity of our current health care system. Development of these skills can foster quality improvement, enhance clinical care, and optimize use of clinical resources (Pearl & Fogel, 2017). Few medical residency programs have specialized leadership training programs. Data from the graduate medical education database shows “only 14-4 percent of all fellowship and 9.6 percent of residency programs (n=5,247 programs) provide MPH/MBA or PhD training” (Kahn & Gardin, 2016, p. 42). The limited number of programs providing business and leadership training presents a challenge to the majority of trainees entering the physician workforce (Bhatia et al., 2015). Some studies have shown longitudinal leadership curricula are more likely to be successful (Sadowski, Cantrell, Barliski, O’Malley & Hartzall, 2018). Therefore, the following research pilot intervention was designed to measure outcomes from a leadership and communication seminar series delivered to residents.

CASE DESCRIPTION: The pilot study (beginning July 2019) included development, implementation, and evaluation of a longitudinal business and leadership seminar series for eighteen Physical Medicine & Rehabilitation residents. Participants attended monthly, one-hour sessions addressing a variety of essential communication and leadership topics including interpersonal and intrapersonal communication, emotional intelligence, effective teaming, negotiation, and conflict resolution. Pre-test and post-test focus groups were conducted to measure the participants knowledge in these areas prior to the seminar series.

DISCUSSIONS: The initial data from the pre-test focus group show low self-perceived confidence and poor understanding of effective communication and leadership strategies. Participant observation throughout the longitudinal study showed rapid increases in competency in both communication and leadership as well as ability to identify and resolve conflict effectively.

CONCLUSIONS: As our current health care system continues to evolve, it is quintessential that all PM&R resident physicians are exposed to the skills that develop their communication and leadership styles.

LIPOMA ARBORECENS IN A YOUNG WOMAN WITH BILATERAL KNEE PAIN

Bruce Zhang, MD, and Reed C. Williams, MD, MBBS, RMSK

CASE DIAGNOSIS: 37 year old woman with bilateral knee pain; found to have Lipoma Arborecens.

CASE DESCRIPTION: 37-year-old female evaluated for 9-months of bilateral knee pain, intermittent swelling, and range of motion (ROM) deficit after falling up the stairs and hitting the leading-edge with her knees. Flexion and direct on-knee weight-bearing exacerbated symptoms; off-loading relieved pain. Failed ice and oral medications. Exam noted decreased flexion ROM with end-range pain, lateral joint line and superior patellar pole tenderness, and positive Ober’s, Noble’s, and Clark’s Grind tests. Prior knee MRI revealed bilateral chondromalacia and moderate joint effusion. Intra-articular fat proliferation, termed Lipoma Arborecens (LA), was found in the left knee. In clinic, ultrasonographic examination 6 months after initial MRI revealed right knee effusion and bilateral knee synovial hypertrophy and villi without hyperemia, suggesting LA progression to bilateral knees.

DISCUSSIONS: The patient was provided ultrasound-guided corticosteroid knee injections and a therapy regimen consisting of knee/hip girdle strengthening. At 3-month follow-up she noted bilateral 75% pain and swelling reduction. At 6-months left knee pain had resolved; right knee pain remained stable. ROM improved. She was recommended 1-year follow up MRI of her knees to assess LA progression. Lipoma Arborecens is a rare condition with unclear etiology, previously not attributed to trauma, involving replacement of normal sub-synovium with mature fat.
cells causing villous hypertrophy. It is considered a benign process but can have biomechanical implications, potentially degenerative changes. Synovectomy can be the definitive treatment for symptomatic LA, in this patient’s case expectant management was warranted given overall improvement of symptoms.

CONCLUSIONS: LA should be considered in the differential diagnosis for knee pain. This report serves to bring awareness to LA and propose possible traumatic etiology. Ultrasonography is a useful diagnostic tool to quickly assess progression of LA in-clinic. Management should rely on clinical judgment and degree of symptomology.

LIPOMA ARBORESCENS MIMICKING A MEDIAL MENISCUS TEAR
Jared Placeway, DO, and Gary Hoover, DO
CASE DIAGNOSIS: Lipoma arborescens of the knee with associated effusion mimicking symptoms of an acute medial meniscal tear.

CASE DESCRIPTION: A 47 year old female presented to PM&R Musculoskeletal clinic with a 1 week history of left knee pain, which began after a hyperextension injury while playing soccer. The pain was located anteromedially with clicking noted intermittently. Pain was worse with stairs, twisting, and extremes of flexion or extension. Examination revealed a suprapatellar effusion with tenderness to palpation along the medial patellar border and the medial joint line. Meniscal tests including McMurray’s test and Apley’s grind test reproduced her stated pain. Patellar grind produced mild discomfort. Xrays of the left knee showed mild tricompartmental osteoarthritis. Pain remained persistent despite activity modification, icing, and topical nsaid’s. An MRI of the left knee was obtained which demonstrated a large effusion and significant synovial frounds consistent with lipoma arborescens, but no meniscal tear. She was referred to Orthopedic Surgery and subsequently underwent an arthroscopic synovectomy with near complete resolution of knee pain.

DISCUSSIONS: Knee pain, including meniscal tears, is a common complaint encountered in a PM&R MSK clinic. Lipoma arborescens is a rare condition with common findings including recurrent knee effusions. Limited prior case reports have documented the findings of and treatment of this condition. However, no prior reports have been found where the presenting symptoms mimicked primarily meniscal symptoms with resolution noted on arthroscopic synovectomy.

Lipoma arborescens can be a pathologic causative factor of persistent knee pain and effusion in cases of refractory knee pain resistant to conservative treatment. Although rare, lipoma arborescens should be considered in the differential diagnosis of knee pain with effusion.

LISFRANC FRACTURE IN AN INPATIENT REHABILITATION PATIENT
Alexandre Mazar, MD, Riley Smith, MD, Robert Gapinski, MD, P. Tyler Roskos, PhD, ABPP, and Rizwan Alvi, MD
CASE DIAGNOSIS: Left Lisfranc fracture.
CASE DESCRIPTION: A 66-year-old male presented to inpatient rehabilitation after sustaining a crush by a cabinet. He had multiple injuries to his thorax, lumbar spine, pelvis and also underwent a right below knee amputation. On day 12 of his rehabilitation admission, he reported intermittent band-like left foot pain located at the medial malleolus which radiated to the midfoot. Physical exam was unremarkable with normal gait. Xrays of the left foot revealed a Lisfranc fracture. Left foot Computer Tomography confirmed the diagnosis. Podiatry was consulted and recommended a walking boot and non-weight bearing on the left lower extremity. He elected for non-operative management and completed his rehabilitation program at wheelchair level.

DISCUSSIONS: A Lisfranc fracture is a tarsometatarsal fracture characterized by the disruption of the medial cuneiform-base of second metatarsal joint. It occurs from trauma or from an axial load onto a plantar- flexed foot. In this case, the fracture occurred during the crush. Lisfranc fractures are rare, accounting for less than 1% of all fractures and nearly 20% are missed on initial imaging. This was the situation in this report, where the fracture was identified in a subsequent left foot x-ray series. Early identification of the fracture is important as it guides treatment options (non-operative and operative) based on ligament and bony injury patterns. The consequences of a non-treated Lisfranc fracture include osteoarthritis and chronic midfoot pain syndrome.

CONCLUSIONS: This case highlights the importance of considering a Lisfranc fracture as a cause of foot pain in a multi-traumatic injury patient. Although this patient had a delayed presentation of a Lisfranc fracture, work up with imaging was key in it’s identification. Communication between the rehabilitation and podiatry teams was important for acute management and for outpatient follow up given the known sequela of a missed Lisfranc fracture.

LONG TERM FOLLOW UP POST-SCHENER PROSTHESIS FOR MADELUNG’S DEFORMITY
David Zachariah, and Dinesh Sharma, MD
CASE DIAGNOSIS: A 43-year-old female lab technician was evaluated in 2010 for ongoing pain in the right wrist and forearm after sustaining a work-related hyperextension injury September, 2010.
CASE DESCRIPTION: Wrist imaging revealed bilateral Madelung's deformity, and right sided ganglion cyst, triangular fibrocartilage ligament tear, and extensor carpi ulnaris tear. She underwent right distal ulnar head partial resection (wafer procedure), tendon repair, and ganglion cyst removal. Post-operatively she lost an approximate 40% in supination and pronation. She was recommended distal radioulnar arthroplasty with Scheker prosthesis. Post-prosthesis she experienced moderate improvement of symptoms and utility. 5 years later she developed numbness and tingling in her first three fingers. EMG/NCS confirmed median nerve entrapment localized to the carpal tunnel.

DISCUSSIONS: Madelung's deformity is a rare malformation of the wrist, caused by premature closure of the distal radial physis. Diminished growth of the distal radius causes instability at the distal radioulnar joint, and manifest as pain and functional impairment. In many cases surgery is required. Several surgical procedures are performed to address Madelung's deformity. In this case, distal radioulnar joint arthroplasty and Scheker Prosthesis was performed. Fusion of the distal radioulnar joint with Scheker prosthesis commonly improves mobility at the wrist joint in supination and pronation.

CONCLUSIONS: Scheker prosthesis was designed for symptomatic patients after destruction of the distal radioulnar joint from surgery or trauma. Patients are expected to have improved wrist mobility, grip strength, and reduction of pain. Inadequately after any implantation, long-term complications such as arthritis and entrapment neuropathies can occur. A small retrospective study of 46 cases found the most common complication 2 years post-Scheker prosthesis to be extensor carpi ulnaris tendonitis (Rampazzo, Antonio et al.). In this case, the long term issues include chronic pain and carpal tunnel syndrome. There remains limited published literature on long term complications post-Scheker prosthesis.

LONG TERM USE OF OPIOIDS IN PATIENTS DISCHARGED FROM AN INTERDISCIPLINARY CHRONIC NON MALIGNANT PAIN PROGRAM
Daniel G. Colon-Conde, MD, Isabel Borras-Fernández, MD, Ady Corea-Mendoza, MD, Ruben J. Rivera-Rivera, MD, and Mariana Cuadrad-Pereira, MD
OBJECTIVES: There is limited evidence of studies addressing opioids long term use and adherence to the recommended opioid prescription. This study intends to observe a selected population of veterans and document their adherence to opioid prescription a year and five years after being discharged from the Interdisciplinary Chronic Pain Program.

DESIGN: Retrospective descriptive study designed to determine the long term use of opioids in a sample of patients discharged from an Interdisciplinary Chronic Pain Program. Records reviewed include patients discharged on opioids from January 1, 2005 to December 31, 2012. The records were divided based on substance control classification. The subjects’ adherence to the recommended prescription, a year and five years after being discharged, was documented.

RESULTS: At one and five years most patients with class IV substances were still adherent to their prescription, however those discharged on class II substances were not active on those medications. Class II medications prescribed included Oxycodeone, Morphine Sulfate, Hydromorphone and Fentanyl. Class IV substance included Tramadol. Reasons for discontinuation of medications included not being renewed by primary physician, changes in medications after recent hospitalization, poor pain response, loss of follow up and unknown reasons.

CONCLUSIONS: This study reveals that at five years less patients are taking class II opioids but are still taking Class IV; being Tramadol was not a controlled scheduled medication during the time frame that the sample of patients was obtained, therefore providers might have felt more comfortable prescribing the medication. This study provides evidence that long term adherence to pain clinic medication recommendations are not necessarily followed for different reasons. Therefore, being enrolled in a structured pain program would improve compliance, adherence and follow up with this population thus optimizing pain management and overall quality of life.

LOWER EXTREMITY WEAKNESS AFTER QUININE GLUCONATE INJECTION
Kemly M. Philip, MD, PhD, MBE, Nathan Darji, DO, Elizabeth Forrest, MD, Donna Bloodworth, MD, and Faye Chiou-Tan, MD
CASE DIAGNOSIS: Polyneuropathy, Myopathy, and Anisomelia after Childhood Quinine Injection.

CASE DESCRIPTION: A 4yo African-woman presented for electromyography/nerve conduction studies (EMG/NCS) of right lower extremity (RLE) weakness. Briefly, she reported flaccid paralysis after receiving high-dose quinine gluconate (Quinamax) injection to her right hip at 8 years old, lasting one month followed by residual RLE weakness for which she was fitted a right double knee, up-right brace with drop lock. On exam, she had right quadriceps atrophy with limb length discrepancy of 4.5cm, and less than anti-gravity RLE weakness. EMG/NCS indicated chronic neuropathic and myopathic changes in the RLE. Ultrasound evaluation showed hypervascular changes in quadriceps muscles bilaterally, with fibrotic changes distally in the RLE as well. Patient was referred to limb deficiency clinic where she was fitted a light-weight aluminum brace with bail lock, and full sole lift to improve gait stability and function.

DISCUSSIONS: Quinine gluconate (Quinammax) is a water-soluble combination of Cinchona alkaloids used for malaria treatment. Adverse effects noted previously from intramuscular (IM) thigh quinine injections include hypoglycemia, local toxicity including swelling, sciatric nerve injury, ectopic ossification, paralysis of the injected limb, bilateral lower extremities, or whole tetraparesis, and even transmission of bloodborne pathogens with differential effects based on diluted versus undiluted drug delivery with or without a loading dose. Though the patient in this case presented with unilateral weakness, ultrasound and NCS showed changes in bilateral LE.

CONCLUSIONS: Paralysis after intramuscular quinine injections of the injected side has been reported previously. Few randomized control trials have evaluated the effect of rectal or intravenous quinine administration to avoid these effects though insufficient evidence remains. Though studies after acute injury are lacking, the combination of diagnostic EMG/NCS, musculoskeletal ultrasound, and limb deficiency prosthetic care allows for comprehensive management of these patients with residual weakness, improving their functionality and quality of life overall.

LOWER LUMBOSacral PLEXOPATHY AFTER POSTERIOR ACETABULAR FRACTURE

Jennifer Hankenson, MD, Katherine Power, MD, and Robert Bunning, MD

CASE DIAGNOSIS: 42 year old woman with lumbosacral plexopathy after posterior acetabular fracture, confirmed by EMG.

CASE DESCRIPTION: The patient fell through her attic ceiling (approximately 15 feet fall) and suffered multiple injuries that included acetabular fracture, splenic laceration, acute pneumothorax, scapular fracture, multiple rib fractures, cervical transverse process fracture, and lumbar transverse process fracture. Patient had open reduction and internal fixation to left hip to treat acetabular fracture. Upon presentation to acute rehabilitation she was found to have weakness in her left lower extremity out of proportion to what would be expected post-surgery. She had an absence of hip flexion, knee extension and ankle dorsiflexion in the left leg. She had antigravity strength with plantar flexion. After approximately two weeks of acute rehabilitation the patient had minor improvement in hip flexion, antigravity strength in knee extension and ankle dorsiflexion and antigravity strength in the ankle plantar flexion.

DISCUSSIONS: The patient had an EMG performed two months after initial surgery that showed electrodagnostic evidence of lumbosacral plexopathy. There was evidence of active denervation in left sided common peroneal, tibial nerve and superior gluteal nerve. Though less common in isolated acetabular fractures, lumbo-sacral plexopathies are often associated with pelvic injuries. As seen in this case, patients present with weakness of ankle dorsif- and plantar flexion as well as varying degrees of weakness in quadriceps, hamstrings and gluteal muscles. Recovery is often based on the extent of injury and whether the EMG shows signs of complete versus incomplete nerve injury with the former having a poor functional prognosis.

CONCLUSIONS: EMG plays a crucial role in diagnosing lumbosacral plexopathies associated with acetabular fractures. Many incomplete nerve injuries can achieve good to complete recoveries. For this patient, the plan is to repeat EMG in 4-6 months after initial injury to confirm a lumbosacral plexopathy versus a femoral nerve injury.

LUMBAR BACK PAIN SP/FUSION REVEALS UNDERLYING RARE CARCINOID MYOPATHY

Karthik Sabapathy, DO, MS, and Neyha Chen, DO

CASE DIAGNOSIS: Lumbar back pain s/p fusion reveals underlying rare carcinoid myopathy.

CASE DESCRIPTION: A 52-year-old male with history of Polygynalgia Rheumatica (PMR) and low back pain (LBP) status post recent L2-5 laminectomy and L2-4 posterior fusion, complained of progressive bilateral, proximal lower extremity weakness and paresthesias. NCS/EMG showed reduced left peroneal motor EDB amplitude and bilateral tibial motor studies of the adductor hallucis showed reduced amplitudes proximally. Active denervation was seen in the right gastrocnemius. Myopathic units were seen in all proximal muscles tested of the upper and lower extremities.

CONCLUSIONS: Initially we were consulted for possible worsening lumbar radiculopathy, then we were concerned for reactivation of PMR. We noted there had been no spinal imaging since prior to surgery as this was done at an outside hospital and recommended new imaging. After this, it was noted the patient had spinal metastases secondary to stage IV Renal Cell Carcinoma. In the literature there is scant case reports that discuss carcinoid myopathies.

CONCLUSIONS: This case highlights the importance of taking a thorough history even as an EDX consultant. As physicians, we can offer a second opinion on management that may have been missed by those so closely involved with a patient’s case. In this case, a more thorough exam and history changed the management and prognosis of the patient. One should not be hesitant on offering medical advice based on one’s obtained exam and history.

LUMBAR FACET ARTHROPATHY CAUSED BY CALCIUM PYROPHOSPHATE DEPOSITION (PSEUDOGOUT)

Michael J. Ingraham, MD, Daniel Sainburg, DO, Nevin Vijayaraghavan, DO, and William T. Riden, DO, MBA

CASE DIAGNOSIS: Lumbar Facet Arthropathy caused by Calcium Pyrophosphate Deposition (CPPD).

CASE DESCRIPTION: A 71 year-old female presented with acute on chronic low back pain not well manged with PT, medications, and previous epidural steroid injections at an outside facility. She had axial back pain that was preventing her from walking and had an MRI from the year before that showed severe bilateral facet arthropathy at L4-5 and L5-S1 without any significant stenosis. She underwent bilateral L4-5 and L5-S1 facet joint injections with 80% relief of her symptoms. She again developed acute on chronic pain 2 months later and follow-up MRI in ER showed increased right L5-S1 joint effusion with involvement of the paraspinous muscles. Interventional radiology aspirated the fluid which showed calcium pyrophosphate crystals. Initial treatment with prednisone 40mg daily provided improvement in her symptoms until this was stopped secondary to UTI with pyuria.

CONCLUSIONS: Lumbar facet arthropathy is a common condition which is typically secondary to degenerative changes. However as synovial joints, they are also susceptible to crystal deposition which may cause acute worsening of pain and local inflammatory response. On MRI, this effusion may mimic septic arthritis and requires labwork and fluid aspiration for cell count and culture. Though thought to be rare, a recent French study of patients with CPPD found up to 24% of patients has CT imaging findings suggestive of spinal involvement. It is even more rare to have concurrent septic arthritis, though a recent Australian study noted a 5% of coinfection in all crystalline facet arthropies.

CONCLUSIONS: Lumbar facet arthropathy is a common condition which is typically secondary to degenerative changes. As a true synovial joint, it is also susceptible to crystal deposition. Pseudogout can produce acute pain and imaging findings concerning for septic arthritis, requiring fluid aspirate and labwork to confirm the diagnosis.

LUMBAR FACET CYST ASPIRATION FOR TREATMENT OF LUMBAR RADICULAR PAIN

Michael J. Ingraham, MD, William T. Riden, DO, MBA, Daniel Sainburg, DO, and Nevin Vijayaraghavan, DO

CASE DIAGNOSIS: Lumbar Spinal Stenosis from Facet Cyst.

CASE DESCRIPTION: 86 year-old male was referred for bilateral hamstring pain. He reported 6 months of bilateral posterior thigh pain. No injury or stress to hamstrings which would explain situation, and PT directed at this was not helpful. Associated symptoms of posterior lower leg numbness and gait instability, as well as reports of progressive leg heaviness with walking, raised concern for neurogenic claudication. An MRI was ordered which showed a large anteriorly projecting synovial cyst measuring 2.3 x 0.7 cm at L3-4 causing severe spinal canal stenosis and compression of the descending nerve roots. Given lack of improvement with PT, he requested more definitive treatment but was initially declined surgical intervention given his age. He then underwent bilateral lumbar facet cyst aspiration and injection 3 times, each time removing 0.3 to 2.0ml of synovial fluid and providing 1-4 weeks of 75% relief.

DISCUSSIONS: Lumbar stenosis in the older adult is typically multifactorial. Lumbar facet cysts can be a cause of back and leg pain if projecting anteriorly into the spinal canal. Facet cyst aspiration and injection can provide temporary relief.
MAINTAINING FUNCTIONAL STATUS WHILE STIMULATING BONE HEALING IN BILATERAL CHRONIC FIFTH METATARSAL BASE FRACTURES: A CASE REPORT

Zachary Belford, DO, Milan Rustic, DO, and Alex Moroz, MD, MPH

CASE DIAGNOSIS: A 60-year-old female presented with chronic bilateral foot pain and was found to have bilateral fractures of the fifth metatarsal bases.

CASE DESCRIPTION: A 60-year-old female presented with pain on the lateral plantar aspect of both feet for one year. There was no trauma or inciting event. Prior treatments included shoe inserts and physical therapy, which did not alleviate her pain. Physical examination revealed tenderness of the fifth metatarsal base bilaterally. MRI demonstrated bilateral nondisplaced nonunited chronic fractures of the fifth metatarsal bases with extension into the tarsometatarsal joint. Given the delayed healing of these fractures, an orthopedist was consulted. The patient was prescribed a CAM boot for the right foot (more symptomatic side) and daily bone stimulator use. Follow up X-rays three months later showed progression of healing bilaterally. The patient also reported a 33% reduction in pain and was able to tolerate walking longer distances.

DISCUSSIONS: Fractures of the fifth metatarsal base are classified according to anatomic location. The proximal tubercle is Zone 1, where fractures are typically due to avulsion. Zone 2 fractures occur at the metatarsal diaphyseal junction, and usually result from acute injury. The proximal diaphysis is Zone 3, which is prone to stress fractures in athletes. This patient’s fractures both occurred in Zone 2, though she had no history of trauma. Zone 2 fractures have an increased risk of nonunion (15-30%) due to vascular supply being in a watershed area. Management of fifth metatarsal base fractures is not universally agreed upon. In this case, conservative treatment with a CAM boot and bone stimulation led to noticeable healing on repeat imaging. The patient’s pain intensity and functional status also improved.

CONCLUSIONS: Patients with persistent lateral foot pain should be evaluated for fractures of the fifth metatarsal base, which require careful management considerations to prevent progression to nonunion.

MANAGEMENT OF A MULTI-LIGAMENT KNEE INJURY IN A POOR SURGICAL CANDIDATE

Mark N. El-Miniawi, BS, Anna Rozman, DO, MBA, Stephanie Rand, DO, and Karen Morice, MD

CASE DIAGNOSIS: Multi-Ligament Right Knee Injury After Tibiofiberal Dislocation.

CASE DESCRIPTION: A 48-year-old female presented with right knee pain and instability. She initially sustained a traumatic fall with tibiobimal dislocation. After manual relocation, imaging confirmed tear in multi-ligamentous structures, quadriceps tendon, and patellar tendon, and a fractured fibular neck. The patient was considered a poor surgical candidate (PSC) due to risk of arthrofibrosis. Conservative treatment including aqua therapy, analgesics, and the use of a free motion knee immobilizer 0-60° was initiated instead. An intra-articular steroid and lidocaine injection was provided to decrease inflammation and improve therapy tolerance. Prior to injection and therapy, the patient demonstrated an antalgic gait with increased right hip flexion, absent knee flexion on heel strike, and 0-60° range of motion (ROM). On follow-up, the patient showed improved ambulation, less knee flexion guarding, and increased ROM 0-75°. She returned to work four months after the injury with continued physical therapy and home exercises.

DISCUSSIONS: Tibiofiberal dislocations are rare and challenging to evaluate and treat. Publications studying them are uncommon, and even fewer describe treatment of PSCs. Patients with compartment syndrome, vascular injuries, open fractures, or irreducible knee dislocations should be considered absolute candidates for surgery. Compared to all surgical candidates, PSCs had poorer functional outcomes with persistent knee instability. However, there is still hope in restoring functionality with conservative interventions such as physical therapy, bracing, analgesics, and a close follow-up program. Steroid injections are effective in symptom control. Conservative intervention outcomes may not be satisfactory for athletic PSCs, but are sufficient for activities of daily living in PSCs with lower functional demands. If PSCs can follow conservative treatment and show improvement, they may be reconsidered for surgery to possibly obtain better outcomes.

CONCLUSIONS: Further studies on rehabilitation strategies and conservative interventions should be conducted in order to improve individualized patient care.

MANAGEMENT OF A SPINAL CORD INJURY (SCI) DUE TO BLASTOMYCOSIS INFECTION OF THE SPINAL CORD: A CASE REPORT

Irene Tseng, BS, and Leslie Rydberg, MD

CASE DIAGNOSIS: SCI following a blastomycosis infection resulting in paraplegia, neurogenic bowel and bladder, and muscle spasticity. The patient’s spinal cord injury is a T4 complete SCI ASIA A.

CASE DESCRIPTION: A 39-year-old man suffered from a work place injury, resulting in a splenectomy. Subsequently immunocompromised, the patient contracted a blastomycosis infection of the spinal cord which left him paraplegic. Physical therapy and occupational therapy FIM scales initially rated him as maximal to total assistance for most mobility statuses and self-care statuses. The patient’s hospital course was complicated by orthostatic hypotension, heterotopic ossification, and pressure wounds. Goals for therapy were to reach a modified independent level for most ADLs.

DISCUSSIONS: He spent 8 weeks in therapy at an inpatient rehabilitation facility, averaging about 3 hours of physical and occupational therapy a day, 6 times a week. Physical and occupational therapies focused on pop-over transfers, regaining his center of gravity to sit upright, reaching for objects using core strength, modified push-ups, being able to lie prone, practicing car transfers, etc. Therapeutic devices used in physical and occupational therapy include sliding boards for transfers, leg loops, therapy wedge pillows, long-handled mirrors, standing mirrors, pant holder dressing hooks, commodes, shower benches, and long-handled suppository inserts. At the time of discharge, he met goals of modified independent level for most mobility and ADLs, though he still required assistance for lower body dressing, bathing, and toilet transfers.

CONCLUSIONS: Blastomyosiscis infections rarely affect the central nervous system, however, when it does occur, the infections could be fatal. Though the pathophysicsology behind this particular spinal cord injury is unusual, the rehabilitation course is structured similarly to other, more traditional causes of spinal cord injury. A comprehensive course of therapy for those suffering from spinal cord injury due to blastomycosis infection can improve these patients’ independence and functionality.

MANAGEMENT OF CHRONIC BACK PAIN WITH PSEUDO-ARTICULATION INJECTION IN A PATIENT WITH SCOLIOSIS AND OSTEODENESE IMPERFECTA

Hank Shipman, BS, and Richard Kendall, DO

CASE DIAGNOSIS: Chronic Back Pain, Osteogenesis Imperfecta.

CASE DESCRIPTION: A 30-year-old female with osteogenesis imperfecta presented to clinic with a 15-year history of chronic left-sided back pain. The pain is located in the left lumbar, posterior gluteal area, worse with sitting in her power wheelchair. The patient works as a social worker, operates a vehicle, and cares for two children. Pain was not relieved with PT, over-the-counter analgesics, or time. CT of the abdomen and AP scoliosis x-rays confirmed an L3 transverse process-iliacum articulation, within a severe thoracolumbar kyphoscoliosis. She underwent an L3 transverse process and ilium assimilation joint steroid injection and experienced 100% pain relief after 4 weeks. By 8 weeks post-injection, the pain began to return, so the patient underwent a subsequent injection 15 weeks after the initial one. At follow-up 3 weeks after the second injection, the patient had again experienced 100% relief and noted significant improvements in mobility, sleep, and function with ADLs.

DISCUSSIONS: The case illustrates that painful pseudo-articulations can develop due to severe scoliosis and can be managed temporarily with localized injections. The articulations may form with severe kyphoscoliosis of the thoracolumbar spine, severe lumbar lordosis, and anterior pelvic tilt. The reemergence of her left-sided back pain approximately two months following the injection suggests that steroid injections may not provide sustained long-term relief. However, the pain relief provided increased function and avoidance of systemic medications.

CONCLUSIONS: For patients with chronic back pain caused by osteogenesis imperfecta, steroid injections offer a non-surgical approach to providing short-term pain relief. Although they may not provide sustained long-term relief, they can help manage chronic pain and improve quality of life during times that require increased physical function.
MANAGEMENT OF FOOT AND ANKLE TENDONITIS BY GENERAL PRACTITIONERS AND FAMILY MEDICINE RESIDENTS

Nesrine Beizig, Resident, Mouna Sghir, Doctor, Aymen Haj Salah, Doctor, Jiljen Bahr, Doctor, and Wassim Kessomtini, PRAG

OBJECTIVES: Foot and ankle tendonitis are a common cause of consultation in the primary care setting. The aim of our study is to evaluate foot and ankle tendonitis management by general practitioners (GPs) and family medicine (FM) residents.

DESIGN: This is a cross-sectional study, conducted over a period of 2 months (November and December 2018) using a questionnaire sent by e-mail to GPs of the center of Tunisia, and to FM residents at Monastir’s Faculty of Medicine.

RESULTS: Sixty five doctors responded to the questionnaire. The clinical triad of tendonitis was only known by 13.46% of the physicians. All of them were GPs. Ultrasoundography was the most prescribed (61.7%), followed by conventional radiography (48.3%), MRI (25%) and CT-scan (6.7%). Analgesics, rest and non-steroidal anti-inflammatory drugs (NSAIDs) were the first line treatments, prescribed respectively in 83%; 76.9% and 64.6%. When it failed, 55.38% of doctors referred their patients to specialists, 38.38% prescribed physical therapy and 20% steroid injection. The medical training about foot and ankle tendonitis was rated as “weak” in 64.6% by our population.

CONCLUSIONS: Based on our findings, good training of primary care physicians would be required for the recognition of foot and ankle tendonitis. This knowledge is essential to improve the diagnosis and management of this pathology.

MANAGEMENT OF LOWER BACK PAIN WITH ELECTRO-ACUPUNCTURE IN PAKISTAN: A QUASI EXPERIMENTAL STUDY

Muhammad Tawab Khalil, MBBS, and Ali Raza, MBBS, FCPS Rehab Medicine

OBJECTIVES: Lower back pain (LBP) is a common pain condition which results from a number of risk factors including lifestyle, trauma, abnormal posture and occupation however 95% of cases are non-specific. Current treatment regimens focus on the use of NSAIDs and opioid analgesics. Electro-acupuncture (EA) is a potential non-pharmacological management option but data from lower middle income countries regarding its application to reduce pain is scanty. Purpose of Study: To study the effect of EA on pain in patients with LBP.

DESIGN: This quasi experimental study took place in Out Patient Department of Rehabilitation Department in a Tertiary Care Hospital from January to August 2019. Through convenience sampling, patients with acute, subacute and chronic LBP reporting to OPD were recruited. Standards for reporting interventions in controlled trials of acupuncture (STRICTA) checklist was followed to ensure methodological quality. After documenting demographic data (age, gender, duration of pain, radiation of knee pain), one session of electro-acupuncture was performed. 0.25 x 25mm stainless steel needles manufactured by Hawato were used. Eight needles were inserted per session per patient at BI.25, BI.26, BI.27, BI.31 on right side and BL.25, BL.26, BL.27, BL.31 on the left side. Needles were inserted up to full skin thickness depth (1.3mm). Electrical stimulus of 4-9 Hz was applied for 5 minutes. Severity of pain was assessed by numerical rating scale (NRS) score before and after intervention. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 25.

RESULTS: Of n=20 patients, n=14 were male, n=6 were female. Mean age was 53.5±3.4years. Mean duration of pain was 38.5±8months. 40% of patients had localized pain whereas 10%, 20% and 30% of patients had right, left and bilateral radiation of pain respectively. NRS pain score significantly decreased at 4th week after intervention (p-value=0.017).

CONCLUSIONS: Electro acupuncture significantly decreases the pain in patients with lower back pain.

MANAGING THE PAIN OF RADIATION INDUCED DEGENERATIVE CHANGES OF THE CLAVICLE: A CASE REPORT

Matthew D. Wilhelm, BS, Aaron Hacker, BS, Erik Slabaugh, BS, and Jackson Cohen, MD

CASE DIAGNOSIS: 70-year-old male status-post radiation therapy for small cell lung cancer with left-sided clavicular and anterior shoulder pain.

CASE DESCRIPTION: A 70-year-old male presents to the interventional pain medicine office with complaints of left-sided clavicular and anterior shoulder pain. The patient has a history of small-cell lung carcinoma of the right lung status-post chemotherapy and radiation therapy. The pain began upon the finalise of chemotherapy and radiation therapy for lung cancer. The patient characterizes the pain as a sharp, aching, and stabbing at a constant 6 out of 10. Extensive imaging, including computed tomography (CT) and position emission tomography (PET) scans of the chest obtained pre and post-radiation therapy, were available for evaluation. Imaging confirmed findings of collapse of the clavicular head at the sternoclavicular junction with sclerosis and degenerative changes. Fluoroscopically guided injection to the sternoclavicular junction was reviewed with the patient and subsequently scheduled.

DISCUSSION: Radiation induced changes are well described, unfortunately sequela of radiation therapy. Reactive oxygen species (ROS) are uniquely tied to radiation therapy and can induce an apoptotic or necrotic pathway to cellular degenerative changes. These unfavorable effects can occur at differing times, depending on radiation dosing, field size, and beam energy, among others. Weighing benefits against possible adverse effects is imperative in treatment plans for all patients.

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MANUAL LYMPH DRAINAGE VODDER IN TREATING BREAST CANCER RELATED AXILLARY WEB SYNDROME IN CHINESE POST-OPERATION BREAST CANCER PATIENTS

Tianhao Gao, and Rongrong Lu

CASE DIAGNOSIS: Axillary web syndrome (AWS) is one of the common complications after breast cancer operation but was always be ignored. AWS is characterized by the presence of a visible and palpable stretched band under the skin which is taut and painful during shoulder flexion or abduction. Although most of the AWS patients would be automatically cured in one year, but their activity of daily life would be affected severely during the year. More importantly, the decreased range of motion of the affected shoulder would delay the timing of radiotherapy. And this would affect the prognosis of these post-operation patients. So it is urgent to treat breast cancer related AWS in post-operation breast cancer patients. But there existed no definite training for AWS. In this study, we want to introduce a manipulation which might improve AWS related pain and decreased range of motion of the shoulder.

CASE DESCRIPTION: This is a before-after study. 8 post-operation breast cancer patients with AWS were admitted in this study. Disease duration of these patients was less than 2 months. They both had pain of the affected upper extremity and decreased range of motion of the shoulder. Before the treatment, the assessment we did were listed as follows: bilateral Stammer sign, Pitting sign and arm circumference. The arm circumference was measured at 5 points, namely amputt, fossa cubitalis, 10cm above and below fossa cubitalis, and the transverse crease of the wrist. The active abduction range of motion of the affected shoulder was also assessed and VAS score was recorded at the maximal abduction and external rotation range of motion. The intervention was based on manual lymph drainage Vodder. It was divided in several parts. Basic therapy+Abdomen therapy+ Reroute. At last, the stretch of the cord in the region of axilla or antecubital fossa.

DISCUSSIONS: The Stammer sign and Pitting sign were both negative before and after intervention. No significant difference of the arm circumference was observed before and after intervention. The active range of motion of the affected shoulder was increased by 15%. And average VAS score was decreased by 3 points. All the patients could tolerate the intervention and they had good compliance. These Results that after the intervention, no obvious edema occurred, pain decreased and active range of motion of shoulder increased dramatically. After the intervention, they could receive the radiotherapy.

CONCLUSIONS: Manual lymph drainage Vodder is feasible and effective in breast cancer related AWS in post-operation breast cancer patients. The active range motion of the affected shoulder would be increased in a short time. This is very important in those patients who had urgent needs for radiotherapy but were disrupted by the limited range of motion of the shoulder. But we still need randomized controlled trial to better confirm the effectiveness of this therapy. And the long-term occurrence rate of lymphedema is also needed to be compared in patients receive or not receive this therapy.

MARKED IMPROVEMENT WITH THE USE OF PERIPHERAL NERVE STIMULATOR AFTER 3 YEARS OF POST-AMPUTATION PAIN

Soojin Kim, and Conley J. Carr, MD

CASE DIAGNOSIS: Acquired left, transhumeral amputation as a result of a work-related injury.

CASE DESCRIPTION: A 69-year-old male, s/p left, transhumeral amputation from work-related trauma in 2015, first came to the amputation clinic in May 2016.
Since 2015, the patient had been using myoelectric prosthesis to improve self-care activities and quality of life. However, his pain limited the prosthetic wear time. The patient complained of phantom sensation of the left upper extremity, reporting residual limb pain. Despite the use of non-steroidal anti-inflammatory drugs, aspirin, gabapentin, baclofen, duloxetine, Botex injection, Otena, trigger point injection with Kenalog, and physical and psychological therapies, the patient’s pain remained at 10 out of 10. In 2019, the patient tried SPRINT peripheral nerve stimulator (PNS) system, which lowered his pain to 5 out of 10. With this significant improvement, he plans to continue the therapy until he becomes pain-free.

DISCUSSIONS: Many post-amputation patients experience neuropathic pain, such as phantom or stump pain. However, neuropathic pain continues to be challenging to manage and negatively affecting functional outcome and quality of life for the patients. Despite many attempts, the conventional therapies have demonstrated limited efficacy in managing the pain, as shown in this patient. The reversible, percutaneous, ultrasound-guided PNS therapy, which poses less complications and is less invasive and costly compared to other neuroromodulators, suppresses nociceptive nerves. After years of suffering from the post-amputation pain, the patient finally experienced a great relief from the PNS therapy.

CONCLUSIONS: Our patient presented with unresolved post-amputation pain on the left upper extremity. After three years of trials in oral and topical medication and trigger point injection, the patient’s pain finally experienced a significant relief from PNS implant. The outcome of PNS therapy for post-amputation neuropathic pain is promising and those suffering from neuropathic pain may benefit significantly from the therapy.

MAY-THURNER SYNDROME WITH SENSORY AND MOTOR DEFICITS
Jonathan Chapekis, DO, Annette Lukose, MD, Yosiki Takeyama, Michael Khalil, OMS-4, and Susan Stickevers, MD
CASE DIAGNOSIS: May-Thurner Syndrome.
CASE DESCRIPTION: An 11-year-old female presented to the ED with severe left calf pain, left lower extremity swelling, and inability to ambulate. There was no history of trauma. PM&R was consulted for patient’s inability to ambulate. Physical examination revealed decreased left lower extremity strength in the knee flexors, plantar/dorsiflexors and inverters/evertors. Sensory deficits were noted on the dorsum and the sole of the foot and the lateral aspect of the calf. The patient was unable to tolerate weightbearing on the left leg due to pain. Venous duplex ultrasound revealed thrombosis of left saphenous vein and left superficial femoral vein. CT abdomen/pelvis with IV contrast revealed focal compression of the left common iliac vein by the right common iliac artery, consistent with May-Thurner Syndrome (MTS). The patient was treated with therapeutic Enoxaparin. Her motor and sensory deficits improved. Follow-up in clinic was scheduled upon discharge. The patient’s mother refused EMG testing.

DISCUSSIONS: MTS is an anatomic variant in which the left common iliac vein, when crossing over to the right side at the L5 level, is compressed by the right common iliac artery, resulting in symptomatic venous occlusion in the left lower extremity. The increased venous pressure can lead to swelling, claudication, and sciatic nerve compression. The incidence of MTS may be as high as 22-32% and the condition is three times more common in women than in men. It is important to identify MTS because it is often under-detected and the syndrome can result in re-occurrence of DVT or iliac vein rupture.

CONCLUSIONS: Clinicians should have clinical suspicion for MTS when young females present with left lower extremity swelling or DVT. Sensory and motor deficits related to sciatic nerve compression associated with MTS usually resolve with anticoagulation and conservative management.

MCL TEAR IN THE RESIDUAL LIMB OF A PRIOR BELOW KNEE AMPUTATION DIAGNOSED ON BEDSIDE ULTRASOUND: A CASE REPORT
Steven J. Mann, MD, Sarah Gaballah, MBBCCh, and Susan Stickevers, MD
CASE DIAGNOSIS: MCL tear in the residual limb of a patient with a prior BKA due to improper prosthetic engagement, diagnosed on bedside ultrasound examination.
CASE DESCRIPTION: 76-year-old Female with a history of diabetes mellitus and peripheral vascular disease, and status-post Right transfibial below knee amputation secondary to gangrene. She received her permanent transfibial patella tendon bearing prosthesis with a K2 foot at 14 months post amputation. 1 month later she presented to ED with acute right knee pain and swelling following a fall at home after failing to fully engage the shuffle-lock mechanism of the prosthesis. Knee XRay revealed no fracture. She was unable to don the prosthesis due to edema. Ultrasound evaluation after the right knee revealed a partial thickness tear of the Medial Collateral Ligament and possible tear of the medial meniscus. She underwent a corticosteroid injection and was advised to wear a shrinker. Swelling resolved after 1 month, however the prosthesis alignment required multiple readjustments before she was comfortable ambulating again.

DISCUSSIONS: Patients with transtibial amputations are at risk of developing structural injuries to the intact joint in the residual limb. Failure to completely engage the patella tendon bearing prosthesis puts the joint at further risk. Physical examination of the knee in these patients can be challenging, as numerous studies have demonstrated the unreliability of standard provocative maneuvers such as varus stress, valgus stress, and Lachman (posterior drawer testing is considered most reliable). Some authors have suggested the use of radiographic imaging to help diagnose injury to the collateral ligaments, however application is limited. Bedside ultrasound evaluation of the residual limb, when available, is a useful imaging modality to aid diagnosis.

CONCLUSIONS: Improper engagement of a below knee prosthesis will put the knee joint at risk of structural injury. Bedside ultrasound is a useful diagnostic tool when evaluating injury in residual limb.

MEDIAL FOOT PAIN IN AN IRISH STEP DANCER: A CASE REPORT
Carolyn Black, MD, PhD, and Lauren Eison, MD
CASE DIAGNOSIS: Exercise induced muscle damage and delayed onset muscle soreness of the abductor hallucis.
CASE DESCRIPTION: A 24 year old female dancer returned to competitive Irish step dancing after a 3 year break. She developed pain in her medial left foot the day after her first dance class, which she treated by “rolling out” her foot on a lacrosse ball. The following day she had difficulty weight-bearing due to pain and presented to sports medicine clinic. Her exam was notable for pain with passive dorsiflexion and active toe abduction, as well as swelling of the posteros medial arch of the left foot. MRI demonstrated significant swelling and edema within the abductor hallucis muscle. She was diagnosed with exercise induced muscle damage (EIMD) and delayed onset muscle soreness (DOMS) of the abductor hallucis. She was managed with NSAIDs and ice for pain. She rapidly recovered and returned to Irish step within several weeks.

DISCUSSIONS: Unaccustomed repetitive eccentric loading can cause exercise induced muscle damage. Eccentric contraction of the abductor hallucis muscle along with the flexor digitorum brevis provides an important damping effect in the foot during activities requiring rapid deceleration. Dancers such as our patient experience repetitive eccentric loading of foot intrinsic musculature due to the nature of the step movements and jump landings, which can increase their risk of EIMD and DOMS. Massage is an evidence-based technique for promoting recovery from DOMS, however in this case, we believe an overly-aggressive approach to self-massage contributed to her pronounced tissue edema and worsening symptoms.

CONCLUSIONS: Injuries of the foot are common in dancers. Exercise induced muscle damage in the intrinsic muscles of the foot should be included in the differential for foot pain in this group of athletes. Although self-massage is one of the techniques used to improve muscle recovery, overly-aggressive massage may worsen tissue edema and DOMS.

MEDICAL REHABILITATION PERSPECTIVES OF 2019 BANGLADESH BUILDING FIRE
Taslim Uddin, MBBS, FCPS, Md. Israt Hasan, MBBS, MD, Fatema Nezvaz, MBBS, FCPS, Syed Mozaffar Ahmed, MBBS, FCPS, PhD, Hasan Habibur Rahman, MBBS, MD, and Md Atiquzzaman, MBBS, MD
CASE DIAGNOSIS: Building collapse and fire both having significant health impacts with loss of lives and injuries. This report represents rehabilitation perspectives of 2019 Bangladesh building fire survivors, victims of burn and associated musculoskeletal injuries with an analysis of capacity building at low resource austere situation.
CASE DESCRIPTION: An observational analytic study done during April-July 2019 at an urban based military general hospital. This hospital was the closest to the fire affected tower building and the authors are the regular employees of the hospital who attended the patients mostly on voluntary basis.
DISCUSSIONS: The death caused death of 26 people and another more than 100 injuries. Medical records of 54 patients were examined where 27 patients were admitted through emergency. Among these about 50% of the victims were with smoke inhalation injury and other cases were with musculoskeletal injuries including limbs bone fracture, nerve injuries, spinal cord injuries and one amputee. 21 cases were consulted by rehabilitation physicians. Lack of preparedness for evacuation and immediate rescue response, scarcity of trained personnel and rehabilitation facilities, triage and shortage of rehabilitation equipments were found.
CONCLUSIONS: Building fire is an emerging disaster that is unlike other natural disasters presents with smoke inhalation, burn- thermal injuries and...
musculoskeletal injuries. WHO EMT and national disaster preparedness team guided acute care rehabilitation professionals in adequate number is required to face such future building fire events. lessons from 2013 Savar building collapse, 2015 Nepal earthquake and 2017 Bangladesh landslide may be utilized to work out the ways of facing the large scale humanitarian disasters.

MENORRHAGIA IN A POST-MENOPAUSAL WOMAN AFTER LUMBAR EPIDURAL STERROID INJECTION

Anita Tewari, MD, and Gerardo Miranda-Cornas, MD

CASE DIAGNOSIS: Epidural Steroid Injection-Induced Menorrhagia.

CASE DESCRIPTION: A 54-year-old post-menopausal female with diabetes and hypertension presented to our outpatient clinic with four months of constant, sharp low back pain. Her pain radiated down the lateral side of her left leg and was associated with tingling in that distribution. It worsened with prolonged sitting and standing, with no noticeable alleviating factors. She denied any bowel or bladder incontinence or saddle anesthesia. She was on gabapentin, which was providing minimal relief, and failed other conservative measures, including several oral NSAIDs and physical therapy. Her history, physical exam, and imaging were consistent with a left L5 radiculopathy and she underwent an uncomplicated left L5 transforaminal epidural steroid injection (ESI), using 1 cc each of dexamethasone and 0.25% bupivacaine. Although her back pain improved, she developed painless menorrhagia within three days of the injection. She did not report any other associated symptoms. The menorrhagia subsided without intervention after one month.

DISCUSSIONS: Menstrual dysfunction, although rare, can occur in post-menopausal women after steroid injections. In the post-menopausal population, it is important to consider the possibility of similar adverse effects as well. The above patient experienced bleeding for several days, which was concerning as she was post-menopausal. This prompted her to see her gynecologist, who was prepared to start an extensive work-up, including screening for endometrial cancer. After mentioning that she had received an ESI, her gynecologist then felt it was safe to see if the bleeding would resolve on its own, as administering steroids could be a cause. Had the patient not mentioned this, she may have undergone unnecessary testing.

CONCLUSIONS: Although an uncommon side effect from a relatively common procedure, it is important to educate both pre and post-menopausal women about potential menstrual dysfunction from epidural steroid injections.

MOBILIZATION STATUS OF DIABETICS VERSUS NON-DIABETICS AFTER BELOW KNEE AMPUTATION: A COMPARISON

Poonji Gupta, MBBS MS

OBJECTIVES: Mobility following below knee amputation has direct impact on quality of life. Early and independent mobilization develops confidence in below knee amputee. This helps the patient to become psychologically, socially and economically independent. We compared mobilization status of diabetics versus non-diabetics amputees. We also prepared a note of type of supports used and duration of prosthetic usage by both the groups postoperatively.

DESIGN: The study is prospective and retrospective observational study. A total of 144 below knee amputates using various supports for mobilization were included. 63 were diabetics and 81 non diabetics. They were followed for a minimum period of 1 year. On follow up they were observed for the type of support used for mobilization.

RESULTS: Of 144 amputees, 92 patients initially used crutches for mobilization. 40 patients used walker, 7 used wheelchair and 5 remained bed ridden before they died. It was observed that of 92 patients who were using crutches, 22 were in diabetic group and 70 in non-diabetic group. 31 patients of diabetes and 9 patients of non-diabetic group used walker. 5 in diabetic group and 2 in non-diabetic group could mobilize only on a wheelchair. 104 patients started using prosthesis for mobilization once their stumps had healed adequately. Of 104 prosthesis users, 43 were using it for less than 6 hours per day, 55 were using 6-12 hours per day and 6 patients were using it for > 12 hours per day.

CONCLUSIONS: Non diabetics preferred crutches and prosthesis for mobilization in comparison to diabetics. More diabetics were bedridden or on wheelchair after one year. On follow up they were observed for the type of support used for mobilization.

MUCOID DEGENERATION OF THE ANTERIOR CRUCIATE LIGAMENT: CASE REPORT OF A YOUNG BASKETBALL PLAYER

Nedra Elfani, Doctor, Soumaya Elarem, Doctor, Mariam Gaddour, Doctor, Emma Toulgui, Doctor, Walid Ouanes, Professeur Agroce, Sonia Jenmi, Doctor, and Faycal Khachnoussi, Professor

CASE DIAGNOSIS: Mucoid degeneration of the anterior cruciate ligament (ACL) is a little-known pathology. This infiltrating lesion is included in the mucoid pathology of the intercondylar fossa.

CASE DESCRIPTION: A 18-year-old female competitive Basketball player presented since 6 months a pain in the back of the left knee upon flexion of the knee joint. The range of motion was limited from 0 to 90° with flexion terminal pain and the rest of the examination was without particularity. Magnetic resonance imaging (MRI) of the left knee showed a cystic formation oblong the ACL and well limited at the level of its femoral insertion with bulging in the intercondylar indentation of 24 mm of major axis. The arthroscopic exploration made it possible to objectively and reset the mucoid cyst at the level of the ACL. The evolution was marked by the disappearance of the pain after 15 days and the recovery of the articular amplitudes.

DISCUSSIONS: They mucoid cysts of the knee are neofomed cystic formations. These cysts are frequently silent. When they become symptomatic; they cause progressive pain, worsening with time and often posterior in the popliteal fossa. These deep swellings are frequently associated with a limitation of flexion or extension, sometimes with episodes of blockage. MRI is the best test for positive diagnosis and associated lesions. Arthroscopic resection remains the method of choice, given its mini-invasive character, good results on pain and joint mobility and the rate of recidivism which is zero for most authors. It also makes it possible to treat the associated lesions.

CONCLUSIONS: Mucoid degeneration of the ACL should be suspected in patients presenting pain on terminal extension or flexion without preceding trauma. Prior knowledge of condition with high index of suspicion and careful interpretation of MRI can establish the diagnosis preoperatively. Arthroscopic debridement with or without notchplasty gives excellent functional results.

MULTI-DISCIPLINARY IN-PATIENT SUBACUTE REHABILITATION OF PATIENTS WITH SCHIZOPHRENIA

Lena Lutsky, MD, MHA, and Iuly Treger, MD, PhD, MHA

OBJECTIVES: It was well defined, that patients with chronic schizophrenia have reduced life-expectancy and increased risk for physical disorders and injuries. Many schizophrenia patients do not get a non-psychiatric subacute multi-disciplinary rehabilitation due to avoidance of rehabilitation system and strong stigma about their low compliance and motivation. According to our data, it took 26:9±20:9 days for those patients to be admitted to rehabilitation ward, in comparison with 10-14 days for non-psychiatric population. We aimed to examine treatment outcomes in a subacute rehabilitation department for schizophrenia patients, and to compare them with no-psychiatric patients.
MUSCLE FUNCTION AFTER RECONSTRUCTION OF THE ANTERIOR CRUCIATE LIGAMENT OF THE KNEE USING DIFFERENT GRAFTS

William Ramos, BS, Brenda Castillo, MD, Belmarie Rodriguez, MD, William Micheo, MD, and Walter Frontera, MD, PhD

OBJECTIVES: To evaluate muscle strength and endurance of knee extensor and flexor muscle groups in patients undergoing rehabilitation after reconstruction of the anterior cruciate ligament of the knee using either the patellar tendon (P) or the hamstring (H) tendon. To compare side-to-side differences in muscle strength and endurance, a commonly used criteria for return to sports, in both patient groups.

DESIGN: A total of 56 patients active in competitive sports (50% females; age range=12-47 yrs; 54% hamstring tendon graft) were evaluated. An isokinetic device was used to measure peak torque of the knee extensors and flexors at an angular velocity of 60 deg/s, on average, 10.7 months post-surgery. Total work was used as an index of local muscular endurance and measured with a 20-repetition test at 240 deg/s. Side-to-side differences (StSD) were calculated for each muscle group as [100 – (x injured/non-injured knee)]. A value >10% was considered as abnormal muscle symmetry.

RESULTS: Of those receiving an H graft, 50% showed muscle strength asymmetry in the knee flexors (mean StSD=13%). A total of 70% of this group showed asymmetry in the knee extensors (mean StSD=18%). Of those receiving a P graft, 31% showed muscle strength asymmetry in the knee flexors (StSD=8%) and 88% in the knee extensors (StSD=43%). In terms of total work, 63% patients with an H graft showed significant StSD in the knee flexors (StSD=25%) and 53% in the knee extensors (StSD=15%). In patients with a P graft 54% and 85% showed significant StSD in the knee flexors (StSD=16%) and extensors (StSD=33%), respectively.

CONCLUSIONS: Muscle dysfunction (weakness and fatigue) is frequent after reconstruction of the anterior cruciate ligament of the knee, even close to one year post-surgery. In general, muscle asymmetry is more significant in the knee extensors compared to the knee flexors independent of the type of graft.

MUSCULOSKELETAL INJURIES IN YOUNG COMPETITIVE DANCERS: A CROSS-SECTIONAL STUDY

Margarida M. Freitas, and Susana Almeida

OBJECTIVES: Dance is a challenging art form requiring years of training for precise motor control, often at the extremes of joint range of motion. It has been found that as many as 60-90% of dancers are injured during their career. These injuries may happen as early as they start their dance education. The strictness of dance training is a potential risk for physical injury in young dancers. This study aimed to assess the prevalence, location, and nature of musculoskeletal injuries among young dancers.

DESIGN: This is a questionnaire-based cross-sectional study that was performed during three national dance competitions in Portugal. Dancers aged 15 or older were invited to complete a questionnaire related to injuries they may have suffered during the previous year (location, etiology); other information collected included demographic data (sex, age, training styles and training (training frequency and duration, years since starting to dance).

RESULTS: A total of 86 participants were included. Among all participants, 38 (44%) reported at least one previous injury. The locations of the injuries were the lower limbs (27; 71%), upper limbs (2; 5%), and spine (9; 24%). Significant differences were found in the injury location as well as the nature of the injury and dance modality (p<0.01). No significant differences were found between injured and non-injured dancers in demographic data and number of classes per week.

CONCLUSIONS: Our results showed that a significant number of dancers reported at least one injury, with these being located particularly in the lower limbs and being predominantly strains and sprains. Participants who only practiced ballet had higher injury prevalence compared to others who danced multiple styles or only jazz or contemporary. Prevention programs should be implemented to reduce injury rates. Further research is needed to identify appropriate strategies to protect dancers' health.

MUSCULOSKELETAL ULTRASOUND IN THE DIAGNOSIS AND MANAGEMENT OF SUPERFICIAL PERONEAL NERVE ENTRAPMENT: A CASE REPORT

Daniel T. Kuo, DO, Sun Lee, MD, and Steven A. Makovitch, DO

CASE DIAGNOSIS: Chronic right superficial peroneal nerve (SPN) entrapment neuropathy.

DESCRIPTION: A 68-year-old male with history of lumbar spinal stenosis presented with longstanding right lower extremity pain over the anterolateral aspect of the lower leg. Symptoms were exacerbated with walking. MRI right lower extremity was benign and electrodiagnostic findings were consistent with right L5-S1 radiculopathy without evidence of peroneal neuropathy. Examination revealed ankle dorsiflexion and extensor hallucis longus weakness. Patellar 16 cm proximal to the lateral malleolus reproduced patient’s symptoms. Point of care ultrasound showed focal enlargement of the SPN as it passed through the crural fascia of the leg, correlating with patient’s site of maximal tenderness. The SPN was hydrodissected with lidocaine and corticosteroid, providing complete relief lasting 24 hours. Focal swelling of the SPN was again seen on ultrasound at 1-month follow-up. Hydrodissection was repeated with lidocaine only, again providing immediate relief. Given complete relief of symptoms with two separate blocks, he was sent for consideration of surgical decompression.

DISCUSSIONS: SPN syndrome is an entrapment neuropathy that occurs from compression of the nerve at the point where it pierces the intermuscular fascia, approximately 10-14 cm superior to the lateral malleolus. Patients typically present with pain and paresthesias over the anterolateral aspect of the leg and dorsum of the foot. Examination can reveal soft tissue bulging proximal to the lateral malleolus and worsening of symptoms with palpation over the site of entrapment. Electrodiagnostic studies can demonstrate reduced nerve conduction velocities or present with entirely normal electromyography and nerve conduction studies. Ultrasound can show enlargement of the nerve at the site of compression. Localized nerve block with anesthetic can be used to aid in diagnosis. Conservative management is generally ineffective. Definitive treatment involves surgical decompression of the involved nerve.

CONCLUSIONS: This case illustrates the diagnostic and therapeutic ability of musculoskeletal ultrasound in SPN entrapment.

MYOELECTRIC ORTHOSIS IN TREATMENT OF INDIVIDUALS WITH TRAUMATIC BRACHIAL PLEXUS: A CASE SERIES

Uyen Pham, BS, and Eric Aguila, MD

CASE DIAGNOSIS: Traumatic brachial plexus injuries with root avulsions are debilitating neuromuscular injuries that often result in significant disability and functional limitations, even after traditional surgical reconstruction and traditional rehabilitation methods. Studies have shown that up to 6% of patients with new brachial plexus injuries go on to have an elective amputation.

CASE DESCRIPTION: We present cases of two patients with traumatic brachial plexus injuries with root avulsion that employed the use of myoelectric orthosis as part of their rehabilitation program. Patient 1 is a 42 year old male who sustained a right brachial plexus injury with avulsion of the nerve roots from C3 to T1 following a motorcycle accident resulting in a flail arm. He underwent a bilateral sural nerve grafting of the lateral and medial cord. Patient 2 is a 30 year old male who also sustained a right brachial plexus injury with avulsion of the nerve roots from C5 to C8 also with a flail arm. He underwent neurolaxis of the C5 nerve in December 2018. Myoelectric orthosis uses surface electrodes to pick up a muscles electromyographic (EMG) signal, which are emitted during subclinical muscle contraction and amplifies the signal initiate movement of the robotic components of the orthoses.

DISCUSSIONS: After 90 days, both patients noted slight improvements in muscle contraction and control.

CONCLUSIONS: In conclusion, the use of myoelectric orthosis is a relatively new treatment modality available for patients with brachial plexopathies that...
warrants further study with hopes of providing patients with better functional outcomes in their recovery.

**MYOFASCIAL HERNIATION AS A CAUSE OF EXERTIONAL COMPARTMENT SYNDROME IN RESIDUAL LIMB OF A PATIENT WITH A TRANSTIBIAL AMPUTATION: A CASE REPORT**

Tawnee L. Sparling, MD, David Crandell, MD, and Jeremy Goverman, MD, FACS

**CASE DIAGNOSIS:** Compartment Syndrome Causing Chronic Pain.

**CASE DESCRIPTION:** 56-year-old male with history of left Transtibial Amputation (TTA) who presented with complaints of chronic distal residual limb pain. Exertion and knee extension (KE) worsened symptoms. Prior treatment included multiple surgical and prosthetic revisions, physical therapy (PT), mirror therapy and medications. Spasms and phantom pain improved after EMG-guided Botox and PT-guided E-stim; however, lateral distal pain with activity persisted. Eight years from initial TTA, patient remained impaired, with weight gain and limited prosthetic use. Physical exam revealed a soft, deformable budge at the lateral, distal thigh with active KE. CT imaging revealed no obvious pathology. In clinic, under local anesthesia, patient underwent surgical exploration for direct visualization during active KE. Herniation of anterior thigh musculature was noted through muscle fascial openings. Myotomy and fasciectomy were performed. Post-operatively, exertional pain had nearly resolved. He was weaning off opioids and using his prosthesis >8hrs daily.

**DISCUSSIONS:** This case presents an atypical etiology for a patient with chronic residual limb pain. Compartment syndrome is defined as increased pressure within a muscle compartment causing pain. In this patient, it was secondary to myofascial herniation which is a rare cause of chronic leg pain and is associated with focal fascial sheath defects. To date, there has been little to no published literature on residual limb muscle hernias. Given multiple, common etiologies for his pain, it took many years to correctly diagnose this patient, ultimately requiring direct surgical visualization. Post-treatment, he could more fully resume rehabilitation, exercise, prosthetic use and decrease his impairment.

**CONCLUSIONS:** Although this case identifies a rare etiology for chronic pain following lower extremity amputation, myofascial herniation must be considered in the differential for atypical residual limb pain and questions should be asked regarding exertional symptoms or triggers. Fasciotomy and physiastic prosthetic management provide definitive treatment.

**NECROTIZING MYOSITIS, A CASE REPORT**

Caroline Lee, MD, Sarah Gaballah, MBMBCH, and Marcel Bayol, MD

**CASE DIAGNOSIS:** Necrotizing auto-inflammatory myopathy (NAIM) is a rare disease that was previously classified as an inflammatory myopathy. Patients present with symmetrical proximal muscle weakness, creatinine kinase (CK) levels up to 50x the upper limit of normal, histologically with myofiber necrosis with regeneration and paucicellular lymphocytic infiltrate, and electromyographically with active myopathic units. Recent studies have shown correlations with anti-Signal Recognition Particle (SRP), anti-3-hydroxy-3-methylglutaryl-coenzyme A reductase (HMGR-CR) antibodies and disease activity, and therapies such as statin use, infections, or cancers.

**CASE DESCRIPTION:** A 52 year old female from Guyana with no significant past medical history presented with progressive proximal muscle weakness over a three month period. The patient had become so debilitated that she was dependent on a wheelchair for mobility. On admission, the patient was found to have an elevated CK and myopathy work-up was initiated. MRIs were negative for spinal cord compression but did demonstrate edematous changes in bilateral proximal muscles. The patient was started on steroids and IVIG. Muscle biopsy was consistent with necrotizing autoimmune myopathy and the Anti-SRP antibody was positive. Unfortunately, the patient did not respond well to steroid therapy and immunosuppressant therapy was added. The patient was transferred to acute inpatient rehabilitation unit for continued care.

**DISCUSSIONS:** Only 300 cases of NAIM have been reported in the United States. The discovery of the anti-HMGCR and anti-SRP antibodies were crucial in the diagnosis and stratification of NAIM. As these diseases present similarly, patients with inflammatory myopathies and muscular dystrophies refractory to conventional treatments should be evaluated for NAIM.

**CONCLUSIONS:** Physiatry is in a unique position to advocate for such testing while coordinating services and monitoring functional status. As such, this rare but treatable disease should remain on the differential diagnosis for every physiatrist treating neuromuscular disorders.

**NERVE INJURIES RESULTING FROM DOG BITE TO THE ELBOW: A CASE REPORT**

Sonia Thakur, MBBS, Ramzi A. El-Hassan, MD, MS, and Jennifer Paul, MD

**CASE DIAGNOSIS:** Complete median antibrachial sensory neuropathy and chronic partial median nerve injury in a dog trainer after a severe dog bite injury to the left elbow.

**CASE DESCRIPTION:** A 48 year old female presented to our outpatient PM&R clinic for evaluation of left forearm pain which had been ongoing since past two years, since a dog bite to the left elbow. She was found to have traumatic arthroscopy and a large soft tissue defect over the left antebrachial fossa, for which she underwent surgical debridement, washout and closure. Eventual work up included electromyography (EMG) and nerve conduction studies (NCS). Initial findings at 11 months were consistent with complete left median antibrachial cutaneous (MABC) neuropathy and chronic partial median nerve injury. The chronic partial median nerve injury showed evidence of reinnervation. In addition, the findings remained the same on the repeat EMG/NCS studies at 30 months. Notably, starting gabapentin allowed partial relief of neuropathic pain.

**DISCUSSIONS:** To our knowledge this is the first reported case of a complete MABC nerve injury caused by a dog bite. In this case, the severe soft tissue injuries made differentiating the cause of her weakness and ongoing pain challenging, as her symptoms could have been caused by chronic inflammation due to muscle injury or direct nerve injury. The prognosis for recovery of her left MABC nerve was noted to be poor as there was no axonal continuity months after the injury. However the prognosis for further recovery of the left median nerve remained encouraging due to normal nerve function and response amplitudes and evidence of ongoing reinnervation on needle examination.

**CONCLUSIONS:** This case demonstrates the utility of electrodiagnostic studies in differentiating the cause of persistent pain after severe traumatic peripheral soft tissue injury. Electrodiagnostic evaluation not only insured conclusive evidence towards diagnosis but also helped direct patient care and expectations.

**NEUROMUSCULAR ULTRASOUND TO IDENTIFY METASTATIC DISEASE IN DIFFUSE LARGE B-CELL LYMPHOMA AFTER AN ATYPICAL EMG: A CASE REPORT**

Jacob Christiansen, DO, Daniel Cushman, MD, Colby Hansen, MD, and Benjamin Brown, MD

**CASE DESCRIPTION:** A 69-year-old male with a history of DLBCL presented for an electrodiagnostic evaluation for a suspected length-dependent polyneuropathy, in addition to right wrist and finger extension weakness of around 4 months duration. He had undergone chemotherapy without radiation and developed these symptoms towards the end of his treatment course. A PET scan at the completion of chemotherapy showed resolution of his cancer. The EMG was complex with an axonal peripheral polyneuropathy with a mononeuritis multiplex affecting the radial and median nerves. An ultrasonographic examination was later performed on the right upper extremity. The radial nerve showed significant enlargement and a hypoechoic circular appearance just proximal to the elbow. The median nerve near the distal humerus was notable for similar thickening and hypoechoogenicity. The nerves within the brachial plexus were unremarkable, but an ovoid structure with a central hypoechoic focus and hypechoic casing was identified near the C5 nerve root.

**DISCUSSIONS:** Neuromuscular US examination in situations of possible cancer workup is not commonly used. This case demonstrated the utility of neuromuscular ultrasound examination in the evaluation of a patient with DLBCL who presented with atypical electrodiagnostic findings, which unfortunately demonstrated recurrence and metastatic spreading of the DLBCL.

**CONCLUSIONS:** This case demonstrates the diagnostic value of neuromuscular ultrasound in the setting of a patient with multifocal electrodiagnostic findings. In the setting of patients with a history of cancer and atypical electrodiagnostic findings, neuromuscular US should be highly considered.

**NEW DIAGNOSTIC APPROACH FOR LATERAL EPICONDYLITIS: ULTRASONOGRAPHY-GUIDED INTRATENDINOUS INJECTION: A CASE OF COMMON EXTENSOR TENDON TEAR MISDIAGNOSED AS CALCIFIC TENDINITIS**

Seon ilyul Hwang, MS, Kyung Cheon Kim, PhD, Woo-Yong Lee, PhD, and Sang Yong Kim, MD

**CASE DIAGNOSIS:** Lateral epicondylitis (LE) is the most common cause of elbow pain. There are many possible causes that may occur lateral elbow pain. Inaccurate diagnosis of structural lesion of elbow is the key to appropriate treatment lead to early recovery of the symptoms. In this case, we would like to introduce a case of refractory elbow pain which once was considered as calcific tendinitis and later was
diagnosed with the hidden intratendinous tear of common extensor tendon (CET) by ultrasonography (US)-guided intratendinous injection.

CASE DESCRIPTION: In this case report, a 53-year-old man had a 5-month history of refractory right lateral elbow pain, who was originally referred with a diagnosis of LE as a result of a calcific tendinitis, presented to the clinic for treatment. His epicondylalgia symptoms which did not respond favorably to the previous conservative treatment. The radiographs showed calcific tendinitis on CET. On the ultrasonographic evaluation, there’s an observation of calcified lesion with posterior shadow, and ambiguous lesion of common extensor tendon in adjacent area to posterior shadow. After informed consent was provided, US-guided 0.2% lidocaine injections were performed into ambiguous lesion with amount of 0.4ml revealed intratendinous tear lesion was full of injection and appeared in the posterior shadow. To prevent pressure-gradient tendon injury, injection were regorged to the syringe, repetitively.

DISCUSSIONS: Previous studies of LE focused more on the thickness, edema and hypochoegenicity of CET. But this case shows hidden intratendinous tear lesions inferior to the calcific tendinitis was diagnosed by US-guided intratendinous injection. And, US-guided intratendinous injection can be accurate and useful detecting method in diagnosis of small, uncertain intratendinous tear can be overlooked by usual ultrasonographic exam.

CONCLUSIONS: This case emphasizes that US-guided intratendinous injection is a novel method for accurate diagnose small or ambiguous intratendinous tear lesion in CET.

NON-NEUROLOGICAL URINARY INCONTINENCE IMPACT ON SEXUALITY AMONG TUNISIAN WOMEN

Soumaya Boudokhane, Professeur Agrege, Anis Jalled, Professor, Migaou Houda, Professeur Agrege, Nedra Elfani, Doctor, Soumaya Boudokhane, Professeur Agrege, Anis Jalled, Professor, and Zohra Ben Salah, Professor

OBJECTIVES: Our study aimed to evaluate the impact of non-neurological urinary incontinence on sexuality among Tunisian women.

DESIGN: This was a cross-sectional descriptive study involving women with non-neurological urinary incontinence followed at the urodynamic unit at the Physical Medicine and Rehabilitation department of the University Hospital of Monastir over six months. The analyzed data focused on the epidemiological and clinical characteristics. We used a validated questionnaire to evaluate sexual function: the Female Sexual Function Index (FSFI) and for symptoms: Urinary symptom profile (USP).

RESULTS: Fifty women with an average age of 51 years were included. Women were diabetic in 24%. The most frequent symptom was urgency in 76%. Stress urinary incontinence was found in 64%. The median USP stress urinary incontinence score was 9.3 out of a maximum of 21. The median USP overactive bladder score was 3.5 out of 6. Eighty percent of our patients were sexually active, 73.17% of them have sexual dysfunction (FSFI ≤ 26.55) and 65% reported hyposexual desire; 45% complained of organic deficiency, and 48% suffered from dyspareunia. Sexual dysfunc- tion was negatively correlated with age and urinary stress incontinence. No correlation was found between FSFI, urgency urinary incontinence, dysuria and diabetes.

CONCLUSIONS: The negative impact of urinary incontinence on sexual health is evident in our study and it is rarely discussed by health professionals and patients with urinary incontinence and requires more attention.

NON-SURGICAL MANAGEMENT OF CALCIFIC TENDONITIS: A CASE REPORT

Richard Thai, DO, Ronald Takekno, MD, and Minelli Mehrb

CASE DIAGNOSIS: Calcific Tendonitis of the Right Supraspinatus Tendon.

CASE DESCRIPTION: A 73-year-old male with hypertension and type 2 diabetes presented to clinic for six months of right shoulder pain. He reported the pain was over the superior lateral aspect of the right shoulder. Physical exam revealed positive impingement signs and empty can. Right shoulder X-ray showed a large calcific deposit near the supraspinatus tendon. The patient failed conservative measures and wanted a different treatment. With sterile technique and ultrasound guidance, we injected 3cc of 1% lidocaine into the supraspinatus tendon with an 18-gauge needle. Thereafter, 3cc of 1% lidocaine and 40mg of depomedrol was placed into the subacromial bursa. Three more treatments were performed with resolution of symptoms.

DISCUSSIONS: Calcific tendonitis is a relatively common disorder that can be asymptomatic in some people but for others it can result in debilitating shoulder pain. Impingement syndrome of the shoulder is often implicated in calcific tendinitis. The diagnosis can be made with a thorough history, physical exam, and imaging. Initial management involves non-steroidal anti-inflammatory medications, physical therapy, and modalities such as extracorporeal shock wave therapy. Refractory cases can be treated with interventions including ultrasound guided needle lavage or barbotage. Arthroscopic surgical decompression may also be considered. For this patient, we offered a referral to orthopedic surgery, but he declined and preferred trial of ultrasound guided barbotage. We provided a total of four treatments over the span of two years. After each treatment, the patient’s pain, symptoms and function improved significantly. Follow-up imaging revealed resolution of the calcific deposit.

CONCLUSIONS: Calcific tendonitis is a common etiology of shoulder pain. Initial management involves medications, physical therapy, and extracorporeal shock wave therapy. When conservative management fails, ultrasound guided needle barbotage is an excellent treatment option.

NOVEL TREATMENT APPROACH FOR INTRACTABLE POST-MASTECTOMY PAIN SYNDROME: A CASE REPORT

Anita Garg, DO, and Ashish Khanna, MD

CASE DIAGNOSIS: Post-mastectomy Pain Syndrome (PMPS).

CASE DESCRIPTION: A 43-year-old female with bipolar disorder and BRCA + breast cancer who underwent bilateral mastectomy with tissue expander reconstruction. Following one year of severe left chest wall pain the implants were removed and referred to cancer pain clinic. Two years later referred to pain clinic with persistent left chest wall pain. Patient underwent cervical barbotage, follow-up imaging revealed intratendinous tear in common extensor tendon (CET) and ambiguous lesion of common extensor tendon in adjacent area to posterior shadow. On initial evaluation, she presented with constant, “throbbing,” 10/10 left lateral chest pain with radiation down to the forearm despite conservative measures including medications and outpatient cancer treatments. Pain was exacerbated with activity and shoulder abduction. Physical examination revealed exquisite alldynia over axilla and chest wall along with pectoralis spasm and limited upper limb range. She underwent a series of four serratus plane and intercostobrachial nerve blocks along with onabotulinumtoxinA injection to the pectoralis muscle, resulting in 70% pain relief.

DISCUSSIONS: PMPS is a neuropathic and musculoskeletal pain syndrome concerning the ipsilateral axilla, medial arm, breast, and chest wall for greater than 3 months following surgery for breast cancer. The prevalence is fairly high at 20-68%, however, only 1-2% present with intractable PMPS as seen with this case. It is thought that this syndrome is partially related to nerve injury during surgery, where the risk is particularly increased with reconstruction. Treatment strategies of PMPS include specialized physical therapy including myofascial release and neuropathic and nociceptive pain medications. Although lacking strong evidence, procedures such as intercostal nerve and serratus plane blocks for neuropathic pain, and botuli- nux toxin injections for focal dystonia, should be considered. In this case, these procedures were the only treatment option that benefited the patient.

CONCLUSIONS: This case emphasizes the valuable use of intercostal nerve and serratus plane blocks as well as botulinum toxin injections for pain due to PMPS. This is particularly useful in patients with intractable PMPS who do not have relief from aggressive therapies or medications.

NPY AND COMT PAIN-RELATED SNPS: ASSOCIATION WITH LUMBAR SPINAL STENOSIS PATIENT EXPERIENCE AND TREATMENT OUTCOMES

Sara Ernst, MD, Wan Huang, MD, PhD, Yvette Conley, PhD, Nam Vo, PhD, Michael Schneider, PhD, and Gwendolyn Sowa, MD, PhD

OBJECTIVES: Lumbar spinal stenosis (LSS) is a debilitating disorder with limited capacity for predicting individual response. Recent advances in pain research have identified several genetic polymorphisms associated with treatment-response variability. Neuropeptide Y (NPY) encodes a neuronal protein which may confer resilience in coping with pain. A common variant in the promoter region has been associated with decreased levels of NPY expression. Numerous works have also implicated a functional variant allele, Val158Met, in the COMT gene with decreased functionality and increased susceptibility to chronic pain syndromes. The objective of this study was to examine the association of genotypes for either NPY (rs16147) or COMT (rs4680) with clinical outcomes during treatment for LSS.

RESULTS: Patients with radiographic and clinical LSS were recruited from a study which randomized patients age 60+ years into three treatment groups: usual medical care, community-based group exercise, or clinic-based individualized exercise and manual therapy. Patient data collected at baseline included BMI, demographics, depression score, back and leg pain, Swiss Spinal Stenosis questionnaire, and performance on a self-paced walking test. Saliva was obtained for polymorphism genotyping (NPY rs16147 and COMT rs4680). Patients received treatment for 6 weeks, and outcome measures were collected at 8-weeks and 6 months.

DISCUSSION: Subjects with the NPY TT genotype exhibited higher baseline symptoms severity (22.02 vs 19.98 and 19.20 for the CT and CC genotypes respectively) but also a higher likelihood of reduced symptoms in response exercise-based treatment. Subjects with the COMT GG genotype also exhibited higher baseline symptoms severity. The role of NPY and COMT polymorphisms in response to LSS treatment requires further research.
severity (21.31 vs 19.58 and 19.84 in AG and AA genotypes respectively) and a higher likelihood of reduced symptoms in response to exercise-based treatment.

**CONCLUSIONS:** NPY rs16147 and COMT rs6680 are important potential factors associated with response to exercise-based therapies as well as baseline pain and functionality in older adults with lumbar spinal stenosis.

**OFFLOADING ONLY AS A MEANS OF MANAGEMENT OF NEUROPATHIC ULCERS: A CASE SERIES**

Aradhana Shukla, MD, PMR, and Anil K. Gaur, DPMR, DNB-PMR, MBA

**CASE DIAGNOSIS:** Neuropathic ulcers result from repetitive trauma to hypopsonate distal extremities usually on weight-bearing bony prominences which are seen in patients with diabetes, leprosy, spinal dysraphism, etc. The physical examination of an uncomplicated foot ulcer typically shows peripheral pulses to be intact, but sensation is diminished or absent near the ulcer. Ulcers are most frequently located on bony prominences of the plantar metatarsals, midfoot, or heel. Ulcers usually have regular borders and exuberant surrounding callus formation.

**CASE DESCRIPTION:** Repeated weight bearing on the insensitive and deformed part leads to skin breakdown, subsequent infection and chronic ulceration. We describe a case series of 4 cases where thorough debridement and offloading only was used for management of these ulcers with excellent results.

**DISCUSSIONS:** Clinically ulcers vary in their appearances and presentation in every patient, but pathogenesis stays the same. These ulcers occur rapidly but are usually slow to heal.

**CONCLUSIONS:** As new dressings, orthotic management and various alternate ways of treatment of these ulcers are described, the best way and crux of treatment remains the offloading. When prescribed and followed diligently it proved to be the single most effective factor in treating chronic neuropathic ulcers even can prevent unfortunate risks of amputations.

**ONE GRAVE COMPLICATION: GRAVE’S DISEASE OR TSH-OMA?**

Gabrielle Abissi, MD, and Christine Greiss, DO

**CASE DIAGNOSIS:** Pituitary apoplexy causing secondary adrenal insufficiency.

**CASE DESCRIPTION:** A 52 year old female with untreated Grave’s Disease presented with nausea, vomiting, fever and headaches was found to have a hemorrhaging pituitary adenoma on CT scan requiring emergent transphenoidal resection. She was found to have adrenal insufficiency and admitted to acute inpatient rehabilitation for proximal muscle weakness after steroid treatment.

**DISCUSSIONS:** Pituitary macroadenomas can potentially lead to apoplexy, a condition in which the tumor extensively hemorrhages amidst the surrounding structures. Endocrinopathies, such as the inability to secrete ACTH, can lead to insufficient cortisol and aldosterone production. This results in oral steroid intervention to avoid electrolyte abnormalities such as hyperkalaemia and hypotension. In this case, the pituitary macroadenoma was excreting thyrotropin stimulating hormone, resulting in a rise in both serum TSH and free T4 levels; clinically mimicking Grave’s Disease. As a result, it is unclear whether there is a secreting adenoma (TSH-oma) or an underlying thyroid condition. In rare cases, less than 1% of patients with hyperthyroidism warrant a CTH to rule out pituitary adenoma, particularly in patients who have an underlying endocrine disorder.

**CONCLUSIONS:** Diagnosis and early intervention of TSH-omas may prevent neurological and endocrinological complications. Pituitary apoplexy resulting in secondary adrenal insufficiency requires treatment with steroids, which can lead to myopathy. In order to avoid complications of chronic steroid use, patients with recurrent headaches and a prior diagnosis of an endocrinopathy, should undergo further workup to investigate for a pituitary tumor.

**OPIOID THERAPY FOR CHRONIC PAIN: CHARACTERISTICS OF PATIENTS ATTENDING A CHRONIC PAIN CLINIC IN ONTARIO, CANADA**

Amanda McIntyre, PhD (C), Swati Mehta, PhD, Jerome Iruthayarajah, MSC, Shannon Janzen, MSC, Danielle Vanderlaan, BSC, Eldon Loh, MD, and Robert Teasell, MD, FRCP

**OBJECTIVES:** The objective was to characterize patients in a chronic pain population by examining whether biopsychosocial characteristics differ among individuals based on morphine equivalent dose (MEQ).

**DESIGN:** This cross-sectional study recruited individuals from a chronic pain clinic in Ontario, Canada. The following data/outcome measures were collected: sociodemographics, clinical health information (MEQ), Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder 7 item (GAD-7), Pain Disability Index (PDI), Brief Pain Inventory short form (BPI), CAGE substance abuse screening tool, Anxiety Sensitivity Index (ASI), and Acceptance and Action Questionnaire (AAQ).

**RESULTS:** Differences between four MEQ groups (0, 1-89, 90-199, > 200) were compared using one-way ANCOVAs for continuous variables and Fisher’s exact tests for nominal data. Bonferroni-corrected post-hoc tests were conducted as necessary.

**RESULTS:** 218 individuals (140 females) completed the study with a mean age of 52.9±11.9 years and mean time since injury of 14.2±10.3 years. There was no significant difference in age, type of pain, education, living arrangement, use of non-opioid medications or cannabis use between MEQ groups (p < 0.05 for all). Time since injury (p = 0.001), gender (p = 0.002), employment (p = 0.014), and pain severity (p = 0.001) differed between groups. While controlling for time since injury and pain severity, the ANCOVAs demonstrated significant differences between groups on the PHQ-9 (p = 0.001), GAD-7 (p = 0.006), PDI (p = 0.026), BPI interference (p = 0.001), ASI (p = 0.003), and AAQ (p = 0.007), but not CAGE (p = 0.674). Post hoc t-tests revealed that the MEQ-90-199 and >200 groups had significantly worse scores on all measures compared to the MEQ-0 group (p = 0.05 for all). The MEQ-200 group was significantly worse on all measures compared to the no and low MEQ groups (p < 0.05 for all).

**CONCLUSIONS:** The data suggest that, compared to individuals using no or low-dose opioids to treat chronic pain, those using high-dose opioids have significantly greater pain disability, depression, and anxiety.

**OSTEOARTHRITIS KNEE PAIN: AN UNJUSTIFIED DIAGNOSIS**

Aradhana Shukla, MD, PMR, and Anil K. Gaur, DPMR, DNB-PMR, MBA

**OBJECTIVES:** To highlight various common causes of knee pain in patients following in OPD who are generalized under common term osteoarthritis knee pain.

**DESIGN:** Cross-sectional observational study set in out-patient department of All India Institute of Physical Medicine and Rehabilitation, Mumbai, over a period of 3 weeks (15 OPD). Data was collected from the patients who between 18 years to 60 years of age reporting for knee pain. The data was analyzed for mean number of cases over the number of samples for each diagnosis.

**RESULTS:** From sample size of 120 patients, we were able to diagnose specific causes for knee pain in each patient. None of the patient were given diagnosis of osteoarthritis knee for the cause of pain because of changes present on radiological imaging. The diagnosis was based on history of patient and findings of clinical examination. The causes of knee pain found in study were patellofemoral pain (36%), pes anserinus bursitis (24%), Medial collateral ligament sprain (11%) as well as knee effusion (9%), ligament laxity (6%), Bakers cyst (3%), lateral collateral ligament sprain (3%), infrapatellar bursitis (2%), prepatellar bursitis (2%) and quadriecps tendonitis (2%).
CONCLUSIONS: It is necessary to understand that osteoarthritic knees are a degenerative condition, but there had been numerous studies that states that there is association between inflammatory conditions and pain in osteoarthritic knee pain. Diagnosing a person only on basis of radiological findings is unjustified as other minor conditions can be treated in the setting of degenerative changes in knee and when treated well, can alter the course of derangement of biomechanics due to osteoarthritis knee and improve quality of life. In OPD settings emphasis should be sky high on elicitation of proper history and clinical examination which proves worthwhile in management of this commonly debilitating yet manageable knee condition.

OVER-THE-COUNTER AND PRESCRIBED MEDICATION USE AMONG CONSTRUCTION WORKERS WITH CHRONIC KNEE PAIN

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OBJECTIVES: Construction workers are exposed to heavy manual material handling at the jobsite that can influence development of knee osteoarthritis and painful musculoskeletal injuries. Recent epidemiologic studies on construction worker health and safety suggest that these workers rank in the top of all U.S. occupations for illicit drug and heavy alcohol use. In the present study, we: 1) characterize the type of over-the-counter (OCT) and prescribed medication use among construction workers with chronic knee pain; and 2) examine for predictors of OCT and prescribed medication use by knee pain status.

DESIGN: A cross-sectional study design was used to conduct a workplace knee assessment that included a baseline screening survey instrument. Construction workers were consented and recruited from five commercial construction sites in Florida. During their scheduled jobsite breaks, the research team approached workers at the jobsite to complete the paper-based baseline questionnaire. Standard and validated survey measures assessed for self-reported chronic knee pain (pain lasting >3 months duration) using the Knee Injury and Osteoarthritis Outcome Score (KOOS) instrument and medication use.

RESULTS: Among the 305 participating construction workers (mean age = 42 years ±12.0 standard deviation), 51.2% had no health insurance and 54.1% reported chronic knee pain of which 40.7% self-medicated with acetaminophen, 46.5% with anti-inflammatory drugs (i.e., ibuprofen, naproxen), 9.9% used opioid medication (i.e., codeine, hydrocode), and 6.4% used marijuana. Approximately 56.8% of workers with chronic knee pain reported using at least three pain medications intermittently. Workers with chronic knee pain who used medication were significantly more likely to be older (>40 years old), Adjusted Odds Ratio=3.38, 95% Confidence interval=[1.52-7.48]) and have severe chronic knee pain AOR=6.27;[1.26-31.16]).

CONCLUSIONS: Construction workers self-report managing their chronic knee pain using OTC, opioid medications, and marijuana. Workplace health promotion programs that educate on medication use and support construction worker knee health are needed.

PAGET-SCHROETTER SYNDROME IN A RECREATIONAL ULTIMATE FRISBEE ATHLETE

Akash N. Patel, DO, and Kevin Carneiro, DO

OBJECTIVES: Paget-Schroetter Syndrome of the RUE with Venous Thoracic Outlet Syndrome.

DESIGN: 41 year old right hand dominant female with a past medical history of oral contraceptive use presented for a second opinion regarding arm swelling for the past one month. 3 days prior to symptom onset, she performed 2 hours of ultimate frisbee. 2 days prior to symptom onset, she performed a 45 minute upper body workout consisting of tricep dips and pull-ups. She denied history of prior DVT and clotting disorder. Physical exam demonstrated right arm swelling, large ecchymosis, and a positive Adson’s Sign. Venous Duplex Ultrasound demonstrated an acute right subclavian vein thrombosis. Venogram revealed high grade stenosis of the right subclavian at the level of the clavicle consistent with venous thoracic outlet compression. Oral contraceptive pills were discontinued and she was referred to Vascular Surgery. She underwent thrombolysis, right thoracic outlet decompression, and was started on a 3 month course of Eliquis.

RESULTS: Paget-Schroetter Syndrome (PSS), or effort-induced thrombosis, is a venous thrombosis of the axillary and/or subclavian veins that occurs after strenuous and repetitive physical activity of the upper extremities. PSS is well documented in base runners and weightlifters, but not in recreational ultimate frisbee athletes. The pathophysiology of PSS involves repetitive endothelial trauma of the deep veins of the upper extremity and anatomical variations that predispose to Thoracic Outlet Syndrome. Thoracic Outlet decompression is recommended to prevent recurrent thrombosis. In our presented case, we believe the patient’s anatomic abnormalities of the thoracic outlet, the repetitive shoulder abduction and external rotation movements involved in her frisbee throws, and the upper body workout resulted in thrombosis of the subclavian vein.

CONCLUSIONS: Paget-Schroetter Syndrome should be considered as a cause of upper extremity swelling not only in competitive athletes, but also in recreational athletes including recreational ultimate frisbee athletes.

PAIN AND FUNCTIONAL IMPROVEMENT IN WORKERS’ COMPENSATION PATIENTS AFTER TRAUMATIC INJURY IN ACUTE REHABILITATION

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OBJECTIVES: To test the hypothesis that patients experiencing a traumatic injury with workers’ compensation claims report less improvement in pain and functional recovery after acute rehabilitation.

DESIGN: This is a retrospective chart review of 147 patients aged 19-80 with traumatic injuries admitted to an inpatient rehabilitation program from a Level I Trauma Center from January 1, 2017 to December 31, 2018, of whom 17 had workers’ compensation claims. Our main outcome measures are demographics, including sex, age, workers’ compensation status, BMI, race/ethnicity, and marital status as well as pain scores (Numeric Rating Scale 0-10) at admission and discharge, length of stay in acute rehabilitation, destination after discharge (home or skilled nursing facility), change in FIM scores from admission to discharge, and FIM efficiency.

RESULTS: Workers’ compensation was significantly associated with younger age (39 years vs. 56 years; p = 0.008) and male gender (88.2% vs. 63.9%; p = 0.045); these patients had a higher FIM score at admission (80 vs. 66; p < 0.001) and discharge (101 vs. 96; p = 0.006), however, the difference in FIM score between these two time points (21 vs. 28; p = 0.051) and FIM efficiency (2.6 vs. 2.4; p = 0.444) were not significantly associated with compensated status. Pain at discharge was increased for compensated patients (5 vs. 2; p = 0.026), and time in acute rehabilitation was decreased (10 days vs. 12 days; p = 0.020). Destination after discharge and pain scores at admission were similar for the compensated and non-compensated patients.
CONCLUSIONS: During acute rehabilitation for traumatic injuries, workers’ compensation claims may be associated with higher levels of self-reported pain at rehabilitation discharge; however, FIM efficiency, destination after discharge, and difference in FIM between admission and discharge are similar for compensated and non-compensated patients.

PAIN AND PAIN MANAGEMENT IN CHILDREN WITH HYPERMOBILITY SYNDROME AND EHLERS-DANLOS

Yelim Chung, BS, HeeRak Kang, MD, Katherine D. Goss, MPH, David Kanter, MD, and Margaret A. Turk, MD

OBJECTIVES: Joint hypermobility and Ehlers-Danlos syndromes (EDS) constitute a group of clinically heterogeneous disorders characterized by altered connective tissue structural integrity. Despite being highly reported in these patients, a clear understanding of how pain and fatigue manifest in hypermobility patients is lacking. 2 This study aimed to understand pain symptoms and management in a sample of pediatric hypermobility patients.

DESIGN: A retrospective electronic chart review of 17 pediatric patients (under age 18 years) receiving care from an outpatient PM&R service was conducted. Patient demographics, medical history, hypermobility-related symptoms, and pain management treatments were collected. Descriptive statistics and Results of t-tests, chi-square tests, and correlations are reported.

RESULTS: The average patient age was 13 years, 82.4% of patients were female, 58.8% had genetic-testing confirmed EDS, 47.1% had a family history of hypermobility, and 58.8% had genetic-testing confirmed EDS, 47.1% had a family history of hypermobility. All patients indicated arthralgia and 76.5% also indicated myalgia. Among these, patients most commonly reported pain in joints, muscles, or back, with facial pain (for each, N=12, 70.6%). A majority of the sample (76.5%) used both pharmacological and non-pharmacological pain management techniques. Amongst this sample, non-pharmacological pain management treatments (i.e. therapy, acupuncture) were more commonly used. Interestingly, whereas the number of pain symptoms was significantly positively correlated with pharmacological intervention (Pearson’s R=0.517; p=0.33), it was not correlated with non-pharmacological intervention.

CONCLUSIONS: Pediatric hypermobility patients report numerous pain experiences usually more than one, with symptoms across multiple body areas. Non-pharmacological strategies were more commonly used, suggesting that these methods are better-indicated for hypermobility patients. Although the sample was limited in size and demographic diversity, the study depicts the heterogeneity in hypermobility-related pain symptoms and provides an overview of pain management for a largely understudied pediatric population. Further research is needed to delineate a specific regimen for pain management in children with hypermobility.

PAIN AND QUALITY OF LIFE QUESTIONNAIRES DO NOT DIFFERENTIATE THE "WHITE FLAG" SOCIO-CULTURAL ASPECTS

Thomas U. Schreiber

OBJECTIVES: Dealing with back/ neck pain patients led to the concept of the "white flags," a hint to socio-cultural aspects of pain. Beside the western think-framework of bio-psycho-social factors, "white flags" should indicate, that individual beliefs regarding cultural, spiritual, specific-ethnic or religious (moral) backgrounds are important to medical outcomes.

DESIGN: 121 back (69.8%)/ neck patients were included (mean age 44.5; 43 female) completing a pain questionnaire set - including pain body scheme, short form chronicity, quality of life, EQ-5D, Oswestry Disability Index (ODI), spine function, McGill as well as basic biographical data. Cluster analysis was performed – with SPSS/ Excel - to analyze correlations of quality of life, pain characteristics (intensity, quality, pain-related function) as variables of (A) resident status, (B) ethnicity, (C) denomination, (D) non-denominational.

RESULTS: Quality of life (SF-36) reveals no clusters or statistical correlations in any dimension: e.g. (C) vs. (D). PF 52.6 vs. 55.5, RP 30.1 vs. 35.1, BP 28.8 vs. 31.0, GH 40.1 vs. 45.5, Vitality 33.7 vs. 36.1; SF 51.3 vs. 56.0, RE 49.0 vs. 56.3, MH 48.5 vs. 56.2 – despite differences range from 2.4 to 7.7. As well no differences were found for (A) and (B) and for all in EQ-5D, ODI and chronicity score.

CONCLUSIONS: Differences in quality of life data did not show clear pictures – probably due to misses/ biases. Basic information and rough data of resident status, ethnicity or denomination membership give no statement about personal attitudes to health status or individual ideas about consequences of pain and diseases – they seem not suited to give evidence to the hypothesis of “white flags”. Further studies to “white flag” aspects have to focus to prospective analyses, which involve tailored questionnaires about spiritual, cultural and religious beliefs including ethnic peculiarities to take into account difference between western medical understanding and alternate healing approaches.

PAIN ASSOCIATED FACTORS IN TUNISIAN POST-POLIO PATIENTS

Migaua Houda, Professeur Agrege, Nedra Elfani, Doctor, Soumaya Boudokhane, Professeur Agrege, S Nouili, Doctor, Anis Jalled, Professor, and Zohra Ben Salah, Professor

OBJECTIVES: The purpose of our study was to assess pain and identify its associated factors in patients with post-polio syndrome (PPS).

DESIGN: This is a descriptive study involving all PPS patients, followed at the Physical Medicine and Rehabilitation department of the Monastir University Hospital. Our patients were evaluated using the Visual Analog Scale (VAS) to measure pain intensity, the Multidimensional Fatigue Inventory (MFI-20) and the Borg RPE scale, the functional capacity by the six minute walk test (6MWT) and psychological disorders with the Hospital Anxiety and Depression scale HAD.

RESULTS: We collected 45 patients in our study, the average age was 52.4 years [±7.5]. The sex ratio was 0.7females predominance), the most common symptoms were fatigue and muscle and joint pain. The average VAS was 4.8 ± 1.9. The intensity of the pain was greater in the unaffected limb than in the limb reached (4.7 vs. 4.3). Most of our population (40%) had moderate pain. Pain considered very intense (pain EVA ≥7) in 8 patients. The intensity of pain was positively correlated with general fatigue and reduced motivation of the MFI-20 items, fatigue assessed by the Borg RPE scale, and HAD-D and HAD-A scores. We found also a statistically significant and negative correlation between pain intensity and the 6MWT.

CONCLUSIONS: The findings indicate that pain is a persistent and common problem in persons with PPS, highlighting the need for effective and accessible pain treatments for this population.

PAIN MANAGEMENT AND GLOBAL CULTURE – INTERSECTION

Anne Kuwabara, MD, Kamala Shankar, MD, Priya Shankar, MD, and Annie Wang, BS

OBJECTIVES: To describe how globalization and intersection of cultures impact patient’s perception of pain and its subsequent management.

DESIGN: We performed a literature review of the impact of culture and its relation to pain.

RESULTS: Cultural values and our upbringing influence how we express pain type, intensity and duration. Some cultures encourage the expression of pain while others suppress it. Pain is universal and cultural differences in pain response are multifactorial. Culture shapes the experience of pain, pain expression, seeking alternative remedies, family expectations and perceptions of the medical system, and receptivity to medical care intervention. There are many barriers for pain care: Pain and illness may be used or interpreted as same or different, Subjective nature of pain, access to Health care may vary based on culture, health literacy, lack of insurance, language barriers, availability of pain management specialist. It is important to build awareness of how cultural differences can profoundly impact people, how Motivate providers to think about their behavior and attitude toward others. Allow providers to examine their own bias and focus on how they perceive differences.

CONCLUSIONS: In conclusion, there are many barriers for pain management due to its subjective experience. The clinical presentation of pain is further complicated by the overlay of culture and health literacy. Clinicians can improve care and enhance patient outcomes by increasing their awareness of these intersections and aligning management plans with patient’s expectations and cultural values.

PAIN REDUCTION AFTER SHORT EXPOSURE TO VIRTUAL REALITY ENVIRONMENTS IN PEOPLE WITH SPINAL CORD INJURY

Laura Tabacoef, MD, David Putrino, PT, PhD, Erica Breymam, and Mar Cortes, MD

OBJECTIVES: The aim of this study is to provide critical information about the efficacy of Virtual Reality (VR) to decrease the experience of neuropathic pain in the upper and lower extremities of people with a spinal cord injury. In addition, we aimed to expand current knowledge of the neurophysiology underlying pain reduction.

DESIGN: We performed a pilot case series study with endpoint comparison pre- and post-intervention. Eight individuals with chronic SCI and neuropathic pain were introduced to two different forms of VR intervention: somatic and scenic. Pain was assessed before and after each VR intervention using a numeric rating scale (NRS). We also investigated how immersive tendencies and presence of the participants interacted with their reported pain relief after exposure to the VR environment using the Immersive Tendencies Questionnaire (ITQ) and Presence Questionnaire (UQO-PQ).
RESULTS: There was a significant reduction in relation to baseline pain levels (Δ=−5.1, SEM=−0.4) after a short exposure to both the scenery virtual environment (VE) (Δ=−3.1, SEM=−0.7; p=0.03) and somatic VE (Δ=−3.0, SEM=−0.7; p=0.04). There was no significant difference between intervention types (somatic and scenery), in regards to change in pain scores (p=0.60). There was a statistically significant negative correlation between total ITQ score and the change in NRS after both the scenery (r =−0.762, p=0.028) and somatic VR interventions (r =−0.711, p =0.048). Moreover, there was a statistically significant negative correlation between the focus subcategory of ITQ and the change in pain after the somatic VR intervention (r =−0.742, p =0.035).

CONCLUSIONS: Overall, our pilot study revealed that short-term exposure to VR environments (somatic or scenery) can lead to a significant decrease in chronic neuropathic pain intensity. In addition, we found that immersive tendencies, specifically, focus are correlated with neuropathic pain reductions.

PAIN, CERVICAL SPINE PATHOLOGIES, AND POSTURAL CHANGES ASSOCIATED WITH OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEW

Thi R. M. Annaswamy, MD, MA, Chung-Kuang Lin, BS, Tri Pham, BA, Dustin Leek, MD, and Ravindra Chandrashekhar, MD

OBJECTIVES: While obstructive sleep apnea (OSA) is associated with several chronic health conditions such as hypertension, obesity, and chronic hypoxia, there is limited information on its association with neuromuscular and spinal pathologies, that may be of interest to the Physical Medicine & Rehabilitation (PM&R) clinician. The objective of this study was to perform a systematic literature review to examine the association between OSA and pain, cervical spine pathologies, and postural changes.


RESULTS: Our search resulted 13 articles that met our study criteria, which were selected for this review. Seven articles were on pain, three on cervical spine pathology, and three on postural changes associated with OSA. In pain, ulnar nerve entrapment, carpal tunnel syndrome, oromandibular pain, and musculoskeletal pain were found to be more prevalent among OSA patients compared with patients without OSA. For cervical spine pathology, OSA is associated with fusion anomalies, posterior arch deficiency, cervical lordosis, and other related spinal pathologies. Among reported postural abnormalities, it was found that patients with OSA have larger airway volumes, lower apnea-hypopnea-index with head of bed elevation, and severe OSA patients demonstrate exaggerated cranio-cervical extension and forward head posture.

CONCLUSIONS: This systematic review revealed that patients with OSA have higher rates of Musculoskeletal and neuromuscular pain conditions, higher prevalence of cervical spine pathology and specific instances of postural abnormalities compared with patients without OSA. PM&R practitioners need to be more aware of these associations so as to better provide appropriate care to these patients such as imaging studies or other diagnostic modalities, and/or referrals for management of their OSA.

PALMAR FASCITIS: A DEBILITATING, PARANEoplastIC DIAGNOSIS

Michael K. Appelado, MD, and Robert Hawkins, MD

CASE DESCRIPTION: Palmar fasciitis and polyarthritis syndrome (PFPPAS). Given the bilateral severe flexion contractures, pain, and thickening of the palmar fascia without nodules or cords the diagnosis of PFPPAS was made. The patient was referred to oncology for further workup. CEA was found to be mildly elevated. CT scan of abdomen revealed bilateral inguinal lymphadenopathy. Lymph node biopsy and colonoscopy were ordered. Nine months after initial presentation the patient unfortunately passed away from other comorbidities, he had various signs pointing to malignancy including history of tubulovillous adenoma. On examination of the first metacarpal joint, pain was noted. No other indication of PFPPAS was noted.

DISCUSSIONS: PFPPAS is a rare, disabling paraneoplastic condition. It has most commonly been associated with ovarian carcinoma. However, other malignancies have been described as well. The pathophysiologic mechanism is thought to involve tumor mediated fibroblast proliferative factors causing inflammation and fibrosis of the palmar aponeurosis. The symptoms often precede the onset of cancer. Tumor resection may resolve musculoskeletal symptoms. Although our patient passed away from other comorbidities, he had various signs pointing to malignancy including history of tubulovillous adenoma, lymphadenopathy, and an elevated tumor marker. A few cases of PFPPAS not associated with malignancy have been described.

CONCLUSIONS: PFPPAS is a debilitating condition associated with various cancers. Physicians who diagnose patients with PFPPAS should refer the patient for malignancy workup and surveillance.

PARASPINAL TORADOL TRIGGER POINT INJECTION FOR ACUTE LOW BACK PAIN

Kyaw Lin, DO, Michael D. Beckman, MD, and Edward Barawid, DO

CASE DIAGNOSIS: Acute on Chronic Lumbar Radiculopathy; Acute on Chronic Axial Low Back Pain

CASE DESCRIPTION: We analyzed 7 patients who received paraspinal ketorolac trigger point injections (TPIs) for acute low back pain (LBP). Patients all had numerical rating scale over 7 with six patients endorsing radicular pain, two endorsing axial pain, and five endorsing both radicular and axial symptoms. Patients received a combination of either 30mg ketorolac with 2cc 1% lidocaine or 60mg ketorolac with 4cc 1% lidocaine (if done bilaterally) to the area of their lumbar paraspinal muscle that was the most symptomatic with dry needleling. All patients had over 50% reduction in pain following the procedure.

DISCUSSIONS: A common treatment acute for back pain is an intramuscular injection. At our clinic, intramuscular Toradol injection is a common choice. A Cochrane review found that intramuscular injection of local anesthetic demonstrated moderate evidence of benefit for mechanical neck disorders. Other studies demonstrated that most patients obtain significant relief from TPIs, but did not identify differences between injectate. We performed a case series to analyze outcomes in patients who received intramuscular paraspinal ketorolac.

CONCLUSIONS: The purpose of this case series is to examine the comparative effectiveness of paraspinal ketorolac TPIs for acute LBP. Typically, intramuscular ketorolac injections are given in the quadriceps or gluteal muscles. However, as physiatrists, we are able to localize the pain generators in the muscles adjacent to a certain lumbar level, giving an alternative but possibly more effective injection site. We found that there was an acute, significant improvement in patients’ axial and radicular symptoms per the NRS with multiple lumbar pathologies ranging from facet arthropathy to radiculopathy. However this improvement was short lived, often less than 24-48 hours. There needs to be a large sample of patients to further analyze whether TPIs with ketorolac is efficacious.

PARTIAL PROXIMAL MEDIAN MONONEUROPATHY AFTER SHOULDER HEMIARTHROPLASTY

David J. Park, MD, and Sameer O. Kapasi, MD

CASE DESCRIPTION: A 53 year-old woman had a bike accident and fell on her right shoulder resulting in a comminuted proximal humerus fracture. Four days later she underwent an uncomplicated right shoulder hemiarthroplasty and was placed in a sling. One month later, she noticed that she was unable to flex her right thumb at the IP joint. A cervical MRI showed no evidence of cervical radiculopathy. She was noted to have normal sensation to light touch throughout her right upper extremity and weakness in flexor pollicis longus 1/5 and pronator teres 1/5. Nerve conduction studies showed normal median and ulnar motor and sensory nerve latency amplitudes and conduction velocities. Median to radial nerve comparison recording over the first digit demonstrated symmetrical latency. EMG demonstrated acute denervation of the flexor pollicis longus and pronator teres with no evidence of motor unit recruitment but abductor pollicis brevis was found to be normal.

DISCUSSIONS: Nerve complications after shoulder joint surgery have been described in the literature with the median nerve a less common victim than its neighbors. The mechanism of injury is thought to be due to traction, compression, or contusion. The clinical picture in this case is most consistent with a partial proximal median mononeuropathy affecting APB and FPL. Anatomical variants such as Martin-Gruber anastomosis and Riche-Camnue anastomosis were considered as possible explanations for the patient's presentation, however the normal sensory nerve studies make them less likely.

CONCLUSIONS: This is a unique manifestation of proximal median mononeuropathy above the level of innervation to the pronator teres after shoulder hemiarthroplasty. The patient will be followed for resolution of symptoms.

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PATIENTS’ EXPERIENCES ABOUT EXERCISE PRESCRIPTION AND EDUCATION IN THE PHYSIOTHERAPY MANAGEMENT OF NON-SPECIFIC LOW BACK PAIN

Omenyemi O. Ogwumike, PhD, Bashir Kaka, PhD, and Fatima Bashir-Bello, MSC

OBJECTIVES: Low back pain (LBP) is highly prevalent in the society and its socio-economic consequences are quite evident. Physiotherapists play a prominent role in the management of individuals with this condition and it is therefore of utmost importance that physiotherapists engage in the most efficient and effective management practices available. For perceptions of good performance and quality healthcare, patient experience is an important indicator of effective care and management. This study investigated patients’ experiences about education and exercise prescription in the physiotherapy management of non-specific LBP in Abuja, Nigeria.

DESIGN: A mixed-methods research design was employed in this study, a cross-sectional survey (quantitative research) and a focus group discussion (FGD) (qualitative research). An adapted questionnaire on patients’ experiences about education and exercise prescription in the physiotherapy management of non-specific LBP in Abuja, Nigeria.

RESULTS: Patients were 126 (male = 41, female = 85) mean age 51.0 ± 14.6 years, while the modal age-group was 60-69 years. Forty-one (32.5%) of them had non-specific LBP for less than a year and the two most applied interventions were exercise and heat therapy followed by education/advice. Majority (71.8%) of the respondents reported positive experience about education while 119 (94.4%) reported positive experience about exercise prescription. The result from the qualitative research is in conformity with that of the quantitative analysis.

CONCLUSIONS: Patients with non-specific LBP received adequate education regarding their condition and had good experience in the course of their physiotherapy management.

PEAK PROMINENCE IS A BETTER THRESHOLD PARAMETER THAN PEAK HEIGHT IN GAIT EVENT DETECTION FOR HEALTHY AND GAIT-IMPAIRED ADULTS

Zohaib Aftab, PhD, Nazia Gillani, Kashif Saeed, PhD, Ahmed Zohaib, and Molins Akhtar

OBJECTIVES: Clinical assessment of gait abnormalities is usually done using visual gait analysis, especially in the developing world where 85% of all disabled population reside. Wearable inertial sensor-based systems (accelerometers and gyroscopes) present a cost-effective way to quantify this procedure. However, it requires an algorithm for automatic gait segmentation, usually relying on peak (local maxima or minima) detection of a certain variable, further dependent on the selected threshold value. Recently, a threshold optimization technique was proposed by [2] minimizing the gait cycle variance within the cycle. In this study we demonstrate the limitations of this optimization technique. Moreover, we show that a simple heuristic-based threshold on the prominence of the peak, rather than its height, produces more accurate gait detection accuracy.

DESIGN: Gait data was collected from 6 adults (3 healthy, 3 gait-impaired) on flat ground, wearing 4 inertial measurement units. Right leg’s medio-lateral angular velocity signal is used to predict mid-swing event of the cycle using its peak as reference. 2 peak detection algorithms (‘PeakDet’ and ‘findpeaks in Matlab’) were tested. The former method uses an optimum threshold value calculated based on minimizing variance of cycle durations. For the later, we simulate under 2 conditions: a) by providing the threshold for minimum peak height of the signal, b) by providing the threshold for min peak prominence.

RESULTS: For a total of 40 trials, highest accuracy is obtained (98%) with the threshold on the peak prominence using the Matlab ‘findpeaks’ function while comparable accuracy is obtained with threshold on peak height (93%). Least accuracy is obtained with the ‘PeakDet’ algorithm using optimum threshold.

CONCLUSIONS: A simple threshold on peak prominence results in better prediction accuracy than threshold on peak height for healthy as well as patient gait data.

PERCUTANEOUS SACROPLASTY IN SACRAL INSUFFICIENCY FRACTURES: A LITERATURE REVIEW

Jameis E. Eubanks, MD, MS, Michael E. Farrell, MD, DC, Brandon Barndt, DO, Vinicius Tieppo Francio, MD, Michael Smith, MD, and Kaivalya Deshpande, MD

OBJECTIVES: To review the clinical effectiveness of percutaneous sacroplasty (PS) for sacral insufficiency fracture (SIF). SIF affects up to 5% of females over 55 years of age and comprises an important source of spine pain in this population. While most cases are successfully managed conservatively, PS is an interventional procedure utilized for select cases where pain persists despite usual clinical care.

DESIGN: An electronic search was performed using MEDLINE (PubMed). Trials published during the last decade (2009-2019) were identified that report on clinical effectiveness of PS in SIFs. Studies were selected that described patient outcomes under real-world clinical conditions. Articles were excluded if the study did not include PS as a treatment, included it as a treatment for sacral fractures related to non-osteoporotic fractures including those from metastasis, or if the study was a meta-analysis, systematic review, or non-human trial.

RESULTS: Most of the available data consists of prospective and retrospective studies, with 22 papers identified; seven were excluded because they did not meet criteria. Of the included papers, there were three case reports, two case series, seven prospective studies, and three retrospective studies, accounting for 653 patients who underwent PS for SIF. Positive results were observed in the majority of the included papers with rare and transient complications. Duration of symptomatic relief varied depending on follow-up time, which ranged from two weeks to 10 years.

CONCLUSIONS: The available evidence supports the clinical effectiveness of PS for SIF with limited safety data also supporting tolerability. Most papers concluded that PS is a viable treatment modality for SIF. Recipients experienced significant pain and symptom relief and low incidence of adverse reactions. Overall, the paucity of double-blind, randomized, placebo-controlled trials with long-term follow-up limits the recommendation for PS for SIF, while the positive results demonstrated thus far support the need for further study.

PERFORMANCE IMPROVEMENT IN A VETERANS AFFAIRS TELEHEALTH AMPUTEE CLINIC

Cyrus O. Abbasi, MD, PhD, Mary Bryant, MD, and Billie Pack, DO

OBJECTIVES: Improve the efficiency and quality of care of our Veterans Affairs telehealth amputee clinic (ATC).

DESIGN: Questionnaires were completed by patients and multidisciplinary providers reporting their experience with ATC. The questionnaires explored patient’s and provider’s opinions regarding the quality of medical history taking and physical examination (PE), convenience, overall quality of care and potential savings in time, money or other resources. Strengths and weaknesses across our thirteen site ATC network...
were assessed to develop standardized examination settings, maximize efficiency and provide excellent care despite remote patient location.

RESULTS: Thirteen patients and six providers participated. Patients reported savings in time (84.6%), money (76.9%) and other resources (30.7%). 84.6% were "very satisfied" with ATC’s, the remainder being "satisfied". 92.3% found the service "more convenient" with the rest being "neutral". 92.3% were "very confident" in staff’s clinical abilities; the rest were "confident." Further comments included need of additional clerical staff. 83.3% of providers were either "very satisfied" or "satisfied" overall. 66.6% were "dissatisfied" and 33.3% were "satisfied" regarding obtaining a thorough PE given current setting limitations. Provider recommendations of a tertiary hospital with privileges for chest imaging and bronchoscopy were positive. AETC is a more convenient way to provide high quality amputee care in a more cost-effective and convenient manner.

CONCLUSIONS: Recommendations to improve our ATC’s overall quality of care, performance and reliability are as follows: Rooms equipped with raising/lowering chairs, mobile cameras with zoom, translator-phone, reliable monitors and speakers. Trained medical staff assisting with patient positioning, PE, donning/doffing prosthetics and equipment operation. Staff should establish video connectivity prior to encounter improving efficiency. Implementing patient reminder-calls/postcards to reduce no-shows. Providing digitalized location/staff info, minimum equipment and room specifications and staff equipment training.

PHYSIATRIST APPROACH OF MARFAN SYNDROME:
Allen S. Zheng, BS, and Kimberly Arndt, MD

CASE DIAGNOSIS: Right radial neuropathy following phlebotomy.

CASE DESCRIPTION: 36-year-old male with 4-year history of right arm pain and weakness following phlebotomy in antecubital fossa. He reported severe pain upon needle insertion with burning sensation traveling down through the snuffbox to thumb and index finger. Currently, patient has burning pain on lateral forearm extending through the snuffbox, difficulty with grip strength, and 4/5 strength with thumb and index finger. He works as a police officer and has difficulty drawing and stabilizing his weapon. Patient refused gabapentin and pregabalin due to potential cognitive side effects. EMGs demonstrated right radial neuropathy with mild chronic neurogenic changes in all radial-innervated muscles below the elbow, along with median neuropathy with AIN involvement and carpal tunnel. Patient had radial nerve release in the elbow and forearm and carpal tunnel release. Carpal tunnel symptoms improved after surgery, but radial nerve symptoms have persisted since original injury.

DISCUSSIONS: While peripheral nerve injury following venipuncture is rare, nerve damage may still occur. Based on limited literature, symptoms typically resolve spontaneously within 6-12 months, but unfortunately, nerve injury may be permanent. This patient’s radial neuropathy impacts his ability to safely perform his job as a police officer, and repeat EMGs over 4 years have shown limited improvement in radial nerve function despite surgery. His work also causes him to refuse typical neuropathic pain medications, which makes treating symptoms of burning pain difficult. Currently, patient is working with occupational therapy to maximize hand function to determine whether he can continue employment in law enforcement. Nerve function is not expected to improve.

CONCLUSIONS: There are no reports of chronic radial neuropathy from venipuncture. Venipuncture, while typically very safe, may lead to permanent nerve damage in rare cases. Electromyography is helpful in identifying nerve injury and tracking improvement over time.

PERMANENT VENIPUNCTURE INDUCED RADIAL NEUROPATHY
M. A. Shakoor, MBBS, FCPS, and Md. Tariqul Islam, MBBS, FCPS

CASE DIAGNOSIS: As there is no gold standard of diagnosis of Marfan Syndrome, cases often go unnoticed unless a full range of attributing features becomes apparent. Information on physicist’s involvement in the assessment and management of Marfan cases are lacking although these patients frequently present with muscularkeletal and other functional problems including fatigue.

CASE DESCRIPTION: This 14-year-old school boy attended rehabilitation OPT and complained of pain and difficulty with fine feeling at school and playgrounds. There was positive history of similar chest deformity of his mother and 05 year older younger sister. Physical examination revealed piggion chest deformity, BMI-15, arm span to height ratio-1.06, hand length 11.7% of height. He had high arched palate, positive wrist sign, thumb can be brought parallel to forearm with 130 elbow extension with 14 % increase of FEV1 after bronchodilator. Echocardiogram shows mild tricuspid regurgitation, mild pulmonary regurgitation and pulmonary arterial hypertension with diameter of aorta was. He had myopia on both eyes, high arched palate, osteoporosis of lumbar spine (z score-3.7) associated with low serum calcium.

DISCUSSIONS: We paid utmost attention to the most serious life threatening complication of aortic involvements with CT scan of chest which was normal. Comparing with Marfan system hand protocol testing this patient had positive hand length, arm span, wrist sign and thumb flexibility sign (21 points). On the other hand, In regard to revised Ghent criteria of presence of aortic diameter change, high foot abnormality, pneumothorax, protrusion, acetabuli, scoliosis, reduced elbow extension and facial features were absent. limitations were a geneticist consultation and searching of FBN1, because of fund constraint.

CONCLUSIONS: Patients attending with pectus excavatum and associated fatigue can be a clue for diagnosis of Marfans Syndrome.

PHYSICAL ANALGESIA IN PATIENTS WITH LOW BACK PAIN AND LUMBO-SACRAL RADICULOPATHY (A COMPARATIVE STUDY OF THE EFFICACY OF PARAVERTEBRAL INFILTRATIONS AND DEEP OSCILLATION)
Ivet B. Koleva, MD, PhD, DMEDSC, Borislav R. Yoshinov, and Radoslav R. Yoshinov

OBJECTIVES: According the International Association for the Study of Pain (IASP) pain is a subjective experience, provoked by noiceptive activation, by changes in sensory nerves and roads, or by cerebral centers – regulating stress, affects and motivation. The Declaration of Montréal of the International Pain Summit of IASP identifies chronic pain as a serious chronic health problem. The objective of current study was to compare the efficacy of paravertebral infiltrations and a rehabilitation program (including Deep Oscillation) in patients with low back pain and lumbo-sacral radiculopathy.

DESIGN: Material and methods: A total of 105 patients (divided into three groups) with this pathology were treated during 20 days. All patients received education (back school), physiotherapy (analytic exercises, soft tissue techniques) and ergotherapy. Patients of first group received paravertebral infiltrations with corticosteroids and vitamin B. In group 3 we applied Deep Oscillation (DO). In group 2 we combined both methods: paravertebral infiltrations and rehabilitation procedures. Statistical analysis was performed with SPSS electronic package, version 17. We applied options for two samples comparison with parametrical analysis of variances ANOVA and non-parametrical distribution and correlation analysis: t-test, Signed rank test, Kolmogorov– Smirnov test, Mann– Whitney W test. The treatment difference was considered to be statistically significant if the p value was < 0.05.

RESULTS: Patients were controlled before, during, at the end of the PRM course and one month later - using visual analogue scale of pain, Lasseege’s sign, scales of Zung for depression and anxiety. Analysis of results demonstrates the efficacy of medication and rehabilitation in all patients. Medication is most effective during first weeks of a complex rehabilitation program has stable and durable effects on positive sensory signs and psychological patterns.

CONCLUSIONS: The combination of paravertebral infiltrations and preformed physical modalities is most effective for these patients.

PHYSICAL MEDICINE AND REHABILITATION RESIDENTS’ PERCEPTION OF THE MOST USEFUL RESOURCES FOR EXPLORING PHYSIATRY RESIDENCY PROGRAMS AND CAREER PLANNING
Soojin Kim, Dae Hwan Kim, BA, Laura B. Kezar, MD, and Alexandra Fry, BS

OBJECTIVES: To assess the perceived usefulness of the following resources in exploring physical medicine and rehabilitation (PM&R) residency programs and career planning: advisor/mentor, specialty interest group-sponsored activities, school-sponsored career planning workshops, PM&R fair, MS1/2 summer programs, local/regional/national meetings, websites (AAPM&R, AAP, AAMC), and social media. METHODS: The survey was developed based on AAMC and NRMP surveys. The survey link, created on Survey Monkey, was sent out via email to all 92 AGME-certified PM&R residency program directors in the United States including Puerto Rico. The program directors were asked to forward the survey to their residents. The survey was available for a month, and reminders were given 1-week and 1-day prior to the final submission date. Residents ranked each of the resources’ usefulness through a 4-point Likert scale: 1=Not Useful, 2=Minimal, 3=Moderate, and 4=Very Useful.

RESULTS: Among 13.05% of the PM&R residents who responded, 48.86% found advisor/mentor and 23.30% found the websites to be ‘Very Useful’ resources.

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PHYSICAL PERFORMANCE PREDICTORS OF SELF-REPORTED PHYSICAL FUNCTION AND QUALITY OF LIFE IN PATIENTS 3 MONTH AFTER UNILATERAL TOTAL KNEE ARTHROPLASTY: A CROSS SECTIONAL STUDY

Won Kim, Bo Ryun Kim, MD, PhD, and Youn Ji Kim

OBJECTIVES: This study was undertaken to identify postoperative physical performance factors predictive of self-reported physical function and quality of life at 3 month after unilateral total knee arthroplasty (TKA).

DESIGN: We assessed a total of 158 patients (24 males and 134 females; average age 72.6±5.8 years) who underwent unilateral primary TKA. All patients completed performance-based physical function tests including stair climbing test (SCT), 6-minute walk test (6MWT), timed up and go test (TUG), gait analysis and isometric knee flexor and extensor strength of the surgical and nonsurgical knees. Self-reported physical function and pain were measured using the Western Ontario McGill Universities Osteoarthritids Index (WOMAC) and Visual Analog Scale (VAS), and self-reported quality of life was measured using the Euro-QOL five dimensions (EQ-5D) questionnaire.

RESULTS: In the bivariate analyses, the postoperative WOMAC-function score had a significant positive correlation with postoperative age, WOMAC-pain score, WOMAC-stiffness score, TUG tests, SCT ascent, SCT descent, VAS, deficit of extensor and a significant negative correlation with postoperative EQ-5D, stride length, peak torque (PT) extensor of non-surgical knee, PT flexor of non-surgical knee. The postoperative EQ-5D score had a significant positive correlation with postoperative 6MWT, cadence, PT extensor of non-surgical knee, PT flexor of non-surgical knee, and a significant negative correlation with postoperative age, WOMAC-pain, WOMAC-stiffness, WOMAC-function, TUG, SCT ascent, SCT descent, VAS. In the linear regression analyses after adjustment for demographics and anthropometrics variables, the postoperative WOMAC-function score are significantly associated with age, WOMAC-pain, stride length, PT flexor of non-surgical knee and deficit of extensor and the postoperative EQ-5D score are significantly associated with age, WOMAC-pain, SCT ascent, and cadence.

CONCLUSIONS: This study demonstrated that self-reported physical function and quality of life were an important explanatory factor for functional recovery in patients 3 month after unilateral TKA, as reflected by WOMAC-function and EQ-5D in the early postoperative period.

PILOT EVALUATION OF DISABILITY INTEGRATION TOOLKIT ACTIVITIES WITH MEDICAL STUDENTS

Jeremy R. French-Lawyer, MPH, CAS, CHES,
Michael Ioeeger, PhD, MPH, CSCS, ACE-FNS, Katherine D. Goss, MPH, and Margaret A. Turk, MD

OBJECTIVES: Interventions to teach medical students about disability are lacking in rigorous evaluation using preferred methodology. The Disability Integration Toolkit (DIT) was developed to provide easy-to-implement tools for integrating disability education into medical curriculums. The purpose of this evaluation was to pilot test rigorous methodology to evaluate DIT activities.

DESIGN: Evaluation was conducted with five medical students in a Physical Medicine and Rehabilitation (PMR) summer clinical externship. Students were involved in daily shadowing in the PMR department, resident lectures and workshops, and educational activities from the DIT. The DIT Evaluation Matrix was utilized to assess student knowledge and self-efficacy. Student satisfaction and self-other overlap were also measured. Attitudes were measured using a subset of questions related to comfort from the validated Medical Student Attitudes Towards Persons with Disabilities measure. Descriptive statistics and t-tests are reported.

RESULTS: Medical students were all rising MS2 and 60% were female. Initial findings suggest that the students who have completed this program have demonstrated increased knowledge in providing effective care for people with disability (40% increase correct answers pre and post program), and increased self-efficacy in providing that care for patients with disability (average self-efficacy increased pre post in 86% of items). Additionally, there were positive changes in self-other overlap, and students showed improvements in the comfort subscale of the attitudes measure.

CONCLUSIONS: This data demonstrates an initial positive impact of the MSSEE program on students’ knowledge and self-efficacy. These results support the efficacy of the program and the DIT to improve disability education for medical students. Further evaluation should be conducted with larger sample sizes in order to better understand the impact of the DIT, along with evaluation of individual aspects of the DIT. Evaluation methodology of this type could be utilized to evaluate other educational interventions with medical students.

PLANTAR FASCIITIS IN THE INTENSIVE CARE UNIT

Angela Samaan, DO, Eduardo Gomez, MD, and Miguel Escalon, MD, MPH

CASE DIAGNOSIS: Plantar Fasciitis.

CASE DESCRIPTION: A 27 year-old female was admitted for decompensated valvular disease. She underwent mitral valve repair and subsequently required ECMO. While in the ICU, the patient complained of right foot pain. Pain was constant, non-radiating, located on the plantar surface and made worse with palpation or movement. She was immobile and in severe pain requiring Hydromorphone for possible neuropathic etiology. Upon PM&R evaluation, there was noted tenderness to palpation along the right plantar fascia with crepitus. Findings were consistent with plantar fasciitis and initial treatment included family education on simple massage therapies, Lidocaine patch for pain control and physical therapy to improve mobility, with favorable results. Initial pain was severe and limited any weight bearing. After treatment of plantar fasciitis, she was able to ambulate from 50ft to 200ft walking distance in 10 days and no longer required Hydromorphone for pain control.

DISCUSSIONS: Plantar fasciitis is one of the most common causes of foot pain. Diagnosis is usually made clinically, as done so with our patient. Critically ill patients often present with atypical symptoms and difficult to treat pain. Providers should consider common diagnoses in patients even if presenting with unusual symptoms. Limited mobility is not typically associated with plantar fasciitis; however our patient's clinical exam findings including severe pain localized to the plantar surface of her foot without involvement of the dorsum and improvement with recommended initial treatments for plantar fasciitis supported this common diagnosis. Despite being so prevalent, plantar fasciitis often has a favorable prognosis and patients usually have complete resolution with the aforementioned treatments.

CONCLUSIONS: Providers in any medical setting should have a high suspicion for plantar fasciitis when patients present with foot pain. Further studies may be conducted to assess the management of foot pain in critically ill patients with empiric treatment for plantar fasciitis when indicated.

PLANTAR FASCIITIS TREATMENT OUTCOME STUDY: ULTRASOUND GUIDED STEROID INJECTION AFTER FAILURE OF CONSERVATIVE TREATMENT

Abeer Alomari, MD, and Mohd Rami H. Alalhann, MD

OBJECTIVES: One of the challenges physiatrist encounter during plantar fasciitis treatment is failure of conservative treatment (including rest, NSAIDs, stretching exercises, and orthoses) plus lack of objective measure of recovery. Plantar fasciitis is primarily a clinical diagnosis. Patients classically describe medial plantar heel pain on weight bearing, which is often most intense during their first few steps in the morning but tends to improve with rest. Scant research in the Middle East exists on how US guided steroid injections assist physiatrists in management of chronic planar fascitis unresponsive to conservative measures.

DESIGN: Thirty patients (mean age: 48.3, range: 35-65) with chronic planar fasciitis were treated with perilesional injection with 1ml of Methylprednisolone (40mg/ml) mixed with 2ml of lidocaine 1% under US guidance using medial in plane approach. Follow up after 3 weeks was done to evaluate treatment efficacy subjectively byVAS score and objectively by fascia thickness.

RESULTS: The results showed that 22 patients have reported significant improvement regarding pain. In the remaining 8 patients plantar fascial thinning in all 22 patients.

CONCLUSIONS: This paper, while unearthing interesting results concerning US guided steroid injections, calls for further research to examine how US can help physiatrists in management and follow up of chronic plantar fasciitis.
POLAND SYNDROME: REPORT OF A LATE DIAGNOSIS CASE
Paula M. Lucas, Flávio Henrique N. Dos Santos, Amanda Oliva Spaziani, Talita Costa Barbosa, Raissa Silva Frota, and Amanda Bergamo Bueno

CASE DESCRIPTION: First described in 1841 by Alfred Poland who, through anatomical dissection, identified the association of chest wall defects with hand defects. It is a clinical syndrome characterized by chest wall defects, ipsilateral hand defects, and ipsilateral shoulder anomalies. It is a rare congenital anomaly affecting males and females. After thoracic post-junctional kyphosis deformity correction, including vertebral augmentation, and was admitted to acute inpatient rehabilitation. The patient had a significant evolution during the rehabilitation period. Improved pain, muscle strength and functionality. Differences include pleuritic chest pain, cough, dyspnea, shock, and death. Evidence-based treatment for PMMA PE is not well defined, but case literature indicates that application of traditional guidelines for thrombotic PE may reduce comorbidities and mortality. Conclusions: Cement PE is a relatively common and potentially lethal complication following vertebral augmentation. This case demonstrated signs of symptomatic PMMA PE on post-op day 8/2. Proper imaging and appropriate intervention are necessary for diagnoses and reduction in comorbidities and mortality. However, despite evidence-based guidelines are not available for this type of pulmonary emboli.

POST-CONCUSSIVE PERSISTENT POSTURAL PERCEPTUAL DIZZINESS: A BALANCING ACT
Aaron Hacker, BS, Matthew D. Wilhelm, BS, Clay Guyon, DO, Roody Joseph, PT, DPT, OCS, Lisa Farrell, PT, PhD, AT, C, and Alessandra Posey, DO

CASE DIAGNOSIS: Persistent Postural Perceptual Dizziness.

DISCUSSIONS: This case helps highlight that concussions can sometimes be a precipitating event for the development of persistent postural perceptual dizziness (P3D). Conclusions: Practitioners evaluating and treating patients with concussions should be aware of 3P and know the diagnostic criteria because this functional vestibular disorder has been reported to occur in 10 to 15% of concussion or whiplash injuries. Additionally, understanding the intricacies of patient management, which can include vestibular rehabilitation, cognitive behavioral therapy and/or pharmaceuticals, will help promote successful patient outcomes.

POSTERIOR SHOULDER PAIN REVEALING A “PANCOAST-TOBIAS SYNDROME”
Soumya Elarem, DOCTOR, Mouna Sghir, DOCTOR, Aymen Haj Salah, DOCTOR, Ikram Haddada, DOCTOR, Taki Elhers, DOCTOR, and Wassia Kessomtini, PROFESSOR

CASE DIAGNOSIS: The term Pancoast or superior sulcus tumor defines a wide range of tumors invading the apical chest wall and producing a characteristic syndrome named “Pancoast-Tobias syndrome”. The Pancoast-Tobias syndrome involves severe and unremitting shoulder and arm pain along with the distribution of the eighth cervical and first and second thoracic nerve trunks, Horner’s syndrome (ptosis, miosis, anhidrosis), and atrophy of the intrinsic hand muscles. We report the case of a man followed in our physical and rehabilitation department for a posterior shoulder pain, for whom a Pancoast-Tobias syndrome was diagnosed.

CASE DESCRIPTION: A 44-year-old man presented with a persistent right shoulder pain. He had no neck pain or numbness in the fingers. On examination, he had normal active and passive motion of the shoulder. X-Ray of the shoulder and the neck were normal. First electrophysiological examination was not conclusive. The patient presented, after 6 months, with a Claude Bernard Horner (CBH) syndrome. A chest X-ray was ordered, and it showed an apical opacity in the right apex of the lung. The diagnosis of Pancoast tumor was confirmed by CT scan and biopsy. Therapeutic decision was a preoperative chemotheraphy followed by an extensive surgical approach. Postoperative period was marked by the appearance of a shoulder pain and the right lower lobe of the lungs. Chest pain improved with aggressive incentive spirometry, and prophylactic enoxaparin dose was immediately increased to therapeutic levels for the next six months. The remaining rehabilitation course was uneventful, and she was discharged home. During follow-up with her PCP and neurosurgeon, she reported continuing functional improvement with no recurrence of chest pain.
limitation, a neuropathic pain and a deficit of the upper limb. The clinical examination concluded a high incidence of postural symptoms and a parasialgia and hypoesthesia C8-D1. Postoperative electrophysiological examination confirmed pathologic C8-D1 roots. 

**DISCUSSIONS:** This case is an unusual presentation of “Posterior Tibialis Syndrome.” It emphasizes the importance of its inclusion in the differential diagnosis of patients presenting with persistent shoulder pain. 

**CONCLUSIONS:** A persistent shoulder pain should incite clinicians to search for differential diagnosis with the help of pertinent investigations.

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**POSTEROMEDIAL FRICTION SYNDROME: A consideration for medial knee pain**

Alexandra I. Gundersen, MD, and Ashwin Babu, MD

**CASE DIAGNOSIS:** Postero medial Friction Syndrome.

**CASE DESCRIPTION:** A 23-year-old male presented with two months of posteromedial left knee pain made worse with squatting and high impact activity. He denied any trauma, swelling, buckling, or catching of the knee. Exam was notable for negative ligamentous and meniscal testing but elicited significant discomfort with palpation of the left posteromedial femoral condyle during passive range of motion. 

An MRI identified intact menisci and ligamentous structures, and point of care ultrasound (US) noted edema in between the Sartorius tendon and the MFC, along with reproduction of his pain with palpation of this area. The patient was diagnosed with Postero medial Friction Syndrome (PMFS) and was offered an US guided lidocaine/steroid injection in between the Sartorius tendon and the MFC. He tolerated the procedure well and afterwards was able to squat without reproducing his symptoms.

**DISCUSSIONS:** PMFS is a rare clinical entity thought to be caused by friction between the posteromedial femoral condyle (PMFC), the Sartorius and/or the Gracilis tendons during dynamic activity. The prevalence of PMFS is unknown but is more frequently seen in active, young athletes (females > males). This syndrome is commonly misdiagnosed as a medial meniscus tear but ultimately requires a physical exam and imaging (MRI > US) to confirm the presence of edema for diagnosis. Biomechanics and morphologic abnormalities are suspected to contribute to PMFS as 27% of patients diagnosed with PMFS are concurrently diagnosed with other friction syndromes (patellar tendon or iliotibial band friction syndrome). Treatment consists of analgesics and NSAIDS, physical therapy, and image-guided steroid and anesthetic injection.

**CONCLUSIONS:** PMFS should be considered in the differential diagnosis of medial knee pain especially in the setting of other friction syndrome diagnoses. Image-guided injections have been shown to be effective in treating PMFS.

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**POST-STROKE SHOULDER PAIN: PREVALENCE, PREDICTORS AND EFFECT ON MOTOR RECOVERY.**

Tarek Shaﬁkh, MD, Movafag Abd-Elhamid, MD, and Marwa A. Amer, MD

**OBJECTIVES:** Post-stroke shoulder pain (PSSP) is a common distressing musculoskeletal complication of stroke, interfering with both function and quality of life. This study was designed to determine the prevalence of shoulder pain among stroke survivors (SS), identify predictors for its development and effect on motor recovery.

**METHODS:** This cross-sectional study included 80 SS who were screened for the presence of PSSP. Ninety age, sex and occupation matched non-stroke subjects were also included to rule out the presence of shoulder pain. Subjects with previous shoulder trauma were excluded. All SS were subjected to history taking and clinical evaluation including assessment of shoulder muscle power, passive shoulder range of motion, spasticity assessment using Modified Ashworth scale, Fugl-Meyer for upper extremity and Brunnstrom motor recovery.

**RESULTS:** The prevalence of shoulder pain among SS was 37.5% which was significantly higher than that among non-stroke subjects (p=0.002). Shoulder muscle weakness, sensory impairment, motor impairment and hypoaesthesia were significantly associated (p<0.01, p=0.001, p=0.01, and p<0.001, respectively) with the development of PSSP. However, logistic regression model revealed hyperaesthesia and motor impairment (p=0.019, and p=0.002, respectively) as significant predictors for PSSP. Moreover, PSSP negatively affected motor recovery (p=0.002).

**CONCLUSIONS:** There is increased prevalence of PSSP among SS which negatively influences stroke recovery journey. Screening for hyperaesthesia and its proper treatment in SS should be recommended to prevent the development of PSSP.

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**POWER WHEELCHAIR DRIVING TRAINING AND PROVISION IN FRANCE AND UNITED KINGDOM: A SURVEY COMPARING PRACTICES**

Bastien Fraudet, MSC, Philippe Gallien, MD, PhD, Benoît Nicolas, MD, Emilie Leblong, MD, MSC, Marie Babel, PhD, Nicolas Ragot, PhD, Matthew Pepper, Doctor, Guillaume Caron, PhD, and Mohamed Sakel, MD

**OBJECTIVES:** This survey was conducted as part of the European project INTERREG ADAPT, through French and British professionals involved in training and provision of Powered Wheelchairs (PW). The purpose of this survey is to report on practices related to training and assessing the driving of PW. 

**METHODS:** The survey was based on a literature review and exploratory interviews with French and British experts in training and PW provision. The questionnaire included the profile of respondents, PW training of the clinicians, driving training practices and driving assessment practices. The online questionnaire was sent to rehabilitation units in France, and NHS services in United Kingdom (UK), involved in the training and provision. The study received the HRA and HREC Approval. The online questionnaire was open from November 1, 2017 to January 31, 2018.

**RESULTS:** 367 questionnaires have been completed. Common points emerge from this survey: Professionals declare themselves highly competent in a comparable way in training support or in provision. The absence of a standardized process or the lack of the use of standardized grid in the evaluation is also a common element. Some points also statistically diverge, like the profile of the trainers more occupational therapists centered in France and the training, that is organized during the initial formation in France, and during update formation in UK.

**CONCLUSIONS:** While there is a basic form of consensus regarding tasks training, the modalities of training process and assessment are relatively subjective in both French and UK sides. This survey is in line with the Conclusions of Le Ray (2012) and Bozec (2013) concerning the limit of practices standardization. Despite the variability and the lack of objectivity concerning the PW drivers training but also the training of the trainers, it also suggests that practice are not so different in both sides of the Channel.

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**PRE-SEASON ANKLE FUNCTIONAL ASSESSMENT IN SOCCER ATHLETES CAN PREDICT INJURIES**

Marcelo Ribeiro, MD, PhD, Lucas Manoel, MSC, Marcelo Saad, PhD, Danilo Duarte, PT, Gabriel Marques, Student, and Bianca Santana, Student

**OBJECTIVES:** Background: Risk of ankle injuries in soccer depends on intrinsic factors, such as muscle strength asymmetries, decreased flexibility and decreased proprioception, requiring accurate assessment tools to measure these parameters. Aim: identify risk factors present in preseaasen assessment that may predispose professional soccer players to ankle injuries. 

**DESIGN:** Longitudinal study of 89 professional soccer athletes. Pre-season functional assessment comprised anamnesis, isokinetic ankle dynamometry and functional tests: dorsiflexion lunge test (DLT) and Y Balance Test (YBT). During the competitive period, the incidence of injury was retrieved from medical charts.

**RESULTS:** A higher incidence of ankle injuries was associated with lower YBT scores oth in the dominant (p = 0.042) and non-dominant (p = 0.017) limbs. Other parameters were not related to injury incidence.

**CONCLUSIONS:** YBT can be used in preseaasen assessment to predict higher risks of ankle injuries and direct possibly preventive interventions.

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**PREDICTIVE FACTORS FOR INITIATION OF PHYSICAL TREATMENT AND REHABILITATION IN PATIENTS AFTER SURGICAL INTERVENTION FOR CHRONIC VENOUS INSUFFICIENCY**

Sorin I. Struturul, and Sida Maria, MD

**OBJECTIVES:** The objectives of this paper are to obtain predictive factors in the recovery treatment of patients who have undergone surgery for deep vein thrombosis, as well as their ICF (International Classification of Functioning, Disability and Health) score in order to assess the need for further hospitalization or follow-up treatment at home.

**DESIGN:** 192 patients that have been admitted with chronic venous insufficiency at the Clinic of Vascular Surgery of St. Spiridon Emergency Clinic Iasi during January-June 2019 were included in the study. We have analyzed the following variables: sex, urban/rural lifestyle, age, BMI (Body Mass Index) value, smoking, chronic venous disease at the lower extremities, history of deep venous thrombosis, compression therapy, previous history of venous thrombosis, comorbidities, previous history of venous thrombosis, and their ICF (International Classification of Functioning, Disability and Health) score in order to assess the need for further hospitalization or follow-up treatment at home.

**RESULTS:** 192 patients that have been admitted with chronic venous insufficiency at the Clinic of Vascular Surgery of St. Spiridon Emergency Clinic Iasi during January-June 2019 were included in the study. We have analyzed the following variables: sex, urban/rural lifestyle, age, BMI (Body Mass Index) value, smoking, chronic venous disease at the lower extremities, history of deep venous thrombosis, compression therapy, previous history of venous thrombosis, and their ICF (International Classification of Functioning, Disability and Health) score in order to assess the need for further hospitalization or follow-up treatment at home.

**CONCLUSIONS:** Patients with chronic venous insufficiency at the Clinic of Vascular Surgery of St. Spiridon Emergency Clinic Iasi during January-June 2019 were included in the study. We have analyzed the following variables: sex, urban/rural lifestyle, age, BMI (Body Mass Index) value, smoking, chronic venous disease at the lower extremities, history of deep venous thrombosis, compression therapy, previous history of venous thrombosis, and their ICF (International Classification of Functioning, Disability and Health) score in order to assess the need for further hospitalization or follow-up treatment at home.

**DISCUSSIONS:** The majority of the patients have been included in CEAP (Clinical-Etiological-Anatomical-Pathophysiological) stage III classification. A total of 148 patients underwent crossectomy, internal saphenous vein stripping and phlebectomy. The sex report shows an increased incidence of women patients (128 cases). The average age of the studied patients is 54 and 67 of them are over 60 years old. The analysis of the BMI factor shows that 48 of the total number of patients reached a BMI of
over 30. Furthermore, over half of these patients have multiple risk factors such as high blood pressure, diabetes and dyslipidemia. Based on the ICF score, the patients were included in all the 5 categories.

**CONCLUSIONS:** Variables analyzed in this paper represent risk factors to be considered for the management and rehabilitation of these patients. We further raise the question whether the ICF score should be included in the criteria for the initiation of rehabilitation following chronic venous insufficiency surgery.

**PREDICTORS OF DEPRESSION AMONG PATIENTS WITH CHRONIC PAIN**

Amanda McIntyre, PhD (C), Jerome Iruthayarajah, MSC, Swati Mehta, PhD, Shannon Janzen, MSC, Sarah Caughlin, PhD, Eilon Loh, MD, and Robert Teasell, MD, FRCP

**OBJECTIVES:** There is a strong link between depression and chronic pain; however, less is known about how factors may influence depression in this population. The objective of this study was to identify predictors of depression in a sample of patients with chronic pain.

**DESIGN:** In this cross-sectional study, individuals were recruited from a chronic pain clinic at Notre-Dame, Canada. Sociodemographic data and clinical health information was collected. The following outcome measures were completed by patients: Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder 7 item (GAD-7); Pain Disability Index (PDI), Brief Pain Inventory (BPI) severity and interference, CAGE Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder 7 item (GAD-7); Pain Disability Index (PDI), Acceptance and Action Questionnaire (AAQ). Associations between all variables and the PHQ-9 were determined using hierarchical regression modelling.

**RESULTS:** The sample consisted of 218 individuals (140 females, 78 males) with a mean age of 52.9±11.9 years and mean time since injury of 14.2±10.3 years. Time since injury, gender, living arrangement, and use of non-steroids were not correlated with depression. In the subsequent stepwise model, GAD-7 (R2 change=0.66; p<0.001), BPI pain interference (R2 change=0.062; p=0.001), ASI (R2 change=0.018; p=0.001), employment status (R2 change=0.009; p=0.016), AAQ (R2 change=0.008; p=0.019), and PDI (R2 change=0.008; p=0.021) were significant predictors of depression whereas age, type of pain, pain severity, education, cannabis use, morphine equivalent, and substance misuse were not. The overall model fit was R2=0.770 (p=0.021).

**CONCLUSIONS:** Anxiety, pain interference, employment status, and pain disability in life activities was found to significantly predict depression in this chronic pain population. These factors should be considered when evaluating and treating depression in individuals with chronic pain.

**PRESCRIPTION OF A PROSTHETIC LEG WITH A MICROPROCESSOR-CONTROLLED PROSTHETIC KNEE FOR A BILATERAL TRANSMENORAL AMPUTATION PATIENT WITH DILATED CARDIOMYOPATHY: A CASE REPORT**

Yoshihiro Kanata, Rehabilitation Specialist, and Tomoyuki Ito, Rehabilitation Specialist/Instructor

**CASE DIAGNOSIS:** Bilateral transfemoral amputation.

**CASE DESCRIPTION:** A 4-year-old boy experienced cardiac arrest after a marathon. After cardiopulmonary resuscitation, he developed rhabdomyolysis and underwent bilateral lower extremity (LE) amputation at the thighs. He was diagnosed with dilated cardiomyopathy and an implantable cardioverter defibrillator was implanted at 148 days after amputation. Thereafter, he was permitted activities of up to 8 metabolic equivalents (METs). He was admitted to our hospital at 266 days after amputation. Initial assessment showed muscle weakness [MMT (R/L): gluteus maximus 3/3, gluteus medius 3/3], limited range of motion [ROM (R/L): hip extension 10°/5°, hip adduction 10°/10°], decreased cardiovascular function, and inadequate residual limb steadiness. He started walking training with a prosthesis at 242 days after amputation. VO2 during walking with the prosthesis was 1032 mL/min (6.8METs). We selected a microprocessor-controlled prosthetic knee (MPK) to reduce the load on the heart. Finally, he was able to walk with the prosthesis using bilateral crutches for the management of transfemoral amputation.

**DISCUSSIONS:** We selected an MPK to reduce the energy cost because the patient was suggested to exercise at an intensity < 8 METs. A comparison between MPK and non- MPK knee revealed that oxygen consumption was less with MPK in patients with unilateral limb loss. Notably, our patient had bilateral LE amputation and cardiomyopathy. Therefore, in such cases, it is important to perform training with the prosthetic leg after determining the exercise intensity having a low risk of cardiomyopathy and then select the type of prosthesis.

**CONCLUSIONS:** Using MPK and regulating exercise intensity enabled the patient to walk with the prosthesis.

**PRESSURE INJURY PREVENTION IN PEOPLE WITH SPINAL CORD INJURY: MICROCONTROLLED SYSTEM IN A WHEELCHAIR SEAT**

Amanda Wilceki, Lucas Lavratti, Guilherme N. Neto, PhD, Maria de Fatima Fernandes Vara, SCM, Percy Nahorna, PhD, and Elgion L. dos Santos, SCM

**OBJECTIVES:** Development of a smart system to prevent pressure injuries in people with spinal cord injury through an integrated computer monitoring composed of a sensitive seat. The cushion is positioned in the wheelchair alerting the user through a smartphone app of a possible formation of pressure injury so that the individual can perform pressure relief maneuvers to prevent this wound.

**DESIGN:** A Velostat® layer was used as the main material in the seat due to its pressure-sensitive proprieties. It was possible to achieve up to a 10-bit precision (equivalent to 1024 levels) pressure data reading from the sensor array. Lab tests were conducted before proceeding to a patient trial, conducted with three low-risk patients according to the Waterlow Scale. It was prompted to the patient to sit on the sensor array, placed above the patient’s seat and wheelchair, for 20 min. The app notified the user after 10 min of elapsed time. Evaluation was done through a questionnaire, in accord with the Likert Scale, about health conditions and the utilization of the proposed system.

**RESULTS:** The system proved itself useful in notifying and presenting a graphical visualization of the varying pressure levels throughout the procedure, especially in the areas with higher propensity to lesions. The system also captured the movements related to pressure relief maneuvers performed by the patient. According to the questionnaire results, patients agreed on the safety.

**CONCLUSIONS:** This assistive technology is useful for demonstrating the highest pressure points in the wheelchair and alerting the individual to switch to a relief position because of the affected region preventing pressure injuries. Due to the low cost, demonstrates applicability to the low-income population and has the potential to reduce health expenses in treating this condition.
PREVALENCE OF SPINAL SEGMENTAL SENSITIZATION SYNDROME IN PATIENTS WITH CHRONIC MUSCULOSKELETAL PAIN IN A PHYSIATRIC PRACTICE: DIAGNOSIS USING A NEW SYSTEM OF CLASSIFICATION

Thomas Nakarato, MD, Galo Camacho, MD, Pablo Quezada, MD, and Roberto Alarcon, PT

OBJECTIVES: Spinal segmental sensitization (SSS) is the state of hyperreactivity of a spinal segment and its corresponding nerve roots. This syndrome leads to regional pain due to sensitization of the corresponding peripheral structures innervated (dermatomes/myotomes/sclerotomes). Our objective is to determine the prevalence of this condition using a new classification (proposed by the author), with the aim to systematize this diagnosis.

DESIGN: Clinical evaluation of new patients who attended a physiatric office for chronic (>3 months) musculoskeletal pain (CMP) were made to diagnose SSS using Fischer’s criteria, and classified into 10 segments: 1) Upper-cervical (C2-3, cervical-origin headache), 2) Mid-cervical (C4-5, neck-sholder pain), 3) Lower-cervical (C6-7, neck-to-external-upper-limb pain), 4) Cervicothoracic (C8-T1, neck-to-internal-upper limb pain), 5) Upper-thoracic (T2-4, dorsal-to-cheast pain), 6) Mid-thoracic (T5-8, dorsal-to-upper-abdominal pain), 7) Lower-thoracic (T9-11, dorsal-to-lower-abdominal pain), 8) Thoracolumbar (T12-L1, lumbar-to-groin pain), 9) Lumbar (L2-4, low-back pain), and 10) Lumbosacral (L5-S1, or “sciatica”).

RESULTS: 185 patients (from March/August 2019, age 55 ±19, 58% women) were evaluated. We found 77 (41.6%) with SSS (71.4% women). Prevalence by segments were: 1) Upper-cervical = 6 (7.8%), 2) Mid-cervical =24 (31.2%), 3) Lower-cervical =1 (1.3%), 4) Cervicothoracic = 1 (1.3%), 5) Upper-thoracic = 2 (2.6%), 6) Mid-thoracic = 1 (1.3%), 7) Lower-thoracic = 0 (0%), 8) Thoracolumbar = 3 (3.9%), 9) Lumbar =10 (13.0%), 19) Lumbosacral = 35 (45.5%).

CONCLUSIONS: SSS was highly prevalent in patients attending for CMP at the physiatric practice studied. The most frequent segments involved were lumbosacral, mid-cervical, lower-cervical and lumbar. There is a need for more studies about this syndrome, which may explain many non-specific pain syndromes, and the proposed classification may help to systematize research in this area.

PREVIEW OF NIH PROJECT: ATTEMPTING TO CREATE AN OBJECTIVE SCALE FOR PAIN

Maryam Hosseini, MD

OBJECTIVES: Currently we are working on a R34 NIH grant, attempting to create an objective scale for pain: This is intended to augment, and eventually replace the 10 point subjective scale.

DESIGN: Volunteer subjects have at least 5/10 pain for MRI confirmed rotator cuff syndrome. Exclusion criteria: previous shoulder surgery, neuromuscular disease, conditions causing pain with shoulder flexion/abduction, paralyis/limitations in movement of the face/limbs. Qualified subjects randomized to be either Sham plus intervention maneuver or simply intervention maneuver. Facial expressions and bodily movements were videotaped during arm abduction/flexion. If randomized for the sham group, they are then taught a novel maneuver, followed by repetition of videotaping them while they abduct and flex their arms. We then teach weather randomized in the intervention maneuver or simply intervention maneuver. Facial expressions and bodily movements were scored.

RESULTS: Both subjects and a physiatrist rate the subject's pain and 10 point subjective pain and the basis of the subjective video data. We have so far completed 160 of 200 subject, and have not yet submitted the data to the artificial intelligence analysis. However, we have done a preliminary investigation on the TFS maneuver, and it does significantly reduce the pain according to the subjects and the physiatrist’s 10-point scale reports.

CONCLUSIONS: The result was as follow: < 5%: 29.7%, 5-10%: 51.4%, 10% -20%:18.9%. These patients received good lymphoscintigraphic finding and were followed up for 1.5 years. In their serial volume change, 64.9% maintained or improved the degree of lymphatic edema, while 35.1% showed worsened results.

PROGRESSION OF HIP INSTABILITY IN CHILDREN WITH SPINAL MUSCULAR ATROPHY

Cosmo Kwok, MD, Alexis Gerber, BS, Wade Coomer, BS, Anne Stratton, MD, Joyce Oleszek, MD, Sayan De, MD, Frank Chang, MD, and Zhaoxuan Pan, PhD

OBJECTIVES: Hip subluxation and dislocation are known problems for children with spinal muscular atrophy (SMA). Medical complexity of these children typically results in absence of monitoring and intervention for pathologic hips. Patterns of hip migration and acetabular morphology in SMA have not been described. This study examines the progression of hip instability across all types of SMA in a pediatric population.

DESIGN: A retrospective chart review was performed. All x-rays taken before the age of 18 years containing adequate projections of the pelvis were measured for Reimer’s migration index (MI), acetabular depth ratio (ADR), and acetabular index (AI). Linear mixed effects model was fit to serial MI measures of individual hips with fixed effects consisting of SMA type, age at x-ray, and their interaction. ADR and AI measures were similarly modeled following conversion of raw values to z-scores.

RESULTS: Forty-five children with SMA types 1-3 were included. Six children were classified as type I, thirty-five type II, and fourteen type III. The interaction of age x SMA type was statistically significant (p<0.01), indicating a difference in the rate of hip subluxation between the three SMA types as measured by MI. By age 4, MI
values were different from one another across all three groups (p> 0.01). ADR decreased with age across all SMA types. The slopes of ADR regression lines were negative and statistically significant between the three groups (p=0.002). AI values were higher for all types of SMA, which is opposite that expected in normal limbs.

CONCLUSIONS: Hip subluxation occurs across all SMA types, most rapidly in SMA type 1. Regression lines of ADR and AI compared to those seen in unaffected populations suggest hips in children with SMA do not follow normal adaptive remodeling. As treatments advance, there is an increased need to monitor hip instability in children with SMA.

PROGRESSIVE DEGENERATION OF STATIC FOOT STABILIZERS LEADING TO ACQUIRED PES-PLANUS IN A WEEKEND ATHLETE: A CASE REPORT

Paul Chan, MD, Erin Barnes, MD, David Oh, MD, and Reed C. Williams, MD, MBS

CASE DESCRIPTION: A 35-year-old female with history of chronic left plantar fasciopathy, symptomatically resolved after ultrasound-guided fascial-scraping and injection develops a partial-tear of the plantar calcaneonavicular (spring) ligament and acquired pes-planus.

DISCUSSIONS: Calaver studies indicate that the plantar fascia contributes more to medial longitudinal arch stability than the spring ligament. During the gait cycle the foot transitions from flexible and ground-accommodating at heel strike to rigid and force-accommodating at toe-off. In this case, the spring ligament is excessively stressed owing to her maladapted arch-mechanics and her highly active lifestyle. Follow up at 1-week and 1-month revealed symptomatic improvement with compliance to conservative measures alone.

CONCLUSIONS: The static stabilizers of the foot are crucial to the integrity of the medial longitudinal arch. Plantar fasciopathy can initiate a degenerative process leading to arch deterioration, acquired pes-planus, and spring ligament injury; ultimately altering the integral mechanics of the mid-foot. Ultrasound can be a key tool in diagnosis and coordination of management, potentially preventing advanced work up and/or treatment.

PRONE TO HEALING: USE OF PRONE CARTS IN PATIENTS WITH POSTERIOR BURNS

Michael Lu, MD, and Mark Huang, MD

CASE DIAGNOSIS: 48% total body surface area full-thickness burns.

CASE DESCRIPTION: A 30-year-old male presented with significant full-thickness burns after his car caught on fire. His injuries required multiple escharotomies, grafting, and bilateral transfemoral amputations. On admission to our rehabilitation center, his skin exam demonstrated extensive open areas along his upper extremities, posterior aspect of his left residual lower limb, and along his bilateral buttocks. His functional mobility training and tolerance for upright activities were severely limited by buttocks pain and slow wound healing despite several adjustments to wound care. Work-up with X-ray is negative. Diagnostic ultrasound shows a normal posterior tibial tendon and course and a high-grade, partial tear of the spring ligament with dynamic gaping. Conservative care included a walking-boot and restrictions to loading activities to minimize gait stress/plantar deformity, allowing offloading and healing. Also, insoles to protect the arch from weight-loaded distortion were recommended.

DISCUSSIONS: Calaver studies indicate that the plantar fascia contributes more to medial longitudinal arch stability than the spring ligament. During the gait cycle the foot transitions from flexible and ground-accommodating at heel strike to rigid and force-accommodating at toe-off. In this case, the spring ligament is excessively stressed owing to her maladapted arch-mechanics and her highly active lifestyle. Follow up at 1-week and 1-month revealed symptomatic improvement with compliance to conservative measures alone.

CONCLUSIONS: The static stabilizers of the foot are crucial to the integrity of the medial longitudinal arch. Plantar fasciopathy can initiate a degenerative process leading to arch deterioration, acquired pes-planus, and spring ligament injury; ultimately altering the integral mechanics of the mid-foot. Ultrasound can be a key tool in diagnosis and coordination of management, potentially preventing advanced work up and/or treatment.

PROSPECTIVE RESEARCH STUDY: THE RELATIONSHIP BETWEEN AUDITORY STIMULI AND THE PAIN EXPERIENCE IN RESPONSE TO A NON-NOXIOUS NOCICEPTIVE STIMULUS

Devin A. Crevani, BA, SPT, Amy Tremback-Ball, PT, PhD, William Dunne, Patrick Killish, Chris Edkins, BS, SPT, Matt Norcini, and Matt Morris

CASE DESCRIPTION: This study seeks to determine the degree to which auditory stimuli are integrated into the pain experience and to elucidate the degree to which commonly encountered sensory stimuli amplify the pain experience.

CASE DESCRIPTION: The prospective study will make use of a one-way repeated measures design in which participants will be randomly assigned to receive one of two auditory stimuli (unpleasant sound, no sound) in the presence of a constant non-noxious nociceptive stimulus. Counterbalancing will be employed to minimize the influence of sequencing or order effects. These painful but not damaging stimuli will be administered to each participant in the form of a cold probe placed against the dorsum of the hand and electrical stimulation on the forearm. Subjects will then be asked to rate their pain on a visual analog scale (0-100) and complete the pain catastrophizing scale questionnaire. The subjects will return one week following the initial testing period for an additional visit during which they will experience the two noxious stimuli along with their pain condition. All doctors also take into consideration the weight of a prosthesis candidate? Mr. I.R., 29 years old, arrived to the Orthopedic Department of Loewenstein Hospital for rehabilitation after the Trans Knee Amputation because of Necroting Fasctis of the left leg. After leg amputation, the patient weighed 200 kg. The patient was admitted with an exudative wound at the end of the stump, in a very poor functional condition after prolonged hospitalization, with poor muscle strength in the arms and legs, confined to a wheelchair and bed, in a poor mood.

DISCUSSIONS: During the hospitalization, the patient was given intensive rehabilitative treatment by a multi-professional team: the stump wound was treated and healed. The patient received a prosthesis with a prosthetic socket and heavy-duty reinforcement, a titanium knee mechanism for Trans Knee Amputation and a heavy-duty foot. The patient practiced standing and later walking and gained independence in walking a distance of 100 meters with a wheel walker/crutches, was able to ascend and descend 14 steps with a prosthesis, a crutch and a handrail with a slight help. The patient was also treated with hand strengthening occupational therapy, monitored by a dietician and received social support.

CONCLUSIONS: The patient with moderate obesity, who underwent Trans Knee Amputation, received prosthesis rehabilitation tailored for his special needs. The patient was released to his home with independence in walking with a prosthesis and a desire for an active life.

PROXIMAL ACETABULUM: AN UNUSUAL CAUSE OF HIP PAIN

Michael Dove, MD, Oliver B. Acosta, MD, and Seema Khurana, DO

CASE DESCRIPTION: A 35-year-old female with history of chronic left plantar fasciopathy, symptomatically resolved after ultrasound-guided fascial-scraping and injection develops a partial-tear of the plantar calcaneonavicular (spring) ligament and acquired pes-planus.

DISCUSSIONS: Calaver studies indicate that the plantar fascia contributes more to medial longitudinal arch stability than the spring ligament. During the gait cycle the foot transitions from flexible and ground-accommodating at heel strike to rigid and force-accommodating at toe-off. In this case, the spring ligament is excessively stressed owing to her maladapted arch-mechanics and her highly active lifestyle. Follow up at 1-week and 1-month revealed symptomatic improvement with compliance to conservative measures alone.

CONCLUSIONS: The static stabilizers of the foot are crucial to the integrity of the medial longitudinal arch. Plantar fasciopathy can initiate a degenerative process leading to arch deterioration, acquired pes-planus, and spring ligament injury; ultimately altering the integral mechanics of the mid-foot. Ultrasound can be a key tool in diagnosis and coordination of management, potentially preventing advanced work up and/or treatment.
CASE DIAGNOSIS: Ankylosing spondylitis with resultant bilateral total hip replacement secondary to protrusio acetabuli.
CASE DESCRIPTION: A 37 year old male with history of ankylosing spondylitis presented with progressively worsening bilateral hip pain. The patient’s hip pain and instability progressed enough that ambulation became impossible without assistance. Examination of the patient’s bilateral hips demonstrated significantly decreased range of motion in all planes. He required moderate to maximal assistance in order to painfully ambulate with a waddling gait and with bilateral thighs in constant contact with each other. X-rays of bilateral hips showed severe deformity with erosion of the medial acetabular wall and medial displacement of the femoral head indicating severe bilateral protrusio acetabuli. The patient was referred to orthopedic surgery and underwent bilateral total hip replacement, which nearly resolved his pain. He was subsequently admitted to an inpatient rehabilitation unit for 10 days where he made significant gains in strength and range of motion before being safely discharged at the modified independent level.

DISCUSSIONS: Ankylosing spondylitis is a spondyloarthritides characterized by inflammation and ankylosis of the axial skeleton and sacroiliac joints. Hip involvement occurs in 25-35% of patients and is associated with increased degrees of disability and more severe axial disease. Between 5-8% of patients with hip pathology eventually require hip replacement. One rare manifestation is protrusio acetabuli, a condition where the acetabular line is medially displaced past the ilioischial line with resultant medial displacement of the femoral head. In such cases surgical hip replacement remains the only therapy that addresses symptoms and loss of function.

CONCLUSIONS: While an unusual presentation to a physiatrist, severe hip symptomatology in patients with known ankylosing spondylitis should prompt evaluation for the presence of protrusio acetabuli and possible hip replacement. Use of the Bath Ankylosing Spondylitis Functional Index (BASFI) would show clinical and functional improvement after surgery and subsequent rehabilitation.

QUALITY OF LIFE AMONG LOWER LIMB AMPUTEES: AN INSTITUTIONAL SURVEY
Zubair A. Khawaja, Nabila Somroo, MBBS, FCPS (PM&R), Mustaizah Fatima, MBBS, Syed Imran Ahmed, MBBS, FCPS, MSC, Madhia Zia, MBBS, FCPS, and Dildhas Hunain Al Anaba

OBJECTIVES: Lower limb amputation causes substantial deterioration of physical function, psychological status and social involvement compromising overall quality of life. Understanding and recognizing the most affected domain may help to design structured rehabilitation plan to enhance health care after amputation.

DESIGN: A Cross-sectional, non-probability study was conducted among unilateral lower limb amputees at Institute of Physical Medicine and Rehabilitation, Dow University of Health Sciences, Karachi from June 2018 to December 2018. After taking consent from participants information regarding age, gender, marital status, level of education, occupation status, area of residence, cause of amputation, level of amputation, time since amputation, use of prosthesis and satisfaction with prosthesis was recorded. Quality of life was measured using WHOQOL-BREF questionnaire. Data was analyzed using the SPSS version 23. Descriptive statistics were used and Chi square test with level of significance 0.05 (95%) was used to measure association.

RESULTS: 89 unilateral lower limb amputees were interviewed. Males were in majority (82%). The mean age was 39 and most participants were between ages of 40 to 60 years. Urban settlers (n=62), married (n=48) and unemployed (n=69) were in majority. Trans-tibial amputation (37%) as most frequent level and non-traumatic cause including diabetes (46%) was reported in majority participants. The mean quality of life score was 63 and median was 65. 69.6% reported poor and 30.3% reported good quality of life. Participants having younger age (0.047), employed (0.006), traumatic cause (0.000) and using prosthesis (0.005) had good quality of life scores. Poor score in each domain was associated with poor quality of life (0.000).

CONCLUSIONS: Structured rehabilitation program should not focus only improving physical health of amputee but provision of prosthesis use, removing environmental barriers, providing psychological support and vocational rehabilitation should be emphasize in order to have better outcome.

QUALITY OF LIFE ASSOCIATED FACTORS IN TUNISIAN POST-POLIO PATIENTS
Migao Houda, Professeur Agrege, Nedra Elfani, Doctor, Soumaya Boudkhimne, Professeur Agrege, S Nouilli, Doctor, Anis Jalied, Professor, and Zohra Ben Salah, Professor

OBJECTIVES: The aim of our study was to assess quality of life (QoL) and identify associated factors in patients with post-polio syndrome (PPS).

DESIGN: This is a descriptive study involving all PPS patients followed at the Physical Medicine and Rehabilitation department of the Monastir University Hospital. The data analyzed were epidemiological and clinical characteristics. QoL was evaluated by the Short form survey (SF-36), pain intensity: the Visual Analog Scale (VAS), fatigue:the Multidimensional Fatigue Inventory (MFI-20) and the Borg RPE scale, the functional independence measure (FIM) and psychological disorders with the Hospital Anxiety and Depression scale (HAD).

RESULTS: Forty five patients were included in this study, the average age was 52. 4 ± 7. 5 years. All areas of QoL were affected. The most affected domain was physical functioning (PF) with an average score of 32.5 ± 15.2. The QoL was better for the mental component (MC) compared to the physical component (PCS) (average score: 43.7 and 35.6 respectively). Statistically significant and negative correlation was found between the domains: “PF” and the mental health (MH) and the general mental component (MCS) of the QoL and the BMI. The SF-36 domains was negatively correlated with the Borg RPE scale and all items of fatigue assessed by the MFI-20 except for activity and motivation reduction, HAD and pain intensity.

CONCLUSIONS: Postpolio-syndrome has a negative impact on QoL. The identification, early recognition and rehabilitation of postpolio-syndrome patients may result in an improvement in their QoL.

RACIAL DISPARITIES IN INCIDENT DYSVASCULAR AMPUTATION LEVEL SELECTION IN A VA PATIENT POPULATION
Max Hurwitz, DO, Dan Norvell, PhD, MS, and Joseph Czerniecki, MD

OBJECTIVES: The goal of the current study is to determine if race is associated with the level of incident non-traumatic lower extremity amputation while accounting for demographic and comorbidity factors in a VA population. Transfemoral (TF) amputation may be the appropriate amputation for certain patients, but it carries a greater adverse impact on function and quality of life than transfemoral amputation (TFM) or transplantsial (TT). Prior research suggests that in addition to comorbidities, patient demographics, payor mix and geographic region are factors associated with rate and level of amputation. To our knowledge, this research did not limit patient selection to first amputation and therefore results may be confounded by prior major amputations.

DESIGN: Retrospective cohort study of 7,356 veterans undergoing an incident unilateral TM, TT or TF amputation secondary to diabetes and/or peripheral artery disease identified in the VA Surgical Quality Improvement Program database (2005-2014). The primary outcome was TF amputation compared to a more distal
amputation. Selected demographic, medical, surgical, laboratory and medication data were included in the multivariable model.

RESULTS: The overall risk of TF amputation across the VA was 34%. Black patients were at increased risk of TF amputation in the South (OR, 1.5; 95% CI, 1.2-1.8) and Mountain West plus Texas (OR, 1.6; 95% CI, 1.3-2.1). Hispanic TF amputation risk was greater in the South (OR, 3.2; 95% CI, 2.2-4.6) and if they had a mental health diagnosis (OR, 1.6; 95% CI, 1.1-2.3). Other factors associated with an increased risk of TF amputation included older age, married, smokers, COPD, CHF and those who were partially or totally dependent.

CONCLUSIONS: Racial disparities in incident amputation level exist within some geographically defined VA regions. Reasons for these differences are unknown, but follow-up studies to identify modifiable causes are important so that we may target interventions that address these healthcare disparities.

RADIOFREQUENCY NEUROTOMY IN A PATIENT WITH KLIPPEL-FEIL SYNDROME
Alex Schmidt, Byron Schneider, MD, and Reza Ehsanian, MD, PhD
CASE DIAGNOSIS: 73-year-old female presented with 5-month history of right upper cervical segment, 36% present with axial symptoms. In this setting of rare anatomy, the localization by fusion of adjacent cervical vertebrae. In patients with a single fused cervical segment, 36% present with axial symptoms. In this setting of rare anatomy, the location of the third occipital nerve and respective medial branches remains unknown. Without traditional fluoroscopic targets for RFN, multiple lesions were attempted to maximize lesion size.

CONCLUSIONS: Patients with Klippel-Feil syndrome provide technical challenges when considering RFN.

RADIOGRAPHIC AND FUNCTIONAL OUTCOME POST MINIMALLY INVASIVE LUMBAR DECOMPRESSION PROCEDURE
Ankur A. Patel, DO, and Navdeep S. Jassal, MD
CASE DIAGNOSIS: Lumbar spinal stenosis successfully treated with minimally invasive lumbar decompression (MILD).
CASE DESCRIPTION: 75-year-old female with a history of lumbar stenosis and multiple spinal comorbidities presented to an interventional pain clinic with worsening low back pain. Due to the pain, she was unable to walk more than 25 feet and stand for more than 15 minutes causing difficulty in her activities of daily living. MRI of the lumbar spine reported L3/4 moderate to severe canal stenosis with moderate left foraminal stenosis and L4/5 moderate to severe canal stenosis with moderate to severe left foraminal stenosis. Given the worsening pain, the patient elected to undergo a MILD procedure.

DISCUSSIONS: Postoperatively, she had 85% pain reduction as per Visual Analog Scale (VAS) and was able to stand for over 2 hours and walk over 0.25 miles without significant pain. 10 months post MILD reported moderate L3-4 left foraminal stenosis and mild L4-5 left foraminal stenosis. Of note, there was an improvement in the stenosis of the central canal diameter by 2 mm at L3-4 and L4-5, resulting in significant functional improvement. Lumbar spinal stenosis remains as one of the leading preoperative diagnosis for adults who undergo spine surgery. After patients fail geographic VA regions. Reasons for these differences are unknown, but follow-up studies to identify modifiable causes are important so that we may target interventions that address these healthcare disparities.

REALITY OF SCHOOL SPORT PARTICIPATION: A CROSS-SECTIONAL STUDY IN URBAN TUNISIAN STUDENTS
Sauassen Layouni, Resident, Islam Megdiche, Resident, Sabbi Elmatawia, Assistant, Wald Omoumes, Professor, Rihab Moncer, Assistant, Emma Tougui, Assistant, Faycal Khachamoui, Professor, and Sonia Jenmi, Professor
OBJECTIVES: The health benefits of increased levels of physical activity are widely established, including decreased risk for disease and improved mental well-being. The aim of this study was to determine student’s perceptions of school sports and their opportunities of an extracurricular sports practice.
DESIGN: A cross-sectional study was conducted in three primary school and three high school during one month (October 2018). Data were collected by self-reported questionnaires.
RESULTS: One thousand one hundred and twenty nine Tunisian students (555 boys, 574 girls), aged 10-16 years old (11.7±3.84) were present at the data collection and completed all the questionnaire. school sport is practiced by 92.5% students with a median of one hour per week and a real duration of 40 minutes but 36% of students are not satisfied with the quality of the session. On the other hand, 51.1% practiced extracurricular sports and the highest prevalence rate (16.7%). The median of duration was 1h [1-1.3]. A statistically significant relationship between socio-economic level and extracurricular sport practice (p < 0.001), also positive associations between physical activity and academic achievement among students (p < 0.001). The academic activity does not deprive the practice of extracurricular sport with p=0.11.
CONCLUSIONS: Participation in school sports and physical education during childhood and adolescence are frequently mentioned as factors likely to promote more active lifestyles in adulthood. If this is true, public policy should more vigorously promote broad participation in school sports and physical education.
RECURRENT BENIGN MYXOPAPILLARY EPENDYOMA: A RARE CAUSE OF FOOT DROP

Moorice Caparo, MD, and Dana H. Kotler, MD

CASE DIAGNOSIS: Spinal Cord Myxopapillary Ependymoma

CASE DESCRIPTION: A 40-year-old man with history of spinal cord myxopapillary ependymoma (SCME) presented with left foot drop. He was diagnosed with L1-4, S1-S2 SCME in 1999 status post partial resection. Following the surgery he developed residual left lower extremity (LLE) weakness which improved after 6 months of PT. He was lost to follow up with neurosurgery after 2013. He reported worsening foot drop over the last 4 months. He denied bladder or bowel incontinence, saddle anesthesia, sexual dysfunction, fevers or chills. Physical examination showed 0.5 strength in his left tibialis anterior and extensor hallucis longus with preserved foot eversion and inversion, steppage gait was noted.

DISCUSSIONS: Lumbar spine MRI from 2013 was reviewed which showed increase in size of S1-S2 central canal heterogenous enhancing mass compared to 2002 MRI. Imaging was repeated which showed minimal decrease in size of recurrent disease at L5 and S1-S2 since 2013. We recommended a course of PT focusing on lower extremity biomechanics, strengthening, gait, and trial of ankle foot orthosis. Were established care with neurosurgery who recommended continued surveillance. Spinal ependymomas are slow growing tumors which develop from ependymal cells of the central canal of the spinal cord. SCME are a rare variant of spinal ependymomas, with an incidence of 0.05–0.08 per 100,000 persons per year. Clinical presentation includes chronic axial lower back pain or radicular pain. Treatment consists of resection and adjuvant radiotherapy. Total resection is possible in 80–90% patients. There is a high risk of recurrence with partial resections.

CONCLUSIONS: Foot drop secondary to myxopapillary ependymomas should be included in the differential for patients presenting with gradual onset foot drop, regardless of the presence of back pain. Special attention should be given to patients with high risk of recurrence, including patients who underwent partial resection or did not receive adjuvant radiotherapy.

RECURRENT LUMBAR DISC HERNIATION: FINDING THE BALANCE BETWEEN CONSERVATIVE MANAGEMENT AND SURGICAL REVISION

Yuri Gordin, MD, Allan Probert, BS, Majid Dadgar, DO, and Vitaly Gordin, MD

CASE DIAGNOSIS: A 35 year old Female with failed back surgery syndrome who presents with worsening lower back pain, left lower extremity weakness and parasthesia was diagnosed with recurrent lumbar disc herniation and had complete resolution of her symptoms with surgical revision after failure of conservative management.

CASE DESCRIPTION: A 35 year old Female with failed back surgery syndrome stemming from L1-L3 fusion, L4-L5 and L5-S1 herniation decompression and laminectomies, presented to Chronic Pain clinic with worsening low back pain, left lower extremity weakness and parasthesia without concurrent bowel or bladder incontinence. After the aforementioned surgeries, conservative management with oral analgesics, physical therapy and interventional spine procedures failed to alleviate her symptoms. Her physical exam was significant for positive straight leg raise test in left lower extremity with paresthesia consistent with radiculopathy. MRI of L-spine revealed 20 x 16 mm disc extrusion at L4-L5, displacing thac sac posteriorly and resulting in foraminal stenosis. Subsequent L4 and L5 revision laminectomy, L2-S1 posterior fusion, as well as L4-L5 and L5-S1 foraminotomy fusion definitively resolved left lower extremity pain and parasthesia.

DISCUSSIONS: Recurrence of lumbar disc herniation (RLDH) is the most common complication of lumbar disc herniation surgery, seen in 5-15% of patients following initial herniation. Risk factors for RLDH include obesity, smoking, and strenuous weightlifting. This clinical vignette illustrates the importance of early recognition of RLDH and emphasizes conditions in which reassessment of surgical revision can minimize the risk of serious complications such as foraminal stenosis and cauda equina syndrome, particularly in the case of massive disc extrusion.

CONCLUSIONS: Prompt recognition of radicular symptomatology and neurologic compromise after failure of conservative management should prompt consideration for surgery, despite recurrence of lumbar disc herniation in the setting of failed back surgery syndrome.

REDUCING ON-CALL TIME DEMANDS, A RESIDENT-LED ORGANIZATION-DIRECTED INTERVENTION

Jason B. Edwards, DO, Bonny S. Wong, MD, Peter C. Yeh, MD, Monica Verdugo-Gutierrez, MD, and Joel Frontera, MD

OBJECTIVES: The World Health Organization defines burnout as a syndrome of exhaustion, cynicism, and reduced professional efficacy. Burnout is associated with decreased work satisfaction, risk of medical errors, depression, and suicide. A primary contributor to burnout includes excessive time demands. The purpose of this study was to develop, implement, and evaluate the effectiveness of a resident-led organization-directed intervention aiming to decrease documentation burden of the in-house on-call resident at a 130-bed stand-alone acute inpatient rehabilitation hospital.

DESIGN: After polling nationwide resident leadership on strategies to reduce time demands for on-call residents, we designed a holding note template consisting of the most common medical issues to replace the standard history, physical exam (H&P) for admissions arriving after 5pm. After hospital administration and residency program approval, holding notes were implemented. One year following implementation, we surveyed 24 resident physicians to assess time saved using holding notes. Secondary measures included residents’ perceived ability to handle cross-cover issues, number of patient adverse events, and overall satisfaction with the intervention.

RESULTS: Over 45 days, the average number of holding notes performed was 1.96 per weekday. 18 residents completed the survey. On average, a full H&P with admission orders took 92.22 minutes versus 34.44 minutes for a holding note with orders, a 57.78 minute difference. We used a 10 point Likert Scale (1=strongly disagree to 10=strongly agree) to measure secondary outcomes. The mean for residents’ perceived ability to handle cross-cover issues post-intervention was 9.33. The mean for perceived number of increased adverse events was 2.56. The mean for overall satisfaction with the intervention with regards to resident well-being and improved educational value was 8.89.

CONCLUSIONS: This intervention saved on-call residents approximately one hour per admission without adversely affecting patient care. This resulted in increased time to deal with cross-cover issues and overall, improved resident wellness and the learning environment.

REDUCING POST-OPERATIVE PAIN AND OPIOID CONSUMPTION THROUGH EVIDENCE-BASED MEDICINE: AN EDUCATIONAL QUALITY IMPROVEMENT PROJECT

Steven Markos, MD, Aakash Thakral, MD, Lei Lin, MD, PhD, and Sara Cuccurullo, MD

OBJECTIVES: Randomized clinical trials have demonstrated that scheduled high-dose acetaminophen (SHDA) decreases post-operative pain and opioid consumption; however, this is not yet common knowledge or practice. Our objective was to design an intervention for physical medicine and rehabilitation residents and fellows that increases their likelihood of prescribing SHDA for patients in acute rehabilitation with post-operative pain.

DESIGN: 16 resident/fellow participants received a case vignette of a patient being admitted to acute rehabilitation on opioids status-post lumbar laminectomy. Participants completed a medication reconciliation task then a pre-test on acetaminophen prescribing practices. Next, participants received an original one-page pamphlet detailing the utility of SHDA, and a post-test. Two weeks later, the same case vignette, medication reconciliation task, and post-test were given. Additionally, a retrospective chart review was performed on all post-operative patients admitted to our inpatient rehabilitation facility before and after the intervention among a subset of 4 resident participants on inpatient units. Study outcomes included self-perceived likelihood to prescribe SHDA, performance on the medication reconciliation task, and rate of actual SHDA prescription on the inpatient rehabilitation units.

RESULTS: Among 16 participants, self-rated likelihood to prescribe SHDA significantly increased following the intervention, both at day one (p<0.001) and two weeks follow-up (p=0.001). Participants were significantly more likely (p=0.004) to prescribe SHDA on the medication reconciliation task (0.16 before versus 8/16 after the intervention). Among actual patients in acute rehabilitation with post-operative pain, following the intervention there was a 9.1% increase in the rate of SHDA prescription among the 4 inpatient residents (0.58 before versus 5/55 patients after the intervention).

CONCLUSIONS: This project established an effective and low-cost intervention to promote evidence-based medicine and decrease pain and opioid consumption in post-operative patients. With further development, our intervention can be given across multiple acute rehabilitation settings to residents, fellows, and attending physicians.

REFRACTORY SHOULDER PAIN IN THE SPORTS MEDICINE CLINIC AS A PRESENTING SYMPTOM FOR METASTATIC LUNG CANCER: A CASE REPORT OF A DELAYED DIAGNOSIS

Brian C. Fricke, MD, and Jack B. Fu, MD

CASE DESCRIPTION: A 72 year old male with a history of metastatic adenocarcinoma of the lung presents with worsening right shoulder pain, following the intervention there was a 9.1% increase in the rate of SHDA prescription among the 4 inpatient residents (0.58 before versus 5/55 patients after the intervention).

CONCLUSIONS: This project established an effective and low-cost intervention to promote evidence-based medicine and decrease pain and opioid consumption in post-operative patients. With further development, our intervention can be given across multiple acute rehabilitation settings to residents, fellows, and attending physicians.
CONCLUSIONS: La practica diaria en pacientes con patrón restrictivo el tratamiento se centra en la realización de ejercicios para mejorar la tolerancia al ejercicio, hipercapnia, arritmia cardiaca, broncoaspriación siletente en paciente con patrón restrictivo. Los síntomas se presentan en momentos de baja intensidad, mientras que los síntomas de alta intensidad pueden aparecer durante el ejercicio. En consecuencia, se debe seleccionar un programa de rehabilitación pulmonar que incluya ejercicios para mejorar la función pulmonar y la calidad de vida.

REHABILITACIÓN PULMONAR EN PACIENTES CON ESPASTICIDAD
Giovanna Barragán, INE
CASE DIAGNOSIS: Simposio "rehabilitación pulmonar en pacientes con espasticidad." Objetivo terapéutico: mejorar la función pulmonar al mejorarse la espasticidad.
CASE DESCRIPTION: Programa de Rehabilitación Pulmonar: Intervención integral basada en la minuciosa evaluación del paciente seguida de terapias diseñadas a medida que incluyen, pero no se limitan al entrenamiento muscular, la educación y los cambios en los hábitos de vida, con el fin de mejorar la condición física y psicológica de las personas con enfermedad respiratoria crónica y promover la adherencia a conductas para mejorar la salud a largo plazo. La limitación al ejercicio es un factor que obstaculiza la participación del individuo en las actividades de la vida diaria. El síndrome cardiolítico es la disnea y/o fatiga que resulta de alteraciones ventilatorias. Dentro de la patología respiratoria restrictiva, hay que distinguir los procesos de pared torácica de la patología parenquimatosa. Evaluación inicial, estudios complementarios: PP, Fibroscopio de tos, ETCO2, evaluación multi-disciplinar: Neumología, Neurología, Cardiología, Deglución y Foniatría.
DISCUSSIONS: Los problemas respiratorios de los enfermos con patología neuromuscular pueden dividirse en dos grupos: los derivados de la dificultad para expulsar las secreciones de las vías aéreas y los relacionados con la incapacidad para conseguir una adecuada ventilación alveolar. La práctica diaria en pacientes con patrón restrictivo el tratamiento se centra en la realización de ejercicios para mejorar la función pulmonar, la hipercapnia, arritmia cardiaca, broncoaspriación silente en pacientes con patrón restrictivo.

REHABILITATION APPROACH TO SCIATIC NERVE SCHWANNOMA: A CASE REPORT
Anton Matveev, MD, Sean P. Delany, Matthew E. Roland, and Cora Brown, MD
CASE DIAGNOSIS: A 24-year-old woman presented to outpatient clinic with 5 years of worsening lower gluteal pain radiating to her right posterior calf with intermittent numbness. Neuromuscular examination showed initial tibialis lateralis tenderness and hip tightness. EMG was consistent with chronic right L4-S1 radiculopathy. Lower extremity MRI demonstrated sciatic nerve schwannoma, a grossly complex and multi-lobulated tumor, which was subsequently resected.
CASE DESCRIPTION: At 6-week post-op, she had a right antalgic gait, gluteal and gastrocnemius atrophy, with persistent hip flexors and abductors tightness. She was unable to tiptoe on her right foot as compared to total weight-bearing with eccentric left calf activation. Sensation was diminished in the right posterior calf and plantar foot. She was unable to work and required gabapentin for pain. Due to significant gait dysfunction and focal post-surgical weakness, patient was referred to physiatry and an outpatient PT program was initiated. After 6-week PT program including low frequency electromyostimulation (EMS), active hip ROM, slow treadmill walking and TENS, notable improvement was observed in manual muscle testing, hip tightness, and the lower extremity functional scale which increased by 75%. At 8-week follow-up, she experienced minimal episodic pain, had discontinued gabapentin and returned to teaching kindergarten. She then transitioned to home program of hip stretching and calf strengthening exercises.
DISCUSSIONS: Sciatic nerve schwannoma is a rare disorder that can present as lumbosacral radicular pain and mimic hip or sacroiliac joint dysfunction. Management of schwannoma often involves surgery, which poses various complications. Following resection, our patient developed a functional decline with gluteal and gastrocnemius atrophy, weakness, and pain. This case emphasizes the role of therapy with low-frequency EMS, ROM/stretching which were initiated at 6 weeks post-operatively.
CONCLUSIONS: Prompt physiatrist evaluation and timely institution of low-frequency EMS with conventional physical therapy, aid in axonal regrowth and maximize function following sciatic nerve schwannoma resection.

REHABILITATION CONSIDERATIONS FOR MITOCHONDRIAL ENCEPHALOMYOPATHY, LACTIC ACIDOSIS, AND STROKE-LIKE EPISODES SYNDROME (MELAS)
Jefferson S. Grisovacav, ATC, and R. Samuel Mayer, MD
CASE DIAGNOSIS: MELAS Syndrome
CASE DESCRIPTION: This is the case of a 56-year-old gentleman with late-onset, progressive-relapsing MELAS syndrome. His past medical history is remarkable for childhood exercise intolerance and intermittent myoclonic seizures. He was admitted to the inpatient rehabilitation service following an acute stroke-like episode, at which time he presented with right hemiparesis, right-sided hemianopsia, right-sided intention tremor, impaired speech, and significant ideomotor and constructional apraxia. The patient responded well to aggressive inpatient rehabilitation, and by discharge was able to perform most ADLs independently. Unfortunately, the patient’s
post-discharge course has been complicated by bouts of debilitating muscle spasms and cognitive “fogginess,” resulting in frequent emergency department visits and hospitalizations.

**DISCUSSIONS:** MELAS syndrome is a rare inherited mitochondrial disorder that affects multiple organ-systems. Its diverse clinical manifestations include: stroke-like episodes, seizures, aphasia, myopathy, vestibulocochlear deficits, cortical blindness, lactic acidosis, neurocognitive decline, and ultimately death. Imaging usually reveals progressive, multi-focal lesions crossing vascular territories. No curative interventions exist; first-line management typically includes OTC supplement cocktails (L-arginine, taurine, creatine-monohydrate, and Coenzyme-Q10), which provide symptomatic improvement. However, pharmacologic treatment alone is inadequate. Given the broad spectrum of disease-related impairments and resulting disability, maximizing patients’ quality of life necessitates multidisciplinary, longitudinal, and individualized rehabilitation efforts. Promising new research demonstrates the efficacy of neuropsychological rehabilitation in improving executive functioning in cognitively-impaired MELAS patients; likewise, anecdotal evidence suggests aggressive physical/occupational/speech therapy is effective in restoring ADLs. Comprehensive rehabilitation must also extend into the patient’s social network, encompassing family education on inheritance patterns and disease course, as well as mitigating barriers in home and community life.

**CONCLUSIONS:** Comprehensive rehabilitation is crucial to optimizing quality of life for patients with MELAS syndrome. A successful rehabilitation course requires multi-organ system management and coordination of patient-centered, interdisciplinary care. Fortunately, many of the physical and cognitive deficits associated with MELAS syndrome appear amenable to rehabilitation efforts.

**REHABILITATION OF A CASE OF HAEMOPHILIA - A**

Muah Bin Noor, MBBS

**CASE DIAGNOSIS:** Haemophilia A with complications resulting in Transisthrial Amputation and Peripheral Neuropathy.

**CASE DESCRIPTION:** A 14 year old diagnosed case of Haemophilia A developed haemarthrosis right ankle leading to Pseudotumor. Infection in pseudotumor progressed to osteoartecitis left Calcaneus, talus and Tarsal bones, resulting in right sided transisthrial amputation. Clinical findings included right sided transisthrial amputation, mild Pes Cavus of left foot and clawing of both hands. Manual Muscle testing revealed diminished power in the distal musculature of bilateral upper limbs and left lower limb. Sensations for pinprick, soft touch, joint perception, propriocception and vibration sense were impaired in bilateral hands as well as left foot. Nerve Conduction Studies/Electromyography revealed chronic symmetrical sensorimotor axonal polyneuropathy. The patient underwent preprosthetic training and was provided a right sided modular transisthrial prosthesis. In addition, he underwent Physical therapy to improve strength in sound lower limb, gait training to achieve an energy efficient gait, as well as occupational therapy to improve strength and dexterity of bilateral upper limbs.

**DISCUSSIONS:** Limb amputations as a result of haemarthrosis or pseudotumor are rare complications of blood dyscrasias, including haemophilia. In addition, neuropathies and neuromyopathies have also been reported in Haemophilic patients. This case is unique in that its management fell squarely in the physiatric domain, involving prosthetic rehabilitation as well as rehabilitation of a peripheral nervous system disorder. It is the first such case seen at our tertiary care rehabilitation hospital, as well as the first to be reported from Pakistan.

**CONCLUSIONS:** Blood dyscrasias including Haemophilia A can in certain rare instances present with complications warranting physiatric management. A holistic treatment plan involving multidisciplinary care under the leadership of a PMR physician can ensure that such patients receive optimal care in order to lead productive lives.

**REHABILITATION OF CHRONIC LOW BACK PAIN IN A PATIENT USING A HUMANOID ROBOT (R-COOL): A PRELIMINARY FEASIBILITY STUDY**

Agathe Blanchard, Olivier Remy-Neris, Mai Nguyen, Mathieu Simonnet, Xavier Mallauran, and Myriam Le Goff-Pronost

**CASE DIAGNOSIS:** The R-COOL study, funded by Echod++ EU program, is a preliminary study in chronic low back pain patients. Its main objective was to evaluate the feasibility of a humanoid robot supervision of a set of movement performed in rehabilitation. Symptomatic improvement.

**CASE DESCRIPTION:** This prospective, randomized, controlled, single-blind and bi-centric study compared a usual rehabilitation program to the same one from which 30 minutes a day of physical activity were substituted by robot supervised movements. The primary endpoint was the time spent for physical activity. The secondary endpoints were lumbar pain, disability, fear and beliefs related to physical activity, acceptability and adverse events. The control group practiced 3 hours per day 5 days a week during 3 weeks a conventional rehabilitation program. The robot group performed 1.5 hours of the same treatment and 30 minutes of rehabilitation supervised by the robot.

**DISCUSSIONS:** 30 patients were randomized, 15 in each group. 3 patients were excluded from the analysis in the robot group. The duration of rehabilitation did not differ between groups. No statistically significant differences between groups were observed for the secondary endpoints except for patient satisfaction which was lower in the robot group. No severe adverse event was reported.

**CONCLUSIONS:** Robot supervised exercises can be inserted in rehabilitation programs in chronic low back pain patients. Although technology driven physical activity programs have not demonstrated to improve the medical condition of these patients more than conventional therapy, they may nevertheless reduce costs and enhance the number of patients benefiting from these programs.

**REHABILITATION OF DEDIFFERENTIATED SACRAL CHORDOMA S/P RADICAL SACRAL RESECTION AND RECONSTRUCTION: A CASE REPORT**

Ali Esfahani, MD, MBA, Richard Aguilera, MD, George Choma, DPT, Katherine Ledyard, APRN, CNP, and Angelina Trovato, BS

**CASE DIAGNOSIS:** Dedifferentiated Sacral Chordoma s/p Radical Sacral Resection and Reconstruction

**CASE DESCRIPTION:** This case report is regarding a dedifferentiated chordoma in the sacrococcygeal region of a 75-year-old female. The patient was admitted to the Inpatient Rehabilitation Facility due to impaired activities of daily living and mobility after undergoing radical sacrectomy with excision of 11 cm sacral chordoma, exploratory laparotomy with abdoninoperineal resection and colostomy creation, and sacral reconstruction with vertical rectus abdominis myocutaneous (VRAM) flap for treatment of sacral chordoma. Subsequent surgical pathology showed dedifferentiated sacral chordoma; sacral incision site measured 13 x 6 cm.

**DISCUSSIONS:** Dedifferentiated chordoma is an exceptionally rare primary high-grade malignant tumor that occurs in the spine. To our knowledge, due to the rarity of the disease, no reports exist regarding the inpatient rehabilitation in this subset of patients, particularly following a radical sacral resection. During her IRF stay, patient was positioned laying on her side at 60 degrees when in bed and during transport. Physical therapy and occupational therapy sessions were implemented daily and were well-tolerated by the patient. Despite the presumed alteration in her center of gravity following the radical sacral resection, she was able to maintain her line of gravity while standing and walking. After completion of 16 days in inpatient rehabilitation, patient achieved a modified independent function for her transfers and walking. Total FIM was 46 on admission and 77 on discharge, leading to a FIM improvement per day of 1.94.

**CONCLUSIONS:** This case reviews the protocol used in positioning patients after reconstructive sacral surgery, demonstrates the body’s center of gravity is maintained despite resection of a large sacral spinal mass, and shows the functional rehabilitation outcome with this extremely rare disease.

**REHABILITATION PROGRAM BENEFITS OF MYELOMENINGOCELE IN ADULTHOOD**

Dmitro Plicaru, MD, and Ramona Plicaru, MD


**CASE DESCRIPTION:** We present the case of a 22 years old male patient, admitted at our hospital for persistent dorsalgia, inability to maintain vertebral posture, bladder dysfunction, lower extremity anestheisa associated with severe motor deficiency. His general condition is relatively stable. BP=120/70 mmHg, HR=74/min, SO2=97%, temporal-spatial oriented, cooperative, lumbar lordosis flattening, dextroconvex dorsolumbar scoliosis, dorsolumbar hyperlordosis, loss of bilateral motor control and anesthesia of the lower limb, muscle strength of the lower limbs=0,5, lower limbs hypotrophy, modified ashworth scale=3, right knee flexum= 110° and left= 120° reductible. The patient performs transfers and requires wheelchair with permanent assistance for another person for ADL, intermittent bladder catheterization. Lab workup: non-specific inflammatory syndrome, dislipidemia, hyperuricemia, urinary tract infection. Standard ECG: unremarkable. Brain MRI: Chiari II malformation, important triventricular hydroceles secondary to Sylvius aqueduct stenosis.
Spinal cord MRI–spinal bifida-myelomeningocele associated with complex vertebral anomalies.

DISCUSSIONS: The rehabilitation program was adapted to the current clinical status of the patient and included: kinetotherapy, occupational therapy, masotherapy, thermotherapy, analogic electrotherapy. Recovery for the lower limbs had minimal but important clinical outcomes for this patient. On the other hand, favorable Results were obtained, such as: increased muscular strength, coordination and posture in the upper body, improved transfers and mental status.

CONCLUSIONS: The case presented is a difficult one in terms of recovery management because implies an adult subject with severe pathology, uninvestigated and neglected. It is crucial for a multidisciplinary team follow-up (orthopedist, neurologist, urologist) as well as a complex rehabilitation program to increase the survival rate of these individuals and social adaptation. This case emphasizes once more the need for early diagnosis, fetal and postnatal surgery and rehabilitation.

REHABILITATIVE THERAPY FOR POST OPERATION OF HEAD AND NECK CANCER
Tsengelmaa Tserendorj, Professor

OBJECTIVES: Head and neck cancer is one of the common and 6th of cancer caused mortality in Mongolia. In last 5 years, there were total 1738 patients had surgery done due head and neck cancer. However most of the patients do not get rehabilitative treatment after operation. Head and neck site cancer operation impacts on mouth opening, swallowing, tongue rotation of movement, voice and speech. Results Bell’s palsy, and my other complications. Rehabilitative therapy reduces patient’s pain and improves overall quality of life. There are no rehabilitative therapy guideline for head and neck cancer. This study aims to reveal the necessity of the therapy.

DESIGN: Pre and post rehabilitative therapy evaluation was made involving 82 patients, who have surgery done within Jan 2018–Jan 2019. In evaluation following measures used: Bell’s palsy, Vas, Borg, neck ROM and mouth opening in cm.

RESULTS: Rehabilitative therapy is effective in reducing edema of salivary gland (p< 0.001), opening mouth (p< 0.00) and improving neck (ROM p< 0.001). It was also effective on reducing pain and fatigue.

CONCLUSIONS: The study result shows that rehabilitative therapy for head and neck cancer operation is significantly reducing the surgery caused impacts, movement limitation, opening mouth, fatigue and pain. It is highly recommended for every patients who have head and neck cancer surgery done.

RELATIONSHIP BETWEEN PSYCHO-SOCIAL AND FUNCTIONAL LIMITATIONS WITH PROSTHESIS SATISFACTION IN LOWER LIMB AMPUTEES
Naimeh Rouhani, Taher Babaei, PhD, and Behrad Kayvan

OBJECTIVES: Amputation have significant impact on psychosocial condition of subjects with lower-limb loss. The goal of rehabilitation programs for these subjects such as prescription of a prosthesis, is to return to work, to achieve independence in order to perform daily living and social activities. Therefore, a proper prosthesis is a key indicator to obtain a successful rehabilitation plan in this population. The aim of this study is to evaluate the relationship between psychosocial and functional limitations with prosthesis satisfaction in lower limb amputees.

DESIGN: This cross-sectional study was performed on 38 patients with lower limb amputation (25 below knee, 13 above knee) with mean age of 46.15 ± 13.41 years. All participants completed the Trinity Amputation and Prosthetics Experience Scale (TAPES). To evaluate the adaptation of patients with prosthesis-related general and social limitation, the functional status and satisfaction with prosthesis, the scores of psychosocial adjustment, functional restriction and the satisfaction domains of the TAPES were calculated, respectively. Pearson correlation coefficient was used to determine the relationship between functional and psychosocial restriction of patients with satisfaction. A P-value of < 0.05 was considered for all statistical analyses.

RESULTS: The mean score of the psychosocial adjustment, functional limitations, and the satisfaction domains were 9.60± 1.67, 11.05 ± 5.67, and 8.85 ± 2.28, respectively. The total score of TAPES was 29.53 ± 6.20. The result of Pearson correlation test showed that there was no statistically significant relationship between prosthesis satisfaction, functional limitations and psychosocial adjustment (P>0.05). The quality of life score was significantly similar between people with above and below knee amputations.

CONCLUSIONS: The results of this study showed that the level of amputation is not a determining factor in the overall quality of life score of lower limb amputees. We found that the relationship between psychosocial and functional limitations with prosthesis satisfaction was low to moderate.

RELATIONSHIP BETWEEN SLEEP QUALITY AND PHYSICAL ACTIVITY LEVEL IN PATIENTS WITH ANKYLOSING SPONDYLITIS
Bena Urdmez, MD, and Vahid Keskin, MD

OBJECTIVES: Data from the literature emphasizes that exercise should be a part of treatment in patients with ankylosing spondylitis (AS) and also suggests that exercise level is associated with disease activity. It is also suggested that sleep disorders are more common in AS patients than in the normal population. The aim of this study was to investigate whether there is a relationship between exercise level and sleep quality in AS patients.

DESIGN: In our study, 150 AS patients fulfilled the altered New York criteria and 80 healthy controls were included. Demographic and laboratory data of both groups were recorded. Physical activity levels of both groups were evaluated using International Physical Activity Questionnaire (IPAQ-s) short form. Sleep quality of the participants was evaluated using Pittsburgh Sleep Quality Index (PSQI). Pain was measured by visual analog scale in two ways: activity and rest. Disease activity and functional status was evaluated by Bath AS Disease Activity Index and Bath AS Functional Index.

RESULTS: Subjective sleep quality, habitual sleep efficiency, sleep disturbance and Total PSQI scores were significantly higher in the patient group compared to healthy participants. The IPAQ score was found to be statistically significantly lower in the patient group. Sleep disturbance, one of the components of PSQI, was found to be significantly higher in patients with low IPAQ score.

CONCLUSIONS: Sleep disorders were found to be higher in AS patients than in the normal population and physical activity levels of AS patients were lower than the normal population. In addition, Sleep disturbance which is one of the components of PSQI was found to be high in patients with low physical activity. Therefore, it should be remembered that one of the causes of sleep disorders in AS patients may be related to low physical activity.

RELATIONSHIPS BETWEEN PHYSICAL ACTIVITY, SCHOOL SPORTS AND ACADEMIC PERFORMANCE
Saoussen Layouni, Resident, Iqbal Kessiche, Resident, Sabhi Elmoutaw, Assistant, Walid Ouannes, Professor, Rihab Moncer, Assistant, Emna Toulgui, Assistant, Faycal Khachnouchi, Doctor, and Sonia Jenni, Professor

OBJECTIVES: Opportunities for children to be physically active during school time are scarce and becoming increasingly so. Our intent in this article is to assess the effects on academic achievement of school Physical activity programs in middle school students and primary school.

DESIGN: A cross-sectional study was conducted in three primary school and three high school during one month (October 2018). Data (Age, school physical activity, hours per week of school sport and Academic Outcomes school) were collected by self-reported questionnaires.
RESULTS: One thousand one hundred and twenty nine Tunisian students (555 boys, 574 girls), aged 10–16 years old (11.7±3.84) were presents at the data collection and completed all the questionnaire. Median of Annual average was 14 [11.51-15.97] in group who practice school sport. The statistical correlation indicate positive association between physical activity involvement and academic achievement among students (P<0.001).

CONCLUSIONS: Practice of a physical activity by children would deserve being largely encouraged, taking into account its beneficial effects not only on health, but also on academic performances. Parents and teachers, as well as health professionals, should be strongly informed.

RELATIVELY COMMON BUT UNRECOGNIZED DISORDER: NOTALGIA PARESTHETICA
Cevriye Mülkoğlu, and Barış Nacar
OBJECTIVES: Notalgia Paresthetica (NP) is a sensory neuropathy characterized by hyperpigmented patch, localized itching and neuropathic pain in the midcervical region. The aim of this study was to analyze the patients who diagnosed with NP by reviewing clinical, epidemiological, radiological localization of damage, Secondly, we assessed the efficacy of neural therapy (therapeutic local anesthetic injection) in NP patients suffering from neuropathic back pain.

DESIGN: A total of 28 patients who admitted to our outpatient clinic and diagnosed with NP were included in this study. The diagnosis of NP was based on clinical examination. Patients’ clinical and demographic features were recorded. Severity of back pain and pruritus was assessed by visual analog scale (VAS). The characteristic duration and localization of the patches were noted. Antero-posterior cervical and thoracic spine radiographs of all patients were completed and localization of degenerative changes on the spine were evaluated. We applied neural therapy for 10 patients and prescribed local capsaicin for those who rejected this application.

RESULTS: Of the 28 patients with NP 22 were females and 6 were males. The mean age was 58.2±11.0 (range 31-77) years. The back pain was burning manner in most of the patients. Most patients had itching and hyperpigmented patch on the right side of the scapulae. The most common disease accompanying with NP was hypertension (HT) (10 patients). The mean VAS-pain score was 7.75 (6-9) and VAS-pruritus score was 8.25 (7-9). The patients had 37 cervical and/or thoracic spinal lesions on plain radiographs.

CONCLUSIONS: Female gender, hypertension and cervical pathologies especially C6-7 disk lesions seem as risk factors for NP. In additionally, we achieved successful results with neural therapy applications in management of NP.

RELIABILITY AND DIAGNOSTIC ACCURACY OF A NEW SET OF DIAGNOSTIC CRITERIA FOR THE SPINAL SEGMENTAL SENSITIZATION SYNDROME: A PILOT STUDY
Toru Nakazato, MD, Gálo Camacho, MD, Pablo Quezada, MD, and Roberto Alarcon, PT
OBJECTIVES: Spinal segmental sensitization (SSS) is a regional and chronic musculoskeletal pain (CMP) disorder, characterized by hyperexcitability of nerve fibers corresponding to a spinal segment, giving rise to symptoms and signs to the corresponding dermatomes/myotomes/sclerotomes. Fischer (based on Gunn and Maigne) formulated the diagnostic criteria, but they were difficult to apply and depended on the interpretation of the examiner. This pilot study aimed to observe the reliability and diagnostic accuracy of a new set for diagnosis, proposed by the author, operationally defined and easier to perform, based on similar CMP syndromes (fibromyalgia and CRS I).

DESIGN: We recruited new patients attending a physiatric office for CMP (>3 months) who signed an informed consent. Diagnosis of SSS was made by the principal researcher (trained directly by the late Fischer), and this was considered the reference standard. The auxiliary researchers, blinded by the results of the first evaluation, examined the same patient thereafter using the new set of diagnostic criteria. Results were arranged in a 2x2 contingency table. For interexaminer reliability we calculated the Cohen’s kappa-coefficient (κ), and for diagnostic accuracy we calculated the overall accuracy (OA), positive and negative predictive values (+PV and -PV), sensitivity (Sn) and specificity (Sp).

RESULTS: 31 patients were evaluated (from March/August 2019, age 58 ±13, 58% women). The κ =0.535. OA =77%, +PV =75%, -PV =82%, Sn =88% and Sp =64%.

CONCLUSIONS: The new set of diagnostic criteria showed moderate interrater reliability and good diagnostic accuracy. It may provide a standardized methodology to diagnose SSS, promoting better communication between investigators, and obtaining more homogeneous samples to evaluate therapeutic interventions. There is a need to expand this study to properly validate it.

REPRESENTATION OF WOMEN PHYSICIANS AS PLENARY SPEAKERS AT ANNUAL PHYSICAL MEDICINE AND REHABILITATION CONFERENCES
Monica Verduzco-Gutierrez, MD, Julie K. Silver, MD, Linda M. Gingrich, MD, FAAFP, Harriet Hofp, MD, and Sarah Diekman, MD, MS
OBJECTIVES: To investigate representation of physician speakers by gender among plenaries at the American Academy of Physical Medicine and Rehabilitation (AAPM&R), the Association of Academic Physiatrists (AAP), and the American Congress of Rehabilitation Medicine (ACRM).

DESIGN: A list of annual plenary speakers was provided by AAPM&R (2007-2018), AAP (2009-2017) and ACRM (2011-2018) upon request. This 12-year history of the three primary specialty organizations in the United States were analyzed. Included were all categories on the list provided. The primary outcome measures were overall and physician plenary speakers evaluated by gender.

RESULTS: During the period studied, the proportion of women as Physical Medicine and Rehabilitation (PM&R) faculty increased from 33.5% (2007) to 35.3% (2017) in academia, and our medical societies invited 130 plenary speakers to the annual meeting. Of these speakers, 94 (72.3%) were men and 36 (27.7%) were women. Looking at the sub-group of 64 physician plenary speakers, 47 (73.4%) were men and 14 (26.6%) were women.

CONCLUSIONS: Women are often underrepresented among plenary speakers. Although the reasons are not clear, these findings warrant further investigation.

RESIDENT ACCURACY OF FOOT AND ANKLE PALPATION WITH ULTRASOUND VERIFICATION
Jason Bitterman, MD, Mooyeon Oh-Park, MD, MS, and Rex Ma, MD
OBJECTIVES: To determine the accuracy of physical medicine and rehabilitation (PM&R) resident palpation of foot and ankle structures using ultrasound as verification.

RESULTS: 30 PM&R residents palpated and marked with an assigned color marker on a male model the tibiotalar joint, talonavicular joint, calcaneocuboidal joint, 2nd and 4th tarsometatarsal joints, tibialis posterior tendon, and peroneal tendons. An attending physician then assessed each site's accuracy using a paperclip placed over each marking and scanned. The paperclip’s reverberation artifact on ultrasound determined if the marking on the surface was over the intended structure. The primary outcome was palpation accuracy of the seven structures. The secondary outcome measures were comparisons of accuracy between class years, gender, and intended career plans.

RESULTS: Among all residents, the accuracy within 1cm for the tibiotalar, talonavicular joint, calcaneocuboidal joint, and second and fourth tarsometatarsal joints, tibialis posterior tendon, and peroneal tendons were 93.3%, 50%, 26.7%, 93.3%, 50%, 26.7%, 13.3%, 20%, 63.3%, and 83.3% respectively. 56.6% of residents labeled the talonavicular joint at the metatarsophalangeal joints. 36.67% of residents identified the calcaneocuboidal joint as a medial foot structure and 13.33% of residents identified the talonavicular joint as a lateral structure. When comparing accuracy within 1cm by class year using the Pearson’s chi-squared test, there was a significant difference for the talonavicular joint, the calcaneocuboidal joint, the posterior tibialis tendon, and peroneal tendons. Eleven out of 30 residents planned on pursuing an MSK-related career. When comparing accuracy within 1cm between this group and other residents, the only statistically significant difference was for the posterior tibialis (100% vs. 42.11% accuracy). There were no differences by gender.

CONCLUSIONS: This study demonstrates that foot and ankle anatomical knowledge and palpation skills are an area of improvement for PM&R trainees. Residency programs should strive to improve teaching of these structures.

RESOLUTION OF BILATERAL FOOT DROP AFTER PLACEMENT OF AN INTERSPINOUS SPACE: A CASE REPORT
Nomen Azeem, MD
CASE DIAGNOSIS: Bilateral Foot Drop
CASE DESCRIPTION: A 68 year old male with bilateral leg pain and bilateral foot drop for approximately 3 years. EMG/NCS done revealed bilateral L4 Radiculopathy. He failed physical therapy was prescribed ankle foot orthotics for his bilateral foot drop. He reported that pain and weakness in the legs is worsened with walking moderate distances, standing upright for longer periods of time, and
increased activity. MRI revealed at L4-5, moderate central canal stenosis with bilateral lateral recess narrowing, and bilateral neural foraminal narrowing. An interspinous spacer device was placed at the L4-5 level under MAC sedation with fluoroscopic guidance in the setting of an ambulatory surgery center with no complications.

**DISCUSSIONS:** 1 week post-operative the patient reported a recovery period with no complications and he reported >90% pain relief in his legs and improved ability to stand for longer periods of time, walk further distances, and resolution of his bilateral foot drop and was able to ambulate with a normal gait without his ankle foot orthotics. The patient was seen again at 4 weeks, 3 months, and 6 months with consistent measurable improvement, improved function, and sustained resolution of his bilateral foot drop. PROMIS-29 demonstrated significant percentage improvements over baseline.

**CONCLUSIONS:** Foot drop is a consequence of nerve root compression that can lead to significant functional limitation and falls which may result in further injury. Although there is evidence that spinal decompression surgery may improve foot drop, the risks associated with such surgery can be formidable especially in patients with comorbidities. It has been noted that the placement of an interspinous spacer indirectly decompresses the lateral recess, neural foramina, and central canal which may play a role in clinical improvement of symptoms such as radiculopathy and foot drop as well as neurogenic claudication without major surgery.

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**Results of a Physical Fitness Training for Individuals with Hemiplegia Post Stroke: Results of a Randomized Sham-Controlled Trial**

Alexio G. Carayannopoulos, DO, MPH, FAAPMR, FFSMB, FAAOE

**CASE DIAGNOSIS:** Presented on behalf of ReAct8 Comparator investigators (clinicaltrials.gov/show/NCT02577354). In patients with disabling mechanical low back pain (CLBP) and no indications for surgery, symptoms are often linked to impaired neuromuscular control and reduced quality of the multifidus muscle, the key stabilizer of the lumbar spine. Prior studies have indicated efficacy of an implantable neurostimulation system which stimulates the medial branch of the dorsal rami to elicit repetitive multifidus contractions aimed at restoring motor control. Safety and efficacy of this therapy was evaluated in an international, multicenter, randomized, active sham-controlled, double-blinded trial with single-arm crossover.

**CASE DESCRIPTION:** 204 subjects were randomized to ‘Treatment’ or ‘Active-Sham-Control’ and self-administered two 30-minute stimulation sessions daily. After primary endpoint assessment, subjects in the ‘Active-Sham-Control’ group crossed over to ‘Treatment’. The Primary Endpoint compared responder rates at 120 days with a ‘Responder’ having ≥30% reduction in average low back painVAS without any increase in pain medication. A modified-intention-to-treat (mITT) analysis excluding subjects who increased pain medication unrelated to LBP, a cumulative proportion of responder analysis (CRP) and multiple secondary- and supporting analyses were prespecified in the protocol.

**DISCUSSIONS:** At baseline (N=204), mean LBP duration was 14±11 years, age 47±9, VAS 7.3±0.7 and ODI 39±10 and most subjects (80%) were on pain medications, including opioids (37%). At 120 days the primary endpoint did not reach significance, the totality of short- and long-term results suggest that restorative neurostimulation is a promising option for patients with mechanical CLBP. A cumulative proportion of responder analysis (CPR) and multiple secondary- and supporting analyses were prespecified in the protocol.

**RESULTS:** 268 charts were audited, and attempts were made to contact via phone and email, with a 32% patient response rate (n=200). Injection therapy was recommended for 71.5% of patients, with the mean number of injections performed at 2.2±1.7, with an overall improvement rate of 53±38.5%. All age groups were prescribed other treatments, 48% receiving a combination of prescribed therapies. Global surgery rate was 15.1%, significantly below the national surgical intervention average of 33%. This below average surgical rate is associated with a cost avoidance upwards of $536,000 for the fiscal year. Overall, 65% of patients reported improvement from the treatments and therapies prescribed.

**CONCLUSIONS:** While there is no one therapy or intervention that overwhelmingly treats lumbar radiculopathy and its associated symptoms, a multifocal conservative approach including epidural steroid injections provides significant improvement. A conservative approach to spine care prevents unnecessary surgeries and promotes care pathways that provide quality care with fiscal responsibility.

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**Persistant Local Low Back Pain Symptoms and the Impact of Pain on Social and Occupational Functioning**

Mohammed K. Alatwi, MBBS, SBPM&R, and Khader S. Alabdulateef, MBBS

**OBJECTIVES:** According to the disability survey in 2017 from general authority for statistics in Saudi Arabia, there is 2092 persons lives with lower limb prosthesis. In Saudi Arabia, patients with lower limb amputations are exposed to several physical and psychosocial problems regarding body image, self-care activities, mobility, occupational or non-occupational activities. There is no study showing the obstacles and barriers facing lower limb amputee patients in their life, considering their education level before and after amputation, level and type of amputation and duration of using a prosthesis. The aim of this study was to investigate the prognostic variables among lower limb amputees at the King Saud Medical City in Riyadh, Saudi Arabia after the implementation of an assisted device with respect to level of amputation and prosthesis use in order to improve their quality of life in regards of return to work and drive.

**DISCUSSIONS:** Retrospective Cohort study.

**RESULTS:** Out of 117 patients with lower limb amputations, 43 of them were due to trauma and 38 of those were eligible for research. Male to Female ratio = 16:3; Mean age: 44.7 years; Median duration of amputation: 7 years; Median duration of using prosthesis 4.7 years; Transstibial to Transfemoral Ratio 3:2; Right to Left Ratio: 9:5; 17 were employed before, 7 back to work (41%); 26 were driving before, 24 able to drive again (92%)

**CONCLUSIONS:** Retrospectively, there is a relative low proportion of patients returned to work. Common reasons reported were environmental factors, loss of confidence and the amputation itself. Trans-tibial amputees appeared to return to work and drive more commonly than trans-femoral amputees.
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Abstracts

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CASE DIAGNOSIS: Case 1: A 50-year-old woman underwent posterior decompression and spinal fusion surgery (C2-Th1) for cervical myelopathy. On day 4 after surgery, she was unable to lift her left arm and left postoperative C5 paralysis was diagnosed. Case 2: A 62-year-old man underwent posterior decompression and spinal fusion surgery (C3-6) for cervical myelopathy. On day 2 after surgery, he was unable to lift both arms and bilateral postoperative C5 paralysis was diagnosed.

CASE DESCRIPTION: The cases involved two patients with shoulder elevation dysfunction due to postoperative C5 paralysis after cervical decompression and spinal fusion surgery. Case 1: Five days postoperatively, left robotics shoulder elevation training with the shoulder single-joint Hybrid Assistive Limb (shoulder HAL-SJ) was initiated (1–2 sessions per week, 10 sessions in total). Case 2: Seven months postoperatively, robotics shoulder HAL-SJ was initiated on the left side (1 session per 2 weeks, 15 sessions in total); the right-sided shoulder elevation dysfunction due to postoperative C5 paralysis had completely recovered by postoperative 3 months. In both cases, the shoulder abduction power was grade 2 in manual muscle testing just before the initiation of shoulder HAL-SJ training.

DISCUSSIONS: Both patients completed all sessions of shoulder elevation training with the shoulder HAL-SJ, without any adverse events. After completing all sessions of shoulder HAL-SJ, both patients could completely elevate the shoulder joint. We also observed gradual improvement of the shoulder abduction angle and shoulder abduction power in both patients. Shoulder elevation training with shoulder HAL-SJ was safely performed in two patients with shoulder elevation dysfunction due to postoperative C5 paralysis.

CONCLUSIONS: Our experience suggests that shoulder elevation training with shoulder HAL-SJ has the potential to be an effective rehabilitation training for patients with postoperative C5 paralysis.

ROBOTIC-ASSISTED THERAPY TO IMPROVE UPPER EXTREMITY FUNCTION IN CHILDREN WITH CEREBRAL PALSY

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CASE DIAGNOSIS: Cerebral palsy (CP) is the most common cause of motor disability in children. Symptoms usually lead to activity limitations and impaired quality of life (QoL). Recent pilot studies have demonstrated the beneficial effect of using robot-assisted therapy (RT) for upper-limb (UL) impairments in CP. However, these studies failed to inform on the mechanisms underlying the observed improvements. The aim of this study was to assess the effectiveness of RT for improving UL function in children with CP and investigate the potential mechanisms underlying change in UL function.

CASE DESCRIPTION: A case study of a child with left UL paresis due to CP (male, 12 years old) with a Manual Ability Classification System level II. The subject underwent eighteen 30-minute sessions of RT using the Amadeo for the left UL. Outcome measures were collected at baseline and discharge and included: box and block test (BBT), Quality of Upper Extremity Skills Test (QUEST), QoL measures (CPQOL) as well as biomechanics (deviation from a linear trajectory) and muscle synergies for 56 target reaching movements.

DISCUSSIONS: BBT score increased from 22 at baseline to 29 after completion of the intervention surpassing the minimal detectable change (significantly less than the age-matched normative 72 blocks). The standardized “disassociated movements” section of the QUEST improved from 92.7 to 96.5%. The mean CPQOL reported by the child was 67.8% at baseline and 67.3% at discharge. We observed an improvement in the deviation of reaching movements, decreasing to 19.9 mm [19.1, 21.1] at discharge compared to 21.0 [19.8, 22.5] at baseline (median [percentiles 25, 75]). RT led to a change in the composition of synergies demonstrating reduced muscle co-activations.

CONCLUSIONS: RT appears to be a helpful tool to improve UL motor function and changes in the composition of muscle synergies suggest improvement in selective motor control, an important determinant of motor impairment in children with CP.
CASE DESCRIPTION: A 28-year-old female presented to inpatient rehabilitation for severe pelvic and groin pain during her postpartum period. Nine days prior to presentation, the patient had a spontaneous vaginal delivery which lasted 3 hours and required cesarean section. The patient was discharged home from the hospital with a pelvic binder. The patient was then started on 10 x 11 cm with severe sacral destruction. He was not a surgical candidate due to size of mass. He participated in therapy sessions was limited due to severity of pain. Orthopedics recommended a biopsy which was positive for high-grade sarcoma with abundant necrosis, consistent with malignant peripheral nerve sheath tumor (MPNST). He underwent an inpatient chemotherapy regimen of four cycles of etoposide and ifosfamide. Pain control included methadone, PCA hydromorphone, pregabalin, and tizanidine. Follow up imaging showed interval increase of the mass with dimensions 14 x 15 x 14 cm and subsequent mass effect on the colon, ureters, and bladder.

DISCUSSIONS: The incidence of postpartum diastasis is rare and varies from 1:300 to 1:3000. In the case, the main focus of care is pain management and rehabilitation care without interfering with breastfeeding. Dilaudid and other physical modalities were safe and well tolerated in this breast feeding mother. However, most literature advocate for surgical management if separation > 4 cm, this case confirmed that a comprehensive inpatient rehabilitation is an effective management for separation up to 5.6 cm. Patient's FIM score improved from 59 to 88 and gait also improved from 2 to 150 during inpatient rehabilitation. In summary, rehabilitation care has not only helped to reduce the pain and improve the function but also to reduce the pubic symphysis separation by more than 3.5 cm, and facilitated her to return to normal activities.

CONCLUSIONS: This case report is significant because it reflects the integral role of inpatient rehabilitation in the conservative management of postpartum pubic symphysis diastasis up to 5.6 cm. Family education and inter-professional communication between obstetric, orthopedic and rehabilitation team enhances best outcome and reduces chronic complications.

ROLE OF PREOPERATIVE PHARYNGEAL INLET ANGLE IN THE DEVELOPMENT OF DYSPHAGIA IN PATIENTS WITH OCCIPITOCERVICAL FUSION

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OBJECTIVES: The disturbance of cervical spine excursion is the risk of dysphagia. Dysphagia is one of the most serious complications seen in patients who had undergone occipitocervical fusion (OCF). In previous study, the cervical spine angles such as Occipito (O)-C2 angle, C2-C6 angle, occipital and external acoustic axis to axis angle (OE(A) angle) and the pharyngeal inlet angle (PIA), were known as factors of the incidence of dysphagia in patient who underwent OCF. The aim of this study was to elucidate factors associated not only with the incidence, but also with severity of dysphagia in patients who had undergone OCF.

DESIGN: We retrospectively reviewed clinical data from the medical charts of patients who had undergone OCF in our institute between January 2006 and May 2019. Moreover, radiological measurements such as O-C2, C2-C6, OEA, and PIA angles, were assessed by lateral plain X-rays of the cervical spine before and after surgery. The impacts of these parameters on incidence and severity of dysphagia were analyzed. Severity of dysphagia was assessed using Functional Oral Intake Scale (FOIS) from medical charts. Patients were classified into non-dysphagia (FOIS: 0) and dysphagia (FOIS: 1-5) groups.

RESULTS: Seventy patients (35 %) suffered from dysphagia after OCF. There were no significant differences between the 2 groups in pre-operative O-C2, C2-C6 and OEA angles. Moreover, there were no significant differences in the change of O-C2, C2-C6 and OEA angles. In PIA, we found that pre-operative PIA was significantly smaller in the dysphagia group (p = 0.02) whereas there were no differences between the 2 groups in post-PIA and change after surgery of PIA. Spearman rank correlation showed a significant correlation between PIA and FOIS (r = 0.53, p = 0.02).

CONCLUSIONS: This study suggested that the preoperative PIA is related to both incidence and severity of dysphagia due to occipitocervical fusion.

SACRAL MALIGNANT PERIPHERAL NERVE SHEATH TUMOR RESULTING IN LOWER EXTREMITY WEAKNESS, INTRACTABLE PAIN, BOWEL AND BLADDER INCONTINENCE IN A PATIENT WITH NEUROFIBROMATOSIS TYPE 1

Brandon T. Money, DO, and Whitney Pratt, MD, PhD

CASE DIAGNOSIS: Pain, weakness, and incontinence in a patient with sacral malignant peripheral nerve sheath tumor and neurofibromatosis type 1.

CASE DESCRIPTION: A 33-year-old male who presented as a transferral with concern for cauda equina syndrome. He experienced worsening lower extremity weakness over the past year with increase in pain over the past 2-3 months with recent bowel and bladder incontinence. MRI revealed a mass measuring 14 x

SCAPULAR WINGING CAUSED BY PROXIMAL UPPER TRUNK BRACHIAL PLEXOPATHY IN COMBAT SPORTS: A CASE REPORT

David Oh, MD, Jacob Rohrs, MD, Esther Yoon, MD, Bruce Zhang, MD, Reed C. Williams, MD, and Ernesto Cruz, MD

CASE DIAGNOSIS: Medial Scapular Winging.

CASE DESCRIPTION: A 20-year-old male who presented with a one-year history of right shoulder pain associated with dislocation and relocation of his scapula, which he could provoke. He had no recollection of inciting event or trauma, but regularly participated in mixed martial arts. Exam was notable for medial winging of his right scapula at rest and subtle weakness in the right C5-C6 myotomes. There was scapular asymmetry and dyskinesia during shoulder forward flexion, along with anterior tilt and internal rotation of the right scapula during wall push-ups. Electrodiagnostic studies revealed a brachial plexopathy with involvement of the C5-C6 myotomes and long thoracic nerve.

DISCUSSIONS: Scapular winging is an uncommon debilitating condition that can limit an individual’s upper extremity function. Often, an underlying nerve injury can cause subsequent muscle paralysis which manifests in the form of medial or lateral winging. This is a rare case of medial winging where a traction injury likely sustained during combat sports led to a proximal upper trunk brachial plexopathy. Electrodiagnostic studies were essential for diagnostic and prognostic evaluation, localizing the lesion at the plexus distal to the root level. The information provided a favorable prognosis and supported recommendation for conservative management. The patient was referred to physical therapy with an individualized therapy program for serratus anterior strengthening, shoulder strengthening/stabilization, and functional electrical stimulation.

CONCLUSIONS: This case highlights an unusual presentation of medial scapular winging in combat sports, given the location of injury causing a proximal upper trunk brachial plexopathy with long thoracic nerve involvement. The underlying pathophysiologic mechanisms in mixed martial arts can predispose participants to such injuries. Although scapular winging is a clinical diagnosis, it is important for providers to perform thorough diagnostic workup to evaluate for uncommon or potentially overlooked etiologies and guide appropriate therapy.

SCIROTH SCOLIOSIS-SPECIFIC EXERCISE SHOWED POSITIVE CLINICAL EFFECT AS TO RISK OF PROGRESSION FOR ADOLESCENT IDIOPATHIC SCOLIOSIS PATIENTS

YiTien Su, Bachelor

CASE DIAGNOSIS: The results of scoliosis-specific exercise holds potential to prevent scoliosis progression. Schroth exercise is the most widely used and studied. Our study was to demonstrate the effect of Schroth exercise in patients with scoliosis with question of curve progression in compare with patients with regular rehabilitation protocol.

CASE DESCRIPTION: This was a retrospective study. We traced patients with AIS in a single medical center follow-up for more than 3 months. Inclusion criteria: patients with AIS aged 10-19 year old, rehabilitation outpatient clinical follow-up for more than 3 times, and physical therapy for more than 3 months. Supervised Schroth exercise was delivered by a single experienced therapist for 12 weeks. The intervention was 70 minutes in each session, which included 15 minutes of check of patients, review previous session, and warm-up, then 45 minutes of new lesson, and the final 10 minutes for discussion.
DISCUSSIONS: Forty patients were reviewed and 28 of them fit the inclusion criteria. Thirteen patients were wearing braces at the time of the study; while 15 patients were not. After training, three patients in the non-brace group had worsened curve while 4 in the brace group got worsened curve. Three patients in the non-brace group had stable major curve while the brace group had 6 stable cases. Surprisingly, we found 4 patients with stable improving major curve in the non-brace group and 1 patient in the brace group had stable improving major curve. Applied with 16th edition of SPSS, we compared the two group (non-braced versus braced) and found the improvement of curve progression were significant in both groups, with p value 0.013 and 0.018 separately.

CONCLUSIONS: Combined with standard care, Schroth exercise improves the risk of progression in patient with adolescent idiopathic scoliosis. Further evidence of reliable non-surgical means of treatment to prevent tragic consequences is needed.

SCIATIC NERVE PALSY FOLLOWING TOTAL HIPARTHROPLASTY
Hamza Khalid, DO, Sony M. Issac, MD, Thomas Pobre, MD, Ajendra Sohal, MD, and Adam Isaacson, MD

CASE DIAGNOSIS: Sciatic nerve palsy is a rare but potentially devastating complication of total hip arthroplasty, with incidence ranging from 0.1-7.6%. Patients may present with a broad range of symptoms from radiculopathy to foot drop. Perioperative and postoperative causes include excessive tension or inappropriate placement of retractors, instrument or implant related complications, heterotopic ossification, compression due to hematoma, and scarring. Risk factors include female gender, posterior approaches, revisions, and congenital hip dysplasia.

CASE DESCRIPTION: A 68-year-old female presented to the Acute Rehab Unit with a right-sided foot drop following a right total hip arthroplasty. On exam, the patient had complete loss of right-sided dorsiflexion, decreased sensation on the lateral aspect of the right leg, and an absent achilles reflex on the right. EMG/NCS done two weeks after the injury revealed electrodiagnostic evidence of axonal injury to the right sciatic nerve with denervation atrophy of the right peroneus longus muscle and absent motor unit action potentials in the right tibialis anterior, gastrocnemius, and biceps femoris.

DISCUSSIONS: Treatment of sciatic nerve palsy is based on the cause of injury, however the etiology is unknown in more than half of cases making supportive care the mainstay of management. Motor deficits causing foot drop are best managed with an ankle foot orthosis to allow clearance during the swing phase of gait and to prevent late equinus deformity. Physical therapy is essential to focus on ankle dorsiflexors strengthening, plantarflexors stretching to prevent joint contractures, and skin desensitization in cases of causalgia.

CONCLUSIONS: Patients with partial recovery of motor function in the early stages generally have good outcome, whereas complete motor palsy accompanied with sensory palsy is indicative of poor prognosis with only a third of these patients experiencing full recovery. As providers, it is important to make a timely diagnosis to allow patients their best chance to regain functionality.

SCLEROTOMAL PAIN: LOCALIZED PRESENTATION IN THE FACE OF DISTAL ORIGINATION
Faisal Bawalah, MD, Aaron Clark, MD, PhD, and Sibel Demir-Deviren, MD

CASE DIAGNOSIS: We described three patients with spinal canal stenosis, foraminal stenosis, and disc extrusion who exhibited sclerotomal pain in the left iliac crest, right knee and left hip respectively.

CASE DESCRIPTION: All three patients were evaluated and treated for possible local pain generators and did not receive any relief from treatments. The spinal nerve roots (SNR) as causes of sclerotomal pain were predicted by using classic sclerotomal maps and impingement of the predicted SNRs confirmed on magnetic resonance images. Each patient underwent at least two transfemoral epidural steroid injections (TFESI) for both diagnostic and therapeutic purposes. All three patients experienced more than 80% relief from each TFESI that confirmed the pain patterns presented as if they were originating locally were in fact of spine origin (SNRs).

DISCUSSIONS: A sclerotome is an anatomical concept that defines an area of bone innervated by a single spinal nerve. Similar to the familiar dermatomes, sclerotomes provide an element of depth to the sensory innervation of the extremity based on the deep fascia as an embryologic boundary. Anatomical knowledge of sclerotomes can be used clinically in the diagnosis and treatment of pain. Sclerotomal pain patterns are frequently overlooked because they project some distance from their pain generators and are not frequently considered. Patients presenting with sclerotomal pain will quite often only receive a regional examination and treatment of the symptomatic area, which can often miss the true etiology.

CONCLUSIONS: Impingement of SNRs could present as pain in the iliac crest (L2, L3 SNRs), knee (L3, L4 SNRs), hip (L4, L3 SNRs), and sacroiliac joints (S1 SNRs) as sclerotomal pain without radicular pain. It is the utmost importance that clinicians also consider sclerotomal pain rather than concentrating only on the symptomatic region especially in patients who do not improve with localized treatments.

SEAMLESS ACTIVITY MONITORING SYSTEM USING A WAIST-WORN 3D - ACCELEROMETER FOR INPATIENTS AND OUTPATIENTS
Hirotaka Matsuura, Kikuo Ota, and Emiko Yoshishashi

OBJECTIVES: In Toyota Regional Medical Center, seamless daily activity monitoring system, Karada station(Toyota Tsusho corp., Nagoya, Japan) started in April 2019. This system consists of cloud server, the PC and the measurement device. The device is a waist-worn 3D – accelerometer and can measure steps, which can be viewed at the device screen anytime. The device can also recognize upright posture. You can check in and out just by putting the device over the PC and pressing several buttons. The PC records the exercise time and count steps during the exercise. You can view the number of daily total steps and the one during exercise for the last two weeks on the PC screen. Walking 100 steps with the device revealed that accuracy was 97.2 (4.18)%.

RESULTS: The average number of daily total steps on the 1st day and the last day was 3328 (1552) steps and 4200 (2369) steps, respectively. The one during PT one 1st day and the last day was 1725 (598) steps and 2208 (869) steps, respectively.

CONCLUSIONS: The monitoring system, Karada station can count daily steps during PT and the other. This feedback is easily to understand for the patients and can be useful for the therapists to make PT plan each day. Moreover, it is comfortable enough to carry and the measurement system makes it possible to monitor daily activity seamlessly for inpatients and outpatients.

SEASONAL VARIATION IN RESIDENT WORKPLACE HAPPINESS: A PROSPECTIVE COHORT STUDY
Tomas W. Salarz, MD, Eric Liu, DO, LSD, A. Burke, BA, Lei Lin, MD, PhD, and Sara Cuccurullo, MD

OBJECTIVES: Physician wellness and burnout are areas of increasing exploration. A recent study found that 19% of physicians were happy at work, last among the 29 specialties. Per ACGME guidelines, residency programs are required to address resident wellness; specifically, requirement V.LC. states, “psychological, emotional, and physical well-being are critical in the development of the competent, caring, and resilient physician and require proactive attention to life inside and outside of medicine...skills that must be modeled, learned, and nurtured in the context of other aspects of residency training.” Despite this requirement, nearly 80% of residents sometimes or rarely have time for personal wellness. Almost 40% reported feeling depressed always or sometimes. Our study evaluates the effect of seasonal changes on resident workplace happiness.

DESIGN: This prospective cohort study followed 14 psychiatry residents providing weekly workplace happiness scores on a 1-10 scale. Scores were then divided into four seasons.

RESULTS: Mean happiness scores were fall = 7.99, winter = 7.01, spring = 7.38, and summer = 7.53. Analysis of variance (ANOVA) was performed with p = 0.00014. Tukey’s honestly significant differences (HSD) revealed p = 0.001 for fall versus winter and p = 0.031 for fall versus spring. Other seasonal comparisons had p > 0.05.

CONCLUSIONS: ANOVA demonstrated a statistically significant difference among seasons. Tukey’s HSD determined a statistically significant difference between fall and winter and between fall and spring. Though the sample size was small, we identified from this analysis that residents were less happy in the winter and the spring when compared to the fall. While the ACGME made a step in the right direction by addressing resident wellness, programs may benefit from a more targeted approach. Based on our study, we recommend further investigation on initiating a resident wellness program that focuses on these times of lower happiness.

SEATING AND POSTURAL MANAGEMENT IN HEMIPLEGIC VECTOMY: A CASE REPORT
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CASE DIAGNOSIS: Hemipelvectomy due to traumatic injury is frequently associated with multiple organs damage. The inability to sit, as result of asymmetrical pelvic shape results in imbalance, pressure ulcers, trunk misalignment and mobility reduction. We investigated different pad systems to afford a stable and functional position in wheelchair, considering the correct alignment of trunk-pelvis and the pressure distribution.

CASE DESCRIPTION: An 18 years-old man underwent a right external hemipelvectomy after a motorcycle accident. Skin grafting at the amputation site and colostomy were necessary. The severity of clinical conditions constrained the patient to a prolonged bed rest. After three months, it was possible to sit him on a tilted wheelchair and, one month later, on a standard one. We used an air cushion to relieve completely the right hemipelvis and a backrest to improve the trunk stability. Later, we chose a modular customized cushion with polymer foams.

DISCUSSIONS: Regarding the body segments we used ISO16840-1. On bed, with and without cushion (air and modular) on wheelchair. On frontal plane, the modular cushion reached a precise alignment of scapulas and a greater reduction of kyphosis, on sagittal plane. For the pressure analysis (ISO/16480-9) the peak pressure was lower if compared with the air device, in static and in dynamic positions. The contact area, the best model for studying the weight distribution, was higher with both the cushions, meaning the better result, but the modular cushion revealed lower pressure picks in any condition.

CONCLUSIONS: Because of the level of amputation, the skin grafting, the impaired movements and the deficiency of sensibility on left body-side, it was contraindicated to apply a prosthetic limb. For this reason, the goal was a comfortable, stable and functional seated posture to ensure wheelchair mobility. The results observed disclose that, using the modular support, the patient achieves a proper posture in wheelchair.

SERIAL ELECTRODIAGNOSTIC TESTING TO EVALUATE NITROUS OXIDE-INDUCED PERIPHERAL POLYNEUROPATHY
Valerie A. Chavez, MD, Jennifer Wu, MD, PhD, and Jay Han, MD
CASE DIAGNOSIS: Axonal degeneration and demyelination neuropathy caused by acute, chronic nitrous oxide abuse
CASE DESCRIPTION: A 23-year-old female presented with two weeks of progressive bilateral lower extremity paraparesis, paresthesia, and gait disturbance in the setting of acute on chronic heavy nitrous oxide abuse. Physical exam revealed bilateral foot drop, wide-based gait, and lower extremity areflexia with decreased temperature and vibratory sensation. Metabolic and infectious workup, imaging, and lumbar puncture were unremarkable. She received high dose intramuscular vitamin B12. In acute inpatient rehabilitation, she demonstrated stable foot drop and improvement in proximal lower extremity strength. Limited electrodiagnostic (EDX) exam revealed a generalized sensorimotor peripheral process with prolonged latencies, slowed conduction velocities, and abnormal spontaneous potentials. Upon discharge, she was a limited household ambulator with bilateral solid ankle-foot orthoses and front-wheel walker. At two-month follow-up, she progressed to a limited community ambulator still requiring her walker and orthoses due to continued foot drop. Repeat EDX testing demonstrated persistent abnormal spontaneous potentials with improvement in conduction velocities.

DISCUSSIONS: This case report advances previously reported EDX changes associated with nitrous oxide abuse while providing the first-known description of serial EDX testing as a proxy of clinical progression. This patient had continued bilateral foot drop at follow-up and her repeat EDX testing demonstrated persistent abnormal spontaneous potentials despite improved conduction velocities. This suggests that chronic, high-dose nitrous oxide toxicity results in irreversible axonal damage and poor long-term prognosis.

CONCLUSIONS: Serial electrodiagnostic testing may be a useful prognostic tool for evaluating patients with nitrous oxide-induced peripheral polynuropathy.

SHIN PAIN DUE TO SAPHENOUS NEUROMA DIAGNOSED BY ULTRASONOGRAPHY
Mohammad Moin Uddin, Fellowship (FCPS), and Md Atiqul Islam Chowdhury, FCPS, MRCP (UK)
CASE DIAGNOSIS: High frequency ultrasound showed of a hypo-echoic, well circumscribed, spindle shape subcutaneous swelling with gradual narrowing of both ends (tail sign) to be continuous as the medial crural branch of saphenous nerve suggesting neuroma. Finally, local anesthetic infiltration produced prompt pain relief.
CASE DESCRIPTION: A young non-diabetic lady of 36 years presented with chronic burning pain and paresthesia of left shin pain for one year. There was no prior history of trauma or surgery. No other physical findings were found. All her hematological profiles were normal. Electrodiagnostic study and MRI of spine showed no compatible findings. She had been treated with neuremodulating medications but no improvement. Ultrasound examination along the long axis of the medial shin depicted a spindle shape, hypoechoic swelling with both tapered ends (tail sign) continuous as the medial crural branch of the saphenous nerve. Ultrasound guided infiltration of 4 ml Lidocaine (1%) around the neuroma resulted in immediate pain relief.

DISCUSSIONS: Distal to its infra-patellar branch at the antero-inferior knee, saphenous nerve provides the medial crural branch to supply cutaneous innervation to the anterior and medial leg to reach as far as the medial aspect of the first metatarsal head. Saphenous neuropathy is rare (< 1% adults with leg pain). Proximal infra-patellar branch is the most frequently involved by neuromas and usually associated with trauma or surgery. However, no evident etiology was found in this case. Like this case, neuromas are described to appear on US as oval-shaped, hypo-echoic masses with a circumscribed margin and no internal vascularity on Doppler. High-frequency ultrasound is considered superior to MRI to detect tiny abnormalities.

CONCLUSIONS: Neuroma of unknown etiology in the distal superficial branch of saphenous nerve is unique in the literature. High frequency ultrasound diagnoses tiny structures like neuroma with success comparable to MRI.

SHORT WAVE ENHANCES MESENCHYMAL STEM CELL RECRUITMENT THROUGH HYPOXIA-INDUCIBLE FACTOR-1 SIGNALING IN FRACTURE HEALING
Dongmei Ye, Doctor, Chen Chen, Master, Qi Zhang, and Hongwei Liu, Bachelor
OBJECTIVES: Short wave is a type of high frequency electrotherapy, which can promote the fracture healing process; nevertheless, the underlying mechanisms are still not fully understood. In this study, we investigated the stimulatory effect of short wave in promoting MSC homing, which in turn stimulates a healing effect in rats.

DESIGN: Briefly, 80 SD rats underwent surgery to establish the femoral shaft fracture and intramedullary fixation ad were randomly divided into four groups (n=20): short wave treatment group (SW), MSC transplanting group (M), short wave and MSC transplanting united treatment group (M+SW) and control group (Con). Fracture healing parameters, including callus morphology and micro-architecture of the callus were analyzed after the treatment. In addition, fluorescence assays were used to analyze the GFP labeled MSC migration after treatment in 20 nude mice that underwent surgery. For in vitro study, osteoblast stimulated fracture site was divided into control or short wave treatment group and then co-cultured with MSC. After treatment, intracellular HIF-1, SDF-1, CXCR-4, FAK, F-actin, β-catenin and secreted HIF-1, SDF-1 protein levels were quantified, and MSC migration was evaluated with or without blocking HIF-1 pathway by siRNA.

RESULTS: Our in vivo data suggested that short wave could promote the MSC homing, thus speeding up the healing process of the fracture site, which was associated with an increase of local and serum HIF-1 level, the changes in callus formation, and the improvement of callus microarchitecture and mechanical properties. Furthermore, in vitro results showed that short waves upregulated HIF-1 expression in osteoblast and increased HIF-1 and SDF-1 protein levels in the conditioned medium; on the other hand, the inhibition of HIF-1α partially inhibited the migration of MSC.

CONCLUSIONS: To sum up, these results suggested that HIF-1 mediated MSC homing might be one of the crucial mechanisms through which short waves exert their influence on fracture healing.

SHOULDER MUSCLE ACTIVATION DURING EXERCISES ON STABLE AND UNSTABLE SURFACES: A META-ANALYSIS
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OBJECTIVES: Shoulder discomfort is one of the most common complaints and the muscle imbalance may contribute to shoulder problems. Push-up and push-up plus exercises have been used for years to improve shoulder muscle strength and re-store shoulder muscle imbalance. Additionally, exercises on unstable surfaces have been used to recruit more muscles and increase the muscle activation compared to exercises on stable surfaces. However, the effect of surface instability on muscle activation is inconclusive in the previous studies. Therefore, we conducted a meta-analysis to investigate the muscle activation of the glenohumeral and scapular muscles during the push-up and push-up plus exercises on the stable and unstable surfaces.

DESIGN: A literature search was performed using the Pubmed, PEDro, Cochrane, Medline, CINAHL and Embase databases from 1989 to 2019. Push-up, push-up plus, unstable surfaces, shoulder muscle, and electromyography were used as the key words. RESULTS: In push-up exercise, muscle activity of the upper trapezius and upper trapezii/serratus anterior ratio are higher on unstable surfaces compared with the same exercise on stable surfaces. However, muscle activation of the anterior deltoid is higher on stable surfaces than on unstable surfaces. In push-up plus exercise,
activation of the serratus anterior is higher on unstable surfaces (sling). Muscle activities of the pectoralis major and triceps brachii are higher on unstable surfaces in both push-up and push-up plus exercises.

CONCLUSIONS: This study provides suggestions for choosing different surface conditions for push-up and push-up plus exercises as the clinical approach. For strengthening, these two exercises on unstable surfaces can be good choices for pectoralis major and triceps brachii, while serratus anterior activation is significantly higher when performing push-up plus on slings. Push-up plus on slings increases serratus anterior activation without overactivating upper trapezius, so it may be a better option for people with shoulder impingement and anterior instability.

SHOULDER PAIN FROM AMALGAMATED ANTIBIOTIC BEAD "STONE" REQUIRING SHOULDER DISARTICULATION: A CASE REPORT

Andrew J. Patton, DO, Amelia Ni, BA, Gerard Dysico, MD, Ehah Yasin, DO, and Alethea Appavu, DO

CASE DIAGNOSIS: The shoulder disarticulation surgery was successful, with significant pain relief achieved. The “stone” found during surgery is believed to be an amalgamation/coalescence of antibiotic beads, never removed by the previous surgeon. We believe the foreign body’s location caused rotator cuff impingement, limiting the patient’s ROM and contributing to chronic pain.

CASE DESCRIPTION: A 58-year-old male involved in a snowmobile accident requires a right trans-humeral amputation and ORIF of the residual humerus. Hospital course complicated by sepsis with hardware infection requiring surgical washout and antibiotic bead placement. Over the following 4 years the patient experiences chronic pain in the residual limb, particularly the shoulder joint, with limited ROM. Prosthesis fitment was unsuccessful. After careful consideration, the patient underwent an elective shoulder disarticulation surgery with the goal of pain control. A stone-shaped foreign body was discovered in the subscapular space and removed.

DISCUSSIONS: To our knowledge there are no reports of retained antibiotic beads coalescing into forming a large foreign body. Review of the literature suggests beads should only be left in place for longer than 7-10 days when preserving space for a bone graft, as well as instances of surgical materials causing shoulder impingement.

CONCLUSIONS: This case raises the important considerations that must be made when making surgical decisions, especially when it involves joints and amputations. Our case demonstrates an unfortunate instance where an amputee was denied the opportunity for functional use of the residual limb with a prosthesis due to a foreign body causing rotator cuff impingement. We suggest early consultation of a physiatrist on cases involving joint pain and amputations as it may affect the future ability to utilize a prosthesis. We also suggest removal of antibiotic beads unless deemed absolutely necessary as they appear to have the potential to cause significant functional limitations and pain.

SIDELINE AND EVENT COVERAGE: ASSESSING CONFIDENCE AND KNOWLEDGE IN PHYSICAL MEDICINE AND REHABILITATION TRAINEES

Deindre S. Rodericks, MD, and Daniel Blatz, MD

OBJECTIVES: Physical medicine and rehabilitation (PM&R) residents and fellows are often encouraged to participate in sideline/event coverage as part of their training. Despite this, there are no standardized requirements and it is at the discretion of the residency program as to incorporate in their training. At our institution, we have a formal lecture given annually by sports medicine trained faculty that is required before being able to volunteer for medical coverage events. The purpose of this quality improvement study was to determine if the lecture improved PM&R trainees’ sideline and event coverage knowledge and confidence.

DESIGN: Before the required lecture, the PM&R trainees who attended were given a questionnaire made up of a survey and test. The survey asked background information and asked trainees to rate their confidence level (1-5) in independently assessing patients during sports/event coverage and in diagnosing/managing common injuries. Lastly, the knowledge-based test consisted of 11 questions created by a sports medicine attending regarding various scenarios seen in medical coverage. The trainees then listened to the required lecture. After the lecture they were given the same survey and test.

RESULTS: 25 residents completed the pre-lecture questionnaire and 22 completed the post-lecture questionnaire. The average confidence scores improved in all categories with the highest change in managing interphalangeal dislocations. The average knowledge-based test scores improved by 1.95 points.

CONCLUSIONS: The results of our study show improvement in PM&R trainees’ sideline and event coverage knowledge and confidence with a formal lecture, which enforces that this should be a continued part of our curriculum. Additionally, we can use this data to further improve training in medical coverage scenarios. Our next goal is to assess whether PM&R trainees’ confidence and knowledge improves further with a hands-on simulation-based education model.

SIGNIFICANT IMPROVEMENT IN NEUROGENIC PAIN WITH EPIDURAL INJECTIONS FOLLOWING INTERSPINOUS SPACER IMPLANTATION IN PATIENTS WITH LUMBAR SPINAL STENOSIS: A CASE SERIES

Paul So, MD, and Steve M. Aydin, DO

CASE DIAGNOSIS: Lumbar spinal stenosis with neurogenic claudication status post intermuscular spacer implantation

CASE DESCRIPTION: Four patients with multi-level spinal stenosis all of whom initially presented with symptoms of neurogenic claudication. All four patients underwent magnetic resonance imaging of the spine which revealed the most severe stenosis at the L3-4 and L4-5 levels. Each patient underwent greater than 6 months of conservative management as well as lumbar epidural steroid injections with only up to 50% improvement in symptoms for up to 2 months. All four patients subsequently underwent intermuscular spacer implantation at the L3-4 and L4-5 levels. All four patients went on to experience improvement in standing and gait as well as up to 100% improvement in symptoms of neurogenic claudication. However, improvement in pain decreased down to as low as 20% at 3 months follow-up. Each patient then underwent repeat epidural steroid injections or at below the level of the intermuscular spacer with subsequent improvement up to 100% in pain for up to 6 months.

DISCUSSIONS: Lumbar spinal stenosis with neurogenic claudication can be a disabling condition, affecting quality of life. Intermuscular spacer implantation is a minimally invasive indirect spinal decompression procedure for treatment of lumbar spinal stenosis which involves the implantation of a spacer device between the spinous processes. The device limits spinal extension and therefore minimizes further narrowing of the affected regions and subsequent neural compression.

CONCLUSIONS: Our conclusion is that either post-space epidural injections helped reduce inflammation associated with the implantation procedure or the intermuscular spacer maintained an open space by limiting spinal extension to allow the epidural injectate to permeate areas with most stenosis and help reduce inflammation and therefore pain. Additional studies are needed to further investigate the mechanism as well as response to epidural steroid injections following intermuscular spacer implantation.

SIMULTANEOUS SPONTANEOUS BILATERAL QUADRICEPS TENDON RUPTURE AND ROTATOR CUFF TEAR IN A PATIENT WITH UNDERLYING VITAMIN D DEFICIENCY

Kevin Machino, DO

CASE DIAGNOSIS: Bilateral quadriceps tendon rupture and full-thickness tears of the right supraspinatus and infraspinatus tendon

CASE DESCRIPTION: A 46 year-old male with remote history of lumbar disc herniation status post lumbar fusion presented to the emergency department with bilateral knee pain sustained while playing basketball. He felt a sudden "pop" in both knees while loading up for a rebound and immediately experienced bilateral anterior knee pain with impossibility to ambulate. MRI revealed bilateral complete quadriceps tendon ruptures. He denied antibiotic, statin, or steroid use. Laboratory workup was significant for Vitamin D deficiency (11 ng/mL) and negative for other metabolic derangements (renal failure, parathyroid disease, diabetes). The patient underwent primary repair of the bilateral quadriceps tendons. Post-operatively, he was started on Vitamin D supplementation and admitted to an acute inpatient rehabilitation hospital. During rehabilitation, the patient was noted to have right shoulder pain and decreased range of motion. Right shoulder MRI revealed full-thickness tears of both supraspinatus and infraspinatus tendons. Surgery was deferred.

DISCUSSIONS: By the time of discharge from acute rehabilitation, the patient made functional improvements in mobility, transfers, and ADLs. After discharge, he received outpatient physiotherapy and eventually ambulated independently with the use of bilateral knee braces. Spontaneous bilateral quadriceps tendon rupture is an extremely rare pathology. Only few cases have been reported, with most patients having an underlying predisposing metabolic condition. To our knowledge, this is the first reported case study of a patient with bilateral quadriceps tendon rupture and concurrent complete rotator cuff tear associated with an isolated Vitamin D deficiency.

CONCLUSIONS: For complete bilateral quadriceps tendon ruptures, early surgical intervention followed by physiotherapy can result in optimal functional recovery without the need for an assistive device. Several studies have linked Vitamin D to tendon-to-bone healing. Aging athletes who participate in explosive sports may benefit from Vitamin D deficiency screening to prevent tendinopathies.
"SLEEPING WITH SIRENS IN THE EAR": A PATIENT CENTERED APPROACH TO IMPROVE THE QUALITY OF LIFE FOR TINNITUS PATIENTS
Manita Thomas, Masters, Tisa Thomas, Doctorate In Audiology, and Azhivarya Liz Varghese, Masters In Audiology and Speech Language Pathology
CASE DIAGNOSIS: To evaluate the clinical efficacy of progressive tinnitus management for treatment of chronic subjective tinnitus
CASE DESCRIPTION: Case control study design
DISCUSSIONS: The effective rate in the patients having hearing loss was significantly higher than the control group. Tinnitus Handicap Inventory scores showed a significant improvement were seen in their quality of life in both groups’ in terms of stress, concentrations, emotions after the intense rehabilitation were given
CONCLUSIONS: Treatment of tinnitus is still a dilemma because the etiology is multifactorial. Conventional therapy usually provides only temporary relief, but in the present study we focused on patient-based rehabilitation by applying the conventional methods along with progressive tinnitus management and effective counselling which focuses on meeting specific patients’ needs and preferences.

"SLIDE TO THE EMERGENCY DEPARTMENT": A CASE REPORT OF PUBIC SYMPHYSIS DIASTASIS SECONDARY TO WATERSLIDE USE
Anthony L. Cooper, DO, and Abigail Morales, MD
CASE DIAGNOSIS: Pubic Symphysis Diastasis
CASE DESCRIPTION: A 20 year old female presented to the ED after traveling down a waterslide with a subsequent hard landing which caused her legs to force-fully spread apart. On evaluation, she had decreased range of motion and limited movement in her lower extremities due to pain. Bilateral labial hematomas were also seen on exam.Computed Tomography (CT) revealed a 35mm pubic symphysis diastasis and pelvic hematomas with evidence of active hemorrhage. She underwent pelvic arteriogram which showed small foci of extravasation at distal branches of the left vesicular/vaginal trunk of iliac artery which were successfully embolized. Patient also had open reduction, internal fixation of anterior pelvic ringer for pubic symphysis disruption. After surgery patient was non-weight bearing to bilateral lower extremities for 2.5 months, however strict stand and pivot transfers were allowed.
DISCUSSIONS: The pubic symphysis is a midline, nonsynovial joint that connects the right and left superior pubic rami. This joint allows limited movement of 0.5-1mm. Diastasis is commonly associated with childbirth due to increased hormonal stimulation. Diastasis of the pubic symphysisal joint is reported to occur in 13-16% of pelvic ring injuries associated with trauma. They commonly follow high velocity force with predominant external rotatory vector. A diastasis less than 25mm can usually be managed non-operatively, while those more than 30mm usually require fixation.
CONCLUSIONS: It is pivotal to be observant for pelvic ring dysfunctions, especially following activities that involve high velocity force. In the case of this patient, the injury occurred after enjoying a ride on a waterslide. Due to extended post-operative weight bearing restrictions, aggressive intervention with therapies for range of motion were needed to reduce risk of contracture development. Interestingly aquatic therapy was an effective modality because of reduced weight bearing after incisional healing.

SMALL-CELL LUNG CARCINOMA WITH ULTRASOUND-DETECTED RETROPERITONEAL METASTASIS: A CASE REPORT
Nai-Yu Ko, MBCHB, and Yi-Pin Chiang, MD
CASE DIAGNOSIS: Stage IV metastatic small-cell lung carcinoma
CASE DESCRIPTION: A 52-year-old female presented with bilateral hip pain. The pain started in her left buttock one night around three months ago when she rolled over in bed. Initial radiologic study was unremarkable; muscle strain was suggested at that time. However, the pain and numbness gradually spread to the other buttock and her left thigh, and she came to the rehabilitation clinic three months later when it became too painful to walk. On physical examination, there was marked pain when doing the Patrick’s test on both hips and a bilateral hip lesion was suspected. Ultrasound of the anterior hips was unremarkable. However, when scanning the painful buttocks, huge space-occupying lesions were seen at the sciatic notches. Bursitis or retroperitoneal mass was suspected; further investigations including X-rays, CT, and MRI were arranged. A right lung tumor with diffuse lymphadenopathy and metastatic osteolytic lesions were found.
DISCUSSIONS: Two-thirds of small-cell lung carcinoma present with distant metastases. This is due to the highly malignant characteristic of the cancer, with shorter doubling time and earlier development of metastases. With earlier diagnosis, patients have a better chance of survival.
CONCLUSIONS: This case shows that ultrasound can be a quick, non-invasive and effective tool for aiding the diagnosis of retroperitoneal metastatic lesions.

SNAPPING GRACILIS TENDON IN A COMPETITIVE SWIMMER
Megan Gillum, BS, Daniel Lueders, MD, and Jesse Day, MD
CASE DIAGNOSIS: Snapping distal gracilis tendon
CASE DESCRIPTION: A 14 year old competitive swimmer presented with aching, constant distal posterior medial thigh pain worsened with swimming kicks and flip turns. Physical therapy and Graston manipulation afforded limited relief of symptoms. Initial ultrasound evaluation was concerning for sartorius or semitendinosus tendinitis but injection between those distal tendons resulted in symptom exacerbation. Diagnostic ultrasound was repeated and definitively identified a dyskinetic distal gracilis tendon which moved posterior to the semimembranosus in knee flexion and forcefully snapped anteriorly with knee extension. Due to failure of previous nonoperative interventions, an open harvest of the distal gracilis from the pes anserine to its distal myotendinous junction was performed, analogous to graft harvest for ligamentous reconstruction. After post-operative physical therapy, medial hamstring snapping and sharp pain completely resolved and the patient returned to full activity.
DISCUSSIONS: Symptomatic snapping of the medial hamstrings is rare. Specifically, isolated snapping of the gracilis tendon over the semimembranosus muscle has not been described. A small number of cases detail involvement of both the semitendinosus and gracilis tendons. Ultrasound is the most accurate diagnostic imaging for snapping symptoms because of its capability to quickly and intricately evaluate structures in various positions in real time. Surgical resection of snapping semitendinosus and gracilis tendons has proven definitive in symptom resolution and return to sport. Surgical harvest of the distal gracilis tendon is commonly performed to obtain autograft material for anterior cruciate ligament reconstruction. This case innovatively repurposes that procedure to correct this unusual snapping pathology.
CONCLUSIONS: Dyskinetic distal gracilis tendon snapping is a rare etiology of medial hamstring snapping and has not previously been described in a swimmer. Diagnostic point of care ultrasound was integral in the visualization and diagnosis of gracilis snapping. Resection of the distal gracilis tendon resolved pain and snapping without decrement in athletic performance.

SNAPPING PES SYNDROME IN A STROKE PATIENT: A CASE REPORT HIGHLIGHTING THE USEFULNESS OF DYNAMIC ULTRASOUND
Tan Y. Leng, MRCP(UK)
CASE DIAGNOSIS: Snapping Pes anserine
CASE DESCRIPTION: This is a case report of a 56-year-old Chinese lady. She had a background history of left lateral medullary infarct in 2014 presenting with recurrent falls in 2019 and left knee pain for few months thereafter. Since then, her left knee experienced a palpable snap or click on knee extension. Dynamic left knee ultrasound revealed translation of semitendinosus tendon between the gracilis, sartorius and medial femoral condyle associated with localized knee pain at the media-posterior aspect of the left knee. MRI of the left knee did not reveal any meniscus tear or joint effusion but mild pes anserinus bursitis was noted. A trial of ultrasound guided triamcinolone and lidocaine injection around the semitendinosus tendon with physical therapy helped to relieve the pain. This patient did not require any surgical intervention. Her pain was relieved despite having intermittent knee snapping from knee flexion to extension during ambulation.
DISCUSSIONS: Snapping pes anserinus syndrome causes medial knee snapping. It results from impingement and translation of the gracilis tendon or semitendinosus tendon over the ossseous structures of the knee during active flexion and extension. Musculoskeletal ultrasound is often the diagnostic imaging of choice in cases of mechanical snapping followed by treatment guidance.
CONCLUSIONS: There is great value of dynamic ultrasound to assist in the diagnosis snapping pes anserine. Ultrasound guided injection is a feasible option in managing pain in patient with snapping pes syndrome.

SOCIAL MEDIA ENGAGEMENT AS A TOOL FOR PM&R RESIDENCY PROGRAMS: A CURRENT SURVEY
George Raum, Vinicius Tippi Francio, MD, April Hyon, James E. Eubanks, MD, MS, Conan So, BS, MPH, Barbara Kozminski, MD, and Ha Chris, DO
OBJECTIVES: To investigate how PM&R residency programs use social media and to determine why programs that do not use social media have yet to join these platforms. Social media use (Twitter, Facebook, Instagram) has become increasingly popular in the medical field. Studies have shown that social media increases the reach of journal articles, promotes advancement of medical education, and enhances scientific conference experiences.

DESIGN: An online survey was distributed to accredited PM&R residency programs via email, official PM&R association newsletter, and social media. Responses were recorded using multiple choice, binary, and free text components.

RESULTS: Of the 90 ACGME-accredited PM&R residency programs, 27 use social media. 38 programs responded to the survey, of which 63.2% use an official form of social media. The most common purpose of social media is networking (79.2%), followed by education/research (70.8%). 30.4% of programs noted an increase in website traffic with social media use. 79.2% agree that an important tool to recruit medical students. The most common reasons for not using social media are lack of staff to maintain it and resistance from institutional or program leadership. However, 57.2% of the programs that do not currently use social media believe that their programs will use it in the future.

CONCLUSIONS: Social media is a useful tool for PM&R residency programs to highlight their programs, recruit students, and disseminate research. Of interest, in a separate study of 125 MS-4s/PGY-1s, 49.6% reported using social media to conduct residency research. It is important for PM&R residency programs to recognize the utility of social media in connecting with the future generation and enhancing program visibility. Although social media engagement by residency programs has become more common, it is still limited by limited staffing to set up and maintain accounts and by institutional restrictions.

SONOGRAPHIC EVALUATION OF OPTIMAL NEEDLE INSERTION SITE OF BICEPS FEMORIS SHORT HEAD
Seoyeon Shin, Resident, and Donghyew Kim, MD, PhD

OBJECTIVES: To assess the optimal needle placement site for the electromyographic examination of the biceps femoris short head muscle through sonographic evaluation.

DESIGN: The study was designed as a prospective cross-sectional study. Thirty-six lower limbs of 18 voluntary healthy people were enrolled the study. The distance was measured using ultrasonography from medial and lateral margin of BFL tendon to CNP (M_BFLT_CPN), L_BFLT_CPN distance), and hazard window from medial and lateral margin of BFL tendon to CNP (M_CPN_angle1&2, L_CPN_angle1&2) at 5cm proximal to the tip of fibular head (P1), 7cm proximal (about 4 finger breadths) to the tip of fibular head (P2).

RESULTS: Median results of medial BFL tendon margin to CNP distances (M_BFLT_CPN) were 7.33mm (2.10mm – 16.18mm) at P1, 11.58mm (7.16mm – 22.99mm) at P2 level. Median results of lateral BFL tendon margin to CNP distances (L_BFLT_CPN) were 19.97mm (11.96mm – 26.22mm) at P1, 22.05mm (14.31mm – 29.81mm) at P2 level. Median results of angle between medial BFL tendon margin to CNP borders were 23.53 to 52.28° at P1 level, and 18.18° to 35.06° at P2 level. Median results of angle between lateral BFL tendon margin to CNP borders were 75.12° to 83.00° at P1 level, and 37.24° to 74.60° at P2 level. The CPN courses in proximity to the median margin of the BFL tendon and locate nearly direct below the BFL tendon.

CONCLUSIONS: A medial approach of the needle electrode for electromyographic examination of the biceps femoris short head would have a high risk of injury to the CNP. Considering the anatomical positioning between CPN and biceps femoris short head muscle, the lateral approach is strongly recommended for electromyographic examination of this muscle.

SONOGRAPHIC EVALUATION OF THE PLANTAR FASCIA AFTER TREATMENT WITH EXTRA CORPOREAL SHOCK WAVE THERAPY IN PATIENTS WITH CHRONIC PLANTAR FASCIITIS IN KUWAIT
Douaa M. Mosalem, MD, Shothour M. Alghunaim, FRCPC, Sherif M. Kharat, MD, and Farah F. Abdel Hameed, Medical Student

OBJECTIVES: The aim of this study therefore was to study the effect of ESWT on heel pain, and foot functions, as well as the sonographic evaluation of the plantar fascia thickness after ESWT treatment in patients with chronic plantar fasciitis in Kuwait.

DESIGN: Thirty Kuwaiti patients with chronic plantar fasciitis and twenty five healthy individuals as control were included in this study. Sonographic evaluation of the plantar fascia thickness was done at baseline and 1.5 month after ESWT treatment. Moreover, other outcome measures were visual analogue scale (VAS) and the Roles and Maudsley (RM) score at baseline and 1.5 month after ESWT treatment for the assessment of pain.

RESULTS: A statistically significant reduction in VAS from 8.0 ± 1.4 to 1.2 ± 1.0 at 1.5 months after ESWT treatment was noted (P < 0.001) and improvement of functions by assessment of Roles & Maudsley score was also observed. Moreover, there was a significant reduction in the ultrasound measured thickness of the plantar fascia from 5.0 ± 1.2 mm to 4.3±0.3 mm at 1.5 month after ESWT treatment in patients with plantar fasciitis group (P < 0.001).

CONCLUSIONS: The major finding of the present study was that ESWT resulted in significant pain relief from plantar fasciitis and improvement of function. Additionally, a reduction of the ultrasound measured thickness of the plantar fascia at 1.5 month after treatment was also concluded. Therefore, ESWT appears to be an effective therapeutic modality for chronic plantar fasciitis with positive effects on pain, foot functions, and reducing fascia thickness.

SPINAL CORD STIMULATOR MULTI-LUMEN CONCENTRIC LEAD FRACITURE. A CASE REPORT
Joseph M. Seldin, MD, and Yili Huang, DO

CASE DIAGNOSIS: We herein present a case of a 81-year-old Man with a history of chronic pain who underwent spinal cord stimulator (SCS) trial and during the follow up visit was found to have a lead that fractured.

CASE DESCRIPTION: 81-year-old Man with a history of lumbar spinal stenosis with radiculopathy and alcohol induced painful neuropathy in bilateral lower extremity who presents with persistent pain despite multiple medical and interventional treatments. The decision was made to trial spinal cord stimulation in an effort to decrease his present pain from his co-morbid conditions. Epidural access obtained at T12-L1 and two 16 contact trial were leads placed at T6 midline and right of midline. Both performed with one pass through, simple silicon trial anchors used to secure. Patient demonstrated significant improvement in back and leg pain. During the follow up visit post-trial the decision to pull the trial leads was made. The right trial lead pulled with mild resistance however continuation of smooth pull motion resulted in “snap” feel. Trial lead visualized with contacts missing.

DISCUSSIONS: SCS are useful for patients that have chronic pain. SCS lead fracture is a failure of the device and have been reported in the literature at a rate from 0 to 10.2% and common with single lumen leads. It is however rare to be observed as in this case, with multi-lumen concentric leads. Management for when lead fractures occurs is not defined. For resolution as in this case, we recommended X-ray to evaluate the fracture site and if subcutaneous location proceed with dissection and retrieval. If epidural/luminous location or neurologic symptoms are present including pain obtain neurosurgical consultation.

CONCLUSIONS: We thus present a rare case of SCS multi-lumen concentric lead fracture after trial implantation. Management is ill-defined however, if this occurs obtain appropriate imaging and if needed neurological consultation.

SPINAL EPIDURAL LIPOMATOSIS IN THE SETTING OF HIV
Caroline Lee, MD, Sanjeev Agarwal, MD, and Steven J. Mann, MD

CASE DIAGNOSIS: Spinal Epidural Lipomatosis (SEL) is a rare complication associated with older age, obesity, male sex, systemic corticosteroid use, and epidural corticosteroid injections. Usually incidental (2.5%), SEL can present as a wide spectrum of sequelae from spinal cord compression to chronic lower back pain. While 1.8% of patients are symptomatic, the HIV population presents a unique level of medical complexity given the association of lipodystrophy and combined anti-retroviral therapy (cART).

CASE DESCRIPTION: A 61-year-old male with a history of HIV on HAART presented to the outpatient setting for chronic lower back pain and an acute worsening of his pain in the last month. Pain was associated with numbness and tingling in his lower extremities and was refractory to medication. No incontinence were noted. Physical exam was significant for decreased motor strength in bilateral hip flexion, knee extension/flexion, and ankle dorsiflexion/plantarflexion. The patient ambulated with a straight cane and antalgia. MRI was significant for diffuse epidural lipomatosis and thecal sac compression from L1-S1. As such, the patient was referred to a spinal surgeon who deemed that the patient was non-operative at this time. Conservative therapies were initiated, and the patient reported mild improvement in pain.

DISCUSSIONS: While some patients improve with conservative management, the removal of cART and the associated two-fold problem. Therapy may improve pain but the nidi is still present. Additionally, patients have limited interventional treatments given the association of steroids and SEL. Surgical intervention may improve outcomes but the recurrence of SEL is a possibility given its association with cART.
Abstracts

SPINAL STIMULATION RESOLVING PAIN AND SPASTICITY IN THORACIC SPINAL CORD INJURY
Benjamin Sirutis, MD, and Erik Shaw, DO
CASE DIAGNOSIS: Successful spinal cord stimulator trial in a T7 AIS A
CASE DESCRIPTION: The patient is a 58 year old man who suffered a spinal cord injury in 2006 during a tree trimming injury. He had lateral fusion at the levels of T5 through T9 and was diagnosed with a T7 ASI A spinal cord injury. Following his injury he suffered from chronic neuropathic pain. A 60 tab octopular lead was placed at the level of T6. With stimulator activation the patient experienced a resolution of his neuropathic pain and on follow up endorsed he had significant improvement in his spasticity as well as lower extremity edema.

DISCUSSIONS: Spinal cord stimulation has been a well proven treatment for refractory pain in individuals suffering from central pain syndromes but the benefits have been incompletely explored for patient’s suffering from spinal cord injuries. It is currently postulated that spinal cord stimulation is effective for neuropathic pain through suppression of wide dynamic range (WDR) neurons in the dorsal column. The exact mechanism of this inhibition is under research however inhibitory GABA-ergic interneurons may play a role in the depression of WDR activity. Our patient describes an improvement in the frequency and intensity of his spasticity. One mechanism contributing to spasticity development is the disruption of descending inhibitory pathways, allowing for overexcitation of the stretch-reflex arc. We suggest spasticity may improve with spinal cord stimulation of similar GABA-ergic interneurons which cause presynaptic inhibition of IA fibers involved in the stretch-reflex arc. With lower stimulation of the stretch-reflex arc, spasticity becomes less severe.

CONCLUSIONS: Spinal cord stimulation for the treatment of pain and spasticity in the spinal cord injured patient remains an incompletely understood avenue of treatment, warranting further research to determine its effectiveness. It represents a potential treatment for patients experiencing symptoms refractory to medical management.

SPONDYLOCOSTAL DYSOSTOSIS WITH SPRENGEL DEFORMITY: A CASE REPORT
Anuradha Shenoy, MD, and Anil K. Gaur, DPMR, DNB-PMR, MBA
CASE DIAGNOSIS: Spondylocostal dysostosis with sprenge deformity
CASE DESCRIPTION: Nine year old female second child of parents born out of non-consanguineous marriage complaints of deformity of left shoulder. In postnatal period at one and a half month of age she started experiencing multiple episode respiratory infection and on further investigation was found to have chest wall abnormality. Currently she came with complaints of breathlessness on activity. Since last 4 months she free of any respiratory symptoms. On examination her height -114 cm, U/SLS ratio was 1.1 and weight - 18 kg. Shoulder asymmetry was seen with left shoulder at higher level than right. There was no scoliosis. Cervical as well as shoulder range of motion was full. On palpation a defect was found in left axilla along 4th to 6th rib. Chest x ray showed broad fused rib in left side involving 6th, 7th and 8th rib in posterior end, bifid anterior 8th rib, narrow hemithorax. regault classification group 2

DISCUSSIONS: Spondylocostal dysostosis is clinicoanatomical entity defined radiologically as multiple segmentation defect of vertebrae in combination with abnormalities of ribs. clinically there is short trunk in proportion to height, short neck, non- progressive scoliosis. Due to reduced size of thoracic respiratory function may be impaired. Multiple vertebral anomalies include butterfly vertebrae, hemivertebrae, fused hypoplastic vertebrae. Ribs may be fused, split or bifid. Associated anomalies include meningo(myelo)cele, congenital heart disease and ureteral abnormalities. Sprengel deformity is caused due to interruption of normal development and movement of scapula during early fetal growth. Regault classified deformity into 3 groups of which group 2 is superomedial angle of scapula located between C5 and T2 transverse process.

CONCLUSIONS: In our patient sprenge deformity was associated with multiple ribs and vertebral anomalies. The case was reported because of rare presentation.

SPORTS INJURY: MANAGEMENT & REHABILITATION UPDATES

CASE DIAGNOSIS: To understand the common causes of injuries related to sporting activities.
CASE DESCRIPTION: Rapid review
DISCUSSIONS: A well-trained Physiatrist would appear to be the most logical choice to direct the Rehabilitation Team, addressing the majority of non-operative injuries in conjunction with Athletic Trainer, Physical Therapist and referring other conditions as needed to the most appropriate specialist in a timely manner.
CONCLUSIONS: Prevention is the best treatment of sports injury.

STAI - INDIVIDUALIZED ASSISTIVE TECHNOLOGICAL SOLUTION: A NEED FOR CHILDREN WITH MULTIPLE DISABILITIES
Chiara Mastantuono, Mirco Fava, Luca Labianca, Carlo Brogioni, Annastasia Fiengo, Luisa Di Pietro, Elena D’Agostino, and Laura De Berardinis
OBJECTIVES: In disability, defined as the consequence/result of a complex relationship between the state of health of the individual, personal and environmental factors, the intervention cannot and must not be standardized, but thought in the context of family and social life. The structuring of the STAI contributes to social integration and participation, requires a careful consideration of the specific needs of the user, the family and an assessment of the impact on activities and the environment at the context. The use of a single help able to respond to the needs of the person with disabilities leads to a better bio-psychosocial integration.

DESIGN: The evaluation and design of the STAI is the result of a multidisciplinary approach defined in the school environment, a meeting point for specialists in the neuropsychiatric area, school services and family. An objective is developed, based on the functioning profile of the child (ICF-CY) and on evaluation of a functional nature specific to the different adaptive functions. The help is shared, formed by the user, the operators and the family, and then monitored.
RESULTS: In 12 months, through the ICF classification, improvements in temperament and personality functions, psychomotor functions, emotional functions, use of communication tools and techniques, family relationships and communication products and technologies have been observed. In addition, there has been an improvement in gross motor skills linked to the use of the aid itself.
CONCLUSIONS: The multidisciplinary work of the implementation of the STAI is based on the bio-psychosocial model, which places on the same level the aspects concerning health, social participation, putting everything in relation to environmental factors, and taking into account the dignity and rights of the person. The creation of a Core Set, based on lists of ICF relevant categories to specific context, can facilitate in the creation of customized tools.

STATUS OF ULTRASOUND IN FLUOROSCOPIC GUIDED IMPAR GANGLION BLOCK: A PROSPECTIVE STUDY
Nitesh M. Gonnade, MD, and Satyasheel Asthana, MBBS, MD (PMR)
OBJECTIVES: This prospective study was done to determine efficacy of ganglion impar blocks in recalcitrant cases using both musculoskeletal ultrasound and fluoroscopic guidance.

DESIGN: This prospective study was conducted in the Department of Physical Medicine and Rehabilitation at a tertiary center in India after obtaining approval from the institutional ethics committee. 30 patients with chronic coccygeal pain for more than 6 months who did not respond to conservative treatment and who fulfilled the inclusion and exclusion criteria were recruited into the study. Ultrasound guidance was used to locate sacroccygeal joint and needle placement in joint. Fluoroscopic guidance was used to determine depth of needle. The scales used were numerical pain rating scale (NPRS), Oswestry disability index (ODI) and Paris score.
RESULTS: Before intervention NPRS was 8.0±3.8. After procedure the reduction was to 3.43±1.22, 2.80±1.16, 2.80± 1.27 and 2.80±1.50 at 2, 4, 8 and 12 weeks respectively. The Paris score before intervention was 66.0±6.75. It was reduced to 23.33±9.22 and 20.33±1.59 at 4 and 12 weeks respectively. The p-value was found to be <0.0001 at all follow ups. The ODI initially was 54.60±6.44. It was reduced to 21.40±8.90 and 19.80±12.03 at 4 and 12 weeks respectively. The p-value was found to be <0.0001 at all follow ups. The study shows that impar ganglion block is effective modality in treating chronic coccydynia.
CONCLUSIONS: Coccydynia is a common condition that has potential to abruptly affect patient’s quality of life. In this study the combination of ultrasound and fluoroscopy in administering impar ganglion block via sacrococcygeal route appears to be safe and effective in coccydynia and also reduced overall radiation exposure to patients. The intervention should be used along other rehabilitative measures. For optimal effectiveness of this method further research is required.
STERNAL FRACTURE IN A WHEELCHAIR BASKETBALL PLAYER WITH PARAPLEGIA: A CASE REPORT

Harnek S. Bajaj, MD, Olivier Rolin, MD, PhD, and Mary E. Caldwell, DO

CASE Diagnosis: Sternal Fracture.

CASE DESCRIPTION: A 40-year-old male with T4 AIS A spinal cord injury participating in community wheelchair basketball suffered a fall after collision with an opponent's chair. He absorbed a blunt force trauma to the center of his chest, and complained of immediate sharp, stabbing, non-radiating pain. Pain was elicited with deep inspiration, cough, and pushing motions with his arms. On exam, sensation, strength, and range of motion were preserved in the bilateral upper extremities. He had severe focal tenderness on palpation of the right lateral sternalum at the insertion of the ribs, at the level of T3-5. Lateral chest radiographs showed a focal fracture of the sternum without displacement. EKG showed normal sinus rhythm. He was advised to continue weight-bearing as tolerated and to refrain from sports until pain free. Follow up was performed at 3 weeks post injury, and the patient endorsed improving pain. He continues to refrain from contact sports.

DISCUSSIONS: Here we report a case of sternal fracture in a wheelchair basketball player with paraplegia. Standard of care for rehabilitation of non-displaced sternal fractures involves rest, ice, and oral analgesics. Return to play guidelines are controversial—in general precautions are instituted, and sports are withheld for a minimum of 6 weeks, or until the patient’s respiratory expansion is no longer limited by pain. Depending on the level of injury, certain paraplegic athletes may not benefit from such stringent precautions, as these may significantly restrict function, with respect to wheelchair mobility and transfers. Many of these patients can attribute their respiratory muscle strength and health to wheelchair sports, as supported by the literature. As such, certain paraplegic athletes could potentially return to training earlier.

CONCLUSIONS: Sternal fractures in the paraplegic athlete are exceedingly rare, and special consideration should be taken with respect to management and return to play.

STEROID INJECTION VS. PLATELET-RICH PLASMA (PRP) INJECTION FOR THE TREATMENT OF INTERSPINOUS LIGAMENT SPRAINS: A CASE REPORT

Michael Pico, MD, and Andrew J. Duarte, MD

CASE Diagnosis: T12-L1 Interspinous Ligament Sprain

CASE DESCRIPTION: A 26 year old healthy female presented to clinic with mid-low back pain, described as dull, aching, and worse with lumbar flexion and extension. Physical exam revealed midline tenderness over the lower thoracic and upper lumbar spinous processes. After physical therapy proved unsuccessful, MRI revealed soft tissue edema posterior to the T12-L1 spinous process, consistent with inter-spinous ligament sprain. A T12-L1 interspinous ligament steroid injection provided 100% pain relief for 1 month. The patient then received a PRP injection to the interspinous ligament. After an initial pain flare up lasting 2 weeks, the patient noted 5% pain relief for 6 weeks. The patient returned 5 months later for a third steroid injection, which provided 65% pain relief for 1 week. To date, the patient still has back pain and is contemplating another PRP injection.

DISCUSSIONS: PRP provides growth factors to tissues with relatively low blood supply, which may prompt healing by promoting proliferation of mesenchymal stem cells and increasing collagen formation. Although PRP injections have been shown to be beneficial in treating intervertebral disc injuries, few studies have examined the effects of PRP on interspinous ligament sprains. While this case suggests that steroid injections may provide more pain relief compared to PRP, the effectiveness of steroid injections decreases with subsequent administrations. Conversely, studies of up to three PRP injections have shown that the probability and degree of pain relief increase with each subsequent injection. Thus, PRP injections may still be a viable treatment option for interspinous ligament sprains.

CONCLUSIONS: Steroid injection may be superior to PRP injection when comparing single dose injections to the interspinous ligament, but sequential steroid injections confer diminishing benefits. In contrast, the effects of successive PRP injections are still unclear.

STUDENT PERSPECTIVES ON PM&R: IMPACT OF A REGIONAL PM&R SYMPOSIUM

Christopher Lu, Stacey Isidro, BA, Sam Huss, MD, and Keunbe Eric

OBJECTIVES: Evaluate the impact of a regional PM&R symposium on student knowledge and interest in the field of PM&R. Evaluate PM&R topics that most interest students and determine what educational format best presents these topics.

DESIGN: 39 students attended a regional PM&R symposium. Lectures and workshops were presented by PM&R physicians from seven different institutions on topics relevant to PM&R. Additionally, there was a resident’s panel, a combined physical therapy-occupational therapy lecture, and a prosthetics workshop. Post-symposium surveys were distributed to 35 attendees who provided contact information, with 22 responses received. Respondents ranked their top five sessions. Each session was assigned an integer value of 1-5 with p-value=0.001. The top five ranked topics were 1) U/S workshop; 2) TBI lecture; 3) EMG workshop; 4) Optimizing Care for People with Disabilities and Their Families lecture; 5) Prosthetic workshop. All three- and two-tailed t-test was performed to obtain p-values. Respondents ranked their top five topics presented.

RESULTS: Interest in PM&R after the event rose from 4.23 (SD=1.066, range 1-5) to 4.59 (SD=0.666, range 3-5) with p-value=0.029. Level of understanding in PM&R after the event rose from 3.14 (SD=1.125, range 1-5) to 4.09 (SD=0.750, range 3-5) with p-value=0.001. The top five ranked topics were 1) U/S workshop; 2) TBI lecture; 3) EMG workshop; 4) Optimizing Care for People with Disabilities and Their Families lecture; 5) Prosthetic workshop. All three workshops were included in the top five ranked topics presented.

CONCLUSIONS: A symposium which incorporates lectures and workshops on PM&R topics presented by both physicians and allied health professionals significantly increases knowledge and interest in the field of PM&R. Students demonstrated interest in a variety of PM&R topics. Topics presented in a hands-on workshop format is associated with greater interest.

STUDY THE CHANGE IN ACECLOFENAC USAGE PATTERN IN KNEE OSTEOARTHRITIS FOLLOWING VISCOSUPPLEMENTATION

Kirar Kumar, MBBS, DNB, Sunam Badhal, MBBS, MD; Ajay Gupta, MBBS, DNB, R K Chadwa, MBBS, DNB, and Chethan C, MBBS, MD

OBJECTIVES: The main objective is to evaluate the change in aceclofenac usage pattern in terms of frequency, quantity and improvement in pain and function following viscosupplementation

DESIGN: Prospective observational study

RESULTS: All the subjects showed improvement in VAS and WOMAC. They also showed significant decrease in frequency and quantity of Aceclofenac usage following viscosupplementation

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CONCLUSIONS: Accelofenac usage is decreased following vissocusplementation in terms of frequency and quantity and there is improvement in pain in function after vissocusplementation

SUBDACIAN ARTERY THROMBOSIS VS. BICEPS BRACHII TENDINOPATHY: A CASE REPORT
Rachel Abouzaid, MD, Mazen Zein, DO, and Nicholas Cretu, MD
CASE DIAGNOSIS: Subclavian artery thrombosis
CASE DESCRIPTION: The patient is a 20-year-old female with a T3 ASIA A injury secondary to a gunshot wound complicated by trauma to the left subclavian artery requiring stenting and lifelong aspirin. During inpatient rehab, she began complaining of left proximal arm pain that worsened during therapy sessions (i.e. push-ups and weightlifting). After examination, the pain was attributed to muscle strain or possible biceps tendinopathy. She was treated conservatively with ibuprofen and a lidocaine patch and experienced no relief. The pain worsened and she was examined and found to have an absent left radial pulse. She was immediately sent for an arterial doppler of the left upper extremity which showed decreased flow of the left axillary and brachial arteries. An angiogram demonstrated a thrombus within the subclavian artery that required thrombectomy and balloon angioplasty with stent placement. She was instructed to take dual antiplatelet therapy with follow-up arterial doppler after three months.

DISCUSSIONS: Due to the nature of this patient’s arm pain with exertional activities, a thorough musculoskeletal exam was performed and revealed a limited active range of motion in the left upper extremity secondary to pain. The physical exam excluded rotator cuff involvement. There were no discoloration, edema, or temperature changes within the arm. It was not until failed conservative management that vascular claudication became part of the differential. The lack of a palpable pulse further supported the decision to obtain an arterial doppler. It is important to consider a vascular insult in one's differential diagnosis.

CONCLUSIONS: It is critical to consider vascular claudication as a possible etiology for arm or shoulder pain in high risk patients, especially ones that have experienced an injury to a major vessel. The sooner this is identified, the better chance there is to preserve limb viability and function.

SUBDURAL EMPYEMA IN A TEENAGE FEMALE
Carlos A. Cevallos, BS, and Russell Lacey, MD
CASE DIAGNOSIS: Subdural empyema in a teenage female
CASE DESCRIPTION: A 16 year old female (JB) was admitted after her mother found her drooling, with seizure-like activity, left sided weakness, and dysarthria. Imaging indicated severe sinusitis and a subdural fluid collection consistent with subdural empyema (SDE). JB underwent a sinosotomy and right frontal craniotomy with evacuation of the SDE. Previous to this, JB was a fully independent and active 16 year old. As a result of the SDE, she required admission to acute inpatient rehabilitation for difficulty with ambulation and activities of daily living (ADLs) due to left spastic hemiplegia and cognitive impairments. At time of discharge, 25 days post-admission, JB demonstrated significant functional gains, completing most ADLs at a modified independent level and ambulating over 150ft independently with only mild impairment in balance. She continued to have mild-to-moderate cognitive impairments, particularly with complex attention and working memory.

DISCUSSIONS: Subdural empyema is an intracranial collection of purulent material located below the dura-mater. Common effects include neurological deficits, hemiparesis, and seizures. JB was consistent as she displayed cognitive deficits, left sided hemiplegia, and had seizure episodes. Sinusitis of the frontal sinuses is one of the most common sources of SDE in older children. In JB’s case, the SDE occurred in the setting of frontal and maxillary sinusitis. The culpable pathogen was Streptococcus anginosus, a bacteria known to produce rhinosinusitis with intracranial complications. Identification of the underlying cause and optimal respiratory care helped alleviate the patient’s SSD symptoms and improved his rehabilitation course. This case suggests that SSD may be overlooked in younger patients with multiple delirium/SSD predisposing and precipitating factors.

CONCLUSIONS: This case demonstrates that assessing delirium status, even for young cardiopulmonary patients, may lead to early identification, intervention, and improved outcomes.

SUCCESSFUL TREATMENT OF BIOMECHANICAL ABNORMALITY AND SACCING BETWEEN THORACIC MUSCLE PLANES FOR CHRONIC POST THORACOTOMY PAIN SYNDROME
Xiaoyue Li, MD, and John Norbury, MD, RMSK
CASE DIAGNOSIS: Chronic post thoracotomy pain syndrome due to scarring and biomechanical abnormalities between the latissimus dorsi and the serratus anterior.
CASE DESCRIPTION: Patient is a 43 year old male with history of empyema who underwent thoracostomy and chest tube placement on the left chest wall in 2008. Since then he developed progressive pain and spasm over chest wall around prior thoracotomy site. He was diagnosed with post thoracotomy pain syndrome and was referred to our clinic for pain management. On exam, patient with visible spasms over left serratus anterior region, no wing scapula appreciated. Point of care ultrasound revealed an area of increased Doppler flow and hypoechoegenicity consistent with scarring and biomechanical abnormalities between the left latissimus dorsi and the serratus anterior. Patient received ultrasound guided injection to the hypoechoic area under the left latissimus dorsi using kenalog and lidocaine along with referral to outpatient occupational therapy. At 4 week follow up, patient reported his pain had resolved, and he was able to return to work fulltime as an electrician.

DISCUSSIONS: Conventional management for chronic post thoracotomy syndrome involves thoracic epidural analgesia, or less commonly intercostal or paravertebral nerve block. Our patient with complete pain resolution after local steroid with anesthetics injection directly into hypoechoic area under ultrasound guidance confirmed our suspicion that the pain is due to scarring and dysfunction between the two thoracic muscle planes.

CONCLUSIONS: Pathophysiology of chronic post thoracotomy pain is often multifactorial. Musculoskeletal ultrasound allows direct visualization of the pain source and allows targeted pain relief using local steroid and anesthetics.

SUCCESSFULLY MANAGED RESPIRATORY INSUFFICIENCY IN A PATIENT WITH BMPER GENE MUTATION: A CASE REPORT
Dahwi JUNG, MD, Ho Eun Park, MD, Ji Won Hong, MD, Jin A. Yoon, PhD, and Yong Boom Shin, PhD
CASE DIAGNOSIS: Diaphanospondylodysostosis (DSD) is a rare and fatal disease that can occur as a phenotype of the BMPER gene mutation. We report a successful management of respiratory insufficiency by chest retraction through non-invasive ventilator (NIV) for DSD patients.
CASE DESCRIPTION: The patient complained of respiratory distress since she was 12 years old. Pulmonary function test showed a pattern of restrictive lung disease due to thoracic deformity. From the age of 14, she used NIV only at night. At the age of 15 years, she suffered from upper respiratory infection and visited the emergency room with dyspnea. Arterial blood gas analysis showed marked carbon dioxide retention up to 73 mmHg of arterial partial pressure of carbon dioxide (pCO2). With appropriate adjustment of NIV, PC02 was lowered to 48 mmHg within one week of hospitalization and she discharged to home on the 9th day, maintaining NIV application at night. We suspected DSD in this patient with respiratory insufficiency, and other characteristic morphologic features including axial skeletal anomaly and diagnosis at night. We suspected DSD in this patient with respiratory insufficiency, and appropriate adjustment of NIV, PC02 was lowered to 48 mmHg within one week of age of 15 years, she suffered from upper respiratory infection and visited the emergency room, washing, surgical debridement, reduction and fixation of the fracture were performed. Revascularization of the brachial artery and neurorathy of the radial and ulnar nerves were performed. Flat closure, dressing, splint and antibiotic therapy. It evolved with return of perfusion and radial and ulnar pulses. After three weeks, the fracture was consolidated with preserved pulses, but with nerve deficits. After two months of rehabilitation, he already had a full arc of elbow movement, with six, outline of the radial and ulnar nerves and one year return to their normal functions.

DISCUSSIONS: Lesions in the elbow region are frequent, especially in children who are still in the age group considered pediatric. In percentage terms, fractures in this group are represented by 17% of all fractures. Humeral supracondylar fractures account for about 60 to 75% of pediatric upper limb fractures. Supracondylar humerus fractures are urgent, requiring rapid diagnosis and management, mainly due to severe vasculonervous complications.

CONCLUSIONS: The aim was anatomical reduction and functional restoration as early as possible. The higher the degree of instability, the higher the complication rate. Strict neurological examination and palpation of the distal peripheral pulses are relevant. There are contradictions regarding the type of treatment that should be instituted, precisely because it is a delicate region full of anatomical structures that refer to a complex system.

SUPPLEMENT USE IN MUSCULOSKELETAL PATIENTS OF THE METRO ATLANTA AREA SINCE OPIOID RESTRICTION

Benjamin Sirutis, MD, and Di Cui, MD

CASE DIAGNOSIS: To describe current opioid, supplement, nutraceutical, and homeopathic remedy use in Emory Spine Center and Pain Center patients. This data will be put in context of opioid transaction data available through Automated Reports and Consolidated Ordering System (ARCOS) reports specific to the Metro Atlanta area.

CASE DESCRIPTION: An electronic survey is used to collect data from patients with a musculoskeletal or pain related diagnosis. Emails acquired during patient intake will be used to offer study information and a survey link. The survey questions are multiple choice with few short free response sections. The information collected will include: demographic information, condition treated, quantification of prior and current prescribed / non-prescribed opioid / supplement / nutraceutical use, source of information regarding the use of opioids / supplements / nutraceuticals, adverse effects experienced while using opioids / supplements / nutraceuticals, and perceived effectiveness while using opioids / supplements / nutraceuticals. Significant supplement and nutraceutical use in the participant population will be determined. Frequency of use data from these significant supplements / nutraceuticals will be described alongside opioid transaction data available in the public ARCOS database. Finally, we will also complete a literature review regarding the key supplements / nutraceuticals.

DISCUSSIONS: Data collection is currently ongoing and expected to complete by February 2020. We expect to have a minimum of 200 responses and will continue data collection afterwards. We are also working on outreach efforts to other clinics to create a multi-center follow up study.

CONCLUSIONS: Recently government agencies have issued guidelines for the prescription of opioids encouraging the restriction of access, reduction in quantity dispensed, and improved levels of prescription monitoring. The current cause and effect between opioid policy changes and alternative treatments is incompletely understood. This study will describe current use of supplements and nutraceuticals in the context of recent opioid use legislation, however further studies will be required to measure meaningful correlation in trends.

SUPRACONDYLAR FRACTURE IN A PEDIATRIC PATIENT ASSOCIATED WITH VASCULAR-NERVOUS INJURY: A CASE REPORT

Flávio Henrique N. dos Santos, Paula M. Lucas, Talita Costa Barbosa, Amanda Oliva Spaziani, Raisa Silva Frota, and Leonardo Faidiga

CASE DESCRIPTION: Male patient, 7 years old, treated in an emergency after horse fall and left elbow trauma with bone exposure in a wound larger than ten centimeters. He presented a supracondylar open fracture in the left elbow - grade 3C - with injury to the brachial artery and radial and ulnar nerves. Referred to the operating room, surgical debridement, reduction and fixation of the fracture were performed. Revascularization of the brachial artery and neurorathy of the radial and ulnar nerves were performed.

DISCUSSIONS: DSD is a rare, fatal disease with little known disease progression or prognosis. Long term progression of DSD is affected by renal failure due to renal disease, and we suggest that respiratory insufficiency due to chest deformity may also affect the course of the disease. In patients with DSD, axial skeletal development is abnormal, whereas appendicular skeletal development is relatively normal. In this case, however, symmetrical muscle wasting was observed in the both upper and lower extremities. This may be due to the extremely rare reports of DSD and the life span of the patient was so short that we could not fully see the course of the disease.

CONCLUSIONS: We recommend early pulmonary rehabilitation for chest expansion and NIV training to improve quality of life, reduce hospital stay, delay disease progression.

SUPRACAPULAR NEUROPATHY SECONDARY TO SUPRACAPULAR NOTCH PARALABRAL CYST: AN UNUSUAL CAUSE OF SHOULDER PAIN

Fady S. Yaacoub, DO

CASE DIAGNOSIS: Shoulder pain is a very common symptom in the clinical setting for both young and old patients. Suprascapular nerve neuropathy is an uncommon and often underestimated source of shoulder pain and dysfunction. It can be due to a ganglion or paralabral cyst causing entrapment at the suprascapular notch and resulting in weakness and atrophy of the supraspinatus and infraspinatus muscles.

CASE DESCRIPTION: A 44-year-old male presented with one-year history of traumatic left posterolateral shoulder pain. The patient had failed physical therapy, pharmacological management, subacromial steroid injection, cervical epidural steroid injection and medial branch nerve blocks. Physical examination revealed weakness with shoulder external rotation, forward flexion and abduction. The rest of the neurological examination was normal. Magnetic resonance imaging scan displayed a paralabral cyst extending into the suprascapular notch. Electromyography showed fibrillation potentials and positive sharp waves in the left supraspinatus and infraspinatus muscles. The patient subsequently underwent arthroscopic decompression of the paralabral cyst with significant improvement of symptoms.

DISCUSSIONS: Suprascapular nerve neuropathy due to ganglion cyst impingement causes shoulder pain, and can therefore easily be mistaken for rotator cuff injury or cervical spondylosis. Compression at the spinoglenoid notch results in weakness of only the infraspinatus muscle, whereas involvement at the suprascapular notch can cause weakness of both the infraspinatus and supraspinatus muscles. There are multiple etiologies for this compression, with the most common being a paralabral cyst. Treatment options include ultrasound-guided aspiration, open surgical decompression, or arthroscopic decompression of the cyst.

CONCLUSIONS: In patients presenting with non-specific shoulder pain, suprascapular nerve neuropathy should be considered. Although uncommon, suprascapular notch entrapment is a very treatable condition with potentially good results when recognized and intervened early prior to the setting of muscular atrophy.

SWADPT1: EVALUATION ON STANDARDIZED CIRCUITS OF THE INTEREST OF A ROBOTIC MODULE FOR ASSISTING THE DRIVERS OF A POWERED WHEELCHAIR: PILOT, PROSPECTIVE, CONTROLLED, RANDOMIZED STUDY

Emilie Leblong, MD, MSC, Bastien Fraudet, MSC, Louise Devigne, PhD, François Pautot, PhD, Marie Babé, PhD, Benoît Nicolas, MD, and Philippe Gallien, MD, PhD

OBJECTIVES: The objective of this study is to highlight the interest of a robotic Powered Wheel Chair (PWC) driving assistance module, using infrared sensors and accessorizing a commercial wheelchair, on reducing the number of collisions on standardized circuit in a population with neurological disabilities, by comparing driving performance with and without assistance.

CONCLUSION: This is a prospective, monocentric, controlled, randomized, single-blind pilot study involving patients with neurological disabilities who usually use PWC. The main criterion for evaluating the device is the number of collisions without and with the assistance of a prototype anti-collision system on 3 circuits of increasing
Abstracts

TAKING MY BREATH AWAY: UTILIZING DIAPHRAGMATIC ULTRASOUND IN NEUROLOGIC DISORDERS

Ellen M. Farr, MD, and Colin K. Franz, MD, PhD

CASE DIAGNOSIS: Neuromuscular disorders affecting diaphragmatic function

CASE DESCRIPTION: This is a case series detailing dynamic diaphragmatic ultrasonographic evaluation in patients with various neurologic disorders. To date, we have scanned 24 patients whose diagnoses included but were not limited to amyotrophic lateral sclerosis, Parsonage Turner syndrome, phrenic nerve injury, and spinal cord injury for new evaluation or routine follow up in our academic inpatient rehabilitation facility or outpatient neuromuscular practice. Each patient had bilateral diaphragmatic ultrasound scans performed between the mid-axillary line, at the 8th or 9th intercostal space, in either the supine or seated position. The thickness (T) of the diaphragm was measured at total lung capacity (TLC) and functional residual capacity (FRC) and the thickening ratio was determined (T TLC/FRC ). These values were compared to normal values determined in prior studies and contributed to explaining the current diagnosis and delineating respiratory functional status.

DISCUSSIONS: Ultrasound is a well-known and widely used modality for neuromuscular disorders, but its use in evaluating diaphragmatic muscle bulk and function is relatively novel. Studies have shown it correlates well with pulmonary function tests and phrenic nerve EMG, and is already being used to monitor respiratory dysfunction. The incidence of musculoskeletal complaints in an emergency room of an academic hospital for the teaching/learning of acute musculoskeletal care in physical and rehabilitation medicine by studying the incidence of musculoskeletal complaints by age, sex, and ICD-10 code with particular emphasis on knee and ankle health conditions.

DESIGN: The electronic database of all visits to an emergency room during calendar years 2016 and 2017 was searched. The frequency of all M (musculoskeletal system and connective tissue) codes and all S (injury or certain other consequences of external causes) codes was determined. Codes such as infection, bites and skin injury associated with joints were excluded. Frequency distributions were calculated per year, month, sex, and age group for all visits and those involving the knee or ankle joint. Statistically significant variables were compared to normal values determined in prior studies and contributed to explaining the current diagnosis and delineating respiratory functional status.

CONCLUSIONS: Diaphragmatic ultrasound is a safe, rapid, and cost-effective way to assess diaphragm muscle appearance and function in patients with varying neurologic disorders for initial diagnosis, follow-up, or procedural planning.

TALLER NACIONAL DE ORTESIS Y PRÓTESIS DE COSTA RICA: UN ESTUDIO DESCRIPTIVO DE LA POBLACIÓN AMPUTADA TRANSTIBIAL Y SUS CORRELACIONES FUNCIONALES Y PROTÉSICAS

Laura Cordero-Molina, MD

CASE DIAGNOSIS: Las amputaciones son uno de los diagnósticos más frecuentemente valorados por los servicios de rehabilitación en Costa Rica, sin embargo desconocemos las características clínicas de esta población y sus posibles correlaciones con los procesos de prototización. Analizar las características clínicas más relevantes de los pacientes amputados transtibiales valorados en el Taller Nacional de Ortesis y Prótesis (T.N.O.P) para prototización durante el período comprendido entre agosto del 2018 hasta julio 2019 y generar recomendaciones al personal encargado de rehabilitar a esta población.

CASE DESCRIPTION: Análisis descriptivo y correlativo de la hoja de valoración de pacientes con solicitud de prototización mediante programa Excel.

DISCUSSIONS: Se obtuvo 245 valoraciones válidas, correspondientes al 79.3% del total del periodo, en una población cuya edad promedio es de 57.7 años, referidos de zonas rurales el 33.8%, El 58% tienen como factor causal de su amputación complicaciones derivadas de la Diabetes Mellitus. El 26.5% fueron pacientes amputados nuevos y el tiempo promedio despues de la amputación en llegar al TNOP fue de 8 meses. En cuanto a las correlaciones con el entrenamiento pre-protésico y funcionalidad encontramos que sólo el 16% de los pacientes amputados nuevos (no prototizados previamente) realizan la técnica correcta del vendaje, la intolerancia al contacto total es del 21% y la falta de equilibrio monopolado en el 26% y son en promedio menos funcionales que aquellos que ya son usuarios de prótesis.

CONCLUSIONS: Establecer mejores mecanismos de rehabilitación pre-protésica y de coordinación con el T.N.O.P para la llegada temprana de los pacientes amputados son las dos principales acciones que los equipos de rehabilitación deben de adoptar para el manejo más oportuno de esta población. La funcionalidad del paciente mejora significativamente al protetizar.

TEACHING MUSCULOSKELETAL REHABILITATION MEDICINE: HEALTH CONDITIONS IN AN EMERGENCY ROOM OF A UNIVERSITY HOSPITAL

Richard A. Fontanaza, MD, Humberto Ramirez, BS, William Ramos, BS, Juan Gonzalez, MD, and Walter Frontera, MD, PhD

OBJECTIVES: To evaluate the usefulness of an emergency room of an academic hospital for the teaching/learning of acute musculoskeletal care in physical and rehabilitation medicine by studying the incidence of musculoskeletal complaints by age, sex, and ICD-10 code with particular emphasis on knee and ankle health conditions.

DESIGN: The electronic database of all visits to an emergency room during calendar years 2016 and 2017 was searched. The frequency of all M (musculoskeletal system and connective tissue) codes and all S (injury or certain other consequences of external causes) codes was determined. Codes such as infection, bites and skin injury associated with joints were excluded. Frequency distributions were calculated per year, month, sex, and age group for all visits and those involving the knee or ankle joint. Statistically significant variables were compared to normal values determined in prior studies and contributed to explaining the current diagnosis and delineating respiratory functional status.

CONCLUSIONS: The incidence of musculoskeletal complaints in an emergency room is high (mean of 28 visits per day) and most patients are young and middle-age females with acute injuries. This is an excellent environment for teaching acute musculoskeletal medicine to PRM residents.

TELEREHABILITATION AS A TEACHING-LEARNING TOOL FOR MEDICAL STUDENTS IN A DEVELOPING COUNTRY IN SOUTHEAST ASIA

Carl Freilain D. Leochico, MD, and Jose Alvin P. Mojica, MD, MPHED

OBJECTIVES: To determine the process and outcomes in using telerehabilitation as a teaching-learning tool for medical students.

DESIGN: This was a mixed-methods study design, involving use of an original questionnaire to gather feedback on the process of telerehabilitation, supplemented by focus group discussions with the medical students (particularly those in 3rd year, 4th year or clerkship, and 5th year or internship) who have participated in small group discussions on telerehabilitation during their rotation at the Department of Rehabilitation Medicine, Philippine General Hospital. Every two weeks throughout the academic year 2018-2019, a new group of medical students rotated in the Department of Rehabilitation Medicine at Philippine General Hospital. The students received an orientation on telerehabilitation (i.e., definition, significance, benefits, risks, procedure). The medical clerks and interns were required to present a case in a small group discussion delivered via telerehabilitation. After each telerehab session, the program was evaluated via self-administered questionnaires and focus group discussions.

RESULTS: We have detailed the process of conducting telerehabilitation sessions with medical students according to three phases: 1) orientation, 2) implementation, and 3) evaluation. Telerehabilitation was conducted via live videoconferencing between the tele-community site (with the patient and medical students), and the telerehabilitation site (with the physician and allied health professionals). Majority of the students reported to have had an excellent experience with telerehabilitation. They highlighted the value of using telerehab as a way of referring cases seen in rural health units to urban-based Rehabilitation Medicine specialists. They also shared the practicality of doing telerehab to learn more about the physiatric evaluation and multidisciplinary case management. The most common limitation in telerehab was the occasional Internet lags.

CONCLUSIONS: Telerehabilitation can be used as an effective and innovative tool to educate millennial medical students on the principles of rehabilitation medicine. The processes of conducting telerehabilitation with the students entails orientation, implementation, and evaluation. The interactive way of managing cases and learning from them even from a distance was well accepted by the medical students.
THE ACUTE EFFECTS OF VIBRATION STIMULI TRAINING ON SHOULDER SENSOMOTOR CONTROL

Sornu Kotoshiba, PT, Yukio Urabe, PT, Junpei Sasada, PT, Masanori Morakawa, Prosthetist and Orthotist, Mitsuhiro Yoshimi, PT, Shogo Sakai, PT, and Noriaki Maeda, PT

OBJECTIVES: Whole body vibration is widely purported to increase muscle activation when used as a supplement to exercise. However, this potential benefit has predominantly been demonstrated in the lower limb (Marn et al., 2011), with only a paucity of studies evaluating the upper limb (Ashnagar et al., 2016). Shoulder functional stability requires a fine balance of active and passive forces, developed by muscles and joint structures respectively, which is regulated by the shoulder sensorimotor control system (Myers JB et al., 2006). Therefore, the aim of this study was to investigate the impact of vibration stimuli training on shoulder sensorimotor control.

DESIGN: Ten healthy collegiate men without shoulder orthopedic disease. Participants placed both hands on a vibration platform with partial weight bearing in push-up position during a vibration protocol. Vibration protocol included 6 sets and rest for 30 seconds at 0Hz (control) and 30Hz frequencies. In shoulder sensorimotor control, 1) The center of pressure (COP) velocity during 30 seconds in the push-up position with their hands on the force platform as static stability test and 2) Upper Quarter Y Balance Test (UQYBT) composite score as dynamic stability test were collected before and after the intervention.

RESULTS: COP velocity was significantly faster from pre to post only at 0 Hz (9.7±0.97 mm/s vs 10.12±0.98 mm/s, p<0.05), mean to become unstable. In the UQYBT, composite scores were significantly greater from pre to post at 30 Hz (86.1±8.7 % vs 90.5±8.4, %, p<0.01), mean to become stable after exercise with vibration.

CONCLUSIONS: In previous study, the use of vibration stimuli provokes a global increase in shoulder muscle activation levels (Grant MJ et al., 2019). Furthermore, in this study, vibration stimuli training improved shoulder sensorimotor control. Further work is undoubtedly required evaluating exercises more representative of the training programs within elite sport.

THE ANGLE OF LOUIS MANEUVER: A NOVEL ALTERNATIVE TO THE SERNAL RUB TECHNIQUE

Lawrence G. Chang, DO, MPH, and Benjamin Seidel, DO

CASE DIAGNOSIS: Altered State of Consciousness in a Medically Complex Stroke Survivor

CASE DESCRIPTION: A 74-year-old woman with history of atrial fibrillation, coronary artery disease, and urinary tract infection admitted to inpatient rehabilitation for right anterior and middle cerebral artery stroke. Patient was working on her bicycle exercises in the gym until she suddenly syncopated. She was placed in Trendelenburg position and a code was called. Patient had a pulse, was breathing and hypotensive but was not responsive to touch, mild pain, or verbal stimuli. Strong painful stimuli was initiated. A tense, deep kneel rub to the angle of Louis was applied. Patient awakened. She endorsed feeling pain, moved all extremities, was awake and oriented to self, place, and situation. A reassessment of the joint revealed no bruising or tenderness of palpation or problems with breathing or palpitations.

DISCUSSIONS: Since this is the fifth case in successfully using this technique from experience, it is hypothesized that nosuous mechanical manipulation of the angle of Louis irritates both bone and joint nociceptors stimulating the cardiac plexus. From the cardiac plexus, the cardiac nerves activate upper sympathetic nerves and cervical ganglions which ascend to the reticular activating system with neurochemicals – acetylcholine, serotonin, dopamine, norepinephrine, glutamate, histamine, and oxyehin/hyporectas - spreading throughout the brain to arouse consciousness. This is the first research study to theoretically propose how this novel, alternate technique to sternal rub can induce wakefulness.

CONCLUSIONS: Nosuous pressure applied to the angle of Louis can be important in arousal for medically complicated brain injured patients with potential for worsening consciousness. In emergencies, this specific physical maneuver can be a lifesaving alternative to sternal rubs. This study will help in applying nosuous stimuli in disorders of consciousness by better understanding neuroanatomy and neurophysiology.

THE APPLICATION OF SIMULATION-BASED LEARNING IN THE REHABILITATION MEDICINE COURSE

Xuan Zhou, Master, and Qing Du, PhD

OBJECTIVES: The aim of this study was to evaluate the effect of simulation-based learning (SBL) in the rehabilitation medicine course.

DESIGN: 55 undergraduates of clinical medicine were recruited to participate and divided into the control group (37) and SBL group (18). The rehabilitation teaching of all subjects in this study was conducted by the same group of teachers, using the same “rehabilitation medicine” teaching materials. The syllabus, the content and the hours of teaching were the same as well. While the 18 students in the SBL group were exposed to simulation-based learning, the other 37 students of the control group adopted the traditional learning method. In the SBL group, clinical learning activities were based on simulation, which included the establishing of the simulated learning environment, role-playing as patients and their family, interacting with them individually or as a group, observing, and obtaining guidance from the teachers. After the course, case-writing and theoretical knowledge were examined and the Student Evaluation of Educational Quality (SEEQ) survey was conducted among all the subjects.

RESULTS: The average scores in case-writing and theoretical knowledge of the students in the control group were 84.3 points and 91.9 points respectively and in the SBL group were 88.8 points and 94.1 points respectively. The SBL group outperformed the control group significantly with higher scores in case-writing and theoretical knowledge assessment (P < 0.05). The SEEQ variable scores for students of SBL group were significantly higher on the value of learning, teaching enthusiasm and organizational clarity, group interaction and individual rapport (P<0.01). The students exposed to SBL also scored higher on the knowledge breadth and the difficulty and amount of assignments in the feedback towards teaching (P < 0.05).

CONCLUSIONS: SBL can improve the academic performance of the clinical medical students and their evaluation towards teachers in rehabilitation course.

THE ASSOCIATION BETWEEN FREE TESTOSTERONE LEVEL AND COGNITION IN COMMUNITY-DWELLING ELDERLY

Shin Who Park, MD, Won Kim, MD, Mi Ran Yoo, MD, Cheon Ji Kang, MD, and Kyoung Hyo Choi, MD, PhD

OBJECTIVES: This study aimed to investigate the association between serum free testosterone (FT) level and cognitive function in Korean community-dwelling elderly.

DESIGN: This is a cross-sectional study using the Korean Frailty and Aging Cohort Study (KFACS) database. 3014 community-dwelling men and women aged between 70 and 84 registered for KFACS in 2016 and 2017. Cognitive function was assessed by Mini-Mental Status Examination in the Korean version of the CERAD Assessment Packet (MMSE-KC), Trail Making Test (TMT), Frontal Assessment Battery (FAB), Digit Span (DS), word list memory, recall and recognition. Short Physical Performance Battery (SPPB) was conducted. Univariate and multivariate logistic regression analyses were performed to investigate the association between FT level and cognitive function.

RESULTS: In elderly female, low FT level was associated with decreased cognitive function in most of cognitive function test results except word list recognition in univariate analysis. These associations were maintained in MMSE-KC, FAB and word list memory task even after adjusting for all potential confounding factors including age group, education duration, alcohol consumption, smoking, depression and SPPB. Analyses based on four categories in female FT level revealed higher odds ratio in the lower FT quartile groups for decreased cognitive function. However, this trend was not observed in elderly male. As a result, there was a significant association between FT levels and cognitive decline only in women. FT level shows remarkably lower in females than in males. It can be interpreted that the decrease in neuroprotective function of the FT in brain is prominent only in very low levels.

CONCLUSIONS: In Korean community-dwelling elderly people, the decline in cognitive function showed a significant association with the decrease of FT level. And this relationship was noticeable in women, not men.

THE CHANGE IN THE AMOUNT OF ACTIVITY DURING SUBACUTE INPATIENT REHABILITATION: A MONITORING STUDY USING A “SMART-CLOTHING” SYSTEM

Masahiko Mukaino, MD, PhD, Takayuki Ogawasawa, ME, Hirotaika Matsuura, MD, DMSC, Yasuo Aoshima, RPT, Takuya Suzuki, OTR, Yuta Nomura, RPT, Moe Ijima, RPT, Eichi Saitoh, MD, DMSC, and Yohsei Otaka, MD, PhD

OBJECTIVES: Inpatient rehabilitation is expected to improve the amount of activity in daily life of the patients. The aim of this study was to investigate the time course of the amount of activity of rehabilitation inpatients using a “smart clothing” system.

DESIGN: Data from 67 patients who stayed in the rehabilitation ward of Fujita Health University Hospital for longer than 6 weeks were analyzed. For the measurement, the hitoe system, which is composed of underwear containing electrodes to monitor heart rate and a transmitter for accelerometry, and IoT (internet of things) system.
gates embedded in the rehabilitation ward to collect data, was used. The heart rate, posture (lying down or upright), and amount of trunk motion (Trunk Motion Index (TMI): trunk acceleration metrics) were continuously monitored from the system. Patients were asked to wear the transmitter-attached underwear for 48 hours at admission and 2, 4, and 6 weeks after admission. RESULTS: Patients were lying down 5.8 ± 3.7 hours of the day at admission, which was decreased to 3.6 ± 2.5 hours after a 6-week inpatient rehabilitation. The average heart rate was 75 ± 14 bpm at admission and 74 ± 13 bpm after 6 weeks, while TMI was 7.0 ± 4.3 at admission and 10.7 ± 6.2 after 6 weeks. CONCLUSIONS: Increased activity of patients during inpatient rehabilitation was observed, while the reduction of rest time did not change throughout the period measured. This may reflect the improvement in cardiorespiratory function and or movement efficiency related to motor recovery.

THE CHANGES OF SWALLOWING FUNCTION AFTER EXPANSION SPHINCTER PHARYNGOPLASTY IN OBSTRUCTIVE SLEEP APNEA

In Sung Choi, MD, PhD, Bora Mun, MD, Min-Keun Song, MD, PhD, Hyung Chae Yang, MD, PhD, and Hyung-Kyu Park, MD, PhD

OBJECTIVES: Obstructive sleep apnea (OSA) patients may present swallowing dysfunction without subjective symptoms. Pharyngeal wall dysfunction in OSA has been known to be associated with abnormal palatopharyngeal structures such as hypertrophy of the oropharyngeal lumen, hypotonicity of the oropharyngeal muscle or increased number of varicoses nerve ending. Expansion sphincter pharyngoplasty (ESP) is the surgery for OSA patients to divide the muscle on the sides of the throat behind the tonsil (palatopharyngeal) and pulling it forward and laterally to sew it in place. We aimed to find the changes of swallowing function after ESP in OSA patients using videofluoroscopic swallowing study (VFSS).

DESIGN: Eight OSA patients (7 men and 1 woman, age 55.37±5.55 years, Apnea-Hypopnea Index (AHI) 33.9±21.1%) who underwent an ESP were recruited. All of them received VFSS before and 1 month after ESP. We measured oral transit time (OTT), pharyngeal transit time (PTT), pharyngeal delay time (PDT) and laryngeal elevation (LE) with liquid, yogurt, soft diet and solid diet. AHI is estimated from the average number of episodes of apnea plus episodes of hypopnea per hour during sleep. Mann-Whitney test was used to verify the differences in the quantitative parameters of swallowing function and during the VFSS before and after ESP. The spearman’s correlation analysis was done to find the correlation between quantitative parameters of swallowing function and AHI.

RESULTS: PTT with liquid diet significantly shortened after ESP (p = 0.050). There was no significant correlation between AHI and the quantitative parameters of swallowing function.

CONCLUSIONS: In this study, post-operative PTT of liquid diet was shorter than pre-operative PTT of liquid diet. We suppose that the hypertrophy of the oropharyngeal lumen may interfere with the passage of liquid. After ESP in OSA patients, pharyngeal passage showed the improvement with liquid diet by expanding the oropharynx.

THE CURRENT APPLICATIONS OF TELEMEDICINE IN THE FIELD OF PHYSICAL MEDICINE AND REHABILITATION

Chris Ha, DO, and Joshua Romero, MD

OBJECTIVES: To review current practices of telemedicine for treatment and rehabilitation of musculoskeletal and neurologic disorders relevant to physiatry. Technological advances in the past decade have made addressing problems within healthcare such as cost reduction and patient access more feasible. Consequently, medicine has seen an exponential growth in the use of telemedicine to deliver care. We discuss current applications of telemedicine to patient populations seen in PM&R and future directions of the field.

DESIGN: A systematic review of the literature in the PubMed, Medline, and CINAHL databases was conducted from 2010-2019 with keywords including telemedicine, telerehabilitation, musculoskeletal, neurologic, and physiatry.

RESULTS: Overall, telemedicine reduced burden of travel and subsequently improved access to care. Neurologic telerehabilitation was shown to be effective in both inpatient and outpatient settings for patients with stroke, traumatic brain injury, spinal cord injury, and multiple sclerosis. Videoconferencing has helped facilitate interdisciplinary care planning and patient-physician congruence in the inpatient environment. In the outpatient setting, other applications include game-based virtual reality, remote monitoring and automated outreach improved patient functional outcomes and symptom management. For outpatient musculoskeletal care, telemedicine has been useful in delivering physical therapy services and reviewing diagnostic imaging with patients. Those with acute musculoskeletal pain benefited from real-time evaluation via video technology. Feedback and monitoring technologies and videoconferencing have been effective in helping patients manage chronic musculoskeletal pain.

CONCLUSIONS: The burgeoning field of telemedicine has proven to be an effective tool to extend treatment and rehabilitation for musculoskeletal and neurologic disorders. This is a promising avenue for the physiatrist’s practice and for their patients who may not have otherwise had access due to travel burden or cost. Looking forward, it will be important to develop a standardized protocol that can ensure uniform quality care, train providers in using this emerging technology, and disseminate more research on the latest technological advances.

THE DEMOGRAPHICS OF MUSICIANS WHO ACQUIRED MUSICAL-INSTRUMENT-ASSOCIATED INJURIES: WHY DO SOME MUSICIANS OBTAIN INJURIES FROM PLAYING THEIR MUSICAL INSTRUMENT(S) WHILE OTHERS REMAIN INJURY-FREE?

James B. Meiling, DO, and Chris Ha, DO

OBJECTIVES: While instrumentalist musicians may differ in the level of their skills and the instrument(s) they play, they are all susceptible to musical-instrument-associated injuries. The literature is sparse regarding the predictability of injuries in musicians. The purpose of this study was to determine and compare the demographics of musicians who obtained musical-instrument-associated injuries versus musicians who remained injury-free.

DESIGN: The authors created an online survey to collect data about musicians, including the instruments they play, their practice methods, and if they acquired any injuries from playing their musical instruments. The survey was released and available for participation on various social media outlets (Facebook, Instagram, and Twitter) for 33 days. Over that time, the survey received a total of 115 responses. The authors defined a “musician” as anyone who plays a musical instrument, regardless of their skill level or previous training.

RESULTS: Of the 115 responses, 18 individuals received one or more injuries from playing their musical instrument. When looking at age, 83.3% of the injured musicians were below 40 years old. Injured musicians were more likely to have received a bachelor’s degree or higher in music. Generally, injured musicians played longer before taking a break to rest their bodies. A greater degree of injured musicians were self-classified as “professional” or “expert” in their instrumental skill level. In addition, professional instrumentalists were more likely to get injured than unpaid instrumentalists.

CONCLUSIONS: There are many contributing factors that may relate to whether or not a musician obtains an injury while playing their musical instrument. This survey found that a young, professionally-trained, paid musician, who requires a lot of uninterrupted practice time for their career was at a greater risk of obtaining a musical-instrument-associated injury. Further studies would be indicated to see if these findings are reproducible.

THE DEVELOPMENT AND FEASIBILITY TEST OF BRAIN-MACHINE INTERFACE CONTROLLED SOFT-ROBOTIC WEARABLE DEVICE FOR POST-STROKE PATIENTS

Jongseung Lee, Jihoong Park, MD, and Nam-Jong Paik, MD, PhD

OBJECTIVES: A brain-machine interface (BMI) combined with a motion assistive device is a new solution for stroke patients with severe hand paresis. Neurofeedback training with the BMI-robot system could facilitate reafferent plasticity by monitoring the activation pattern of the brain and guide them in the desired direction. The objective of this study is to test the feasibility of the BMI-controlled soft-robotic glove to enhance hand motor recovery.

DESIGN: We designed the BMI system comprising a functional near-infrared spectroscopy (fNIRS), a BMI algorithm, and a wearable robotic glove. The fNIRS system (NIRx Medical Technologies, LLC, US) measures local hemoglobin concentrations through 38 channels placed on a patient’s scalp. The linear discriminant analysis-based BMI algorithm detects a motor intention-related perilesional activation from the fNIRS signals. And, the glove-type device with pneumatic muscles assists the finger extension.

The system was evaluated with one 53 years old female patient with chronic right ischemic infarction lacking voluntary finger extension. The patients performed the block-designed motor imagery finger extension task. The evoked motor intention-related activation, and the detection accuracy of the motor intention in different regions of interest was evaluated.
RESULTS: The patient could evoke motor-related activations in terms of contrast-to-noise ratio (CNR, >0.3). Those activations were not restricted to the affected brain though the affected brain showed larger activations above broader area. The BMI algorithm could detect the motor intentions, with accuracies of 84.35%, 87.41%, and 91.18% in the left-, right-, and both-hemisphere, respectively.

CONCLUSIONS: The accuracy of motor intention-related activation was high enough to apply our fNIRS-based BMI system to the subcortical stroke patient with proper motor-related activations during finger extension task. Further study with larger samples would be needed to verify the contribution of our system for the enhancement of hand motor recovery.

THE DIAGNOSTIC ROLE OF HOFFMAN-REFLEX IN PATIENTS WITH L5 AND S1 LUMBOSACRAL MONORADICULOPATHY
Hasan Kara, Elif Balevi Batur, Onder Murat Ozerbil, Abdulvahab Kahveci, Onur Hansev, Ilkmen, Albynkay Gezer, Funda Levendoglu, and Murat Zinnunglu

OBJECTIVES: The Hoffman reflex (H-reflex) is the most commonly examined reflex in routine electromyography (EMG) laboratories (1). The conventional method of obtaining this reflex from the soleus muscle is based on stimulating tibial nerve from the popliteal fossa with submaximal stimulation intensity (2). The soleus H-reflex is usually found as normal in L5 radiculopathies (3). There are very few studies on H-reflex recorded from L5 innervated muscles. In this study, we aimed to investigate the H-reflex changes by stimulating the sciatic nerve and recording simultaneously from L5 (tibialis anterior, peroneus longus) and S1 (soleus muscle) in patients with monoradiculopathies involving L5 or S1 levels.

DESIGN: This study was designed as a double-blind, prospective, and controlled study. The patients with a diagnosis of unilateral L5 or S1 root compression (lumbosacral monoradiculopathy) who had previously undergone lumbar MRI, and who was referred to the EMG unit with the pre-diagnosis of lumbosacral radiculopathy during routine examinations, included in the study. A total of 29 patients with L5 root compression, diagnosed by magnetic resonance imaging (MRI) were defined as group 1. A total of 29 patients with S1 root compression, which was diagnosed by MRI defined as group 2. Lastly, 29 healthy volunteers as control defined as group 3. Electroneuromyography (ENMG) was performed in groups 1 and 2, and afterward, H-reflex was evaluated in both groups. In group 3, only H-reflex was studied. According to ENMG results, the patients were divided into L5 radiculopathy ENMG positive, negative, and S1 radiculopathy ENMG positive and negative groups.

RESULTS: In group 1 patients, there was a significant delay in H-reflex latency, recorded from tibialis anterior, peroneus longus, and soleus muscles compared to the control group. In group 2 patients, there was a significant delay in H-reflex latency recorded from peroneus longus and soleus muscles and decreased amplitude recorded from soleus muscle, compared with the control group. There was no significant difference in H/M ratios between the groups. H-reflex latency recorded from tibialis anterior muscle was significantly delayed in ENMG positive group 1 patients compared to the control group. H-reflex latency recorded from peroneus longus and soleus muscles were significantly delayed in both ENMG positive and negative group 1 patients as compared to the control group. As recorded from soleus muscle, there was a significant decrease in amplitude and H/M ratio in ENMG positive group 2 patients and a significant delay in H-reflex latency, in both ENMG positive and negative group 2 patients.

CONCLUSIONS: Our study is the first study evaluating lumbosacral monoradiculopathies by recording H-reflex from three different channels simultaneously (tibialis anterior, peroneus longus, and soleus muscles) after stimulation of the sciatic nerve. This study suggests that the latency of the H-reflex, recorded from the peroneus longus and tibialis anterior muscles by stimulating the sciatic nerve can be used in the diagnosis of the L5 radiculopathy. It also helps to differentiate the L5 radiculopathy from S1 radiculopathy. Moreover, H-reflex latency, amplitude, and H/M ratio recorded from soleus muscle by stimulating the sciatic nerve also help to diagnose S1 radiculopathy.

THE EFFECT OF 4-WEEK CYCLIC STRETCHING PROGRAM ON MUSCLE PROPERTIES AND PHYSICAL PERFORMANCE
Shogo Sakai, PT, Yukio Urabe, PT, Junpei Sasadai, PT, Somu Kotoshiba, PT, and Noriaki Maeda, PT

OBJECTIVES: Static stretching is generally used for physical conditioning because it improves muscle flexibility, although it has reported decreasing muscle strength and jump performance. We reported that acute effect of cyclic stretching (CS), involving the continuous passive movement of a joint at a constant velocity, improved muscle flexibility and maintained physical performances. However, the effect of long-term CS program was not clear. Therefore, we aimed to investigate the effect of long-term CS program on muscle properties and physical performances in this study.

DESIGN: Eighteen healthy men participated in this study. They were randomly separated 2 groups, which was CS and control group, before the intervention. The participants assigned CS group and performed 2-minutes CS for their ankle joint at 5 times per week for 4 weeks using special device. Control group did not perform stretching or exercise program for 4 weeks. Range of motion (ROM) of ankle joint, ultrasound elastography at medial gastrocnemius muscle (index of muscle flexibility), maximum voluntary contraction of plantar flexion (MVC), and height of counter-movement jump (CMJ) measured at pre- and post-program. The effects of the interventional overall outcomes were determined using two-way repeated-measures ANOVA and t-test.

RESULTS: Muscle flexibility and ROM had a significant interaction effect. MVC did not significant interaction and main effect. CMJ did not have a significant interaction effect, although it had a significant main effect (time) and deference between pre- and post-program in CS group.

CONCLUSION: This study clarified that 4-week CS program improved muscle flexibility, ROM, and CMJ compared with the control group. The previous study has reported that CS improves muscle fiber sliding in the acute phase. In this study, it could be kept due to perform CS for 4 weeks. We suggested that the 4-week CS program not only improved muscle flexibility but also improved or maintained physical performance.
THE EFFECT OF FOOTWEAR GENERATED BIOMECHANICAL MANIPULATION (FGBM) OF GAIT ON THE NUMBER OF OPIOID PRESCRIPTIONS AMONG CHRONIC NON-SPECIFIC LOW BACK PAIN (CNSLBP) AND KNEE OSTEOARTHRITIS (OA) PATIENTS

Sadee Ghassempour Soleymani, MD, Jasal Patel, MD, Vikram Madan, MPH, Beendra Pujar, MD, and Matthew N. Bartels, MD

OBJECTIVES: The Global Burden of Disease Study estimated a 60% to 70% lifetime prevalence of non-specific low back pain (CNSLBP) in industrialized countries with 19% of American adults over age 45 suffering from Knee Osteoarthritis (KOA). In conjunction, opioid prescription rose from 76 million to 219 million between 1991 and 2013, making the US the largest consumer of opioids globally with an increase in opioid-related emergency room visits, treatment admissions, and overdose fatalities. A non-invasive FGBM device, AposTherapy, has had efficacy in relieving pain and improving function in patients with KOA and CNSLBP. This study evaluated the effect of FGBM on the use of prescription opioids in patients with CNSLBP and KOA.

DESIGN: To determine whether Footwear Generated Biomechanical Manipulation (FGBM) of gait can decrease opioid prescriptions filled in patients with CNSLBP and KOA.

RESULTS: A significant decrease in opioid prescriptions was seen in all OA and CNSLBP patients. At 12 months prescriptions for opioids decreased by 13.1% (n=73, p = 0.0002). This was greatest for patients with CNSLBP, with a 20% decrease in prescribed opioids (n=53, p=0.0001).

CONCLUSIONS: This study demonstrates the effect of the therapy on the reduction of usage of prescription opioids by patients who have been treated with FGBM. Further investigation shown in previous studies where FGBM (AposTherapy) has decreased discomfort and improved gait speed for patients suffering from KOA and CNSLBP.

THE EFFECT OF LAND AND BOAT CONDITIONING PROGRAM ON THE AEROBIC CAPACITY OF ADAPTIVE PADDLERS IN A NON-PROFIT ORGANIZATION AS BASIS FOR IMPROVEMENT

Lohindren V. Adorable, MD, and Christian Vince Z. Uy, BSPT

OBJECTIVES: Paddlers with disability or adaptive paddlers of a dragon boat team of a local non-profit organization has been winning regional and international games and is currently the world record holder of the paradigm dragon in 500m and 200m races. To defend their international status in the coming races, their coaches wanted to craft a scientific conditioning program in contrast to the empirical ones they used in the previous races. Conditioning programs are usually based on some normative values like the aerobic capacities or VO2max. Normative data for the aerobic capacities of able-bodied paddlers have been suggested in several studies as basis for their conditioning programs. However, in adaptive paddlers, no studies were found. Hence, this study determined the effect of land and boat conditioning program on the aerobic capacity of adaptive paddlers in a non-profit organization as a basis for improvement.

DESIGN: The single-subject experimental Design, specifically, the A-B-A design (multiple baseline design) was used in this study. The venues of the study were as follows: sea channel for boat conditioning, nearby mini park for land training and the university rehabilitation clinic for cardiopulmonary exercise testing (CPET).

RESULTS: Twenty-four adaptive paddlers in a local non-profit organization qualified for the study. The cardiopulmonary exercise testing machine and rowing ergometer (KayakPro) in lieu of the standard treadmill and bike ergometer were used to measure the aerobic capacity of the adaptive paddlers before and after the land and boat conditioning program. The designed conditioning program was composed of land-based and in-boat training for a total of six months, wherein, each two months has different sets of combined land-based and in-boat exercises provided by their coaches. The aerobic capacities were gathered and the differences before and after the training were treated using paired t-test at p<0.01.

CONCLUSIONS: Fourteen out of the 24 adaptive paddlers in a non-profit organization were completely assessed before and after the designed conditioning program. They were composed of individuals with hearing impairment, lower limb amputation, cleft palate, deformed feet from fracture and degenerative joint disease, and congenital lower limb deficiency. The other ten paddlers either missed the CPET before and after the conditioning program or some of the conditioning sessions. Fourteen measurements of aerobic capacities before the conditioning training and another 14 after the conditioning training were collated in this study. Further, the difference in the aerobic capacities of the adaptive paddlers before (x̄ = 1.70107, a = 0.659329) and after (x̄ = 2.24757, a = 0.582945) the combined land and boat conditioning training program was statistically significant by paired t-test with t stat equivalent to 4.025 (p<0.01).

CONCLUSIONS: The designed six-month combined land and boat conditioning training program given to the adaptive paddlers in a non-profit organization was significantly effective. The values obtained from this study may become the basis for improving future conditioning programs for this group of adaptive paddlers or other teams which may be formed in the future. However, it is recommended that confounding variables like nutrition, work patterns, lifestyle and sleeping habits should be controlled, and the conditioning program should be more sports-specific applied to a larger sample size.

THE EFFECT OF NEWLY DEVELOPED ROBOT-ASSISTED GAIT TRAINING SYSTEM ON BALANCE AND WALKING ABILITY IN PATIENTS WITH SUB-ACUTE STROKE: A RANDOMIZED CONTROLLED TRIAL

Peirong Chen, Bachelors Degree, Fang Zhang, Doctorate, Zulin Dou, Doctorate, and Kui Li, Master’s Degree

OBJECTIVES: Background: Balance and walking ability impairment is often observed in patients with stroke. A new robot-assisted gait training system (NTS) has recently been developed, which utilizes the advantage of simulating ground reaction force to the sole. However, its true therapeutic effect has not been investigated. Purpose: To investigate the effect of NTS on balance and walking ability in patients with sub-acute stroke.

RESULTS: Forty hemiplegic patients with sub-acute stroke were recruited in this study and allocated randomly into two groups: experimental group (n=20) and control group (n=20). Both groups received interventions for one session/day, 5 days/week for 4 weeks. In each session, the experimental group received NTS training for 30 minutes and conventional therapist-guided walking and training for 30 minutes. The control group only experienced conventional training for 60 minutes. Before and after interventions, the balance, represented by Berg Balance Scale (BBS) and the range and speed of the center of pressure movement (COP-R/S) during standing, and walking ability, represented by 10-Meter Walk Time Test (10MWT) of all patients, were assessed. Repeated measure ANOVA was used to assess the difference in the variables between pre- and post-intervention as well as groups.

RESULTS: Both groups showed significant improvement in the balance and walking ability (P<0.05), while the experimental group exhibited significantly greater increase in BBS and decrease in COP-R, COP-S and 10MWT, compared to control group (P<0.05).

CONCLUSIONS: The newly developed robot-assisted gait training system demonstrated a beneficial effect on balance and walking ability in patients with sub-acute stroke. Moreover, it’s therapeutic effect is better than conventional training.

THE EFFECTIVENESS OF EXERCISE IN THE PREVENTION OF GESTATIONAL DIABETES: A SYSTEMATIC REVIEW

Nicole Evansky, PT, DPT, Amanda Sheehan, SPT, Amy Sokol, SPT, Haley Stack, SPT, Gabrielle Freed, SPT, and Amy Tremback-Ball, PT, PhD

OBJECTIVES: Background: Gestational diabetes develops during pregnancy and can cause complications for the mother and baby. Poor management of
gestational diabetes can lead to a large sized baby, Cesarean section at delivery, pre-eclampsia, or hypoglycemia in the baby at birth. Physicians advise women, pre-conception and post-conception, to follow a diet and exercise plan in order to decrease the chances of developing gestational diabetes. Studies have been done to determine the effectiveness of proper diet and exercise prior to conception and during pregnancy in the prevention of gestational diabetes. Purpose: The purpose of this systematic review was to evaluate the role of exercise pre-conception and post-conception in the prevention of gestational diabetes.

**DESIGN:** Methods: A literature search using four search terms (gestational diabetes, exercise, pregnancy, and weight gain) and three filters was performed utilizing PubMed. A screening process and a hand search was performed to create a list of twelve articles to be included in the systematic review. Articles were analyzed for quality using a hierarchy of evidence scale.

**RESULTS:** Twelve studies met the inclusion criteria. All were classified as 1b level of evidence.

**CONCLUSIONS:** Conclusion: The chosen studies provide evidence that support the idea that risk for gestational diabetes can be decreased through weight management and exercise before and during pregnancy. Exercise during the pre-conception period and the first trimester has been found to help reduce the risk of gestational diabetes. Further research is needed to determine the most effective form of exercise. Implications: Physical therapy prior to and during pregnancy should be prescribed by physicians in order to help prevent the onset of gestational diabetes. Physical therapists specialize in developing exercise programs, educating patients on nutrition and wellness, and preventing injury due to pregnancy related physical changes.

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**THE EFFECTS OF CYCLING AND SEAT DESIGN ON UROGENITAL AND SEXUAL DYSFUNCTION IN WOMEN: A SYSTEMATIC REVIEW**

Amy Tremback-Ball, PT, PhD, and Ariana Gagliardi, BS

**OBJECTIVES:** Some female athletes are at risk for developing urogenital issues due to prolonged periods of intense training. Research has shown that sitting for prolonged periods on a bicycle seat can lead to injury of the perineum and compression of the nerves innervating the pelvic floor in both females and males. Though male injuries have been well-reported such research on females is scarce. The purpose of this systematic review was to examine the effect of cycling for leisure and sport on urogenital and sexual function in women. We also aimed to discuss potential injury prevention strategies for female athletes based on the findings.

**DESIGN:** Two searches of the literature were performed. The first search was completed in October 2018 and the second in January 2019 using EBSCOhost. All articles included in the review were analyzed for quality on a hierarchy of evidence scale. In addition, all experimental articles were analyzed on the PEDro scale.

**RESULTS:** Ten articles were included in the Results. Five were descriptive, five were experimental. The level of evidence for all articles was 2b on the hierarchy of evidence scale. Dependent variables included measures of urogenital and sexual dysfunction such as genital numbness, incontinence, pelvic pain and sexual satisfaction. Studies looking at seat type generally found that design had an impact on the development of urogenital and sexual dysfunction due to the distribution of pressure in the perineal region. For example a wider width seat distributes pressure more posteriorly which in turn puts more pressure on the pudendal nerve which can cause entrapment. Studies looking at cycling for leisure or sport found no difference in the development of urogenital and sexual symptoms.

**CONCLUSIONS:** There appears to be vulnerability among women cyclists that are exposed to prolonged periods of intense training during stair climbing in knee osteoarthritis (KOA) and explore the related biomechanical mechanisms. The proprioception system plays an important role in maintaining normal neuromuscular function and balance, also it helps keep spinal alignment and adjust the movement of the spine. The abnormal proprioceptive function may be an important factor for AIS and may increase injury risk during daily or therapeutic activities for AIS patients. This study aims to explore whether the proprioceptive function and basic motion patterns in AIS are abnormal in comparison with healthy adolescent.

**DESIGN:** 15 patients (8 males, 7 females) were recruited from Xinhua hospital, Shanghai, as the Controls. All subjects accepted the same active spine position re-test (FMS). Mean absolute error (MAE) and FMS original score were calculated for each joint in AIS and Controls. The results of the within-group analysis showed muscle flexibility improved and pressure pain threshold increased at post-rolling in both the traditional-roller and vibration-roller groups. However, the results of the between-group analysis demonstrated no significant difference between the two types of rollers.

**CONCLUSIONS:** The chosen studies provide evidence that vibration roller and traditional-roller, therefore, to provide evidence for clinical practice, the main purpose of this systematic review and meta-analysis is to compare the effects of the two types of rollers on lower-limb muscles flexibility and pressure pain threshold in healthy adults.

**OBJECTIVES:** Previous systematic reviews and meta-analyses have demonstrated that both foam roller massage and vibration therapy are efficient treatments to increase muscle flexibility and relieve pain and soreness after intense exercises. Vibration roller is a novel but more expensive tool, which combines the concepts of vibration therapy and foam roller massage. Recently, many studies have compared the effects of vibration-roller and tradition-roller. Therefore, to provide evidence for clinical practice, the main purpose of this systematic review and meta-analysis is to compare the effects of the two types of rollers on lower-limb muscles flexibility and pressure pain threshold in healthy adults.

**DESIGN:** Two reviewers independently searched studies investigating vibration-roller and tradition-roller prior to March 2019 from electronic databases. Because of different joints investigated in the included studies, we chose the data with the largest mean difference from each study for the analyses. To normalize the data from different joints, we converted the data of range of motion to ratio according to normal value of joint range of motion or muscle length. Within-group and between-group comparison were made with Review Manager Software.

**RESULTS:** Five studies with total 99 participants were included in this meta-analysis. The results of the within-group analysis showed muscle flexibility improved and pressure pain threshold increased at post-rolling in both the traditional-roller and vibration-roller groups. However, the results of the between-group analysis demonstrated no significant difference between the two types of rollers.

**CONCLUSIONS:** This is the first review to investigate whether a vibration roller is more effective than a traditional roller. Both rollers improve muscle flexibility and pressure pain threshold increased at post-rolling in both the traditional-roller and vibration-roller groups. However, there are no clear evidences that the vibration roller is superior to traditional roller. Further studies may need to test the effects of vibration roller on other outcomes.

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**THE EFFECTS OF TRADITIONAL FOAM ROLLER AND VIBRATION ROLLER ON FLEXIBILITY ANDpressure pain threshold of LOWER-LIMB MUSCLES IN HEALTHY ADULTS: A SYSTEMATIC REVIEW AND META-ANALYSIS**

Weng-Sam Siu, BSPT, Chia-Ching Wang, BSPT, Yin-Liang Lin, PhD, and Tzyy-Juan Wang, PhD

**OBJECTIVES:** Previous systematic reviews and meta-analyses have demonstrated that foam roller massage and vibration therapy are efficient treatments to increase muscle flexibility and relieve pain and soreness after intense exercises. Vibration roller is a novel but more expensive tool, which combines the concepts of vibration therapy and foam roller massage. Recently, many studies have compared the effects of vibration-roller and tradition-roller. Therefore, to provide evidence for clinical practice, the main purpose of this systematic review and meta-analysis is to compare the effects of the two types of rollers on lower-limb muscles flexibility and pressure pain threshold in healthy adults.

**DESIGN:** Two reviewers independently searched studies investigating vibration-roller and tradition-roller prior to March 2019 from electronic databases. Because of different joints investigated in the included studies, we chose the data with the largest mean difference from each study for the analyses. To normalize the data from different joints, we converted the data of range of motion to ratio according to normal value of joint range of motion or muscle length. Within-group and between-group comparison were made with Review Manager Software.

**RESULTS:** Five studies with total 99 participants were included in this meta-analysis. The results of the within-group analysis showed muscle flexibility improved and pressure pain threshold increased at post-rolling in both the traditional-roller and vibration-roller groups. However, the results of the between-group analysis demonstrated no significant difference between the two types of rollers.

**CONCLUSIONS:** This is the first review to investigate whether a vibration roller is more effective than a traditional roller. Both rollers improve muscle flexibility and pressure pain threshold increased at post-rolling in both the traditional-roller and vibration-roller groups. However, there are no clear evidences that the vibration roller is superior to traditional roller. Further studies may need to test the effects of vibration roller on other outcomes.

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**THE FEATURES OF SPINAL PROPRIOCEPTION AND FUNCTIONAL MOVEMENT IN ADOLESCENT IDIOPATHIC SCOLIOSIS**

Nan Chen, Master

**OBJECTIVES:** Many studies have shown that adolescent idiopathic scoliosis (AIS) may have neuromuscular and balance disorders. The proprioception system plays an important role in maintaining normal neuromuscular function and balance, also it helps keep spinal alignment and adjust the movement of the spine. The abnormal proprioceptive function may be an important factor for AIS and may increase injury risk during daily or therapeutic activities for AIS patients. This study aims to explore whether the proprioceptive function and basic motion patterns in AIS are abnormal in comparison with healthy adolescent.

**DESIGN:** 15 patients (8 males, 7 females) were recruited from Xinhua hospital, Shanghai, as the Controls. All subjects accepted the same active spine position re-test (FMS). Mean absolute error (MAE) and FMS original score were calculated for each joint in AIS and Controls. The results of the within-group analysis showed muscle flexibility improved and pressure pain threshold increased at post-rolling in both the traditional-roller and vibration-roller groups. However, the results of the between-group analysis demonstrated no significant difference between the two types of rollers.

**CONCLUSIONS:** This is the first review to investigate whether a vibration roller is more effective than a traditional roller. Both rollers improve muscle flexibility and pressure pain threshold increased at post-rolling in both the traditional-roller and vibration-roller groups. However, there are no clear evidences that the vibration roller is superior to traditional roller. Further studies may need to test the effects of vibration roller on other outcomes.

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**THE EFFECTS OF ELECTRO-ACUPUNCTURE ON VERTICAL GROUND REACTION FORCE AND IMPULSE SYMMETRY DURING STAIR CLIMBING IN KNEE OSTEOARTHRITIS PATIENTS**

Xiangbin Wang, PhD, FU Shengxing, Bachelor Degree, and Meijin Hou, MA

**OBJECTIVES:** To observe the effects of electro-acupuncture on the joint loading during stair climbing in knee osteoarthritis (KOA) and explore the related biomechanical mechanism.

**DESIGN:** Forty patients with KOA were randomly assigned to 20 patients in the observation group (electro-acupuncture group, EA group) and 20 patients in the control group (traditional-roller group). Sixty patients in two groups completed the study. The observation group chose seven knee acupuncture points and connected with electro-acupuncture instrument to take 2Hz square wave; while in the control group, the electro-acupuncture instrument was connected but not electrified after superficial acupuncture at non-acupoint points. Both groups consisted of 11 sessions of treatment in 3 weeks and 30 minutes per session. The three-dimensional gait analysis system was used to assess the ground reaction force during climbing stairs before and after treatment, biomechanical parameters included peak vertical force (PFz), vertical impulse (IFz) and symmetry index (SI%).

**RESULTS:** After 3 weeks of treatment in EA group, PFz of the right foot during ascending stairs and PFz of the left foot during descending stairs increased (P < 0.05); IFz of both feet during ascending stairs and IFz of the right foot during descending stairs significantly decreased (P<0.05); no significant difference showed in SI% (P>0.05). In SA group, only SI% of impulse during ascending increased (P<0.05). There was no significant difference between two groups before and after treatment (P > 0.05).

**CONCLUSIONS:** Electro-acupuncture can effectively improve the joint load capacity and reduce the dynamic cumulative load during stair climbing in KOA, which may be helpful to slow down the course of disease.
THE IMPORTANCE OF INCORPORATING PERSONAL FINANCIAL LITERACY INTO PHYSIATRY RESIDENCY TRAINING PROGRAMS

Bindiya Shah, DO, and Peter Connelly, MD

OBJECTIVES: Background: Over the last two decades, the cost of medical education and medical trainee debt has increased dramatically. Simultaneously, the financial burden of retirement has increased from defined benefit programs (e.g., pension plans) to individually funded retirement accounts. These factors highlight the importance of understanding the role of personal financial issues in medical trainee well-being and the need for formal financial education in graduate medical education programs. OBJECTIVE: This study assessed nationwide trends in the knowledge of managing personal finances among Physical Medicine and Rehabilitation (PM&R) physicians and the potential role of financial education in residency programs.

DESIGN: An anonymous, 13 question cross-sectional survey was sent to PM&R residency program coordinators nationwide for distribution to PM&R resident physicians.

RESULTS: A total of 127 residents completed the survey. Of respondents, 125 (96.9%) stated issues in personal finances are an important factor in their well-being. Of those respondents, 106 (83.5%) would propose more formal education on issues of personal finance throughout their medical training and 96 (76%) had greater than $100,000 in educational debt. Residents who gave these ratings also endorsed low levels of formal financial education and low levels of confidence in managing their personal finances.

CONCLUSIONS: This study revealed that personal financial management is an important factor in resident well-being that is not routinely addressed as part of PM&R residency programs. The survey supports the idea that financial education should be considered for standardization among graduate medical programs and has motivated us to do so in our own training program.

THE INFLUENCE OF COMORBIDITIES ON SHORT-TERM FUNCTIONAL OUTCOMES AFTER UNILATERAL TOTAL KNEE ARTHROPLASTY

Bo Ryan Kim, MD, PhD, Won bin Kim, and Youn Ji Kim

OBJECTIVES: This study was undertaken to investigate the effect of comorbidities on physical function, quality of life and pain in patients with 3 months after unilateral total knee arthroplasty (TKA).

DESIGN: In this retrospective cohort study, we assessed a total of 140 patients (22 males and 118 females; average age 72.3±5.8 years) who underwent a unilateral TKA. Comorbidities were classified into osteoporosis, sarcopenia, degenerative spine disease, diabetes, and hypertension. All patients completed performance-based physical function tests including range of motion (ROM) of surgical knee, stair climbing test (SC7), 6-minute walk test (6MWT), timed up and go test (TUG), peak torque (PT) of the extensor of surgical knee, peak torque (PT) of the flexor of surgical knee and gait analysis. Self-reported physical function and pain were measured using the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) and self-reported quality of life was measured using the EuroQOL five dimensions (EQ-5D) questionnaire.

RESULTS: The prevalence of osteoporosis was 51.4% of patients, sarcopenia in 5.0%, degenerative spine disease in 15.7%, diabetes in 19.3%, and hypertension in 69.3%. In the univariate analyses, patients with osteoporosis exhibited significantly longer time in SCT-ascent, SCT-descent and TUG, lower scores in 6MWT and PT of the extensor of surgical knee. Patients with degenerative spine disease exhibited significantly negative scores in knee extension ROM. Patients with diabetes showed significantly negative correlation with PT of the extensor of surgical knee and knee flexion ROM and higher scores in WOMAC-stiffness. By the linear regression, WOMAC stiffness remained independently associated with patients with diabetes. 6MWT, TUG, SCT-ascent, and PT of the extensor of surgical knee showed a significant association with patients with osteoporosis.

CONCLUSIONS: This study suggested that several important comorbidities, especially osteoporosis and diabetes, could influence on short-term functional outcomes in patients with 3 months after unilateral TKA.

THE INFLUENCE OF CORE MUSCLE INJURIES AND SUBSEQUENT REPAIR ON COGNITION

Kirk Bonner, MD, Alex Poor, MD, and William Meyers, MD, MBA

OBJECTIVES: The objective of this study is to examine the effect of core muscle injury, and subsequent repair, on cognitive performance as demonstrated by neurocognitive concussion tests.

DESIGN: This study includes 46 subjects presenting to a sports medicine institute with a diagnosis of unilateral core muscle injury established by clinical criteria and MRI. This subjects completed neurocognitive testing including Drop Stick testing and Useful Field of View (UFoV) testing. These neurocognitive tests were performed while the patient was balancing on one leg and performing a transverse abdominis contraction (TAC). Data from these tests were collected while balancing on the injured side one day pre-op, the same, now repaired side, one day post-op, and on the non-injured side both pre and post-op. Pain score during each test was recorded as well.

RESULTS: One day pre-op, subjects were found to have a significantly faster reaction time while balancing on the non-injured side compared to the injured side (p<0.02) with no significant difference in pain (p=0.439). When comparing performance on these cognitive tests during balance on the injured side one day pre-op compared to the same side, now repaired, one day post-op, and on the non-injured side both pre and post-op. Pain score during each test was recorded as well.

CONCLUSIONS: This study concluded that mechanical impairment from a core muscle injury has a negative effect on cognition, specifically reaction time and UFoV performance, which corrects with repair of the injury. Due to the importance of normal cognitive function in athletic performance and injury prevention, it may be useful to consider cognitive impairment as a sequela of musculoskeletal injury.

THE INFLUENCE OF OVERWEIGHT IN CLINICAL MANIFESTATIONS OF CERVICARTHROSIS

Bertin B. Nsirayisatadi, Djema C. Catherine, DR, Betty B. Mbanginda, PhD, Vindicin V. Sali Demokolo, Danus D. Okito Wonga, Jean Marie J. Mbuyi Muamba, PhD, Honoré B. Mbuyi Muamba, PhD, and Meya G. Kiala

OBJECTIVES: This study was undertaken to investigate the effect of overweight on physical function, quality of life and pain in patients with 3 months after unilateral total knee arthroplasty (TKA).

DESIGN: In this retrospective cohort study, we assessed a total of 140 patients (22 males and 118 females; average age 72.3±5.8 years) who underwent a unilateral TKA. Comorbidities were classified into osteoporosis, sarcopenia, degenerative spine disease, diabetes, and hypertension. All patients completed performance-based physical function tests including range of motion (ROM) of surgical knee, stair climbing test (SC7), 6-minute walk test (6MWT), timed up and go test (TUG), peak torque (PT) of the extensor of surgical knee, peak torque (PT) of the flexor of surgical knee and gait analysis. Self-reported physical function and pain were measured using the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) and self-reported quality of life was measured using the EuroQOL five dimensions (EQ-5D) questionnaire.

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CONCLUSIONS: This study revealed that personal financial management is an important factor in resident well-being that is not routinely addressed as part of PM&R residency programs. The survey supports the idea that financial education should be considered for standardization among graduate medical programs and has motivated us to do so in our own training program.
OBJECTIVES: Cervicarthrosis is almost inevitable with age. Men and women are affected. Given the constraints of overweight in the degenerative process of musculoskeletal system, there would be a large number of obese patients. The objective of this research is to demonstrate the role of overweight in the occurrence of clinical manifestations of cervicarthrosis patients with a view to improving management.

DESIGN: This prospective and descriptive study was carried out in University Hospital of Kinshasa during the period from January 2014 to march 2018. A Scale weighing scale for weight measurement and standard wall gauge was used to measure patients sizes. Body Mass Index. BMI is the ratio of weight (kg) to height squared (m^2) was used to define weight status. The WHO classification was adopted for interpretation of values, as below: Reference: 18.5-24.95. Overweight: 25.0-29.9; Obesity: ≥30; (grade i) 30-34.9; grade ii ≥ 35.5-39.9; grade iii ≥ 40

RESULTS: Of 81 patients followed for clinical manifestations of cervicarthrosis, 44 (54%) of men, (34.46%) of women. The mean age of the patients was 56±12 years, with 18 and 84 as extremes. Clinically, mecanical type of cervical pain was present to 100% of patients. Of which 52 (64.2%) with moderate pain (EVA 4-6), and 29 (35.8%) with severe pain (EVA from 7 to 10). Neck stiffness and parenthesis of the upper limbs was present to 67.9% of patients and pain radiating to the shoulder at 49.4%. Radiologically inter-somatic nip was found in 87.7% of cases, osteophytes in 86.4%, and erosion of cervical lordosis in 74.1% of cases. The evolutionary curve of the calculated body mass index of our sample was greater the 24.9 kg/m^2 whish is above the upper limit expected in the standards. The mean calculated BMI was 26.4±3.6

CONCLUSIONS: The study shows that overweight exert considerable influence in the clinical manifestations of cervicarthrosis.

THE INFLUENCE OF ROBOTIC THERAPY IN MOTOR FUNCTION, COGNITIVE AND PSYCHOLOGICAL ASPECTS

Elaine Cristina Silva, Master Degree, Vanessa M. Jorge, Graduate Degree, Beatriz Cordeiro, Graduate Degree, Fernanda Rocha, Master Degree, Mayara L. Santos, Graduate Degree, Itamara Lins, Graduate Degree, Cibele Tamashiro, Graduate Degree, Cibele Capaldi, Graduate Degree, and Celso V. Mattos, Physiatry

CASE DIAGNOSIS: We describe the case of a 33-year-old female with chronic right hemiparesis, aphasia and spastic hypertonia following an ischemic stroke two years ago. She was able to walk with cane and AFO.

CASE DESCRIPTION: She underwent 15 sessions (twice sessions/weekly- each lasting 30 minutes) with robotic therapy (Lokomat®Nanosh) before and after robotic therapy through Functional Ambulation Categories (FAC), ten-meter walk test (10MWT), 6-minute walk test (6MWT). Time up and Go (TUG) and cadence. After cognitive examination with Montreal Cognitive Assessment (MoCA) was administered the Hospital Anxiety and Depression Scale, Short Form Health Survey 36 to evaluate psychological status. The walking assessed tests before robotic therapy were TUG 20s, 10MWT 20s, 6MWT 75m and cadence 51 steps/min- ute. After intervention TUG 16s, 10MWT 13s, 6MWT 244m in cadence 82 steps/min- ute. Also after the Lokomat training there wasn’t any difference in FAC (FAC3).

Moreover, her mood, cognitive status and quality of life improved when compared to the initial assessment.

DISCUSSIONS: The robotic training with high number of movement repetitions has shown benefits in gait performance. Our chronic patient, after undergoing Lokomat training, shows a positive improvement in functional, psychological and cognitive status when compared to the initial assessment. This positive impact in gait promotes endurance and velocity. On mood and cognition possibly leads to improved quality of life on functional capacity, decreased physical limitations, improved pain and overall health by 10% upon initial assessment.

CONCLUSIONS: Robot-assisted movement training may improve not only motor function like gait, but also mood, cognition, and quality of life, as shown by this case study.

THE OPTIMIZED ACUPUNCTURE TREATMENT FOR NECK PAIN CAUSED BY CERVICAL SPONDYLOSIS: A MULTICENTER RANDOMIZED CONTROLLED TRIAL

Ling Chen, Doctor, and Wenbin Fu, Doctor

OBJECTIVES: To evaluate the effect of the optimized acupuncture program on neck pain caused by cervical spondylosis, and explore high-quality clinical evidence of optimized acupuncture program.

DESIGN: In this multicenter, randomized, single-blind placebo controlled study, patients with chronic neck pain from China. 793 patients who meet inclusion criteria were randomly assigned to receive optimized acupuncture therapy, sham acupuncture or shallow acupuncture in a ratio of 1:1:1 by a computerized central randomization system. The interventions for 4 weeks with 10 sessions in total. Patients were evaluated using the Northwick Park Neck Pain Questionnaire (NPQ) and the McGill Pain Questionnaire (MPQ) at baseline, at the end of the intervention.

RESULTS: After treatment, the NPQ scores of the patients in the three groups all decreased compared with that before intervention (p<0.01). The comparison between the groups indicated that the NPQ and MPQ scores of the optimized acupuncture group were lower than those of the shallow acupuncture group and the sham acupuncture group, while the NPQ and MPQ scores of the shallow acupuncture group were lower than those of the sham acupuncture group (p<0.05).

CONCLUSIONS: The effect of the optimized acupuncture program on neck pain caused by cervical spondylosis was better than that of the shallow acupuncture group and the placebo acupuncture group, suggesting that the optimized acupuncture program is a promising tool for neck pain caused by cervical spondylosis.

THE PATTERNS OF UPPER AND LOWER EXTREMITY AMPUTATION IN SAUDI ARABIA

Fayez Alshcheeri, MBBS, SBPM&R, Salwa Ali, MRCP, FRCP, Sami Ullah, MBBS, FCPSPM&R, Haftham Ghazal, MSC, Shah Nawaz, BPO, and Ahmad Alzahrahi, MBBS

OBJECTIVES: To identify the current trends in etiology for upper and lower limb amputations in Saudi Arabia (SA).

DESIGN: A retrospective electronic chart review study at amputation rehabilitation program, King Fahd Medical City, Riyadh, Saudi Arabia.

RESULTS: A total of 412 Saudi patients with 311 (75%) males and 101 (25%) females. 287 (70%) had unilateral lower limb level, 86 (21%) had unilateral upper limb level, 30 (7%) had bilateral lower limb involvement and one patient (0.2%) had bilateral upper limb involvement, while 8 patients (2%) had amputations involved both upper and lower limbs. Partial hand amputation (48%) was the most common cause of upper limb amputation. Transatlantal amputation (70%) was the main level for lower limb amputation. There was a significant lower limb amputation secondary to vascular causes and upper limb amputations related to traumatic etiologies (P = <0.001). 12.57% subsequent amputation incident within 5 years from the previous amputation onset secondary to peripheral vascular diseases (P < 0.001). 62 patients (15%) were enrolled in an amputation rehabilitation program (ARP).
within three months of amputation onset, the majority 213 (52%) were enrolled after one year of onset.

CONCLUSIONS: Vascular amputation was the most common etiology in recent years in SA. Transtibial amputation represented the most common level. Majority of patients enrolled after one year in the rehabilitation program. Early ARP enrollment and national guidelines required to focus on prevention and management of risk factors for vascular amputation.

THE PHYSIATRIST’S ROLE IN DIAGNOSING DIAPHRAGMATIC DYSFUNCTION TO IMPROVE LTACH WEANING OUTCOMES: A RETROSPECTIVE COHORT STUDY

Sofia Barchuk, DO, and Alex Barchuk, MD

OBJECTIVES: To investigate the prevalence of diaphragmatic dysfunction (DD) among prolonged mechanical ventilation (PMV) patients in the long-term acute care hospital (LTACH) setting; to examine the association between DD and ventilator weaning outcomes; and to examine the role of Physical Medicine and Rehabilitation (PM&R) physicians in assessing respiratory muscle function in collaboration with interdisciplinary weaning teams.

DESIGN: Quantitative retrospective record review of data from 319 patients, examining the association between DD and weaning outcomes. Providers measured diaphragmatic excursion (DE) using fluoroscopy to assess for DD.

RESULTS: Of 319 patients, 55.17% (n=176) had significant DD, 96.02% (n=302) of whom were previously undiagnosed. The prevalence of previously undiagnosed DD was 52.98%. The weaning success rate for patients with DD was 28.40% (n=51) compared to 55.94% (n=80) for patients without DD. The median weaning duration for patients with DD was 28.67 days, diaphragmatic dysfunction and weaning compared to 16.18 days for those without DD. Weaning duration and failure rates increased in direct proportion to DD severity.

CONCLUSIONS: In PMV LTACH patients, DD was strongly associated with weaning outcomes, and the prevalence of undiagnosed DD was high. Interdisciplinary weaning teams that include PM&R physicians, and protocols that incorporate DD evaluations may prevent failed weaning attempts, prompt earlier DD treatments, and improve weaning outcomes.

THE POSITIVE EFFECTS OF A PHYSICAL MEDICINE & REHABILITATION (PM&R) DEPARTMENT’S FUNDING OF RESIDENCY SOCIAL EVENTS ON OVERALL RESIDENT HAPPINESS

Tomas W. Salazar, MD, Eric Liu, DO, Lei Lin, MD, PhD, and Sara Cuccurullo, MD

OBJECTIVES: Physicians face many stressors on a daily basis; only 19% of physiatrists were found to be happy at work in a recent study on physician burnout and wellness, last among the 29 specialties surveyed. Over half of physiatrists in the study were burned out. As of 2017, residency programs are required by the ACGME to address physician well-being. This study evaluates the effect of residency funded social events on the overall happiness of residents.

DESIGN: This prospective cohort study followed 10 physiatry residents as they experienced history: 4.4y.) were included this study. The scapular motion relative to thorax, humerus motion relative to thorax, and humerus motion relative to scapula during chest pass on a wheelchair was measured using an electromagnetic tracking device. Maximal chest pass; the participant passed a basketball as far as possible from a stationary position. Additionally, the distance of chest pass, the power of hand grip, and the distance of 2kg medicine ball throw was measured as a physical functional data.

RESULTS: The distance of chest pass was associated with physical performance tests such as the distance of medicine-ball chest pass and the power grip. The maximum angle of scapular/humeric upper rotation and humerothoracic flexion were positively associated with chest pass distance. There was no relationship between the distance of basketball chest pass and the terms of experiences and practice time.

CONCLUSIONS: Our findings suggested that higher scapular upper rotation angle and shoulder flexion might be important to enhance the performance of the chest pass. In the future, we need to measure the scapular motion for disabled and assess the differences between the types of impairments or each class.

THE PREVALENCE OF AXIAL GOUT AMONG KOREAN PATIENTS WITH PERIPHERAL GOUTY ARTHRITIS IN A TERTIARY SPINE CENTER

Du Hwan Kim, MD, PhD, and Eun-Seek Son, MD, PhD

OBJECTIVES: The study aimed to describe the prevalence and possible risk factors of axial gout among patients with peripheral gouty arthritis in Korea. We also report the feasibility of using dual-energy CT (DECT) to diagnose axial gout.

DESIGN: We enrolled 95 Korean patients who visited our spine center from March 2012 to February 2017 and who were previously diagnosed with peripheral gouty arthritis with available CT images of vertebral columns. Seven patients underwent DECT. Axial gout was defined by the presence of erosions or tophi in the vertebral endplate or facet joint. Clinical and laboratory data of these patients were retrieved from medical records.

RESULTS: Fifteen (15.8%) of 95 patients had conventional CT evidence suggestive of axial gout. Of the 15 patients, the lumbar spine was commonly involved (12 patients, 80%). Fifteen patients (17 vertebral lesions) had erosions in vertebral columns and two patients presented with tophi with erosive changes in facet joints. Of the 7 patients subjected to DECT, six demonstrated monosodium urate deposits with erosive foci. There were no correlations of the presence of axial gout with age, duration of peripheral gouty arthritis, laboratory findings, and the presence of hyperten-

CONCLUSIONS: The prevalence of axial gout in Korean patients with peripheral gouty arthritis and spinal symptoms was 15.8%. The lumbar spine was commonly involved. DECT may be useful as an adjunctive tool in the diagnosis of axial gout.

THE PREVALENCE OF FIBROMYALGIA AMONG NURSES

Haticê Merve Gökmen, Elif Akalan, and Ismail Güney Gökmen

OBJECTIVES: The aim of this study was to investigate the prevalence of fibromyalgia syndrome among nurses.

DESIGN: The study included a total of 227 nurses (208 females; 19 males; mean age: 36.37 ± 8.57 years; range, 20 to 60 years) who were working at Dokuş Eylül University, Medical Faculty Hospital. Demographic data of the nurses were obtained. He ARA pool (12 patients per pool) and the calculated ACR 1990 and 2013 diagnostic criteria were applied to each nurse for the diagnosis of fibromyalgia syndrome (FMS). Tender point sites were examined by using an algometer. The Fibromyalgia Rapid Screening Tool (FIRST) was applied to nurses with chronic pain for more than three months. The Pittsburgh Sleep Quality Index (PSQI) was used to evaluate the sleep quality of nurses.

RESULTS: Sixty-one (26.9%) and 35 (15.4%) of the nurses were diagnosed with FMS according to the ACR 1990 and 2013 criteria, respectively. A total of 125 nurses had chronic pain for more than three months, and 57 (45.6%) were diagnosed with FMS according to the FIRST. A total of 24 nurses fulfilled all three criteria

THE PRELIMINARY STUDY OF THE SCAPULAR MOTION ANALYZES OF CHEST PASS MOTION FOR WHEELCHAIR BASKETBALL

Hironori Fujishita, MSC, Tetsuhioku Sakamitsu, MSC, Yoshifumi Kono, MSC, Daigo Nakashima, PhD, Kazuhiko Hirata, BSc, and Hiroaki Kimura, PhD

OBJECTIVES: The two-handed chest pass is an important skill for wheelchair basketball (W/B), and also maximal pass skill is used as an efficiency test for classification. Previous studies described wrist snapping are affected chest pass skills in W/B players. Although the upper limb motion has been reported, there are no studies focused on the scapular motion during the chest pass. This study aimed to clarify the biomechanics of chest pass in wheelchair basketball player and investigate the relationship with physical function assessment.

DESIGN: Six well experienced able-bodied W/B players (Age: 22.7±1.5 y.o., Height: 173.0±2.7 cm, Weight: 63.1±2.7 kg, Body Mass Index: 21.1±1.3 kg/m², Ex- perienced history: 4.4y.) were included this study. The scapular motion relative to thorax, humerus motion relative to thorax, and humerus motion relative to scapula during chest pass on a wheelchair was measured using an electromagnetic tracking device. Maximal chest pass; the participant passed a basketball as far as possible from a stationary position. Additionally, the distance of chest pass, the power of hand grip, and the distance of 2kg medicine ball throw was measured as a physical functional data.

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CONCLUSIONS: Our findings suggested that higher scapular upper rotation angle and shoulder flexion might be important to enhance the performance of the chest pass. In the future, we need to measure the scapular motion for disabled and assess the differences between the types of impairments or each class.
THE RELATIONSHIP BETWEEN EXERCISE HABITS IN TEENAGERS AND HEALTH-RELATED PHYSICAL FITNESS OF ADULTS
Po-Wei B. Chen, and Willy Chou

CASE DIAGNOSIS: Regular exercise habits can lead to better physical fitness and mental health. The research (1985) about the percentage of people engaged in exercise in USA and Canada showed decreased tendency while age increased, most obviously during teenage and early adulthood. There are few studies in the past decades on whether the exercise habits of adolescence will affect physical fitness in later adulthood. The aim of our study is assessing the relationship between adolescent and adult exercise habits and further influence on physical fitness.

OBJECTIVES: According to the exercise habits questionnaire by sports administration, ministry of education, Taiwan, trained and qualified researches collected 413 people, age from 25 to 65, their adolescent and adult exercise habits, demographic data, and chronic diseases details. According to ACSM’s guideline, exercise habits are analyzed by frequency (0-1 session/week, 2-3 sessions/week, or more than 3 sessions/week), intensity (by rating of perceived exertion(RPE)), time (less than 20mins/session, 20-40 mins/session, more than 40mins/session), type, total exercise amount (frequency x time x intensity) and the reasons why not doing exercises, retrospectively. We tested cardiopulmonary function by 6-min walk test, muscle strength by 30-second sit-ups, muscle endurance by 60-second sit-ups, flexibility by the distance between finger tips to the ground when standing forward bend.

RESULTS: Exercise habits of adults showed positive correlation with exercise habits of adolescence (p<0.001), besides, FITT of exercise of adolescence showed significant difference to adults (p<0.01). Adults with exercise habits have better cardiopulmonary function (p<0.001), muscle strength (p<0.001), muscle endurance (p<0.002), and BMI (p=0.009). However, flexibility (p=0.051) and percentage of chronic diseases (p=0.796) showed no significant between two groups.

CONCLUSIONS: Exercise habits of adolescence have positive correlation with exercise habits of adults. Adults with exercise habits also have better physical performance and appropriate BMI. Exercise habits of adults must be established since adolescence.

THE RELATIONSHIP BETWEEN FIBROMYALGIA AND HISTORY OF TRAUMATIC LIFE EVENTS
Armando Alvarez, MD, MPH, and Douglas Johnson-Greene, PhD, MPH, ABPP

OBJECTIVES: Fibromyalgia (FM) is a chronic pain-related disorder that includes non-specific somatic, cognitive, and psychiatric complaints. The pathophysiology of FM remains unknown, though it may involve biologic, genetic, and environmental factors. Traumatic life events have been discussed as potential etiologic factors in FM. The goal of this study was to conduct an exploratory study to determine the different types of traumatic life events present in persons with FM and the relationship between exposure to traumatic events in persons with FM relative to other chronic pain patients without FM.

DESIGN: We studied 73 FM patients at a tertiary care clinic. The control group consisted of 58 patients with chronic pain seeking approval for neuromodulation treatment, but without evidence of fibromyalgia (NM Group). History of trauma was assessed with the Life Events Checklist (LEC), a well-validated 15-item test designed to assess exposure to potentially traumatic events.

RESULTS: The FM and NM groups did not differ in terms of age, education, or gender distributions. Group analyses showed that the FM Group reported significantly more traumatic events and had a different distribution of the types of trauma compared to the NM Group (T=2.24; p<.03). Additionally, history of sexual assault and trauma were reported by a higher portion of FM patients compared to NM patients (67% v. 33%).

CONCLUSIONS: The findings of the present investigation demonstrate a relationship between traumatic life events and FM compared to a control sample of patients with chronic pain. It has been difficult to determine what type of physical or psychological trauma might lead to the development of FM. This study reinforces...
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THE RELATIONSHIP BETWEEN LEVELS OF PHYSICAL ACTIVITY AND ACAMEDIC PERFORMANCE AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF FEZ

Hajjouj Abderrazak, MD, PhD, Abdelkader Boukharta, and Maryam Fourassi, MD, PhD

OBJECTIVES: This study aimed to explore the prevalence of physical activity among Moroccan medical students at Fez University and to determine the relationship of their physical activity level with their academic achievement.

DESIGN: A cross-sectional study was conducted among the medical students (n = 752), from April to November 2018. Socioeconomic and biometric data were evaluated and students' physical activity habits were assessed through the long version of the International Physical Activity Questionnaire (IPAQ). The MET calculation ranks the PA in three levels (IPAQ categories): intense, moderate and low. Students' academic records were obtained for comparisons. Multiple linear regression models were used to analyze the relationship between PA with Academic performance.

RESULTS: 36.44% of the medical students reported a low PA level (< 1500 MET-minutes / week). In contrast, 42.29% were classified in high level of PA (> 3000MET-minutes / week) with female predominance. Results showed that there was a linear relationship between academic performance and physical activity (ρ=0.014, IC=95%).

CONCLUSIONS: The present study showed a positive association was found between PA and high academic achievement. Students with high level of PA performed better academically than those who were non active. Therefore, there is a need for the establishment of physical activity education and public health programs to promote importance of PA in Moroccan population.

THE RELATIONSHIP BETWEEN PATIENT EXPECTATIONS AND OUTCOME OF INJECTIONS FOR KNEE OSTEOARTHRITIS

Shirali Shah, BS, Andrew George, BA, Jacqueline Spangenberg, BS, Joana Barroso, MD, and Prakash Jayabalan, MD, PhD

OBJECTIVES: Patient expectations of treatments have been shown to be related to surgical outcomes. However, the impact of expectations in less invasive treatments, such as knee joint injections for osteoarthritis (OA), has not been studied. The objective of this prospective study was to assess the relationship between expectations and surgical outcomes. However, the impact of expectations in less invasive treatments, such as knee joint injections for osteoarthritis (OA), has not been studied. The objective of this prospective study was to assess the relationship between expectations and surgical outcomes.

DESIGN: Forty-nine (n=49) knee OA patients completed the study with improvement in knee weakness being the highest symptomatic improvement expected (mean score 4.8/5). Surprisingly pain relief and ability to walk showed the lowest expectation scores (mean 1.3 and 1.1/5). Multivariate linear regression modeling did not show an association between demographic/clinical variables and global expectation score. Injection treatment did significantly reduce pain (mean pain reduction 2.3, p<0.001, and disability (p<0.001)). Baseline expectation score had a low but significant association with change in pain and disability (R2=0.1, p = 0.056 and R2=0.14, p=0.02).

CONCLUSIONS: Knee injections improved pain and disability in this cohort of patients, and expectations before treatment had a small but significant association with their outcome. The variability found in expectation subdomains, the low levels of expectation regarding pain improvement and walking ability may explain, the lack of a stronger association. A larger number of subjects, with physical and psychological outcomes, may further advance knowledge in this area.

THE RELATIONSHIP BETWEEN PATIENT EXPECTATIONS AND THE CHANGE IN DISABILITY FOLLOWING EPIDURAL INJECTIONS FOR LOW BACK PAIN

Claire Fernandez, BBA, Jacqueline Spangenberg, BS, Jacqelyn Cruz, BS, Joana Barroso, MD, and Prakash Jayabalan, MD, PhD

OBJECTIVES: Patient expectations have been shown to be associated with the outcome of lumbar spine surgery. However, their relationship to the outcome of epidural injections for low back pain has not been assessed. The objective of this study was to examine the association between patients’ expectations prior to receiving a lumbar epidural steroid injection and change in level of disability and pain.

DESIGN: Fifty-eight (n=58) patients completed a demographics intake and modified Hospital for Special Surgery Lumbar Spine Surgery Expectations Survey (LSSS) pre-injection. Both pre- and 4-2 weeks post-injection, they also completed the Roland-Morris Disability Questionnaire (RMDQ), VAS pain scale and Patient Health Questionnaire (PHQ-9).

RESULTS: Fifty-eight (n=58) patients had pre- and post-data for analysis with mean age of 57 years and primarily women (58%). Of these participants, 49% had a previous spinal injection (n=33), and majority had previously enrolled in physical therapy (n=63;92%). Baseline expectations were not explained by clinical or psychosocial predictors (p=0.07). Follow-up at 2-4 weeks revealed epidural injections were effective in reducing back and leg pain (p<0.001), improvement disability (ρ=0.001), and had a borderline effect on reducing depression score (PHQρ=0.06). Patient expectations at baseline (p=0.33;22) was not explained by clinical or psychosocial predictors (Adj R2 0.0771 p=0.07). All four outcome changes were explained by initial expectation scores, controlling respective entry levels. The change in disability (RMDQ score) had a positive correlation with expectation levels (Adj R2 0.19, p=0.0012), but not change in VAS pain or PHQ-9.

CONCLUSIONS: Epidural injections improved pain and disability in this cohort of patients, and patient expectations prior to the procedure had a small but significant association with change in disability. Further study is on-going to assess psychosocial and socioeconomic factors that may be associated with the outcome of these procedures.

THE RISK OF DEPRESSION AMONG ADMITTED PATIENTS REFERRED FOR REHABILITATION

Lohindren V. Adorable, MD, Alyza Kamille A. Miole, BSOT, and Ryan V Makiling, BSOT

OBJECTIVES: This study determined the risk levels of patients during confinement. Specifically, it determined: 1. the average score and the number of patients under each severity level of the BDI-II screening tool upon referral to rehab, seven days and 14 days after referral to rehabilitation; 2. the difference in BDI scores between referral to rehab and the 7th day, 14th day, and 7th day and the 14th day after referral; 3. significance of the difference in BDI scores between referral to rehab and the 7th day, 14th day, and 7th day and the 14th day after referral.

DESIGN: Ninety-five admitted patients qualified to the study according to the inclusion criteria. The BDI II score of the patients were obtained upon referral, on the 7th and 14th hospital day. Using the initial BDI score, the patients were classified into minimal, mild, moderate and severe risk level. The BDI score of each classification were obtained on the 7th and 14th hospital day. The differences of BDI scores in each classification between the reference of referral and the 7th day, 14th hospital day, and the 7th and 14th hospital day were determined and its significance was treated using paired t-test at p<0.05.

RESULTS: No significant increase or decrease in the BDI scores among the different risk levels on the 7th and 14th day of admission except for those in the mild risk classification which showed significant increase. On the other hand, there was only one patient who initially showed moderate risk but scored minimal in the succeeding two weeks.

CONCLUSIONS: This study showed no significant increase nor decrease in BDI scores among the admitted patients. However, those who initially belonged to the mild risk classification showed significant increase.

THE ROLE OF EMOTIONAL AND COGNITIVE DISFUNCTION ON SUCCESS AT PROSTHETIC REHABILITATION IN DIABETES RELATED LOWER EXTREMITY AMPUTATION

Yael Yona, DR, Gita Franco, Amir Haim, Israela Polod, Chana Shneider, Hadas Shaller, Chen Chaimovitz, and Hagay Amir, DR

OBJECTIVES: To examine the role of the mental and cognitive function on the outcome of diabetic LEA prosthetic rehabilitation, and to analyze predicting factors of rehabilitation success.

DESIGN: Cross sectional observational study, comprising 60 diabetic amputees. Sociopsychological and demographic data was extracted from their medical files. Mental and cognitive assessments was completed for each participant using validated tolls. The BECK Depression Assessment Questionnaire, the Anxiety Assessment Questionnaire and the Montreal Cognitive Assessment Questionnaire...
THE SAFETY AND FEASIBILITY OF A NEW REHABILITATION ROBOTIC EXOSKELETON FOR ASSISTING INDIVIDUALS WITH MOTOR COMPLETE LOWER EXTREMITY PARALYSIS FOLLOWING SPINAL CORD INJURY (SCI): A MULTI-SITE, PRE-POST, PROSPECTIVE TRIAL

Xiao-na Xiang, Bachelor, and Hong-chen He, Doctor

OBJECTIVES: Powered exoskeletons have recently emerged as new devices during robot-assisted gait training. However, the clinical evidence-based support of application in spinal cord injury is still not sufficient. No study presented the robotic exoskeleton we use before. Therefore, the purpose of this study was to provide initial evidence for the potential effects of using a new robotic exoskeleton in people with lower extremity paralysis as a mobility device and to ensure its safety.

RESULTS: Twenty-eight individuals (mean age=40.8, 71.4% males) met the eligibility criteria and two persons dropped out. The mean±SD of the 6MWT increases in distance walked of baseline, and the walking distance one and two weeks after implementation were 13.0±5.3 meters and 16.2±5.3 meters, respectively (p< 0.05). Inattention to treat analysis showed the results 10MWT, the Hoffer walking ability grading, the Spinal Cord Independence Measure (SCIM), the American Spinal Injury Association lower extremity motor score (LEMS) and the Walking Index for SCI II (WISCI II). Data were collected at pre-, mid- (week 1) and post-intervention (week 2).

CONCLUSIONS: A walking program with the new robotic exoskeleton provided potential clinically meaningful improvements in mobility for individuals with SCI and few adverse events. Moreover, the activity of daily life, urodynamic examination and satisfaction should be further investigated.

THE SHORT-, MID- AND LONG-TERM EFFECTS OF WEDGED INSOLE ON PAIN RELIEF AND FUNCTIONAL IMPROVEMENT IN INDIVIDUALS WITH KNEE OSTEOARTHRITIS: A META-ANALYSIS

Kuo-Chao Liao, Master, Wen-Yu Shih, Master, Ko-Shin Hsu, Master, Yi-Fen Shih, PhD, Wen-Yin Chen, PhD, and Hauer-Chen Lee, PhD

OBJECTIVES: Osteoarthritis of the knee is a major cause of chronic musculoskeletal pain and disability among the elderly. One approach to pain relief is the use of wedged insoles. However, the numerous published studies arrived of very differing results. The purpose of this meta-analysis therefore was to determine the effect of using wedged insoles in the short, medium and long term and clarify their effect on socio-economic outcomes such as pain relief, functional improvement and secondary outcome such as the days of NSAIDs intake.

RESULTS: A literature search for randomized controlled trials which had flat insole or no intervention as the control group, and published in English was conducted using the MEDLINE, PubMed and Pedro etc. databases (updated to May 2019). The keywords used in the online search included knee osteoarthritis and wedged insole.

RESULTS: Totally 114 articles were found based on the searching criteria, and 105 of these studies were excluded due to duplicates or did not match the inclusion criteria. The remaining 9 reports were included in our meta-analysis. The effect of wedged insole in pain relief and functional improvement was not significant in short-, mid- and long-term. However, the intake days of NSAIDs in wedged insole group was significantly less than control group (MD= -0.43, 95%CI: -0.64– -0.23, p < 0.0001).

CONCLUSIONS: Although no beneficial effects of wedged insoles on pain relief and functional improvement in knee osteoarthritis were found, there was a reduction in the days of NSAIDs intake when using wedged insoles. Hence, using wedged insoles as an intervention for people with knee osteoarthritis may be helpful.

THE STRIVE FOR WELLNESS PROGRAM: AN ACCESSIBLE PHYSICAL ACTIVITY PROGRAM FOR INDIVIDUALS WITH CHRONIC NEUROLOGIC INJURY

Luke Meng, MD, Douglas Griffin, James Burke, MED, Frank Lombardo, MS OTR/L, CKTP, Ashley Chory, MPH, and Ona Bloom, PhD

OBJECTIVES: Consistent physical activity and exercise boosts mental and physical wellness and is widely recommended to all individuals. Benefits of exercise include lowering risk of all-cause mortality, cardiovascular disease, anxiety, and depression, while improving physical function, cognitive function, sleep, and quality of life. Physical activity guidelines exist for individuals with chronic neurologic conditions such as stroke, spinal cord injury, multiple sclerosis, and traumatic brain injury, groups that have elevated risk of reduced mobility and reduced physical activity. Unfortunately, there are many barriers for persons living with chronic neurologic disabilities to obtain the health benefits of regular physical activity, such as lack of access to gyms with adaptive or accessible sports equipment and/or lack of appropriate supervision.

DESIGN: Here, we describe the design and utilization of “Strive for Wellness” Program (“Strive”) in an outpatient setting. The program’s main purposes are: (1) to provide neurologically impaired persons with accessible, state-of-the-art equipment to maximize their functional outcome, while in a structured safe exercise/physical activity program; and (2) to establish a multi-tier wellness program that can be used to maintain, improve and maximize their physical and emotional wellbeing. The program is open to the public and includes a fee-for-service fitness screening and monthly membership fee.

RESULTS: Since its initiation in 2015, Strive enrolled 81 neurologically impaired community members. Neurologic conditions of participants included stroke, SCI, MS, transverse myelitis, and traumatic brain injury. The average age of participants was 59 (range: 20-92). The program was utilized by both genders (N=54 male, N=27 female).

CONCLUSIONS: The Strive program offers a model of the translation of general exercise recommendations into effective real-world solutions for individuals with chronic neurologic disabilities. In the future, we will report results from a pilot feasibility study to determine changes in quality of life as a result of consistent participation in the Strive program.

THE USE OF DIGITALIZED WHEELCHAIR ADAPTATION IN THE PREVENTION AND THERAPY OF SPINAL DEFORMITIES IN CHAIRING PATIENTS

Angelica S. Kuwae, Physician, Regina Chueire, Physician, Pedro Tovo, Physician, Isabela Chueire, Physician, Ricardo Gonçalves, Physician, Pâmella Toledo, Physician, Marina Zaiden, Occupational Therapy, Sabrina Favaro, Occupational Therapy, and Rafaela Antonucci, Nurse

OBJECTIVES: To evaluate and demonstrate the importance of using the proper postural support device for wheelchair users with large spinal deformities through the digitalized seat and backrest adaptation system, as opposed to the use of braces.

DESIGN: We evaluated 20 patients with moderate to severe scoliosis, aged 7 to 45 years, within 12 months. An interview was conducted with physical and radiological assessments and the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) questionnaire validated by World Health Organization and the visual analogue pain scale (VAS) were applied.

RESULTS: Data analysis showed a two-point or greater drop in VAS in 81% of patients evaluated, and high satisfaction in 85% of patients assessed by the QUEST 2.0 questionnaire. These data corroborate the improvement of patients’ self-esteem and quality of life due to greater adherence to wheelchair use with digitized adaptation.
and, consequently, decreased contracture, pain, postural instability and progression of scoliotic curves.

CONCLUSIONS: The wheelchair with digitized adaptation has a high technology, therefore it was observed that the wheelchair patients had an improvement in postural stability, comfort and adhesion when correlated to the braces. Consequently, there was a positive impact on patients' quality of life. In addition, the progression of spinal deformities was prevented.

THE USE OF HIGH FREQUENCY ULTRASOUND TO IDENTIFY WARTENBERG SYNDROME: A CASE REPORT
Karen N. Woods, MD, Jeffrey A. Strakowski, MD, and James F. Nappi, MD
CASE DIAGNOSIS: Entrapment of the superficial radial sensory nerve by the brachioradialis – Wartenberg Syndrome
CASE DESCRIPTION: A 60-year-old male presented with sensory disturbance of right thumb and dorsum of right hand and focal tenderness near the volar distal forearm. Electrophysiology demonstrated a right superficial radial sensory mononeuropathy, but was non-localizing. Conventional and ultra-high frequency (UHF) ultrasound was utilized to assess the radial nerve. Focal superficial radial sensory nerve enlargement occurred at the distal forearm as the nerve exits the brachioradialis fascia. The focal enlargement was corroborated at surgery and compression by the brachioradialis fascia was identified. The patient obtained good relief with surgical facial release of the superficial radial nerve.

DISCUSSIONS: Wartenberg Syndrome is a specific mononeuropathy caused by Entrapment of the superficial branch of the radial nerve, a purely sensory nerve. The entrapment occurs at the distal forearm as the nerve exits the brachioradialis fascia between the brachioradialis and extensor carpi radialis longus. The condition is typically aggravated by repetitive pronation of the forearm. Symptoms include numbness, tingling, and paresthesia on the posterior aspect of the thumb and radial-dorsum of the hand as well as focal discomfort at the site of entrapment. High frequency ultrasound helped define the abnormality by demonstrating the precise area of entrapment. UHF ultrasound (frequencies greater than 24 MHz) was also used in this case and provided more intimate detail of the nerve pathology. Ultrasound can be used in distinguishing Wartenberg Syndrome from other potential pathologies in the differential, including de Quervain syndrome and intersection syndrome.

CONCLUSIONS: High frequency ultrasound with dynamic visualization can aid in localizing and further defining focal sensory neuropathies and provide insight into the underlying etiology. UHF ultrasound can provide even further visualization detail. This can assist with treatment decisions including guiding surgical intervention.

THE USE OF OBJECTIVE ULTRASOUND METRICS TO ASSESS SHOULDER HEALTH IN ELITE SLED HOCKEY PLAYERS: A PILOT STUDY
Ryan P. Nussbaum, DO, Matthew T. Santa Barbara, MD, Jacqueline Spangenberg, BS, Avraham B. Eisenstein, Irmina J. Swiostek, BS, Sarah Abrindani, BS, and Prakash Jayabal, MD, PhD
OBJECTIVES: Incident shoulder pain in sled hockey players has been reported to be as high as 70%. Despite this knowledge, there remains a lack of information regarding specific shoulder musculature that are at risk of pathology and potential pain generators in these athletes. Identifying at risk musculature may allow the clinician to target these as part of an exercise program. The primary objective of this pilot study was to compare acute pre- and post-tournament objective ultrasound metrics to target these as part of an exercise program. The primary objective of this pilot study was to compare acute pre- and post-tournament objective ultrasound metrics to target these as part of an exercise program. The primary objective of this pilot study was to compare acute pre- and post-tournament objective ultrasound metrics to target these as part of an exercise program.

DESIGN: Sled hockey players (n=6) competing in the 2019 USA Sled Hockey Classic were assessed. All participants used a manual wheelchair greater than 50% of the time. Before the tournament, participants completed surveys addressing pain and activity. They also underwent a physical examination shoulder scale (PESS) assessment and ultrasound examination bilaterally pre- and post-tournament. Incident pain pre and post-tournament was assessed using the Visual Analog Scale (VAS). Ultrasound images were obtained of the biceps tendon and supraspinatus cross-sectional areas and acromio-humeral distance (AHD) in neutral and 60 degrees of abduction.

RESULTS: Subjects were aged 38 +/-14, body mass index 35.6 +/-11.09, and used their wheelchair for 21.25 +/- 8.58 years. VAS scores increased during the tournament in both arms (p<0.01), as did PESS (p<0.15), although both findings were non-significant. For the subject's dominant arm, there was a trend towards significant increase in the cross-sectional area of the biceps tendon (p=0.06). There were no significant changes in the AHD for neutral and abducted positions, or supraspinatus cross-sectional area.

CONCLUSIONS: This study highlights the beneficial use of objective ultrasound metrics to ascertain potential soft tissue structures that may be at risk of injury in adaptive athletes. The findings support that elite sled hockey athletes may be more susceptible to biceps tendinopathy and less likely to impingement and supraspinatus tendinopathy.

THE UTILIZATION OF THE AMERICAN HEALTHCARE SYSTEM FOR MUSICAL-INSTRUMENT-ASSOCIATED INJURIES: WHERE DOES PHYSICAL MEDICINE AND REHABILITATION FIT IN?
Chris Ha, DO, and James B. Meiling, DO
OBJECTIVES: Instrumentalist musicians are at high risk for developing painful musculoskeletal injuries. Because of this, it is important that the evaluating clinician is not only familiar with the context of musicians’ injuries, but also possesses a comprehensive understanding of the relevant anatomy and pathophysiology. The purpose of this study was to determine the level of utilization of physical medicine and rehabilitation (PM&R) in the evaluation and treatment of musical-instrument-associated injuries as compared to other medical subspecialties.

DESIGN: The authors created an online survey to collect data about musicians, including the instruments they play, their practice methods, and if they acquired any injuries from playing their musical instruments. The survey was released and available for participation on various social media outlets (Facebook, Instagram, and Twitter) for a span of 33 days. Over that time, the survey received a total of 115 responses. Respondents who suffered a musical-instrument-associated injury were asked to report the type of injury sustained, the type of physician sought out, and the treatment plan prescribed.

RESULTS: Of the 115 responses, 18 individuals reported sustaining an injury while playing one (or more) of their musical instruments. Of these, 9 respondents sought care from 7 different medical specialties, with some utilizing 2 or more different specialties. The other 9 did not seek out a physician. In total, there were 17 unique encounters with various specialties, broken up into sports medicine (23%), orthopedic surgery (23%), family medicine (23%), PM&R (12%), pediatrics (6%), urgent care (6%), and OMM (6%).

CONCLUSIONS: PM&R is still a fairly understudied specialty for musical-instrument-associated injuries. Physicians’ in-depth knowledge of both musculoskeletal and neurological systems uniquely position them to evaluate and treat musicians with musical-instrument-associated injuries. More advocacy and outreach is needed within the PM&R community to help establish the field as a frontline partner for non-emergent musculoskeletal care of musicians.

TIBIAL TUNNEL GANGLION FORMATION POST-ACLR RECONSTRUCTION
Andrea Dockrty, MD, and Michael Baria, MD, MBA
CASE DIAGNOSIS: Post- anterior cruciate ligament reconstruction (ACLR) tibial tunnel ganglion presenting as painful anterior knee mass.
CASE DESCRIPTION: A 33 year old male sustained a left ACL tear after pedestrian versus motor vehicle accident. He underwent arthroscopic-assisted ACLR with anterior tibial allograft. He presented to the sports medicine clinic fourteen months after ACLR with two tender left knee masses. Exam was limited due to pain but revealed a joint slightly warm to touch, an intact extensor mechanism, and no effusion or erythema. Left knee MRI revealed near complete ACL graft disruption, a large rim-enhancing fluid collection within the tibial tunnel extending into the anterior medial soft tissues, measuring 2.1 by 3.6 by 3.5 cm. He was referred to an orthopedic surgeon who recommended excision of the ganglion, debridement and bone grafting of the tibial tunnel.

DISCUSSIONS: Post-ACLR cyst formation occurs with autografts and allografts due to immune-mediated reactions and/or lack of graft integration and presents 1-5 years after ACLR. Multiple etiologies of tunnel widening include graft motion within tunnel, rehabilitation prior to graft incorporation, proximity of graft to joint line, and osteolytic cytokines within tunnel. This must be on the differential for patients presenting with knee dysfunction or masses post-ACLR.

CONCLUSIONS: Tibial tunnel ganglion presented as anterior knee masses post-ACLR. A staged procedure will remove the ganglion and repair the tibial tunnel followed by physical therapy and use of a functional ACL brace. Currently this patient does not wish to return to pivoting activities, but ACLR will be considered if knee instability persists.

TODD'S PARALYSIS: ADVANCING STAGE OF BREAST CANCER
James Salerno, MD

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TRACHEOSTOMY IS ASSOCIATED WITH DELAYED DEVELOPMENT OF HEAD CONTROL AND ROLLING IN INFANTS

Hyun Lee Shin, Master Degree, and Hyung-Ik Shin, PhD

CASE DIAGNOSIS: Advances in neonatal care led to increased survival rate of critically ill babies. In turn, infantile tracheostomies are not uncommon. However, effect of infantile tracheostomy on early motor function has not been much evaluated in detail. By comparing the scores of Gross Motor Function Measure-88 (GMFM) about head control and rolling of infants with and without tracheostomies, the authors attempt to evaluate the effect of infantile tracheostomy on early motor development.

CASE DESCRIPTION: Medical records and GMFM of subjects were retrospectively reviewed. 33 patients with tracheostomies and 132 patients without tracheostomies were matched by gestational age, birth weight and corrected age when GMFM was performed using propensity score matching. Scores of GMFM in head control and rolling in different positions were compared by using generalized estimating equation (GEE).

DISCUSSIONS: Tracheostomized infants showed lower score in head control in supine position and in pull to sit maneuver in multivariate GEE (p=0.008, 0.004, respectively). However, scores of head control in prone position and head lifting while holding thorax by examiner, showed no difference between groups. Rolling from prone to supine was delayed in infants with tracheostomy (p=0.002), while rolling from supine to prone was not. Tracheostomized infants performed better in rolling than head lift in supine position (p=0.00).

CONCLUSIONS: Infantile tracheostomy can influence early motor development in head control and rolling in specific positions. This finding could help clinicians to establish intervention plans for this patient group such as encouraging prone positions to enhance motor development.

TRACING THE IMPACT OF THE OFFICE OF RURAL HEALTH (ORH) TELE-REHABILITATION ENTERPRISE WIDE INITIATIVE BY RURALITY

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CASE DIAGNOSIS: Implemented in 2017, VA’s Tele-Rehabilitation Enterprise Wide Initiative (TR-EWI) uses a Hub and spoke model to expand Veteran access to specialized rehabilitation services. Four VA centers with rehabilitation expertise were recruited to serve as TR-EWI Hub sites providing care to spoke sites in rural areas. The TR-EWI delivers tele-rehabilitation services, clinical care and consultation to rural Veterans, either at a local Community Based Outpatient Clinic (CBOC) or to their homes, via various tele-rehabilitation protocols. This work examined the growth trajectory of the number of Veterans served and total number of patient encounters recorded for TR-EWI from FY2017 to FY2019 by rurality.

CASE DESCRIPTION: The VHA Support Service Center Capital Assets (VSSC) Telehealth data cube was used to extract data for total unique patients served and the total number of encounters by rurality from FY 2017- FY 2019 across the tele-rehabilitation step codes.

DISCUSSIONS: Workload for tele-rehabilitation nearly tripled from FY 2017- FY 2019, with the total number of patients and patient encounters increasing by 191 percent. Trends in increased unique patients were observed by clinic type and patient rurality, with the largest rural growth occurring in Physical Therapy (639 percent) and the largest urban growth occurring in Occupational Therapy (1,265 percent). The number of tele-rehabilitation patients and patient encounters also increased across urban and rural settings from FY 2017-FY 2019, with larger growth present across urban Veterans (Uniques: rural, 74 percent; urban, 264 percent and Encounters: rural, 93 percent; urban, 206 percent).

CONCLUSIONS: Tele-rehabilitation fills a gap in disparities to health care access for rural Veterans by focusing on reaching out to this population and better meeting their rehabilitation needs. This work shows growth in VA TRE-WI tele-rehabilitation; thus, minimizing patient and caregiver travel burden and helping ensure all Veterans, regardless of their geographic location, have access to specialized rehabilitation care.

TRADITIONAL RESISTANCE TRAINING IMPROVES FUNCTIONAL AND IMMUNOLOGICAL LUNG RESPONSES IN ELDERLY WITH METABOLIC SYNDROME

Maysa Rangel, MS, Adriano Silva Rennô, PROF, Rodolfo de Paula Vieira, PhD, and Claudio Ricardo Frison, DOC

CASE DIAGNOSIS: Analyze resistance training alone improve lung function, lung mechanics and systemic and pulmonary immune response in elderly with metabolic syndrome.

CASE DESCRIPTION: We investigated the effects of resistance training (RT), 3x/week, for 10 weeks, on lung function in mechanics and pulmonary immune response of the elderly with metabolic syndrome.

DISCUSSIONS: after ten weeks improve functional capacity (p<0.05), decrease physical activity limitation (p<0.05), pain (p<0.05), improve overall health status (p<0.05), improve vitality (p<0.05), reduce the level of body fat (p<0.05), reduce the resting blood pressure (p<0.05) and fasting glucose (p<0.05) and glycated hemoglobin levels (p<0.05), reduce total cholesterol (p<0.05), LDL cholesterol (p<0.05), triglycerides (p<0.05) and increase HDL cholesterol (p<0.05, p<0.05). In relation to pulmonary mechanics evaluated by impulse oscillometry, there was an improvement of resistance of the distal airways R at 20Hz (p<0.001) and the resistance of the proximal airways at 20Hz (p<0.05), as well as central resistance (p<0.001). RT resulted in a reduction in IL-1beta, IL-6, TNF-alpha (10 weeks, p< 0.001), while increasing IL-1ra levels (p<0.001) and IL-10 (p<0.001) in the supernatant of induced sputum.

CONCLUSIONS: We conclude that resistance training provided an improvement in cardiometabolic response, pulmonary mechanics and pulmonary immune response of the elderly with metabolic syndrome.

TRAJECTORIES OF FIBROMYALGIA IMPACT OVER A 12-WEEK PERIOD OF EXERCISE INTERVENTIONS

Augustine C. Lee, MD, Natalie Sajkowicz, MD, Matthew Junzen, MD, Lori Lyn Price, MAS, MLA, Raveendhara Bannuru, MD, PhD, and Chenchen Wang, MD, MS

OBJECTIVES: Exercise is the recommended non-pharmacological treatment for fibromyalgia. However, heterogeneous patterns in treatment response are poorly understood. Our purpose was to identify trajectories of overall impact from exercise interventions among adults with fibromyalgia and to determine their association with baseline factors.

DESIGN: Secondary analysis of a single-blind, randomized trial comparing Tai Chi and Aerobic Exercise programs among adults with fibromyalgia. We used weekly measures of Revised Fibromyalgia Impact Questionnaire (FQIRQ) scores (0-100) over up to 12 weeks of cumulative exposure to identify trajectories using group-based trajectory models. Associations between baseline factors and trajectories were examined using multinomial logistic regression. Participants with less than four weeks of exposure were excluded.

RESULTS: We included 165 participants (mean age 53 years, BMI 30kg/m2, 92% female, 61% white) and identified three trajectories of overall impact: Low Impact-Progressive Improvement (28.6%), Moderate Impact-Gradual Improvement (47.9%), and Higher Impact-Delayed Improvement (23.5%). Treatment assignment was not significantly associated with trajectory group (p=0.91). Compared with the
Lower Impact-Progressive Improvement trajectory, moderate and higher impact trajectories were significantly associated with younger age, higher BMI, and poorer sleep quality, mobility, and quality of life. Participants with worse psychological functioning, including anxiety, depression, perceived stress, and quality of life, were more likely to be in the Moderate Impact-Gradual Improvement and Higher Impact-Delayed Improvement trajectories than the Lower Impact-Progressive Improvement group.

CONCLUSIONS: We found three distinct trajectories of overall impact over cumulative exposure to exercise interventions of up to 12 weeks among adults with fibromyalgia. While some older participants with greater mobility and worse psychological functioning were more likely to experience progressive improvement, most participants had more gradual improvement. These findings help us better understand the heterogeneity of treatment response and may advance patient-centered care for patients with fibromyalgia.

TRANSCRANIAL PULSE STIMULATION, TPS REDUCES SIGNIFICANTLY THE ALZHEIMER’S DISEASE SYMPTOMS

Pavel Novak, DR

OBJECTIVES: Acoustic waves, or shockwaves respectively are used in medicine since 1980. First application was for extracorporeal kidney stone disintegration. Meanwhile, low intensity acoustic waves proved to be efficient for the treatment of non-unions, tendon and muscular pain, wound healing, heart insufficiency, erectile dysfunction, osteoporosis, and finally also neurological indications. The working principle is the mechanical stimulation of biological processes called mechanotransduction resulting in increased cell metabolism, release of nitric oxide (eNO) and numerous growth factors like VEGF, BMP, TGF-β, GABA, BDNF and GDNF. There is also an anti-inflammatory effect and the stimulation of stem cells and the innate immune system. There are no significant side effects. Alzheimer’s disease or dementia in general is a multi-modal disease resulting from different causes like deposition of dedicated proteins (tau, beta-amyloid), inflammation, reduced blood supply and others. This might be the reason why the pharmaceutical solutions failed till now.

DESIGN: First the effect of acoustic pulses on brain was tested in-vitro and on behalf of animal tests (Sprague-Dawley rats) the safety margins were evaluated. Transcranial Pulse Stimulation (Neuroth) was than applied to patients suffering from minor Alzheimer’s disease in two centers. 35 patients were treated in this multicenter clinical pilot study. The treatment consisted of 6 sessions in 2 weeks, with 6000 pulses per session, energy flux density of 0.2 mJ/mm² at 5Hz. It was performed with an unshaved head through the hair. The energy transmission was maintained with ultrasound coupling gel. The treatment is painless and very well tolerated by the patients.

RESULTS: The patients showed a significant improvement of the Alzheimer’s disease symptoms of up to 20% measured with CERAD Plus battery of tests. No side effects have been observed.

CONCLUSIONS: The exact working principle is not completely understood, but based on the scientific knowledge of the mechanotransduction effects in the tissue (see above), it covers very well the different known courses of the Alzheimer’s disease. The acoustic wave stimulation, or TPS with its broad scope of effects seems to be more efficient, than other treatment methods available till now. The device (Neuroth) has meanwhile the CE mark clearance in Europe and there are regulatory discussions. Meanwhile, low intensity acoustic waves proofed to be efficient for the treatment of Alzheimer disease symptoms of up to 20% measured with CERAD Plus battery of tests. No side effects have been observed. The most challenging rehabilitation-related issues in the future will be avoiding sternal complication, infection and technical problems. Therefore, the rehabilitation of amputees treated with TOPS needs an interdisciplinary specialized team with Physical and Rehabilitation specialists, Physiotherapists, Orthopaedic Technicians and Surgeons.

TRAMCIAL PARTIAL PLANTARIS TENDON TEAR IN A SCOTTISH HIGHLAND DANCER: A CASE REPORT

Tracey Isidro, MD, Stacey Isidro, BA, and John C. Cianca, MD

CASE DIAGNOSIS: Traumatic partial plantaris tendon tear

CASE DESCRIPTION: We present the case of a 29-year-old elite level Scottish Highland female dancer with a history of acute overuse injury secondary to Scottish Highland dancing. She had distal right leg pain and tendon tightness that was worsened by dancing during a competition three days prior to presentation. The pain radiated up the medial side of the right calf with mild tenderness in the proximal portion of the Achilles tendon eventually making weightbearing difficult. She did not hear or feel a pop at that time. Previous providers initially diagnosed her right posterior lower leg pain as Achilles tendinopathy and later as a gastrocnemius strain.

DISCUSSIONS: On exam she was able to bear weight with mild discomfort. There was tightness in the distal right posterior leg and pain with passive range of motion that worsened with knee flexion. Further, there was tenderness along the mid to distal portion of the Achilles tendon with mild proximal tenderness at the gastro-Achilles junction. Active plantar flexion increased pain in the Achilles region rather than the gastrocnemius. Ultrasound revealed an enlarged plantaris tendon with associated edema, Achilles tendinopathy, and a normal gastrocnemius. MRI showed a partial tear of the plantaris tendon with soft tissue edema, mild thickening without tear or tendinosis of the Achilles tendon, and a normal gastrocnemius. We diagnosed her with a partial plantaris tendon tear at the distal soleus and recommended conservative management.

CONCLUSIONS: Partial plantaris tendon tears are uncommon and may be confused with Achilles tendinopathy or gastrocnemius injuries.

TREATMENT OF EOSINOPHILIC MYOSITIS WITH STEROID TRIGGER POINT INJECTIONS: A CASE REPORT

Michael Pico, MD, and Andrew J. Duarte, MD

CASE DIAGNOSIS: Eosinophilic Myositis

CASE DESCRIPTION: The patient is a 40 year old male who presented with gradual onset shoulder and thoracic/lumbar back pain. He described muscle soreness and cramping, which worsened with activity. Physical exam revealed tenderness and tightness over the right trapezius, and thoracic/lumbar paraspinals. While systemic glucocorticoids and immunosuppressive effects have been observed, but based on the scientific knowledge of the mechanotransduction effects in the tissue (see above), it covers very well the different known courses of the Alzheimer’s disease. The acoustic wave stimulation, or TPS with its broad scope of effects seems to be more efficient, than other treatment methods available till now. The device (Neuroth) has meanwhile the CE mark clearance in Europe and there are regulatory discussions. Meanwhile, low intensity acoustic waves proofed to be efficient for the treatment of Alzheimer disease symptoms of up to 20% measured with CERAD Plus battery of tests. No side effects have been observed. The most challenging rehabilitation-related issues in the future will be avoiding sternal complication, infection and technical problems. Therefore, the rehabilitation of amputees treated with TOPS needs an interdisciplinary specialized team with Physical and Rehabilitation specialists, Physiotherapists, Orthopaedic Technicians and Surgeons.

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DISCUSSIONS: Eosinophilia-associated myopathies are a group of rare diseases characterized by eosinophilia and/or eosinophilic muscle infiltration. Focal eosinophilic myositis is a limited subtype, with no organ involvement or systemic manifestations. Patients often present with muscle pain, tenderness, and eosinophilia. Treatment commonly involves oral glucocorticoid administration and/or immunosuppressive drugs. In this case, the patient failed a variety of treatment modalities and experienced symptom relief only with steroid trigger point injections.

CONCLUSIONS: While systemic glucocorticoids and immunosuppressive drugs are the mainstay of treatment for eosinophilic myositis, this case report demonstrates the use of steroid trigger point injections as a possible alternative treatment for cases refractory to conventional treatment.

TREATMENT OF SEVERE RADICULAR LEG PAIN SECONDARY TO PELVIC LEIOMYOSARCOMA RESECTION UTILIZING TARGETED STEROID DELIVERY THROUGH A RIGHT SI TRANSFORAMINAL APPROACH

Addison Weseloh, MD, Ann Hulme, MD, Jennifer Lee, MD, and Adrian Popescu, MD

CONCLUSIONS: The present data elucidates that TOPS is an alternative treatment method for patients with transfemoral amputation with good clinical outcome. The most challenging rehabilitation-related issues in the future will be avoiding sternal complication, infection and technical problems. Therefore, the rehabilitation of amputees treated with TOPS needs an interdisciplinary specialized team with Physical and Rehabilitation specialists, Physiotherapists, Orthopaedic Technicians and Surgeons.
CASE DIAGNOSIS: S1 radiculopathy related to leiomyosarcoma  
CASE DESCRIPTION: A 71 y.o. female with right pelvic leiomyosarcoma encasing the pelvic nerve roots status post resection presented to a Physiatry spine center with severe right-sided pain in the S1 distribution with planter flexion weakness. Post-operative pelvic MRI with and without contrast demonstrated increased perineural hyperintensity of the exiting right S1 nerve root at the anterior aspect of the sacrum. The patient failed McKenzie based physical therapy, medications, and had only mild non-sustained relief from prior CT-guided traditional right S1 transforaminal epidural steroid injection (TFESI). A fluoroscopically guided contrast enhanced right S1 TFESI was performed advancing spinal needle at the anterior aspect of the S1 foramen to achieve proximally the exiting right S1 nerve. The patient had complete pain relief post-procedure and persistent relief of 70% at 1 month.  
DISCUSSIONS: To our knowledge, this is the first case of lumbosacral radiculapain related to pelvic tumor resection managed by TFESI. In this case, by advancing the spinal needle anteriorly, the injectate was able to flow to the S1 nerve root including the area of tumor resection, providing relief of the patient’s symptoms. By adapting the TFESI approach to the patient’s symptoms, target-specific imaging, and surgical history, TFESI may provide an option for cancer-related postsurgical lumbosacral radiculapain.  
CONCLUSIONS: A patient with severe leg pain secondary to postoperative leiomyosarcoma resection with scar tissue and inflammation involving the S1 nerve root attained sustained pain relief by a modified approach for an S1 TFESI. This case demonstrates that target specific steroid injection through a transforaminal approach may have a significant role as a palliative procedure in postoperative pain for cancer survivors.

TRENDS IN HEALTH CARE OUTCOMES AMONG PATIENTS WITH MUSCULOSKELETAL DISORDERS IN GERMANY UNDERGOING REHABILITATION. AN INTERSECTIONALITY PERSPECTIVE  
Patrick Brzoska, MSC, EMPh, DRPh, and Yüce Yilmaz-Aslan, DRPh  
CASE DIAGNOSIS: Demographic factors such as sex, socioeconomic position and migration status may be associated with disadvantageous health care outcomes. Measures implemented by health care providers aiming to reduce these disparities are not always successful. The present study provides empirical insights from Germany using patients with arthropathies, dorsoptopathies and soft tissue disorders as an example and illustrates the need for evaluated diversity-sensitive measures.  
CASE DESCRIPTION: The analysis is based on routine data on completed rehabilitative treatments among patients with arthropathies, dorsoptopathies and soft tissue disorders in Germany during 2006-2016 (n=298,673). The outcome of interest was the persistence of impairment after medical treatment. It was compared between sex, nationality and occupational position groups, the latter of which was considered a proxy for socioeconomic status. Logistic regression was used to adjust for other demographic confounders. Differences in disparities over time and across demographic/diagnostic groups were examined by means of interaction analysis.  
DISCUSSIONS: As compared to men, women had a 11% higher chance of impairment despite treatment (adjusted odds ratio [aOR]=1.11; 95%-CI=1.00,1.25). Also, patients who worked in a semi-skilled or unskilled position had a 13% higher chance of a poor outcome than those in skilled occupational positions (aOR=1.13; 95%-CI=1.01,1.27). Differences also existed with respect to nationality with Turkish and Former Yugoslavian nationals being at a higher chance of a poor health care outcome than Germans (aOR=1.56; 95%-CI=1.45,1.67 and aOR=1.52; 95%-CI=1.41,1.65, respectively). Disparities did not significantly differ between the years in which services were utilized. However, disparities between man and women were more pronounced for soft tissue disorders.  
CONCLUSIONS: Measures implemented by health care providers to address the needs of a diverse population were not able to reduce disparities over time. This calls for an increased and coordinated transfer from research into practice as more pronounced for soft tissue disorders.  

ULTRASONOGRAPHIC EVALUATION OF THE DISTAL FEMORAL AND TALAR CARTILAGE THICKNESSES IN PATIENTS WITH POLYMIELITIS  
Kamal Mezian, MD, PhD, Yvona Angerová, MD, PhD, Murat Kara, MD, Veronika Pudilová, MD, Klaudia Michalíková, MSC, Eva Konopáková, MSC, and Levent Özçakar, MD  
OBJECTIVES: Late effects of poliomyelitis, coupled with asymmetric weight-bearing, typically alter walking biomechanics which can be associated with the knee and ankle osteoarthritis. We aimed to investigate whether the distal femoral and talar cartilage thicknesses were different in patients with poliomyelitis.  
DESIGN: In this cross-sectional observational study, there were 26 patients (9 M, 17 F) with a history of poliomyelitis. Mean values for age, body mass index and age of disease onset were 69.3±4.4 years, 27.2±5.2 kg/m2 and 3.1±2.0 years respectively. Visual analogue scale was used to assess pain. Lower limb muscle strengths were measured by manual muscle testing. Bilateral distal femoral (lateral femoral condyle, intercondylar area, medial femoral condyle) and talar cartilage thicknesses were measured using ultrasound imaging.  
RESULTS: Along with the muscle strength, the three cartilage measurements were significantly lower on the affected sides (all p<0.001) while talar cartilage thicknesses were found to be similar between the sides (p=0.241).  
CONCLUSIONS: The knee but not the ankle joints of poliomyelitis patients seems to have decreased cartilage thickness. Further studies with larger samples also including control subjects are needed to better understanding the biomechanical pathogenesis or the potential consequences.

ULTRASONOGRAPHY FINDINGS IN KNEE OSTEARTHRITIS  
Marta Imanura, Prof DR, Claudia Andrea Rabay Pimentel Abicalaf, MD, Artur Aquino, Claudia Andrea Rabay Pimentel Abicalaf, Medical Student, and Linamara R. Battistella, MD, PhD

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OBJECTIVES: Worldwide knee osteoarthritis (KOA) accounts for 2.2% of total years lived with disability. There is low correlation between joint damage and pain intensity. Periarticular structures may be involved and are not properly identified in XRs. The objective of our study was to describe the main ultrasonography (USG) changes in symptomatic patients with primary KOA and to correlate the number of ultrasonography findings with KOA severity determined by the Kellgren and Lawrence (K&L) radiological scores and with pain intensity measured by a visual analogue scale (VAS).

DESIGN: A total of 57 consecutive consenting patients (54 bilateral and 3 unilateral) with primary symptomatic KOA (111 knees) were assessed with three RX incidences: K&L grade, ultrasonography (Sonoline G40, multi-frequency linear transducers of 8-12 MHz, Siemens, Germany). Quantitative and qualitative analyses (changes of the echogenicity of the muscles and tendons, presence or absence of peri-tendinous fluid/synovial thickening and/or joint fluid (effusion) as well as presence or absence of cysts, especially in the popliteal fossa) were assessed in a systematic manner.

RESULTS: A single USG finding was observed in 45 knees (40.54%), two in 27 (24.32%), three in 22 (19.82%), and four in four knees (3.6%). The most frequent USG findings were joint effusion (n=91; 83.64%), popliteal cysts (n=33; 33%), pes anserinus bursitis (n=46; 41.82%), and patellar tendinitis (n=9; 8.18%). Ultrasoundography findings were not observed in 13 knees (11.71%; 9 patients). Pearson's correlation analysis demonstrated a significant moderate positive association between VAS scores and the number of USG findings (r = 0.33; p < 0.001). VAS was divergent between K&L grades I and IV (p = 0.014, ANOVA with Bonferroni correction).

CONCLUSIONS: The main ultrasonography findings were joint effusion, popliteal cysts, pes anserinus bursitis, and patellar tendinitis. Number of USG findings was associated with VAS scores and should be explored in patients with KOA as potential sources of pain.

ULTRASOUND AS AN ADJUNCT TO ELECTRODIAGNOSIS IN DIAGNOSING AN ULNAR NERVE INJURY SECONDARY TO A BLIND CARPAL TUNNEL INJECTION: A CASE REPORT

Naveen Khokhar, DO, and John Norbury, MD, RMSK

CASE DIAGNOSIS: Severe right ulnar neuropathy at the wrist and elbow

CASE DESCRIPTION: A 69 year old male with a remote history of trauma to the right medial epicondyle presented with complaints of weakness, pain, and paresthesias in the third to fifth digits of his right hand and forearm following a blind injection into his right wrist for carpal tunnel syndrome (CTS). Electrodiagnostic (EDX) findings were consistent with a severe right ulnar axonal mononeuropathy at the wrist which could not be localized due to the axon loss pathology. Neuromuscular Ultrasound (NMUS) revealed focal enlargement of the right ulnar nerve at both the distal pisiform and the medial epicondyle. A large osteophyte was noted on the right medial epicondyle in close proximity of the ulnar nerve. These findings were consistent with a double crush ulnar neuropathy.

DISCUSSIONS: In this case, the patient developed an ulnar neuropathy at the wrist following a blind injection for CTS. It is possible that the lack of ultrasound (US) guidance was a contributing factor in the injury. NMUS was critical in precisely localizing the lesion beyond what was possible with EDX testing alone.

CONCLUSIONS: Blind carpal tunnel injections may put patients at risk for injuries to both the median and ulnar nerves and US guidance should be considered to reduce risk of iatrogenic injury. Also, NMUS is especially helpful for localizing lesions in axon-loss lesions with more than one potential injury site.

ULTRASOUND GUIDED SUPRACAPULAR NERVE PULSED RADIOFREQUENCY ABLATION FOR CHRONIC HEMIPLEGIC SHOULDER PAIN: A CASE REPORT

Daniel G. Colon-Conde, MD, Eduardo Otero-Lopereña, MD, David Soto-Quijano, MD, and Marinaie Rodriguez-Campos, MD

CASE DIAGNOSIS: Right Chronic Hemiplegic Shoulder Pain

CASE DESCRIPTION: Case of a 48 y/o male patient with chronic Left MCA stroke with right flaccid hemiplegia who presented with right shoulder subluxation and pain unresponsive to medications, shoulder sling, and physical therapy. A right ultrasound guided suprascapular nerve block with lidocaine/methylenebis-nisilone provided 50% relief for 3 weeks. Striving for a longer-lasting relief, after informed consent, an ultrasound-guided suprascapular nerve pulsed radiofrequency ablation was done as follows: With patient sitting, the right suprascapular notch was identified by palpation and by ultrasound scan; the needlepath was in anesthetized manner. A 54mm radiofrequency probe with a 5 mm active tip was advanced medio-laterally under ultrasound toward the suprascapular notch. After needle confirmation with sensory (50-100Hz, 1ms pulse width up to .5 volt), and motor stimulation (2Hz, 1ms pulse width, up to 1 V) and after lidocaine infiltration, lesioning was done for 3 minutes at 2Hz, 30ms pulse width and 42°C.

DISCUSSIONS: After procedure performed, pain improvement from 5/10 to 2/10, using Defense and Veterans Pain Rating Scale, was sustained for 6 weeks, and returned to baseline at 3 months post procedure. Chronic hemiplegic shoulder pain secondary to glenohumeral subluxation occurs in 17% of patients post-stroke, and conservative therapeutic management, such as slings, are not effective once subluxation occurs. Pulsed radiofrequency ablation of suprascapular nerve, which provides 50-70% of shoulder capsule innervation, provides a longer term relief by pain signal neuromodulation, with minimal thermal injury to adjacent tissues. Ultrasound guidance increases accuracy of procedure without radiation exposure. There is scarce evidence in literature regarding pulsed radiofrequency ablation for hemiplegic shoulder pain.

CONCLUSIONS: Suprascapular nerve pulsed radiofrequency ablation can be an alternative for management of hemiplegic shoulder pain with subluxation in patients with significant but short lasting response to nerve block.

ULTRASOUND-GUIDED TEMPOROMANDIBULAR JOINT INJECTION IN SPONDYLOARTHROPATHY: A CASE REPORT

Sakshi Jain, MD, C Chethan, MBBS, MD, and Shweta Jain, MBBS, MD, DNB

CASE DIAGNOSIS: Temporomandibular Joint Involvement in Spondyloarthropathy

CASE DESCRIPTION: 18 year old, male presented with limited mouth opening and pain in preauricular region since 6 months. He also had history of pain in multiple joints including knees, ankles, feet joints with HLA B 27 positivity. He was on DMARDs since 6 months. On examination, there was preauricular tenderness on both sides along with restricted mouth opening with VAS score of 40 mm. Under USG guidance 0.5 ml (20 mg) of triamcinolone acetonide was injected in both temporomandibular joints. After 2 weeks of injection VAS score reduced to 20 mm and mouth opening improved.

DISCUSSIONS: Temporomandibular Joint may be involved in peripheral spondyloarthropathy presenting with preauricular pain, tenderness and limited mouth opening. Radiological investigations include Orthopantomograms, CT and MRI. The CT findings include joint space narrowing, erosions, osteophyte formation and extensive sclerosis. Treatment options include rest, NSAIDs, exercises, physiotherapy, intraarticular steroids.

CONCLUSIONS: Temporomandibular joint involvement is often diagnosed late leading to limited mouth opening and functional impairment. Intra articular corticosteroid injection in temporomandibular joint under ultrasound guidance was effective leading to improvement in pain and functional impairment.

ULTRASOUND-GUIDED RADIOFREQUENCY ABLATION OF GENICULAR NERVES IN PATIENTS AFFECTED BY KNEE OSTEOARTHRITIS: SHORT-TERM EFFECTS ON PAIN AND SAFETY

Alessandro de Sire, MD, Lorenzo Lippi, MD, Maurilio Massara, MD, Carlo Cisari, MD, Alessio Baricich, MD, PhD, and Marco Invernizzi, MD, PhD

OBJECTIVES: Radiofrequency (RF) neurotomy has been recently proposed to treat knee osteoarthritis (KOA) in patients not responsive to conservative management or not candidates for surgery. Previous studies have analyzed RF ablation performed on genicular nerves, approached percutaneously mainly under fluoroscopic guidance. Aim of this study was to evaluate the effects and safety of ultrasound-guided RF in in patients affected by knee osteoarthritis.

DESIGN: In this retrospective study we included patients aged 50-80 years, with diagnosis of KOA Kellgren-Lawrence stage ≥2, suffering pain for >3 months, refractory to conventional therapies. Exclusion criteria: previous knee surgery, skin lesions, infections, severe neuropathy, and allergy to anesthetic used. All patients were treated with RF of the supero-lateral, supero-medial, and inferior-medial geniculate nerve. Correct positioning of the needle was assessed by ultrasound guidance and fluoroscopy and motor electrostimulation. Primary outcome was intensity of pain measured by Numeric Pain Rating Scale(NPRS). Secondary outcomes were disability, assessed Knee Injury and Osteoarthritis Outcome Score(KOOS), and safety measured recording adverse events. All these outcomes were assessed at the baseline(T0) and at 2 weeks after the procedure(T1).

RESULTS: Forty-seven patients (age = 68.8±13.7 years; BMI = 28.2±4.9 kg/m²) were included; there was a significant reduction of pain (NPRS: 7.8±3 vs 2.0±0.5, p<0.05). Moreover, all patients showed statistically significant reduction of disability, as showed by KOOS score (21.5 vs 44.9; p<0.05). All adverse events were recorded in order to assess safety; we did not collect major adverse events, but there were minor

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adverse events, such as vaginal reactions (n=2), minor bleeding (n=17) and temporary local hypotension (n=29).

CONCLUSIONS: The results suggest ablation of genicular nerves through ultrasound-guided RF might be a safe and effective technique to reduce pain and disability in KOA patients, with encouraging in patients not responders to conventional treatments. Further prospective studies are mandatory to confirm our results.

UNDERDIAGNOSIS OF A BRACHIAL PLEXUS TUMOR OF A CASE WITH CARPAL TUNNEL SYNDROME

Aysun Gene, Specialist, Eser Mustafa, Assistant, Burak Kamil Turan, Assistant, and Yesim Aytur, Professor

CASE DIAGNOSIS: The patient admitted with severe pain in right arm following recurrent operations for carpal tunnel syndrome(CTS) and thought to have complex regional pain syndrome. But final diagnosis was Thoracic outlet syndrome (TOS) due to schwannoma.

CASE DESCRIPTION: A 57 year old woman with complaints of severe pain, numbness and burning radiating from right shoulder to fifth finger. These symptoms increased with hand movements especially at nights. Daily living activities was restricted and she had a poor sleep quality. Before she was diagnosed as CTS and the patient was operated three times for CTS and one times for cubital tunnel syndrome(CuTS). Beside this, the patient treated with electrotherapy agents. On physical examination, abduction and flexion of right shoulder was restricted. Strength of first dorsal interosseous, extensor indicis proprius and hand flexors muscles were 4/5 and abductor digitii minimi and abductor pollicis brevis muscles were 3/5.

DISCUSSIONS: The typical presentation of schwannoma is painless and asymptomatic solitary mass. Patients may show symptoms of nerve compression with radicular pain and/or sensory/motor deficit. Only a few cases of schwannomas originating from the brachial plexus mimicking TOS have been reported. Clinical symptoms, physical examination, ENMG, brachial plexus ultrasonography and MRI can help diagnose symptomatic tumors of the brachial plexus. Physical examination should include a careful assessment of the range of motion, postural abnormalities, muscle atrophy, sensory loss, and muscle weakness for the spine, thorax, shoulder and upper extremities. In our case, previous ENMG studies performed by other clinics were compatible with CTS and CuTS. However, recurrent operations due to lack of improvement, and symptoms indicating complex regional pain syndrome complicated the case.

CONCLUSIONS: Other medical conditions like thoracic outlet syndrome, should be kept in mind under the condition of CTS and CuTS that are resistant to conservative and surgical therapies. Physical examination and ENMG are important for differential diagnosis.

USEABILITY EVALUATION OF JOYSTICKS FOR DEVELOPING USER-FRIENDLY MOBILITY ASSIST ROBOTS: A PRELIMINARY STUDY IN HEALTHY YOUNG ADULTS

Shigee Tanabe, RPT, PhD, Soichiro Koyama, PT, PhD, Tsuyoshi Tatamoto, RPT, MSC, Nobuhiro Kumazawa, RPT, MSC, Kotaro Takeda, PhD, Eichi Saitoh, MD, DMSC, and Yohei Otaka, MD, PhD

OBJECTIVES: For driving mobility assist robots, various-shaped joysticks designed for electric wheelchairs have been used. However, usability evaluation of these joysticks has not been fully conducted. In the present preliminary study, the sensory evaluation test for joysticks was performed in 26 healthy young adults.

DESIGN: All participants were asked to pass through the driving course (710mm in total length, 910mm in width, and 2 right-angle curves) as quickly and accurately as possible using a total of nine types of joysticks (one type of U-shaped, two types of T-bar, three types of I-handle for pinching with the fingers). After driving, the participants were asked to rank the joysticks based on their usability (one = Best to nine = Worst). For statistical analysis, medians and ranges were calculated for all joysticks. Kendall’s coefficient of concordance was used as a measure of agreement among participants.

RESULTS: As a result, the rankings of the I-handle for grasping with the hand or pinching with the fingers tended high scores compared with U-shaped and T-bar. Median ranking values of the joysticks ranged from three (medium-size I-handle for grasping with the hand) to eight (U-shaped). The coefficient of agreement of Kendall (W) was 0.16.

CONCLUSIONS: In the present experimental Design, the findings suggest that there is no joystick that many people choose. Further studies should be conducted to clarify the factors (e.g. participants’ characteristics and driving course configuration) that influence the usability of joysticks for developing user-friendly mobility assist robots.

USE AND EFFICACY OF MEDICATIONS AND SUPPLEMENTS FOR UTI PROPHYLAXIS IN SPINAL CORD INJURY PATIENTS WITH NEUROGENIC BLADDER

Sara Rosenzweig, BA, MD CANDIDATE, Michael Staines, MD, Katherine D. Goss, MPH, Gizelda Casella, MD, PhD, and Margaret A. Turk, MD

OBJECTIVES: There are no clear recommendations in the literature regarding prophylactic medications or supplements to treat recurrent urinary tract infection (UTI). The goal of this study is to examine the correlation between prophylactic strategies, bladder management types, and frequency of UTI in spinal cord injury (SCI) patients.

DESIGN: A retrospective chart review of 28 patients with SCI who used at least one type of UTI prophylaxis was performed. Collected information included: patient information (age, gender, mechanism of SCI injury, level of lesion, type of catheterization), UTI experiences (pathogen type, number and rate of UTIs during prophylaxis configuration) that influence the usability of joysticks for developing user-friendly mobility assist robots.
diverse patient population, is necessary. The inclusion of a wide variety of prophylactic treatments for UTI is a strength of this study.

USE OF A ROBOT (PEDBOTHOME) TO INCREASE COMPLIANCE WITH HOME EXERCISE PROGRAMS IN CHILDREN WITH STATIC NEUROLOGICAL INJURY

Catherine L. Coley, PT, DPT, PCS; Sarah H. Evans, MD; Staci Kovelman, PT, DPT; Justine Belschner, PT, DPT; Kevin Cleary, PhD; Hadi Foolad, MS; Rachel Huard, PhD; Tyler Salvador, BS; Manon Schladen, MSE, PhD; and Sara Alyamani, BS

OBJECTIVES: The primary objective of this feasibility study was to determine if a subject with a static neurological injury would adhere to using an ankle rehabilitation robot as a home exercise program for at least 20 out of 28 days. The secondary objective was to examine if using PedBotHome over 28 days would lead to improvements in strength, active range of motion (AROM), and/or passive range of motion (PROM).

DESIGN: PedBotHome consists of a robotic device with a cast shoe interface, smartphone to detect ankle movement, chair, and computer with software to display a video game. Each week, the child was assigned three exercises incorporated into game play. The exercises focused on movement in one or multiple planes of motion in a simulated airplane flight game. The device was initially calibrated to the child’s baseline range of motion and video game play progressed through an algorithm to progress speed of play and level of resistance. The child began in active play with the device passive. The system was programmed to advance the child to working against resistance within their available range, and then to work on increasing range of motion. If the child had difficulty with the progression, the system moved the child into an assist mode where the robot provides torque assistance to help the child to achieve success.

RESULTS: To date, 67% of patients have demonstrated compliance with performance of twenty sessions in the twenty-eight days that PedBotHome was placed in their home. All patients demonstrated improvement in all three secondary outcome measures of PROM, AROM, and strength. All participants improved in the majority of PROM measurements that were not already within normal limits at initial evaluation. Most participants also demonstrated improvement in ankle dorsiflexion PROM 1st resistance (R1) which is indicative of improved muscle tone. AROM improved an average of 4.2 of 5 measurements. Participants improved an average of 4.2 of 5 strength measurements. Qualitative analysis of reaction to using PedBotHome for an HEP showed that approximately half of the factors important in HEP compliance are relevant to the use of PedBotHome; and that of the top six factors, PedBotHome eliminates concern for three.

CONCLUSIONS: Home based robotic therapy may improve compliance with a therapeutic home exercise program. Participants and families were encouraged by improvements in secondary outcome measures which indicate a positive effect in all 3 domains of flexibility, active movement, and strength. Increased AROM and strength were associated with increased number of sessions performed within the 28 day period which could indicate opportunity for better results over a longer period of consistent use. PedBotHome has the potential to mitigate some barriers to home exercise adherence identified in prior studies of programs without such robotic and gamified enhancement. The greatest gains may be in the areas of decreased family burden and decreased demands on therapists’ time, increasing efficiency and quality of delivered care.

USEFULNESS OF MYOELECTRIC PROSTHESSES IN PARTIAL HAND AMPUTATIONS: A CASE REPORT

Riccardo De Rosa, Resident, Lluis Guirao Cano, MD, Pablo Peret Hernández, MD, Maria Angeles Díaz Vela, OT, and Beatriz Samitier Pastor, MD

CASE DIAGNOSIS: Partial hand amputation alters all the aspects of the daily life, causing serious functional and psychological repercussions for the patients.

CASE DESCRIPTION: We present a clinical case of a 59-years-old male patient who suffered a disarticulation of the thumb, index, middle and ring fingers after an industrial accident due to entrapment by a press. Afterwards, he carried out a standard and virtual training to enable a prior learning of the prosthetic manufacture. Finally, an adapted myoelectric prostheses was made. The results of the functional (Box and Block: 21 vs 20,90 ± 5,74 literature score), subjective (SAT-PRO 33 vs 27 literature score) and quality of life (EURO Qol-5D: 0.71 vs 0.73 literature score) assessment showed a significant improvement compared to the literature’s results.

DISCUSSIONS: Partial hand amputation is a relatively uncommon pathology with an important functional consequences for the patients who present it, causing permanent disability, as well as a psychological trauma and loss of the individual's work capacity. The main cause is traumatic, related in most of the cases to work accidents. It also represents a significant direct and indirect economic burden for patients and society. Technological evolution has increasingly led to the use of myoelectric prostheses in patients who have undergone minor amputations of the upper extremities. Different types of prostheses, use the electrical impulses that come from the contraction of the muscles of the residual part of the limb to operate the prostheses.

CONCLUSIONS: Myoelectric prostheses, despite their high cost, prove to be fundamental in this type of patients to achieve reintroduction of daily life activities and to recover their occupational, family and social role again.

USING ANALYTIC MODEL TO PREDICT RESPONSE TO LUMBAROSCOPIC INJECTIONS

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OBJECTIVES: Low back pain remains a leading cause of disability. Utilization of the resources has grown without corresponding improvement in outcomes and the use of lumbaroscopic epidural steroid injections (ESI) remains controversial. Given challenges accurately measuring effectiveness, recent focus has shifted towards patient-centered criteria. Studies show patients wish to have preferences incorporated into treatment algorithm and be involved in decision making. The current quality improvement initiative aims to improve selection and patient outcomes by utilizing a novel clinical analytic model.

DESIGN: Patients undergoing lumbaroscopic ESI were enrolled from an outpatient spine clinic following evaluation by a single physician. They completed a Oswestry Disability Index (ODI) and Numeric Pain Rating Scale (NPRS) during the initial encounter and at subsequent encounters. Demographic and clinical characteristics were used to create a patient specific mathematical model based on prior patients from our healthcare system, from which an odds ratio for improvement following injection was calculated. This odds ratio was shared with the patient as part of shared decision making.

RESULTS: Of 88 patients analyzed, 46 patients were predicted to worsen in response to ESI based on odds ratio < 1. Of these 46, 14 patients pursued injection, with 78.5% having poor response based on clinically significant change in ODI and NPRS. Of the 88 patients analyzed, 21 patients were predicted to improve based on odds ratio > 1, with 10 electing to undergo ESI. Of these, 70% had good response based on clinically significant change in ODI and NPRS.

CONCLUSIONS: We propose a patient specific shared decision making tool for evaluating patients who may benefit from ESI. Initial data indicates this is reliable at predicting response to ESI with an accuracy of 75% in our sample population, with additional prospective validation needed. This tool has the potential to help select appropriate patients, improve outcomes, and facilitate dialogue between patient and provider.

VALIDATION AND REPRODUCIBILITY OF THE TEST OF DAILY ACTIVITY-GLITTRE TO EVALUATE THE FUNCTIONAL CAPACITY IN THE ELDERLY

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OBJECTIVES: To investigate whether the Glittre-ADL test is valid for evaluating functional capacity of the healthy elderly and to analyse the inter-rater and intra-rater reproducibility.

DESIGN: A cross-transversal study (n = 100, 68±5 yrs, both sexes) was performed. The construct validity of the Glittre-ADL test was made by its correlation with the Glittre time (min), with a minimal interval of 24 hours and a maximum interval of seven days. The best Glittre-ADL test (shorter duration, min) was considered for analysis. The intra-rater reproducibility was made by the leading researcher (rater 1) on the same day with an interval of 30 minutes and the inter-rater reproducibility was done by another researcher (rater 2), with a minimal interval of 24 hours and a maximum interval of seven days.

RESULTS: There was a correlation between the Glittre-ADL test time with the M6WD (r=0.76, P<0.001) and the TUG (r=0.77, P<0.001). The intra-rater and inter-rater reliability were excellent (P<0.001 for both) (intra-rater: intraclass correlation coefficient, ICC = 0.90 and 95% confidence interval, 95%CI= 0.86-0.93; inter-rater: ICC=0.91; 95%CI=0.88-0.94). The standard measurement error intra-rater
was 0.03 min and inter-rater was 0.05 min. The minimal detectable change (MDC) intra-rater was 0.40 min and inter-rater 0.07 min.

CONCLUSIONS: The Glittre-ADL test is a valid and reproducible tool to evaluate the functional capacity in healthy elderly.

VERTEBRAL ARTERY DISSECTION AFTER CERVICAL SPINAL MANIPULATIVE THERAPY

David Nguyen, and Brionn Tonkin, MD, RMSK

CASE DIAGNOSIS: Left vertebral artery dissection

CASE DESCRIPTION: 30-year-old male with a history of tobacco and cocaine use presented to the emergency department (ED) for sudden onset of right-sided extremity weakness with nausea and vomiting. Patient reported left-sided headache two weeks prior with a negative head computed tomography (CT) in ED and improvement with pain medication. Weeks later, he was treated with high-velocity cervical spine manipulation and immediately while on the table presented with dysarthria and several episodes of nausea and vomiting. Physical exam revealed right-sided hemiplegia, weakness and facial droop with National Institutes of Health Stroke Scale of 14. The patient also experienced several episodes of nausea and vomiting. CT angiogram demonstrated left vertebral artery dissection of the V3 segment. He was emergently administered tissue plasminogen activator, approximately 80 minutes after symptom onset.

DISCUSSIONS: Strokes in young adults are rare, but a common cause is due to traumatic or spontaneous cervical artery dissections—flap-like tears of the arterial lining, disrupting normal flow which can lead to thromboembolism or hyperperfusion. In vertebral artery dissection (VAD), the V3 segment is most commonly affected. There have been reports of a potential association between VAD and spinal manipulative therapy (SMT) but causality and incidence have been difficult to discern. Other potential risk factors for arterial dissection include connective tissue or vascular disorder, hypertension, hypercholesterolemia, and smoking. VAD can be asymptomatic or can present with headache, neck pain, Horner syndrome, and may result in symptoms associated with brainstem ischemic stroke. Treatment includes thrombolytic therapy for hyperacute ischemia. Otherwise, treatment of ischemic stroke includes anticoagulation or antplatelet medication.

CONCLUSIONS: There are potential risk factors associated with VAD that need to be further evaluated. This case is presented to raise awareness of this potential relationship between VAD and cervical SMT which could help clinicians with early diagnosis.

VIDEO GAME NEUROPATHY: A CASE REPORT AND BRIEF REVIEW OF THE LITERATURE

Andrew J. Patton, DO, Reza Tanveer, Manraj Dhesi, Boss Povbieng, BS, Salman Aljjilani, DO, and Theresa McCarthy, DO

CASE DIAGNOSIS: Exam reveals diminished light touch sensation in the distribution of the right sciatic nerve. EMG study findings are consistent with compression neuropathy of the right sciatic nerve.

CASE DESCRIPTION: The patient reports numbness in the lateral lower right leg with mild weakness raising his foot after playing video games in a “cross-legged” position for >6 hours without repositioning. He presents to EMG clinic for evaluation.

DISCUSSIONS: Injuries resulting from playing video games have been described since 1984 (1). Injuries reported include neuropathies (1,2), tendinopathies (3,4), tendon ruptures (5), and even pain syndromes (6). The rise of movement-based gaming such as Nintendo Wii has seen an increase in MSK injuries (7,8), while more contemporary conditions such as tendinopathies, and even pain syndromes (6). The rise of professional gaming elevates these risks as well. Participants complete the survey at all levels of training. Participants included providers directly involved in the field of PM&R ranging from intern (PGY-1) to attending physician status. Non-PM&R and allied healthcare staff were excluded. The questions were designed to assess reports of self-identification to patients and other providers, frequency of specialty explanation, and perceived importance of name consistency. In total, 161 participants completed the survey at all levels of training.

RESULTS: Survey results showed that PM&R-trained participants identify themselves to patients predominantly as “rehab physician” (57.8%) followed by “PM&R physician” (24.2%) and less commonly “physiatrist” (5.6%). For other medical colleagues, participants primarily use the term “PM&R physician” (64.6%) followed by “rehab physician” (20.5%) and “physiatrist” (8.7%). When asked about how frequently participants need to explain the PM&R specialty to others, the terms “always” and “usually” constituted the majority (75.8%). When asked about how important specialty name consistency is to the participants, the term “extremely important” and “very important” accounted for the majority (55.9%).

CONCLUSIONS: PM&R-trained providers tend to identify themselves as “rehab physician” to patients and “PM&R physician” to other medical colleagues. The term “physiatrist” is used infrequently. Limitations of this study include small sample size and the inability to verify participant status. Specialty name consistency may contribute to improved awareness and perceived value of PM&R by others.

WEARABLE ANKLE-ASSISTED ROBOT IMPROVES GAIT PARAMETERS IN HEMIPLEGIC STROKE PATIENTS

Yun-Hee Kim, MD, PhD, Su-Hyun Lee, MSC, Hwang-Jae Lee, PhD, Jinuk Kim, MS, Won Huyk Chang, MD, PhD, Byung-Ok Choi, MD, PhD, and Gy-Ya Hyu, PhD

OBJECTIVES: The purpose of this study was to investigate the effect of the Gait Enhancing and Motivating System-Ankle (GEMS-A, Samsung Advanced Institute of Technology, Korea) on spatiotemporal, kinematic, and kinetic gait parameters in hemiplegic stroke patients.

DESIGN: A total of 45 unilateral hemiplegic stroke patients were recruited. Participants were asked to walk at a self-selected normal speed along a 8-m walkway under the following three conditions in a random order: 1) the FG condition, free gait without robot assistance, 2) the FG condition, free gait while a 8-m walk without wearing the exoskeleton in order to measure baseline spatiotemporal, kinematic, and kinetic gait parameters; 2) the RAG-Z condition, robot-assisted gait with zero torque, a 8-m walk while wearing the exoskeleton, but the desired torque was set to zero to verify the effect of wearing the exoskeleton on spatiotemporal, kinematic, and kinetic gait parameters; 3) the RAG condition, robot-assisted gait, a 8-m walk while wearing the exoskeleton and using the assist torque.

RESULTS: The RAG condition demonstrated significantly greater gait speed, cadence, and stride length than the FG and RAG-Z conditions. In addition, we observed that the affected foot had more positive tilting angle from the ground at initial contact than the FG and RAG-Z conditions. Toe clearance during swing phase was successfully achieved only in the RAG condition. The RAG condition showed higher propulsive forces by altering their peak ankle power generation compared with the FG or RAG-Z conditions.

CONCLUSIONS: These findings indicated that the GEMS-A was a useful robotic device for enhancing walking performance by providing positive tilting angle at initial contact, proper toe clearance during swing, and improving push-off power.

WHAT WE CALL OURSELVES: A SURVEY-DRIVEN ANALYSIS OF SELF-IDENTIFICATION IN PHYSICAL MEDICINE & REHABILITATION

Ryan Hafner, MD, and Reed C. Williams, MD, MBS, RMSK

OBJECTIVES: Physical Medicine & Rehabilitation (PM&R) has long been identified as the field of medicine focused on optimizing function in patients with disabilities. Although several names may accurately describe the specialty, the variety of nomenclature likely contributes to confusion regarding the specialty. Studies have shown generalized lack of awareness for the specialty that diminishes its overall perceived contribution to patient outcomes. This study assesses current providers and how they identify themselves given the ever-changing nature of the field.

DESIGN: A six-question multiple choice electronic survey was created and distributed via social media and email. Participants included providers directly involved in the field of PM&R ranging from intern (PGY-1) to attending physician status. Non-PM&R and allied healthcare staff were excluded. The questions were designed to assess reports of self-identification to patients and other providers, frequency of specialty explanation, and perceived importance of name consistency. In total, 161 participants completed the survey at all levels of training.

RESULTS: Survey results showed that PM&R-trained participants identified themselves to patients predominantly as “rehab physician” (57.8%) followed by “PM&R physician” (24.2%) and less commonly “physiatrist” (5.6%). For other medical colleagues, participants primarily use the term “PM&R physician” (64.6%) followed by “rehab physician” (20.5%) and “physiatrist” (8.7%). When asked about how frequently participants need to explain the PM&R specialty to others, the terms “always” and “usually” constituted the majority (75.8%). When asked about how important specialty name consistency is to the participants, the terms “extremely important” and “very important” accounted for the majority (55.9%).

CONCLUSIONS: PM&R-trained providers tend to identify themselves as “rehab physician” to patients and “PM&R physician” to other medical colleagues. The term “physiatrist” is used infrequently. Limitations of this study include small sample size and the inability to verify participant status. Specialty name consistency may contribute to improved awareness and perceived value of PM&R by others.

WHEELCHAIR IMMERSION PROGRAM FOR MEDICAL STUDENTS

Shelly Hsieh, MD, Steven Kirshblum, MD, Jayne Donovan, MD, Ondrea McKay, MD, and Denise Fyffe, PhD

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OBJECTIVES: Approximately 22% of the US population lives with a disability. With the growing population, physicians of all specialties will be treating more of these patients. In this prospective pilot study, we evaluated the impact of adding a wheelchair immersion program into a mandatory 4th year medical student PM&R clerkship. We hypothesized that those who participated in the wheelchair program would have improved attitudes towards people with disability, feel more comfortable treating patients with disability, and better understand the challenges of wheelchair use.

DESIGN: The standard group participated in the 2-week PM&R clerkship and didactic lecture series. The wheelchair group participated in an additional one-hour wheelchair immersion program consisting of an indoor course and task list. It was designed to demonstrate the daily challenges of wheelchair use, while also providing exposure to how individuals perceived them. Quantitative analyses included the (1) Multidimensional Attitudes Scale toward persons with disabilities, and (2) Likert-scale questions we developed to assess level of knowledge and comfort caring for patients with disability, as well as knowledge regarding the challenges of wheelchair use. Qualitative analyses included open-ended questions regarding the impact of the wheelchair program.

RESULTS: The wheelchair (intervention) group had a significantly greater improvement in the understanding of the challenges of wheelchair users in accessibility, in the healthcare setting, and in their daily lives (p < 0.05). All reported that medical students would benefit from the addition of a wheelchair program in the medical school curriculum.

CONCLUSIONS: The integration of a wheelchair immersion program in the PM&R clerkship resulted in a significantly greater understanding of the challenges of wheelchair use. Given positive results from this pilot study, future directions include the formal addition of the wheelchair immersion program into our medical school curriculum. We also suggest the implementation of a wheelchair program in other medical school curriculums.

WHICH COGNITIVE ASSESSMENT SCALE IS BETTER FOR PREDICTING FUNCTIONAL OUTCOME IN STROKE PATIENTS?
Donghyuk Yun, Doctor, Yeong Wook Kim, Doctor, and Min Kyun Sohn, MD, PhD
OBJECTIVES: The purpose of this study is to compare Montreal Cognitive Assessment (MoCA) and Mini-Mental State Examination (MMSE) in categorizing cognitive impairment in subacute stroke patients and to figure out the relationship of cognitive assessment scales to functional outcome.

DESIGN: We retrospectively analyzed patients with ischemic stroke. Inclusion criteria were as follows: (1) age of 18 years or older, (2) medically stable, (3) K-FAST (Korean version of Frenchay Aphasia Screening Test) score ≥ 25 points in < 65 years old and ≥20 points in ≥ 65 years old. The MMSE, MoCA, FIM were evaluated. Paired t-test was used to compare the difference between mean MMSE and MoCA total score.

RESULTS: The total number of patients was 241; Following the inclusion and exclusion criteria of the study, 53 patients were analyzed. The sample consisted of 53 persons with a mean age of 67.57±12.33 years with a median time from stroke of 7.0 days. There were significant correlation cognitive assessment scales and FIM scores. Of the subscores, there was the strongest relationship between the visuo-executive subscore and discharge FIM score, and it subsequently was included in the multivariate linear regression models outlined next. Multivariate linear regression models that included age, admission FIM score, and a cognitive measure (ie, MoCA total score, MMSE total score, MoCA visuoexecutive subscore) significantly explained approximately 62.8% to 66.4% of the variance in discharge FIM scores. In this regression model, the visuoexecutive subscore of the MoCA was the strongest predictor of functional status (P< 0.05).

CONCLUSIONS: The MoCA may be an important cognitive screening tool for patients with stroke and mild cognitive dysfunction on an acute rehabilitation unit. Regarding the FIM score at discharge, visuoexecutive domain appears to have a greater relationship with acute inpatient rehabilitation functional improvement and outcome.

WHITE MATTER IN LOW BACK PAIN PATIENTS WITH DEPRESSION AND ANXIETY: A PRELIMINARY DIFFUSION TENSOR IMAGING STUDY
Liliana L. Jorge, MD, PhD, Lianna G. Rocha, Pedro Paulo Oliveira, and Edson Amorim, Jr.
OBJECTIVES: Pain is associated to structural, functional brain abnormalities; white matter (WM) disturbance was found in pain conditions. Chronic low back pain (LBP) is a disabling syndrome, but it is still unclear how affect relates to alterations in WM integrity of LBP. We studied differences in pain-related white matter pathways in LBP and Controls (C) using Diffusion Tensor Imaging (DTI). We expected LBP exhibit differences in fractional anisotropy (FA) and mean diffusivity (MD) if compared to C, within the tracts: corpus callosum, internal capsule, cingulum, superior longitudinal fasciculus, and uncinate fasciculus.

DESIGN: 41 LBP subjects were compared to 24 healthy controls (C). All responded Beck Depression scale and Anxiety Inventory. DTI data were acquired in a 3T Magnetom. FA and MD images were created by fitting a tensor model. Statistical analysis data was carried out using Tract-Based Spatial Statistics. Mean FA image was used to create a mean FA skeleton. Each subject’s FA data was projects onto this skeleton and the resulted data was into voxelwise cross-subject statistics. DTI data were controlled for Beck and IDATE-T. Age, gender, and school years were controlled as covariates.

RESULTS: Groups were demographically similar. LBP had higher depression and anxiety scores. For the FA comparisons and C > LBP, we found cluster in right frontal part of inferior frontal occipital fasciculus, and corona radiata. For MD comparisons and LBP > C, we found a cluster in the right parahippocampal cingulum. These differences remained after controlling for IDATE-T but not for Beck.

CONCLUSIONS: Our results are in line with previous data showing that musculoskeletal pain leads to lower FA in corpus callosum and cingulum. When controlling for Beck and IDATE-T, the maps for group differences changed, suggesting influence of anxiety and depression on the WM. Further evidence regarding different WM alterations patterns in LBP might help the establishment of individualized rehabilitation treatments.

WHO IS A REHABILITATION MEDICINE PHYSICIAN? AN INSTITUTIONAL SURVEY REFLECTING PATIENT’S PERSPECTIVE
Mustajab Fatima Metlo, MBBS, Dilsbud Hanaul Ain Arabia, MBBS, and Quratlain Syed, MBBS
OBJECTIVES: To evaluate patient’s understanding regarding specialist in Physical Medicine and Rehabilitation (PMR), conditions treated and procedures done at Institute of Physical Medicine and Rehabilitation.

DESIGN: A cross-sectional study was conducted at Institute of Physical Medicine and Rehabilitation, Karachi, Pakistan from December 2018 to September 2019, amongst 200 randomly selected patients visiting out-patient department through a self-designed questionnaire, translated in local language, consisting of two portions; demographic information and questions to enquire awareness regarding PM&R specialists and practicing procedures.

RESULTS: Of the respondents, 45% were able to correctly identify that the physician they were referred to was PM&R specialist or a physiatrist or a rehabilitation specialist. While 30% of the patients wrongly identified PM&R specialist as exercise specialist, 12.5% as orthopaedic doctor, 8% referred them neurologist, 4% identified as artificial limb maker. Regarding conditions treated by a PM&R specialist, 46% thought that the physician they were consulting treats pain and 13% stroke, 8% musculo-skeletal and joint problems and 8% cerebral palsy. Moreover responses for procedures physiatrist performs were 40.5% ‘don’t know’, 40% ‘nerve testing’, 6% ‘intravascular injections’, 5.5% ‘surgery’, 5% ‘acupuncture’, and 4% ‘cupping therapy’. The responses by the patients corresponded with the nature of complaint they had.

CONCLUSIONS: Majority of the patients attending a Rehabilitation physician’s Out-patient department are unaware of the name, conditions treated and the procedure performed by a PM&R specialist. Awareness of the field in general can help a larger number of patients visiting the appropriate field specialist for the treatment of disability thereby not only improving their functionality but also enhancing their health related quality of life.

WILL PARALYMPIC TRACK RUNNERS ONE DAY BE FASTER THAN THE OLYMPIC TRACK RUNNERS?
Yunna L. Sinskey, MD, and Mariam Chun, MSW
OBJECTIVES: Since Oscar Pistorious, “Blade Runner”, participated in both the Paralympic and Olympic Games in 2012, there have been questions whether the utilization of running-specific prostheses are giving amputee athletes unfair advantages compared to their counter able-bodied athletes. The focus of this study is to analyze the track race records of the past 5 Paralympic Games compared to the Olympic Games to predict the year Paralympian amputee sprinters would match the race times of their able-bodied Olympian counterparts.

DESIGN: Top five records of male and female Paralympic Games 100m/200m/400m track finals records for the past five summer Paralympics were collected. This data was compared to the Olympic Games track finals for the equivalent classes. The...
time of the Paralympic Games reaching the same value as the Olympic Games records were estimated using a linear relationship.

**RESULTS:** Paralympic sprinters are predicted to reach similar race times as their counter Olympic sprinters at Olympic Games in year 2028 for 400m male BKA, 2012/2040 for 200m male BKA/AKA, 2004/2072 for 100m male BKA/AKA, 2056/2044 for 100m female BKA/AKA, 2052 for 200m female BKA. For male sprinters, the length of the race is inversely proportional to the time taken to reach comparable race results. Furthermore, BKA male athletes are predicted advance faster than the AKA athletes in their corresponding group. For female sprinters, the value is difficult to interpret given the limited Paralympic races that were performed.

**CONCLUSION:** Assuming a linear correlation of decrease in race time of the top five sprinters in the past 20 years of Paralympic and Olympic Games, race times are predicted to be similar at the earliest in 2028. This decrease in race time is inversely proportional to the race length in males; however, this is difficult to predict in females given fewer numbers of races.

**WORKFORCE CAPACITY BUILDING FOR ACQUIRED BRAIN INJURY REHABILITATION – POST NEPAL EARTHQUAKE**

Brenda S. Yujiawatman, MBBS, MREHABMED, Nur Azira Izmail, MBBS, MREHABMED, Nur Farhan Ishak, Diploma In Occupational Therapy, Thurairaj Manobaharan, BSc (HONS) Applied Rehabilitation Physiotherapy, Siti Amriah Mat Saad, BSc (HONS) Speech Sciences, Masniza Mustaffa, MSC Nursing, Ohmmar Htw, MBBS, MMEDSC (Rehabilitation Medicine), Manimalar S. Naicker, MBBS, MPH, MMEDSTATS, and Amaramalar S. Naicker, MBBS, MREHABMED

**OBJECTIVES:** A magnitude-7.8 earthquake struck Nepal on April 25, 2015, where many lost their lives and numerous others were injured. This has increased the number of people with trauma-related injuries including traumatic brain injury. Primary care in one of the non-governmental organizations from Malaysia who responded to the call for help dispatched a rehabilitation team to assist in providing comprehensive care for various groups of patients such as those suffering from traumatic brain injury. The objective of this mission was to deliver acquired brain injury rehab training course whilst building local workforce capacity at National Trauma Centre, Kathmandu, Nepal.

**DESIGN:** A short course with lectures and hands-on workshops was conducted for 5 days (16–20 July 2018), followed by Train-the-Trainer program for the next 7 days (21 – 27 July 2018). The rehabilitation training team included 2 rehabilitation physicians, 1 physiotherapist, 1 occupational therapist, 1 speech therapist and 1 nurse. Post-training survey questionnaire was used to assess training outcome.

**RESULTS:** The 25 participants consisted of 12 nurses, 11 physiotherapists, 1 doctor and 1 speech therapist. 64% had less than 5 years of service experience whilst 36% had between 5 – 10 years’ experience. 80% of them were currently treating brain injury patients but most of them (79%) thought the current management for these patients were inadequate. All participants found the training useful and 84% of them felt that the training was applicable in their workplace. All of them also felt that other people would benefit from this training and should be done regularly. Suggestions to further improve the training include having more practical sessions, more frequent courses and increased duration of training.

**CONCLUSIONS:** The training proved useful to the participants and although most agreed that it was applicable to their current practice, they also wanted a longer duration of training with more practical skills sessions.

**WORSENING BILATERAL LOWER EXTREMITY WEAKNESS IN A PATIENT WITH POLYMYSITIS WITHOUT SEROLOGIC EVIDENCE OF AN ACUTE FLARE**

Devin Oakes, DO, and Cecilia Cordova Vallejos, MD

**CASE DIAGNOSIS:** Mature T cell Lymphoma 2012 **CASE DESCRIPTION:** A 52 year old male with a past medical history of polymyositis, antibody positive HTLV-1, psoriasis, prior DVT, and gout presented to tertiary care hospital with a 4 week history of acute on chronic bilateral lower extremity weakness. Initial evaluation showed electrolyte derangements and a UTI, all of which were treated. Serologic markers were negative for acute polymyositis flare. EMG showed acute on chronic neurogenic changes affecting the L2 through S1 myotomes. MRI of the lower extremities showed decreased muscle mass with fatty replacement consistent with polymyositis. The patient also reported three week history of left sided breast mass. Imaging revealed a BI-RADS 4 lesion. CT chest showed multiple enlarged left axillary lymph nodes, prompting a biopsy. With negative evaluation, weakness was attributed to deconditioning secondary to polymyositis and the patient was transferred to the acute rehabilitation unit. Soon after, biopsy Results returned showing mature T cell lymphoma.

**DISCUSSIONS:** This patient had a known history of weakness secondary to polymyositis, ambulated with a walker at baseline, and followed up with his Rheumatologist regularly. CPK and TSH were normal, while ESR and CRP although elevated, were at the patient’s baseline. While a polymyositis flare was at the top of the differential, work up showed that the actual causative factor was Mature T cell lymphoma.

**CONCLUSIONS:** A presentation of acute on chronic weakness in a patient with polymyositis should always be fully worked up. The most likely diagnosis is sometimes not the correct one.

**X-LINKED CHARCOT MARIE TOOTH DISEASE (CMTXI): A CASE ASSOCIATED WITH A MUTATION IN THE GJB1 GENE**

Iván M. González, Mariana C. Muñoz Rodriguez, Laura E. McCormick Useche, Luisa F. Vasquez Fernandez, Claudia R. Mondragón Ríta, and Maria C. Gomez Guevara

**CASE DIAGNOSIS:** A molecular panel of 79 expanded genes was requested for Charcot Marie Tooth in our patient. We found a mutation in the homozygous type GJB1 gene that causes a deletion of thymine at position 54 of the coding region of the GJB1 gene. The same study was applied to the patient’s mother showing the same mutation. Therefore, the case presented suggests a mother to son inheritance pattern.

**CASE DESCRIPTION:** A 23 year old male patient with family history of cavo facial weakness of lower limbs. He began with hand tremors and finger weakness then showed muscle fatigue, steepage gait, falls and balance failures. The first electrodiagnostic study showed Intermediate Charcot-Marie-Tooth pattern. Studies included MRI, metabolic profile and autoimmune profile, which were normal. The first molecular study for PMP22 gene wasn’t conclusive so a molecular panel of 79 expanded genes was requested, finding a homozygous mutation in the GJB1 gene. He completed his rehabilitation without complications and he is currently an industrial engineer and performs sport.

**DISCUSSIONS:** Charcot-Marie-Tooth disease (CMT), is an inherited, autosomal dominant disease, caused by duplication in the peripheral myelin protein 22 gene (PMP22) in 40-50% of cases. However, mutations in the GJB1 gene correspond to 10-20% of cases. The GJB1 gene is related to a variant linked to the X chromosome. Due to the genetic variability of hereditary neuropathies, genetic studies are part of the diagnostic algorithm.

**CONCLUSIONS:** Is important to recognize the X-linked CMT and his genetics in the men with neuropathy findings, emphasize the importance of recognition, timely diagnosis and therapeutic approach according to the experience through multidisciplinary rehabilitation. It is important to know the genetic variants and their clinical presentation to arrive at a correct diagnosis. The CMTX phenotype is an uncommon variant, with mutation of the GJB1 gene of which few cases have been reported.

**YOGA IS EFFECTIVE IN REDUCING PAIN IN VETERANS WITH GULF WAR ILLNESS: A RANDOMIZED CONTROLLED TRIAL**

Kamala Shankar, MD, Peter J. Bayley, PhD, Louise Mahoney, MS, C-IAY Yoga Therapist, L. Collery, D. Moore-Downing, and M. Majumbdar, BS

**OBJECTIVES:** Gulf war illness (GWI) is characterized by the symptoms of pain, fatigue, and cognitive/mood problems, and affects an estimated 175,000-250,000 veterans of the 1991 Gulf War. Objective: To compare the effectiveness of yoga and cognitive behavioral therapy (CBT) in treating chronic pain among veterans with GWI.

**DESIGN:** Randomized controlled single-blind parallel groups clinical trial. Data was collected before, during, and after the 10-week treatment, between 2015 and 2018. Research center at a single VA Healthcare System site. Veterans who served in Iraq or Kuwait during the 1991 Gulf War era and exhibited symptoms of Gulf War illness; moderate to severe chronic pain and two or more symptoms from the cognition/mood and fatigue GWI symptom clusters. After triage, Seventy-five participants were randomized to treatment that consisted of ten weekly 60-minute group sessions. The yoga intervention consisted of postures, controlled breathing, and meditation to address pain. The CBT intervention included activity pacing, pleasant event scheduling, sleep enhancement, relaxation, and problem solving. Outcome measures: The Brief Pain Inventory-short (BPI-SF) total score was a priori-defined primary outcome. Secondary outcomes were standardized measures of fatigue, depression, wellbeing, and autonomic nervous system function.
2018 PILOT PROGRAM OF COMMUNITY-BASED REHABILITATION FOR PEOPLE WITH AMPUTATION IN A CENTRAL AMERICAN COUNTRY

Susan E. Ladley, MD, and Jonathan J. Naiber, MSC Public Health In Developing Countries

OBJECTIVES: Our group published a 2017 study showing that people with amputation in a Central American country have key needs that go beyond prosthetic care, recommending the piloting of a community-based rehabilitation (CBR) program. CBR is a strategy developed by the World Health Organization (WHO) over four decades, and implemented today by numerous institutions working with people with disabilities, to attend to their entire spectrum of needs, on the community level.

DESIGN: The six-month pilot aimed to improve the multifaceted mobility of ten patients with amputation by addressing general health, mental health, prosthetic care, and medical therapy needs. The CBRWs also coordinated services to improve mobility and quality of life for each participant. A small team of community rehabilitation workers (CRWs) visited each patient at home twice per month, following a protocol addressing general health, mental health, prosthetic care, and physical therapy needs. The CRWs also coordinated services according to the needs of each participant, including: medicine, nutrition, laboratories, dentistry, group therapy, psychiatry, psychology, prosthetic care, physical therapy, self-employment, wage-employment, and legal support. The majority of these services were donated or highly-subsidized by Guatemalan volunteers. Participants were trained in accessing services and caring for themselves post-graduation.

RESULTS: Baseline, midpoint, and endpoint data were collected with the home visit protocol, SF-36, PHQ-9, GAD-7, PC-PTSD-5, prosthesis use questionnaire, LSMS, and WHOQoL-BREF instruments. The data showed wide-ranging and important signals of improvement in all objectives.

CONCLUSIONS: CBR could be an effective way to improve the outcomes of patients with amputation. Higher-powered studies are needed to establish statistically-significant evidence for effectiveness. The program operated its second and third CBR cohorts in 2019.

A BOUT OF GOUT: A CASE OF SEVERE TOPHACEOUS GOUT: A CARE REPORT

Naveen Khokhar, DO, and Hannah Florida, MD

CASE DIAGNOSIS: Tophaceous Gout

CASE DESCRIPTION: A 75 year old male presented with progressive bilateral lower extremity weakness and endures frequent anti-inflammatory use. He was found to have rhabdomyolysis and melena secondary to duodenal ulcers. Further, the patient required hemodialysis temporarily for acute renal failure. Unfortunately, during this course the patient had an acute flare of gout. Rheumatology was consulted and patient was initiated on intravenous solumedrol. Upon admission to inpatient rehabilitation, the patient was noted to have several joints affected by tophaceous gout with the eruption of milky fluid. These were drained daily and Silvercel dressings were provided to avoid infection.

DISCUSSIONS: Gout is an inflammatory arthritis notable for the collection of uric acid crystals within joint spaces. Anti-inflammatory agents, especially NSAIDs, are the first line for acute gout flares. NSAIDs were contraindicated in this case since the patient had duodenal ulcers and acute renal failure. Steroids are also very effective in treating acute gout but lead to poor wound healing. In this case, the initiation of Solumedrol led to the eruption of gouty joints.

CONCLUSIONS: Acute gout is a disabling condition due to the pain which can limit a patient’s functional ability. Early and aggressive treatment is the mainstay to reduce the acute episode, but can increase the risk of wound formation. In cases of tophaceous gout eruption with draining wounds, appropriately draining wounds actively can provide relief for patients. It is also important to maintain an aseptic environment and use antimicrobial dressings to avoid any soft tissue infection.

A CASE OF DISPHAGIA ASSESSED BY VIDEOENDOSCOPIC SWALLOWING STUDY AND ASSOCIATED WITH CENTRAL PONTINE MYELINOLYSIS AFTER CORRECTION OF HYPERNATREMIA IN A CHRONIC ALCOHOLIC PATIENT AND LITERATURE REVIEW

Mohiedin M. Ahmad, MD, Shymaa Hassan, MS, Diaa Shehab, FRCPC, and Aziz Alfeeli, FRCPC

CASE DIAGNOSIS: Central Pontine Myelinolysis (CPM) or Osmotic demyelination syndrome (ODS) primarily occurs after rapid correction of severe hypernatremia in a chronic alcoholic patient. To our knowledge, this is the first case showing dysphagia assessed by videodendoscopic swallowing study and associated with CPM after alcohol withdrawal and correction of hypernatremia in a chronic alcoholic patient.

CASE DESCRIPTION: A 66-year-old woman was admitted with a history of altered mental status and decreased level of consciousness. Severe hypernatremia was evident initially in a chronic alcoholic patient and brain MRI done and revealed a high signal intensity lesion in the pons, consistent with central pontine Myelinolysis. Videodendoscopic swallowing study showed excessive residue of nectar fluid consistencies with blue dye in valveluces and pyriform sinuses. His neurological symptoms, which included dysphagia, dysarthria, and weakness of lower limbs, were markedly improved. Management of these conditions involves recognition of risk factors, careful electrolyte correction, prompt and exact diagnosis, early rehabilitation for functional recovery.

DISCUSSIONS: Central Pontine Myelinolysis (CPM) or Osmotic demyelination syndrome (ODS) primarily occurs after rapid correction of severe hypernatremia. Rapid correction of hypernatremia causes extracellular tonicity and will continue to drive water out of the brain’s cells leading to cellular dysfunction. This is a common problem and refers to an excess of sodium relative to the amount of water in the body.

CONCLUSIONS: This is the first case showing dysphagia assessed by videodendoscopic swallowing study associated with CPM after alcohol withdrawal and correction of hypernatremia in a chronic alcoholic patient.

A CASE OF EXTERNAL ABDOMINAL OBLIQUE SPASTICITY FOLLOWING TRANSVERSE MYELITIS

Tomasz Chec, MD, and Mitchell Paulin, MD

CASE DIAGNOSIS: We present the case of a 58 year old male with a history of chronic kidney disease who developed spasticity of the right external abdominal oblique following an episode of transverse myelitis.

CASE DESCRIPTION: The patient initially presented to acute care with sudden onset pain, numbness, and weakness of the bilateral lower extremities. Examination and work up lead to likely diagnosis of transverse myelitis, with improvement in symptoms after initiation of steroids. He was subsequently discharged to acute rehabilitation where he made further functional gains, achieving a supervision level with improvement present in the body.

DISCUSSIONS: This case presents an opportunity to study an atypical manifestation of spasticity as well its treatment. While a framework for the anatomical localization and approach to performing motor nerve blocks on the abdominal musculature is available, research pertaining to these areas is currently emerging. This case presents one method of approaching evaluation and treatment of spasticity to the area of the external abdominal oblique.

CONCLUSIONS: Spasticity is a continually growing field of interest and study. While classical presentations and patterns of hypertonicity, as well as their methods of treatment have been elucidated, further attention and research must be done on atypical courses and management techniques.
A CASE OF PARANEOPLASTIC CEREBELLAR DEGENERATION SECONDARY TO BREAST CANCER: BARRIERS TO INTENSIVE REHABILITATION

Chanel I. Davidoff, DO, Sylvia John, MD, and Amy Park, DO

CASE DIAGNOSIS: Paraneoplastic Cerebellar Degeneration secondary to Breast Cancer

CASE DESCRIPTION: A 67-year-old healthy female presented to acute hospital for rapid onset truncal and appendicular ataxia found to have ER+ ductal breast adenocarcinoma and positive anti-Yo antibody, consistent with paraneoplastic subacute cerebellar degeneration. Patient received IVIG, plasma exchange, right modified mastectomy and started hormonal therapy with anastrozole. She was discharged to acute inpatient rehabilitation where she made significant functional gains despite having a difficult rehab course due to physical and cognitive barriers.

DISCUSSIONS: Paraneoplastic cerebellar degeneration (PCD) is an uncommon, autoimmune, neurologic disease manifestation of malignant tumors against cerebellar antigens. PCD is associated with a poor prognosis leading to significant disability. To date, there has been only a few reported cases of PCD that underwent intensive rehabilitation demonstrating significant functional improvements. We present a case of PCD secondary to breast cancer who improved during intensive rehabilitation, highlighting the barriers that impacted her rehabilitation course. Physical and cognitive barriers identified on initial evaluation included severe, persistent ataxia, dysarthria, intractable nausea, and mood disturbances. Although some barriers remained non-modifiable, by effectively managing her nausea and mood symptoms, she was able to make significant functional gains made evident by a FIM change highlighting what has been reported in current literature.

CONCLUSIONS: It is established that acute rehabilitation is beneficial for PCD, however there is limited insight to the challenges one may encounter in acute rehabilitation. In addition to demonstrating functional improvements, this case report highlights important and underestimated barriers to rehabilitation in patients with PCD. Rehab treatment plan should include early evaluation and treatment of mood disturbances as well as symptomatic management of neurologic sequelae in patients with PCD in efforts to optimize time in acute rehabilitation and decrease length of stay.

A CASE OF QUAD FEVER WHICH RESPONDED TO ORAL IBUPROFEN

Sachithna H. Adhikari, MD, MRCP

CASE DIAGNOSIS: A case of quad fever which responded to oral ibuprofen

CASE DESCRIPTION: A 45 year man admitted for rehabilitation on day 15 following cervical cord injury; AIS A above C 5. The patient developed daily spiking high fever of 101°C from day 22 since the injury. There was no identifiable site of infection. CBC was normal, CRP repeatedly < 6, blood culture- negative, urine culture- no growth. His medication review ruled out possible causative drug for neurologic malignant syndrome. There was no evidence of DVT. CXR, USS abdomen and pelvis- no evidence of infection. CBC was normal, CRP repeatedly < 6, blood culture- negative, urine culture- no growth. His medication review ruled out possible causative drug for neuromyopathy. EMG was consistent with AMAN. Patient was treated with intravenous immunoglobulin (IVIG) and completed acute inpatient and subacute rehabilitation. Patient received two more IVIG treatments 5 and 7 months after the onset of symptoms with minimal improvement. A fourth round of IVIG was administered at 10 months, followed by a short course of inpatient rehabilitation and extensive outpatient PT/OT. This subsequent treatment led to significant functional improvement. Prior to final IVIG treatment, patient had maximum total assistance for all functional mobility, currently he is minimum assist with transfers and ambulating up to 1200 feet with a walker, left KAFO, and right AFO.

DISCUSSIONS: Gold-standard treatment for GBS is a single course of IVIG or five sessions of plasma exchange. A second course of IVIG may lead to clinical improvement in patients unresponsive to initial treatment. The second course of IVIG is typically given up to 6 weeks after onset of symptoms. This case is unique as the patient received four total IVIG courses with the most improvement arising after the last treatment, given 10 months after symptom onset.

CONCLUSIONS: This case is important because it demonstrates that neurologic and functional improvement can occur months after the onset of symptoms in GBS. Furthermore, recurrent courses of IVIG and inpatient rehabilitation may be beneficial for this subset of patients. This case raises multiple important questions, most significantly what is the appropriate doseduration to treat GBS patients with IVIG and should treatments be extended over a longer timeframe.

A CASE REPORT OF POST-HYPOXIC MYOCLONUS (LANCE-ADAMS SYNDROME) HINDERING THE PATIENT’S FUNCTIONAL REHABILITATION UNTIL THE ADDITION OF PERAMpanel

Evan M. Berlin, MD, Vartgez Mansourian, MD, and Emily Tarvin, MD

CASE DIAGNOSIS: Post-hypoxic myoclonus

CASE DESCRIPTION: A 75-year-old male with past medical history of COPD and CAD was admitted to inpatient rehabilitation due to critical illness myopathy after a PEA arrest that resulted in an extended hospital stay. His hospital course was complicated by myoclonus that was debilitating to the patient. The myoclonus occurred unpredictably, affecting his arms and legs, and even causing falls. The patient had no history of myoclonus, seizures, or tremors. Prior to arrival to inpatient rehabilitation, an extensive work up was performed which included a head CT and MRI of his brain that showed no acute findings. Twenty-four-hour EEG captured clinical occurrences of myoclonus, but no seizure activity was reported. Neurology was consulted and the patient was trialed on levetiracetam, valproic acid, and clonazepam with minimal relief of his symptoms.

DISCUSSIONS: During his stay at inpatient rehabilitation, the patient continued to suffer from frequent myoclonus, and due to the increased risk of falls, his therapists were concerned. A diagnosis of post-hypoxic myoclonus, also known as Lance-Adams Syndrome (LAS), was made by the Neurology consultant. Although there is limited research on LAS, there have been several case reports on the addition of perampanel for treatment. The patient was started on perampanel and within several days the patient had near complete resolution of his myoclonus, and was able to be discharged home safely.

CONCLUSIONS: As a result of the introduction of perampanel, the patient’s myoclonus resolved which enabled him to ambulate independently and was discharged home instead of a skilled nursing facility. This case study aims to describe myoclonus as a sequela of hypoxic brain injury, to suggest potential pharmacologic treatment of post-hypoxic myoclonus, and to spread awareness of this uncommon, yet clinically significant syndrome in the inpatient rehabilitation setting.

A CASE REPORT: PROLONGED RECOVERY IN A 22-YEAR OLD FEMALE WITH DISORDERS OF CONSCIOUSNESS (DOC) SECONDARY TO MOTOR VEHICLE ACCIDENT (MVA) AND DELAYED INPATIENT REHABILITATION, "GET WITH THE GUIDELINES, NOT BETTER LATE THAN NEVER"

Harsha Ayyala, MD, Monica Verduzco-Gutierrez, MD, and Katherine O’Brien, PhD

CASE DIAGNOSIS: Secondary complications of severe traumatic brain injury were enhanced when patients with DoC are not admitted to inpatient rehabilitation for a specialized DoC program according to the DoC guidelines.

CASE DESCRIPTION: A 22-year-old female presented after MVA with polytrauma, significant brain injury, skull fractures and prolonged disturbance in consciousness. The PM&R rehabilitation team was initially consulted at acute care but discharged home instead of a skilled nursing facility. This case study aims to describe myoclonus as a sequela of hypoxic brain injury, to suggest potential pharmacologic treatment of post-hypoxic myoclonus, and to spread awareness of this uncommon, yet clinically significant syndrome in the inpatient rehabilitation setting.
hospital to evaluate the patient and she was found to have significant cognitive defi-
ciencies; however, she showed some signs of environmental awareness including tracking
on exam. At that time, the Physiatrist deemed her to be a good candidate for DoC re-
hab program given that she showed more signs of awareness. The patient was sent to
long-term residential care instead.

DISCUSSIONS: After 8 months from injury, she was admitted to inpatient reha-
bilitation. Initial acute issues such as dysautonomia and hypoaerousal were easily
managed; she was alert, vocal and quickly oriented. However in delaying her inpatient
rehabilitation, the patient developed severe spastic tetraplegia with contractures in
all four limbs as well as complex regional pain syndrome that had not been addressed.
These issues created significant barriers to her progress in therapies and delayed ac-
cess to beneficial treatments such as intrathecal baclofen pump placement or
neurolytic injections. As a result, the continuum of care from the acute setting should
emphasize early rehabilitation in patients that are considered appropriate candidates
to facilitate recovery.

CONCLUSIONS: The Practice Guidelines Recommendations on DoC recom-
pand referral of patients that meet criteria to specialty settings with multidisciplinary
rehabilitation teams to receive specialized training. As demonstrated in this case
where guidelines are not followed, patients are more likely to have complications
and be limited in their rehabilitation stay. In addition, they have possible worsening
of long-term outcomes that not only poses a significant burden to the patient but to
the healthcare system as well.

A COMPARISON OF HEALTH OUTCOMES IN THE USE OF STEM
CELLS, SURGICAL, AND NONSURGICAL APPROACHES TO TREAT
DEGENERATIVE DISK DISEASE

Daniel Indorato, BSA, and Marx Sadacharan, PhD

OBJECTIVES: This study provided a systematic review of randomized con-
trolled trials which assessed the therapeutic effects of stem cell treatments, surgical in-
terventions, and nonsurgical treatments on the outcomes of patients diagnosed with
intervertebral disk degeneration (IDD).

DESIGN: Systematic literature review.

RESULTS: Literature evaluating the comparative treatment outcomes between
patients who underwent surgical versus nonsurgical interventions demonstrated
mixed findings in treatment efficacy. Although studies involving the manipulation of
endogenous stem cells in fibrocartilage suggested that this application could be
a potentially noninvasive, stem cell–based strategy to treat fibrocartilage degeneration,
especially in patients with IDD.

CONCLUSIONS: The reviewed literature suggested that no clinical signifi-
cance exists between surgical and nonsurgical treatment for IDD. The decision to un-
dergo surgical or conservative treatment should depend on the patient’s state of health
at the time of surgery, as well as any other potentially alarming factors (altered mental
status, level of consciousness, comorbidities, etc) that could be exacerbated with the
proposed treatment. Mesenchymal stem cells and fibrocartilage stem cells may also
be an effective therapeutic option for the regeneration of a degenerated intervertebral
disk. To move forward in finding an effective therapeutic treatment protocol for IDD,
further research needs to be implemented that minimizes the limitation discussed in
this review.

A COMPARISON OF THREE VARIATIONS OF THE TIMED UP AND
GO TEST FOR THE DISCRIMINATION OF FALLERS IN FRAIL
ELDERLY PEOPLE

Satoshi Sugimoto, PhD, Osamu Okuma, MS, Tsuyako Koyama, BS,
Naoya Sekine, BS, and Yusuuke Yasuno, BS

OBJECTIVES: The timed up and go test (TUG) is a fall risk assessment test.
However, a recent systematic review reported that the TUG was not a significant pre-
dictor of falls. Another systematic review reported that dual-task performance was
more strongly associated with falls than single-task performance. Shumway-Cook
et al. reported that the ability to predict falls was not enhanced by adding a secondary
task when performing the TUG. Beauchet et al. reported that a large discrepancy be-
 tween real and imagined TUG performance was related to relative decrease in walk-
ing speed during dual-task walking. However, they did not use the dual-task TUG.
Moreover, it was not clarified whether the time difference between two TUG tests
was related to falls. The purpose of this study was to compare the discrimination ac-
curacy of three variations of TUG for falls in frail elderly people.

DESIGN: Thirty-eight frail elderly people were enrolled in this study. They were
classified as fallers and non-fallers according to an individual fall history. Perfor-
mance times of the normal TUG (n-TUG time), dual-task TUG (d-TUG time), imag-
ined TUG (i-TUG time), the difference between n-TUG time and d-TUG time
(d-TUG delta time) and the difference between n-TUG time and i-TUG time (i-TUG
delta time) were compared between two groups. The area under curve (AUC) was
calculated for each receiver operating characteristic curve and inspected to determine
a cutoff point for each variable.

RESULTS: Fallers produced shorter i-TUG times and longer i-TUG delta times
than non-fallers. However, other variables did not show significant differences be-
 tween two groups. The AUC was 0.79 for the i-TUG time and 0.74 for the i-TUG
delta time.

CONCLUSIONS: Only the imagined TUG was related to a fall history. These
results suggest that an individual’s overestimation of their real physical performance
would increase their falls risk.

A COST ANALYSIS OF STROKE IN LIMA, PERU

Amy K. Unwin, MD, Rosa Ecos Quispe, MD, MPH, and Ronima Tejada, MS

OBJECTIVES: To determine the total monetary costs (i.e. direct and indirect
costs) for the inpatient and outpatient phases of stroke treatment in Lima, Peru,
including medical treatment during acute hospitalization, medicines, rehabilitation,
transportation, and lost wages for the affected individual and caregiver.

DESIGN: Participants admitted to the stroke ward at a public neurologic referral
center in Lima were recruited. The breakdown of medical costs they incurred during
hospitalization was collected through the institution’s financial office. Interviews
with patients and families were conducted during hospitalization and at 3 and 6
months post-stroke to capture indirect costs and medical costs incurred elsewhere.
Functional measures were also recorded at these time points. Analyses were per-
formed to determine the association between the cost and severity of the disease
and other variables, and to compare costs over the duration of the study.

RESULTS: 76 patients, of whom 42 (58%) were male, with a mean age of 64
years were included. Forty-eight (64%) had preexisting hypertension, 17 (23%) had
diabetes and 15 (20%) had cardiovascular disease. Most strokes were ischemic (61,
81%). NIHSS was highest upon admission to the hospital (mean 9.04) and
downtrended in follow up visits (mean 3.21 at six months). Modified Rankin scale
scores also showed a small but significant decrease. Total cost per patient in the first
six months after discharge was $1518. The most frequent types of expenditures were
therapy (49%) and physician visits (18%), while radiology (CT, MRI) was generally
the most expensive cost. Most expenditures were financed by the patient or family
(66%), and health expenditures generally decreased with time (p< 0.001); nonethe-
less, significant indirect costs persisted even at 6 months.

CONCLUSIONS: Direct and indirect costs of stroke in Lima, Peru are substi-
tual. This study forms the basis for a future cost-effectiveness analysis of stroke reha-
bilitation, which will attempt to influence government policy.

A DECade oF rISK FACTORS IN CEREBRAL PALSY: A rETROSPECTIVE
REVIEW AT THAMMASAT UNIVERSITY HOSPITAL, THAILAND

Chuenchoch Chueeluacha, MD, Paskorn Sriptsukho, MD,
and Warangkana Deepartdamrong, MD

OBJECTIVES: Cerebral palsy (CP) causes patients to experience developmen-
tal delays. It affects patient self-help and socialization, increases patient care costs,
and may precipitate familial strife. Current studies hold that CP has many risk factors;
unfortunately, no total risk summarization exists now. Thus, under-surveillance is
likely, leading to treatment delays and complications. Monitoring awareness to facil-
itate early diagnosis and reduce complications is needed. A study to establish total risk
factors for neonate CP prediction is useful, especially for patients in small hospitals
lacking specialized doctors, making it possible to identify vulnerable patients.

DESIGN: This was a retrospective case control study in children aged 0-2 years,
born at Thammasat University Hospital, Thailand from 2005-2014. Multivariable lo-
gistic regression compared prenatal, perinatal and postnatal risks between normal
children (control) and those with CP (case).

RESULTS: Neonatal risk factors included cerebral and non-cerebral
malformations. Prenatal factors were fetal growth restriction, preterm delivery and
multi-fetal gestation. Perinatal risks comprised low Apgar score (< 7) at five minutes,
fetal distress, uterine and cord abnormalities, and maternal infections during delivery.
Postnatal risks were shown to be congenital infections; neonatal jaundice, seizure, en-
cephalopathy and sepsis; and use of a mechanical ventilator. All demonstrated evi-
dence of differences (p< 0.05). Within multivariable logistic regression evaluation,
CP risk factors were cerebral and non-cerebral malformations, multi-fetal gestation,
preterm, low birthweight, fetal distress, neonatal jaundice and sepsis: odds ratio
(mOR) = 250.43, 16.04, 5.42, 4.00, 32.60, 5.19, 4.56 and 63.15 respectively.
CONCLUSIONS: Cerebral and non-cerebral malformations, low birthweight, and neonatal sepsis are CP predictive risks. However, multi-fetal gestation, preterm birth, low Apgar score, fetal distress, uterine and cord anomalies, maternal infection, neonatal seizure, neonatal encephalopathy, congenital infections, and use of ventilator remain undetermined. Multicenter research incorporating increased events is needed.

A MULTI-INTERVENTIONAL APPROACH FOR ACUTE CALCIPHYLAXIS TREATMENT
Sudeep K. Mehta, MD, and Clinton Faulk, MD

CASE DIAGNOSIS: A 62-year-old female with a past medical history of Chronic Kidney Disease stage 4, uncontrolled Diabetes Mellitus Type 2, chronic bilateral venous stasis, and chronic deep venous thrombosis, recently transitioned from Warfarin to Apixaban, presented with large distal lower extremity wounds concerning for calciphylaxis. She was admitted to inpatient rehabilitation for initiation of hemodialysis along with local wound care with a bioengineered living cell therapy skin substitute.

CASE DESCRIPTION: The patient was evaluated by plastic surgery but was not a skin graft candidate due to significant contractures of the peripheral wound edges. Calcium alginate dressings were placed on the wounds for one week, followed by placement of a bioengineered skin substitute. She underwent further compression therapy with self-adherent wraps and tubular bandages to decrease venous congestion in the lower limbs. Intravenous Sodium Thiosulfate was started during hemodialysis sessions for calciphylaxis treatment. Furthermore, aggressive diuresis with Bumetanide and Chlorothalidone was started to reduce surrounding limb edema. She was referred for outpatient parathyroidectomy and continued local wound care with debridement to improve granulation.

DISCUSSIONS: Calciphylaxis results from a reduction in arteriolar blood flow due to calcification, fibrosis, and thrombosis formation. Mural vessel calcification occurs, followed by vascular endothelial injury causing tissue infarction. This case exemplifies an effective multi-interventional strategy to treat calciphylaxis caused by widespread angiopathy and chronic inflammation. Effective management includes aggressive diuresis and administration of sodium thiosulfate, along with weekly wound care management to facilitate prompt wound healing.

CONCLUSIONS: Calciphylaxis is a serious disease in which calcium accumulates in small blood vessels of fat and skin tissues. It causes blood clots, painful skin ulcers, and can cause widespread infection. The risk of calciphylaxis increases in the setting of End Stage Renal Disease, secondary hyperparathyroidism, and chronic Warfarin therapy. This case highlights success in wound healing from local wound care and systemic sodium thiosulfate.

A NARRATIVE REVIEW ON THE SAFETY OF BASIVERTEBRAL NERVE (BNV) RADIOFREQUENCY ABLATION (RF) FOR THE TREATMENT OF CHRONIC LOW BACK PAIN (CLBP)
Brandon Barnhill, DO, Vinicus Tieppo Francio, MD, James E. Eubanks, MD, MS, and Robert D. Pagan-Rosado, MD

OBJECTIVES: To review the literature regarding the safety of BNV RF for the treatment of vertebralce BCLBP. Recent studies suggest vertebralce BNV RF and II endplate modic changes may be a source of BCLBP, with the idea that pain may be transmitted by the BNV. Minimally invasive procedures such as BNV RF for the treatment of CLBP are being employed, where an RF generator ablates the BNV of the L3-S1 vertebrae. In this study, we reviewed the literature discussing the safety of this intervention.

DESIGN: Narrative review from 2010-2019 of MEDLINE database with “basivertebral” AND ‘ablation’ keywords. 34 studies were identified, 8 were deemed relevant and reviewed, and 7 studies were included. Studies where safety was not addressed were excluded.

RESULTS: Of the studies reviewed, there were no device-related patient deaths or serious adverse events (AEs). Specifically, there were no reports of spinal cord injuries, thermal injuries, avascular necrosis, pedicle fractures, infections, or broken devices. AEs were defined as procedure-related: incisional pain, urinary retention, meralgia paresthetica, new-onset back pain, or new-onset radiculopathy or paresthesia. These were all considered mild and required only oral medications with resolution within 3 months. Persistent radiculopathy was noted in one case with potential pedicle tract issues.

CONCLUSIONS: Few studies discussed the safety of BNV RF in the treatment of CLBP, which is a limitation of our study and the intervention. Furthermore, this study did not evaluate long-term outcomes. Nonetheless, based on the studies available, BNV RF seems to be safe and well tolerated by most patients when proper patient selection and procedural technique are applied. There was a low rate and severity of device and/or procedure-related AEs, and the most common AEs noted were mild incisional pain and leg paresthesia.

A NEGLLECTED CONDITION IN PEDIATRIC NON-CARDIOGENIC CHEST PAIN: JUVENILE FIBROMYALGIA
Basak Mansiz-Kaplan, MD, Mihriban Cagli, MD, Fatih Atik, MD, Ibrahim Ece, MD, and E Figen Ayhan, MD, PROF

OBJECTIVES: 99% of pediatric chest pain is non-cardiogenic. The most common cause of non-cardiogenic chest pain is musculoskeletal origin. Among the musculoskeletal causes, the causes of acute chest pain are better known. However, the causes of chronic chest pain have not been investigated sufficiently in the literature. In this study, we aimed to evaluate the musculoskeletal causes of non-cardiogenic chest pain and to evaluate its relationship with abuse and central sensitization.

DESIGN: The patients aged 12-18 years who had chest pain for at least three months were evaluated by pediatric cardiologist. Patients without any organic pathology were referred to the physical medicine and rehabilitation clinic. Detailed history and physical examination were performed. In addition, patients were questioned for juvenile fibromyalgia (JFM) according to ACR 2016 revised diagnostic criteria. The chest pain intensity was measured with visual analog scale (VAS). Central Sensitization Inventory was used to evaluate the presence of central sensitization. Hospial Anxiety Depression Scale was used for detecting depression and anxiety. Childhood Trauma Questionnaire was performed to evaluate presence of emotional, physical and sexual abuse.

RESULTS: The study was completed with 64 patients (54 females, 10 males). The mean age 15±1.8 years, the median symptom duration 12 (interquartile range 4-25.24) months. JFM was diagnosed 26% (n=17). Postural problems was detected in 32% (n=21). There was a positive correlation between CTQ and HADS-anxiety (r=0.52; p<0.001), HADS-depression (r=0.56; p<0.001), VAS (r=0.77; p<0.001), CSI (r=0.57; p<0.001). There was also a positive correlation between CSI and HADS-anxiety (r=0.75; p<0.001), HADS-depression (r=0.64; p<0.001), VAS (r=0.75; p<0.001), CTQ (r=0.57; p<0.001).

CONCLUSIONS: This study showed that JMS is a previously unreported cause of pediatric non-cardiogenic chest pain. However, the presence of central sensitization or JFM in these patients may indicate childhood abuse.

A NEW MODEL OF DISCHARGE PLANNING OPERATED BY REHABILITATION STAFF IN A MEDICAL CENTER SETTING
Chi-ye Chen, BS, Chiao Hsin Lao, BS, Peng Hsuan Hou, MD, and Victoria Shaifu Ai Hsieh, MS, MD

OBJECTIVES: To review current evidences of discharge planning work in medical center settings and compare with our proposed rehabilitation staff discharge planning model.

DESIGN: Extensive literature reviews and workplace interviews were performed to collect conventional hospital discharge planning models in Taiwan. The new discharge planning model operated by rehabilitation staff in our hospital is then compared with the conventional models by an multidisciplinary expert panel. Feedbacks from the patient, caregivers, and healthcare staff were collected.

RESULTS: The most important similarities between the conventional and new models are the center position of the need of patient and families/caregiver in discharge planning. Also, major health conditions leading to this hospitalization and prognosis affect planning significantly in both models. The major merits of the proposed models are its ability of integrating post-acute reconditioning/rehabilitation considerations into the discharge plans, the greater capacity of team staff to provide instant caregiver education of mobility and assistive devices, the better connections and allocations to the alternative rehabilitation services including the PAC, Home Care, Hospit Care, Long-Term Care resources and therefore may be potentially better as one-site solution for early discharge support. Model graph: https://drive.google.com/open?id=1BwVqXAOOGgKJmRUyZD58QSCRQG1

CONCLUSIONS: This new discharge planning model operated by rehabilitation staff may provide insights to enhance future care continuum and the quality of early discharge support service in the new era of limited healthcare budget to achieve universal rehabilitation coverage.

A NEW TENDON-LENGTHENING TECHNIQUE USING A TENDON STRIPPER FOR KNEE FLEXION CONTRACTURE IN A CEREBRAL PALSY PATIENT
Hirotaka Matsuzuki, MD, PhD, Shogo Nakagawa, MD, Yuki Mataka, MD, Ryoko Takeuchi, MD, PhD, and Hiroshi Kamada, MD, PhD
Abstracts

A NOVEL INJECTABLE BIOMATERIAL FOR IMPROVED STEM CELL DELIVERY FOR TREATMENT OF JOINT OSTEARTHRITIS
Alexandra N. Borelli, BS, Balaji Sridhar, MD, PhD, Veru Akuthota, MD, and Kristi Anseth, PhD
OBJECTIVES: To test the hypothesis that mesenchymal stem cell (MSC) viability can be improved after injection into osteoarthritic joint space with the use of an injectable, biocompatible dynamically adaptable hydrogel network. Encapsulation of cells in this material would improve upon current methods of injection with saline alone and will render stem cell therapies more reliable for treatment of degenerative conditions such as joint osteoarthritis.

DESIGN: Cells were either injected with low glucose DMEM media (negative control) or after encapsulation in a modified, injectable hyaluronic acid (HA) gel and were compared for viability at the same seeding density. Sprague Dawley Rat bone marrow derived MSCs were used after a second passage and were placed in 1 mL insulin syringes (BD Bioscience) before being injected through a range of needle gauges including an 18 G needle, a 21 G needle and a 26 G needle on an untreated 24 well plate. 1 mL of low glucose DMEM media was added to the plate along with Live/Dead reagents after injection with either low glucose DMEM media or with the HA material. Viability was measured using the Live/Dead high-content imaging system or with a fluorescent scope to quantify live cells and dead cells.

RESULTS: Preliminary evidence shows that cells demonstrated higher viability (~75% ± 5%) when injected with the HA gel through a 21 G and 26 G needle compared to cells that were delivered with only media (~55 % ± 10%).

CONCLUSIONS: Preliminary data suggests modified HA hydrogels can be used to protect stem cells during injection through small gauge needles to protect them from shear forces and increase their viability after injection. This can permit cells to deliver a more potent anti-inflammatory signal to the surrounding joint space.

A PORTABLE SYSTEM FOR REMOTE EVALUATIONS OF REHABILITATION AFTER JOINTS TRAUMA
Andriy I. Tsvyakh, PhD, DSC, and Andriy Y. Hospodarsky, PhD

OBJECTIVES: The international orthopedic community aims to achieve the best possible outcome for patient care by modifying rehabilitation methods and using telemedicine technology. Currently not sufficiently studied sequential algorithm of movement activity on the injured upper and lower extremities after immobilization, not studied physiological and pathophysiological response during rehabilitation.

DESIGN: The aim of this article is to discuss the integration of telemedicine technology in the rehabilitation of patients with injuries of the upper and lower extremities. A total of 84 subjects with upper extremity elbow joint injuries were enrolled in the study. 48 patients from the control group underwent traditional rehabilitation procedures. A total of 36 subjects were enrolled in the telerehabilitation group. Home remote monitoring for the 36 test subjects included use of a portable device with Axis sensor, temperature, pulse and volume sensors, which were fixed to the injured limb.

Software was developed in the I. Horbachevskyy Tompol Medical University, Ukraine and permits the monitoring of exercise time, local temperature, the frequency of active movements of the injured limb. Based on the patient’s individual condition the rehabilitation doctor created an individualized rehabilitation plan for each subject.

RESULTS: The time needed for the rehabilitation was significantly shorter (12.6 min) than the traditional rehabilitation (12.6 min). Patient satisfaction was higher for the telerehabilitation (83.1%) than for traditional rehabilitation (33.1%). Subjects reported a higher satisfaction with telerehabilitation than with the traditional orthopedic. This will improve the quality of life in this group of patients and significantly reduce the cost of the rehabilitation period.

CONCLUSIONS: The telerehabilitation system can be used in complex rehabilitation of patients with injuries of the upper and lower extremities.

A PRE-OPERATIVE BOWEL EVACUATION PROTOCOL WHICH REDUCES POST-OPERATIVE GASTROINTESTINAL AND FEEDING PROBLEMS IN CHILDREN WITH CEREBRAL PALSY WHO UNDERGO A MAJOR SURGERY
Supreet Deshpande, MD, Alexander Kulkarni, Mark Gormley, MD, Annette Lowell, BA, RN, CRRN, Marie Krisik, RN, BSN, and Karen A. Brill, MHA, RN

OBJECTIVES: Children with cerebral palsy (CP) who undergo a selective dorsal rhizotomy (SDR) to manage their spasticity may have severe constipation during the post-operative period resulting in abdominal discomfort, nausea/vomiting, and poor oral intake. These patients may require aggressive bowel and medical management during the post-operative period. Many children with CP may have manage chronic constipation which can be exacerbated post-surgery. This study evaluates the benefit of a pre-SDR bowel evacuation protocol in reducing the severity of these problems.

DESIGN: Retrospective chart review of patients with CP who underwent an SDR from 2017-present at a pediatric rehabilitation hospital. Some of these patients participated in a pre-operative bowel evacuation protocol which included 2 consecutive days of a mini-enema then a final day of a Fleet’s enema just prior to the day of surgery. Data included pre-operative laxative history, and post-operative laxative history, nausea/vomiting frequency, and return time to baseline oral or gastrostomy tube feeds.

RESULTS: 60 patients underwent an SDR with 22/60 (37%) participating in the pre-operative bowel evacuation protocol. The routine use of laxatives pre-operatively was not significantly different between the pre-operative bowel evacuation protocol group: 18/22 (82%) and the non-protocol group: 26/38 (68%) (p=0.41). The frequency of post-operative constipation symptoms and medical interventions in the pre-operative bowel evacuation protocol group vs the non-protocol group were as follows: nausea/vomiting, 1/22 (5%) vs 19/38 (50%) (p=0.001); post-operative laxatives, 2/22 (9%) vs 33/38 (87%) (p=0.0001); return to baseline feeding by post-operative day 1, 16/22 (73%) vs 7/38 (18%) (p=0.007).

CONCLUSIONS: This study demonstrates a significant improvement in post-operative nausea/vomiting and laxative use, and much quicker return to baseline feeds in patients with CP who followed the pre-operative bowel evacuation protocol prior to their SDR. An aggressive pre-operative bowel evacuation regimen should be considered in children with CP prior to major surgery.

A RANDOMIZED CONTROLLED TRIAL ON THE EFFECTS OF GYROMAGNETIC THERAPY COMBINED WITH MEDICATION FOR OSTEOPOROSIS
Yuxin Zheng, BS, Shijuan Lang, MMBS, Meifeng Zheng, MD Candidate, Qiang Lin, PhD, Haining Ou, PhD, and Junjie Liang, MMED

OBJECTIVES: Osteoporosis (OP) is a systemic bone disease characterized by low bone mass, damaged bone microstructure, increased bone fragility, and susceptibility to fracture. With the extension of human life and the advent of an aging society, OP has become an important health issue for humans. Gyromagnetic therapy could use the induced potential and induced current generated to improve bone metabolism and bone remodeling and promote osteoblast activity to prevent bone loss and increase bone density, but relatively few clinical random clinical trials (RCT) concerning this subject have been conducted.

DESIGN: Forty-four patients with osteoporosis were randomly divided into two groups, consisting of 20 patients in the gyromagnetic and 24 patients in the control groups. The gyromagnetic group performed the 30 sessions of gyromagnetic treatment in 50 days (60 min per session and three sessions per week) and 90 sessions of oral medication (calcium and vitamin D), whereas the control group just took the same 90 sessions of oral medication. These two groups were evaluated at baseline, and then at 50 and 90 days follow-up. The primary outcomes were the bone mineral density (BMD), visual analog scores (VAS), and blood calcium values.

RESULTS: There were no differences in baseline characteristics, including serum phosphate, serum calcium, and VAS scores. The primary outcomes showed the significant differences in VAS scores and blood calcium values within the gyromagnetic and control group, respectively, (p< 0.05) but not in BMD. Moreover, there were no significant differences in three primary outcomes between two groups.
CONCLUSIONS: Gyromagnetic therapy combined with calcium and calcium carbonate alone could improve pain in patients with osteoporosis. There were no advantages in the gyromagnetic group compared with single calcium therapy.

A RANDOMIZED, CONTROLLED, DOUBLE-BLIND STUDY: EFFECT OF DEXTROSE PROLOTHERAPY IN UNILATERAL PLANTAR FASCIITIS
Basak Mansiz-Kaplan, MD, Baris Nacir, MD, Assoc Prof, Secil Pervane-Vural, MD, Burcu Duyur Cakir, and Hakcan Gene, MD, PROF

OBJECTIVES: To evaluate the efficacy of dextrose prolotherapy on pain intensity, disability and plantar fascia thickness in the treatment of chronic resistant plantar fasciitis (PF) through comparison with a control group.

DESIGN: The patients were randomized into two groups. The prolotherapy group (n=30) was administered 5 cc 30% dextrose, 4 cc saline, 1 cc 2% lidocaine mixture (15% dextrose solution) and the control group was given 9 cc saline and 1 cc 2% lidocaine mixture twice at a three-week interval. Pain intensity was recorded using the visual analog scale during activity (VAS-A) and at rest (VAS-R). The foot function index (FFI) was used to measure pain and disability. The plantar fascia thickness was measured by ultrasonography. The clinicians both applying injections, performing clinical evaluations and performing ultrasonography were blinded. The measurements were undertaken before treatment and at post-treatment weeks 7 and 15.

RESULTS: Improvements in VAS-A, VAS-R, FFI (all subgroups), and plantar fascia thickness measured at the 7th and 15th weeks were significantly higher in the prolotherapy group compared to the control group (p <0.001).

CONCLUSIONS: Dextrose prolotherapy has efficacy up to 15 weeks and can be used as an alternative method in the treatment of chronic refractory PF.

A RARE CASE OF BROWN SÉQUARD SYNDROME SECONDARY TO NEUROMYELITIS OPTICA: A CASE REPORT
Naveen Khokhar, DO, and Alexandru Dinu, MD

CASE DIAGNOSIS: Brown Séquard Syndrome secondary to Neuromyelitis Optica.

CASE DESCRIPTION: A 39 year old female presented with progressive gait instability, low back paresthesias, right lower extremity weakness, left lower extremity numbness, and decreased vision in her right eye. MRI brain and cervical spine demonstrated T2 enhancement in the right optic nerve and findings consistent with demyelination in the cervical spine. She was treated with Prednisolone for 5 days. The patient was noted to have monoparesis in her right lower extremity and diminished sensation in her left lower extremity consistent with Brown Séquard Syndrome. She did have improvement in right lower extremity function with steroids and therapies, but required a double metal ankle foot orthosis to ambulate improving significantly. Further, the patient benefited from increased therapies to improve functional mobility and ADLs in the setting of lower extremity weakness and new vision deficits. A positive Anti-aquaporin4 antibody resulted and confirmed the diagnosis of Neuromyelitis Optica.

DISCUSSIONS: Neuromyelitis Optica is an immune mediated process involving demyelination and axonal damage that targets both the spinal cord and optic nerve. Interestingly, this patient developed lower extremity weakness and sensory changes in a pattern consistent with Brown Séquard Syndrome leading to ipsilateral loss of motor function, vibration, and proprioception and contralateral loss of pain and temperature.

CONCLUSIONS: It is important to consider central demyelinating processes when considering spinal cord injury including nontraumatic presentations of Brown Séquard Syndrome. Clinical presentation with vision deficits can key practitioners to consider Neuromyelitis Optica as a likely etiology. Prompt diagnosis can lead to early treatment and initiation of therapy to reduce acute injury and improve functional ability.

A RARE COMPLICATION OF PROGRESSIVE MULTIFOCAL LEUKOENCEPHALOPATHY: IMMUNE RECONSTITUTION INFLAMMATORY SYNDROME
Vivek Nagar, MD/MBA, Andrew Bloomingfield, MD, MPHIL, BSC, and Dudley Angell, MD

CASE DIAGNOSIS: Progressive Multifocal Leukoencephalopathy (PML) with Immune Reconstitution Inflammatory Syndrome (IRIS).

CASE DESCRIPTION: 28 year old female with uncontrolled, congenital HIV re-admitted for worsening diplopia and gait instability after she was diagnosed with progressive multifocal leukoencephalopathy (PML) three months earlier and had started antiretroviral therapy. Acute hospitalization workup included MRI brain showing progression of cerebellar atrophy and lumbar puncture for infectious work up. Patient was transferred to acute rehabilitation with diagnosis of worsening PML versus infectious cerebritis. Her functional status worsened, prompting treatment with oral steroids following multidisciplinary decision between ID, neurology, and PM&R. Her functional status dramatically improved, primarily gait stability, affirming a diagnosis of immune reconstitution inflammatory syndrome (IRIS).

DISCUSSIONS: PML, caused by a reactivation of JC virus, is a devastating disease seen in up to 5% of patients with AIDS. PML has a 30-50% mortality rate within the first few months following diagnosis. While combined antiretroviral therapy improves prognosis in HIV individuals, PML may worsen with antiretroviral therapy despite recovery of immune function, a manifestation thought to be PML-IRIS. PML-IRIS may account for up to 18% of HIV-infected patients with PML. There are no evidence-based guidelines for the prevention or management of PML-IRIS. Anti-inflammatory agents have been used and may be effective in the treatment of IRIS. Steroid treatment in PML-IRIS is anecdotal and treatment trials are lacking.

CONCLUSIONS: This case highlights a patient that improved functionally after steroid treatment with concurrent antiretroviral treatment. Not only does this case contribute to the growing knowledge base for PML-IRIS treatment, but it also shows the integral role of physiatry in the multidisciplinary approach to evaluation of PML-IRIS using functional monitoring. It is imperative for physiatrists to be aware of the presence and severity of IRIS, as the progression of IRIS will affect treatment strategies and rehabilitation goals.

A RARE OCCURRENCE OF SINGULTUS FOLLOWING LUMBAR INTERLAMINAR EPIDURAL STEROID INJECTION: A CASE REPORT
Chelsea D. Frost, MD, MS, and D. Preston Grice, MS, MD

CASE DIAGNOSIS: Lumbar spinal stenosis is a degenerative disease of the lumbar spine that can cause back and leg pain due to narrowing of the spinal canal, subsequently resulting in compression of neuronal structures. Epidural steroid injections are frequently used as therapeutic intervention for conservative management and have been demonstrated to be generally very safe. Singultus is considered a rare complication and overall incidence remains relatively unknown likely due to patient underreporting.

CASE DESCRIPTION: 42yo male presented with low back pain and left leg radiculopathy in the L5-S1 distribution. He elected to proceed with lumbar epidural steroid injection (LESI) via an interlaminar approach using 12 mg betamethasone as he previously underwent LESI with significant benefit and no adverse effects. Following 20 minutes of observation following injection with no complications, he was discharged home. Patient later reported onset of painful singultus within 24 hours of injection lasting for several days prior to spontaneously resolving. Following this event, patient did report a prior episode of persistent painful singultus following steroid injection of the shoulder that also spontaneously resolved.

DISCUSSIONS: Though usually benign and self-limited, persistent or intractable singultus have been associated with interventional procedures and have the potential to be distressing for patients and clinicians. Various steroids have previously been reported as causes of singultus. The exact mechanism and incidence due to steroids are not known, however steroids are known to cause neurotransmitter effects on the central pathway components which affect neurotransmitter metabolism and subsequent activation of the hiccup center.

CONCLUSIONS: Lumbosacral pain is a degenerative disease of the spine that can result in intermittent neurogenic claudication, and epidural steroid injections are frequently utilized for conservative management of symptoms. Though rarely reported, painful singultus can occur post-injection and should be included in the discussion of possible side effects with patients.

A RETROSPECTIVE STUDY OF ULTRASOUND-GUIDED PRP INJECTION FOR PARTIAL THICKNESS ROTATOR CUFF TEARS
Yan Liu, Bachelor

CASE DIAGNOSIS: The rotator cuff tears is a common disease that causes shoulder pain and limited daily living ability. However, because the conservative treatment of partial rotator cuff tears is not effective, it is a great challenge for clinicians. PRP (platelet-rich plasma) as a kind of treatment method rich in platelets and various growth factors, it has been proved by many animals and clinical trials to promote soft tissue repair.

CASE DESCRIPTION: We treated 45 patients with PTRCTs, with ultrasound-guided PRP injection for partial rotator cuff tears. The indication of treatment with
PRP is the I-II RCT. Under ultrasound-guided we inject PRP around the injured rotator cuff tendon and the obvious defect tendon site. After treatment, instructed the patients to gradually begin the movement and stretching of the shoulder joint within the pain tolerance range on the second day after treatment. VAS, UCLA, Constant-Murley, and Return to work were used for follow-up before treatment, 2 weeks, 1 month and 3 months after treatment.

DISCUSSIONS: Of all patients, 29 were left shoulders and 16 were right shoulders. The average age was 52.7 ± 14.8. The VAS score was 5.6 on average, the UCLA score was 11.6 on average, and the Constant score was 51.3 on average. At 3 months after treatment, the VAS score decreased to 1.8 points, the UCLA score increased to 26.6 points, and the Constant score increased to 75.65 points. In some patients, after 3 months of follow-up with ultrasound, the injured rotator cuff tendon was significantly repaired before treatment.

CONCLUSIONS: In this retrospective study, we evaluated the safety and efficacy of PRP via ultrasound-guided injection for PTRCTs. After 3 months of follow-up, the patients had significant improvement in the VAS, UCLA, and Constant scores. Therefore, we believe that the large amount of growth factor released by PRP through its degranulation may accelerate and promote its repair in the process of tendon healing and tendon-bone healing.

A STUDY INVESTIGATING THE BENEFITS OF COMPLEMENTARY AND ALTERNATIVE MEDICINE THERAPY ON QUALITY OF LIFE

Tochi J. Nwuru, MEDICAL DEGREE, Adeepa D. Singh, MD, and Alexandra Oudheusden, MASTERS

OBJECTIVES: This is a preliminary study looking at which benefits of Complementary and Alternative Medicine (CAM) therapies were thought to be most advantageous in an acute rehabilitation setting.

DESIGN: This is a retrospective study using mixed methods, examining specific benefits of CAM therapies and their benefits to patients in an acute rehabilitation hospital. One hundred patient surveys were collected. Diagnoses included spinal cord injuries, strokes, post-operative orthopedic surgeries, traumatic brain injuries, and debility secondary to underlying medical conditions. Patients who were deemed appropriate for CAM therapy received several interventions including aromatherapy, acupressure, lymph drainage, massage/reflexology, and craniosacral therapy. In addition, some were led through breathing exercises, discussion/education, sensorimotor exercises, guided meditation, and yoga. Sessions were individualized based on patient need, goals, and preferences. A survey, created using the Likert scale, was given at discharge. Patients evaluated the therapies they received in regards to their perceived effect on pain, stress, sleep, and other quality of life (QOL) measures.

RESULTS: The fifteen outcomes evaluated included: effects on relaxation/stress, comfort/anxiety, energy levels, self-image, sense of well being, alleviation of pain, development of pain management strategies, quality of sleep, control of emotions, ability to identify stressors, benefit from resource materials, likelihood of practicing techniques after sessions and post-discharge, whether CAM should continue to be offered in patient care, and likelihood of participating in outpatient CAM therapy at our institution. Overall, 5.3% of patients responded “undecided”, 50.3% “a great deal”, 15% “somewhat”, 3.9% “a little”, 2% “not at all” and 22% left responses blank.

CONCLUSIONS: CAM therapy is known to provide a number of different benefits. This study quantifies and highlights effectiveness of CAM therapies on improving QOL for a mixed diagnosis, in-patient population. Further research is needed to evaluate specific CAM components in relation to QOL—ultimately a dose dependent relationship may be identifiable in the future.

A STUDY OF MULTI-TASK GAIT ANALYSIS ON MOTOR COGNITIVE FUNCTION IN MILD COGNITIVE IMPAIRMENT

Qiang Lin, PhD, Yuanyuan Guo, MD, Shijuan Lang, MMBS, Yuxin Zheng, BS, Hongxin Chen, MD, Dongqiang Huang, BS, Haining Ou, PhD, and Junjie Liang, MMED

OBJECTIVES: Early diagnosis and treatment of mild cognitive impairment (MCI) has become a hot topic in current brain science research. Because biomechanical parameters of gait could predict the progress of cognitive function, our study aimed to explore the potential mechanism of the biomechanical characteristics under multi-task gait for MCI diagnosis.

DESIGN: A total of 96 subjects, including thirty-six MCI patients in the MCI group, twenty-nine healthy young subjects in the normal young group (NY group), and thirty-one healthy elderly subjects in the normal elderly group (NE group), were recruited for the study. All of the subjects performed the 10 Meter Walk Test (10 MWT) and the Timed Up and Go Test (TUG) for clinical functional gait evaluation. Moreover, all of the subjects performed five walking tasks based on the three-dimensional gait analysis: (1) single-walking task; (2) word-repetition-walking task; (3) dual-motor-walking task; (4) calculation-walking task; and (5) barrier-crossing-walking task. The primary outcomes were the dual-task gait cost of gait parameters.

RESULTS: The primary outcomes showed significant differences between dual-task gait costs in stride velocity, swing phase, and cadence during the calculation-walking task and between dual-task gait costs of single stance phase and cadence during barrier-crossing walking task among three groups. The secondary outcomes indicated that the MCI and NE groups both presented significantly poor performances in 10 MWT and TUG compared with NY group but not between the MCI and NE groups. Moreover, there were significant differences in dual-task gait costs of velocity and cadence among multi-task walking performances within the MCI and NE groups but not within the NY group.

CONCLUSIONS: The clinical gait assessments might have poor sensitivity in discrimination between normal elderly people and the MCI population. Meanwhile, the dual-task gait cost of gait parameters based on the multi-task gait analysis showed the potential superiority of an MCI diagnosis.

A SURVEY OF CAREGIVER BURDEN IN PATIENTS WITH HOME MECHANICAL VENTILATOR

Eun-Ho Yu, MD, and Soo Yeon Kim, MD, PhD

OBJECTIVES: In recent years, with the development of home mechanical ventilator (HMV), patients in need of ventilatory support have become cared at home. The purpose of this study is to investigate the burden of caregivers of community-dwelling patients using HMV.

DESIGN: A total of 136 patients using HMV and their caregivers answered the questionnaire. The questionnaire is composed of 2 sections, each of which consisted of status of patient care and the burden on caring. Korean version of Short Form Zarit Burden Interview (K-ZBI-12) and 3-Level version of EuroQol-5 Dimension (KEQ-5D-3L) were investigated to measure the burden on caring and the life quality of caregivers. The KEQ-5D-3L score was recalculated by the weighted formula for each item in the Korean population. Collected data were statistically analyzed.

RESULTS: Main caregivers were family members in 50 (37.9%), professional caregivers in 34 (25.8%) or both in 48 (36.4%) patients. Only one caregiver was taking care of the patients in 39 cases (29.5%). Caregivers responded that position change and patients’ discomfort are one of the most burdensome for them. More than half of the responders answered that patients’ immobility, reduced free time and increased financial burden are the most difficult parts. The K-ZBI-12 score showed weak negative correlation with KEQ-5D-3L score (p=0.000). Patients’ age and financial burden from both medical and nursing cost also showed weak positive correlation with K-ZBI-12 scores (p=0.007, 0.000 and 0.000, respectively), but not with KEQ-5D-3L score. The more caregivers care for the patients, the lower K-ZBI-12 score (p=0.000). Caregivers who are using invasive ventilation showed lower KEQ-5D-3L score than the others (p=0.001).

CONCLUSIONS: Life quality and care burden of the caregivers were affected by various properties of the patients. We hope this study will help identify the institutional, economic and medical services, community-dwelling patients using HMV and their caregivers need.

A VALIDATION OF THE DISABILITY ATTITUDES IN HEALTH CARE SCALE USING THE RASCH ANALYSIS ON A SAMPLE OF KOREAN MEDICAL STUDENTS

Yoo Gyoung Yi, MD, MSC, and Hyung-Ik Shin, MD, PhD

OBJECTIVES: The “Disability Attitudes in Health Care” (DAHC) scale contains 17 items and measures attitudes toward persons with disabilities (PwDs) in healthcare settings. This study aimed to analyze the psychometric properties of the DAHC in order to improve its measurement quality.

DESIGN: The DAHC scale was administered to 272 students at a medical school. Rasch analysis was conducted to assess the category use, the overall fit of the model, and the person-item fit.

RESULTS: Compared to the previous 5-point Likert scoring system, the combination of category 1 (strongly disagree) and 2 (disagree), which transformed the DAHC into a 4-point scale, was more appropriate. Items 2 and 13 had a poor fit with the model because of low construct homogeneity and low point-measure correlation, respectively; therefore, they were removed. However, there were not enough questions regarding education level for distinguishing medical students’ attitudes toward PwDs more sensitively.

CONCLUSIONS: The results of this study suggest that constructing DAHC with 15 items and using a 4-category scoring method could help to increase the...
scale’s reliability and validity. The DAHC could be of value to those who educate medical students and train rehabilitation professionals.

ABOBO TULINUM TOXIN A (DYSPORT®) IN SALIVARY GLANDS: A CASE SERIES REPORT

Sandra Castellar, MD, Edicion Ruiz, MD, Camilo Mendoza, MD, and FT Diana Soto

OBJECTIVES: Assess the efficacy of abobotulinum toxin A (Dysport®) injection in salivary glands for drooling treatment.

DESIGN: Descriptive and cross-sectional study. Abobotulinum toxin A injection in bilateral parotid and submandibular glands, dose range from 100 to 125 units per gland with ultrasound guidance. Results were measured at 4 to 6 weeks after treatment by specific objectives in the Goal Attainment Scaling (GAS).

RESULTS: 14 patients were included in the study. Mean age 14.9 years; 10 patients with cerebral palsy, 3 with severe intellectual disability, 1 patient with Amyotrophic Lateral Sclerosis (ALS). 37 from 14 individuals (80.2%) achieved specific goals measured by GAS after Botox® injection (Decrease of 50% in the number of bibs used during the day, decrease of 50% of drooling perception by the caregiver). 3 patients (21%) presented some dysphagia in the first two weeks after Botox® injection without penetration or aspiration evidenced by clinical and paraclinical tests.

CONCLUSIONS: Abobotulinum toxin A injection showed efficacy in drooling treatment in 78.57% of the patients. Mild dysphagia was observed in 21% of individuals without experiencing life threatening conditions.

ABOBO TULINUMTOXINA TREATMENT SATISFACTION AND QUALITY OF LIFE EVALUATIONS IN PEDIATRIC LOWER LIMB SPASTICITY: EXPLORATORY INTERIM RESULTS FROM A PHASE IV, PROSPECTIVE, OBSERVATIONAL, MULTICENTER STUDY

Sarah H. Evans, MD, Mark Gormley, MD, Mauricio R. Delgado, MD, Ann Tilton, MD, Asare Christian, MD, MPH, Edward Dabrowski, MD, Pascal Maisonneuve, MSC, Stefan Wietek, PhD, CMPP, and Bruce Rubin, MD

OBJECTIVES: Define the efficacy and safety of abobotulinumtoxinA treatment for children with spasticity due to cerebral palsy (CP) patients.

DESIGN: Phase IV study of abobotulinumtoxinA in patients with CP.

RESULTS: Patients aged 2-17 years treated with abobotulinumtoxinA and their caregivers completed PedsQL® and PedsQL®-CP (CP only) questionnaires at study inclusion, subsequent injections, and end-of-study visits. PedsQL® (23-items) and PedsQL®CP (35-items) comprises Physical, Emotional, Social, and School Functioning. PedsQL® (23-items) and PedsQL®-CP (35-items) comprises Daily Activities, School, Movement/Balance, Pain/Hurt, Fatigue, Eating Activities, and Speech/Communication. Items are scored, then transformed to a 0-100 scale (higher scores indicate better QoL).

CONCLUSIONS: AbobotulinumtoxinA showed greatest improvements in health and function during physical therapy 12 months after admission. Hospital course was complicated by complications including postoperative hemorrhage, which resulted in a short stay. He was discharged and did not report any complications. This case report highlights the importance of multidisciplinary care in the management of patients with chronic pain.

ACUPUNCTURE AND OSTEOPATHIC MANIPULATION COMBINED TREATMENT FOR UPPER SHOULDER PAIN: CASE SERIES

Yonghoon Lee, DO, and Mark A. Thomas, MD

CASE DESCRIPTION: A 67-year-old man presented with chronic pain over the left upper trapezius muscle and pain associated with tension headache. The patient had a history of cervical spondylosis and was prescribed analgesics. The patient reported pain relief with acupuncture and osteopathic manipulation treatments. The patient continued to experience significant pain relief with regular acupuncture and osteopathic manipulation treatments.

CONCLUSIONS: Acupuncture and osteopathic manipulation combined treatment is effective in reducing chronic pain over the left upper trapezius muscle and associated tension headache.

ACCESSIBILITY OF MEDICAL FACILITIES FOR PERSONS WITH DISABILITY IN PERU

Amy K. Unwin, MD, Miguel G. Moscoso Porras, PT, MSC, and Angela Carbone, MD

OBJECTIVES: To determine how accessibility to medical facilities for persons with disabilities is affected by architectural and transportation barriers and to assess the impact on health care access.

RESULTS: Both patients received similar treatments. Acupuncture points on hand were selected to open up meridians. Osteopathic manipulative treatment was performed to realign the spine and provide pain relief. Both patients reported significant improvement in pain and reduced medication usage.

CONCLUSIONS: Acupuncture and osteopathic manipulation are effective in treating chronic pain and associated tension headache.

ACCIDENTAL PREHABILITATION: A CASE WHERE LACK OF INSURANCE INCREASED EXERCISE FREQUENCY BEFORE THORACIC SURGERY

Jennifer Baima, MD, Mark Maxfield, MD, Maggie Powers, NP, John Varlotto, MD, and Karl Uy, MD

CASE DESCRIPTION: A 67-year-old man developed pleuritic chest pain while participating in a local church choir. He was diagnosed with stage IV lung adenocarcinoma and underwent thoracic surgery. During the patient's hospitalization, he participated in a regular exercise program, which increased his exercise frequency before thoracic surgery.

CONCLUSIONS: Access to insurance is a barrier to early intervention and preoperative exercise. This case highlights the importance of addressing insurance barriers to improve patient outcomes.
(OMT) including suboccipital release, counter strain, balanced ligamentous tension. After acupuncture treatment, the relaxation of upper trapezius was noted. Subsequent OMT provided further relaxation of deeper muscles in more focused manner. Before needling were taken out, the patients were asked to walk with large arm swing to activate quadriceps and with dynamic stretching. Patient 1 had significant pain relief up to four days with monthly treatment. Patient 2 showed pain relief lasting for three weeks and overall 60% pain reduction after 3rd monthly treatment.

CONCLUSIONS: Combined treatment of acupuncture and OMT was more efficient and effective compared to acupuncture or OMT alone from other clinical experiences. Immediate pain relief experienced by the patients was very satisfactory for both practitioner and patient. Myofascial pain responded better with the treatment compared to the degenerative joint pain as the combined treatment may be more effective addressing myofascial component compared to the structuralized osseous pathology.

ACUTE ENCEPHALOPATHY ANY MYOCLOTON JERKING WITH USE OF ERTAPENEM COMPARED TO MEROPENEM: A CASE REPORT

Anthony L. Cooper, DO, and Clinton Faulk, MD
CASE DESCRIPTION: A 4-year-old male with stage 3 chronic kidney disease presented to inpatient rehabilitation center with septic arthritis after left total knee arthroplasty. Synovial joint aspiration cultures were positive for Enterobacter Aerogenes. He was started on a 6 week course of etrapenem 1 gram daily. On day 3 of admission patient presented with fluctuating orientation, hallucinations, and myoclonic jerking. The patient had significant difficulty transiting and using a supine stander for 1 hour daily. His respiratory status is stable, he is able to cough, and he is able to assist in respiratory efforts. His motor control of his neck and had trace movements of his proximal upper extremities. After urine culture returned with minor bacteria growth etrapenem treatment was resumed. After 24 hours hallucinations and myoclonic jerking returned. Additional physical, laboratory, and radiologic workup revealed no conclusive etiology for his symptoms, at which point drug-induced encephalopathy was suspected in setting of impaired renal function. Upon discontinuation of etrapenem, the patient rapidly improved over the next 72 hours, including return to baseline mentation.

CONCLUSIONS: Hallucinations altered mental status are rare but known side effects of treatment with etrapenem. To our knowledge myoclonic jerking is not a known side effect of etrapenem. We attributed onset of side effects to patient’s age and impaired renal clearance.

ACUTE FLACCID MYELITIS RESULTING IN TETRAPLEGIA IN A CHILD: A CASE REPORT

Vera A. Tsetlina, MD, Katherine Rief, MD, Jared Levin, MD, Xiaofang Wei, MD, and Heakyoung Kim, MD
CASE DIAGNOSIS: Acute Flaccid Myelitis.
CASE DESCRIPTION: 13-month-old, previously healthy boy, who presented with sudden onset of flaccid tetraplegia following prodromal URI symptoms a few days prior. MRI revealed diffuse inflammation throughout the spinal cord. He underwent emergent C1-C3 laminectomies and sub-occipital craniectomy due to suspected compressive etiology. Then infectious workup revealed +RSV and +Enterovirus. After extensive workup, he was diagnosed with Acute Flaccid Myelitis (AFM). Due to respiratory failure he required tracheostomy and gastric tube placement. He received empiric antibiotics, IVIG and Solumedrol without significant neurologic improvement. Patient completed 6 months of multidisciplinary rehabilitation in acute rehabilitation facility, focusing on ventilator and feeding care. Patient was partially weaned off ventilator and was taking small amounts of PO by discharge home. He regained active control of his neck and had trace movements of his proximal upper extremities.

DISCUSSIONS: AFM affects the motor neurons in the gray matter of the spinal cord. Patients classically rapidly progress from full strength to neurological nadir over hours to days, with the disease typically affecting a single extremity. There are few reported cases of symmetric quadriparesis with respiratory failure as a presentation of AFM and prognosis is very guarded. Although some individuals demonstrate improvement in motor weakness and functional deficits, most have residual weakness a year after onset. A year later, our patient can actively rotate his head and propels a head-motion-controlled power wheelchair in therapy. He assists in transitions and uses a supine stander for 1 hour daily. His respiratory status is stable, he is accepting small amounts of liquid and is verbal, producing 2-3 word combinations.

CONCLUSIONS: Our case demonstrates continued gradual improvement in breathing and function as well as quality of life in a patient with symmetric tetraplegia and respiratory failure due to AFM. Continuous multidisciplinary rehabilitation approach made patient with severe tetraplegic AFM be functional.

ACUTE INPATIENT REHAB COURSE OF A 46-YEAR-OLD FEMALE WITH ANTI-NMDA RECEPTOR ENCEPHALITIS

Evan R. Zelden, MD, and Leonardo Villarrosa, MD
CASE DIAGNOSIS: 46-year-old Female with Anti-NMDA Receptor Encephalitis.
CASE DESCRIPTION: The patient presented with episodes of confusion, hallucinations, and paranoia. Before admission, she was independent in all of her ADLs and was working. She was initially admitted to the inpatient psychiatric unit for treatment of psychosis but did not respond to antipsychotics or CBT and underwent further workup. A lumbar puncture found antibodies to the NR1 subunit of the NMDA receptor in her CSF and the patient was transferred to the neurology service for treatment with plasma exchange and methylprednisolone. She was later admitted to the inpatient rehabilitation hospital for 14 days. An interdisciplinary treatment approach with both psychiatry and neurology was utilized. The patient’s moderate cognitive impairment improved to mild. She also progressed from needing contact guard assistance to being independent with ambulation and most ADLs.

DISCUSSIONS: Anti-NMDA receptor encephalitis is a rare autoimmune disorder due to antibodies attacking the NMDA glutamate receptors presenting with both neurologic and psychiatric manifestations. Patients generally present with a viral-like illness followed by a progression of psychiatric symptoms as well as autonomic instability and dyskinesias. Patients can also present with decreased consciousness, catatonia, and language dysfunction. Diagnosis is usually confirmed with the detection of IgG antibodies to the GluN1 subunit of the NMDA receptor in either the serum or the CSF. Intensive rehabilitation can provide these patients with significant functional gains in both cognitive and motor abilities in a relatively short time. Patients can also benefit from an interdisciplinary approach involving both neurology and psychiatry.

CONCLUSIONS: Patients with anti-NMDA receptor encephalitis can derive significant cognitive and motor gains from an intensive interdisciplinary inpatient rehabilitation program.

ACUTE REHABILITATION MANAGEMENT DIFFICULTIES IN PELVIC LYMPH NODE PENILE CANCER AFTER PENECTOMY AND CHEMOTHERAPY: A CASE REPORT

Jonathan Lee, BS, Miguel Escalon, MD, MPH, Michael Harbus, DO, and Sophia Barchuk, DO
CASE DIAGNOSIS: Squamous cell carcinoma of the glans penis.
CASE DESCRIPTION: The 40-year-old male patient with a history of squamous cell carcinoma of the glans penis with pelvic lymph node recurrence status post penectomy, lymph node resection, and multiple rounds of adjuvant chemotherapy was initially admitted for sepsis. After antibiotic therapy and continuing chemotherapy, he was admitted to acute rehabilitation due to debility and inability to walk. His rehabilitation was limited due to hip pain, knee pain, and lower extremity edema, which required high doses of MS Contin and morphine. Unconventionally, Lasix was effective at reducing the edema thought to be secondary to his lower lymph node resection, which improved his therapy sessions. The patient was able to meet his ambulation goals, but, despite his aggressive care, he was not able to complete any stairs due to weakness and flexion contracture at his hip. Due to his inability to climb stairs to his home, he was discharged to subacute rehabilitation to continue rehabilitation.

DISCUSSIONS: Although penile cancer is rare the U.S., with an estimate of 2080 new cases with 410 deaths in 2018, and regional metastasis recurrence has a poor 5-year survival prognosis of 38%, limited studies have shown that adjunct chemotherapy compared to surveillance may help improve survival rates. In addition, lymph node dissection was associated with improved survival.

CONCLUSIONS: In the future, despite the added complications of penectomy, chemotheraphy, radiotherapy, and lymph node dissections, patients may opt for continued treatment to improve their prognosis. If continued advances are made in penile cancer treatment to increase survivability, including clinical trials, it warrants better studies and guidelines within cancer rehabilitation management and intervention to ensure maximal gain of function and minimization of disability and handicap during those gained survival years.

ADHERENCE TO ONABOTULINUMTOXINA TREATMENT IN POST-STROKE AND MULTIPLE SCLEROSIS PATIENTS WITH SPASTICITY FROM THE ASPIRE STUDY

Alberto Esquenazi, MD, Wuuwei (Wayne) Feng, MD, MS, George F. Wittenberg, MD, PhD, Philippe Gallien, MD, PhD, Alessio Baricich, MD, PhD, Alkosej Zuzek, PhD, Gerard E. Francisco, MD, and Daniel S. Bandari, MD
CASE DIAGNOSIS: To help understand clinical strategies to manage spasticity, we aimed to identify baseline clinical characteristics and treatment-related factors that

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impact adherence to onabotulinumtoxinA treatment in post-stroke and multiple sclerosis (MS) patients from the Adult Spasticity International Registry (ASPIRE) study.

**CASE DIAGNOSIS:** Multicenter, international, prospective, observational registry (ICT01930786). Patients with spasticity were treated with onabotulinumtoxinA at the clinician’s discretion. Clinically meaningful improvements in treatment adherence/non-adherence were used. Treatment adherent: patients receiving 83 treatment sessions with onabotulinumtoxinA during 2-year study; non-adherent: patients receiving 82 treatment sessions. Data were analyzed using univariate and multivariate logistic regression models and are presented as odds ratios (OR) with 95% confidence intervals (CI). Statistical significance was accepted at P<0.05; non-significant effects of clinical interest at P=0.10. Treatment-related factors include data from sessions 1 and 2 only.

**DISCUSSIONS:** In the final stroke model (N=346/411, 288 patients (83.2%) were categorized as treatment adherent, with 5.3 (±1.6 [mean±SD]) sessions, and 58 (16.8%) non-adherent, with 2.0 (±0.0) sessions. Baseline characteristics associated with adherence: European patient (OR:2.91;CI:1.35–6.27;P=0.006), use of orthotics (OR:3.12;CI:1.54–6.34;P=0.002), and prior surgeries/procedures (OR:3.22;CI:0.92–121.7;P=0.068), treatment-related: treatment for thumb-in-palm (OR:2.09;CI:0.93–4.71;P=0.076). Baseline risk factors for non-adherence: higher age at enrollment (OR:0.98;CI:0.95–1.00;P=0.096) and use of assistive devices (OR:0.45;CI:0.20–1.01;P=0.053); treatment-related: treatment interval ≥15 weeks (session 1 to 2; OR:0.42;CI:0.21–0.84;P=0.014), moderate/severe disability on upper limb Disability Assessment Scale pain subscale (OR:3.99;CI:19.09–82.0;P=0.013), and clinician dissatisfaction with onabotulinumtoxinA to manage pain (OR:0.11;CI:0.02–0.59;P=0.099). In the final MS model (n=105/119, 92 patients (87.6%) were categorized as treatment adherent, with 5.4 (±1.6) sessions, and 13 (12.4%) non-adherent, with 2.0 (±0.0) sessions. Treatment for stiff extended knee (OR:9.68;CI:6.58–55.80;P=0.011) was associated with adherence, while treatment for equinovarus foot (OR:0.07;CI:0.01–0.57;P=0.012) and treatment interval ≥15 weeks (session 1 to 2; OR:0.11;CI:0.02–0.76;P=0.025) were treatment-related risk factors for non-adherence.

**CONCLUSIONS:** These ASPIRE analyses can provide real-world insights to improve adherence, and decrease non-adherence, to onabotulinumtoxinA treatment for spasticity to enhance patient care.

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**ALLODYNIA IN CERVICAL POLYRADICULOPATHY DUE TO LOW-VOLTAGE ELECTRICAL BURN INJURY: A CASE REPORT**

Marian Michelle M. Marquez, PTRP, MD, Dorothy Dy Ching Bing-Agsaonay, MD, Carl Froilan D. Leochico, MD, and Anna Cecilia Tiangco, MD

**CASE DIAGNOSIS:** The presentation of a low-voltage electrical burn injury can be diverse as high-voltage burn injury. Neuropathic pain following an electrical injury has been documented, whether as an immediate response or late-onset sequela.

**CASE DESCRIPTION:** A 17-year-old female, right-handed, grade 12 student, had a low-voltage electrical injury with no cutaneous burn noted on the affected extremity. She presented with alldynia that is not proportionate to the clinical findings of a patient with low-voltage electrical injury. EMG-NCV done revealed cervical polyradiculopathy and C5, C6 enlargement on musculoskeletal ultrasound. Medical management, daily physical therapy, occupational therapy and psychological management was instituted which resulted to complete resolution of the patient’s pain and significant improvement in functional outcome.

**DISCUSSIONS:** Neurologic impairment from electrical injury is highly variable in clinical presentation. Limited reports of peripheral neuropathy after low-voltage injury have been documented that is similar to our patient’s clinical manifestation. To our knowledge, no local studies have reported a case of polyradiculopathy with an absent cutaneous involvement in an electrical burn injury setting. Delayed neurological manifestations including complex regional pain syndrome, predominated during the chronic phase after an electrical injury but in our patient, no vasomotor changes and regional osteoporosis were noted during initial examination and admission. Some studies illustrate the extent of chronic pain that some electrically injured patients endure and how a multimodal approach to pain management is required. Our patient responded to a multimodal approach resulting to complete functional recovery with no recurrence of symptoms.

**CONCLUSIONS:** Our patient presented with an atypical course of neuropathy following a low-voltage electrical injury. The management of this patient highlights the importance of a multimodal approach, as electrical neuropathic pain is a highly individual experience, and there is no one medication nor non-pharmacologic modality alone that can adequately resolve pain for these patients.

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**ALTERNATING HEMIPLEGIA OF CHILDHOOD**

Yaritz M. Astudillo, MD Candidate, and Mohammad Islam, MD

**CASE DIAGNOSIS:** Alternating Hemiplegia of Childhood (AHC).

**CASE DESCRIPTION:** Our patient is a 7 years old male with a history of global developmental delays and diffuse hypotonia who presented due to acute weakness and abnormal movements of his right side. On exam, the patient had a hemiplegic gait with right knee dragging his right foot laterally. The right upper extremity had increased tone with fist contraction and bilateral ankle clonus was observed. He displayed stereotyoes of the arms and hands which began a year prior. MRI studies were normal with no focal findings. Parent reported previous shorter “attacks” of hemiplegia. He had persistently low weight (BMI of 13.5), likely due to a hypermetabolic state from ongoing hand tremors and dystonic movements. Genetic testing revealed a de novo ATP1A3 related mutation, leading to a diagnosis of Alternating Hemiplegia of Childhood (AHC).

**DISCUSSIONS:** AHC is characterized by episodic neurologic dysfunction including alternating hemiparesis, dystonia, quadriaparesis and/or seizures1. Our patient exhibited a prolonged episode of hemiplegia and dystonia. He exhibited increased falls, stereotyped movements and intermittent resolving hemiplegia. All of which are characteristic of AHC. ATP1A3 related mutations lead to dysfunction of the Na,K-ATPase, however, it is unclear how this leads to AHC and related phenotypes 1-4. Our patient has a rare diagnosis and given there is only symptomatic treatment, early diagnosis is crucial. He is following the appropriate course of treatment which includes rehabilitation, ankle-foot-orthosis, and an interdisciplinary approach.

**CONCLUSIONS:** This report highlights a presentation of Alternating Hemiplegia of Childhood in a patient with genetic confirmation and remarkable clinical presentation. Given the rarity of AHC, better understanding of ATP1A3 related mutations and clinical presentations are imperative in the proper treatment of patients for improved care and quality of life. Thus, this case provides insight and an increased understanding of this condition.

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**AMNIOTIC STEM CELL INJECTION PROVIDING PAIN RELIEF, FUNCTIONAL IMPROVEMENT, AND ITS EFFECT ON RADIOLOGICAL IMAGING FOR REFRACTORY KNEE OSTEOARTHRITIS AND MENISCUS TEARS: A CASE REPORT**

Fady Boutros, MD, Edward Barawid, DO, and Nathaniel Dusto, MD

**CASE DIAGNOSIS:** Chronic knee pain is a condition that affects up to 25% of adults and is a frequent complaint in musculo-skeletal clinics. Amniotic stem cell injections are an up and coming intervention for which outcomes are still being studied. Here we present a case of an individual who achieved significant reduction in knee pain as well as radiologic evidence of improvement following amniotic stem cell injections.

**CASE DESCRIPTION:** The patient is a 55 year old veteran who with bilateral knee pain. The patients pain ranged from 7-10/10 on the VAS and limited his ability to ambulate more than 2 miles, stand for 30 minutes, and drive for less than 15 minutes. X rays showed bilateral moderate osteoarthritis. Left knee MRI showed a complex tear of the lateral meniscus and partial medial meniscectomy and recurrent complete tear of the body and posterior horn of the medial meniscus. R knee MRI showed a complex tear of the lateral meniscus and partial medial meniscectomy and high-grade trochlear chondromalacia. He had previously undergone steroid injections, hyalgan injections, PT/OT and aqutatherapy as well as NSAIDS. Patient underwent bilateral knee amniotic stem cell injections.

**DISCUSSIONS:** Following a single injection of amniotic stem cells in each knee, the patient had significant and sustained improvement in pain and function for 6 months. Within one week he was able to ambulate 5 miles, stand for greater than 60 minutes, and drive for up to 1.5 hours. Notably, the patients radiologic findings improved over this time span as well, Xray evidence of arthritis was downgraded from moderate to mild. New MRI results are still pending at this time.

**CONCLUSIONS:** This case highlights the potential of amniotic stem cell injection in relieving knee pain and improving function refractory to more common therapies. In addition, amniotic stem cell injections resulted in improvement in severity of knee osteoarthritis evident on radiologic studies.

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**AN ASSOCIATION OF INFLAMMATORY MONOARTHRITIS WITH PEMBROLIZUMAB THERAPY: A CASE REPORT**

Chelsea D. Frost, MD, MS, and Nicole Kelleher, MD, MPH

**CASE DIAGNOSIS:** Melanoma is the 6th leading cancer type and comprises 5% of dermatologic cancers, however accounts for 80% of skin cancer deaths annually. Pembrolizumab is an immune checkpoint inhibitor and the first anti-program-death-1 (PD1) drug licensed by the Federal Drug Administration for treatment of melanoma. Side effects are generally mild and easily managed. As it works via activation of immune response, it can result in immune-related adverse events (irAEs) with < 1% reported incidence of inflammatory arthritis.

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CASE DESCRIPTION: 60yo female with metastatic melanoma being treated with pembrolizumab and high dose prednisone presented with sudden onset right knee pain and swelling. No associated trauma or activity change, though prednisone dosage recently decreased. Pain localized to anterior aspect of knee both superior and inferior to patella. Exam noted large effusion with decreased range of motion. Ultrasound negative for thrombosis and x-ray negative for acute abnormality. Synovial fluid consistent with inflammatory arthritis. Patient experienced symptom improvement following intra-articular steroid injection, increased prednisone dosage, and pembrolizumab discontinuation. As prednisone was again tapered she developed recurrent knee pain and swelling. She received symptom improvement with repeat intra-articular injection and increasing prednisone dosage again with plans for an even slower taper.

DISCUSSIONS: To our knowledge, this is the first reported case of recurrent inflammatory monarthrosis following pembrolizumab discontinuation. Assessment did not reveal known inflammation causes suggesting symptoms were the result of the anti-PD1 antibody pembrolizumab. As pembrolizumab-induced inflammatory arthritis can occur after therapy discontinuation, it may be under-reported in this population.

CONCLUSIONS: Melanoma is one of the leading types of cancer and comprises the majority of skin cancer deaths annually. Pembrolizumab is an FDA approved treatment with generally mild or well-tolerated side effects, however severe irAEs can occur. When a patient presents with joint pain and is currently or recently treated with pembrolizumab, pembrolizumab-induced arthritis should be on the differential.

AN ECONOMIC EVALUATION OF PHYSICAL MEDICINE AND REHABILITATION REMOTE OUTREACH CLINICS IN CANADA
Janine N. Reid, BS C, MD, and Karen Ethans, BSC, MD, FRCP C

CASE DIAGNOSIS: Healthcare access is inequitable for rural and remote communities in Canada, approximately 20% of the population. Rehabilitation patients often travel overnight at great expense to receive outpatient care, compounded with physical and cognitive limitations. Specialist outreach can increase access, however there is no international literature documenting this rare form of rehabilitation care. Physical medicine and rehabilitation outreach clinics were developed with two remote communities in Canada. This study evaluates the costs of the outreach clinics compared with conventional urban clinics.

CASE DESCRIPTION: A cost-minimization analysis was developed to calculate the societal costs of outreach clinics compared to potential costs of conventional clinics. Outcomes of interest included direct costs to government health services, patients, and indirect opportunity cost of travel time. The total costs of the outreach and conventional clinics, the average unit cost per patient visit, and costs savings per patient visit were calculated in Canadian dollars.

DISCUSSIONS: 31 patients with 48 visits were seen in 6 outreach clinics. The total cost of outreach clinics was $30,010.93. The total potential cost of conventional clinics was $152,577.17. The average per unit cost for outreach visits was $625.23, compared to $3,178.69 for conventional visits. This represents a costs savings of $2,553.46 (80%) per outreach visit compared to conventional visit.

CONCLUSIONS: Estimated societal costs savings of physical medicine and rehabilitation remote outreach clinics compared to conventional urban clinics in Canada are 80%. Most direct costs are accrued by the Canadian public healthcare system. However, for patients not receiving funding for travel, conventional care access is prohibitive. Further, 4 patients seen in outreach cannot fly commercially, and air ambulance costs to access conventional care were not included. The current global medical literature does not adequately address indirect costs of health outcome changes from rural specialist outreach, and its absence limits this economic analysis within a complex healthcare system.

AN INTERNATIONAL, MULTICENTER, OBSERVATIONAL, LONGITUDINAL STUDY TO ASSESS THE EFFECTIVENESS OF ABOBOTULINUMTOXINA INJECTIONS FOR ADULT LOWER LIMB SPASTICITY: THE ABOLISH STUDY
Alberto Esquenazi, MD, Stephen Ashford, PhD, FCS, Allison Brashear, MD, MBA, Pascal Maisonneuve, MSC, and Andreas Lysandropoulos, MD

OBJECTIVES: To assess the longitudinal attainment of person-centered and function-related goals after one or more abobotulinumtoxinA injections in the lower limb over 16 months in a real-life clinical setting.

RESULTS: The ABOLISH study is a prospective, international, longitudinal real-life clinical observational study. Eligible participants are aged ≥18 years with unilateral adult lower limb nonprogressive spasticity, able to take ≥5 steps with or without assistance, and for whom the decision has already been made to inject

AN INNOVATIVE MOBILE HEALTHCARE TECHNOLOGY WITH INCREASED ADHERENCE AND DATA COLLECTION CAPABILITIES
Vikram Madan, MPH, Sandeep Yerra, MBBS, Sadee Ghasempour Soleymani, MD, Stephanie Rand, DO, and Matthew N. Bartels, MD

OBJECTIVES: Healthcare mobile applications are increasingly becoming an integral part of healthcare delivery. A healthcare mobile application specific to physical medicine and rehabilitation (PM&R) has been launched by PtPal ©. This paper reports the utility and outcomes of this application in our hospital’s outpatient PM&R department.

RESULTS: For each researcher, PtPal had no errors when transcribing from the application to Microsoft Excel for each of the 5 instances of transcription. For the manual entry, each researcher averaged 1.8 errors per transcription. Time spent and accuracy of data extraction from PT pal was measured and compared to the manual entry of the same dataset. Time spent entering data and accuracy of data entry was measured 5 times over for the 30-point dataset for each of the three researchers.

RESULTS: PtPal is an application which is more accurate and time-efficient than the traditional model of collecting patient information through paper questionnaires and then transcribing them to excel. Transcribing by the researchers was error-free as it was a copy and pasting method instead of manually entering from a paper questionnaire. Patient reported outcomes are integral for any clinic, and PtPal integrates the collection of data and creates a more user-friendly method of data collection. PtPal increases the efficiency of the clinic and the accuracy of the data collected.

AN EXERCISE PROGRAM TO IMPROVE PHYSICAL FITNESS IN PATIENTS WITH CKD IN K/DIGO STAGE 4: A QUASI-EXPERIMENTAL AND AUTO-CONTROLLED STUDY
Carlos Omar López López, PhD, MD, Veronica Liliana Ruiz Medina, MD, Maria de la Luz Montes-Castillo, MD, Janitizia Vázquez-Mellado, PhD, MD, Maria Guadalupe Olivera-Soto, PhD, and Rafael Valdez-Ortiz, PhD, MD

OBJECTIVES: A sedentary lifestyle is an independent and important risk factor to renal function and functional independence in patients with chronic kidney disease (CKD). Around of 52% patients with CKD don’t perform exercise during their daily routine. The purpose of this study was to evaluate the benefits of an exercise program using the elastic band and resistance training exercise to improve the physical fitness in patients with advanced CKD.

OBJECTIVES: An international, multicenter, observational, longitudinal study to assess the effectiveness of abobotulinumtoxinA injections for adult lower limb spasticity: the ABOLISH study
AN MSK DIAGNOSIS MASQUERADING AS UPPER MOTOR NEURON SYNDROME

Cameron Fausett, MD, and Charles Sisung, MD

CASE DIAGNOSIS: Osgood-Schlatter Disease.

CASE DESCRIPTION: An 11 year old girl presented to inpatient rehabilitation with severe cognitive impairments after sustaining a non-traumatic brain injury second-ary to a ruptured arteriovenous malformation. On initial assessment she had increased velocity-dependent tone in her bilateral elbow flexors and ankle dorsiflexors consistent with spasticity. Over subsequent days she began maintaining her left knee in extension and would grimace during attempts to flex her knee. It was suspected that this posture was also spasticity in the setting of her recent brain injury and plans were made to administer botulinum toxin. However, on further exam, there was notable swelling of the left knee prompting further work up. X-rays of her knee were significant for Osgood-Schlatter disease. Instead of pursuing spasticity treatment, a course of ibuprofen was prescribed and the patient soon began to voluntarily bend her knee. This led to improved positioning in her wheelchair and decreased caregiver burden with transfers.

DISCUSSIONS: This case highlights the diagnostic challenges faced in patients with underlying brain injuries. The patient was cognitively impaired and thus unable to give a history. In addition, the patient presented with knee extension, which is both an unusual presentation for Osgood-Schlatter disease and mimicked the extension posture sometimes seen in brain injured patients. Finally, she had underlying spasticity, which biased the team’s differential diagnosis.

CONCLUSIONS: This unique presentation of Osgood-Schlatter disease highlights the importance of keeping a broad differential diagnosis and the importance of a thorough physical exam. In this particular incident a thorough physical exam led to further work up which saved the patient from an unnecessary and potentially harmful procedure (botulinum toxin injection).

AN UNUSUAL CASE OF FEMORAL NEUROPATHY

Alexandra Coelho, Resident, Joana Martins, Resident, Ana Margarida Ferreira, Specialist, João P . Branco, PhD, ST, and João P. Pinheiro, PhD

CASE DIAGNOSIS: Isolated unilateral femoral nerve neuropathy is an unusual complication after pelvic surgery and renal transplantation. Femoral neuropathy is a serious complication which compromises the postoperative recovery and prolongs the patient's hospital stay.

CASE DESCRIPTION: A 37-year-old man with end-stage renal disease due to obstructive uropathy was transplanted in the left iliac fossa. After surgery, he was unable to stand up. Clinical examination revealed weakness of the flexion of the hip and the extension of the knee, hypotonia in anterior surface of the thigh and absence of patellar tendon reflex. The patient is undergoing a rehabilitation program with recovery of walking ability.

DISCUSSIONS: The clinical presentation varies according to the location of injury and may include atrophy, weakness, sensory loss, abnormal femoral muscle, absence or diminution of the patellar tendon reflex, and sensory disturbances. To understand the clinical presentation and pathogenesis of femoral neuropathy it’s necessary to know the femoral nerve’s anatomy and its course in the pelvis. Direct or indirect trauma to the femoral nerve by the retractors probably plays a major role, but interruption of the blood supply or hematoma formation close to the femoral nerve may also play an additional role. Electromyography and nerve conduc-tion electrodiagnostic studies are helpful when trying to locate anatomically a nerve lesion, and additionally, offers prognostic information. The early establishment of a rehabilitation program can improve outcomes.

CONCLUSIONS: The neuropathy of the femoral nerve is an unusual but dis-abling complication after renal transplantation. The prognosis of recovery depends upon the severity of the damage to the femoral nerve and it’s generally favorable in the presence of nerve integrity. Rehabilitation needs to be instituted as first-line treat-ment for optimal functional recovery.

AN UNUSUAL CASE OF SUDDEN ONSET PARAPARESIS IN A PEDIATRIC PATIENT: A CASE REPORT

Ana Ortiz-Santiago, MD, and Eduardo Ramos, MD

CASE DIAGNOSIS: Surfer's Myelopathy.

CASE DESCRIPTION: Case of a 13-year-old right-handed healthy male ath-lete presenting with sudden pressure-like, intense low back pain on 7/30/19. Patient had completed his first 3-hour surfing lesson while on vacation. Within an hour, he had difficulty voiding and standing. At the ER, 900cc were obtained upon bladder catheterization. Weakness progressed with foot drop, upper motor neuron signs, im-paired proprioception, pinprick, and soft touch from L1 down, rectal tone intact. A thoracolumbar CT was remarkable for central T7-T8 hypertensities. Given rapid progression, thoracic acute atraumatic myelopathy, Surfer’s Myelopathy, was suspected and high dose steroids and vasopressors were administered. Workup for infl-amatory, coagulopathy or infectious processes were negative. Lower extremities regained strength with physical therapy at bedside. He was transferred to an inpatient rehabilitation facility to continue rehabilitation.

DISCUSSIONS: Surfer’s myelopathy is rare cause of an atraumatic spinal cord lesion mostly described in novice surfers. It was first described in 2004 and 66 cases have been described today. Symptoms emerge within 1 hour with back pain, paresthe-sias followed by paresis with sacral involvement. It is thought to be due to prolonged hypotension causing spinal cord ischemia. Given the rarity of the diagnosis, other common causes must be ruled out. MRI has demonstrated T2 hypertensities in the central cord with midthoracic swelling. Early invasive treatment must be started upon suspicion to minimize permanent complications. If within 3 hours from symptom on-set, the NASCIS III methylprednisolone protocol may be considered. Elevated MAP >85mmHg for the initial 5-7 days yields better neurorecovery.

CONCLUSIONS: Novice surfers tend to remain in static hypotension placing them at risk for a detrimental atraumatic myelopathy. Recognizing this condition acutely may be the best measure to prevent permanent damage. Evidence based man-agement is not determined, but awareness to physicians and surfers alike increases early recognition, diagnosis and treatment, improving quality of life.

ANALYSIS OF THE IMPACT OF REHABILITATION ON DIAGNOST PATIENTS GUILLAIN BARRÉ SYNDROME: A SYSTEMATIC REVIEW

Daniel Figueirêdo, MD, Marianne Figueirêdo, Zineide Cunha, and Janaína Bauab

DISCUSSIONS: The systematic review of rehabilitation had a positive impact on the improvement of the variables studied by patients with GBS sequence.

ANKYLOSING SPONDYLITIS MISSED DIAGNOSIS IN MULTIPLE SCLEROSIS, A CASE REPORT

Prasanth N. Nishabhavan, PMR, Fellow SGH, and Salem A. Alkandari, HOD

CASE DIAGNOSIS: 44 yr old Kuwaiti gentleman chronic smoker, Known MS since 2005 c/o Weakness and Numbness in legs. Treated with Biologicals. Currently Copyright © 2020 Wolters Kluwer Health, Inc. All rights reserved.
on Tab. Gilenya. He was able to walk short distance until 2016. Admitted for MS Rehabilitation in PMR Hospital Kuwait in 2019. Also Severe back pain, Neurogenic Bladder and Bowel. Spasticity grade 3. Backpain as a Barrier in Rehabilitation, severe Back pain, Weakness, Spasticity Neurogenic Bladder and Bowel are Functionally and Medically debilitating. Medical Management started with Indomethacin, Physiotherapy for Pain management and Exercise for AS. Occupational Therapy for Functional, Wheelchair Transfer Training. Inj Botox given for Hip Adductors, Hamstrings Gastrosoleus and Backlfn Oral given. Bladder shows high Residual Volume. Patient Not willing for self Intermittent Catheterization. Bowel Training with Suppositories At end of 3 Months Rehabilitation He is able to walk with walker Indoor. Regarding saftey, Electric wheelchair for Ambulation Pain is better with Indomethacin and Neurontin.

DISCUSSIONS: Rehabilitation Problems are Co existing MS and AS. Both are Progressive and Debilitating. Early Diagnosis and Treatment, Rehabilitation is crucial for Maximum Possible Functional Achievement. Team of Rheumatologist, Physiatrists and Rehab professionals, Neurologists, involved. Clinically, Patient was complaining with Paraplegia, Backpain, Neurogenic Bladder and Bowel. Functionally Bedridden while Admission, after 3 Months able to walk on walker Indoor under supervision. FIM Score improved 56 to 78. Patient was not aware of AS and its outcome. In Literature Many Cases Reported Co Existing MS and AS.

CONCLUSIONS: Patient had MS since 2005 and Delayed in Diagnosis and Management of Ankylosing Spondylitis. Patient was able to use walker until 2016. Early Intervention with Multidisciplinary Rehabilitation and Medical Team is Mandatoty as Time Factor affect Prognosis in Both Medically and Functionally.

ANTI-NMDAR ENCEPHALITIS IN A 9-YEAR-OLD BOY
Moorice Caparo, MD, and Susan Quinn, MD

CASE DIAGNOSIS: Anti-NMDAR Encephalitis.

CASE DESCRIPTION: A 9-year-old previously healthy boy presented with a first-time 2-minute seizure preceded by gastrointestinal symptoms. Seizure was followed by 30 minutes of confusion. During the following days the patient had two similar episodes, which led to his inpatient admission. Neurological exam demonstrated delayed language and generalized weakness. He became nonverbal and increasingly agitated over the course of his admission. He underwent an extensive workup pertinent for Anti-NMDAR antibodies on CSF. Patient was diagnosed with Anti-NMDA receptor encephalitis (ANRE) and treated with a regimen of high-dose pulse solumedrol followed by steroid taper, IVIG, rituximab, and cytoxan. Work-up pertinent for Anti-NMDAR antibodies on CSF. Patient was diagnosed with ANRE and treated with a regimen of high-dose pulse solumedrol followed by steroid taper, IVIG, rituximab, and cytoxan.

Anti-NMDAR Encephalitis (ANRE) is a rare autoimmune encephalitis that presents with a variety of neuropsychiatric symptoms, including seizures, delirium, agitation, and memory loss. The condition is often associated with antibodies against the N-methyl-D-aspartate (NMDA) receptor, which plays a critical role in synaptic transmission and plasticity.

Diagnosis: ANRE is a diagnosis of exclusion, and the presence of specific antibodies is necessary for definitive diagnosis. The patient was initially diagnosed with ANRE based on the clinical presentation and typical laboratory findings, including positive anti-NMDAR antibodies on cerebrospinal fluid (CSF).

Treatment: The patient was treated with a high-dose pulse of solumedrol followed by steroid taper, IVIG, rituximab, and cytoxan. These therapies are used to prompt immunosuppression and reduce inflammation. Close monitoring and treatment of complications, such as seizures and delirium, are also crucial.

Prognosis: The patient made a good recovery with improved language and generalized weakness. He became nonverbal and incoherent; however, significant improvement was noted with aggressive physical therapy and music intervention.

Are tilted writing and drawing after stroke related to a biased perception of the vertical?
Flora Daïane, Anais Verdirer, Rémi Gimat, Shenhao Dai, MD, PhD Candidate, Patrice Davoine, Anne Chrispin, Marie Jaeger, Caroline Jolly, Monica Baciu, Céline Piscicelli, PhD, and Dominick Pérenno, MD, PhD

OBJECTIVES: Establish diagnostic criteria for tilted writing and drawing after a right hemispheric stroke (RHS), test their feasibility and validity, use them to assess writing and drawing orientation on 61 post stroke individuals, search a link between these criteria, verticality perception and spatial neglect.

METHODS: In our single site study, discharge documentation of needed primary care physician (PCP) and psychiatry (PM&R) follow-up were missed far more often than other specialty appointments at 68% and 26% respectively compared to 7% for all other specialties combined. Excluding PM&R and PCP, Fisher's exact comparing unscheduled appointments to those of other medical specialties was significant only for neurology (p = 0.01).

RESULTS: From the total 721 identified appointments, documentation of needed primary care physician (PCP) and psychiatry (PM&R) follow-up were missed far more often than other specialty appointments at 68% and 26% respectively compared to 7% for all other specialties combined. Excluding PM&R and PCP, Fisher's exact comparing unscheduled appointments to those of other medical specialties was significant only for neurology (p = 0.01).

CONCLUSIONS: In our single site study, discharge documentation of needed PM&R, PCP, and neurology follow-up were less consistently scheduled. Further investigation should be performed to elucidate etiology and potential interventions to reduce unscheduled appointments with additional focus on these three medical areas.
verticality perception. The mean lines tilt should be systematically assessed after a RHS in order to diagnose and rehabilitate a biased perception of verticality.

**ARTHROGRYPOSIS MULTIPLEX CONGENITA TYPE II: A CASE REPORT**

Ranavindrambola Ando Tatiana, Physiatrist, Tidahy Ando Servino, Resident, Randrianasolo Ruth Pascale, Resident, Humaid Francis Allen, Pediatric Surgeon, and Solofomalalana Gaetan Duval, Orthopaedic Surgeon

**CASE DIAGNOSIS:** Arthrogryposis Multiplex Congenita is a congenital disorder characterized by non-progressive multiple joint contractures affecting one or more areas of body, muscle weakness, and fibrosis. This term includes a heterogeneous group of diseases, of neurological, neuromuscular, genetic or mechanical origin. Two types of classification have been developed: a clinical one (types I, II and III) and an etiological one. A multidisciplinary approach is needed for better care and appropriate follow-up.

**CASE DESCRIPTION:** It is a case of arthrogryposis multiplex congenita type II. A 9 month old infant, with an antecedent of low levels of amniotic fluid, so maturation of a small sample size. It included 15 women/2 men, 23.5% had severe deficiency in respiratory functions, 100% had alterations in the structure of the respiratory system. More than 80% had no difficulty performing single or multiple tasks.

**DISCUSSIONS:** In infants with arthrogryposis, joint stiffness is maximal at birth but before any surgical intervention by age, sex, or insurance status after controlling for age and found in their study that at 9 months of age, many of these infant’s impairments of body function and structure, functional activity limitations and participation restrictions were improved. The program of stretching, muscle strengthening, facilitation of motor skills, orthopedic intervention, and parent education may have contributed to this infant’s progress. Prospective intervention studies exploring specific intervention strategies are needed to establish the plan of care for this patient.

**CONCLUSIONS:** Arthrogryposis describes a set of joint contractures present from birth and non-progressive. The common physio pathological mechanism is foetal immobility syndrome. Multidisciplinary care is necessary and should be early and continued in order to gain the maximum autonomy and facilitate social integration.

**ASSESSING FACTORS INFLUENCING DISCHARGE DISPOSITION FOR PEDIATRIC PATIENTS WITH INPATIENT REHABILITATION REQUIREMENTS**

Valentine Chukwuma, PhD, R. Sterling Haring, DO, MPH, Sarah A. Welch, DO, Elizabeth Martin, MD, MPH, MHS, Katherine M. Hedden, PT, DPT, PCS, Camille Marsden, MOT, OTR/L, and Philip J. Davis

**CASE DIAGNOSIS:** To evaluate the impact of age, sex, insurance type, and primary diagnosis on the discharge disposition of pediatric patients with inpatient rehabilitation needs.

**CASE DESCRIPTION:** We identified children discharged from a large children’s hospital with a recommendation for inpatient rehabilitation (IRF), and examined correlations between discharge disposition and age, sex, primary admission diagnosis and insurance type. Standard descriptive statistical methods were employed. We constructed a logistic regression model to identify primary predictive factors after controlling for other variables; a sensitivity model employed bootstrapping to reduce bias and standard error.

**DISCUSSIONS:** 202 children met inclusion criteria and the mean age was 9.8 years. Despite all included children having inpatient rehabilitation recommendations, only 101 (50.0%) were discharged to IRF, with no correlation to sex (p=0.884) or age (p=0.485). While privately insured children tended to have higher rates of discharge to inpatient rehabilitation than government-insured children, this was not significant (p=0.103). Logistic regression modeling showed no significant differences in odds of discharge to inpatient rehabilitation by age, sex, or insurance status after controlling for other variables. Children with a primary diagnosis of polytetraum (OR=30.6, p=0.003), spinal cord injury (OR=19.4, p<0.001), stroke (OR=16.0, p=0.002), or brain injury (OR=12.4, p<0.001) were more likely to be discharged to inpatient rehabilitation than those with a primary diagnosis of amputation. There were no significant correlations between age and insurance, or diagnosis and insurance.

**CONCLUSIONS:** About half of the children recommended for inpatient rehabilitation were discharged to IRF. While no significant correlation was seen between discharge disposition and insurance type, age, or sex, children with severe primary diagnoses were more likely to be successfully discharged to an inpatient rehabilitation facility. Future studies utilizing larger sample sizes, or data from multiple centers, can provide insights on ways of improving rates of rehabilitation among this vulnerable population.

**ASSESSING SPINAL CORD STIMULATION TREATMENT RESPONSE WITH OSIWESTRY DISABILITY INDEX SCORES AND TOTAL MORPHINE EQUIVALENT USAGE**

Jerry Lin, DO

**OBJECTIVES:** Assess whether spinal cord stimulation treatment is beneficial for patients with radicular low back pain and/or lower extremity neuropathic pain.

**DESIGN:** Patients were offered a spinal cord stimulation trial if they failed conservative treatments and/or wanted to reduce their opioid intake. The ODI was used to track overall function of patients before and during the trial. If applicable, the patient's total MEQ usage was recorded before the trial and after implantation. Patients were referred for implant if they reported 50% reduction in pain.

**RESULTS:** Nineteen patients underwent spinal cord stimulation trial. The patients' primary diagnoses included 11 with failed back surgery syndrome, 7 with lumbar sacral radiculopathy, and 1 with neuropathic pain secondary to Guillain-Barre Syndrome. Three of the FBSS patients failed the trial. One lumbar sacral radiculopathy patient could not have implantation due to health reasons. Excluding the failed trials, 15 of 16 patients had reduction of their ODI scores. The greatest ODI reduction was 78% and the average reduction was 43%. Twelve patients were on opiate medication before the implantation. Four patients came off opiates completely, 3 patients reduced their total MEQ, and 3 remained on the same total MEQ. Two patients had an increase in total MEQ. One patient is pending implant.

**CONCLUSIONS:** Overall, spinal cord stimulation treatment appears to be a helpful alternative that should be considered for patients with radicular low back pain and/or lower extremity neuropathic pain who have failed conservative treatments. Out of 16 patients, 15 had reduced ODI scores and 7 of 12 patients were able to come completely off or reduce their opiate intake. Limitations of the study include low number of cases and possibly placebo effect. It would be useful to follow patients over a longer period of time to determine if ODI scores change and if reduced opiate intake persists.

**ASSESSMENT OF DISABILITY IN BRONCHIECTASIS NOT ASSOCIATED WITH CYSTIC FIBROSIS, USING THE INTERNATIONAL CLASSIFICATION OF FUNCTION, DISABILITY AND HEALTH**

Juan Carlos Garcia Hernandez, Physical and Rehabilitation Medicine, Pulmonary Rehabilitation, Susana Galicia Amor, Physical and Rehabilitation Medicine, Pulmonary Rehabilitation, Esperanza De Lourdes Trojo Mellado, Physical and Rehabilitation Medicine, Pulmonary Rehabilitation, and Sandra A. Garcia, Physical Medicine and Rehabilitation / Pulmonary Rehabilitation

**OBJECTIVES:** To describe the functionality of patients diagnosed with bronchiectasis not associated with cystic fibrosis using the international classification of functioning, disability and health.

**DESIGN:** Observational, descriptive, cross-sectional study. Non-probabilistic sampling for convenience. We included men and women with clinical and radiographic diagnosis of bronchiectasis not associated with cystic fibrosis from the Department of Pulmonary Rehabilitation. The representative items of the international classification of function and health described function, structure, activities, participation and environmental factors for this health condition were selected. Descriptive statistics were applied.

**RESULTS:** It included 17 patients, 15 women/2 men, 23.5% had severe deficiencies in respiratory functions, 100% had alterations in the structure of the respiratory system. More than 80% had no difficulty performing single or multiple tasks. Products and substances for personal consumption are complete facilitator for 89.2%. 42.1% perceive close relatives as full facilitator and 47.1% consider health professionals as full facilitators. 17.6% consider social attitudes as a moderate barrier. 11.8% consider social norms, customs and ideologies as a moderate barrier. Assessment of the global functionality and/or self-perception of disease-related quality of life it is very important. It is important to recognize the impact on daily life and social participation of diseases that lead to limitations in activities or restrictions on people’s participation.

**CONCLUSIONS:** It’s necessary to consider more patients from different age groups, to establish the sociodemographic profile and functionality for this health condition. Similarly, greater use of ICF is required to identify actions to benefit this disease. The patients studied are not perceived as disabled.
ASSISTED LIVING AS A NEW FORM OF LIFE ORDER AF PERSONS WITH DISABILITIES IN THE RUSSIAN FEDERATION

Ludmila A. Kozhushko, PhD in Medicine, Kristina N. Rozhko, MIA, and Valeria A. Gladstein, MIA

OBJECTIVES: Ratification by the Russian Federation the Convention on the Rights of Persons with Disabilities (CRPD) in 2012 caused the transition to a new human rights model of disability based on a biopsychosocial approach and aimed at empowering people with disabilities. Within the framework of this model, ideas of an independent living (or as it is called in Russia – assisted living) of people with disabilities began to develop, the first apartments and departments of assisted living appeared, allowing people with disabilities to live independently. It means that a way to the deinstitutionalization of specialized residential care facility was taken. In this context, the development of technologies of assisted living is relevant and socially significant. The purpose of the study is to assess the availability of technology of assisted living for persons with disabilities in the Russian Federation.

DESIGN: Monitoring study of materials submitted by executive authorities of 85 regions of the Russian Federation was conducted. Information was collected by the method of continuous statistical observation, analysed and summarized.

RESULTS: The results of the study showed that as at January 1, 2019, the technology of assisted living was introduced in 68 regions of the Russian Federation (80.0%). In 18 regions, this is only the initial stage of development, when the regulatory framework is worked, the source of financing is determined, accommodations are selected, and candidates are selected. In 43 regions, the stages of training for assisted living were integrated, during which the disabled are trained in self-care and independent living skills. In 47 regions, the 3rd stage is already being implemented that is assisted living for persons with disabilities in the Russian Federation.

CONCLUSIONS: This study has shown a shortage of the supply of rehabilitation care and its inadequacy to the needs of PwD. RS should be integrated into health systems and between primary, secondary, and tertiary levels. A multidisciplinary rehabilitation workforce should be available. Both community and hospital RS should be available. Hospitals should include specialized rehabilitation units for inpatients with complex needs. Financial resources should be allocated to RS.

ASSOCIATION OF SCOLIOSIS AND AGE, BMI AND DURATION OF TRAINING IN ADOLESCENTS PRACTICING SWIMMING

Slavica D. Jandric, PROF, Predrag Krugulji, MD, Drenka Šćerov Zecević, ACADEMICIAN, and Ljiljana S. Milasinovic, MD

OBJECTIVES: The presence of scoliosis in adolescents could be associated with age, anthropometric parameters and specific physical activity in adolescents who have practiced swimming. The aim of this study is to investigate association between presence of scoliosis with age, BMI and duration of training in adolescents who have practiced competitive swimming.

DESIGN: This investigation involved 90 adolescents who practiced swimming (45 girls and 45 boys), average age of 11, 7±1, 3 years, range from 10 to 14 years. Modified original The physical activity and postural disturbance test was used for the investigation. BMI was measured, and age and duration of training in adolescents who have practiced competitive swimming were registered for each participant. Average value of BMI was 18.6±3.2 kg/m2. The average duration of engagement in swimming training was 3±2 years. For statistical analysis ANOVA test was used in order to estimate association between presence of scoliosis and age, BMI and duration of training in adolescents who have practiced swimming. Differences were statistically significant on the level of p<0.05.

RESULTS: It was shown that there was no statistically significant association between presence of scoliosis and duration of training in adolescents who have practiced swimming (t=-3.35, p=0.005) but there is significant association between presence of scoliosis and BMI and age (t=-3.898, p<0.001, t=-2.296, p<0.05, respectively).

CONCLUSIONS: Presence of scoliosis in adolescents who have trained swimming did not show statistically significantly association with duration of training. Age and lower values of BMI are significantly associated with scoliosis. These findings could be useful in practice and further investigation.

ATYPICAL CHARCOT TOOTH MARIE

Yaritzy M. Astudillo, MD Candidate, and Mohammad Islam, MD

CASE DIAGNOSIS: Atypical Charcot Tooth Marie (CTM)
CASE DESCRIPTION: Patient is a 9 year old male presenting with progressive unspecified myopathy, bilateral lower extremity weakness and pain along with elevated ESR and CK. He had started having difficulty with stairs and had a fall at school. On exam, he exhibited a wide based gait, absent bilateral lower extremity DTRs and inability to produce a heel walk or toe off. Given his clinical presentation and age, EMG and genetic testing were ordered. EMG revealed evidence of motor axonal and demyelinating neuropathy of the lower extremities as seen in CMT disease. A comprehensive genetic panel revealed a Variant of uncertain significance (VUS) in the gene for Pompe Disease and negative for CMT or related diseases. With these clinical findings and genetic testing, he was found to have an atypical presentation of CMT.

DISCUSSIONS: CMT characterized as “peroneal muscular atrophy” is a heterogeneous group of inherited neuropathies. Our patient had a remarkable presentation of progressive weakness, areflexia, muscular atrophy and neuropathy 1-2. EMG and genetics can be vital in diagnosis 3. Most CMT types have a PMP22 mutation, an important gene to screen along with several other known genes 4. However, as in this patient, diagnosis might not adhere to the genetic profiles of CMT. Our EMG and clinical presentation were conclusive. This patient fulfills the clinical manifestations but not the genetic profile of CMT. It is not uncommon to be genetic negative. CMT has been characterized by the discovery of new implicated genes and mutations, thus the genetic profiling is both complex and changing 5-6.

CONCLUSIONS: CMT is a multifaceted diagnosis of supportive treatment. Aids for walking and correction of gait are introduced along with physical rehabilitation. This case highlights the importance of clinical diagnosis while underscoring that genetic negative profiles do not exclude diagnosis.

ATYPICAL PRESENTATION OF ACUTE DISSEMINATED ENCEPHALOMYELITIS (ADEM) IN A YOUNG ADULT
Megha Mandalaywala, DO, Alexander Brahmsteadt, BS, Eric Westerbeck, MD, and Kelly Crawford, MD

CASE DIAGNOSIS: Acute Disseminating Encephalomyelitis (ADEM)

CASE DESCRIPTION: A 23-year-old female with history of prediabetes and morbid obesity presented with bilateral blindness following 10 days of headache with viral prodrome. Initial ocular ultrasound was negative for retinal detachment; head CT was negative for a cerebrovascular event. Pseudotumor cerebri was suspected but lumbar puncture attempt failed, prompting EVD placement. Subsequent MRI revealed multiple demyelinating lesions in periventricular deep white matter of the basal ganglia, midbrain, cerebellum, and bilateral optic nerves. EVD was discontinued after ruling out pseudotumor cerebri, and further lab work returned negative for meningitis, thus increasing suspicion for Acute Disseminating Encephalomyelitis (ADEM). High-dose steroid therapy and plasma exchange were initiated during exercise is also beneficial to mitochondria. This case demonstrates the importance of targeting multiple facets of the disease. Introducing a comprehensive outpatient rehabilitation approach includes specialized spasticity management, orthotics aiding gait impairment, outpatient and school-based therapy regimens, and even supplements for mitochondrial disease.

CONCLUSIONS: Guidelines for managing ARSACS in the outpatient setting are sparse. There is some evidence exemplifying dedicated physical therapy improving functional capacity in ARSACS patients. Recruiting energy-dependent molecules during exercise is also beneficial to mitochondria. This case demonstrates the importance of targeting multiple facets of the disease. Introducing a comprehensive outpatient rehabilitation approach includes specialized spasticity management, orthotics aiding gait impairment, outpatient and school-based therapy regimens, and even supplements for mitochondrial disease.

BACK AND HIP MUSCLE WITH EMG BIOFEEDBACK TRAINING IN DIPLEGIC CEREBRAL PALSY TO IMPROVE BALANCE AND GAIT: A RANDOMIZED CONTROL TRIAL STUDY
Rattana Rattanatharn, MD, and Rattana Rattanatharn, MD

OBJECTIVES: To evaluate the efficacy of EMG biofeedback compared with conventional physiotherapy on gait and balance in children with cerebral palsy diplegia.

DESIGN: Experimental Randomized controlled trial, single blind (Assessor) Setting: Faculty of medicine, Chulalongkorn University and Thai red cross rehabilitation center Subjects: Children with diplegic CP age 5-13 years old. Method: 34 children with diplegic cerebral palsy were included in the study. The EMG biofeedback group consisted of 17 children who received EMG biofeedback training in back and hip muscles plus conventional exercise. The control group consisted of 17 children who receive only conventional exercise. Gait analysis, pediatric balance scale, range of motion of hip extension, abduction and 6-minute walk test were evaluated and compared.

RESULTS: Both EMG biofeedback and control groups displayed statistically significant improvement in pediatric balance scale (p=0.001, p=0.001 respectively). Only EMG biofeedback group displayed statistically significant improvement in gait speed, range of motion of hip extension, abduction and 6-minute walk test (p=0.04, 0.003, 0.03, 0.003 respectively). No statistically significant mean difference in all outcome between 2 groups was found.

CONCLUSIONS: Conclusion: EMG biofeedback group displayed statistically significant improvement in gait speed, pediatric balance scale, range of motion of hip extension, abduction and 6-minute walk test. Control group displayed statistically significant improvement only in pediatric balance scale.

BACK TO THE BASICS: WHEN BASIC HIP PRECAUTIONS MEET STATE OF THE ART SURGICAL PROCEDURES
Jeremy Jacobs, DO

OBJECTIVES: 43 y/o female with history of pelvic dermatofibroma sarcoma underwent significant improvement in hip function and pain while maintaining a functional level of modified independence, able to walk more than 150 feet with rolling walker. Her case was significantly complicated by hip dislocation. Due to the type of surgical procedure and complete resection of hemipelvis with total hip

AUTOSOMAL RECESSIVE SPASTIC ATAXIA OF CHARLEVOIX-SAGUENAY: A PHYSIATRIST’S APPROACH
Gaurish Soni, DO, Neha Kohli, MD, Sharonpreet Singh, MS4, and Mary Keen, MD

CASE DIAGNOSIS: Autosomal Recessive Spastic Ataxia of Charlevoix-Saguenay (ARSACS)

CASE DESCRIPTION: 5 and 3 ½ year-old brothers with Autosomal Recessive Spastic Ataxia of Charlevoix-Saguenay (ARSACS) presented as a referral, from a Pediatric Neurologist, with their mother for Physiatry assessment and recommendations. The elder brother was initially misdiagnosed for joint pain with Juvenile Idiopathic Arthritis. With constellation of additional symptoms including dystarthisia, spasticity, developmental regression & peripheral neuropathy, patients had genomics testing, which found homoyzomous abnormalities in the SACS gene. Additional findings included anorexyphoria, mitochondrial basis of disease, & hypermyelinated retina. Upon evaluation, several physiatry-relevant conditions identified. Both brothers were integrated into outpatient Physiatry and a comprehensive approach targeting rehab-specific concerns was implemented.

DISCUSSIONS: ARSACS is a rare form of hereditary, early-onset spastic ataxia with progressive degeneration of the spinal cord and cerebellum. This disease is more commonly found in the Charlevoix-Saguenay region of Quebec, Canada, than worldwide. The abnormality in the ARSACS gene encodes sacsin, a large protein expressed in the brain, skeletal muscles, fibroblasts, mitochondrial surfaces, and other areas of the central nervous system. This leads to progressive cerebellar ataxia, peripheral neuropathy, and lower-limb spasticity. Additionally, all identified cases have dystarthisia. Hypermyelinated retinal fibers are usually found in patients originating from Quebec; however, our cases from the United States also had the manifestation. The disease is progressive and patients are wheelchair-bound at 40; hence, the importance of early intervention.

CONCLUSIONS: For managing ARSACS in the outpatient setting are sparse. There is some evidence exemplifying dedicated physical therapy improving functional capacity in ARSACS patients. Recruiting energy-dependent molecules during exercise is also beneficial to mitochondria. This case demonstrates the importance of targeting multiple facets of the disease. Introducing a comprehensive outpatient rehabilitation approach includes specialized spasticity management, orthotics aiding gait impairment, outpatient and school-based therapy regimens, and even supplements for mitochondrial disease.

BACK TO THE BASICS: WHEN BASIC HIP PRECAUTIONS MEET STATE OF THE ART SURGICAL PROCEDURES
Jeremy Jacobs, DO

OBJECTIVES: 43 y/o female with history of pelvic dermatofibroma sarcoma underwent initial resection of mass in 2013 with subsequent recurrence. She was later treated with chemotherapy, radiation followed by type II and type III pelvic resection with total hip arthroplasty and neuroplasty of sciatic and femoral nerves. She suffered hip dislocation 3 weeks post op requiring return to operating room and revision.

DESIGN: After two surgical procedures, IV antibiotics, pain medications she was continued rehab. She was able to return to the acute inpatient rehab hospital and obtained a functional level of modified independence, able to walk more than 150 feet with rolling walker. Her case was significantly complicated by hip dislocation. Due to the type of surgical procedure and complete resection of hemipelvis with total hip
arthroplasty she was supposed to follow anterior and posterior hip precautions. The initial hospital therapist were not comfortable with these precautions which led to her dislocation. Upon admission to acute rehabilitation hospital, she was educated extensively on the importance of both precautions and the hip remained stable, and she achieved ODI and VAS scores improved at 2 and 6 weeks, 3, 6, and 12 months. At 24-months, ODI, VAS, and SF-36 improved by a mean of 53.7%, 70.2%, and 75% had a >10-point and >20-point ODI improvement, respectively, with a mean VAS score of 1.77 after 3 months. A 2019, 140-patient, multicenter RCT comparing BVN RFA with continuing standard care for CLBP supported the above findings, showing significant improvement in ODI andVAS after 3-months. Additionally, a 2019 double-blinded RCT study revealed decreased opioid utilization following BVN RFA, with concomitant improvements in ODI and VAS scores compared to sham RFA. Four other studies supported the above findings.

CONCLUSIONS: These studies demonstrate that BVN RFA for CLBP with type I and II MCs provides clinically-meaningful benefits in pain, function and quality of life. This emerging intervention may be considered effective when conservative strategies fail. Limitations include limited technical skills, few RCTs, and small sample size.

BARRIERS TO THE IMPLEMENTATION OF A CLINICAL PRACTICE GUIDELINES FOR AMPUTEES
Ana M. Posada, MD, MSC, Luz H. Lugo-Aguirre, Doctor, Daniel F. Patino-Lugo, Doctor In Health Policy, Jesus A. Plata Contreras, PMA and Clinical Epidemiology, Daniel C. Aguirre Acevedo, Doctor in Epidemiology, Statistical, Veronica Ciro, PMA, and Pilar Pastor - Durango, Nurse/Doctor in Public Health

OBJECTIVES: A clinical practice guidelines (CPG) for the diagnosis, treatment, integral rehabilitation and the prescription of the prosthesis for the amputated person was developed. The implementation and adherence to the recommendations proposed by the CPG may not be adequate due to the difficulty of overcoming barriers related to the users of the guidelines and/or the health system. Efforts to produce high-quality and updated CPG are not sufficient to ensure a change in care models if they are not accompanied by implementation strategies aimed at specific barriers. The purpose of this study was to identify the barriers for the implementation of the CPG for people with amputation.

DESIGN: We conducted a survey to assess individual and system barriers. To measure these barriers, the instrument to identify barriers to the implementation of the Clinical Practice Guidelines for amputees (GP/CAMP-B) was used and the frequencies and percentages were calculated according to the responses obtained from workers of health and academic institutions in different cities of the country.

RESULTS: 545 health workers and academics completed the questionnaire. The five most frequent barriers were the functioning of the health system in the country (78%), the lack of knowledge about the CPG in the professionals of the institution (72%), changes in regulations in the health system (68%), the administrative and authorization processes of health services (68%) and the lack of a unified health information system in the country (66%).

CONCLUSIONS: Identifying barriers is a necessary process to design implementation interventions aimed at those specific barriers. The functioning of the health system in the country was the most frequent barrier, followed by lack of knowledge about the CPG in the health workers. There are important individual and health system barriers that must be overcome to improve adherence to the proposed recommendations, improve care models and the health status of patients.

BASIVERTEBRAL NERVE (BVN) RADIOFREQUENCY ABLATION (RFA) FOR THE TREATMENT OF CHRONIC LOW BACK PAIN (CLBP) ASSOCIATED WITH MODIC CHANGES (MCS) TYPE I AND II: A NARRATIVE REVIEW
Vinicius Tieppo Franco, MD, Conan So, BS, MPH, Eric Twoekey, Medical Student, David R. Schulze, DO, and William Ramos, BS

OBJECTIVES: To review the efficacy of BVN RFA for the treatment of CLBP. BVN RFA is an image-guided, minimally-invasive transpedicular procedure which uses RFA to hypothetically stop verterogenic nociceptive transmission, which has been shown as a source of pain in CLBP models.

DESIGN: A literature search of the MEDLINE from 2009-2019 resulted in 34 studies with the keyword ‘basivertebral and ablation’. After applying the inclusion and exclusion criteria, 10 studies were included.

RESULTS: A 2018, 225-patient, level I RCT comparing BVN RFA with sham control demonstrated clinical efficacy in patients with CLBP MCs types 1 or II. ODI, SF-36, and VAS scores improved at 2 and 6 weeks, 3, 6, and 12 months. At 24-months, ODI, VAS, and SF-36 improved by a mean of 53.7%, 70.2%, and 11.84 points, respectively. A 2019, 28-patient, RCT demonstrated that 93% and 75% had a >10-point and >20-point ODI improvement, respectively, with a mean VAS score of 1.77 after 3 months. A 2019, 140-patient, multicenter RCT comparing BVN RFA with continuing standard care for CLBP supported the above findings, showing significant improvement in ODI and VAS after 3-months. Additionally, a 2019 double-blinded RCT study revealed decreased opioid utilization following BVN RFA, with concomitant improvements in ODI and VAS scores compared to sham RFA. Four other studies supported the above findings.

CONCLUSIONS: These studies demonstrate that BVN RFA for CLBP with type I and II MCs provides clinically-meaningful benefits in pain, function and quality of life. This emerging intervention may be considered effective when conservative strategies fail. Limitations include limited technical skills, few RCTs, and small sample size.

BCI TECHNOLOGY AS A CONTROLLED IDEOMOTOR TRAINING IN THE REHABILITATION OF PATIENTS AFTER A STROKE
Yulia Bushkova, Candidate of Pedagogical Sciences, Galina Ivanova, Professor, Lyudmila Stakhovskaya, Doctor of Medical Sciences, and Aleksandr Frolov, Doctor of Medical Sciences

OBJECTIVES: The basis for successful interaction with BCI is determined by the ability of patients to qualitatively solve mental motor tasks (Motor Imagery).

DESIGN: BCI was used, based on the results of EEG patterns, sensorimotor rhythm, in MI patients. Recognition results were presented by visual and kinesthetic feedback. 10 treatments.

RESULTS: 10 patients MIQ-RS 44.5 (34.0; 58.0), management quality (Cohen kappa index) BVN 67.0 (54.0; 74.0), 11 patients MIQ-RS 28.0 (22.0; 30.0) and management quality 42.0 (33.0; 49.0).

CONCLUSIONS: A positive correlation was found between MI success (MIQ-RS) and BCI management quality.

BE-LUNG: A NOVEL COMMUNITY-BASED INTERVENTIONAL EDUCATIONAL EXERCISE PROGRAM FOR LUNG CANCER SURVIVORS
Jacqueline Spangenberg, BS, Joshua E. Martin, MD, Chad Hanaoka, BA, Kathleen Boss, BS, Marco Masci, MD, Victoria Villaffor, MD, and Prakash Jayabalan, MD, PhD

OBJECTIVES: Prior studies of lung cancer survivors (LCS) has demonstrated that exercise improves survival and quality of life in these patients, but perceptions, attitudes and knowledge of the benefits of exercise are barriers to participation. The goal of the present study was to assess the longitudinal effects of a novel community-based educational and exercise program for LCS.

DESIGN: Thirteen (n=13) participants completed a first of its kind 5-week community-based program, (‘Be-Lung Education and Exercise Series’) that included multidisciplinary educational and exercise sessions. At completion of the program the primary outcome measure was participants’ attitudes towards exercise using survey evaluation. Secondary outcomes included changes in quality of life (FACT-L), symptoms (PROMIS) and functional markers of strength and conditioning (10 meter walk test, chair rise time and grip strength).

RESULTS: Attitudes regarding physical activity had a trend towards improvement including ratings of importance (p = 0.071), pleasantness (p = 0.114), enjoyment (p = 0.084), and helpfulness (p = 0.089). Trend was also noted in improvement of quality of life (FACT-L, p=0.084) however PROMIS Function- Dyspnea Survey assessing shortness of breath did not show a statistical difference post intervention (p = 0.343). There were statistically significant improvements in all mobility related functional measures assessed, including the 10-meter walk test (p = 0.006) and chair rise time (p=0.001). Grip strength of the dominant hand had trend towards improvement following the program (p=0.075), while oxygen saturation remained similar pre and post intervention.

CONCLUSIONS: The novel community based educational exercise program that we developed had low attrition and was associated with improvements in attitudes, quality of life and functional outcome measures. This study does provide significant preliminary evidence that interventional community-based programs are feasible, realistic for individuals afflicted with lung cancer, and may improve their function significantly.

BENEFITS AFTER 36 SESSIONS OF PHASE II AT A CARDIAC REHABILITATION PROGRAM IN 31 PATIENTS
Jaeane Alejandro Acevedo Gonzalez, and Oscar Alvarez
OBJECTIVES: Heart valve diseases are 1/3 of all heart diseases; treatment of choice, if symptomatic, is surgery. The objective is to show the positive effects of a Cardiac rehabilitation program (CRP) after heart valve replacement.

DESIGN: A descriptive and retrospective study of records from patients after heart valve replacement at the beginning and the end of phase II at a CRP between January 2015 and December 2018. Data analysis included the aerobic gain (METs) at 1st session and at 36th session; and the PERFSCORE, as a way to predict success of cardiac rehabilitation.

RESULTS: 31 patients after valve replacement (26 aortic valve, 5 mitral valve) assisted to 36 sessions of the 2nd phase of a CRP. The mean of the initial aerobic capacity was 5.2METs, and the mean of the final aerobic capacity was 8.2METs, having a mean gain of 3.1METs with a standard deviation of 2.2 (p < 0.0001). We calculate the PERFSCORE at the final session and found that the program wasn’t satisfied in 2 cases, satisfied at 12, and optimum at 17; showing control of heart ratio < 70 beats/min (15); Blood pressure < 140/90 mmHg (28); smoking cessation (25); left ventricular ejection fraction > 40% (28); LDLc < 100 mg/dl or < 70 mg/dl if diabetic (22); and evaluating the treatment at least with three drugs among angiotensin converting enzyme inhibitors or angiotensin receptor blocker, β-blockers, statins, and ASA (30).

CONCLUSIONS: Patients after heart valve surgery have a gain statistically significant in the aerobic capacity after phase II of a CRP comparing the beginning and the end, not having a direct relation with the results of the PERFSCORE, designed to measure the control of cardiovascular risk factors after cardiac rehabilitation in patients with coronary syndrome, but, because there is no way to measure the control in patients after heart valve surgery, we use it to show the global benefits of cardiac rehabilitation.

BIG STEPS IN PARKINSON REHABILITATION: A ROAD TO FUNCTIONAL RECOVERY
Willem Oudegeest, MD

OBJECTIVES: Recent research has dramatically changed the insights on Parkinson’s disease. It used to be seen as a neurodegenerative brain disease with merely motor symptoms due to loss of dopamine production in the substantia nigra with no possibility of functional recovery. Brain Research of Parkinson’s shows an important role for sensory-motor disorders in the basal ganglia, leading to microkinesia and hypophonia with specific complex impairments. To challenge these the broad multidisciplinary functional insight of Rehabilitation Medicine is needed in conjunction with medication to enhance the neuroplasticity to fight the neurodegenerative disease.

DESIGN: As pioneer in Parkinson Rehabilitation in the Netherlands, Meander MC has successfully introduced an interdisciplinary short intense treatment aiming in restoring the amplitude affected due to microkinesia and hypophonia. In these treatments patients are taught to normalize their movement and speech in daily life by increasing their amplitude with specific daily exercises.

RESULTS: Research shows that patients not only improve during training, but are able to show improvement with daily exercise even after the Rehabilitation has stopped.

CONCLUSIONS: Considering all these findings, it’s important that the knowledge on Rehabilitation Medicine of Parkinson’s is shared to improve treatment for all patients with Parkinson’s.

BILATERAL EPIDURAL HEMATOMAS IN A CHILD WITH SCURVY
Yumi Mitsuya, MD, Rachel Teranishi, MD, and Mai Ngo, MD

CASE DIAGNOSIS: Bilateral epidural hematomas in a child with scurvy

CASE DESCRIPTION: A 10-year-old male with history of anemia presented to the emergency room with bilateral knee pain and reluctance to ambulate. During his evaluation, he developed sudden onset headache, a first time seizure, and a fixed left pupil. Imaging revealed acute on chronic bilateral epidural hematomas. He underwent emergent cranieotomy and hematoma evacuation, complicated by difficulty controlling bleeding. Diet history revealed a limited diet consisting of bread, noodles, and soymilk. Laboratories revealed pancytopenia, coagulopathy, and extremely low Vitamin C level of 5 μmol/L. He was started on supplementation after which serum Vitamin C level quickly normalized. Subsequent cranioplasty was tolerated without significant bleeding.

DISCUSSIONS: Scurvy due to vitamin C deficiency, a disease thought to be rare in developed countries, is increasingly being reported in children with severely restrictive diets, especially those with autism. Vitamin C is involved in many biologic processes including coagulation, iron absorption, catecholamine conversion, and prostaglandin metabolism. Deficiency also results in poor collagen formation leading to compromised bone, joint, and vascular integrity. Scurvy can present with non-specific symptoms such as skin and hair changes, rash, petechial hemorrhages, purpura, arthralgias, joint swelling, limb, and refusal to walk. While intracranial bleed is one of the rare complications of Scurvy, it leads to the greatest morbidity and mortality. It is thought that depletion of pericapillary collagen in the basement membrane of blood vessels leads to increased risk of spontaneous bleed.

CONCLUSIONS: Scurvy, while rare, is a condition that is still encountered in the pediatric population, and should be considered in the differential diagnosis for spontaneous intracranial hemorrhage in patients. Screening for restrictive eating habits during routine Well Child visits may help to identify those at risk of nutritional deficiencies, leading to prompt testing and early treatment which could mitigate clinical symptoms and potentially devastating consequences.

BILATERAL UPPER EXTREMIT Y WEAKNESS FOLLOWING A DOUBLE LUNG TRANSPLANT: A CASE REPORT
Xiao Wei Liu, BS, Lucas First, MD, Daniel Oh, MD, and Diane Thompson, MD

CASE DIAGNOSIS: Classic Postoperative Paresis

CASE DESCRIPTION: A 54-year-old female with end-stage lung disease secondary to obliterative bronchiolitis presented with acute bilateral upper extremity weakness status-post repeat double lung transplant. Intraoperative reports noted difficult surgical dissection of the right lung from the chest wall. On initial exam, inspection revealed lateral winging of the both scapulae. Strength testing demonstrated profound weakness with bilateral shoulder abduction, internal and external rotation, elbow flexion, and forearm supination. Bilateral brachial plexus MRI without IV contrast displayed soft tissue edema at the axillary neurovascular bundle, and at the bilateral supraspinatus, infraspinatus, subscapularis muscles. Right upper extremity EMG demonstrated 1 fibrillation at right biceps brachii, deltoid, EDC, and C6 paraspinal muscles. T2 brain MRI demonstrated multiple nonspecific periventricular and subcortical white matter foci.

DISCUSSIONS: Based on patient's clinical presentation, the pattern of weakness is in the C5 and C6 root distribution, which could be the result of an upper cord brachial plexopathy or damage to the pyramidal tract. The most likely differentials are classic postoperative paresis (CPP), man-in-the-barrel syndrome (MIBS), and neuralgic amyotrophy. Considering the acuity of the patient's presentation, immediately post-operation, the etiology is most likely secondary to CPP. MIBS is less likely considering there was no evidence of hemodynamic instability during surgery, which would indicate hypoperfusion as a cause. Neuralgic amyotrophy was excluded, because excruciating pain of nocturnal onset, a key clinical feature was absent in this patient.

CONCLUSIONS: To our knowledge, the differentials described above have not been reported in a patient status-post double lung transplant. Therapy should focus on maintaining full-range-of-motion in the shoulder, strengthening the rotator cuff muscles and biceps, and stabilizing the scapula to achieve modified independence with transfers and increased movement control during functional and goal directed tasks. Collaboration between physiatry and transplant medicine was essential for the complex care of this patient.

BLINDED OR NON-BLINDED RANDOMIZED CONTROLLED TRIALS IN REHABILITATION RESEARCH
Annti Malmivaara, MD, PhD, Susan Armijo Olivo, PhD, and Jari Arkoiski, MD, PhD

CASE DIAGNOSIS: Recent studies have indicated that if the objective of a randomized trial is to determine the effectiveness of treatments and rehabilitation in real life circumstances, blinding should not be considered a validity criterion; and that a prerequisite for blinding is that there exists a core element in the intervention. This study aims to assess whether these ideas on blinding vs non-blinding in RCTs have been dealt with or discussed in the scientific literature on rehabilitation research.

CASE DESCRIPTION: Well defined study questions, a planned literature search strategy and inclusion and exclusion criteria for the original studies were formulated. Literature search was carried out by an experienced informatician. Eligibility was assessed and data extraction performed by two independent researchers. The systematic review process was in accord with the PRISMA statement.

DISCUSSIONS: The literature search identified a total of 1,052 citations, of which 13 studies fulfilled the inclusion criteria. None of the studies aimed at determining any of the children with these questions set for the present study, and consequently neither produced results thereupon.

CONCLUSIONS: Besides the recent studies, the ideas on blinding vs non-blinding in RCTs have not been dealt with in the scientific literature on rehabilitation
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BLOOD FLOW RESTRICTED TRAINING STIMULATING ANGIOGENIC – A BREAK-THROUGH IN POST-INTERVENTIONAL REHABILITATION OF PERIPHERAL ARTERIAL DISEASE PATIENTS

Aleksandra Włodarczyk, Masters Student, Agnieszka Wachsmann-Maga, MD, Martyna Schönbom, MD, Agnieszka Trynkiewicz, MD, Jakub Krekel, Masters Student, Paulina Klacze, Masters Student, and Mikolaj Maga, MD

CASE DIAGNOSIS: Peripheral artery disease (PAD) is a non-cardiac atherosclerosis manifestation affecting over 20% of Europeans aged 55 and above. Best treatment option of non-critical lower limbs ischemia remains the open case. Among many treatment forms, the most non-invasive, but still effective is rehabilitation by physical training. Recently, innovative solutions have been introduced concerning this form of treatment by combining anarobic interval exercises with venous blood flow restriction (BFR) and cooling. The aim of the research is to evaluate the endothelial and angiogenic response to the aforementioned type of exercise.

CASE DESCRIPTION: Study was divided into 2 stages: with healthy volunteers and non-CLLI patients. 35 healthy volunteers were enrolled into the 1st stage. They performed a 21-minute interval training using a cross trainer with cooling liquid pressure cuffs (arms: 40 mmHg; legs: 65 mmHg) providing vein occlusion and cooling seat. Angiogenenic processes and endothelial functions were monitored by laboratory parameters - vascular endothelial growth factor (VEGF), clusters of differentiation (CD31, CD34) as well as imaging examinations – flow mediated dilatation (FMD), stiffness index (SI), reflexion index (RI), reactive hyperemia index (RHI) and augmentation index (AI). All measurements were performed before, as well as 20 to 30 minutes after the training.

DISCUSSIONS: All of the laboratory parameters were significantly elevated after the training – CD34 (0.03 vs 0.37, p<0.0001) and VEGF (32.20 vs 39.62, p=0.0002). Moreover, physical training resulted in RI (69.52 vs 65.37 p=0.013) and SI decrease (7.60 vs 7.12 p=0.024) and increase of FMD (6.49% vs 9.12% p<0.01). AI and RHI remained influenced by exercise.

CONCLUSIONS: BFR training successfully stimulates acute angiogenenic response and moderately influences certain endothelial functions. This 1st stage results are being now implemented into the 2nd part of project involving PAD patients.

BLOQUEO DE NERVIOS GENICULADOS GUIADO POR ECOGRAFÍA EN DOLOR CRÓNICO DE RODILLA

Rossana P. Chiesa Estomba, Medical License, Iker Castrillo Pérez, Graduado En Medicina, Marco Escrivano Rodríguez, Medical Licensed, Miguel Archcono Olcese, Doctor Profesor Asociado, and Concepción Cuenca González, Doctora Médico Especialista Y Profesor Asociado

CASE DIAGNOSIS: La Gonartrosis, altamente prevalente en población mayor, se caracteriza por dolor intenso e incapacitante, que en muchos casos precisa tratamiento quirúrgico por poca respuesta al tratamiento conservador habitual. El bloqueo de nervios geniculados guiado por ecografía ha surgido como nueva modalidad de tratamiento por poca respuesta al tratamiento conservador habitual. Es preciso realizar más estudios con mayor muestra y seguimiento a largo plazo.

CASE DESCRIPTION: Studie descriptivo de casos consecutivos de dolor crónico de rodilla en mayores de 65 años, en el servicio de rehabilitación de nuestro centro. Se registra la intensidad del dolor con la escala visual analógica (EV A). Previo a la realización del bloqueo se mide el grado de satisfacción (RM) el 60% ha contestado excelente o bueno. La media de dolor registrada (EVA) es de 3,15 en reposo y 5,26 en actividad, se observa mejora de 4,96 puntos de EVA en reposo y 2,84 puntos en actividad. En cuanto al grado de satisfacción (RM) el 66% ha contestado excelente o bueno.

CONCLUSIONS: El bloqueo de nervios geniculados guiado por ecografía se presenta como una alternativa eficaz en pacientes con dolor crónico de rodilla refractario a tratamiento habitual. Es preciso realizar más estudios con mayor muestra y seguimiento a largo plazo.
CONCLUSIONS: This is level V evidence that combination of Botox and physical therapy stretching exercises can improve flexion contracture. Despite these encouraging results, larger studies are required to support its use.

BOTULINUM TOXIN FOR POST IMMOBILIZATION CONTRACTURE OF FOREARM PRONATORS: A CASE REPORT

Nouf Ali, MD, DNB PMR

CASE DIAGNOSIS: Botulinum toxin injection for post immobilization pronator contracture of forearm pronators: a case report

CASE DESCRIPTION: A 15 year old girl, following a fall, had fracture dislocation of Right Radial head and was operated (Open reduction internal fixation). Post-operatively, above elbow casting was given for 4 weeks, with elbow in flexion and forearm in pronation. Following that, she developed pronator contracture. She came to our hospital 3 years after the incident, with difficulty in rotating her forearm and unable to use her Right hand to wash her own face. On examination, pronation was possible from 10 to 90 degrees. As she wanted only nonoperative intervention, Botulinum toxin was offered. It was done to Pronator teres and PQ/Cartilage muscles (dose same as that for spasticity), under USG guidance. Post procedure, she could supinate up to 90 degrees of motion and the patient was satisfied with the pronation also. She was advised to return after 3 weeks for further injection if required. She was followed up for 6 weeks and had good response. As she wanted only nonoperative intervention, Botulinum toxin was offered.

DISCUSSIONS: Botulinum toxin injections have been used for spasticity, skin wrinkling etc. It reduces the cholinergic transmission and also alters the structural property of the muscles. In the literature, there are very few studies, where it has been used for contracture. There are studies on its use in flexion contractures following total knee arthroplasty (F M Seyler et al), knee contractures in persons with Hemophilia (Da Fonchito et al) and shoulder internal rotators contracture in Erb’s palsy (Dujinival et al). In our particular case, the intervention was done after 3 years, and still it improved her function.

CONCLUSIONS: Botulinum toxin is found to be effective in reducing contracture, even when intervened after years. The presence of capsular contracture has to be clinically ruled out before going ahead with the intervention. This intervention was novel, easy and gave Results, so may be added to our therapeutic armamentarium.

BOTULINUM TOXIN INJECTION OF A PATIENT WITH INTRACTABLE ACROMIO-CLAVICULAR JOINT PAIN

Byung Joo Lee, MD, and Dongwhi Park, MD

CASE DIAGNOSIS: Acromio-clavicular osteoarthritis

CASE DESCRIPTION: A 38-year-old man, presented with right shoulder pain with a tenderness on acromio-clavicular (AC) joint line. The pain started right after he lifted a over-weighted barbell. The initial pain was rated 7 out of 10. Under diagnosis of AC joint injury, triamcinolone and lidocaine was injected in the AC joint, monthly for 3 months. The pain subsided for some period. However, continued weightlifting made the pain worse, and later, the effect of injection lasted only for few days. The patient stopped weightlifting and started taking pain pills, but the pain persisted.

Physical examination revealed suprascapular shoulder pain without any loss of range of motion. The O’Brien test was negative. The pain was induced by cross-body adduction test. However, other shoulder tests were negative. He then underwent ultrasound-guided AC joint botulinum toxin injection. One week after the injection, he reported significant pain relief. The pain intensity dropped from 7 to 3.

DISCUSSIONS: The acromio-clavicular (AC) joint is a diarthrodial joint formed by anteromedial acromion and lateral clavicle. Repetitive microtrauma can lead to AC joint degeneration. It is most common in weightlifters. It is often neglected by clinicians because of higher prevalence of rotator cuff pathology. Intra-articular (IA) corticosteroid injection has been reported to be an effective treatment in AC joint osteoarthritis (OA), in addition to other nonoperative treatment, such as physical therapy, activity modification, and oral pain medications. However, there are some cases, in which the mentioned treatments are not sufficient. Recently, IA botulinum toxin injection has been reported as one of effective treatments in OA patients. In accordance with previous studies, we report a case of pain improvement after AC joint botulinum toxin injection in a patient with intractable AC joint OA.

CONCLUSIONS: Intractable shoulder pain due to AC joint osteoarthritis can be managed with intra-articular botulinum toxin injection.

BOTULINUM TOXIN INJECTIONS AS A TREATMENT OF POSTOPERATIVE CHRONIC NECK PAIN SECONDARY TO CERVICAL SPINE SURGERY: A NARRATIVE REVIEW

James B. Meiling, DO, Brandon Barnadt, DO, George Raum, BA, David R. Schulze, DO, MS, and Carter M. Newey, DO

CONCLUSIONS: A frequent, yet seldom studied, consequence of cervical spine surgery is postoperative chronic neck pain (PCNP), which has been found to affect up to 19% of patients after anterior cervical disectomy with fusion and up to 60% after laminoplasty. One newer approach for alleviation of PCNP is the utilization of botulinum toxin injections (BTX) into the cervical musculature, providing a relaxation of tight, spastic or tonic muscles. These injections have previously been applied in the head and neck region for chronic pain relief, but they have not been commonly used to alleviate PCNP. The purpose of this narrative literature review is to summarize all of the pertinent studies that have been published regarding BTX as a treatment option for PCNP.

CASE DESCRIPTION: A literature review was performed in September 2019 using the PubMed and MEDLINE databases, using specific keywords and phrases: (botulinum toxin OR botox) AND (postoperative) AND (neck pain) AND (cervical spine surgery OR cervical fusion).

DISCUSSIONS: As a result of the online literature review, (3) articles were located that fit the overall purpose of the author’s narrative review - (1) preliminary case-control trial, (1) case series, and (1) case report.

CONCLUSIONS: In conclusion, 89% (56 out of 63) of the patients in the reviewed studies with PCNP who had been treated with BTX had symptomatic improvement. Even with the observed benefits, it is important to remember that BTX is not without risks, which are largely mitigated by being judicious with the dosages and frequency of administration. Despite the risks, preliminary studies and selected cases have shown that BTX may have beneficial effects as a form of pain management for individuals with PCNP. Additional studies, especially double-blinded, randomized controlled trials, are needed to add further evidence for the efficacy of BTX in PCNP.

BUNDLED PAYMENT FOR CHRONIC PAIN: A STEPWISE MODEL

Andrew J. Haig, MD, Daniel D. Haig, BS, Samantha Wall, MPH, Barbara M. Haig, BS, and Thomas A. Haig, BA, BS

OBJECTIVES: Chronic pain is a very common and costly problem. Treatment in the United States is characterized by overseer of surgery, invasive procedures and medications. Yet optimal care may involve less invasive and less expensive treatments by various therapists, complimentary/alternative interventions, group treatments, and community work integration, all less profitable and less commonly used. A bundled payment model can allow a healthcare system to creatively manage chronic pain including these resources. Case definition is a challenge because of the complex and variable needs of this population. Working with a regional insurer we developed a hypothetical model involving 3 stages of intervention: PM&R consultation, single-visit multidisciplinary assessment, and structured multidisciplinary interventions. The actual needs of the population identified by an insurer for bundling are not clear. This study explores these needs.

DESIGN: Prospective qualitative study. A pilot probe of free comprehensive PM&R consultation on persons identified through the insurer database as having chronic pain.

RESULTS: PM&R consultations on 20 patients revealed highly varied needs and costs including appropriate (expensive) use of disease modifying arthritis medications, missed diagnoses, untreated psychiatric disease, ongoing ineffective therapy and patients with resolved symptoms.

CONCLUSIONS: PM&R observations were expert but subjective. They confirmed that needs of a population identified by insurance databases are highly varied. Thus a simple bundling will not provide appropriate care. Findings support aspects of the proposed 3-tier bundling: 1) PM&R consultation leading in some cases to 2) team assessment, leading in fewer cases to 3) Multidisciplinary team treatment.

CAN INSPIRATORY MUSCLE TRAINING BENEFIT PATIENTS AFTER STROKE? A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

Yu Zheng, MD, PhD, Xintong Zhang, PhD Student, Yini Dong, MD, Mao Mao, MPHIL Student, Li Wang, MPHIL Student, Yihui Cheng, MPHIL Student, Xiu Zhang, MPHIL Student, and Xiao Lu, MD, PhD

OBJECTIVES: To investigate the effects of inspiratory muscle training (IMT) in patients after stroke and to explore the effective and efficient training protocol.

DESIGN: PubMed/Medline, Web of Science, Scopus, Embase, Cochrane database, China National Knowledge Infrastructure, and China Science Periodical Database were searched through August 2019. Randomized controlled trials examining effects of IMT on pulmonary function, cardiopulmonary endurance, pulmonary infection incidence, and quality of life in patients after stroke were included. Sub-group analysis was also performed to compare different training protocols. Mean differences
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CANCER REHABILITATION IN A NON-CANCER FOCUSED ACUTE REHABILITATION FACILITY: A CASE REPORT

Michelle Leong, DO

CASE DIAGNOSIS: Metastatic melanoma

CASE DESCRIPTION: Patient was a 54 year-old male, World Trade Center first responder, with chronic myeloid leukemia, metastatic melanoma status post resection in January and discharged to sub-acute rehabilitation (SAR) with improvement of strength. Patient was presented in February from SAR with an enlarging chest wall mass and axillary wound drainage. An axillary dissection and metastectomy was performed. During this time, patient’s debility worsened. Prior to January, patient used a walker in the community and furniture for support at home. Upon transfer to acute rehab, patient was requiring maximum assist for all activities and minimally ambulatory. It became quickly apparent that patient was unable to tolerate 3 hours of therapy. Unfortunately, patient declined rapidly and was discharged to inpatient hospice, passing away only a few days later.

DISCUSSIONS: Physiatrists and therapists were placed in an unfamiliar situation—just surprisingly, as only 2-9% of cancer survivors receive rehabilitation care. It is widely agreed that a multidisciplinary approach is imperative for cancer rehabilitation. Unfortunately, communication was difficult as the oncologist was from an outside hospital. Patient was also unaware of the prognosis, which led to unrealistic goals. Therapists were unsure what activities would be safe and beneficial for the patient at this stage of cancer. Few studies discuss acute rehabilitation, especially in medically complex situations, with more studies on benefits of outpatient therapies in stable survivors. In this case, introduction of acute rehabilitation services may have been too late or inappropriate.

CONCLUSIONS: Clear cancer rehabilitation education and guidelines for physicians and therapists are limited and should be developed and validated to advance the field. Structured guidelines would optimize quality of life and care for patients, especially at non-cancer focused centers.

CANDIDA ALBICANS: AN UNUSUAL CAUSE OF SPINAL HARDWARE INFECTION RESULTING IN INCOMPLETE PARAPLEGIA

Charlotte Ball, MD, and Christopher White, MD

CASE DIAGNOSIS: Incomplete paraplegia due to candidal vertebral osteomyelitis and spinal hardware infection

CASE DESCRIPTION: A 32-year-old male presented with worsening low back pain and lower extremity weakness, constipation, and urinary retention. He had a history of Scheuermann’s kyphosis and juvenile osteochondrosis and was status-post T5-L4 fusion ten years prior to admission, with known interval surgical screw displacement into the spinal canal without neurological compromise. Due to his extensive spinal hardware, imaging studies of the spinal column were technically limited and of minimal diagnostic value. He experienced continued neurological decline and worsening pain and was ultimately taken to the OR for hardware removal. Intraoperatively, he was found to have brown purulent material around his spinal hardware. It was determined that the source of the infection was from the hardware itself. He was treated with a course of antibiotics and demonstrated functional and neurological improvement.

DISCUSSIONS: Complaints of back pain with new neurological deficits are concerning for vertebral osteomyelitis or epidural abscess, especially in the setting of prior spinal surgery. Common microbial etiologies include staphylococcus aureus, streptococcal species, and pseudomonas aeruginosa. Vertebral osteomyelitis may be due to fungal species, as demonstrated in this case, though this is an uncommon finding especially in immunocompetent hosts.

CONCLUSIONS: Hardware infection should be considered on the differential diagnosis in patients with prior spinal instrumentation who have worsening neurological deficits, even if the surgical history is distant. In patients with an atypical clinical course, uncommon infectious etiologies should be considered.

CARDIAC REHABILITATION PROGRAM IN A PATIENT WITH TETRALOGY OF FALLOT, RENAL TRANSPLANT AND PACEMAKER

Thalia Ivette Martinez Garcia, Arteaga Jose Rodolfo, MD, and Pavel Loeza Magana, Master In Sport Sciences

CASE DIAGNOSIS: 29 year old male. Diagnosis of Fallot Tetralogy. Glenn surgery is performed at 10 years. Renal failure that required a transplant at age 21. At 23 years stenosis is detected in Glenn’s anastomosis; Interventional catheterization with occlusion in the azygos vein is performed. At 27 by magnetic resonance, double entry and double exit of a single ventricle are observed, with an ejection fraction of 50%. Atrioventricular electrical dissociation and third degree atrioventricular block are also detected, so epicardial pacemaker is placed.

DISCUSSIONS: He began cardiac rehabilitation at age 27, phase II with calisthenics, Borg 12. At two months of training he presented sudden increases in heart rate and therefore a cardiology assessment is requested. Collateral closure with occluder is performed. Re-enters phase II; presenting symptomatology so he enters electrophysiology for pacemaker adjustment. With new stress test, phase II starts again. Subsequently, a new stress test begins phase III, with a follow-up stress test one year later.

CONCLUSIONS: Currently there is not specific Cardiac Rehabilitation Program for patients with tetralogy of Fallot, with a pacemaker and kidney transplant, so it is relevant to publicize this Individualized Program, which has been functionally successful.

CASE REPORT OF ACUPUNCTURE ALLEVIATING MYOKYMIA AND PAIN ASSOCIATED WITH MERCURY POISONING

Stacey L. Hall, DO

CASE DIAGNOSIS: Two siblings are included in this case report: a 17 year-old young man and a 19 year-old young woman. Initial symptoms included diffuse, severe myalgias, muscle twitching, rashes, and cold sweats for 1.5 months. An extensive work-up was completed. They had progressive debility worsened. Prior to January, patient used a walker in the community and furniture for support at home. Upon transfer to acute rehab, patient was requiring maximum assist for all activities and minimally ambulatory. It became quickly apparent that patient was unable to tolerate 3 hours of therapy. Unfortunately, patient declined rapidly and was discharged to inpatient hospice, passing away only a few days later.

DISCUSSIONS: Physiatrists and therapists were placed in an unfamiliar situation—just surprisingly, as only 2-9% of cancer survivors receive rehabilitation care. It is widely agreed that a multidisciplinary approach is imperative for cancer rehabilitation. Unfortunately, communication was difficult as the oncologist was from an outside hospital. Patient was also unaware of the prognosis, which led to unrealistic goals. Therapists were unsure what activities would be safe and beneficial for the patient at this stage of cancer. Few studies discuss acute rehabilitation, especially in medically complex situations, with more studies on benefits of outpatient therapies in stable survivors. In this case, introduction of acute rehabilitation services may have been too late or inappropriate.

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CONCLUSIONS: Hardware infection should be considered on the differential diagnosis in patients with prior spinal instrumentation who have worsening neurological deficits, even if the surgical history is distant. In patients with an atypical clinical course, uncommon infectious etiologies should be considered.
CONCLUSIONS: Acupuncture is non-addictive, safe, and generally well tolerated. Acupuncture should be considered as an adjunctive treatment for pain relief and additionally myokymia, especially when other treatments fall short.

CASE REPORT PERIPHERAL FACIAL PARALYSIS, BELI'S PALSY TREATED WITH OZONE INJECTIONS PRE AND RETRO AURICULAR
Sara M. Alfaro, MD
CASE DIAGNOSIS: Case report of refractory Peripheral facial paralysis treated successfully with ozone injection and measured clinically and with a somatosensory evaluation system
CASE DESCRIPTION: 28 year old male with left peripheral face paralysis, following an upper respiratory viral infection in the previous weeks; he had already been treated with antiviral medication and oral steroids and was clinically evaluated with muscle testing of the facial muscles values of 0 and 1. He complained of significant pain in the cheek and neck area VAS 8/10. He received 8 physical therapy with heat, electrical stimulation, massage and specific exercises for muscle reeducation, with no response both clinically and with Brain gauge®. After one session of ozone and homeopathic injections his muscle values significantly improved as did his Brain gauge® scores. He completely recovered the muscle symmetry in the following weeks.
DISCUSSIONS: The use of ozone injections resulted in the rapid recovery of his muscle values. The technique used was a combination of bioregulatory homeopathics plus the prolozone® mixture was given to improve the modulation of the inflammatory process and aid in the recovery of the muscle values. The patient experienced minimal discomfort with the procedure, no side effects were reported and the following week after the injections there was a significant increase in muscle strength, facial symmetry and complete resolution of the facial pain. This improvement also was observed through the progression of the Brain gauge® measures.
CONCLUSIONS: Ozone injections can be used in the appropriate concentrations in combination of bioregulatory homeopathics as a safe and effective treatment for refractory peripheral facial nerve lesions and resolve nerve pain satisfactorily. The mechanisms of action of ozone help in the modulation of pain and inflammation, and stimulation of tissue regeneration and repair. Brain Gauge® testing can be used to track evolution and patient's individual recovery.

CASE SERIES: EVALUATION OF OUTCOMES OF INDIVIDUALS WITH INABILITY TO ASPIRATE FROM BACLOFEN PUMP CATHETER ACCESS PORT
Linda E. Krach, MD, Chantel C. Barney, PhD, and Frank Symons, PhD
CASE DIAGNOSIS: To describe the clinical outcomes of patients with attempted catheter access port aspirations that yielded no return.
CASE DESCRIPTION: This is a focused review of findings from a prospective study in which intrathecal baclofen (ITB) pump catheter access port aspirations were attempted to obtain cerebrospinal fluid (CSF) to evaluate for biomarkers of pain.
DISCUSSIONS: Seven patients (23.3%) with ITB pumps who were participating in the study had no return of CSF. Practitioners performing the aspirations were very experienced in this procedure; they also identified four individuals (13.3%) where they were not confident that they had successfully entered the catheter access port. Of the seven in which no CSF could be aspirated, three went to surgery: with catheter kink at dura (n=1), with subdural catheter (n=1), and with replacement of entire system (n=1) achieved good post-operative control of tone on half the ITB dose programmed prior to replacement. Another experienced an episode that presented like withdrawal and symptoms improved with programmed ITB boluses; dosage is still increasing 5.5 years after implant. Three patients continue to have steadily increasing doses 2.5 years after implant.
CONCLUSIONS: Our observations indicate that the inability to aspirate CSF during ITB pump catheter access port aspiration may be associated with catheter problems characterized by interference with backflow delivery to the intrathecal space. This association was confirmed at surgery in three individuals. The remaining four continue with dose increases 2.5 to 5.5 years after implantation. This is a concern as reports indicate that doses typically stabilize in a functioning system by one year post implant. It is also concerning that these experienced practitioners were not confident that they were in the access port when attempting aspiration in an additional four cases.

CASTING AS AN ADJUNCTIVE THERAPY TO BOTULINUM TOXIN INJECTION IN ACQUIRED BRAIN INJURY UPPER LIMB SPASTICITY: EFFECT ON GAIT PARAMETERS
Supun Kotteduwa Jayawarden, BS C, MD Candidate, Carl Ganzert, MSC CO(C), Patricia Mills, MD, FRCPC, MHSc, Paul Winston, MD, FRCPC, and Rajiv N. Reebey, MD, FRCPC
OBJECTIVES: A prospective case series was conducted to investigate changes in gait parameters in Acquired Brain Injury (ABI) patients after treatment of upper limb elbow flexor spasticity post-Botulinum toxin A (BoNT A) injection and adjunctive therapy involving casting.
DESIGN: Ten ABI patients (8 stroke, 2 TBI; 6M, 4F) were injected with a total of 200 units Incobotulinum toxin A (Xeomin®) into the brachialis and brachioradialis muscles under ultrasound guidance for their flexed elbow spasticity. Two weeks post-injection, an upper elbow stretching cast was applied for 1 week. Outcome measures were recorded pre-injection (t0) and at cast removal (t1) to assess changes in spasticity and gait parameters. Modified Ashworth Scale (MAS), Tardieu Spasticity Angles (TSA), maximum elbow extension range of motion (ROM), two-minute walk test (2MWT), Edinburgh gait score (EGS) and step length symmetry were recorded at each time point. Goal attainment scale (GAS) was assessed and patients were followed for 1-year post-injection.
RESULTS: 70% of patients demonstrated improvements in MAS (p< 0.05). All patients had increased TSA (p< 0.01) with maximal increase being 3.20. Mean EGS was reduced by 2.7 points at t1 (p< 0.05). Four patients had clinically significant EGS reduction and of those, two patients had a maximal 9-point EGS reduction. The two-minute walk test mean distance increased by 3.1m (p< 0.05). On the GAS, patients reported improved upper limb spasticity and gait. Patients showed a trend of longer injection intervals.
CONCLUSIONS: BoNT A with casting as an adjunct treatment improved flexed elbow spasticity and functional gait parameters in ABI patients with indoor functional mobility. Adjunctive therapy may allow longer intervals between injection cycles and provide longer stretch post-injection affecting the efficacy of botulinum toxin. This study aims to guide an RCT to determine the optimal protocol for casting post-treatment of elbow spasticity in ABI patients.

CD5+ DIFFUSE LARGE B CELL LYMPHOMA IN A PATIENT WITH MULTIFOCAL MOTOR NEUROPATHY: A CASE REPORT
John T. Mansfield, DO, Benjamin Miller, DO, Matthew Weinstein, DO, and Erika V. Gosai, MD
CASE DIAGNOSIS: A 53-year-old male with multifocal motor neuropathy (MMN) and CD5+ diffuse large B cell lymphoma (DLBCL).
CASE DESCRIPTION: This patient had a 10-year history of MMN managed well with IVIG infusions every 4 weeks. This enabled him to be functionally independent. After a poor response to his last IVIG infusion, the patients function quickly deteriorated, resulting in incomplete quadriplegia. Shortly thereafter the patient was found to have newly diagnosed CD5+ DLBCL. CD5+ B cells have been implicated in autoimmune conditions and hence determined, his poor response to his last IVIG infusion could be related to dysregulation of his immune system secondary to the lymphoma. IVIG treatment for his MMN was thus held due to its potential to interfere with the antibody-dependent cell-mediated cytotoxic mechanism of rituximab. Instead, the patient is being treated solely for his CD5+ DLBCL with dose-adjusted etoposide, prednisone, oxoncin, cyclophosphamide, hydroxydaunorubicin, and rituximab (DA-EPOCH-R).
DISCUSSIONS: The patient completed 6 cycles of chemotherapy, with inpatient rehabilitation (IRF) admissions between cycles. Each cycle was complicated by significant weakness, however he demonstrated improvements on previous gains with each IRF stay. Now that all cycles are completed, the patient has made steady progressive functional gains. Admission muscle strength was 1/5 in bilateral upper extremities (BUE) and 0/5 in bilateral lower extremities (BLE). Currently, muscle strength is 4+/5 in BLE and 4+/5 in BUE. He has been able to ambulate independently using forearm crutches. This is the first reported case, to our knowledge, of MMN years prior to the diagnosis of DLBCL, with CD5+ B cells impacting treatment and functional outcome of MMN. The other cases found proposed a causal relationship between DLBCL and MMN.
CONCLUSIONS: Early interdisciplinary management between PM&R and Hematology/Oncology was essential for maintaining function during treatment and subsequently making gains to return to independence post-treatment.

CERVICAL INTERSPINOUS SPRAIN FROM WHIPLASH TREATED WITH PROLOThERAPY
Janice Lau, DO, Min Yoo, MD, and Edward Barawid, DO
CASE DIAGNOSIS: Cervical Interspinous Sprain
CASE DESCRIPTION: A 59-year-old male with a motor vehicle accident two years prior presented to an outpatient clinic with recurrent axial neck pain. Pain was midline without radiation or neurologic deficits. Exam showed tenderness to

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Abstracts

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Challenges in Rehabilitation of a Full Lower Extremity Degloving Injury: A Case Report

Anam Puresaw, and Ashish Khanna, MD

CASE DIAGNOSIS: A 61-year-old man with patellofemoral arthritis and lymphedema secondary to an extensive lower extremity degloving injury

CASE DESCRIPTION: The patient presents with worsening knee pain. In 2018, he was struck and dragged by a tractor-trailer, sustaining an extensive lower extremity degloving injury. There were no bone fractures. Over 8 months, he underwent multiple surgical debridements and skin grafts followed by inpatient and outpatient rehabilitation. Subsequently, he developed 7/10 intensity anterior knee pain, worsened with ambulation and stairs. Range of motion was limited secondary to pain and extensive scar tissue. Patellar crepitus, tenderness, and subluxation were noted. X-rays showed patellofemoral joint space narrowing, posterior patellar tumor, and osteoarthritis. Intra-articular corticosteroid injection led to moderate pain control. To address his severe lymphedema, physiatry used lymphoscintigraphy to map viable lymphatic vessels for targeted manual lymphatic drainage in lymphedema therapy. Combined with multidisciplinary rehabilitation, he regained significant functional ability of his limb and ambulates independently with a straight cane.

DISCUSSIONS: Patellofemoral arthritis is characterized by degenerative joint changes culminating in abnormal biomechanical patellar tracking within the trochlear groove. Risk factors include age, obesity, patellar fracture, and overuse from jumping sports. Rarely do fibrosis and scar contraction of the knee extensor muscles and overlying skin result in increased posterior pressure overlying the patella, leading to subluxation and arthritis. Skin grafts result in a disruption of normal dermal lymphatics. Already impaired lymphatic transport is taxed by trauma and surgery, resulting in lymphedema. This chronic lymphostasis generates a pro-inflammatory state within the soft tissues, perpetuating a cycle of chronic inflammation and further build-up of lymphatic fluid. Therefore, early and aggressive lymphedema management is crucial in degloving injuries.

CONCLUSIONS: Degloving soft-tissue injury sequelae are a rare risk factor for patellofemoral arthritis and severe lymphedema. This case illustrates the importance of a physiatry-led comprehensive rehabilitation regimen.

“Challenges of an Intra-Articular Injection in a Patient with Dercum’s Disease. A Case Report”

Vanessa Roos, MD, Robert M. Worthing, MD FAAPMR, and Lanny Sawatsky, MD PhD

OBJECTIVE: Femoroacetabular arthropathy in a patient with Dercum’s disease

DESIGN: A middle-aged male presented to outpatient musculoskeletal clinic with a 2-year history of left hip pain. Past medical history included prior diagnosis of Dercum’s disease, a rare condition characterized by accumulation of painful, often debilitating lipomas in subcutaneous tissue. Clinical assessment suggested the primary pain source was femoroacetabular arthropathy. Plain radiograph and MRI of the left hip confirmed moderate osteoarthritis with a large CAM-type lesion. Conservative treatment (physical therapy, NSAIDs, topicals, etc.) failed to alleviate pain. Diagnostic ultrasound confirmed multiple subcutaneous lipomas tender to probe pressure about the hip. An ultrasound-guided corticosteroid injection was performed, avoiding disturbance of the lipomas. Injection resulted in 75-80% pain relief lasting five months.

RESULTS: Concomitant diagnosis of Dercum’s disease and femoroacetabular arthropathy is incredibly rare. Treatment of arthropathy with steroid injection may provide temporary pain relief. However, structural disturbance of lipomas in Dercum’s disease may result in multiplication and worsening of symptoms. Utilization of ultrasound guidance allowed for localization and avoidance of painful lipomas while guiding successful management of the patient’s chronic hip pain.

CONCLUSIONS: The present case is the first to describe use of ultrasound-guidance in a patient with Dercum’s disease. Use of ultrasound-guidance for intraarticular hip injection ensured avoidance of painful lipomas, reducing risk for complication.

Change of Cortical Excitability of Acupuncture Intervention on the Unconscious Emotional Processing in Major Depression Patients

Ling Chen, Doctor, and Wenbin Fu, Doctor

OBJECTIVES: To investigate the effect of acupuncture intervention in the major depression patients and explore the change of cortical excitability during the unconscious processing of emotional facial expressions in patients with mild depressive disorder.

DESIGN: In this randomized, controlled trial, 20 mild depression patients were recruited. They were randomly divided into experimental group (n = 10) and control group (n = 10). The experimental group received acupuncture intervention, while the control group received sham acupuncture intervention, 30 minutes per day and 3 times a week for 4 weeks. The primary outcome measure was the event-related potentials (ERPs), the electroencephalogram recordings during the task of subliminally presented happy/neutral/sad faces; secondary outcome measures were the Hamilton depression scale (HAMD). Participants were assessed at baseline and after intervention.

RESULTS: There were larger N170 amplitudes in sad and happy trials among mild depression patients at baseline. After intervention, statistically significant difference in the decrease of the peak amplitude were observed in the experimental group (P<0.05), but not in the control group (P>0.05). The difference value in N170 amplitudes in the experiment group was larger than the control group. The scores of HAMD in the experiment group were significantly lower than baseline (p<0.05), but no significant difference in the control group (p>0.05). The improvement of the HAMD in the experiment group were statistically significant than control group (p<0.05).
CHRONIC THORACIC INTERSPIPONUL LIGAMENT SPRAIN AFTER ATRIAL MYXOMA RESECTION TREATED WITH PROLOTHERAPY

Nathaniel L. Dusto, MD, and Edward Barawid, DO

CASE DESCRIPTION: A 52 year old male with recent open heart surgery for atrial myxoma resection 6 months prior presented to outpatient clinic with significant upper back pain. Pain was midline, constant, and rated 7/10 with infrequent radiation to the chest and without neurologic deficits. Exam showed tenderness to palpation over T5 and T7-T9 spinous processes. Imaging results showed thoracic degenerative disc changes. Cardiac workup concluded his pain was not cardiac in nature. Although a thoracic intercostal nerve block was considered, the focal nature of the symptoms led the treatment team to trial thoracic interstipnus ligament prolotherapy at the initial clinic visit. The patient reported subjective improvement in pain following the initial treatment and continued to improve at future evaluations.

DISCUSSIONS: Thoracic interstipnus ligament sprain can be caused by prolonged surgeries requiring sedation where positioning may not be ideal. It should be considered when patients present with upper back pain and should be differentiated from thoracic radiulopathy or facet disease as the treatments of those conditions tend to be more invasive. First line therapies for Interspinous sprains are typically conservative including RICE, stretching and strengthening the area, and trigger point injections. Resolution of symptoms typically occurs within 4-6 weeks but can become chronic. Prolotherapy can strengthen a ligament by promoting fibroblastic hyperplasia and collagen formation. In this case, we present a patient with chronic thoracic interspinus sprain that was successfully treated with prolotherapy.

CONCLUSIONS: Thoracic interspinus ligament sprain is a commonly omitted source of back pain that can lead to chronic symptoms and disability. In patients with very localized, midline dorsalgia, prolotherapy is a minimally invasive procedure that can be considered before more invasive techniques are trialed.

CHRONIC INFLAMMATORY DEMENTYLATING POLYRADICULONEUROPATHY (CIDP) ASSOCIATED WITH CYTOMEGALOVIRUS INFECTION IN A PATIENT DIAGNOSED WITH HIV INFECTION: A CASE REPORT

Carolina Gómez Gil, and Cristián D. Rojas Beltrán

CASE DIAGNOSIS: Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP) is a progressive disease with motor and sensory dysfunction. It associated with hepatitis C and HIV infection, inflammatory bowel disease, neoplastic, organ transplantation or connective tissue disorders. There are other causes less described in the scientific literature.

CASE DESCRIPTION: We present a 51-year-old male patient with an HIV infection since 2011 without antiretroviral therapy since 2017, he had 6 months of symptoms of neuropathic pain and according to the numerical rating scale (NRS) was 9/10, plus progressive weakness in the last months with abnormal gait. HIV viral load: 484,000 copies / ml, absolute CD4 count: 95 cells / ml, cerebrospinal fluid (CSF) with increased protein level, low glucose level without pleocytosis. It was a clinical suspicion of opportunistic infection and cytomegalovirus (CMV) viral load by quantitative PCR was 333 copies / ml. Nerve conduction studies and late responses showed demyelinating in peripheric nerves. The patient received therapy with Ganciclovir for 10 days and antiretroviral therapy. He did not receive corticosteroid therapy. At the end of the pharmacological therapy with Ganciclovir, the patient showed a decrease in pain intensity by 50% and improvement in gait pattern.

CONCLUSIONS: The management of CIDP is mainly based on corticosteroids and immunotherapy according to the clinical guide, but this case shows the effectiveness to control the primary cause, such as coinfection with CMV in a patient with HIV infection.

CONCLUSIONS: There is a rare but known association between implanted orthopedic hardware and local soft-tissue and bone cancer, including in the pediatric population, which clinicians should be aware of to avoid misdiagnosis. Further studies are necessary to determine the link between the two and the risks imposed.

CHRONIC HIP PAIN SECONDARY TO OSTEOSARCOMA IN THE ILLIOPSOAS IN A PEDIATRIC PATIENT WITH A HISTORY OF NEGATIVE SUTURE FIXATION FOR SLIPPED CAPITAL FEMORAL EPIPHYSIS: A CASE REPORT

Steven J. Mann, MD, Amrit S. Ahluwalia, MD, and Seung Park, MD

CASE DIAGNOSIS: Pediatric Patient with Osteosarcoma in the Iliopsoas following Screw Fixation for SCFE

CASE DESCRIPTION: 19 year-old male who had a left femoral screw fixation for SCFE at age 8 presented with 3 months of worsening left hip pain. Physical exam revealed stable vital signs, left hip edema, tenderness, limited range of motion, and left lower extremity weakness. Labs revealed WBC 30,000/mm3, ESR >130mm/hr, CRP 202.4mg/L, lactate 4.1mmol/L. Empiric antibiotics were started for likely soft-tissue abscess. Left hip X-Ray revealed SCFE pin in place. CT revealed a Left CRP 202.4mg/L, lactate 4.1mmol/L. Empiric antibiotics were started for likely soft-tissue abscess. Left hip X-Ray revealed SCFE pin in place. CT revealed a Left CRP 202.4mg/L, lactate 4.1mmol/L. Empiric antibiotics were started for likely soft-tissue abscess. Left hip X-Ray revealed SCFE pin in place. CT revealed a Left CRP 202.4mg/L, lactate 4.1mmol/L. Empiric antibiotics were started for likely soft-tissue abscess. Left hip X-Ray revealed SCFE pin in place. CT revealed a Left CRP 202.4mg/L, lactate 4.1mmol/L. Empiric antibiotics were started for likely soft-tissue abscess. Left hip X-Ray revealed SCFE pin in place. CT revealed a Left CRP 202.4mg/L, lactate 4.1mmol/L. Empiric antibiotics were started for likely soft-tissue abscess. Left hip X-Ray revealed SCFE pin in place. CT revealed a Left CRP 202.4mg/L, lactate 4.1mmol/L. Empiric antibiotics were started for likely soft-tissue abscess. Left hip X-Ray revealed SCFE pin in place. CT revealed a
CIRCULATING MYOSTATIN AS A POTENTIAL BIOMARKER TO MONITOR SARCOPENIA IN HIP FRACTURE PATIENTS UNDERGOING A MULTIDISCIPLINARY REHABILITATION AND NUTRITIONAL TREATMENT
Alessandro de Sire, MD, Alessio Baricich, MD, PhD, Filippo Renò, MD, Carlo Ciari, MD, Nicola Fusco, MD, PhD, and Marco Ivenzenzzi, MD, PhD

OBJECTIVES: Aim of this study was to characterize the role of myostatin as a biomarker of sarcopenia and skeletal muscle modifications in hip fracture elderly patients undergoing physical rehabilitation and amino acid supplementation.

DESIGN: Osteoporotic hip fracture patients, aged ≥65 years undergone total hip replacement were retrieved. The cohort was randomly divided into two group: A and B. All patients performed rehabilitative program, consisting of 5 sessions of 40 min/week for 2 weeks, and, subsequently, a home-based exercise protocol. Group A received a 2-month amino acid supplementation, two sachets of 4g daily. At the baseline (3 months after hip fracture) and at the end of 2-month treatment, myostatin serum levels were evaluated in all the participants, undergoing two blood samples, centrifuged for 15 minutes at 3000 rpm, with the resulting serum stored in the freezer at -20 °C.

RESULTS: Twenty patients (mean aged 75.9±2.4 years) were randomized into 2 groups: Group A (n=10; mean aged 76.1±2.2 years) and Group B (n=10; mean age 75.7±2.6 years). Prevalence of sarcopenia was similar (70% vs 80%). Serum myostatin levels significantly decreased in both groups after 2 months of treatment, with lower levels in Group A (0.9±0.3 ng/mL) compared to Group B (1.1±0.4 ng/mL). There were statistically significant intra-group in both groups (p=0.01 and p=0.03, respectively); however, there were no differences between them. Interestingly, a significant reduction in circulating myostatin levels was observed in the sarcopenic patients of Group A (1.3±0.3 ng/mL vs 0.9±0.5 ng/mL; p<0.05) but not in Group B.

CONCLUSIONS: Our data suggested that in elderly patients with surgically treated hip fracture, myostatin serum levels decrease after 2 months of a combined nutritional and rehabilitative intervention. This circulating biomarker is significantly reduced in sarcopenic patients. Further prospective studies on larger cohorts of patients are warranted to confirm and broaden the clinical relevance of our results.

CLINICAL AND URODYNAMIC EVALUATIONS OF URINARY DISORDERS IN IDIOPATHIC PARKINSON’S DISEASE
Saoussen Layouni, Resident, Sahbi Elmatwa, Assistant, Sonia Jemmni, Professor, Rihab Moncer, Assistant, Emna Toulgui, Assistant, Sinine Frigi, Professor, Faïcal Khachnaoui, Professor, and Walid Ouannes, Professor

OBJECTIVES: Patients with Parkinson’s disease often have lower urinary tract symptoms(LUTS). They are associated with severely disturb the quality of life. The aim is to describe the clinical and urodynamic profile of bladder dysfunction in idiopathic Parkinson’s disease.

DESIGN: A descriptive study was performed at the unit of urodynamic analysis in the Department of Physical Medicine and Rehabilitation for ten months from June 2017 to March 2018 in 40 patients with idiopathic Parkinson’s disease. The motor symptoms were assessed using Unified Parkinson disease Scale (UPDRS III). The overall severity was assessed according to the Hoehn and Yahr stage. Their motor symptoms were evaluated in all the participants, undergoing two blood samples, centrifuged for 15 minutes at 3000 rpm, with the resulting serum stored in the freezer at -20 °C.

RESULTS: The mean patient age was 61.8±11.18 years. The average of UPDRSIII was 36.6/90-20.46. Median Hoehn and Yahr scale was 2. Clinical evaluation of LUTS revealed the predominance of irritative symptoms with an average overactive Bladder score of 9.6/9-4.7. Urodynamic evaluation revealed that the dominant bladder dysfunction was detrusor hyperreflexia in 65% of patients. Bladder hypersensitivity is found in 75% of cases. Bladder capacity is decreased in 55% of patients. Flowmetry showed a significant decrease Urinary flow rate in 50% of patients. Urethral pressure profile was normal in 70% of patients. USP scale had significant correlations with urodynamic abnormalities with P=0.05.

CONCLUSIONS: The frequency and impact of LUTS in Parkinson’s disease required adequate exploration and care to improve patient quality of life. Urodynamic investigations are necessary to choose the best treatment.

CLINICAL AND URODYNAMIC PROFILE IN ELDERLY
Ikram Haddada, Doctor, Rihab Moncer, Doctor, Ines Louhibi, Doctor, Emma Toulgui, Doctor, Sinine Frigi, Doctor, Walid Ouannes, Doctor, Sonia Jemmni, Doctor, and Faïcal Khachnaoui, Doctor

OBJECTIVES: To determine the clinical profile and evaluate the urodynamic examination data of elderly subjects with vesico-sphincteric disorders.

DESIGN: We counted 80 patients (8 men and 72 women) with mean age of 69.67±4.8 years. 21.2% of the patients were diabetic and 14.3% of men were followed for a prostate disease. The most frequent symptom was urinary tract leakage in 48.5% of cases; prolapsus in 43.8%, and repetitive urinary tract infections in 7.7% of cases.

RESULTS: Flowmeter revealed dysuria in 21.2% of cases. Cystoscopy had objectified a hypocompliant bladder, hypersensitive in 50% of cases and hypocompliant bladder in 3.1% of cases. Sphincteric insufficiency was present in pro- filometry in 24.2% of cases. The therapeutic modalities considered were perineal reeducation in 25% of cases; treatment with anti-cholinergic drugs in 40.6% of cases, and aminergic and alpha blockers in 15.1% of cases.

CONCLUSIONS: The management of urinary incontinence in the elderly should be comprehensive. The challenge is to identify the causes of incontinence specific to aging as well as co-morbidities and environmental factors. An interrogation than an clinical and urodynamic examination make it possible to determine the origin and to define at best the type of urinary incontinence.

CLINICAL APPLICATION OF CUSTOMIZED NECK ORTHOSIS WITH NEGATIVE SENSORY FEEDBACK IN CHILDREN WITH TORTICOLLIS
In Hye Kim, MD, So Jung Lee, MD, Zee Won Seo, MD, and Soo Yeon Kim, MD, PhD

OBJECTIVES: The aim of this study was to investigate the effect of customized neck orthosis with negative sensory feedback for treatment of torticollis that has not been responsive to conservative or surgical treatment.

DESIGN: 13 children with torticollis were participated in this study. A rough surface using Velcro was attached to the site of contact with mandibular angle at the tilted head side, which makes the patient uncomfortable, inducing them to tilt head toward opposite side as negative sensory feedback. All patients were applied neck orthosis for 2 hour per day and 5 days per week. The neck orthosis were applied alone during first 3 months for adaptation and then rough surface were provided. The patients were educated with neck exercise to avoid contact the neck orthosis and rough surface for active stretching exercise of ipsilateral neck muscle and strengthening exercise of contralateral neck muscle. Clinical outcomes were evaluated with angle of inclination of the head.

RESULTS: 4 out of 13 children were dropped out due to poor cooperation or follow-up loss. A significant improvement were revealed in angle of torticollis after neck orthosis applied (p=0.000). Degree of neck angle correction, which represents the treatment effect, were significantly higher in the patients with higher initial neck angle and female gender (p=0.024 and 0.007, respectively). Age of starting treatment, treatment duration and side of the lesion did not affect the treatment effect. Among 9 patients, only 1 patient reported skin lesion as minor complication. They did not report any major complications. After treatment, patients and their family were satisfied with corrected head posture with neck orthosis.

CONCLUSIONS: This study provides the evidence of clinical applicability of customized neck orthosis with negative sensory feedback. It may be an effective treatment option for refractory torticollis after surgical treatment or torticollis with postural problem.

CLINICAL CHARACTERISTICS THAT IMPACT ONABOTULINUMTOXINA TREATMENT ADHERENCE IN PATIENTS WITH SPASTICITY FROM THE ASPIRE STUDY
Alberto Esquenazi, MD, Wuwei (Wayne) Peng, MD, MS, George F. Wittenberg, MD, PhD, Philippe Gallien, MD, PhD, Alessio Baricich, MD, PhD, Kristina Fanning, PhD, Aleksa Zurek, PhD, Gerard E. Francisco, MD, and Daniel S. Bandari, MD

OBJECTIVES: A better understanding of factors that impact onabotulinumtoxina treatment adherence can help improve clinical strategies to manage spasticity. We aimed to identify patient demographics and clinical characteristics that impact onabotulinumtoxina treatment adherence from the Adult Spasticity Interna- tional Registry (ASPIRE) study.

DESIGN: Multicenter, international, prospective, observational registry (NCT01930786). Adult patients with spasticity were treated with onabotulinumtoxina at their clinician’s discretion over 2 years. Clinically meaningful thresholds for treatment adherence/non-adherence were used. Treatment adherent: patients receiving ≥2 treatment sessions with onabotulinumtoxina during 2-year period; non-adher- ent: patients receiving ≤2 treatment sessions. Data assessed using univariate logistic regression and are presented as odds ratios (OR) with 95% confidence intervals (CI). Statistical significance, P< 0.05; non-significant effects of clinical interest, P< 0.10.

RESULTS: Of the total population in ASPIRE (N=730), 523 patients (71.6%) were categorized as treatment adherent and 207 patients (28.4%) as non-adherent.
On average, adherent patients received 5.3 (SD:1.6) treatment sessions, non-adherent patients received 1.5 (SD:0.5). Patients with traumatic brain injury (TBI; 57.8%) were less likely to adhere to treatment (72.6% other etiologies; OR:0.52, CI:0.26-0.96; P<0.036), while patients with cerebral palsy (80.5%) trended towards more likely to adhere (70.6% other etiologies; OR:1.72, CI:0.96-3.10; P=0.070). Additionally, patients who used orthotics (74.3% vs. 68.3% absence; OR:1.34, CI:0.96-1.86; P=0.081) or had surgeries/procedures (79.6% vs. 70.3% absence; OR:1.65, CI:0.97-2.81; P=0.067) trended towards more likely to adhere. Conversely, patients naïve to total knee arthroplasty for spasticity (63.6%) were less likely to adhere than non-naïve patients (76.4%; OR:0.54, CI:0.39-0.75; P<0.001) and diabetic patients (62.8%) were less likely to adhere than non-diabetic patients (73.0%; OR:0.62, CI:0.40-0.98; P=0.042).

CONCLUSIONS: Additional analysis from ASPIRE suggests that TBI patients, diabetic patients, and those naïve to total knee arthroplasty for spasticity are at higher risk of treatment non-adherence. Further analysis of risk factors that impact on total knee arthroplasty treatment adherence can optimize spasticity management strategies to improve long-term patient care.

CLINICAL IMPLICATIONS OF PATIENT SATISFACTION WITH CONTINUOUS PASSIVE MOTION THERAPY: A CASE REPORT

Annette Grotheer, MD, MPH 2020, Lorenzo Diaz, BS, MS, Cristina M. Brea, MD, and Sooma Khraa, DO

A 75-year-old female status post bilateral total knee arthroplasty.

CASE DESCRIPTION: A 55-year-old male presented status-post elective bilateral total knee arthroplasty (TKA) secondary to severe osteoarthritis. Postoperatively, two hours of left unilateral continuous passive motion (CPM) therapy was administered daily, duration was increased with tolerance. Daily physical therapy (PT), occupational therapy, lidocaine patches, and as-needed (prn) Peracet were prescribed. At baseline, patient demonstrated left active range-of-motion (AROM) and passive range of motion (PROM) to 62° and 75° of flexion, respectively. Right AROM and PROM were 77° and 81°, respectively. Baseline pain was 5/10 with maximum utilization of prn Peracet. At discharge, the patient demonstrated AROM to 90° and 93° on the right and left, respectively, with PROM to 75° bilaterally. Pain persisted at 5/10, however less prn analgesia was required. Subjectively, the patient preferred CPM treatment compared to no treatment because of improved ease completing PT, decreased “tightness”, and decreased pain in the treated knee.

DISCUSSIONS: Osteoarthritis continues to be a common condition leading to increasing numbers of TKA procedures each year. Currently there is no clear evidence indicating a specific physical therapy regimen resulting in superior patient outcomes. Nevertheless, the constellation of functional, physical and cognitive impairments, in addition to assistance with a long-term lifestyle modification plan for treatment of the metabolic syndrome.

CLINICAL PRESENTATION OF BARDET-BIE LD SYNDROME: A CASE REPORT

Ililiana Sanchez, MD, Jose A. Fernandez, MD, and Monhammad Islam, MD

CASE DIAGNOSIS: Bardet-Biedl Syndrome in a 15 year old Hispanic male

CASE DESCRIPTION: This is the case of a 15-year-old male born to non-consanguineous Hispanic parents. Abnormal physical features at birth were his weight, on the 99.9th percentile and length on the 10th percentile, polydactyly and consanguineous Hispanic parents. Abnormal physical features at birth were his weight, on the 99.9th percentile and length on the 10th percentile, polydactyly and consanguineous Hispanic parents. By age 8 years old he was diagnosed with bilateral Perthes disease, and other physical features, such as round facies and short neck, became more evident, along with speech and learning delay. Directed work up with genetic analysis revealed a novel non-sense homozygous mutation in the BBS4 gene, confirming the diagnosis of Bardet-Biedl syndrome.

DISCUSSIONS: Discussion: Bardet-Biedl syndrome is a rare autosomic recessive disorder, recently recognized as a ciliopathy. To date, 12 different affected genes associated with the syndrome have been identified, and a wide variety of clinical features and a phenotypical expression of the disease have been described. In some cases, patients present with very particular features, however these may vary among patients. Nevertheless, the constellation of functional, physical and cognitive impairment at different degrees of severity will prompt a customized multidisciplinary rehabilitation plan.

CONCLUSIONS: Conclusion: The treatment of individuals affected with the Bardet-Biedl syndrome is supportive and multidisciplinary. From the rehabilitation standpoint, treatment is oriented to address residual disability which could include cognitive impairment, learning delay, visual and hearing impairment, physical and functional limitations, associated with hypertension, decreased strength and joint abnormalities, in addition to assistance with a long-term lifestyle modification plan for treatment of the metabolic syndrome.

CLINICAL STUDY OF CARDIOPULMONARY FUNCTION ASSESSMENT OF GYNECOLOGICAL CANCER-RELATED LOWER LIMB LYMPHEDEMA

Xu Quan, Master, Pan Yu, Doctor, and Sun Xiaohua, Master

CASE DIAGNOSIS: The purpose of this study were to evaluate cardiorespiratory fitness and cardiorespiratory reserve ability, and to explore the rehabilitation program of aerobic exercise in patients with gynecological cancer-related lower limb lymphedema.

CASE DESCRIPTION: Thirteen cases of gynecological cancer-related lower limb lymphedema (experimental group) and thirteen healthy volunteers (control group) were selected for cardiopulmonary exercise test. The indexes of cardiopulmonary exercise test between two groups were compared.

DISCUSSIONS: No significant differences were found in age, gender and body mass index (BMI) in two groups. The observation group had significantly lower values for peak oxygen uptake (15.6±4.5 vs. 21.1±1.7ml/kg/min), anaerobic threshold (11.5±2.0 vs. 14.0±2.0ml/kg/min), metabolism equivalents (4.7±1.1 vs. 6.0±1.0) than the control group (P<0.001, 0.023, 0.000); There was no significant difference in resting heart rate, peak heart rate, peak oxygen pulse, peak respiratory exchange rate, peak power and peak minute ventilation between experimental group and control group (P>0.05).

CONCLUSIONS: The level of cardiopulmonary fitness in patients with gynecological cancer-related lower limb lymphedema was significantly lower than that of the healthy people, and the reserve function of heart and lung is decreased. Attention should be paid to cardiopulmonary function In the course of rehabilitative treatment. The short-term and long-term effects of aerobic exercise on patients with gynecological cancer-related lower limb lymphedema need more researches further.

COHABITATION OF SMARTWATCH TECHNOLOGY AND IN-HOUSE TELEMETRY ON THE REHABILITATION FLOOR: A CASE REPORT

Matthew D. Wilhelm, BS, Michael Boeving, MD, and Jeremy Jacobs, DO

CASE DIAGNOSIS: 75-year-old female status post bilateral total knee arthroplasty complicated by post-operative, newly diagnosed atrial fibrillation with rapid ventricular rate.

CASE DESCRIPTION: 75-year old female presents to an acute rehabilitation floor, equipped with in-house telemetry, following bilateral total knee arthroplasty complicated by post-operative, newly diagnosed atrial fibrillation with rapid ventricular rate (RVR). Upon admission, the patient was in sinus rhythm and on medications managed by cardiology services. The patient was continuously monitored utilizing in-house telemetry. The patient returned to atrial fibrillation with RVR, documented in real-time with telemetry. In response, the patient was motivated to understand her newly acquired arrhythmia and purchased a smartwatch to assist in monitoring her rhythm. The smartwatch vitals recordings were utilized in conjunction with telemetry for uninterrupted surveillance. Physiatry and cardiology adjusted treatment regimens, leading to completion of rehabilitation and successful discharge home.

DISCUSSIONS: The lines demarcating advancing medical technology and obtainable consumer products are blurring. What was once necessary to visit a physician has become integrated in wearable, everyday devices. The impact of such assessable technology continues to cultivate rapidly. Smartwatches have truly infiltrated the consumer market within the past 5 years, nearly doubling in sales with each consecutive year. Physicians can maximize their patients’ own technology in creating cohesive plans for even the most complicated case.

CONCLUSIONS: A limited number of acute rehabilitation facilities are equipped with telemetry capabilities. The ability to monitor and treat arrhythmias with in-house telemetry while continuing rehabilitation is a luxury. Physiatrists,
Abstracts

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Comparative analysis of reports to the United Nations committee on the rights of persons with disabilities

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OBJECTIVES: The research was made to develop the most effective approach to the preparation of a report on the implementation by Russia of commitments made after the signing of The Convention on the Rights of Persons with Disabilities (the CRPD).

DESIGN: We have analyzed the reports submitted by several countries from different economic groups (all continents were covered-Spain, Great Britain (GB), Norway, Brazil, Denmark, Canada, Latvia, China, Sweden, Belgium, Mexico, Australia, Cyprus, Germany), comparing their approaches to the implementation of obligations under the CRPD, depending on the situation with disabled in a particular country. High priority was given to the problems arising from the limited resources of particular countries, and the problems that require a rather radical change in the social climate and the rejection of existing approaches in such areas as education, employment and legal assistance to disabled.

RESULTS: The implementation of the provisions of the CRPD is most often made through the granting of constitutional status or the establishment of inter-Ministerial bodies to make appropriate changes in the legislative framework. Developing countries provided their reports, focusing on the work done to establish monitoring bodies for the implementation of the CRPD; and the most part of the European countries focused on the results and challenges of implementing specific provisions of the CRPD. All reports, except for the Latvian one, do not contain an alternative assessment of non-government organizations (NGOs), which is a Violation of the requirements of the CRPD.

CONCLUSIONS: With some degree of conditionality, the reports can be divided into three groups: the traditional "medical" approach to a disabled person as a patient – a vivid example of the report of Poland. Moving from a predominantly individual approach to solving problems of disabled as part of society – Denmark and Belgium. A purely social approach requiring from the society to create an equally comfortable environment for the enjoyment of public benefits by all groups of the population, including disabled – Norway. Most developing countries had not yet begun to implement the provisions of the CRPD on a large scale, but their ideas on the active involvement of private business and local communities deserve to be taken into consideration. The most difficult to implementation is the provision of the CRPD on the development of inclusive education.

Comparing clinical outcomes between bone marrow concentrate and whole bone marrow therapies

Nicholas A. Schmidt, MHS, Marc Darrow, MD, JD, Brent Shaw, BS, Saskia Budgett, Grace Lank, Wei-Xian Li, MD, and Christopher Redding

OBJECTIVES: The objective of our study was to shed light on the debate surrounding various therapeutic bone marrow preparations by comparing the clinical outcomes of bone marrow concentrate (BMC) and whole bone marrow (WBM) injections in the treatment of various musculoskeletal injuries.

DESIGN: This prospective study reports private clinical outcomes from 164 patients receiving an average of two injections of either BMC or WBM two weeks apart and assessed at 1, 3, 6, and 12 months using the Upper or Lower Extremity Functionality Index, Numerical Pain Scale and a subjective questionnaire for overall improvement. Bone marrow was obtained from the posterior superior iliac spine and either aspirated (WDM) or centrifuged (BMC) prior to injection.

RESULTS: BMC patients experienced a 1.36 resting pain decrease (p< 0.001) and a 2.28 active pain decrease (p< 0.001) representing a 48.55% and 37.84% decrease in resting and active pain respectively. These patients experienced a 5.22 increase in functionality score (p< 0.001), which is a 23.38% increase compared to baseline. Overall BMC patients experienced an average 48.88% increase in total improvement compared to their prior condition. WBM patients experienced a 1.01 decrease in resting pain (p< 0.001), and a 2.95 decrease in active pain (p< 0.001), representing a 38.59% and 42.51% decrease in resting and active pain respectively. These same patients experienced a 6.21 increase in functionality score (p< 0.001), which is a 29.06% increase compared to baseline. These patients experienced a mean 50.49% total overall improvement compared to their prior condition. There were no statistical differences between BMC or WBM groups in any clinical measure.

CONCLUSIONS: Our study provides evidence that there exists no statistically significant difference in the measured clinical outcomes of WBM and BMC. WBM represents a simplified, and efficacious method, for the use of MSC injections for musculoskeletal injuries.

Community-based rehabilitation for women with breast cancer: WHOQOL-2.0 and EORTC QLQ-BR23 questionnaires

Pavel Lozea Magana, Master In Sport Sciences, Yaqai Sanchez, De la Paz Paloma, MD, Lucatero Iliana, MD, and Cortes Rosalinda, MD

OBJECTIVES: WHO mentions that Community-based Rehabilitation (CBR) plans should be people-centered, goal oriented and realistic. An CBR project for women with breast cancer was designed, covering the 5 components of the CBR matrix proposed by WHO. The objective of this research is to analyze the changes in perception of disability and quality of life referred to in the WHOQOL-2.0 and EORTC QLQ-BR23 questionnaires.

DESIGN: Seven women with breast cancer without previous rehabilitation treatments were included. The CBR program consisted of 3 phases: the first in-hospital with the objective of disability management and prevention or management of lymphedema. The second phase included physical conditioning exercise in addition to psychological and educational preparation for life in the community. The third phase was the community stage where the patient returned to normal life, with follow-up of preventative measures, use of compressive sleeves, home adjustments, monitoring of physical and therapeutic exercise programs and return to work. Throughout the program they received specific education, nutrition management and psychology. The WHOQOL-2.0 and EORTC QLQ-BR23 questionnaires were applied at the beginning and end of each phase.

RESULTS: In phase I, improvements were obtained in the perception of disability but without statistical significance; the perception of quality of life increased with respect to the measure. In phase II and III the perception of disability (initial 11 vs. final 6) and quality of life (49 vs. 37 in A, and 10 vs. 12 in B) improved statistically significantly. The Wilcoxon test was used to study the results in the variables.

CONCLUSIONS: A CBR program that includes an element of the matrix components will impact on the perception of disability and quality of life of breast cancer patients. The EORTC QLQ-C30 and WHOQOL 2.0 questionnaires are feasible instruments to perform the measurements.
COMPARISON OF COMPLICATIONS BETWEEN TWO DIFFERENT INTRATHecal BACLOfen CATHETER MODELS

Linda E. Krach, MD, Angela Sinner, DO, and Julia Pritchard

OBJECTIVES: Intrathecal Baclofen (ITB) can be a very effective treatment for spasticity, but hardware failure can result in a potentially life threatening withdrawal syndrome. The hardware manufacturer developed a catheter to address some of the concerns with catheter fracture and tears, introduced in 2013. The objective of this study is to compare the occurrence and type of catheter complications for the two catheter models.

DESIGN: Retrospective chart review of all individuals who had pump procedures in 2011 and 2012 (pre-new catheter) and 2014 and 2015 (post-new catheter) at one institution. Data collected included patient factors (diagnosis, functional classification, spine fusion status) and catheter information (age of catheter at time of complication, type of complication).

RESULTS: A total of 293 patients’ (230 old model catheter) charts were reviewed. 270 (92%) had a diagnosis of cerebral palsy. There was a non-significant difference in the mean number of years of follow-up between the two types of catheters (old model =12.1, new model=4.1). During the follow up period, the new catheter model had no episodes of catheter breakage or disconnection whereas the old model had a rate of breakage of 10/1000 catheter years and disconnection of 7/1000 catheter years. Occlusion was more common in the new model (12/1000 catheter years vs. 37/1000 catheter years (p< .05). Overall the older model of catheter had a complication rate of 20/1000 catheter years and the new model 35/1000 catheter years (p< .05). The newer model had a tendency to have complications occur early in the course post-implantation, but not later.

CONCLUSIONS: It appears that the newer model of catheter is more resistant to breakage and disconnection than the older model. Once an initial period of time has passed, the newer model also appears to have greater stability/fewer complications. Longer term follow and more detailed analysis will be helpful.

CONSERVATIVE VSURGICAL MODALITIES FOR TREATMENT OF INTRACTABLE SPASTICITY IN CEREBRAL PALSY

Naglaa A. Gadallah, MD, Ashraf Abyad, MD, and Walid Abd Ghany, MD

OBJECTIVES: To evaluate different current modalities involved in treatment of intractable spasticity in children with cerebral palsy including the inclusion and exclusion criteria, complications, efficacy & outcome.

DESIGN: 48 children were included and subjected to: Clinical scoring of spasticity, Muscle Power, Joint range of motion and disability assessment. Electrophysiological studies: F/M and H/M ratios and EMG studies; Baseline and follow up assessments at 1, 6, 12- and 18-months post intervention. Patients were divided into: Group 1: BTX-A group: 23 children with focal spasticity with no evidence of contracture; Group 2: Selective peripheral neurotomy: 17 children with spasticity confined to a specific muscle group. Group 3: Selective dorsal rhizotomy (SDR) group: eight diplegic children with diffuse spasticity. Group 4: multi-modality group: 17 children (selective peripheral neurotomy plus complementary orthopedic procedure). Intensive physical and occupational therapy for all patients.

RESULTS: In group 1: significant decrease in muscle tone and improved functional scale at 1 and 6 months. The recurrence of hypertonia and decrease in scale parameters was recorded at 12th and 18th months post-injection. The maximum baseline of stretch reflex activity Hmax/Mmax for improved patients was 0.49. Significant improvement was recorded in group 2 patients, especially voluntary function. There was no recurrence of reflex activity either clinical or electrophysiological during the follow-up period. Spasticity control is achieved, immediately post-operative, in 7 children in group 3, with no change in disability score over one-year follow-up period. In group 4, there was significant functional improvement one month following treatment. Scale values were highly significant in 15 children at the 6th month post-injection. CONCLUSIONS: Botulinum toxin type-A gave better, if spasticity is focal and moderate, Hmax/Mmax < 0.5 and in absence of fixed joint deformity. Cost/benefit evaluation is best presented with selective peripheral neurotomy in comparison to other modalities.

CONTRALATERAL CHRONIC RIGHT HIP GLUTEUS MEDIUS TENDINOPATHY SIGNIFICANTLY IMPROVED WITH PROLOThERAPY IN POST-POlio PATIENT

Pramanya Suri, MD, Shane Davis, MD, Ronald Takekoto, MD, and Minelli Mehrahi

CASE DIAGNOSIS: Gluteus Medius Tendinopathy.
CASE DESCRIPTION: 74-year-old female with post-polio syndrome presented with generalized left-leg weakness and new right lateral hip pain. The patient endorsed favoring her right leg for several years, and as a consequence was at increased risk of incurring an adverse injury to the right gluteal abductor muscles. Examination revealed tenderness over the right lateral hip, weak hip abuctors (4/5) and positive Trendelenburg sign. Right hip MRI showed a small labral tear, gluteus medius tendinopathy and mild osteoarthritis. Electodiagnostic studies did not reveal lumbar radiculopathy. The patient’s pain was refractory to prolonged treatment with oral medications, PT, IEP, and corticosteroid injections. The patient was then seen at a tertiary PM&R clinic and received prolotherapy to the right gluteus medius tendon, after which she reported significant decrease of at least 50% of her pain after several months.

DISCUSSIONS: Gluteal tendinopathy presents as lateral hip pain. There is increased prevalence among women aged above forty years compared to men, about 23.5% and 8.5%, respectively. Its effects are significant, considering that it interferes with basic weight-bearing tasks. Mechanical factors are responsible for the pathophysiology. The combination of high tensile loads and excessive compression within tendons lead to the most damage. From evidence-based studies, gluteal tendinopathy can be managed with shock wave therapy, exercise, corticosteroid injections, and surgery. Considering that there are limited treatment options, the best way to assess and manage gluteal tendinopathy is through the management of the patient’s tendons loads, which can be achieved through exercise, possibly tendon regenerative treatments, and patient education on underlying pathomechanics.

CONCLUSIONS: Gluteal tendinopathy is a result of stress and compression of the musculotendinous fibers. The existing treatment is aimed at relieving pain through physical and pharmacological methods. Development of more effective management strategies of gluteal tendinopathy may be achieved through prolotherapy, as was demonstrated in this case.

CONTRIBUTION OF AUTOMATIC MOTRICITY IN AN ORIGINAL REHABILITATION PROGRAM FOR HEMIPLEGIC PATIENTS

Laurence Havé, Physiatrist, Valérie Gaveau, Anne-Emmanuelle Pivot, and Jacques Lunnutti, Physiatrist

OBJECTIVES: During the last ten years, the study of different rehabilitation techniques (pharmacology, exoskeleton, transcranial stimulation) showed only partial recovery of arm function after stroke. We studied the effects on the recovery of grasping ability of an original program of rehabilitation based on automatic motricity with the purpose to bypass intentional motricity commonly used in available rehabilitation techniques.

DESIGN: We conducted a prospective randomized, single-blind clinical trial. Patients included in this study were adults with hemiplegia, at least 6 weeks after a stroke. This program was implemented in addition to their usual rehabilitation program. The experimental group participated to a specific rehabilitation program comprising exercises of aiming a mobile target on a motorized table. The control group had a rehabilitation program including exercises of aiming an immobile target on the same table as the other group. Both program included ten daily sessions over two weeks. Evaluations were carried out before, immediately at the end of the rehabilitation program, then after 2 weeks. The main scale was the Fugl-Meyer motor scale. Other valid scales were used like the Motor Activity Log or the Frenchay arm test.

RESULTS: The score on the Fugl-Meyer motor scale was improved in both groups. No difference was noted between the two groups but large inter-individual differences were observed. The rehabilitation session in the experimental group were shorter than in the control group.

CONCLUSIONS: The stimulation of the automatic motricity allows improving the account of movements with reduced fatigue and effort, compared to the control group. We can make the hypothesis that stimulating automatic motricity could increase the activation of sensory-motor loops during action or stimulate the recovery of automatic components of action regulation. Such a program aims at reducing the sense of effort and improving functional recovery.

CONTRIBUTIONS OF MUSCLE ELASTICITY AND LATERAL SLIDE OF THE TRANSVERSUS ABDOMINIS TO LUMBAR STABILITY

Iisuru Shimizu, Hiroichi Miaki, Katsunori Mizuno, Nobuhide Azuma, and Takanaka Nakagawa

OBJECTIVES: Contraction of the transversus abdominis (TrA) plays an important role in lumbar stability. Ultrasoundography can be used to measure muscle elasticity and lateral slide for a noninvasive evaluation of TrA contraction. However, no reports...
have verified the relationship between these indexes and lumbar stability. Therefore, the objectives of this study were to clarify the contribution of the elasticity and lateral slide of the TrA to lumbar stability and to identify an effective exercise for stabilizing the lumbar vertebrae.

DESIGN: Measurements of lumbar stability and muscle elasticity and lateral slide of the TrA were performed in 29 healthy males. Lumbar stability was measured with the participant’s pelvis in a neutral position and body in the crook lying position, and a pressure biofeedback unit was placed under the lumbar vertebrae. The participant then fully extended the knee joints while maintaining the original hip joint angle, and the examiner measured changes in pressure on the biofeedback unit. Muscle elasticity and lateral slide of the TrA were measured at rest and during hollowing with a maximum effort, and the amount of change between rest and hollowing was calculated. Potential relationships among lumbar stability, muscle elasticity, and lateral slide of the TrA were verified using Pearson's correlation coefficient. The significance level was set to p < 0.05.

RESULTS: There was a significant correlation between the elasticity of the TrA and lumbar stability; however, no relationships were observed between lateral slide and lumbar stability or TrA elasticity.

CONCLUSIONS: As an index of TrA contraction during hollowing, improving the elasticity of the TrA, not the lateral slide, may help stabilize the lumbar vertebrae in healthy individuals. Moreover, hollowing with maximum effort may be an effective training exercise for stabilizing the lumbar vertebrae.

COPPER DEFICIENCY MYELONEUROPATHY AND CEREBELLAR ATROPHY: A CASE REPORT
Lyndsey Booker, MD, Lesley Abraham, MD, and Cherry Junn, MD

OBJECTIVES: Subacute ataxia with copper deficiency myeloneuropathy and cerebellar atrophy.

DESIGN: A 78-year-old male presented to the hospital with a one month history of severe truncal and appendicular ataxia with 15-pound weight loss. He underwent an extensive negative workup for infection, malignancy and autoimmune diseases. MRI spine demonstrated multiple areas of cervical cord flattening but no cord signal abnormality. MRI brain demonstrated mild global atrophy in the cerebellum per neurology. Somatosensory evoked potential studies were unremarkable. A short course of plasmapheresis and steroids did not improve symptoms. Lab results were consistent with copper deficiency and its associated triad – anemia, leukopenia, and myeloneuropathy. EMG confirmed distal symmetric axonal neuropathy. Copper level normalized with supplementation. During inpatient rehabilitation, ataxic symptoms improved and he progressed from requiring moderate assistance with ambulation and transfers to requiring minimal assistance.

RESULTS: There have been several cases of copper deficiency myelopathy described in the literature in recent years. This patient presented with unique ataxic symptoms in the setting of copper deficiency. Copper is an important element that serves as a cofactor for numerous enzymes involved in maintaining the nervous system. Common causes of copper deficiency are prior gastrointestinal surgery, malabsorption, and excess zinc. This patient did not have any specific risk factors for copper deficiency and etiology is unclear. Paraneoplastic cerebellar degeneration was considered but primary malignancy was not identified on workup. His ataxia persisted even with the normalization of copper level, but his mobility improved with therapy.

CONCLUSIONS: Copper deficiency myeloneuropathy is a relatively rare presentation. It is important to keep a broad differential and consider nutritional deficiencies in complex neurologic presentations. This patient had clinical evidence of axonal neuropathy on EMG and mild global cerebellar atrophy on brain MRI. In addition to copper supplementation, a multi-disciplinary rehabilitation approach is essential for functional improvement.

COPPER DEFICIENCY RELATED NEUROPATHY ASSOCIATED WITH A 40YR PRIOR JEJUNOILEAL BYPASS
Shawn Joshi, Mitra McLarney, MD, and Benjamin Abramoff, MD, MS

CASE DIAGNOSIS: A 67-year-old female presented with complaints of bilateral paresthesias of her hands and legs, gait instability and falls, and urinary incontinence. The patient has a significant history of malabsorption and malnutrition related to a 40-yr prior jejunooileal bypass (JIB) and abnormal MRI in the dorsal columns in the upper cervical cord. The patient was found to have ongoing incomplete copper deficiency and lateral slide of the TrA. A similar case presentation a year prior which was only treated with IV and PO copper repletion.

CASE DESCRIPTION: The most common cause of copper deficiency is previous upper gastrointestinal surgery (47% of cases). JIB was a popular weight loss surgery in the 1960-70’s, which is now rare and no longer viable due to its short and long-term complications. Hypocupraemia can manifest in a variety of ways including central nervous system (CNS) demyelination, optic neuritis, anemia, leukopenia, peripheral polyneuropathy, and motor neuron disease. Copper deficiency can present indistinguishable to B12 deficiency, making diagnosis difficult. This patient re-presented after 40 years of jejunoileal bypass with copper deficiency and presented with copper deficiency neuropathy.

DISCUSSIONS: The patient returned after one year with continuing bilateral paresthesias and gait instability, indicating that PO and IV Copper repletion was insufficient as a solitary therapy. In conjunction with repletion, the patient began intensive PT and OT 5-7 times/week for 180 minutes. She was able to regain independence, return home, and improved activities of daily living with increased functional mobility.

CONCLUSIONS: It is important to recognize the related metabolic consequences of copper deficiency and their potential for myelopathy. The significant impact that intensive PT/OT regimens may have in addition to micronutrient repletion may be necessary to improve overall function. The patient ultimately underwent reversal of the JIB. This case highlights the importance of continued monitoring of patients with older/rare surgical interventions, and the importance of more holistic and targeted (combination nutrient repletion, PT/OT, and surgical reversal) approaches compared to singular symptomatic treatments.

CREATION OF A MULTIDISCIPLINARY CONCUSSION PROGRAM
Surendra Barshikar, MD, Daniel Alemayehu, FACHE, Alyssa Jones, CRC, Kathleen Bell, MD, and Jason Smith, PhD, ABPP

CASE DIAGNOSIS: Improve access to care for patients with Concussions. Combine multiple specialties into one multidisciplinary clinic. Improve care coordination among multiple stakeholders. Monitor and improve patient outcomes.

CASE DESCRIPTION: Concussion care was fragmented, non-standardized and provided across multiple departments. We established a multidisciplinary concussion program which includes PMR MD, vestibular Physical Therapists, vision/occupational therapist, speech therapist and Rehab counselor as the main pillars of the program and other subspecialty referrals and personal in Neuro-Optometry, Headache Neurology, Neuroradiology and Neurosurgery were identified. Standardized intake questionnaires, physician notes and pathway was identified depending on acuity of concussion. There were weekly team meetings coordinated by the newly hired Rehab counselor who coordinated the program and was a bridge between patient and all services. A registry was created to track symptoms and help with outcomes and research. Patient volume and access to care improved. Patient education booklet and website was created for education.

DISCUSSIONS: The concussion program now provides timely, coordinated approach and standardized care by multiple specialists. The scheduling lag time was decreased from >28 days to < 14 days. The patient volume increased significantly over 50% from FY17. We receive referrals from north Texas, Oklahoma, Arkansas as well as outside states. We are a go to center for complex concussion care in our geographic area. We are actively collecting information, which will help with outcomes and research to improve patient care.

CONCLUSIONS: PMR Clinic serves a perfect home for concussion care. Standardized intake and notes with coordinated approach helps improve outcomes.

CRITICAL ILLNESS MYOPATHY FROM SEPSIS DUE TO INTRATRUNKAL DEVICE INFECTION
Jason Andrade, DO, MSMHS, Beau Bigelow, MD, Anita Koul, MD, Satyam Parikh, MD, and Aye Mon Win, DO

CASE DIAGNOSIS: Critical Illness Myopathy from sepsis due to Intratrunkal Device infection.

CASE DESCRIPTION: 33 year-old female without past medical history presented with abdominal pain and was found to have septic/cardiacogenic shock requiring extracorporeal membrane oxygenation and additionally complicated by disseminated intravascular coagulopathy, shock liver, renal failure requiring hemodialysis, tracheostomy dependence, and pressure ulcers. She was diagnosed with Group A Streptococcus aureus infection from her intratrunkal device (IUD) and treated with antibiotics, hysterecctomy, and bilateral salpingo-oophorectomy. During her prolonged ICU stay, she was found to have severe motor and sensory deficits in all extremities. We present a case where a patient with critical illness myopathy from sepsis due to an intratrunkal device progressed with acute inpatient rehabilitation.

DISCUSSIONS: Combined Critical Illness Myopathy (CIM) is also known as Acute Quadripregic Myopathy and may present similarly to Quadripregic Spinal Cord Injury (SCI). Although 25% of all patients that are intubated for a minimum of 7 days can develop Critical Illness Myopathy, it is still rare. As a result, its medical
management is not well understood. Although the etiology is peripheral nerve injury, therapeutic approach mimics that of quadriplegic SCI.

CONCLUSIONS: During her rehab course, Electromyography and Nerve Conduction Studies confirmed C1M. She participated in multidisciplinary therapies for over 2 months with improvement in her mobility and Activities of Daily Living. She received neurorehabilitation with robotic exoskeleton gait training and robotic hand training. She advanced from total assistance to minimal assistance in her bed mobility, transfers, and ambulation. She improved her ADLs with most notable changes seen in grooming, upper body dressing, and eating from total assistance to minimal assistance, moderate assistance, and set-up, respectively. As seen in quadriplegia, robotic interventions are essential to functional progress in C1M.

CRYONEUROTOMY OF THE BILATERAL LATERAL PECTORAL NERVES IN A QUADRIPLEGIC PATIENT WITH SPASTICITY, A NOVEL APPROACH

Paul Winston, MD, FRCPC, Daniel Vincent, MD, FRCPC, and Emily Krauss, MD, MSC, FRCPC

CASE DIAGNOSIS: A 34 year old C4, ASIA C man with minimal antigravity movements in the legs, minimal hand function, but anti-gravity elbow flexion. 11 months post injury he underwent bilateral auxiliary nerve to lateral triceps nerve transfer with successful reinnervation within one year. He had severe spasticity despite 80 mg of baclofen daily and 500 units of BoNTA in the upper extremities including the shoulder adductors q 3 months. The maximal passive shoulder abduction of 46° right and 36° left and minimal active, impaired the functional use of the new post-surgical elbow extension.

CASE DESCRIPTION: Bilateral lidocaine lateral pectoral motor nerve blocks with ultrasound and e-stimulation guidance were performed showing greatly improved shoulder passive abduction. Bilateral percutaneous cryoneuromeses were next performed with the same localization. Immediate improvements were noted. At 9 days, the passive abduction improved to 170° which was maintained at 1 month and 3 months follow-up. He was able to initiate external rotation and abduction off his wheelchair armrests to allow extension of the elbows. Caregiver burden was notably improved for dressing, hygiene and position along with decreased pain.

DISCUSSIONS: Cryoneurotomy is proposed as a longer duration and effective treatment. An ice ball at -60°C is introduced through a cryoprobe to cause myelin disruption and Wallerian degeneration to the nerve leaving a “tube” which serves as tracks to guide nerve regeneration. The small focus of the ball is felt to cause less damage than alcohol. It is extensively studied as a safe procedure on sensory nerves. There is one published manuscript on cryoneurotomy for a motor nerve for the spastic adducted hip. Due to our incomplete patients evolving function, pectoral tenotomy or definitive neurectomy were undesired.

CONCLUSIONS: This first case presentation found cryoneurotomy to be a safe and effective treatment of the adducted shoulder. Long term follow up is required.

DEBUNKING THE FUTILITY MYTH: FUNCTIONAL GAINS IN CANCER INPATIENT REHAB FOLLOWING MULTIPLE PRIOR SURGICAL TUMOR RESECTIONS

Emily Marquez, MD, Ishan Roy, MD, PhD, Akash Bhakta, DO, MHA, Calvin R. Fedor, MD, Jessica Tse, MD, Margaretta Kasim, RN, PHN, BSN, BA, BBA, Lori Mendoza, PHARM, and Mary Kim, MD

OBJECTIVES: Inadequate medication adherence has been shown to result in poor patient outcomes, higher healthcare costs, and increased patient and physician frustration. Studies have investigated interventions to increase overall medication adherence, but few have analyzed primary medication non-adherence (the act of not filling an initial prescription). We aimed to decrease this non-adherence by developing a medication delivery program titled “Meds-to-Beds”. Through this program, medications are delivered directly to the patient’s bedside by the pharmacy on discharge day, ensuring an immediately available 30-day supply of medications. For this interdiscipli- nary program to function optimally, there has to be timely and effective communi- cation between the physician, charge nurse, and pharmacy. Our objective was to develop a process map outlining the physician role in the Meds-to-Beds program and to achieve 100% timely charge nurse notification of medication reconciliation (med-rec) completion.

DESIGN: Charge nurses were initially surveyed regarding percentage of timely med-rec notifications. A root cause analysis was performed and individual process maps were developed and compiled into a standardized process map. Areas for im- provement were identified and EMR changes were implemented, including develop- ment of an electronic physician reminder to complete the med-rec and an automated charge nurse notification upon completion.

RESULTS: Initial survey showed a 71% timely charge nurse notification rate. After implementation of an education regarding the standardized process map, notifica- tion rate improved to 83%. After implementation of EMR changes, notification rate improved to 100%.

CONCLUSIONS: Through root cause analysis, standardization of the process, directed education, and implementation of electronic reminders and automated notifica- tions, we were able to achieve our goal of 100% timely charge nurse notification of med-rec completion. This institution specific program is a successful model for de- creasing primary medication non-adherence that could be replicated elsewhere. Fu- ture directions of study include whether this program decreases post-discharge hospital readmission rates, ED visits, or urgent care visits.

DEEP LEARNING ALGORITHM IN TELEREHABILITATION OF LARGE JOINTS FOR THE ASSESSMENT OF REHABILITATION EXERCISES

Andriy Y. Hospodarskyy, PhD, and Andriy I. Tsvyakh, PhD, DSc

OBJECTIVES: The continuous development of technology that paves the way towards the expansion of connections through the internet and the growth of the capacity to process data has created greater possibilities of the development of teledem- icine. The increase of Telemedicine, has shown the rise of possible deep neural network (DNN) application. The overarching theme of this paper is proposes the novel model that corrects the improper movement in the injured joints when having rehabilitating exercises alone.

DESIGN: We use deep neural network to analyze the movement, local tempera- ture, volume, pulse in the injured joints, in order to determine whether the rehabilita- tion is correct or not. The data for training our model was correct and incorrect movement during rehabilitation of patients by doctors during last four years. In our study, a total of 148 subjects with large joints injuries were enrolled in the study. 52 patients from the control group underwent traditional rehabilitation procedures. A to- tal of 96 subjects were enrolled in the telerehabilitation group with DNN. Home re- mote monitoring for the 96 test subjects included use of a Prototype device with Axis-sensor, temperature and pulse-oximetry sensors, which were fixed to the injured limb. Based on the patient’s individual condition and machine learning algorithm, the rehabilitation doctor created an individualized rehabilitation plan for each subject.

RESULTS: The orthopedic surgeon during telerehabilitation took signifi- cantly less time to consult patient (19 minutes) than the traditional rehabilitation (15.2 minutes). Patient satisfaction was higher for the telerehabilitation with machine learning algorithm (78.3%) than for the orthopedic surgeon’s traditional rehabilitation (36.7%).
CONCLUSIONS: Subjects reported a higher satisfaction with telerehabilitation with DNN application than with the traditional orthopedic. The telerehabilitation system with DNN application can be used in complex rehabilitation of patients with large joints injuries.

DEFINING CUT-OFF POINTS FOR SARCOPENIA IN PATIENTS WITH LEPREXOST WITH USING HAND GRIP STRENGTH

Seok-Hee Han, MD

OBJECTIVES: Sarcopenia is a muscle disease and characterized by low muscle strength and/or physical performance. Measuring handgrip strength is simple and low handgrip strength has been used as a clinical index of low muscle mass and sarcopenia. Leprosy is a chronic granulomatous disease caused by Mycobacterium leprae and physical disabilities resulting from leprosy include paresthesias and muscle paralysis. The data regarding handgrip strength for patients with leprosy is currently unavailable. In this study, we explore optimal cut-off values of sarcopenia in patients with leprosy using handgrip strength.

DESIGN: The study population consisted of 24 patients with leprosy who visited the out-patient clinics of department of rehabilitation in Sorokdo National Hospital located in South Korea. Handgrip strength, chair stand test, gait speed, timed-up-and-go test and SARC-F were measured in all patients. Based on the recommendation of Asian Working Group for Sarcopenia(AWGS), the cut-off values of handgrip strength were defined as the lower 20th percentile of handgrip strength of the subjects.

RESULTS: The subjects consisted of 13 male and 11 female and the mean age was 74.4 years. The mean handgrip strength of men was significantly higher than that of women (29.2 kg vs. 20.9 kg, P < 0.05).

CONCLUSIONS: Using hand grip strength, the cut-off points of sarcopenia in patients with leprosy were 26.0 kg for male and 16.0 kg for female. The results of this study would provide reference values when evaluating sarcopenia in patients with leprosy.

DEMONSTRATION OF THE SAFETY OF CONTINUING NEUROGENIC BOWEL AND BLADDER PROGRAMS IN A PANCYTOPENIC CANCER PATIENT: A CASE REPORT

Brian C. Fricke, MD, and Ying Guo, CLT, MS, MD

CASE DIAGNOSIS: 41 year-old male with relapse of acute lymphocytic leukemia following matched unrelated donor stem cell transplant who developed incomplete paraplegia and neurogenic bowel and bladder attributed to meningocoelephalitis.

CASE DESCRIPTION: A regular bowel program and intermittent catheterization program was instituted; over half of this time he was noted to be incontinent. Mean post treatment Barthel was 70.29 (±24.88; 95%CI 63.14 – 77.43; p=0.0019). The authors concluded that a transition to outpatient rehabilitation program is feasible to be developed in the private setting and it improves the functional status of the included patients.

DETECTION OF THE UPPER RESPIRATORY TRACT LESIONS IN VIDEOENDOSCOPIC EXAMINATION OF SWALLOWING FOR SWALLOWING FOR PATIENTS WITH DYSPHAGIA

Shinya Yura, DMD, PhD

OBJECTIVES: Videodensoscopic examination is an approach to evaluate dynamics of the swallowing using a rhinopharyngeal larynx fiberscope. Because the fiberscope is inserted in a nasal cavity, we can observe not only swallowing situation but also upper respiratory tract lesions. Therefore, we demonstrate the upper respiratory tract lesions which were able to detect in previous swallowing endoscopy.

DESIGN: A hundred patients with dysphagia who underwent videodensoscopic examination were included in this study. We investigated upper respiratory tract lesions which could be detected during videodensoscopic examination of swallowing.

RESULTS: In 100 patients with dysphagia, epiglottis cyst was found in five cases, vocal cord node in two cases, leukokeratosis of the epiglottis in one case, recurrent nerve paralysis in four cases, and sinusitis in one case. These patients received not only feeding and swallowing therapy but also treatment or follow-up for a detected lesion.

CONCLUSIONS: Understanding of the upper respiratory tract lesions which are able to detect in videodensoscopic examination may contribute to improvement of curability and quality of life in the patients.

DEVELOPMENT AND VALIDATION OF A SCALE TO ASSESS THE ATTITUDE OF HEALTHCARE PROFESSIONALS TOWARDS PERSONS WITH DISABILITY

You Gyoung Yi, MD, MSC, and Hyung-Ik Shin, MD, PhD

OBJECTIVES: Adverse attitudes toward persons with disabilities can serve as barriers to medical care of persons with disabilities. This study aimed to develop and validate an instrument that measures the attitudes of healthcare professionals toward persons with disabilities.

DESIGN: The Delphi survey consensus method was applied to compose a preliminary questionnaire for survey. Afterwards, healthcare professionals responded to the questionnaire online; the results were used for psychometric analysis. In total, 16 experts participated in the Delphi survey. An online survey was conducted among 993 healthcare professionals in three tertiary hospitals.

RESULTS: A 28-item preliminary questionnaire was initially developed after a 2-round Delphi survey. Through psychometric property analysis based on the online survey data, a final 20-item scale of Attitude toward Persons with Disabilities in Health Care was developed. The items were categorized as follows: behaviors in clinical decisions, knowledge and skills, emotional response, and responsibility of healthcare professionals. The Cronbach’s alpha coefficient of the scale was 0.890, which indicates a very good internal consistency. The newly developed tool showed an acceptable model fit. The reliability of each domain ranged from 0.856 to 0.892.
Healthcare professionals who participated in the education module within the past 2 years (n=149) had a more positive attitude toward persons with disabilities than those who did not.

CONCLUSIONS: The newly developed scale showed adequate reliability and validity. The scale could be used for education or training programs to improve the attitudes toward persons with disabilities of healthcare professionals, especially in the rehabilitation setting.

DEVELOPMENT AND VALIDATION OF AN AUGMENTATIVE AND ALTERNATIVE COMMUNICATION ASSESSMENT TOOL IN CHILDREN WITH CEREBRAL PALSY WITH SEVERE IMPAIRMENT IN VERBAL SPEECH IN AN INDIAN POPULATION

Vinitha Varghese, MD (PM&R), Deborah Skeil, MD (PM&R), and Judy John, MD, DNB (PM&R)

OBJECTIVES: Primary: To develop an AAC assessment tool relevant to the Indian culture for children with cerebral palsy who had difficulty in communication, as the pictures and the vocabulary in the existing tools are not culturally relevant to our population. The tool should be suitable for use by professionals who have not specialized in AAC. Secondary: Face validation of the AAC assessment tool by experts. To evaluate this newly developed AAC tool in comparison to the FRENCHAY screening tool in typically developing children and children with various socioeconomic backgrounds. To modify the newly developed tool as required.

DESIGN: Phase 1: The development of an AAC assessment tool was initiated as part of the AAC services in the department of PM&R. Phase 2: The AAC assessment tool was then sent to external reviewers for face validation, both from within India and overseas. Content validity index was calculated for each domain of the tool. Phase 3: The Vellore AAC assessment tool and FRENCHAY screening tool was administered to fifteen typical developing children.

RESULTS: Phase 1: The Vellore AAC assessment tool was developed with components of physical access, auditory comprehension, expressive communication, picture-based communication, letter or word-based communication, categorization, crowding. Phase 2: The domains of seating, auditory comprehension, expressive communication, picture and word-based communication were found to have excellent content validity with a content validity index >0.78. Phase 3: The Vellore AAC assessment tool was found to have relevant pictures which typically developing children could identify, but a few words need to be revised.

CONCLUSIONS: The Vellore AAC assessment tool was developed, appropriate to the Indian culture. Face validation was done by experts and most of the components were found to have good content validity. The component on ‘Auditory comprehension’ and those with poor content validity will require further evaluation and the assessment is to be modified accordingly.

DEVELOPMENT OF ASSAYS FOR PATIENT MONITORING IN A PHASE I CLINICAL TRIAL OF ARTHRITIS GENE THERAPY

Tennilola Y. Abdul, MD, Rodolfo De La Vega Aramador, MD, Michael Coenen, Researcher, Gresin Haswe, Researcher, and Christopher Evans, PhD

OBJECTIVES: In a Phase I gene therapy clinical trial at the Mayo Clinic, a recombinant adeno-associated virus (AAV) expressing the interleukin-1 receptor antagonist (IL-1Ra) will be injected into the knee joints of patients with osteoarthritis. The FDA requires monitoring of patients in the study in several ways, including the detection of possible viral genomes in the synovial fluid, blood and urine at various time points after injection of AAV IL-1Ra. This presentation reports the development of a sensitive quantitative PCR-based assay.

DESIGN: Primers incorporating IL-1Ra and viral genome sequences were designed using Primer 3; Human Embryonic Kidney (HEK) 293 cells were transfected with either the IL-1Ra plasmid or a negative control GFP plasmid. IL-1Ra concentrations in the conditioned media were measured by ELISA (R&D Systems SRA008). Cells were lysed and total DNA purified using the DNAeasy Blood and Tissue Protocol (Qiagen 69504). DNA concentration was determined using nanodrop and diluted with water to 100ng/μL. 1μL PCR reactions were performed in triplicate on 1μL diluted cell culture lysate, 0.2μM primer DNA and 5μL of Veriquest SYBR green mastermix (Affymetrix 75600). A PCR-dose response to determine the lowest detectable plasmid copy number was performed by serially diluting plasmid DNA 10-fold in water from 1.6 x 1010 copies/μL to 1.6 copies/μL.

RESULTS: We have confirmed that HEK 293 cells transfected with the virus plasmid encoding IL-1Ra produce and secrete abundant IL-1Ra protein. We have successfully designed PCR primers that measure viral vector DNA with a lower limit of detection of 16 copies in the absence as well as in the presence of 1μg genomic DNA.

CONCLUSIONS: Cells transfected with the AAV vector plasmid produce abundant IL-1Ra. Primers recognizing unique sequences at either side of the virus-IL-1Ra fusion site are able selectively to amplify vector DNA with a sensitivity of 16 copies per μg genomic DNA.
and statistical indicators of the implementation of the rights of persons with disabilities to rehabilitation and habilitation, mechanisms to ensure coherence of policies of different ministries and departments and to attract users / recipients of these services to rehabilitation activities, including through community-based rehabilitation, standardization and control methods, terminology.

DIAGNOSTIC DELAY OF ALS IN A 64 YEAR OLD VETERAN WITH 25 YEARS OF LIMB WEAKNESS

Minh Quan Le, MD, and Junny Baaca Dager, MD

CASE DIAGNOSIS: Amyotrophic lateral sclerosis.

CASE DESCRIPTION: Patient is a 67 year old Veteran who first experienced limb symptoms with difficulty playing guitar approximately 25 years ago. He underwent evaluation at the Veteran’s Association (VA) with work ups composed of imaging modalities, labs and EMG. He was evaluated in 2003, 2006, 2008, 2012 and 2014 with findings suggestive of polyneuropathy but no definitive diagnosis. His disease progressed until he was wheelchair bound and subsequently lost to follow up. He arrived at the VA Hospital many years later due to COPD exacerbation. While hospitalized, he was evaluated by neurology with EMG and clinical findings diagnostic for Amyotrophic Lateral Sclerosis (ALS). This case highlights the diagnostic challenge of Veterans with ALS.

DISCUSSIONS: Amyotrophic lateral sclerosis (ALS) remains challenging to diagnose despite increased awareness with recent notoriety in the media for the “Ice Bucket Challenge”. Timely diagnosis enables patients to enroll in clinical trials, establish financial, medical and ethical decisions in setting of disease progression. Veterans have increased incidence, in comparison to general population, of developing sporadic form of ALS due to work-related environmental exposures. However, accurate diagnosis remains challenging as physicians have limited awareness with early disease presentation. Additionally, access to care and long wait time may increase diagnostic delays. On average, median total diagnostic time was 11-11.5 months and second opinion was established 2 months following initial diagnosis. Patient with limb onset delays. On average, median total diagnostic time was 11-11.5 months and second opinion was established 2 months following initial diagnosis. Patient with limb onset symptoms, like our Veteran, experience 45% longer diagnostic time compared to bulbar onset.

CONCLUSIONS: ALS should be considered in VA patients with motor neuron deficits due to increased incidence. Early diagnosis permits patients to establish goals of care along with physiatrists to provide end of life interventions to improve functional outcomes.

DIFFERENCES IN SELF-REPORTED PHYSICAL AND BEHAVIORAL HEALTH IN ORTHOPEDIC PATIENTS BASED ON PHYSICIAN GENDER

Alexandra E. Fogarty, MD, Heidi Prather, DO, Ryan Calfee, MD, MSC, Graham Colditz, MD, DRPH, MPH, and Abby L. Cheng, MD

OBJECTIVES: The association between patient health and the decision to seek care from a physician of a particular gender is unclear. The purpose was to determine if there is a difference in self-reported PROMIS physical or behavioral health scores (Physical Function, Pain Interference, Depression, Anxiety) in patients who present to female (FP) versus male physicians (MP).

DESIGN: This cross-sectional study analyzed 21,980 adult patients who presented to an orthopedic department of a tertiary academic medical center. Patients completed Patient-Reported Outcomes Measurement Information System (PROMIS) Computer Adaptive Test domains prior to the encounter: Physical Function, Pain Interference, Anxiety, and Depression. Primary outcome: the difference in mean PROMIS scores by physician gender. Secondary outcomes: differences in the proportion of patients meeting thresholds for clinically significant anxiety and depression; the proportion of patients reporting the floor (best) score for PROMIS Anxiety and Depression.

RESULTS: Patients who chose to present to FP self-reported worse PROMIS scores for Physical Function (FP 40.2 ± 9.4, MP 42.4 ± 9.4, p < 0.001), Pain Interference (FP 61.6 ± 7.6, MP 60.4 ± 7.4, p < 0.001), Anxiety (FP 52.5 ± 10.6, MP 51.4 ± 10.4, p < 0.001) and Depression (FP 47.5 ± 10.2, MP 46.2 ± 9.7, p < 0.001). Between-group mean differences did not meet MCID values, but the proportion of patients exceeding thresholds for heightened symptoms were: Anxiety: FP 741 (17.8%), MP 2,445 (15.1%), odds ratio 1.2 [1.1 to 1.3], p < 0.001; and Depression: FP 490 (11.8%), MP 1,426 (8.8%), odds ratio 1.4 [1.2 to 1.6], p < 0.001.

CONCLUSIONS: Orthopedic patients who chose to present to female physicians instead of male physicians self-reported worse physical and behavioral health. Further investigation into this finding may provide insight into drivers of patients’ preferences, which may enable physicians of both genders to provide the best care for their patients.

DIFFUSE IDIOPATHIC SKELETAL HYPEROSTOSIS: AN UNCOMMON CAUSE OF DYSPHAGIA

Omar Walli, MD, Kara Doherty, CCC-SLP, and Jennie Valles, MD

CASE DIAGNOSIS: Diffuse idiopathic skeletal hyperostosis (DISH) is a disease of unknown etiology causing ossification of spinal ligaments. Symptoms can include neck/back pain, decreased motility, dysphagia, and airway obstruction. Treatment is symptom based, with no known treatments to halt progression and no randomized trials of treatments currently.

CASE DESCRIPTION: We present a 77-year-old male who presented to the Emergency Department after a fall. Exam was significant for bilateral upper/lower extremity weakness. Imaging showed discoligamentous injury at C3-C4 with spinal cord compression and diffuse bridging of anterior osteophytes suggestive of DISH. Patient underwent C3-C4 anterior cervical discectomy and fusion (ACDF) with cage placement. Post procedure he was determined to have dysphagia, was placed on puree and nectar thick diet, and discharged to acute inpatient rehabilitation. A modified barium swallow (MBS) was performed revealing severe pharyngeal dysphagia with silent penetration and aspiration. Patient was made NPO.

DISCUSSIONS: He showed minimal improvement in swallowing techniques due to restricted motion of his neck. Given risk for malnutrition, he was transferred to acute care hospital where he underwent Percutaneous endoscopic gastrostomy (PEG) tube placement, started on tube feeds, and transferred back to rehab to continue aggressive dysphagia therapy. He was cleared from spinal precautions and trained in compensatory swallowing maneuvers. A second MBS showed continued severe dysphagia and silent aspirations but after continued speech therapy a third MBS showed small improvement in pharyngeal swallow/sensation to deep penetration and aspiration. Though improvement was observed, he was discharged home with tube feedings due to nutritional risk and instructions to continue outpatient dysphagia therapy.

CONCLUSIONS: Our patient presented with diffuse DISH combined with mechanical obstruction from C3-C4 ACDF hardware, both likely contributing to his dysphagia. In patients with impaired swallowing and restricted motion from entities such as DISH, it is important to carefully develop an aggressive dysphagia therapy plan while preventing secondary malnutrition.

DILIGENT MONITORING OF FUNCTION LEADS TO DIAGNOSIS OF CASTLEMAN DISEASE: A CASE REPORT

Emily Marquez, MD, and Lynn Vidakovic, MD

CASE DIAGNOSIS: HHV-8-Negative/Idiopathic Multicentric Castleman Disease (TAFRO variant).

CASE DESCRIPTION: A 34-year-old female was admitted for acute inpatient rehabilitation following prolonged hospitalization for systemic inflammation of unknown etiology. She initially presented to acute care with fever and malaise, followed by rapid clinical deterioration and undifferentiated shock. An extensive workup (including bone marrow and core needle biopsies) was unremarkable. Treatment with high-dose steroids resulted in improvement. During subsequent inpatient rehabilitation, she made functional gains in the areas of mobility, transfers, and self-care. However, functional decline prior to planned discharge home was noted, along with recurrence of fevers. She was re-admitted to acute care. Further investigation revealed progression of diffuse lymphadenopathy, elevated interleukin-6, and renal failure along with anasarca. Excessive lymph node biopsy was contraindicated due to thrombocytopenia. The decision was made to treat for presumed HHV-8-Negative/Idiopathic Multicentric Castleman Disease (TAFRO variant) with humanized monoclonal antibody against the interleukin-6 receptor. Due to favorable response, patient was ultimately able to resume rehabilitation.

DISCUSSIONS: Castleman disease is a rare lymphoproliferative disorder affecting single or multiple lymph nodes. Approximately 6500-7700 new cases are diagnosed in the U.S. annually. The TAFRO variant is differentiated by thrombocytopenia, anasarca, systemic inflammation, renal dysfunction and organomegaly. In addition, the disease can result in a myriad of functional impairments. Initial presentation is non-specific, and the diagnosis is difficult as a result.

CONCLUSIONS: Addressing the root cause(s) for plateau or decline in function is one of the cornerstones of a comprehensive rehabilitation program. Physiatrists must attend to subtle changes in function and symptomatology over time. In our case, this unique skill set resulted in the patient receiving appropriate diagnosis and treatment for HHV-8-Negative/Idiopathic Multicentric Castleman Disease (TAFRO variant).

DISCHARGING PATIENTS WITH CANCER: THE CURRENT STATE OF AFFAIRS

Mitra McLaren, MD, Frances Slofer, PhD, and Jasmine Zheng, MD, BS
OBJECTIVES: Acute inpatient rehabilitation centers (IRFs) have been shown to improve functional outcomes for cancer patients. Though the number of referrals to IRFs for cancer patients has grown, it still lags behind referrals for stroke, spinal cord and traumatic brain injury. Little is known about cancer patients discharged to IRFs and how they differ from those discharged to other levels of care. This study evaluates cancer patients based on discharge location and compares 30-day hospital readmission.

DESIGN: A retrospective chart review was performed on patient’s admitted to the University of Pennsylvania (UPenn) Health System between January 1, 2017 to August 31, 2018 with a diagnosis of cancer. Data was collected by the Penn Data Science team using electronic medical records. IRB approval was obtained from UPenn.

RESULTS: 13,992 patients met study inclusion criteria. During initial hospitalization, 79.5% were discharged to home, 8.9% discharged to a skilled nursing facility (SNF) or long-term acute care hospital (LTACH) and 3.5% discharged to IRFs. On average, patients discharged home were younger, more likely to be married (p< 0.001), and functionally independent with mobility and activities of daily living prior to acute hospitalization (p< 0.001). Readmissions at 30-days were slightly lower for those discharged to home, 18.9%, compared to those discharged to IRFs or LTACH/SNF 21.2% and 23.0%, respectively (p<0.001).

CONCLUSIONS: Our findings suggest that cancer patient subgroups may be more likely to require post-acute care services and may be at a higher risk for readmission. This may in part be due to their functional status on admission; however, there may be other medical and/or environmental factors that play a role.

Further study is needed to better characterize the differences between these groups in order to identify predictors of use and possible barriers to access to facilities for patients who may benefit.

DISTRIBUTION PATTERNS OF INJECTATE AFTER ULTRASOUND-GUIDED INJECTIONS FOR CHRONIC LATERAL EPICONDYLOSIS

Chul-Hyun Park, MD, and Sun Gun Chung, MD, PhD

OBJECTIVES: To confer a benefit from substance delivered into tendon, distribution and retention of injectate within target lesion of tendon after injection would be vitally important. However, distributions of injectate have been poorly investigated. The purpose of this study was to investigate distribution patterns of injectate after ultrasound (US)-guided intra-tendon injection for chronic lateral epicondylitis.

DESIGN: A total of 30 participants with chronic lateral epicondylitis were enrolled from a phase II randomized trial, an ongoing clinical trial of allogeneic adipose-derived mesenchymal stem cell (allo-ASC) injection for intractable common extensor (CE) tendinosis. Inclusion criteria were (1) lateral elbow pain with >5 in visual analogue scale (VAS), (2) duration of >12 months, (3) abnormality of common extensor (CE) tendon in US, and (4) CE abnormality in magnetic resonance (MR) imaging. A volume of 1.0 ml, a mixture of fibrin glue with saline, 106, or 107 allo-ASCs, was delivered in the largest hypoechoic lesion of CE. After an hour of each procedure, distribution patterns were determined based on dominant location of injectate and classified as ‘proximal’, ‘distal’, or ‘mixed’.

RESULTS: Mean age and VAS were 54.9 (standard deviation, 9.4) years and 7.4 (1.0). Distribution patterns of injectate were shown as mixed patterns in 17 subjects and distal patterns in 9 subjects, respectively. Only 4 subjects showed proximal patterns. A total of 26 subjects (86.7%) presented distally distributed injectate. The subjects with proximal pattern had a higher proportion of high-grade CE tear than other patterns (p=0.035). There was no difference of age, sex, pain and history of steroid injection among the distribution patterns.

CONCLUSIONS: This study firstly presented distributions of injectate after US-guided injection for chronic lateral epicondylitis, showing that most of injectate can be distributed far from the target lesion of the tendon. Further studies of advanced scaffold systems for maintaining injectate within tendon pathologies are needed.

DISTROFIA MUSCULAR CONGÉNITA POR DÉFICIT DE MEROSINA, EN PACIENTE DE 2 AÑOS DE EDAD: UN REPORTE DE CASO

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OBJECTIVES: Las distrofias musculares congénitas son enfermedades hereditarias, que causan la muerte antes de la pubertad. En la distrofia congénita de merosina tipo 1 A, la mutación en la columna e insuficiencia respiratoria. Cursan con elevación en la CPK, cambios en la sustancia blanca en la RNM cerebral y requiere biopsia muscular para su diagnóstico. Se deben a daño en el fibra muscular y al déficit de diferentes proteínas en este caso la merosina.

DESIGN: Paciente de 2 años con cuadro clínico desde los 3 días de edad con pobre movilidad y sujeción, equino progresivo, falla ventilatoria, neumonías a repetición y retraso en el neurodesarrollo. Paciente con ojos almendrados, debilidad de músculos proximales, hiporeflexia. CPK elevada (655), RNM cerebral con hiperintensidad extensa de la sustancia blanca subcortical y profusa en T2. Electromiografía anormal compatible con enfermedad primaria de la fibra muscular de distribución generalizada. Biopsia muscular con inmuhohistoquímica deficiente por intensidad y con expresión o ausente en algunas fibras segmentarias sugestivas de deficiencia de merosina. Análisis genético variante patogénica del gen LAM2A, distrofia muscular congénita por deficiencia de merosina tipo 1 A. Pruebas funcionales MFM 24/60 40%, Gravedad global compromiso motor severo. En seguimiento interdisciplinario.

RESULTS: La distrofia muscular congénita por deficiencia de merosina, en la presentación temprana es severa 90% de los pacientes nunca logran deambulación. Tardíamente presentan rasgos dismorficos faciales, hiperlordosis cervical, contracturas articulares universales. El 35 % cursan con neuropatía restrictiva. El 30% presentan epilepsia focal. El 10-20 % compromiso cognitivo. Es importante conocer las comorbilidades para dar el manejo adecuado.

CONCLUSIONS: La distrofia muscular congénita es una patología poco prevalente, presentación con múltiples comorbilidades, importante el diagnóstico temprano para dar un manejo interdisciplinario previniendo secuelas y mejorando la calidad de vida.

DOES AN EXERCISE PROGRAM OF ENDURANCE AND STRENGTH IMPROVE THE HEALTH-RELATED QUALITY OF LIFE IN PERSONS LIVING WITH HIV-RELATED DISTAL SYMMETRICAL POLYNEUROPATHY?

Bashar Kaka, PhD, Abdulsalam S. Muhammad Yakasai, PhD, S. S. Maharaj, PhD, and Foye Francis, PhD

OBJECTIVES: The life expectancy of people living with the human immunodeficiency virus (PLWHIV) has increased, due to the widespread use of highly active antiretroviral therapy (HAART), with neurological disorders remaining the most important and disabling aspects of HIV-related disease. The most common Human immune deficiency virus (HIV) neurological comorbidity is distal symmetrical peripheral neuropathy (DSPN), which is characterised by severe symptoms and reduced quality of life. This study was undertaken to investigate the effectiveness of aerobic (AE) or progressive resisted exercise (PRE) on health-related quality of life (HR-QoL) in people living with DSPN associated with HIV (PLWHIV).

DESIGN: One hundred and thirty-six participants living with HIV-related DSPN were recruited in four HIV centers in Kano, in this randomized clinical trial registered with Pan African Clinical Trial Registry (PACTR) PACTR201707002173240 employing consecutive sampling. Ethical approval was obtained prior the commencement of the study. They were randomized into three groups – AE, PRE and the control group (CG). Their HR-QoL was assessed using World Health Organization Quality of life HIV BREF (WHOQoL-HIV BREF) and data was analyzed using descriptive and inferential statistic at alpha 0.05.

RESULTS: Significant differences were noted between the baseline, six weeks and 12 weeks in the AE and PRE groups, in all of the six-domains p<0.05. Similarly, notable differences were observed between the baseline, six weeks and 12 weeks in CG in the domains of Physical, Level of Independence and Spirituality/Religions (p=0.002, p=0.035, p<0.006). However, such differences were noted between the AE, PRE and CG at six weeks and 12 weeks of intervention p<0.05.

CONCLUSIONS: These findings revealed that a strength and endurance exercise regime, of moderate intensity, had a positive effect on HR-QOL in PLWHIV-related DSPN.

DOES LASER EFFECTIVE IN TREATING OSTEOARTHRITIS? AN RCT STUDY

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OBJECTIVES: FDA approved Low Level Laser Therapy (LLLT) as an adjuvant to pain therapy which is effective in many MSK conditions including osteoarthritis but still there is lack of data about the efficacy of LLLT in treating osteoarthritides in home and abroad.

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DOSE A PULMONARY REHABILITATION BASED ERAS PROGRAM (PREP) AFFECT PULMONARY COMPLICATION INCIDENCE, PULMONARY FUNCTION AND QUALITY OF LIFE AFTER LUNG CANCER SURGERY? STUDY PROTOCOL FOR A MULTICENTER RANDOMIZED CONTROLLED TRIAL

Yu Zheng, MD, PhD, Mao Mao, MPHIL, Student, Mei Fang Ji, Liang Liu, Haining Wang, MD, Yun Long Wang, Huei Qing Zhou, Ying Chen, Xintong Zhang, PhD Student, Yihui Cheng, MPHIL Student, Meiling Ling, MPHIL Student, and Xiao Lu, MD, PhD

OBJECTIVES: Lung cancer surgery is associated with a high incidence of post-operative pulmonary complications (PPCs). Preliminary evidence suggests that ERAS processes can reduce overall incidence of PPCs as short- and long-term recovery improved by supporting units to adopt evidence-based care. However, the evidence is inconclusive due to insufficient high-level studies in this research field. Well-designed, adequately powered, randomized controlled trials (RCTs) have investigated the effects of pulmonary rehabilitation based ERAS programs (PREP) on post-operative pulmonary complications, pulmonary function, and health related quality of life following lung cancer surgery.

DESIGN: The PREP trial is a pragmatic, investigator-initiated, multi-center, randomized controlled, parallel group, clinical trial. Five hundred patients scheduled for minimally invasive pulmonary resection at six hospitals in China will be randomized to receive either i) an information booklet or ii) an information booklet, plus an additional education, a 30-min pulmonary rehabilitation training session and the post-operative pulmonary rehabilitation program. The primary outcome is incidence of PPCs. Secondary outcomes include incidence of cardiopulmonary and other complications, pulmonary function, cardiopulmonary endurance, muscle strength, activity level, health-related quality of life (HRQoL), pre- and post-operative hospital length of stay (LOS), and total hospital LOS.

RESULTS: The trial is ongoing and is actively enrolling. All 500 patients will be recruited by December 2021. Data collection will be completed, analysed, and the manuscript prepared for submission by June 2023. The final manuscript will be written in accordance with the CONSORT extensions for a pragmatic trial using a nonpharmacological intervention.

CONCLUSIONS: The PREP trial is designed to verify the hypothesis that pulmonary rehabilitation based ERAS programs reduce incidence of PPCs and improves pulmonary function and HRQoL in patients following lung cancer surgery. This trial will furthermore contribute significantly to the limited knowledge about the pulmonary rehabilitation based ERAS program, and may thereby form the basis of recommendations in the surgical community.

DRESS SYNDROME, AN UNUSUAL CAUSE OF FEVER ON THE REHABILITATION UNIT: A CASE REPORT

David R. Valdes, MD, and Lauren T. Shapiro, MD, MPH

CASE DIAGNOSIS: DRESS Syndrome

A 48 year old man presented on the rehabilitation unit with a large acute intracranial hemorrhage. His hospital course was complicated by fevers of unknown origin and reported allergic reactions to vancomycin and cefepime. After admission to the inpatient rehabilitation unit, he again began to spike fevers of unknown origin. He was placed on broad-spectrum antibiotics without improvement. Blood and urine cultures were unremarkable, and chest x-ray was without infiltrate. Laboratory data was notable for worsening leukocytosis, transaminasts, and eosinophilia and an elevated erythrocyte sedimentation rate. Due to the high suspicion for Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS) syndrome, his antibiotics and hydralazine were discontinued, with resolution of fever, tachycardia, and laboratory abnormalities. He was then able to participate in therapies and was ultimately discharged home.

DISCUSSION: DRESS syndrome is a rare, potentially life-threatening drug-induced hypersensitivity reaction that includes fever, skin eruption, hematologic abnormalities (eosinophilia), lymphadenopathy, and internal organ involvement. It carries a mortality rate of up to 10 percent. Common causes of DRESS include anti-epileptics, beta-lactam antibiotics, vancomycin, allopurinol, and anti-psychoactive medications. Its pathophysiology is unknown, however a strong, drug-specific immune response with expansion of activated T lymphocytes has been observed. The mainstay of treatment is prompt discontinuation of the causative drug. Patients who suffer severe cutaneous reactions require fluid, electrolyte, and nutritional support. Topical steroids can be used for pruritis, and systemic steroids are beneficial for those with severe lung or kidney involvement.

CONCLUSIONS: DRESS syndrome can be caused by medications that are commonly used in inpatient rehabilitation. Prompt recognition of this syndrome is important to ensure discontinuation of the offending drug and avoid potentially fatal complications.
American and Caucasian patients, respectively. Individuals carried a diagnosis of 21.9% Spinal Cord Injury, 16.9% Musculoskeletal Disorders, 13.6% Stroke, 7.6% Radiation Therapy. Surgery is usually the first choice of treatment for patients with pure germinoma. The patient underwent surgery, chemotherapy and followed by focal radiation therapy.

CONCLUSIONS: More than a quarter of the DME requests were from individuals with either private insurance or federal payers, which implies lack of adequate coverage on DME to maintain patients' mobility and independence. This analysis will aid in the clinic’s future endeavors, such as identifying and purchasing most needed DME and guiding new organizations with similar aims.

EARLY MOBILIZATION AFTER BRAIN TUMOR NEUROSURGICAL TREATMENT

Mariia Toropchyna, MD

DIAGNOSIS: An 11-year-old boy was admitted to the hospital with 3-month history of fatigue, weight loss, headache and vomiting. The patient was transferred to the department of neurosurgery after a physical examination and magnetic resonance imaging with contrast. After an open biopsy, a tumor was diagnosed as pure germinoma. The patient underwent surgery, chemotherapy and followed by focal radiation therapy.

CASE DESCRIPTION: The tumor was removed and rehabilitation therapy was started after the 48 hours. The physiotherapist started from core stability test, muscle straight test, orthostatic test. The patient was assisted to sit on the edge of a bed, maintain a sitting position. Also, respiratory physiotherapy was started. After 72 hours, the patient achieved standing and walking with assistance. He was able to walk without human assistance on the 5th day after the surgery. The Pediatric Balance Scale, Up and Go, 6-minute walking tests were used. The patient had difficulties with daily tasks, such as dressing, eating, climbing stairs, and long-distance walking, but a significant difference was shown after 3 weeks. The IC Categorical profile and Pediatric Oncology Quality of Life Scale were used to evaluate the progress. And now, 10 months postoperatively, the patient is doing well without motor deficits and studying at school, as a result of multidisciplinary teamwork.

DISCUSSIONS: Surgery is usually the first choice of treatment for patients with brain tumors. Common complaints after surgery are fatigue, reduced concentration, impaired physical functioning, and sleep disturbances. Early mobilization can improve functional outcome and patient's independence. But postoperative mobilization protocols for brain tumor patients are poorly described.

CONCLUSIONS: The early mobilization program based on respiratory physiotherapy, sitting stability training, orthostatic and walking training improves functional capacity in patients and reduces hospital length of stay. Thus, mobilization should not be delayed for patients after the neurosurgical treatment.

EFFECT OF A NEWLY DEVELOPED ROBOT-ASSISTED OVERGROUND WALKING TRAINING SYSTEM ON DEPRESSION AFTER STROKE

Danli Wu, Bachelor

OBJECTIVES: Background: Many robotic-assisted gait training (RAGT) provide stroke patients a gait training based on a treadmill, which may deprive them of the sense of overground walking. Although RAGT is becoming a method in stroke rehabilitation, its effect on stroke depression is uncertain. This study aimed at observing the effect of a newly developed robot-assisted overground walking training system on depression after stroke.

DESIGN: Thirty-three depression stroke patients were randomly divided into 3 groups: robot-assisted overground walking training group (A), conventional robot-assisted training group (B) and control group (C). Patients All patients received exercise for 4 weeks, 5 days per week, 60 mins per day. Group A received 30 mins of exercise on newly developed training system and 30 mins of routine exercise. Group B received 30 mins of lower-extremity reciprocating training and 30 mins of routine training. Group C received 60 mins of routine exercise. At the time of admission (T0) and at 2 (T1) and 4 weeks of treatment (T2), Hamilton depression scale (HAM-D), Hamilton anxiety scale (HAM-A) were adopted to evaluate patients' psychological state while Stroke Impact Scale (SIS) was used to assess quality of life.

RESULTS: The significant difference was found in the scores of HAM-D, HAM-A and SIS among three groups at T0. Scores of HAM-D, HAM-A in group A and B were lower than group C at T1. T2, HAM-D and HAMA in group A were further decreased while no statistically significant differences were found in the scores of group B and C when compared with those at the end of 2 weeks of treatment. SIS in group A and B both improved significantly between T0 and T2, but did not show difference between two groups.

CONCLUSIONS: The newly developed robot-assisted overground walking training can reduce the depression or anxiety of stroke patients and improve their quality of life.

EFFECT OF AMANTADINE FOR CHINESE PATIENTS WITH VEGETATIVE STATE OF POST-TRAUMATIC BRAIN INJURY

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OBJECTIVES: Amantadine has been applied in the European and American medical field, but it has not been widely used for Chinese traumatic brain injury (TBI) patients with disorder of consciousness (DOC). To observe the awakening effect of amantadine in vegetative state (VS) with TBI patients, and to provide clinical evidence for its application to Chinese patients.

DESIGN: Enrolled 29 patients with TBI in VS, who hospitalized at the Department of Rehabilitation Medicine of First Hospital of Jilin University. All the patients were received inpatient comprehensive rehabilitation. After 2 weeks, all patients were randomly divided into 2 groups, 15 patients in treatment group and 14 patients in control group. The treatment group were taken amantadine and received comprehensive rehabilitation for 8 weeks, while the control group only were received comprehensive rehabilitation for 8 weeks. The medication regimen was: amantadine 200mg/d for the next 2 weeks, 300 mg/d for a week and 400 mg/d for another five weeks. All the patients were assessed with the disability rating scale (DRS), the coma recovery scale-revised (CRS-R) and the Rancho Los Amigos Levels of Cognitive Functioning Scale (RLA) on the 1st day, the 2nd weekend, the 6th weekend, and the 10th weekend of hospitalization.

RESULTS: Comparing with the two groups, the treatment group shows that the DRS scores were reduced, and the CRS-R scores and RLA grades were improved from the 2nd weekend to the 12th weekend (Pc 0.05), but the control group shows those changes from the 6th weekend to the 10th weekend (Pc 0.05). Compared between the two groups, the DRS scores in treatment group were lower than those in control group, but the CRS-R scores and RLA grades were higher than those in control group from the 6th weekend to the 10th weekend (Pc 0.05).

CONCLUSIONS: Amantadine promote the recovery of the consciousness in VS with TBI patients, which means that amantadine might be applied to Chinese VS patients with DOC.

EFFECT OF AUTOLOGOUS PLATELET-RICH PLASMA ON ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Yan Guo, Scholar, Zhirimin Yang, Scholar, Hong Chen, Master, Qi Zhang, Master, and Songhua Su, Scholar

OBJECTIVES: To observe the clinical effect of autologous platelet-rich plasma (PRP) on anterior cruciate ligament reconstruction.

DESIGN: 80 cases of ACL injury patients admitted by the same doctor in running first people's hospital from October 2015 to May 2019 were selected. According to the random number table method, the patients were divided into observation group and control group, with 40 cases each. ACL autologous Epstein tendon reconstruction was performed in both groups. In the control group, 40 patients did not receive any injection of knee joint cavity 4 months after anterior fork reconstruction. The observation group was treated with PRP at 1 month and 2 months after surgery on the basis of the control group. Lysholm score was used to score knee function of the two groups 4 months after surgery, and MRI image results of ACL reconstruction in the two groups were compared.

RESULTS: Follow-up was 1-12 months after treatment. The observation group received PRP treatment at 1 month and 2 months after surgery, and Lysholm scores at 4 months and 12 months after surgery were significantly better than those of the control group, with statistically significant differences (Pc 0.05).

CONCLUSIONS: Patients who received PRP after ACL reconstruction with autologous hamstring tendon under arthroscopy had a positive effect on the recovery of ligament function after surgery, and the MRI image had an ideal effect.

EFFECT OF BOTULINUM TOXIN-A INJECTION FOR LOW EXTREMITY MUSCLE IN CHILDREN WITH CEREBRAL PALSY

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OBJECTIVES: To investigate the effect of Botulinum toxin type A (BoNT-A) injection on dynamic spasticity of calf muscle in children with spastic cerebral palsy.

DESIGN: 12 children, 25-140 months old (64.4±30.4), who have spastic hemiplegic and diplegic CP that have met the following criteria were recruited. Inclusion criteria were as follows: Gross Motor Function Classification System (GMFCS) level I-III, dynamic equinus foot during standing and walking, Modified Ashworth Scale (MAS) ≤2 for ankle plantarflexors with knee extension, ankle range of motion at knee extension by Modified Tandie Scale (MTS) ≥280 over neutral position. Exclusion criteria were as follows: chemodenervation therapy within 6 months, previous selective rhizotomy or orthopaedic surgery, cardiopulmonary disorders, and epilepsy. The effects of the BoNT-A were clinically assessed by the muscle tone and dynamic spasticity of the ankle plantarflexor which followed the MAS and MTS criteria for both knee flexion and extension. Additionally, the gross motor function was assessed by GMFCS and was performed before the injection and 1 month after the injection.

RESULTS: m.TP and m.GCM’s spasticity was reduced by MAS from 2.5±0.52 to 1.5±0.52 after 1 month of BoNT-A injection. The dynamic spasticity assessed by MTS showed that R1 measurements went from -13.75±8.82 to 3.33±4.92 and R2 measurements went from 11.66±8.34 to 21.25±5.69 after 1 month of BoNT-A injection. These results showed statistical significance (p<.0001). According to GMFCS measurements, children’s gross motor functions went from 2.75±0.45 before the injection to 2.08±0.28 after 1 month of BoNT-A injection, demonstrating a statistical improvement (p<.0007) in the gross motor functions.

CONCLUSIONS: BoNT-A injection into the tibialis posterior and calf muscle of children with spastic cerebral palsy, reduces the muscular tone, removes the dynamic spasticity and improves their ability to walk. In the future, we need to investigate the long term effects of BoNT-A injection.

EFFECT OF HIGH FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION ON ATTENTION FUNCTION OF PATIENTS WITH STROKE: A RANDOMIZED CONTROLLED TRIAL

Zhezhe Ma, Bachelor's Degree, Zunke Gong, Bachelor's Degree, and Weiting Wen, Bachelor's Degree

OBJECTIVES: This study was conducted to investigate the effects of high frequency repetitive transcranial magnetic stimulation (rTMS) of the frontal cortex on attention function in patients with stroke.

DESIGN: This is a double-blinded, placebo-controlled clinical trial, 60 patients who were diagnosed with attention disorders were divided into a test group (n=30) and a control group (n=30). The test group received rTMS during a 20-minute session 5 days per week for 4 weeks; the control group received sham rTMS. All of the participants were treated with cognitive training. The patients were then evaluated for attention disorders using the Montreal Cognitive Assessment Chinese version (MoCA), the Digit Span task (DST) Forward and Backward, the Symbol Digit Modalities Test (SDMT), Event-Related Potential P300 was also used. Each assessment was performed before and after the intervention.

RESULTS: After intervention, the test group showed a statistically stronger effect than the control group in the MoCA (p=0.004), DST-Forward (p=0.001), DST-Backward (p=0.004), SDMT (p=0.038). P300 showed a decrease in latency (p=0.046) and an increase in amplitude (p=0.013), which was more significant than the control group.

CONCLUSIONS: The results of this study suggest that application of high frequency rTMS to the frontal cortex of patients with stroke has a positive effect on attention function.

EFFECT OF LOW TO MODERATE-INTENSITY AEROBIC TRAINING ON PULMONARY FUNCTIONS AND DEPRESSION IN ELDERLY PATIENTS WITH COPD

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OBJECTIVES: Chronic obstructive pulmonary disease (COPD) in the elderly population is commonly associated with depression that decreases quality of life and increases mortality. The main aim of the study was to assess the therapeutic effects of low to moderate-intensity aerobic training on pulmonary functions and depression levels in elderly moderate COPD patients.

DESIGN: This randomized controlled study included thirty-four elderly moderate COPD patients. Patients were randomly divided into study and control groups. Study group (n=17) conducted a low to moderate-intensity aerobic training, three times/week for twelve weeks while the control group (n=17) did not conduct any exercise training. Pulmonary functions and depression scores were evaluated before and after study intervention.

RESULTS: Baseline characteristics presented a non-significant difference between the study and control groups (p>0.05). A significant improvement in pulmonary functions and depression scores were observed in the study group after finishing the study program (p<0.05) while non-significant changes were shown in the control group. The findings showed significant differences between groups in pulmonary functions and depression score favor of the study group (p<0.05).

CONCLUSIONS: The study findings approved that low to moderate-intensity aerobic training improves pulmonary function and reduces depression in elderly COPD patients.

EFFECT OF PULMONARY REHABILITATION ON MENTAL STATUS IN PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS

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OBJECTIVES: Pulmonary rehabilitation (PR) for Idiopathic Pulmonary Fibrosis (IPF) patients has been reported to reduce dyspnea, improve exercise capacity and improve QOL. However, the effects of PR on the mental status in patients with IPF have not been clarified. The purpose of this study is to clarify the effects of PR on depression and anxiety in patients with IPF.

DESIGN: We retrospectively studied the medical records of IPF patients from December 2016 to June 2019. Thirty-six IPF patients were enrolled in this study (PR group:15 patients vs. control group:21 patients). The subjects underwent the 3 months outpatient pulmonary rehabilitation program (PRP). The contents of the PRP include endurance training, resistance training for upper and lower limbs, breathing exercises, stretching of trunk and limbs, education. At enrolment, the age, gender, BMI, severity of disease, and history of medication, pulmonary function tests and arterial blood gas analysis, were assessed. At enrolment and 3 month time points, mMRC scale, 6MWT, quadriceps force, hand grip, QOL (SGRQ), mental status (Hospital Anxiety and Depression: HADS) were assessed. The amount of change in each evaluation item at baseline and at 3 months was analyzed. Mann-Whitney U test and chi-square test were used for comparison between groups, and Sperman’s rank correlation coefficient was used for correlation.

RESULTS: Compared with the control group, significant improvements were observed in mMRC, 6 minutes walking distance (6MWD), SGRQ, and depression scores (p<0.05). Furthermore, there was a significant correlation between changes in 6MWD and changes in anxiety (r=0.563, p< 0.05), but no association with depression.
CONCLUSIONS: Our results suggest PR for IPF patients shown to improve depression. It was also associated with changes in anxiety and changes in 6MWD.

EFFECT OF RESPIRATORY REHABILITATION WITH OROFAcial MYOFUNCTIONAL THERAPY IN PATIENTS WITH MILD OBSTRUCTIVE SLEEP APNEA: RANDOMIZED CONTROLLED TRIAL

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OBJECTIVES: Obstructive sleep apnea (OSA) is a relevant health problem that involves repeated upper airway collapse during sleep, causing a hypopnea or apnea of airflow, oxygen desaturation, and fragmented sleep, accompanied by respiratory effort. Complementary therapeutic modalities for OSA has been pointed out, and orofacial myofunctional therapy (OMT) is a modality of treatment for patients with OSA to promote changes in the musculature of the upper airways; the aim of our study is to determine the impact of OMT in patients with mild OSA.

DESIGN: Patients were randomized in Treatment Group and Control one: the Treatment Group performed oropharyngeal exercises 3 times per week plus daily home respiratory exercises plus 10 good practice to better sleep for four weeks instead the CG performed only the good practice points to sleep. Patients were evaluated at baseline (T0) and at the end of the rehabilitation path (T1) by sleep questionnaires (Berlin Questionnaire, Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index) and polysomnography.

RESULTS: We enrolled 24 patients (age, 62.2±9.83 years; BMI, 26.0±3.1 kg/m2; circle-neck, 39±4.0 cm). The Treatment Group showed a correction of polysomnography indices, in particular of apnea/hypopnea index (AHI), compared to the control group (T0 equal to 9.4±2.0 vs T1 of 3.67±4.0 with p < 0.05); also, a decrease in snoring index was observed from 23±0.23 (T0) to 15±0.20 (T1). Furthermore, it is shown statistically significant improvement (p < 0.05) compared with CG results by sleep questionnaires.

CONCLUSIONS: Specific orofacial myofunctional protocol exercises have been proven effective in improving sleep quality respect to AHI and snoring index and improvement in subjective symptoms of daytime sleepiness, sleep quality, and life quality in patients with mild OSA.

EFFECT OF THE PULMONARY REHABILITATION PROGRAM IN PATIENTS WITH BRONCHIECTASIS NOT ASSOCIATED WITH CYSTIC FIBROSIS

Esperanza de Lourdes Trejo Mellado, Physical and Rehabilitation Medicine, Pulmonary Rehabilitation, Susana Galicia Amor, Physical and Rehabilitation Medicine, Pulmonary Rehabilitation, and Juan Carlos Garcia Hernandez, Physical and Rehabilitation Medicine, Pulmonary Rehabilitation

OBJECTIVES: Establish the effects of the pulmonary rehabilitation program in quality of life and control of symptoms; using the SF 36 and St. George questionnaire. Assess the effect on exercise tolerance through the 6-minute walk test after the pulmonary rehabilitation program.

DESIGN: Clinical, prospective research. Type of study longitudinal. Sampling for convenience. Type and size of sample was not probabilistic for convenience. Carried out in the Pulmonary Rehabilitation department. Patients with a diagnosis of bronchiectasis corroborated by TACAR, older than 18 years, stable patients without exacerbation data 4 weeks prior to the start of the study.

RESULTS: 13 patients were included 77% women, 23% men. Undergoing the pulmonary rehabilitation program includes anthropometric measurements, SatO2, PFT, ETCO2 and dyspnea measurement mMRC, 6 minute walk test and quality of life questionnaires (SF 36, St. George). All subjects received pulmonary physiotherapy techniques: reeducation of the respiratory pattern, bronchial hygiene techniques and energy saving techniques (3-5 sessions). Physical Conditioning (12 sessions) with use of endless band and ergometer of upper and lower limbs (3 times a week). Finding statistically significant changes for the distance (6MWT) after the endo f the program p = 0.0002. (40 meters). Improvement in the perception of dyspnea after the intervention p = 0.087. SF36 questionnaires improvements in the Physical Role, Vitality and Mental Health domains. With the application of the St George Questionnaire it shows improvement in the General Health and Impact domains. Rest of the spirometry, Sat O2, ETCO2 and PFT variables without statistically significant changes.

CONCLUSIONS: The importance of this group of bronchiectasis is currently recognized as a cause of respiratory morbidity in developing countries, limiting its functionality due to increased symptoms. The Pulmonar Rehabilitation program consider the Physical Conditioning as an indispensable part of the program. Improving symptoms control and exercise tolerance. Exercise is the best means available to improve muscle function.

EFFECT OF TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS) ASSOCIATED WITH MULTICOMPONENT TRAINING ON THE FUNCTIONAL CAPACITY OF ELDERLY INDIVIDUALS - CLINICAL, CONTROLLED, RANDOMIZED, DOUBLE-BLIND TRIAL

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OBJECTIVES: To evaluate the effects of Transcranial Direct Current Stimulation (tDCS) associated with multicomponent training (TM) on the functional capacity (FC) of the elderly.

DESIGN: Longitudinal, randomized, double-blind, controlled clinical study. 28 elderly individuals (67±5 age was evaluated. Elderly functional capacity was assessed using the pre and post treatment AVD-Glittre Test and 30 after treatment. Individuals were randomized in two treatment groups: 1 (active tDCS associated with TM), 2 (tDCS sham associated with TM). There were 2 weekly sessions of 50 minutes each session, for 12 weeks, 24 sessions total. The TM was composed of warm-up (walking 20 meter straight and flat track (5 minutes), stationary exercise bike (20 minutes), strength training (5 minutes), walking in a straight line with obstacles, walking for 10 meters on uneven surfaces and go up and down in two steps (10 minutes), upper limb exercises (5 minutes) and stretching (5 minutes). The tDCS was applied during the stationary exercise bike. Anode over the dominant dorsal prefrontal cortex (CPFDL) and cathode in the supraboral region contralateral to the anode, current of 2mA.

RESULTS: The average time of group 1 post intervention was (140± 22), that was better than the group 2 (205 ± 43); (p = 0.001); DM54.186 95% CI (-83.306 /-25.067; p < 0.001) The effect size for group 1 was (post vs pre) d = 0.79 and (Follow-up vs pre) d = 0.80 and for group 2 (post vs pre) d = 0.18 and (Follow-up vs pre) d = 0.04

CONCLUSIONS: The tDCS associated with TM potentiated the effects of multicomponent training in improving Ability of the elderly individuals in the study.
Abstracts

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CORONARY INTERVENTION

CARDIAC PATIENTS UNDERGOING PERCUTANEOUS DIETARY HABITS AFTER CARDIAC REHABILITATION IN EFFECT ON DEPRESSION, FUNCTIONAL AMBULATION & MUSCLES IN HEALTHY WOMEN - CLINICAL ESSAY, CONTROLLED, RANDOMIZE AND DOUBLE-BLIND

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OBJECTIVES: Among the conservative procedures available for women’s urinary incontinence, pelvic floor muscle training (PFM) is seen as first-line treatment, however, its effects is not lasting, requiring continuous training. Studies have shown that an association of transcranial direct current stimulation (tDCS) with other therapeutics techniques has neuropsychological effects and better clinical practices. We conducted this study to evaluate the effect of the association of tDCS with pelvic floor muscle training (PFM) on the intravaginal pressure of healthy women.

DESIGN: We evaluate twenty-nine sexually active women (22.7 ± 3.4 years) with perineometer to, initially, verify intravaginal pressure strength and randomized into two groups: (G1-treatment) composed by active tDCS + PFM + biofeedback and (G2-control) sham tDCS + PFM + biofeedback. By the anode electrode positioned on the supplementary motor area (SMA) and the cathode on the dominant supracostral region, we applied the direct current (2mA) to stimulate Pelvic Floor Muscles (PFM) in association with PFM (contractions and relaxations of the perineum) with mechanical biofeedback. We conducted twelve 20-minutes sessions three times a week. We performed three assessment: pre-, post-treatment and 30-day follow-up.

RESULTS: In comparison of pre-treatment assessment, intravaginal pressure post-treatment assessment showed a significant Mean Difference of 13.5 (p< 0.05) for G1 and of 6.9 (p< 0.05) for G2, and a intragroups Mean Difference of 4.9 (p >0.05), being the comparison with the follow-up insignificant for both groups.

CONCLUSIONS: We suggest that the active tDCS potenialize the increase of intravaginal muscle strength; however, we indicate that additional studies with more patients and a longer treatment time have to be conducted in future studies to reinforce these finds.

EFFECTIVE VIRTUAL REALITY WITH VIDEO GAMES IN INDIVIDUALS WITH CHRONIC STROKE

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OBJECTIVES: The use of virtual reality with video games (VR-VG) combined with conventional therapies can be more effective for balance and gait training in patients after Stroke, as well as being a motivating tool. Objective: The aim of this study is to compare the effect of increased VR-VG associated with conventional therapy in a rehabilitation program about balance in individuals with chronic Stroke.

DESIGN: This is a simple blind randomized clinical trial. Thirty individuals with stroke of both sexes were recruited, being 14 in the intervention group (IG) and 16 in the control group (CG). The CG performed conventional physiotherapy sessions for approximately 50 minutes and the IG was added 50 minutes of VR-VG twice a week. The groups were randomized and evaluated at the beginning and end of the protocol by the Rivermead test (RT), Berg Balance Scale (BBS) and force platform (1000 Hz) in the quiet upright posture with eyes open and closed. For VR-VG intervention, the Nintendo® Wii® console was used with the Wii Fit game and the Balance Board platform. For the comparison of the initial and final data between each one the Wilcoxon test was used and for the analysis between the groups the Mann-Whitney test, both p < 0.05.

RESULTS: Both groups showed improvement in BBS and RT scores, but without statistical difference. Regarding the force platform data, no improvement was observed in both groups after VR-VG training.

CONCLUSIONS: Conclusion: The VR-VG protocol added to the rehabilitation program did not contribute to a difference between groups regarding balance, even though both presented gains.

EFFECT ON DEPRESSION, FUNCTIONAL AMBULATION & DIETARY HABITS AFTER CARDIAC REHABILITATION IN CARDIAC PATIENTS UNDERGOING PERCUTANEOUS CORONARY INTERVENTION

Mustajab Fatima Medo, MBBS, and Nabila Soomro, MBBS, FCPS (PM&R)

OBJECTIVES: To compare the level of depression, functional ambulation and dietary habits in patients undergoing percutaneous coronary intervention (PCI) after attending Phase-1 & Phase-2 cardiac rehabilitation (CR).

DESIGN: A cross-sectional study was conducted enroling ninety patients who underwent PCI and received phase-1 and 2 post-procedure. Each participant was interviewed to evaluate for depression using PHQ-9 questionnaire and 6 Minute Walk Test performed at the end of CR phase 1 and phase 2. The demographic data and intake of Mediterranean diet was recorded on self-designed questionnaire.

RESULTS: Of 90 PCI patients, mean age of participants was 54.74 ±11.39 years. Mean systolic blood pressure in phase 1 of CR was 116.99 ±14.15 which improved to 106.30 ±8.61 at end of phase 2 of CR (p-value: 0.003, 95% CI: -8.75 to -1.87). Diastolic blood pressure in phase 1 was 72.08 ±11.01 which improved after phase 2 (p-value: 0.001, 95% CI: -8.38 to -2.86). Higher scores on PHQ 9 were recorded in phase 1 as compared to phase 2 (6.01 ±3.49 vs. 2.65 ±3.26, p-value < 0.001, 95% CI: 2.43 to 4.27). Greater distance was covered during 6MWT in phase 2 (544.44 ±214.72) as compared to phase 1 (301.56 ±134.75) (p-value < 0.001, 95% CI: 277.22 to 208.53). In phase 1, only 5.6% patients were taking Mediterranean diet and 74.4%were smokers. But after phase 2, all patients were on Mediterranean diet and Ex-smokers.

CONCLUSIONS: CR post PCI is associated with lower depression scores, improved functional ambulation and healthy dietary habits. Adopting cardiac rehabilitation as a part of standard treatment protocol can help lower cardiac disease risk factors.

EFFECTIVE MOTOR AND SENSORY STIMULATION DURING RADIOFREQUENCY SESSION FOR ADHESIVE CAPSULITIS

Hussein I. Mousa, Consultant

OBJECTIVES: Adhesive Capsulitis is a common problem and can be associated with substantial disability. A variety of treatments have been tried, there have been promising results, and evidence is limited on the effectiveness of these interventions. Pulsed radiofrequency (pRF) to the suprascapular nerve (SSN) has been anecdotally reported as safe and reliable method. In this study we show evidence of therapeutic motor and sensory stimulation in addition to the pRF SSN.

DESIGN: Ultrasound guided percutaneous pRF to the SSN performed for 110 patients with adhesive capsulitis from were prospectively analyzed. The patients divided into two groups. First group (60) had pRF to the SSN at suprascapular region. Second group (50) adding to the pRF, motor and sensory stimulation (MSS) cycles doing by radiofrequency machine to the proximal SSN at suprascapular region. Follow up of pain using Visual Analog Scale and active range of motion (AROM) shoulder at 2, 8 and 12 weeks respectively.

RESULTS: Compared to pre-procedure score, patients reported highly significant decreases in pain scores and improved movement at all-time points (p< 0.001) in both groups. Comparing suprascapular pRF vs. suprascapular MSS with stimulation, there was a significantly greater decrease in pain score and improved shoulder movements in the suprascapular group in the 2 and 4 weeks (p<0.05). Regarding 12 month follow up group a significantly improve in the shoulder movements (p< 0.05) while no significant difference was demonstrated in pain score.

CONCLUSIONS: Proximal pRF SSN with MSS showed promising results to early relieving pain and improving shoulder functions. There are economic benefits return to work sooner without the need for hospitalization or spending time in physical therapy sessions. However was too small a sample size for meaningful interpretation.

EFFECTIVENESS OF A TELEHEALTH-BASED STRATEGY TO IMPROVE THE IMPLEMENTATION OF THE CLINICAL PRACTICE GUIDE FOR LOWER LIMB AMPUTEES BY NEUROVASCULAR DISEASE AND TRAUMA: INTERVENTION TRIAL RANDOMISED BY CLUSTERS

Jesús A. Plata Contreras, PM&R and Clinical Epidemiology, Luz H. Lugo-Aguadelo, Doctor, and Ana M. Posada, PM&R and Clinical Epidemiology

OBJECTIVES: To evaluate the effectiveness of a strategy based on Telehealth to improve the implementation of the Clinical Practice Guide (CPG) for the diagnosis and preoperative, intraoperative and postoperative treatment of the lower limb amputated person, the prescription of the prosthesis and the integral rehabilitation in health institutions in Antioquia, Colombia. Develop an educational program using the most relevant telehealth resources, to assess the achievement and compliance of the recommendations of the CPG for lower limb amputees that have been prioritized.

DESIGN: Community based intervention study randomized by clusters. These studies are differentiated by the method of randomisation, in which a group of individuals is randomly assigned to an intervention as a group or cluster rather than as individuals. Characteristically, individuals within a conglomerate tend to be more

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similar than randomly selected individuals. This type of study allows the evaluation of the effect of an intervention on health care providers in the institutional field, such as the one proposed in this project.

**RESULTS:** The effectiveness of the educational program based on telehealth tools (TeleEducation: virtual course with recommendations from the CPG, at least four modules: Orthopedics, surgery, rehabilitation and prosthesis; TeleAssistance: virtual conference between CPG researchers and professional from selected hospitals and delivery of educational material containing the recommendations of the CPG) compared to the usual socialization of the CPG at the institutions, will be evaluated by means of a generalized estimated equation model (GEE) for dichotomous variables using the binomial distribution for group A and 1.07 points for group B were observed that will be used with two coded response options satisfy, or does not satisfy.

**CONCLUSIONS:** The effectiveness of a telehealth based strategy is expected to improve the implementation of the CPG in health institutions in Antioquia, Colombia, be at least 15% higher than compare the intervention group with the control group.

**EFFECTIVENESS OF ‘WARD TRAINING PACKAGE’**
Atsushi Naono, OT, Arie Kanbe, NS, Takafumi Kinumura, MD, and Teiji Esaki, MD

**OBJECTIVES:** Our hospital established a convalescent rehabilitation ward in 2004. Since its establishment, the training for inpatients has mainly been provided individually only by the therapist. However, in 2015, some staff other than therapists tried to start additional training contents (‘ward training package’) which included group recreations and individual training menu. We examined how ‘the ward training package’ affected patients.

**DESIGN:** A total of 1220 inpatients who were discharged from our ward from April 2012 to March 2019 were divided into the following two groups. Group A (inpatients before introduction of ward training package): discharged April 2012 through March 2016, 588 patients (314 males, 214 females) averaged age 72.0 ± 13.3 years, Group B (inpatients after introduction of ward training package): discharged April 2016 through March 2019, 632 patients (319 males, 313 females) averaged age 73.3 ± 13.8 years. The length of hospital stay and average of Functional Independence Measure (FIM) score were compared between two groups.

**RESULTS:** The averaged length of hospital stay was 66.1 days for group A and 54.3 days for group B. The averaged FIM score at discharge was 88.2 points for group A and 95.0 points for group B. (The averaged FIM score at admission was 70.2 points for group A and 71.1 points for group B. There was no difference between group A and B in FIM at admission.)

**CONCLUSIONS:** The length of hospital stay was 11.9 days lower in group B than in group A (p<0.01). The FIM at discharge was 6.8 points higher in group B than in group A (p<0.01). Based on the above it was thought that the independence of ADL could be improved more in the group B (after introduction of ‘the ward training package’) than in the group A.

**EFFECTIVENESS OF KINESIO TAPING APPLICATION IN PATIENTS WITH LOW BACK PAIN**
Kamila Pasternak-Mnich, PT, PhD, Monika Senktas, PT, Agnieszka Zawadzka, PT, PhD

**OBJECTIVES:** Kinesiotape (KT) is widely used in musculoskeletal rehabilitation as an adjuvant to treatment and commonly used method of pain relief in LBP. The aim of the study was to evaluate the effectiveness of lumbar Kinesio Taping on pain intensity, the range of motion of lumbar flexion and disability.

**DESIGN:** Thirty six patients with LBP were randomized into experimental group A (n = 18, age=57.2±12.3) where local KT was used and comparative group B (n=18, age=61.7±8.9) where mechanical tape was applied. To evaluate the effects of the therapy, the modified Laitinen Questionaire, Visual Analogue Scale (VAS), Finger-Floor test, Schober’s test, Oswestry Disability Index and Roland-Morris Disability Questionaire were used.

**RESULTS:** There was a significant reduction in pain and improvement in the functioning of patients in both groups. After the therapy, a significant decrease in the average pain point score assessed according to the modified Laitinen Questionaire by 2.8 points for group A, by 3.1 points for group B and according to VAS by 2.4 points for group A, by 3.1 points for group B. A significant decrease in the average QoL points for group A, by 10.7 points for group B were observed. A therapeutically significant effect was obtained for the assessed parameters; with Finger-Floor test, Schober's test and average disability rating values according to RMDQ. The therapeutic effect was not dependent on the application technique.

**CONCLUSIONS:** Kinesio Taping can safely relieve pain, reduce the need for pharmacological management and improve quality of life in patients with LBP, especially in patients with contraindications to other physiotherapy techniques.

**EFFECTIVENESS OF PHYSICAL THERAPY INTERVENTIONS IN THE TREATMENT OF URINARY INCONTINENCE IN OLDER WOMEN: A SYSTEMATIC REVIEW**
Lauren Paretti, BS, Ariana Gagliardi, BS, Stephanie Oliverio, BS, Kayla Stephani, BA, and Kaysa McNab, PT, MEd, OCS

**OBJECTIVES:** Urinary incontinence (UI), or the involuntary loss of urine, is a prevalent condition among older adults. While age and gender are risk factors, UI is not a natural part of female aging. Many women may not recognize that what they are experiencing is a medical condition. Further, they may be embarrassed to discuss this issue with their healthcare provider. By not seeking proper care, these individuals may be hindering their independence, opportunities to receive effective treatment, and their overall quality of life. Research shows a wide variety of physical therapy (PT) treatment options are available for UI. The purpose of this systematic review was to examine the effectiveness of various conservative PT interventions in treating stress, urge, and mixed UI in older women.

**DESIGN:** Two searches of the literature were performed in May and September 2019. All articles included in the review were analyzed for quality on the PEDro scale and a hierarchy of evidence scale. Studies that examined stress, urge, and mixed urinary incontinence were evaluated.

**RESULTS:** Fourteen articles were included in the results. All articles were rated as 1b or 2b on the hierarchy of evidence scale. Dependent variables included instruments, such as questionnaires, scales, and/or bladder diaries, that measured outcomes of UI symptoms.

**CONCLUSIONS:** Studies examining PT interventions for the management of UI generally found that pelvic floor muscle training, electrical stimulation, behavioral therapy, extracorporeal magnetic innervation, and physical activities were effective in reducing UI symptoms as compared to control groups. PT interventions have been shown to be effective in the management of UI and should be the first line of treatment as opposed to non-conservative methods. Physical therapists can and should apply this knowledge in their practice when treating UI in older women. Physicians should consider referring to PT prior to prescription of medication or referral to surgery.

**EFFECTIVENESS OF SUPERVISED PELVIC FLOOR MUSCLE EXERCISE PROGRAM ON STRESS URINARY INCONTINENCE DURING LATE PREGNANCY**
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**OBJECTIVES:** Stress urinary incontinence (SUI) is common during pregnancy and affect quality of life by restricting women’s social participation due to fear of leakage. This study aims to evaluate the effect of supervised PFME program in preventing SUI during late pregnancy in primigravid women.

**DESIGN:** A prospective randomized control trial was conducted at Institute of Physical Medicine and Rehabilitation, Karachi. Female participants with primigravid and gestational age of 20 to 30 weeks were included. Participants were distributed by simple random technique into two groups. Intervention group participants received supervised PFME program for 45 minutes once weekly for six weeks. Participants were trained to identify correct muscle to exercise by stop test and then were instructed to repeat 20 sets of PFME twice a day for 5 days per week up to 6 weeks. The participants in control group received unsupervised PFME program training in awareness session. Follow up was done and participants were advised to maintain daily record of involuntary leakage of urine on sneezing, coughing, effort or physical exertion during 38th week of pregnancy.

**RESULTS:** 84 participants were enrolled divided equally into intervention group (n=42) and control group (n=42). However, follow up of eight participant included 2 from intervention group and 6 from control group was missed. 25% participants (n=10) reported SUI among interventional group and (50%) participants (n=18) from control group reported SUI. There was significant difference in frequency of SUI during late pregnancy in women who received 6 week supervised PFME versus women who practiced unsupervised PFME (P-value=0.024).

**CONCLUSIONS:** Supervised PFME program showed significant decrease in frequency of SUI at late pregnancy. To prevent suffering from devastating problem
like SUI antenatal care should emphasis on supervised PFME program to prevent SUI in late pregnancy.

**EFFECTIVENESS OF THE PEDAL EXERCISER FOR IMPROVING LOWER LIMBS MUSCLE STRENGTH IN THE ELDERLY - A RANDOMISED CLUSTER CONTROLLED FEASIBILITY STUDY**

Rakesh Kumar, MSC, BSC, and Andrew Lemmey, PhD

**OBJECTIVES:** The purpose of this study was to determine if exercising in the seated position with the pedal exerciser could improve leg strength, gait, and reduce fall of falls. If this form of training proves to be efficacious then it could replace exercises done in the standing position for those elderly who have a fear of falling when standing, or unable to stand. Also, if there would be gain in leg muscle strength after using the exerciser for 12 weeks.

**DESIGN:** The design of this study was a feasibility cluster randomised control trial. Fifty-five participants in falls prevention classes in the community falls prevention classes for the suitability for this study; 4 classes were recruited at 2 leisure centres, and 2 communities in Hospitals. Each of two settings was randomised to either the intervention or control group. Manual Muscle Testing (MMT) was conducted on 7 major lower limbs muscle groups which are responsible for balance and gait. Both interventions involved 1 session per week for 12 weeks.

**RESULTS:** A total of 55 participants were recruited and began the study, and 80% (44/55) of this sample completed the study. There appears to be no differential in drop out by centre with 5 withdrawing in hospital and 6 withdrawing in another. Analysis was completed using a linear model adjusting for baseline and taking centre, group allocation and the interaction between group and centre into account.

**CONCLUSIONS:** Use of pedal exerciser improves muscle strength in groups of lower limb muscles, especially hip, knee & ankle flexors and extensors but it was not able to increase the strength in hip abductors and adductor muscles in a structured progressive programme. Result of the study suggests that exercising in the seated position with the pedal exerciser can improve leg strength and lower body function, including gait, and reduce fear of falls in the elderly.

**EFFECTIVENESS OF STABILOMETRIC AND VESTIBULAR REHABILITATION TO REDUCE RISK OF FALLS IN ELDERLY PEOPLE: A COMPARATIVE STUDY**

Houda Migaou, Professor, Saoussen Layouni, Resident, Soumaya Boudakhane, Professor, Darine Touil, Student, Ibtissem Chouchene, Student, Anis Jellad, Professor, and Zohra Ben Salah, Professor

**OBJECTIVES:** Balance dysfunctions are a major source of death and injury in elderly people. The aim of this study was to compare the efficiency of two different methods for balance training: stabilometric platform and vestibular rehabilitation in ameliorating balance and reducing the risk of falls.

**DESIGN:** We have enrolled elderly patients with risk of falls randomly assigned to two groups A and B. Rehabilitation protocols are based on a 6 week cycle conventional physotherapy associated for group A with stabilometric rehabilitation and for group B with vestibular rehabilitation therapy. The outcome measures used were Tinetti test and Timed Up and Go (TUG). Clinical and stabilometric assessment before and after a 6-week period of training were performed.

**RESULTS:** Our study population consisted of 12 patients divided into two groups A and B: 6 patients for each group with 4 men and 2 women and an average age of 73.5 years [67 - 85]. We noted that tinetti test and TUG, improved in both groups with a gain respectively of 2.67 and 2.33 in stabilometric group, versus 1.36 in vestibular rehabilitation therapy group. But the improvement was better for patients performing visual biofeedback rehabilitation.

**CONCLUSIONS:** Our study results show that the and the vestibular rehabilitation therapy have the positive effect on balance dysfunction of elderly people, while stabilometric platform gets better results and significantly reduces the risk of falls.

**EFFECTS OF A SPECIFIC REHABILITATION PROTOCOL ON BREAST CANCER WOMEN IN TERMS OF FATIGUE, MUSCLE PERFORMANCE, AND QUALITY OF LIFE: A PROSPECTIVE COHORT STUDY**

Marco Invernizzi, MD, PhD, Lorenzo Lippi, MD, Sabrina Pasqua, MD, Alessio Baricich, MD, PhD, Carlo Cisari, MD, and Alessandro de Sire, MD

**OBJECTIVES:** We aimed to evaluate the effects of a specific therapeutic exercise protocol on Cancer Related Fatigue (CRF) in women recently treated for breast cancer (BC).

**DESIGN:** In this prospective cohort study, we included women underwent surgery for BC in previous two months with a diagnosis of CRF. We excluded from our study patients with Hb < 9 g/dl, platelets levels < 150,000/mm3, and brain or bone metastases. All participants performed an exercise protocol consisting in two sessions of 60 min each per week for 4 weeks. We evaluated the primary outcome measure the Brief Fatigue Inventory (BFI). Secondary outcomes were: European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30); Hand Grip Strength Test (HGS); Short Physical Performance Battery (SPPB); 10 meter walking test (10MWT); 6 minute walking test (6MWT). All outcomes were assessed at baseline (T0), after one month of treatment (T1), and after 3 months (T2).

**RESULTS:** Of the 68 BC survivors assessed, 26 met the eligibility criteria, resulting in a dropout of 5 patients during the treatment. The 21 patients, mean aged 54.3±7.3 years with a BMI of 25.4±5.9 kg/m2. There were no significant differences in terms of BFI in different time-points (T1: 5.0±1.7 vs 4.4±2.1; NS; T2: 5.0±1.7 vs 4.9±1.8; NS). On the other hand, significant improvements in HRQoL and functional outcomes at both T1 and T2 were observed.

**CONCLUSIONS:** Four weeks of therapeutic exercise protocol did not significantly reduce CRF in women recently treated for breast cancer; however there was a statistically significant improvement as HRQoL, strength and muscle performance, as at the end of the treatment and at follow-up after 3 months. Further studies are necessary in order to assess the best intervention and to adequately define the role of physical exercise within the multidisciplinary management of CRF in BC survivors.

**EFFECTS OF DIFFERENT EXERCISE INTERVENTIONS ON CARDIAC FUNCTION IN RATS WITH MYOCARDIAL INFARCTION**

Chunxiao Wan, Doctor, and Chuan Huang, Master Degree

**OBJECTIVES:** High-intensity interval training (HIIT) and aerobic training (AT) improve cardiac function, however their effects on the cardiac function after myocardial infarction (MI) and the molecular mechanisms are unclear. In this study, HIIT, AT, and sedentary (SED) intervention were carried out for 4 weeks to compare the effects on cardiac function with MI and explore a more suitable approach and potential mechanisms.

**DESIGN:** Twenty-four male rats were randomly divided into a control group (CON), MI-sedentary group (MI-SED), MI-aerobic training group (MI-AT) and MI-high-intensity interval training group (MI-HIIT). After a 4-week intervention, the exercise capacity, left ventricular ejection fraction (LVEF), AMP-activated protein kinase (AMPK), myocardial morphology and myocardial mitochondria were assessed.

**RESULTS:** Compared with the MI-SED group, (1) exercise capacity in the MI-AT (P=0.000) and MI-HIIT (P=0.000) groups significantly increased; (2) LVEF in the MI-AT (P=0.031) and MI-HIIT (P=0.006) groups increased significantly; (3) AMPK expression increased significantly in the MI-AT (P=0.001) and MI-HIIT (P=0.003) groups. No significant difference in exercise capacity, LVEF or AMPK expression was found between the MI-AT and MI-HIIT groups (P > 0.05). (4) The MI-SED group exhibited sarcoplasmic dissolution and fibrous hyperplasia, and the MI-HIIT group displayed mitochondrial vacuolization.

**CONCLUSIONS:** AT and HIIT for 4 weeks have similar cardioprotective effects that are superior to SED. Both AT and HIIT improve cardiac function and exercise capacity by upregulating AMPK expression. However, myocardial mitochondria were damaged in the MI-HIIT group.

**EFFECTS OF EXERCISE THERAPY ON PREVENTING SARCOPENIA IN ELDER INDIVIDUALS WITH KNEE OSTEOARTHRITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS**

Chun-De Liao, Doctoral Candidate, Shih-Wei Huang, PhD, Hung-Chou Chen, MD, Chang-Ya Hsieh, MSC, and Tsan-Hon Liou, MD, PhD

**OBJECTIVES:** Knee osteoarthritis (KOA) and age are associated with high sarcopenia risk. This study aimed to investigate the feasibility and outcomes of muscle strengthening exercise therapy (MSET) on muscle mass gain and muscle hypertrophy in older patients with knee osteoarthritis (KOA).

**DESIGN:** A comprehensive search of electronic databases was performed in accordance with PRISMA guidelines to identify randomized controlled trials (RCTs) that reported the effects of MSET on lean mass gain and muscular morphology changes for KOA. The included RCTs were analyzed through meta-analysis and risk of bias assessment.

**RESULTS:** We included 14 RCTs with a median PEDro score of 6/10 (range, 3/10 to 7/10). A total of 1012 patients with a mean age of 61.6 years were analyzed.
The MSET intervention resulted in a significantly higher gain in lean body mass with a standard mean difference (SMD) of 0.45 (95% confidence interval [CI] = 0.24, 0.66; P < 0.0001). The results showed significant favorable effects of MSET on muscle thickness (SMD = 0.64, 95% CI = 0.03, 1.24; P = 0.04) and muscle cross section area (SMD = 0.54, 95% CI = 0.20, 0.87; P = 0.002).

CONCLUSIONS: This study provides evidence that MSET is beneficial for lean mass gain and muscle morphological changes in older adults with knee or hip KOA. Furthermore, the results of this study showed that sex and intervention design have influences in muscle volume in response to MSET. Therefore, we conclude that MSET may exert effects to offset muscle attenuation or prevent sarcopenia in older individuals with KOA. Based on the limitations of our current study, there is a need for additional studies with larger samples as well as for identification of a specific MSET protocol.

EVALUATION OF PATIENTS WITH HEMIPARETIC INDIVIDUALS - CLINICAL, CONTROLLED, RANDOMIZED, DOUBLE-BLIND, CLINICAL TRIAL

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OBJECTIVES: To evaluate the effects of tDCS concomitant physiotherapy on upper limb of post-stroke painful shoulder patient. To correlate these effects with motor function and quality of life.

RESULTS: There was a 3 point reduction clinically important in pain assessed for both groups, no statistical difference (p = 0.3) was observed between the groups. There was no correlation for the active tDCS group between pain and function and quality of life, the sham group also showed no correlation between pain and function and quality of life.

CONCLUSIONS: The results showed that physical therapy improved the pain of all study subjects, but the tDCS did not potentiate these results. There was no correlation between pain and function and quality.

EFFECTS OF TRANSCRANIAL DIRECT CURRENT STIMULATION AND PERIPHERAL STIMULATION ON THE ELECTRICAL ACTIVITY OF THE TIBIALIS ANTERIOR MUSCLE AND BALANCE OF HEMIPARETIC INDIVIDUALS - CLINICAL, CONTROLLED, RANDOMIZED AND DOUBLE-BLIND STUDY

Aline Fruhauf, PhD, Fabiano Politi, PhD, Camila C. Silva, Under Graduate Student, David Alves, Under Graduate Student, João Carlos F. Corrêa, PhD, and Fernanda I. Corrêa, PhD

OBJECTIVES: Analyze the effects of the combination of Transcranial Direct Current Stimulation (tDCS) associated a peripheral stimulation (PES) on the electrical activity of the tibialis anterior (TA) muscle and balance of hemiparetic due to stroke. The hypothesis was to verify if the combination of afferent stimulation would increase the electrical activity of the muscle. In addition, it was also verified the relationship of muscle electrical activity with the balance.

RESULTS: The increase of muscle electrical activity was evidenced during the tDCS associated with tDCS in the TA muscle. The balance was improved with the combination of tDCS and PES. The correlation between the muscle electrical activity and balance was observed with Mini-BEST score.

CONCLUSIONS: The results showed that the tDCS associated with PES improved the balance of hemiparetic individuals.
active ankle dorsiflexion 6s of TON; for 30 min. The treatment was performed five times a week/2 weeks, 10 sessions total.

RESULTS: There was no difference in RMS for either group. Intragroup MDF significantly decreased (p < 0.05 Repeated measures ANOVA) after 10 days of treatment and follow-up in all groups; intergroup MDF was significantly lower after 10 days and after follow-up in the PESa/DCSa and PESp/DCSa groups compared to PESA/DCPs (p < 0.05 Repeated measures ANOVA). Balance improved significantly (p = 0.00 Friedman) and clinically important (>3 points) in PESa/DCSa after 10 days and follow-up there was no difference (p > 0.05 Kruskal-Wallis) between groups.

CONCLUSIONS: Conclusion: EMG, ETCC did not potentiate PES. In Balance, the combined techniques provided clinical improvement.

Efficacy and Safety of AbobotulinumtoxinA for Upper Limb Spasticity in Children with Cerebral Palsy: Results from an international, phase 3, pivotal study

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OBJECTIVES: Assess the efficacy and safety of upper-limb abobotulinumtoxinA injections for spasticity in children with cerebral palsy (CP). Cycle 1 compared abobotulinumtoxinA at doses of 8U/kg and 16U/kg versus a low-dose (2U/kg) control group.

DESIGN: This was a double-blind, repeat treatment (54 cycles over 1 year) study (NCT02106351). Children (2-17y) with CP and spasticity in ≥1 upper-limb were randomized (1:1:1) to Cycle 1 injections of abobotulinumtoxinA, 8U/kg, 16U/kg or 2U/kg into the primary target muscle group (PTMG; elbow or wrist flexors). The PTMG could change in cycles 2-4 (injection intervals ≥16 weeks), when children received 8U/kg or 16U/kg. All children participated in an individualized home therapy program.

RESULTS: 212 children were randomized and 181 completed the study. Changes in the Modified Ashworth Scale (MAS) score of the PTMG from Baseline to Week 6 of Cycle 1 (primary endpoint) were significantly different for the 8U/kg and 16U/kg abobotulinumtoxinA groups versus 2U/kg control (mean reductions from baseline of -2.0 and -2.3 vs. -1.6 respectively, and statistical difference was maintained at Week 16. All three groups showed a clinically relevant effect on the Physicians Global Assessment (PGA) of treatment response at Week 6 of Cycle 1 (mean improvement of 2.0 grades with 8U/kg and 16U/kg vs. 1.8 grade in the control group), with no significant differences between groups. Benefits were sustained over the 1 year study with repeat abobotulinumtoxinA injections of 8U/kg or 16U/kg. Mean injection intervals (2U/kg, 8U/kg, 16U/kg) were: 22.4, 23.9 and 25.6 weeks, respectively. Adverse events were mostly mild-moderate and reflective of common childhood illnesses.

CONCLUSIONS: AbobotulinumtoxinA administered at doses of 8U/kg or 16U/kg in the affected upper-limb significantly reduced spasticity compared to the 2U/kg control dose and was well-tolerated. Treatment was associated with global improvement and therapeutic benefits were sustained with repeat injections of 8U/kg or 16U/kg over one year.

Efficacy and Safety of AbobotulinumtoxinA in Pediatric Lower Limb Spasticity: interim results from a phase IV, prospective, observational, multicenter study

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OBJECTIVES: AbobotulinumtoxinA is approved for treatment of pediatric lower limb spasticity (PLLS). Treatment and goals need to be individualized according to patient needs. The primary objective of this study was to assess subject-centered, function-related goal attainment (Goal Attainment Scale T-Score) after multiple/ repeated abobotulinumtoxinA injections. Effectiveness of abobotulinumtoxinA in injected muscle groups via the Modified Ashworth Scale (MAS) was also assessed.

DESIGN: This phase IV study was designed to collect real-world data on the clinical use of abobotulinumtoxinA in patients with PLLS (aged 2-17 years). Prescription decision was made prior to, and independent from, study enrollment, with abobotulinumtoxinA used according to local prescribing information. Functional goals (utilizing the T-score) were identified at baseline by patient/parent/caregiver in consultation with investigators. Muscle tone was assessed by the Modified Ashworth Scale (MAS) at baseline and subsequent visits. Adverse events were collected.

RESULTS: Of 144 patients who had their second injection and were included in this first interim analysis, 76.4% (n=110) were botulinum neurotoxin (BoNT)-naïve. At time of enrollment, 76.4% were aged 2-9 years. At the end of treatment cycle 1, mean T-score for the total population was 52.41 (SD 11.76); BoNT-naïve (N=34) was 53.59 (13.63) versus BoNT- naïve 52.05 (11.16). In patients aged 2-9 years, T-score was 51.78 (11.01) versus 54.46 (13.88) in patients aged 10-17 years. MAS responses (≥1 point reduction from baseline) were similarly observed in gastrocnemius (29.9%, n=23/77), soleus (22.0%, n=9/41), and hamstring muscles (21.6%, n=8/37), but less frequently in adductors (4.8%; n=2/41).

CONCLUSIONS: Goal attainment outcomes were better than expected (T-score ≥50) for the overall PLLS population as well as for BoNT-naïve/naïve patients and both age subgroups. Injected muscles demonstrated tone reduction via MAS evaluations. Safety data will be presented at next interim analysis.

Efficacy of a Single Intrarticular Injection of Platelet-Rich Plasma for the Treatment of Early Knee Osteoarthritis

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OBJECTIVES: Platelet-rich plasma (PRP) has been reported to be effective for the treatment of knee osteoarthritis (OA). This study aimed to investigate the efficacy of a single intrarticular injection of PRP for the treatment of early knee OA.

DESIGN: In a prospective trial with 6-month follow-up, 41 patients with knee OA (Kellgren-Lawrence grade 1 or 2) were recruited and received a single intrarticular injection of PRP (N=41). The primary outcome was the mean change from baseline in the visual analog scale (VAS) pain (0-100mm) at 6 months post-injection. Secondary outcomes included the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC, Likert Scale), Lequesne index, single leg stance test (SLS), use of rescue analgesics and patients’ satisfaction.

RESULTS: Thirty-eight patients completed the study. The mean pain VAS decreased significantly from 45.6±13.8mm at baseline to 16.9±13.4mm, 14.0±13.1mm and 15.5±14.0mm at 1, 3 and 6-month follow-up (p < 0.001 for all). Significant improvements in WOMAC, Lequesne index, SLS and consumption of analgesics from baseline (p < 0.001 for all) were noted at each follow-up. Patients’ satisfaction was high, with no serious adverse events occurred.

CONCLUSIONS: One injection of PRP is effective for pain relief and functional improvement in patients with early knee OA.

Efficacy of Amantadine in Improving Recovery of a Chinese TBI Patient with Vegetative State: An Emission Tomography/Computed Tomography

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OBJECTIVES: A 45-year-old male TBI patient had been experiencing disorders of consciousness (DOC) for 16 weeks, whose Coma Recovery Scale-Revised (CRS-R) score was 2/eye opening stimulation and stereotyped abnormal posture), which indicated he was in a vegetative state.

DESIGN: The patient first underwent comprehensive rehabilitation for 4 weeks. Then he was simultaneously given amantadine 200 mg/d for the next 2 weeks, 300 mg/d for a week and 400 mg/d for another three weeks. The curative effect was observed by using CRS-R every week. Changes in cerebral glucose metabolism were additionally tested by 18F-FDG-PET/CT before and after amantadine treatment. In the end, the patient displayed vocalization, automatic motor reaction, visual pursuit, and sound localization, which indicated he progressed to a minimally conscious state (MCS). Improvements in cerebral glucose metabolism were also shown by PET/CT, particularly in the bilateral parietal lobe, frontal gyrus, cingulate gyrus, and precuneus.

RESULTS: Amantadine, a dopamine receptor agonist, has been a conventional application in the recovery of DOC overseas, whereas it’s rarely used in China. In our study, the case showed evident promotion in motor response after receiving amantadine, which indicated amantadine may play a role in the cerebral motor cortex function regions, with the likely mechanism of influencing dopamine-related brain areas. PET/CT showed concordant improvements in cerebral glucose metabolism of regions which are related to voluntary movement, speech language, sensory and emotion,
Efficacy of Constraint-Induced Movement Therapy in Cerebral Palsy Children with Asymmetric Hand Impairment

Rattana Rattanatham, MD

OBJECTIVES: To determine the efficacy of short-interval program of constraint-induced movement therapy on hand function training in asymmetric hand impairment cerebral palsy.

DESIGN: Randomized single-blinded controlled trial study. Subjects: Asymmetric hand impairment cerebral palsy in Srisawang School, Foundation for the Welfare of the Crippled System Methods: Sixteen cerebral palsy spastic triplegia (8-14 years old) were assigned randomly to either CIMT or control group. Both groups participated in occupational therapy program for 1 hour per day, 5 days per week for 8 weeks. CIMT group wore slings on their less impaired arms during therapy session and the slings were removed at the end of each session. To assess the effect of hand function of participants by the Jebsen-Taylor Test of Hand Function, counting the number of the coins that patient was able to put in the box within 3 minutes and stereognosis before training and after training for 8 weeks.

RESULTS: Sixteen cerebral palsy spastic triplegia were divided equally into two groups. One participant in the control group was dropped out from the study because he had surgical intervention in his impaired arm. There was statistically significant (P< 0.05) improvement of hand function by Jebsen-Taylor Test of Hand Function and counting the amounts of the coins in the box within 3 minutes after training for 8 weeks in CIMT group but there was no significance in control group.

CONCLUSIONS: CIMT is efficacious to improve fine motor function in asymmetric hand impairment cerebral palsy.

Efficacy of Moderate-Intensity Aerobic Exercise on Hepatic Fat Content and Visceral Lipids in Hepatic Patients with Diabesity

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OBJECTIVES: Limited studies ascertained the effects of moderate-intensity continuous exercise on hepatic fat content and visceral lipids in hepatic patients with diabesity. This study aims to appraise hepatic fat content and visceral lipids following moderate-intensity continuous aerobic exercise in hepatic patients with diabesity.

DESIGN: A single-blinded randomised controlled trial has included thirty-one diabetic obese individuals with non-alcoholic fatty liver disease. They were randomly classified into exercise and control groups, fifteen in the exercise group, and sixteen in the control group. The exercise group established 8-week moderate-intensity continuous aerobic exercise program with standard medical treatment while the control group established standard medical treatment without any exercise program. Hepatic fat content and visceral lipids were assessed pre- and post-intervention.

RESULTS: Baseline and clinical characters demonstrated no significant difference between groups (p>0.05). While post-intervention analysis demonstrated a significant difference in favoring of the aerobic exercise group (p< 0.05). The aerobic exercise group showed a significant reduction in hepatic fat content and visceral lipids (p<0.05), while the control group illustrated no significant changes (p>0.05) post-intervention.

CONCLUSIONS: Moderate-intensity continuous exercise diminishes hepatic fat content and visceral lipids in hepatic patients with diabesity. Recommendations should be encouraged to preserving moderate-intensity aerobic exercise training, particularly hepatic patients with diabesity.

Efficacy of Occupational Therapy in the Complex Patient: Pilot Randomization Clinical Trial

Martina Pellegrini, OT, Stefania Fugazza, Physiatrist, and Stefania Costi, Physiotherapist

OBJECTIVES: In the literature there were only studies that evaluated the effectiveness of occupational therapy in subjects with the same pathology. We have decided, in agreement with the ICF, to conduct research on the occupational needs of complex patients, that is, not united by the disease, but by the need for treatment due to disability resulting from disease. The main objective is to study the effect of occupational therapy (OT) on patient performance in problems identified through the Canadian Occupational Performance Measure (COPM). Secondly, to evaluate the effect on satisfaction, autonomy in B-ADL and I-ADL, anxiety, depression, reintegration into normal life and quality of life.

DESIGN: This study is a randomization clinical trial. Inclusion criteria: adult complex patients (RC-S-E29), definitive criteria for OT referral to participate. Exclusion criteria: other cognitive impairments, or clinical conditions preventing patient's collabora- tion. 40 patients were enrolled, 20 per group, divided by random sample. Control Group (CG): multiprofessional rehabilitation treatment without OT. IG: multi- professional rehabilitation integrating OT, with focus on patients needs and objectives highlighted by COPM, during hospitalization. After discharge from hospital, the treatment continued at home for 4-6 sessions. Assessment: T0 (admission): socio-de- mographic data, COPM, Instrumental Activity of Daily Living (IADL), Charlson Co- morbidity Index, Hospital Anxiety and Depression Scale, Modified Barthel Index (MBI). T1 (discharge) e T2 (45±15 days after discharge): like T0+Reintegration to Normal Living Index(RNLI), Short-Form 12.

RESULTS: The IG had a significantly higher gain in the COPM performance than the CG (p< 0.05). Similar trend in the IADL. At the end of the study, all IG pa- tients achieved clinically relevant improvements in performance and satisfaction. The IG obtained greater gains in MBI and RNLI scores compared to CG but not signifi- cant. The intervention was feasible.

CONCLUSIONS: Client-centered programs integrating OT are recommended for complex patients since the early stages of rehabilitation. A properly enhanced study is necessary to explore OT effects after discharge.

Efficacy of Omega-3 Fatty Acids in the Treatment of Carpal Tunnel Syndrome: A Randomized Double-Blind Controlled Trial

Siranya Paecharoen, MD, Karnt Wongsuphasawat, PhD, and Pichaya Tantiyavarong, MD, MSC, PhD

OBJECTIVES: Omega-3 fatty acids have anti-inflammatory and neuroprotective effects. The study aimed to evaluate the efficacy of omega-3 fatty acids (1,200 and 3,000 mg) administration compared with conventional treatment for 3 months in patients with mild to moderate carpal tunnel syndrome (CTS).

DESIGN: A randomized double-blind controlled trial was conducted during March 2017 to December 2018. Patients with mild to moderate CTS were randomly assigned into 3 treatments: 1) oral fish oil, EPA/DHA, 1,200 mg per day 2) fish oil 3,000 mg per day, and 3) placebo. All patients received vitamin B as a conventional treatment. Patients and research assistant who gave a concealed container were blinded to the group assignment. The primary outcomes were numbness and pain scores, which were monthly measured in Numeric Rating Scale (0-10) for 3 months. Linear mixed models were used to analyze correlated data.

RESULTS: Twenty-eight patients with 42 CTS hands were analyzed: 1) fish oil 1,200 mg group (n=9, hand=13), 2) fish oil 3,000 mg group (n=10, hand=16) and 3) control group (n=9, hand=13). A duration of symptoms was the only different vari- able between 3 groups in univariable analysis. After adjustment for duration of symp- toms, the numbness scores and the pain score were monthly reduced 0.6 points (95% CI -1.2 to -0.1, p=0.017) and 0.8 points (95% CI -1.3 to -0.2, p=0.005), respectively, in the fish oil 3,000 mg group compared with the control group. However, there was no statistically significant difference in any score between the fish oil 1,200 mg group and the control group. Handburn and abdominal discomfort were found similarly in 3 groups without statistic significant.

CONCLUSIONS: Omega-3 fatty acids (EPA/DHA 3,000 mg/day) can reduce numbness and pain in treatment of mild to moderate CTS.

Efficacy of Screening Hip Fracture Patients for Dysphagia Using the American Society of Anesthesia Classification System Scores

Oksana Zhivotenko, DO, Joanna Israel, DO, Sahba Oboudiyat, DO, Tam Quach, DO, Perry Stein, MD, and Ann Eltanger, PSYD, ABPP

OBJECTIVES: The purpose of this study is to examine the efficacy of screening for dysphagia in post-operative hip fracture patients with American Society of Anes- thesia (ASA) scores of III or IV. Results from prior studies showed an ASA score of III and IV were meaningful predictors of dysphagia. This descriptive study quantifies the
incidence of dysphagia diagnosed by speech language pathology (SLP) and development of pulmonary complications.

**DESIGN:** A retrospective chart review of post-operative hip fracture patients admitted to an acute rehabilitation unit over two years. The control group included data collected prior to the implementation of the SLP evaluation. The primary outcome measure was the incidence of dysphagia found on SLP evaluation in hip fracture patients with ASA scores of III or IV. Secondary outcome measures included the incidence of aspiration pneumonia identified on exam or imaging studies.

**RESULTS:** The incidence of dysphagia on SLP evaluation was found to be similar in the control and interventional groups. Within the control group, there are 22 missing values since those patients were not screened according to their ASA score. The frequency of pneumonia was increased in the control group compared to the interventional group.

**CONCLUSIONS:** This study demonstrated an equal incidence of dysphagia regardless of the intervention using SLP evaluation. Concurrently, there was an increase in pneumonia by greater than 10% in patients with an ASA score of III or IV who were not evaluated by SLP. This could be explained by the 22 unscreened patients which have the potential to contribute to the number of patients with dysphagia, in turn, increasing the incidence of pneumonia. Future studies should include a larger sample size and multi-center data collection but SLP evaluation should be implemented in all hip fractures with an ASA score of III or greater.

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**EFFICACY OF ULTRASOUND-GUIDED BOTULINUM TOXIN TYPE A INJECTIONS FOR SPASTICITY TREATMENT: A SYSTEMATIC REVIEW**

Ryan V. Sandarage, BSC, MD Candidate, Rajiv N. Reebey, MD, FRCP, and Supan Kotteduwu Jayawarden, BSC, MD Candidate

**OBJECTIVES:** Botulinum toxin type A has become a primary treatment for spasticity in several conditions such as stroke, and accuracy of toxin delivery to correct areas of the muscle may improve treatment outcomes. We sought to conduct a systematic review of the impact of the efficacy of ultrasound-guided botulinum toxin type A injections for the treatment of spasticity.

**DESIGN:** We performed a systematic review in accordance with the Cochrane Review protocol. Databases, including MEDLINE, Embase, and Cochrane Database of Systematic Reviews, Scopus, and CINAHL, were searched to find primary research articles which discussed ultrasound-guided botulinum toxin type A injections for the treatment of spasticity. We independently selected the trials, extracted data, and assessed methodological quality using the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE).

**RESULTS:** Studies meeting inclusion criteria after full-text review were analyzed based on the location of spasticity and outcomes such as the Modified Ashworth Scale and Tardieu angle. Most existing evidence focuses on the treatment of post-stroke spasticity with botulinum toxin type A injection. However, many articles involved low to moderate quality evidence. Furthermore, there was less evidence generated for upper motor neuron conditions beyond post-stroke spasticity.

**CONCLUSIONS:** Efforts should be made to generate higher-quality evidence and guidelines on ultrasound-guided botulinum toxin type A injection for the treatment of spasticity. Further knowledge translation and research efforts may be necessary to ensure that best practices are implemented to improve botulinum toxin type A injections for spasticity.

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**EFFICACY PULSED RADIOFREQUENCY, MOTOR AND SENSORY STIMULATION FOR COMMON PERONEAL NERVE IN STROKE PATIENT WITH A DROP FOOT**

Hussein I. Mousa, Consultant

**OBJECTIVES:** This study aimed to compare the efficacy percutaneous Pulsed radiofrequency (pRF), motor and sensory stimulation (MSS) for common Peroneal nerve (CPN) with a conventional functional electrical stimulation (FES) to improve walking in patients with chronic stroke who suffer from a drop foot.

**DESIGN:** A prospective study for fifty-six patients with a drop foot due to stroke ≥3 months with gait speed 50.8 m/s were randomized to 30 weeks. Either a surface FES (control group) or pRF (treatment group) where add pRF and MSS. Clinical assessments Two-Minute Walk Test (2MWT) were conducted with regard to gait at 2 weeks (11), 8 weeks (t2) and more than 30 (t3) weeks. During the 2MWT, participants walked with or without support at their normal, comfortable pace.

**RESULTS:** Short duration FES were not significantly effective regard to walking speed and activity level. The participants were more satisfied with pRF and MSS than with their FES regarding the effort and stability of walking, quality of the gait pattern, walking distance.

**CONCLUSIONS:** pRF with MSS as a neuroprosthesis to the CPN is a safety intervention for treating a drop foot in stroke patients as a comparable with FES and has been shown to increase gait velocity, decrease the physiological demand of walking, improve gait symmetry, increase balance during gait, and improve social integration.

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**OLDERLY HEART FAILURE PATIENTS WITH SLEEP DISTURBANCE: A PILOT STUDY ON THE SHORT-TERM EFFECT OF 4-WEEK LOW-INTENSITY AEROBIC EXERCISE**

Wald K. Abdelbasset, PhD, and Ahmad M. Osalain, PhD

**OBJECTIVES:** Sleep is considered one of the most critical components for general human wellbeing, particularly in heart failure patients. Studies examining the effect of low-intensity aerobic exercise in the treatment of sleep disturbance in elderly heart failure patients are limited. The purpose of the current pilot study was to check the effect of low-intensity aerobic exercise on the quality of sleep in elderly heart failure patients.

**DESIGN:** Eight elderly heart failure patients (6 men, 2 women) with a mean age of 69.4±4.2 years, were recruited for a low-intensity exercise program (40 to 50% of maximum heart rate for 30–40 minutes), five sessions weekly for four weeks. Exercise intensity was monitored during the sessions using heart rate. Sleep quality was assessed pre- and post-four weeks of exercise program using the Pittsburgh sleep quality index (PSQI).

**RESULTS:** The demographic and baseline characteristics of the patients were initially assessed. The mean of the global PSQI score was 9.7±3.4 indicating that the participants experienced sleep disturbances. Post-exercise program assessment showed that patients have reported a significant improvement of PSQI compared with the baseline assessment (p<0.05).

**CONCLUSIONS:** Short-term of low-intensity aerobic exercise (4 weeks) may improve the quality of sleep in elderly heart failure patients. The study findings encourage elderly heart failure patients with sleep disturbance to adhere to the exercise training program. Also, cardiac rehabilitation programs with low intensity of aerobic exercise should be encouraged to these patients by their health care provider.

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**ELECTIVE AMPUTATION FOR AN EQUINOVARUS DEFORMITY IN A PATIENT WITH MULTIPLE SCLEROSIS**

Hazel Mathes, DO, Allen Zheng, BS, and Kristin Caldera, DO

**CASE DIAGNOSIS:** Elective amputation for an equinovarus deformity in a patient with Multiple Sclerosis.

**CASE DESCRIPTION:** A 58-year-old female with a history of progressive Multiple Sclerosis, dependent on a wheelchair for mobility, presented to clinic with mild hip and knee flexion contractures and an equinovarus foot deformity, limiting her ability to stand and transfer, as well as putting her at increased risk for a pressure ulcer. The equinovarus deformity was initially thought to be due to her spasticity. Further work up revealed a history of a total hip arthroplasty 8 years earlier. An EMG confirmed a chronic severe peroneal nerve injury as a secondary contributing factor. She received botulinum toxin injections, physical therapy, and splinting, with minimal change in the foot’s position. She was not a surgical candidate for correction due to peripheral vascular disease. As a final option, she underwent an elective below the knee amputation. She continues to work with physical therapy toward transfers, standing, and ambulation.

**DISCUSSIONS:** Prior to amputation, the patient’s strength and range of motion were thought to be compatible with standing and walking; however, the equinovarus deformity limited that ability. With continued physical therapy, she is on target to achieve her goals. Amputations carry risks including infection, slow wound healing, phantom limb pain, falls, and rejection of a prosthesis. These risks must be weighed with the potential benefits. In this patient’s case, undergoing an elective amputation helped her improve her ability to stand, transfer, and ambulate in her home.

**CONCLUSIONS:** While uncommon, an elective amputation can be considered to restore function and mobility in patients with a severe equinovarus deformity. While neurological and musculoskeletal co-morbidities may complicate function, with realistic goals, proper adjustment of the prosthesis, and physical therapy, a patient may benefit from an elective amputation.

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**EMOTIONAL LABILITY, HALLUCINATIONS, AND AGITATION AFTER CENTRAL PONTINE MYELINOLYSIS IN A LIVER TRANSPLANT PATIENT ON TACROLIMUS**

Michael Harbus, DO, Miguel Escalon, MD, MPH, and Lorenzo Diaz, BS, MS

**CASE DIAGNOSIS:** Delirium after Central Pontine Myelinolysis.
CASE DESCRIPTION: A 57-year-old woman with a past medical history of non-alcoholic steatohepatitis cirrhosis, ascites, and esophageal varices presented to the emergency room for back pain and diarrhea. The patient was admitted to the hospital for decompensated non-alcoholic steatohepatitis cirrhosis, and she underwent an orthotropic liver transplant after which she received tacrolimus for immunosuppres-
sion. Her hospital course was complicated by acute kidney injury, pneumonia, urinary tract infection and altered mental status. Of note, MRI performed prior to the patient’s admission to the acute rehabilitation unit showed changes consistent with central pontine myelinolysis. On the rehab unit the patient was agitated, had hallucinations and demonstrated emotionally labile behavior. Her behavioral symptoms were treated with Serzone, which helped to reduce her agitation. However, her altered mental status impeded her participation in physical therapy, and she was transferred back to the liver transplant service.

DISCUSSIONS: On the acute inpatient rehabilitation unit, an extensive work up was done to determine the etiology of the patient’s altered mental status. Urine cultures were checked and were negative. The patient’s chest X-ray showed bilateral pleural ef-
fusions, and she had elevated serum carbon dioxide levels. Thus, hypercarbia was considered as a cause of the patient’s altered mental status. However, after the patient was given a continuous positive airway pressure machine and her serum carbon di-
oxide levels decreased, she continued to experience signs of delirium.

CONCLUSIONS: There is documentation of psychosis after central pontine myelinolysis, and tacrolimus is a known risk factor for development of central pontine myelinolysis. As such, central pontine myelinolysis was determined to be the most likely cause of this patient’s altered mental status. However, after the first case, to our knowledge, of delirium being caused by a tacrolimus-induced central pontine myelinolysis.

ENTRENAMIENTO ANAEROBICO ISOCINETICO EN UN PACIENTE CON CARDIOPATIA DILATADA

Lezly E. Alcalá, Residente, Pavel Loeeza Magna, Master In Sport Sciences, Iliana Lucatero, Profesor Titular, Arteaga Jose Rodolfo, MD, Juan Antonio Pineda, Mariely Villeda, Residente, Juan Antonio Suarez, and Mariana Dominguez Lopez

CASE DIAGNOSIS: Fenineno 41 años; miocardiopatía dilatada idiopática con insuficiencia cardíaca congestiva (Agosto 2016). Se sospechó post parto vs miocarditis infecciosa. No se llega a etiologia. Fracción de eyeción de ventrículo izquierdo de 45%. Insuficiencia tircapsupedia y miutte leve.

CASE DESCRIPTION: La prueba de potencia anaerobica isocinética (“20 de noviembre” test) se realizó en un dinamómetro-con/cep LT 0.6 m/s de velocidad, modalidad con/con alternante, máximo esfuerzo durante 30 s, con 90 s de reposo, 2 sets; con medición de lactato capilar (accutrend, Roche) a los 3 min de terminado el segundo set; se midieron frecuencia cardíaca, tensión arterial, doble producto, recuperación de la frecuencia cardíaca al minuto y a los tres minutos, y de la tensión arterial al tercer minuto post esfuerzo. Además se evaluaron el cuestionario WHODAS 2.0 de 12 pregunta autoadministrado, dinamometría isométrica de mano (Canny), prueba de caminata de 6 minutos, y prueba de esfuerzo en cíclogéome protocolo PW1 170. El entrenamiento se realizó con el “20 de noviembre” test, con mismos parámetros de la evaluación, 4 sets, 3 veces por semana durante 4 semanas.

DISCUSSIONS: Incrementó la fuerza prensil, disminuyó la frecuencia cardíaca de reposo y la tensión arterial. Todo esto confiere disminución del riesgo cardiovas-
cular general. La percepción de discapacidad por WHODAS 2.0 disminuyó 3 puntos. Se obtuvo un ergometría maximal con incremento del VO2 y adecuada recuperación. En la potencia anaerobica, la frecuencia cardíaca se mantuvo al 51% de la máxima teórica, todos los parámetros mejoraron. El lactato se mantuvo al 30% de la máxima teórica, todos los parámetros mejoraron. El lactato se mantuvo al 30% de la máxima teórica, todos los parámetros mejoraron.

CONCLUSIONS: Entrenamiento con efectos aceptables y seguros en un paciente con cardiopatía dilatada, así como adaptaciones favorables a nivel de la fuerza muscular periférica. Control de las variables en el equipo isocinético, con corta duración por sesión.

EPIDEMIOLOGY OF NEUROMUSCULAR & VISCERAL COMPLICATIONS FOLLOWING TREATMENT OF HODGKIN’S LYMPHOMA

Nabela Enam, MD, Kathy Chou, DO, and Michael D. Stubblefield, MD

OBJECTIVES: The study objective was to identify neuromuscular and visceral complications after treatment of Hodgkin’s lymphoma (HL) survi-
vors managed in a cancer rehabilitation medicine outpatient clinic. We investigated the prevalence of and risk factors for these late complications, and correlations be-
tween impairments and types of oncologic treatment.

DESIGN: This was a retrospective, cross-sectional, descriptive study. Medical re-
cords of approximately 80 HL survivors at one cancer rehabilitation outpatient site were reviewed. Patient demographics, lymphoma stage at the time of diagnosis, chemotheraphy and/or radiation treatment regimens (type, frequency, dosing, dura-
tion) as well as complications and prescribed therapy were collected. Prevalence for each impairment was calculated, odds ratio was used to identify potential pre-
dictors for each impairment.

RESULTS: The most prevalent impairments seen in our HL survivors following their initial cancer treatment included dropped head syndrome, shoulder girdle dys-
tension, cardiovascular disease, pulmonary dysfunction, endocrine abnormalities, radiculopathies and plexopathies, cancer recurrence, and secondary ma-
lignancies. The majority of patients were referred to physical therapy, but also occu-
pational and speech therapy for deficits.

CONCLUSIONS: Hodgkin’s lymphoma is a lymphoid malignancy responsive to chemotherapy and radiation, with most patients cured of their disease after treat-
ment. Unfortunately, many of these survivors, particularly those treated more than a decade ago, are vulnerable to late toxicity adverse effects. The potent treatments often cause dysfunction in any organ system or tissue encompassed by the radiation field, and complications may progress indefinitely with significant consequences on the survivors’ function and quality of life. Increasing awareness of the complications that develop after initial cancer treatment, and understanding the correlation between causes of disability and oncologic treatment will improve the longitudinal care of Hodgkin’s lymphoma survivors. In the future, we hope to investigate the clinical out-
comes following rehabilitation interventions.

EVALUATING PATIENT OUT-OF-POCKET EXPENSES USING REAL WORLD UTILIZATION DATA OF BOTULINUM TOXINS

Lynne Turner-Stokes, DM, FRCP, MBE, Christine Divers, PhD, Andreas Lyssandropoulos, MD, Stefan Wietek, PhD, CMP, and Bruce Rubin, MD

OBJECTIVES: Botulinum neurotoxin type A (BoN-A) is efficacious and well
tolerated for the treatment of adult upper limb spasticity in patients. Patients suffering from limb spasticity require long term treatment which, due to out-of-pocket (OOP) payments, can be burdensome on their budget. The objective of this study is to eval-
uate the impact of different brands of BoNT-A on OOP patient spending based on price and time between injections.

DISCUSSION: The cost to patients was evaluated based on the assumption of 20% OOP cost sharing of patients, without a deductible, and a 3-year time horizon. The time to re-injection and the mean dose for three different brands of BoNT-A (abobotu-
linumtoxina (Dysport®), onabotulinumtoxina (Botox®) and incobotulinum-
toxina (Xeomin®) were obtained from ULIS III trial interim data [NCIT0924548003], with the time to re-injection being 186.1 days, 148.0 days and 148.7 days for the three brands, respectively, and the mean doses being 828.3U, 235.3U and 275.1U, respec-
tively. The drug costs were obtained from IBM Micromedex Red Book. Other costs in-
cluded administration costs, derived from the Physician Fee Schedule Search (2016).

RESULTS: The results showed substantial differences in OOP cost burden to pa-
tients. The OOP cost per injection was $340 for abobotulinumtoxina (Dysport®), $339 for onabotulinumtoxina (Botox®) and $318 for incobotulinumtoxina (Xeomin®). By considering the time intervals between injections, the annual OOP costs were $666, $833 and $777 respectively, which over three years of the analysis amounts to a total OOP cost of $1,997, $2,498 and $2,332, for the three comparators.

CONCLUSIONS: The results indicate that there is an economic benefit for pa-
tients as a result of selecting abobotulinumtoxina (Dysport®) as treatment for upper limb spasticity.

EVALUATION OF PAIN RELIEF IN KNEE OSTEOARTHRITIS USING EXTRACORPOREAL SHOCKWAVE THERAPY IN COMBINATION WITH INTRA-ARTICULAR PLATELET RICH PLASMA INJECTION – A CASE REPORT

Brenda S. Vuliwiratmana, MBBS, MREHABMED, Arif Soemarjono, SPKFR, FACSM, Ohnmar Htwe, MBBS, MMEDSC, and Amaramalar S. Naicker, MBBS, MREHABMED

CASE DIAGNOSIS: Intra-articular platelet rich plasma (PRP) injection is an ef-
fective treatment modality for knee osteoarthritis(OA). However, one of the most fre-
cquent complaint of PRP injection is pain. Extracorporeal shockwave therapy(ESWT) not only provides instant pain relief but also promotes healing processes. Both treat-
mants have regenerative properties and if used in combination may further reduce pain in knee OA.

CASE DESCRIPTION: We treated two patients with tibiofemoral knee OA and radiologic evidence of grades 2-3 Kellgren-Lawrence scale. Wholeblood(60cc) was...
drawn and processed using centrifuge machine producing 4cc of PRP. Both patients underwent ESWT with 2500 shocks, 10Hz frequency and 4 bar pressure. Target treatment areas were medial to superficial knee region. Ultrasound-guided intra-articular knee injection was administered immediately post ESWT. ESWT was repeated weekly for 4 weeks post injection. The Numerical Rating Scale (NRS) for pain was measured at baseline, immediately after injection and weekly post treatment. The Western Ontario McMaster Osteo-Arthritis Index (WOMAC) score for knee OA was taken before treatment and at 4 weeks post treatment.

**DISCUSSIONS:** Patient A is 65-years-old with right knee pain and NRS of 10/10 at baseline. Her radiological finding showed grade 3 OA. Her NRS dropped to 7/10 post-procedure and further reduced to 5/10 at 4 weeks post-intervention. WOMAC was 36% at baseline and 22% at week 4.

**CONCLUSIONS:** ESWT immediately before intra-articular PRP injection may minimize post PRP injection pain. Serial ESWT post PRP injection may augment the effectiveness of PRP and improve function. Further large scale studies are required to compare the effectiveness of ESWT and PRP versus PRP alone.

**EVALUATION OF THE DOSE-RESPONSE CURVE IN INCOTUBULINUM TOXINA INJECTIONS FOR PIRIFORMIS SYNDROME**

Christopher Amen, DO, Olga Komangodski, MD, and Sergio Lombardo, MD

**CASE DIAGNOSIS:** Piriformis Syndrome.

**CASE DESCRIPTION:** We present two cases of piriformis syndrome successfully treated with a single 50 unit incobotulinum toxin A injection after 2-week and 4-week follow-up with no reported side effects. Both patients were diagnosed clinically with FAIR test and confirmed with a diagnostic ultrasound-guided injection of 2% lidocaine. Patients were then scheduled for a single 50 unit ultrasound-guided-guided injection of incobotulinum toxin A. Patient A and Patient B reported a 100% and 80% improvement, respectively, in pain scores and functionality with no reported side effects after two-week and four-week follow-up.

**RESULTS:** Current research demonstrates repeated efficacy of incobotulinum toxin A in the treatment of piriformis syndrome. Dosages between 300 and 500 units (the most accepted treatment dose, and 1/3 the dose of the previously lowest published treatment dose) are also dose-dependent in their rates. The lowest studied dose in current literature is 150 units, which may show treatment benefit equivalent to higher doses with fewer side effects. We present two successfully treated patients with 50 units of incobotulinum toxin A. A dose that is 1/6 of the most accepted treatment dose, and 1/3 the dose of the previously lowest published treatment dose.

**CONCLUSIONS:** These findings call for a re-evaluation of the dose-response curve of incobotulinum toxin A in the treatment of piriformis syndrome. The high rates of side effects often deter patients from treatment. The successful treatment of piriformis syndrome with a significantly reduced treatment dose may further expand its use and decrease the incidence of adverse events and morbidity with its use.

**EVALUATION OF THE PONESI METHOD IN THE MANAGEMENT OF CLUBFOOT IN MADAGASCAR**

Tidahy Ando Servino, Resident In PMR, and Ranaivondrambola Ando Tatiana, Physiatrist

**OBJECTIVES:** Clubfoot is a debilitating pathology and a source of abnormal gait in children. Treatment with the Ponseti method is the treatment used in the management of congenital equinovarus clubfoot in children under 9 years of age. The aim of our study is to identify the proportion of children with equinovarus clubfoot supported by the Ponseti method and to evaluate their effectiveness.

**DESIGN:** This is a multicenter retrospective descriptive study for six (06) months from June 1st to November 30th, 2019 concerning the evaluation of the Ponseti method in the management of clubfoot in Madagascar.

**RESULTS:** One hundred and fifty, and 226 congenital equinovarus clubfoot were treated with the Ponseti method during the study period. The most affected was the equinovarus clubfoot was bilateral in 50.66% of cases and idiopathic in 92.66% of cases. The thickness Pirani score was on average (± SD) 5.04 / 4.98 (± 1.22 / 1.20). The most important of manipulation and plastering sessions averaged (± SD) are 5.95 (± 3.06) sessions. Tornotomy was not necessary in 33.33% of cases. A proportion of 23.33% of cases recurrent were recorded at 3 months of use of Brace abduction splint.

**CONCLUSIONS:** The equinovarus clubfoot is the main pathology of the musculoskeletal system causing a limitation of walking and a lack of footwear in children. Ponseti treatment is the gold standard for proper management.

**EVALUATION OF THE SCIENTIFIC VALIDITY OF FORENSIC MEDICAL EVALUATIONS**

Oregon K. Hunter, MD

**OBJECTIVES:** Forensic medical evaluations can be misleading and used to deny future medical care. Physicians who perform these exams have a responsibility to do so with integrity and adherence to medical ethics and generally accepted standards of care. This study will evaluate the validity of forensic medical evaluations by comparing reported exam findings to videos of these exams.

**DESIGN:** In my work as a medical consultant, I analyzed 20 neuromusculoskeletal medical examinations over a six-month period (May-Oct 2019) Physical exam reports were compared to videos of the actual examinations. (All parties consented to video recordings.) Examination components reviewed included assessment of: a. Spine and limb range of motion. b. Strength. c. Muscle bulk for atrophy. d. Sensation. e. Reflexes. f. Gait. g. Cranial nerves. h. Use of medical gown.

**RESULTS:** Analysis of the data found that 100% of doctors' reports misrepresented what took place during physical exams, including: a. Claiming to perform tests not actually performed. b. Claiming results were normal when they were not. c. Omission of abnormal exam findings. d. Performance of examination in non-standard and unscientific manner. The average hands-on physical exam took approximately 10 minutes, with some exams as brief as 2.5 minutes. Exams were performed by orthopedists, neurologists, physiatrists, a psychiatrist, and a neurosurgeon.

**CONCLUSIONS:** Medical examiners consistently failed to follow standard scientific techniques and their reports misrepresented results. For example, one doctor reported normal vascular findings, but as viewed in the video, did not remove the patient's shoes and socks for the exam, nor did he check the pulses of the limbs. This analysis supports the necessity of video recordings of forensic evaluations to foster the objectivity and validity of the reports provided by expert medical examiners to the court system.

**EVOLVING REHABILITATION SERVICES IN HEALTHCARE AND LONG-TERM CARE SYSTEMS, WITH HUGE SHIFTS OF PATIENTS AND HEALTHCARE WORKERS**

Victoria Shiuaufu Hsieh, MS MD, Chi-yeen Chen, BS, Chiao Hsin Lao, BS, and Tsu-Han Wang, BS
EXERCISE INDUCED ACCELERATION OF LYMPH FLOW – A PILOT STUDY
Evelyn Qin, MD, MPH, Amy Little, DPT, Mindy Bowen, RN, BSN, and Wei Chen, MD, FACs

OBJECTIVES: Lymphedema is a debilitating condition that can severely reduce the quality of life of those it impacts. Indocyanine green lymphography is a highly sensitive and specific tool used to help with diagnosing and tracking lymphedema progression. However, the time it takes for the ICG dye to reach its plateau takes several hours, and has not been well studied among patients with arm and leg lymphedema. The goal of this pilot study was to (1) determine if exercise impact the time it takes for ICG dye to plateau, and (2) create a standardized ICG lymphography protocol that other providers can utilize in the future for lymphedema management.

DESIGN: Nine patients with lymphedema were scanned and underwent a total of 20 minutes of exercise on a Nu-Step exercise machine. After every 5 minutes of exercise, interval ICG scans were performed until disease patterns emerged and were stable for 3 consecutive scans. Patients were then scanned every hour for 6 hours following the plateaus.

RESULTS: Results showed that ICG dye plateau occurred after 15 minutes of exercise and began to regress at 5 hours in all nine patients.

CONCLUSIONS: Exercise accelerates lymph flow in patients with lymphedema. Thus, fifteen minutes of exercise may be a useful strategy for providers to efficiently utilize ICG lymphography in the management of patients with lymphedema.

EXPERIMENTAL PROTOCOL FOR NEUROFUNCTIONAL REHABILITATION AFTER MOTOR IMPAIRMENT BY GUILLAIN-BARRE SYNDROME: A CASE REPORT
Cristhina B. Siegle, Carla Cardillo, Denise Matheus, Denise V. Ayres, and Daniela S. Barboza

CASE DIAGNOSIS: Guillain-Barré Syndrome, an inflammatory, autoimmune, post-infectious polyradiculoneuropathy that affects sensory and motor pathways.

CASE DESCRIPTION: A 43-year-old man diagnosed with the pathology in February 2018. He was admitted to outpatient care in May 2019. He was wheelchair-bound and his main complaint was intense fatigue during daily life activities and weakness of the upper limbs, in addition to the difficulty of riding wheelchair independently and making postural transfers. The Objectives were to achieve greater muscular endurance, especially in the upper limbs and trunk to improve performance and independence in activities of daily living; to achieve greater wheelchair mobility and transfer safety.

DISCUSSIONS: Fatigue Severity Scale, 10-meter walk and 2-minute walk tests, adapted for wheelchair performance, anterior functional reach test and Modified Barthel Index were used. The intervention protocol lasted 8 weeks, twice a week, being 50 minutes per session. In each session, the patient performed 25 minutes of upper limb cycle ergometer associated with the use of neuromuscular electrical stimulation in trunk muscles, followed by 20 minutes of balance training in sitting position on unstable surfaces and strengthening exercises. There was an improvement of 9.31% in perception of fatigue, 18.43% in locomotion speed, 65% in locomotion resistance, 43.75% in anterior stability limit and 20.68% in independence for activities of daily living.

CONCLUSIONS: The protocol used was effective to improve symptoms of fatigue, mobility and performance in activities of daily living in an individual in the chronic phase of Guillain-Barré Syndrome. Aerobic exercise associated with the use of neuromuscular electrical stimulation can contribute to improve muscle endurance, recruitment of motor units and reverse muscle denervation. Trunk control training and strengthening should be implemented to improve performance of functional activities.
Effective therapy for the prophylaxis of chronic migraine. However, with additional myofascial trigger points, potentially more effective procedures exists. Injections of the classic scheme are subcutaneous, and in our modification also intramuscularly in the appropriate muscles.

**CONCLUSIONS:** The technique presented here could be a useful supplement in the interdisciplinary pain therapy of chronic migraine and associated myofascial cervicocephaly, which can be used well by neurologists, neurosurgeons, orthopedists and PRM.

**EXTRACORPOREAL SHOCKWAVE THERAPY (ESWT) AND PERIPHERAL HIGH INTENSITY MAGNETIC STIMULATION PROMOTES HEALING OF TIBIAL FRACTURE NON-UNION UNRESPONSIVE TO CONVENTIONAL THERAPY: A CASE REPORT**

Efthimios Kouloulas, MD, PhD, EDPM-SFE/PRM

**CASE DIAGNOSIS:** Delayed and nonunion of the tibia are not uncommon in medical practice and are associated with a significant impact on patients' quality of life and health care cost. Extracorporeal shockwave therapy (ESWT) has been shown to improve osseous healing in vitro and in vivo. In this case we are presenting the impact of ESWT in combination with peripheral pulsed high intensity magnetic stimulation (Super Inductive System) in a 60 years old male patient who suffered for 7 months with a non-union spiral right tibial fracture during skiing. In the initial evaluation patient was walking using a tall ankle foot support (walking boot) and two maxillary crutches.

**CASE DESCRIPTION:** ESWT coupled with high intensity pulsed peripheral pulsed magnetic stimulation and post treatment mobilization. ESWT parameters consisted of frequency 20Hz, 4000 shocks per session and pressure of 4 bars, energy flux density of 0.5 J/mm². Super Inductive System parameters consisted of frequency 5Hz, 10 minutes duration per session and intensity 40% of 3 Tesla. Patient received one session per week and 8 session in total. Outcome measures included verbal pain rating scale (VAS: 1/10 versus Vas:6/10), radiographing imaging improving, obvious after first 4 sessions already and a return to activities of daily living (ADLs) with normal gait pattern without using the ankle foot support (walking boot) and the maxillary crutches 1 month post treatment.

**DISCUSSIONS:** This case demonstrates the successful boosting of bone regenerative healing process in management of tibia non-union. The procedure is well tolerated, time-saving, lacking side effects, with potential to significantly decrease of health care costs and improvement of patient’s Quality of life.

**CONCLUSIONS:** A combination of ESWT and peripheral pulsed high intensity magnetic stimulation is a feasible treatment combination which seems to accelerates tibia nonunion fracture.

**FACIAL PARALYSIS AS AN ATYPICAL PRESENTATION OF GUILLAIN-BARRE SYNDROME: A CASE REPORT**

Ratnakar P Veeramachaneni, MD, MS, and Yuxi Chen, MD

**CASE DIAGNOSIS:** 13 y/o male with HbSS, G6PD deficiency, presented with L facial droop and slurring of speech of 1-day duration.

**CASE DESCRIPTION:** Patient presented with bifacial diparesis, slurred speech that progressed to different degrees of extremity weakness and eventual respiratory failure that required 3 consecutive hospitalizations. All lab work, CT and MRI were inconclusive. CSF analysis showed only elevated protein and no infectious process. GBS was diagnosed after 3 EMG studies showed worsening demyelinating disease. He was treated with IV prednisolone, IVIG and plasmapheresis and discharged in the recovery phase therapy focuses on active ROM exercises guided by amount of recovery.

**DISCUSSIONS:** This is an unusual presentation with symptoms starting as facial paralysis progressing to limb and respiratory muscle weakness. Cases like this require multi-team approach for quick diagnosis, treatment and good prognosis. PT/OT require multi-team approach for quick diagnosis, treatment and good prognosis. PT/OT play an integral part in recovery of GBS and variants. In the acute phase medical management takes the front seat while rehab works in a consultative role to prevent effects like DVT and bed sores with gentle passive ROM exercises and positioning. In the recovery phase therapy focuses on active ROM exercises guided by amount of recovery. These should progress to ADL, mobility and ambulation training as the patient recovers. Pain component is managed with modalities like TENS, moist heat or sensory desensitization techniques.

**CONCLUSIONS:** Bilateral facial nerve palsy has an incidence of only 1 per 5 million per year. Guillain-Barré syndrome, or Acute Inflammatory Demyelinating Polyneuropathy (AIDP) may present with facial nerve involvement in 27–50% of cases, often bilaterally. Other cranial nerves may also be involved, with coexistent dysphagia and dysarthria. Subsequent limb weakness and respiratory failure may follow. Rehab is an integral part of diagnosis and management of such conditions, providing benefit in acute and recovery phases and in preventing secondary issues.

**FACTORS OF RIESGO Y SIGNOS DE ALARMA PARA DAÑO NEUROLÓGICO EN MENORES DE 1 AÑO**

Christian Roberto Q. Nina, Q - 0313, and Maria A. Mariscal Ramos, Alta Especialidad Rehabilitacion Infantil

**OBJECTIVES:** Mostrar factores de riesgo y signos de alarma para daño neurológico en menores de 1 año valorados en el Centro Integral de Rehabilitación Infantil CIIR ‘Juana Azurduy de Padilla’ de julio a enero de la gestión 2018 - 2019 .

**DESIGN:** Estudio descriptivo de corte transversal. Se aplicó un instrumento de 26 reactivos que clasifico en tres grupos: sin riesgo (verde), riesgo moderado (amarillo) y alto riesgo (rojo), además de 8 signos de alarma.

**RESULTS:** Se incluyó a 32 pacientes con menos un factor de riesgo neurológico. Los factores de riesgo son IMC < 18.5 o sobrepeso IMC > 25-29.9 de la madre 53.1% (17), > 35 años 46,9% (15), cesárea de emergencia 43,8% (14), mujeres que padecen preclampsia o eclampsia 31,3% (10), menores que se hospitalizaron por vigilancia 46,1% (15), ictericia que requirió fototerapia 34,4% (11), prematuros < 34 semanas 31,3% (10). Con respecto a los signos de alarma fueron los reflejos aumentados 50.0% (16) y desarrollo psicomotor anormal 34.4% (11).

**CONCLUSIONS:** Los factores de riesgo más frecuentes son sobrepeso, edad > 35 años, y los reflejos aumentados en menores de un año como signo de alarma.

**FACTORS CONTRIBUTED TO DELAYED DISCHARGE FROM REHABILITATION HOSPITAL AT KING FAHAD MEDICAL CITY, RIYADH**

Bayan Gudal, MBBS, SBPM&R, Salwa Ahmed, MBBS, MRCP, FRCR, CCST, Mustafa Qarras, MBBS, Gassan Azhari, MBBS, and Grace Almacen

**OBJECTIVES:** The Rehabilitation Hospital is the only ministry of health tertiary rehabilitation hospital in Saudi Arabia and it has a long waiting list. There are limited inpatient, community rehabilitation and long-term facilities. Delayed discharges have negative impact on the quality and cost effectiveness of the inpatient services. The aims of this study are to identify the clinical conditions, factors that increased length...
FEASIBILITY OF ECOCLOGICAL MOMENTARY ASSESSMENT OF FATIGUE IN INDIVIDUALS WITH MULTIPLE SCLEROSIS

Ketki Raina, PhD, OTR/L, FAOTA, Andrew Harding, OTD, OTR/L, and Hayley Poland, OTD, OTR/L

OBJECTIVES: Fatigue is a pervasive, chronic, and debilitating symptom experienced by individuals with multiple sclerosis (MS). Traditional paper and pencil measures are subject to recall bias. Additionally, retrospective recall assessments tend to report higher levels of the specific symptom being measured. Ecological Momentary Assessment (EMA) application to measure levels of fatigue in individuals with multiple sclerosis.

DESIGN: This study used a cross-sectional. Design. Participants used an EMA application and received four notifications per day for a total of seven days. Participants were asked to report their level of fatigue at each notification. Outcomes included compliance rates for completion of EMA notifications to measure feasibility and a satisfaction survey to measure usability of the EMA application.

RESULTS: Three hundred and ninety five of 504 possible EMA notifications were completed during the EMA data collection period indicating a compliance rate for all EMA notifications equal to 78.4%. The mean satisfaction level for using the EMA application was .583±.1.95 based on a scale from 1 (disagree) to 7 (agree) indicating a high level of overall satisfaction and usability. Qualitative analysis indicated that technical errors may have contributed to the overall compliance rate and usability and that the EMA application may have contributed to increased understanding of levels of fatigue and pain for 22% of the study participants.

CONCLUSIONS: EMA applications are feasible for use for measuring levels of fatigue and pain in individuals with MS. Future research will further explore the feasibility of EMA and implications for development of interventions to assist individuals with MS better understand and manage their fatigue.
FLAVOR OF THE MONTH OR NEW GOLD STANDARD: CANNABIS FOR CHRONIC LOW BACK PAIN. A CASE REPORT

Fabienne Saint-Peux, MD, Jaimie John, MD, Parul Jajoo, DO, and Craig Antell, DO

CASE DIAGNOSIS: 53M with chronic low back pain and left sided radicular pain successfully treated with medical cannabis.

CASE DESCRIPTION: 53-year-old man with chronic intractable low back pain with radiuclopathy for 30 years presents for continued pain management. He failed physical therapy (PT) and lumbar epidural spinal injections (LESI’S). Medication management with gabapentin, oxycodone and tramadol provided minimal relief. Physical exam revealed tenderness over lumbar paraspinous at L4-5 facets; positive left straight leg raise (SLR); and pain with full flexion. Lumbar MRI showed disc bulges at L4-5, L5-S1 with 1.5 root improvement. EMG confirmed moderate left L5 radiculopathy. Patient retailed PT and LESI’s with significant relief; lumbar sympathetic block also failed. Patient introduced CBD oil twice daily to pain regimen with some relief, eventually transitioning to oral cannabis with 20:1 THC:CBD ratio. Patient now reports tremendous relief with VAS score of 4, down from 8. Physical exam showed negative SLR and no pain with flexion. Patient now requires less tramadol with concomitant marijuana use and reports improved quality of life.

DISCUSSIONS: Medicinal cannabis remains a topic of heavy debate due to the lack of clinical trials and thus uncertainty surrounding its safety, efficacy, dosing paradigms and addictive potential despite the growing positive anecdotal evidence from both patients and practitioners. Several studies showing the successful weaning of opioids with marijuana are changing the tide in favor of marijuana treatment. While federal law does not recognize or protect medicinal marijuana possession or use, currently 33 states have legalized marijuana for medicinal use including chronic pain.

CONCLUSIONS: Medicinal cannabis may be used as a successful treatment for chronic intractable low back and radicular pain. While the marijuana debate continues with increasing need for clinical trials, marijuana may soon emerge as the new standard of care for pain and may finally usher America out of its opioid epidemic.

FOCAL PERIPHERAL EDEMA ON ADOLESCENT KNEE: A CASE REPORT

Daniel S. Lee, BS, BBA, and James Crownerow, MD

CASE DIAGNOSIS: Bilateral X-ray views of knees demonstrated partially open symmetric physes, without abnormalities. An MRI was obtained demonstrating left symmetric physes, without abnormalities. An MRI was obtained demonstrating left symmetric physes, without abnormalities. A Retouched PT and LESI’s with significant relief; lumbar sympathetic block also failed. Patient introduced CBD oil twice daily to pain regimen with some relief, eventually transitioning to oral cannabis with 20:1 THC:CBD ratio. Patient now reports tremendous relief with VAS score of 4, down from 8. Physical exam showed negative SLR and no pain with flexion. Patient now requires less tramadol with concomitant marijuana use and reports improved quality of life.

FOOT SELF-CARE PRACTICES OF DIABETIC PATIENTS IN TUNISIA

Mouna Sghir, Doctor, Soumaya Elarem, Doctor, Nedra Elfani, Doctor, Manel Ben Fraj, Doctor, Aymen Haj Salah, Doctor, and Wassia Kessomtini, Professor

OBJECTIVES: Diabetic foot is a major health problem for people with diabetes mellitus. It can cause serious complications leading to lower extremity amputations. Furthermore, foot self-care practice is one of the most important self-management behaviors to prevent the occurrence of diabetic foot ulcers. The aim of this study was to identify foot self-care practices among diabetic patients in a Tunisian population.

DESIGN: A cross-sectional study was conducted over a period of 3 months. A self-prepared questionnaire was used to collect data from a sample size of 150 diabetic patients at Tahar Sfar hospital and Ezzahra primary care center in Mahdia.

RESULTS: The mean age of patients was 56.91 ± 12.6 years with a range of 20 to 86 years. A low level of education was found in 76% of cases. In addition to diabetes, 41.4% of patients had a history of hypertension and 46% of them had hypercholesterolemia. Smoking was found in 13.3% of cases. Half of patients were using oral medications, 28% were using insulin therapy and 21.3% were using both oral and insulin therapies. Regarding patients’ knowledge of the diabetic foot, 74.7% had no idea about the impact of diabetes on the foot. Many errors in daily care practices were revealed.

CONCLUSIONS: Our patients have a low level of knowledge and a lack of education diabetic foot. Awareness programs should be mandatory in all hospitals and diabetes clinics to help compensate for the lack of awareness and lack of podiatric educational services. Such programs may decrease the risk of diabetes foot disease.

FRAILTY, IMPAIRMENTS AND OBESITY IN PERSONS WITH GYNECOLOGICAL CANCER

Adrian Cristian, MD, MHCM

OBJECTIVES: To determine the prevalence of frailty and obesity and types of physical impairments commonly seen in persons with gynecological cancer.

DESIGN: Retrospective chart review of persons with cervical, fallopian, ovarian, uterine, endometrial and vaginal cancer referred for physiatric evaluation over a 12 month period.

RESULTS: Outpatient, large cancer institute in urban area. Main Outcome Measure: Patient Reported Outcome Measure Information System (PROMIS)-Cancer Physical Function Short Form and Cancer Fatigue Short Form. Timed up and Go test, Sit to Stand in 30 seconds, grip strength using dynamometer in Kg, 4 stage balance test and weight loss > 4.5kg, body mass index (BMI)

RESULTS: The charts of 66 women (mean age 63±12.5) with gynecological cancer stage 1-4, either in active treatment or in survivorship were reviewed. BMI was known in 64 women. Mean BMI was 29.3±9.2. 27/64(42.2%) were obese (BMI ≥30) and 16/64 (25%) were overweight (BMI 25-29.9). 20/64 (31.3%) had a normal BMI (18.5-24.9). 1/64 (1.6%) was underweight (BMI< 18.5). A retrospective frailty assessment based on chart review was completed for 56 of the patients. 22/56 (39.3%) of persons with gynecological cancer met frail criteria and 28/56 (50%) met “pre-frail” criteria.6/56 (10.7%) were neither frail or pre-frail. Most common types of impairments identified included: a) chemotherapy induced peripheral neuropathy (CIPN)-30/66 (45.5%) b) general weakness and decreased endurance 28/66 (42.2%), c) lymphedema of the lower extremity 12/66 (18%). Balance test results were known for 60 women and 16/60 (26.7%) had an impaired balance based on those results.

CONCLUSIONS: Frail/Pre-frail status and being obese or overweight are very prevalent in women with gynecological cancer. Most common types of impairments seen such as CIPN, impaired balance, generalized weakness and lymphedema can be addressed through rehabilitation interventions.

FUNCTIONAL IMPROVEMENT IN CONGENITAL LIMB DEFICIENCY OF BILATERAL UPPER LIMB WITH ELBOW FLEXION DEMENTRY MANAGEMENT BY JOSHI'S EXTERNAL STABILIZATION SYSTEM (JESS): A CASE REPORT

Ameya D. Joshi, MD, Anil K. Gaur, DPMR, DNB-PMR, MBA, and Ankit S. Mhambre, DNB-PMR

CASE DIAGNOSIS: Congenital upper limb deficiency results from failure of formation or abnormal shaping of the upper limb during gestation. Children with congenital upper limb deficiency adapt to achieve functional milestones, with or without surgical or non-surgical intervention. All interventions at different stages of life are guided towards the optimum functional gain. There is no study available showing rehabilitation approach in ulnar deficiency involving both upper limbs presented at

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adulthood. This case report documents functional improvement in a 15-year-old male presented with a bilateral unlar longitudinal deficiency with bilateral elbow flexion deformity managed with Joshi’s External Stabilization System (JESS) with a patient-centered rehabilitative approach.

CASE DESCRIPTION: Patient-centered goals were established, targeting activities of daily living (ADL), by using the Goal Attainment Scale (GAS) with the involvement of the patient and family. JESS application was performed for the correction of elbow flexion deformity in a stage-wise manner. Elbow range was improved by sequential and gradual distraction to improve reach out of upper extremity. The reconditioning and therapeutic exercises were implemented with subsequent ADL training. The outcome measurement was done using the GAS calculation sheet.

DISCUSSIONS: Active elbow range was improved by 200 on left side 250 on the right side. Satisfactory improvement was achieved in activities of daily living. The targeted activities were activities of self-care (bathing, toileting, lower body dressing, eating) and instrumented activities of daily living (writing, routine clean tasks, use of the mobile phone). The baseline and outcome GAS scores were 36.4 and 53.4 respectively. The change in GAS of 17.0 confirms better than expected result.

CONCLUSIONS: Patients presenting at different stages of life with congenital limb deficiency should be treated with patient-centred goal approach. JESS can be used effectively to achieve these goals and rehabilitation.

FUNCTIONAL NEUROLOGICAL DISORDER IN A PEDIATRIC PATIENT FOLLOWING BULLYING-RELATED TRAUMA AT SCHOOL
Abigail Ho, MD, Laura Prince, MD, Sara Liegel, MD, and Melissa Villegas, MD

CASE DIAGNOSIS: Functional Neurological Disorder.

CASE DESCRIPTION: A previously healthy, normally developing 9 yo female presented to pediatric rehabilitation clinic with 10-month history of multiple worsening functional impairments. Symptoms initially began as headache and blurry vision after patient experienced several episodes of unrecognized bullying at school, including one incident in which her chair was pulled out from under her causing her to hit her head. Headaches resolved but patient continued to experience periodic vision complaints and developed new symptoms corresponding with additional bullying events and verbal confrontations by a teacher and school principal who questioned her vision deficits. Symptoms included staggering gait, fatigue, speech difficulty, periodic mutism, pseudoseizures, and emotional and behavioral regression. She eventually required a wheelchair for ambulation and transitioned to homeschooling due to anxiety, safety concerns, and declining academic performance. Symptoms spontaneously resolved during family vacation but returned after developing a mild sore throat.

DISCUSSIONS: Patient underwent thorough workup including laboratory studies, imaging, and unsuccessful IVIG treatment for possible PANDAS. Workup was negative for organic etiology of symptoms. She was ultimately diagnosed with functional neurological disorder and referred to pediatric rehabilitation after failing outpatient interventions. Pediatric rehabilitation recommended acute inpatient rehabilitation, and she completed a 19 day stay with excellent functional improvement. Function improvements were maintained after discharge, and she continued to make continued progress with outpatient therapies at time of two-month follow-up. Functional neurological disorder is a somatiform disorder rarely seen in children under ten years old. FND may develop following traumatic or stressful events and should be considered in the differential in children demonstrating unusual patterns of dysfunction and neurological symptoms. School-aged children presenting with symptoms concerning for FND should be screened for social stressors including bullying.

CONCLUSIONS: Pediatric patients presenting with functional neurological disorder may benefit from intensive, multidisciplinary intervention and should be considered as candidates for inpatient rehabilitation admission.

GAIT DISTURBANCE IN AN ADOPTED CHILD REVEALS AN UNDIAGNOSED 16P12.2 MICRODELETION
Brian J. Novello, DO, Sony M. Issac, MD, Hanza Khalid, DO, Richard Huynh, DO, Tova Plaut, DO, Adam Isaacson, MD, and Paul Pippa, MD

CASE DIAGNOSIS: 16p12.2 microdeletion is an autosomal dominant inherited condition occurring when genetic material on chromosome 16 is deleted. Developmental delay, cognitive and growth impairment, cardiac malformation, epilepsy and behavior problems are common features. Approximately 1 in 2000 newborns show symptoms; however, because many children have mild or even undetectable symptoms and are, therefore, never diagnosed, the incidence may actually be higher.

CASE DESCRIPTION: A 13-year-old adopted male with newly diagnosed autism, mild intellectual disability and an unknown birth, family, or medical history, presents for evaluation for frequent stumbling. Physical exam was notable for mild dysmorphic features including a narrow, flat face, as well as, pes cavus and hammer toes. The neurological and muscle strength testing was grossly normal. His dynamic balance was impaired and his gait was significant for intoeing and decreased heel strike. Imaging was unremarkable. Chromosomal microarray testing revealed a 16p12.2 microdeletion.

DISCUSSIONS: Children with a 16p12.2 microdeletion may show a delay in reaching motor milestones likely secondary to hypotonia in infancy, however, available literature indicates early physiotherapy may improve and even resolve these problems. The child described was started on physical therapy focusing on trunk control and progressive gait training. Podiatry was consulted for management of his foot abnormalities. The decision for lower extremity bracing was deferred until initiation of physical therapy. The patient is currently receiving physical therapy with good improvement in his gait and coordination.

CONCLUSIONS: A 16p12.2 microdeletion is an undiagnosed non-progressive genetic abnormality which leads to a broad range of symptoms of variable severity. A delay in reaching motor milestones is one possible feature of the abnormality and these children may be referred to physiatry for evaluation and treatment for impaired gait. This case hopes to bring awareness of the abnormality and the role of the physiatrist in the management of this condition.

GENERALIZABILITY OF FINDINGS FROM SYSTEMATIC REVIEWS AND META-ANALYSES IN THE LEADING GENERAL MEDICAL JOURNALS
Antti Malmivaara, MD, PhD

CASE DIAGNOSIS: To assess in what degree systematic reviews (SRs) and meta-analyses in the leading general medical journals record adequateness of reporting of randomized controlled trials; and to appraise whether SRs allow interpretations on clinical homogeneity, justification for meta-analysis and generalizability of the findings; and to judge what are the implications for rehabilitation medicine.

CASE DESCRIPTION: All systematic reviews and meta-analyses in BMJ, JAMA, Lancet and Annals of Internal Medicine from 1.1.2016 to 28.2.2019 were searched by PubMed and reporting of RCTs characteristics was documented. Literature search and data extraction was done twice.

DISCUSSIONS: 115 SRs were identified; 71% were pharmacological interventions, none were on rehabilitation. Meta-analysis was done in 90% of the SRs. None of the SRs assessed patients’ selection; 30% of SRs reported on disorder specific clinical features; 25% comorbid conditions; 30% on patients’ behavioral factors in RCTs. Functioning, environmental factors and inequality factors were recorded in 3%, 0% and 9% of the SRs; adherence to interventions, cross-overs, and co-interventions in 7%, 0%, in 2%; follow-up percentages in 8% and adequacy of statistical analyses in 3%.

CONCLUSIONS: The leading journals did not publish any systematic reviews on rehabilitation. Recording of patients’ selection, baseline characteristics, adherence to interventions, follow-up and statistical analyses in RCTs was lacking or rare in all the SRs. Meta-analysis was undertaken despite deficient reporting and lack of assessment of adequacy of statistical analyses in the RCTs. Rehabilitation perspective is not feasible due to lack of recording on functioning. The data does not allow assessment of clinical homogeneity of RCTs, justification for meta-analysis, or generalizability of findings for general medicine or rehabilitation. Comprehensive reporting of characteristics of RCTs is needed in systematic reviews, and this can be accomplished using the benchmarking method. There should be room for SRs on rehabilitation in the most influential medical journals.

GENICULAR NERVE BLOCKS AS A TREATMENT FOR CONSISTENT CHRONIC KNEE PAIN AFTER RECEIVING A TOTAL KNEE ARTHROPLASTY: A NARRATIVE REVIEW
James B. Miling, DO, Brandon Barndt, DO, Ha Chris, DO, James E. Eubanks, MD, MS, Justin Schappell, MD, and Samir A. Khan, DO

CASE DIAGNOSIS: While a total knee arthroplasty (TKA) is currently used for the alleviation of chronic knee pain (CKP) from severe osteoarthritis, a significant number of these patients (7-30%) go on to suffer from CKP, which, reportedly, can be more severe than the preoperative osteoarthritic pain. Recently, promising interventions have emerged with the potential to alleviate this chronic post-TKA pain: therapeutic or diagnostic nerve blocks with often subsequent radiofrequency ablation (RFA) of the genicular nerves. This narrative literature review will summarize all of the pertinent published studies regarding genicular nerve blocks (GNB) as a possible treatment for CKP after receiving a TKA.
CASE DESCRIPTION: A review was performed using the PubMed database in September 2019. The authors constructed a search term using the following phrases: (genicular nerve block OR genicular nerve blocks OR genicular nerves block) AND (total knee arthroplasty OR total knee replacement). A total of 1 research article yielded (5) articles pertaining to GNB and post-TKA CKP. (3) case reports, (1) prospective study, and (1) retrospective study.

CONCLUSIONS: There is a paucity of published evidence on the usage of GNB for post-TKA CKP and the available evidence is primarily case reports, with a few prospective and retrospective studies. Despite this limitation, there is a growing body of literature supporting the usage of GNB and/or genicular nerve RFA to ameliorate post-TKA CKP. All of the included studies demonstrated positive results, in regards to improvement of pain and reducing disability, and there were no reported adverse events. We suggest continued study of this technique and the reported benefits for patients with post-TKA CKP. In addition, we recommend further prospective trials with larger patient cohorts and ideally a double-blinded, randomized, placebo-controlled trial be completed, in order to provide higher quality evidence for both the efficacy and safety of GNB and RFA for recalcitrant post-TKA CKP.

GERIATRIC OR CARDIAC REHABILITATION? PREDICTORS OF TREATMENT PATHWAYS IN ADVANCED AGE PATIENTS AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION
Sarah Eichler, DR, Heinz Völker, PROF DR, Rona Reibis, PD DR, Karl Wegscheider, PROF DR, Christian Butter, PROF DR, Axel Hamarth, DR, and Annett Salzwedel, DR

OBJECTIVES: The literature search yielded (5) articles pertaining to GNB and post-TKA CKP. (3) case reports, (1) prospective study, and (1) retrospective study.

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GUIDELINES OF STANDARDS AND REFERENCES FOR REHABILITATION CARE FACILITIES IN MOROCCO
Hajjouis Abderrazak, MD, PhD

OBJECTIVES: The aim of the study was to develop a guidelines of standards and references for rehabilitation care facilities to be implemented in the Moroccan health system and a rehabilitation care pathway.

DISCUSSIONS: Two methods of data collection were used: literature search of articles and official documents and semi-directive survey of policy-makers and rehabilitation professionals in the country.

REHABILITATION services should be integrated into health systems and between primary, secondary, and tertiary levels of health systems. A multidisciplinary rehabilitation workforce should be available. Both community and hospital rehabilitation services should be available. Hospitals should include specialized rehabilitation units for inpatients with complex needs. Financial resources should be allocated to rehabilitation services to implement and sustain the recommendations on service delivery. Where health insurances exist or are to become available, they should cover rehabilitation services.

CONCLUSIONS: Developing a guidelines of standards and references for rehabilitation care facilities is a big step for Strengthening rehabilitation at the national health systems and an example to follow for the LMIC.

HAEMOPHILUS INFLUENZA (TYPE F) AORTITIS MASQUERADING AS INTRACTABLE BACK PAIN: A CASE REPORT
Mira K. Shenouda, MD, Shrut Patil, MD, Iqbal Jafri, MD, Krishna Urs, MD, and Sara Cuccurullo, MD

CASE DIAGNOSIS: 64-year-old female smoker who presented with acute low back pain secondary to infrarenal aortitis caused by invasive Haemophilus influenzae type f (Hf).

GOAL DIRECTED THERAPY IMPROVES GROSS MOTOR FUNCTION AND QUALITY OF LIFE IN CHILDREN WITH CEREBRAL PALSY: A RANDOMIZED CONTROLLED TRIAL
Suvannika Palee, MD, Kingkaew Payareya, MD, Suttirat Timdang, BSC, and Teerada Ploytetch, MD

OBJECTIVES: To compare clinical outcomes of goal directed therapy (GDT) versus conventional therapy (CT) in children with cerebral palsy (CP) on improvements of gross motor function, quality of life, caregiver burden and home program compliance.

DESIGN: A prospective, single blinded randomized controlled trial study was done in 1-6 year-old children with CP Gross Motor Function Classification System (GMFCS) level-I-V, at a pediatric rehabilitation unit, university hospital. Eligible participants were stratified by GMFCS level and randomized to receive GDT or CT. Both groups received 50 minutes of 12 physiotherapy/PT sessions within 3 month-period and assigned to do daily home program. The difference was that each patient in GDT group had 3 sessions among doctor, therapists, patient and caregiver, to set a SMART (specific, measurable, attainable, realistic, timely manner) goal, which related to gross motor function. Outcome measurements were done at baseline and after 12th PT session, including Gross Motor Function Measure (GMFM-66), Cerebral Palsy Quality of Life questionnaire (CP-QOL), Caregiver Burden questionnaire and home program logbook.

RESULTS: Twenty three participants (11 GDT and 12 CT), mean age of 3y5mo (SD 1y3mo), were recruited. Both groups showed improvements on GMFM-66 (GDT: p=0.012, CT: p=0.011), CP-QOL (GDT: p=0.012, CT: p=0.008) and caregiver burden (GDT: p=0.012, CT: p=0.007). In GDT group, 7 of 11 children achieved their goals. Comparisons between two groups found that GDT resulted in greater improvements than CT on GMFM (p=0.004) and CP-QOL (p=0.001). Home program compliance was higher in GDT (69%) compared to CT (42%) group, p=0.010.

CONCLUSIONS: GDT demonstrated clear gains for children with cerebral palsy in gross motor function and quality of life. The team meeting to set individual’s goal of treatment in children with CP is crucial. It encouraged the patients and caregivers to comply with home programs in order to achieve the goal.

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CONCLUSIONS: GDT demonstrated clear gains for children with cerebral palsy in gross motor function and quality of life. The team meeting to set individual’s goal of treatment in children with CP is crucial. It encouraged the patients and caregivers to comply with home programs in order to achieve the goal.

HAEMOPHILUS INFLUENZA (TYPE F) AORTITIS MASQUERADING AS INTRACTABLE BACK PAIN: A CASE REPORT
Mira K. Shenouda, MD, Shrut Patil, MD, Iqbal Jafri, MD, Krishna Urs, MD, and Sara Cuccurullo, MD

CASE DIAGNOSIS: 64-year-old female smoker who presented with acute low back pain secondary to infrarenal aortitis caused by invasive Haemophilus influenzae type f (Hf).

CASE DESCRIPTION: This patient developed intractable, dull, non-radiating low back pain one week after an upper respiratory infection (URI). She had recently traveled by plane and had sick contact exposure. She was evaluated by an urgent care physician who diagnosed her symptoms as sequelae of a viral infection. Upon admission to acute care hospital, abdominal computed tomography angiography demonstrated 3.2cm inflammatory aneurysm involving the infrarenal aorta. Blood cultures grew Hf. She underwent right axillo-femoral bypass and resection of infected abdominal aortic aneurysm. She received intravenous antibiotics for four weeks. Hospital course was complicated by hypoxic respiratory failure resulting in significant deconditioning. Patient was admitted to an acute rehabilitation hospital and participated in an intensive therapy program. Patient’s back pain and post-op pain were well controlled. She was weaned off supplemental oxygen and was discharged home at independent level.

CONCLUSIONS: The most common causes of aortitis are large vessel vasculitides. Infectious causes are less common, but life-threatening. Haemophilus influenzae are the least common cause. Most patients present with abdominal pain and fever, and if not recognized early, can cause aneurysmal rupture and death. Precautions following emergent surgical repair include monitoring cardiovascular integrity, surgical wound care, and pulmonary status. Cardiopulmonary rehabilitation would be held for emergent cases and while patient is receiving antibiotics.

CONCLUSIONS: Back pain is a common musculoskeletal complaint; however, diagnosis of serious etiologies can be missed if a thorough investigation is not performed. Patients who present with back pain and persistent fevers should be worked up for infectious etiology of the spinal and vascular structures. Prompt recognition
HEAL TH HEAD COMPARISON OF AUTOLOGOUS PERIPHERAL BLOOD DERIVED STEM CELLS THERAPY AND ADIPOSE TISSUE DERIVED STEM CELLS THERAPY (PAST TRIAL) IN PRIMARY OSTEARTHRITIS OF KNEE

CASE DIAGNOSIS: Objective of the PAST TRIAL is to determine the effectiveness of single dose, i). Peripheral derived stem cell therapy for the treatment of Knee OA; ii). Adipose tissue derived stem cell (Micro fat transfer) therapy for the treatment of Knee OA. This trial is also to compare the outcome between two groups.

CASE DESCRIPTION: Randomized clinical trial.

DISCUSSIONS: During recruitment, mean age of respondents of PBSC and ATSC group was 63.6±6.2 and 63.1±3.1 year respectively. Female gender was predominant in both group. Mean BMI was estimated as 28.7±2.0 in PBSC and 29.1±1.8 in ATSC group. Pain was measured by using visual analogue scale (VAS) and the mean pain score was 6.4±1.2 and 6.3±1.3 among PBSC and ATSC group respectively at VAS 0-10 centimeter scale. The mean cartilage thickness among PBSC and ATSC group was 1.8±0.3 mm and 1.9±0.2 mm respectively. The premature results show both cell based therapies are effective and safe for patients with OA knee. However, among both approaches, ATSC is slightly superior to PBSC on VAS and WOMAC scale at 6 months. Cartilage thickness was not changed a lot in either group.

CONCLUSIONS: Autologous microfat transfer therapy (ATSC) can be an innovative cell based therapy with superior efficacy for patients with OA Knee.

HEALTHCARE PROFESSIONALS PERCEPTIONS OF COMMUNITY BASED REHABILITATION IN KWAZULU-NATAL
Sithembiso B. Blose, M Physiotherapy, Verusia Chetty, PhD, Sudipa Deoraj, Sabiha Padia, Kinita Reddy, and Kaveshan Pillay

CASE DIAGNOSIS: Community Based Rehabilitation (CBR) is a strategy for equalization of opportunity, social inclusion and access to rehabilitation for people with disabilities with its main objective to improve quality of life for people with disabilities. The implementation approach is a holistic multi-sectoral approach which incorporates various aspects of a person’s life. The role of Healthcare Professionals is key in CBR implementation and the health sciences training programmes has shifted to cover CBR in undergraduate training in South Africa. The study aimed at ascertain the perceptions of CBR by qualified Healthcare Professionals from different hospitals in KwaZulu-Natal in order to understand the current trends and gaps in the implementation and sustainability of CBR in KwaZulu-Natal public sector hospitals.

CASE DESCRIPTION: A qualitative approach utilizing focus groups and semi-structures interviews for collecting data was used. Four public sector hospitals were purposefully selected based on the Physiotherapy fourth year Decentralized training platform. A total of 29 Healthcare professionals were part of the study. The recorded data was transcribed and analysed thematically using conventional content analysis.

DISCUSSIONS: The discussion revealed five themes that emerged from the data, which related to the: community based rehabilitation conundrum, community based rehabilitation enablers, Approach to community based rehabilitation implementation, perceived impediments to community based rehabilitation implementation and proposal for community based rehabilitation implementation.

CONCLUSIONS: There is a need for promotion, education and training on community based rehabilitation in order to develop an effective implementation plan that will guide the translation of policies into practice. A multi-sectoral approach with key stakeholders will ensure a holistic implementation of community based rehabilitation. Communication among stakeholders is imperative for community based rehabilitation implementation in order to ensure social inclusion, quality of life and access to basic services for people with disabilities.

HEP ARPINDU CE S K N EC RIS I NTH E AB SENC E OF T HROMBO CYTOPENIA: ATYPICAL PRESENTATION OF HEPARPINDU CE S K N EC RIS I NTH E AB SENC E OF T HROMBO CYTOPENIA
Nan Wang, MD, and Gary N. Inwald, DO

CASE DIAGNOSIS: A 54-year old female with history of osteoarthritis underwent bilateral total knee replacement without complications. She was started on lovenox as deep vein thrombosis prophylaxis, and was admitted to acute rehabilitation for physical and functional rehabilitation.

CASE DESCRIPTION: Ten days after starting lovenox, patient was found to have skin necrosis at the lovenox injection sites. She did not have thrombocytopenia or signs of bleeding, and her prothrombin time and partial thromboplastin time were both within normal range. Due to clinical suspicion for heparin-induced thrombocytopenia (HIT), lovenox was discontinued immediately and fondaparinux was started. Both antiheparin IgG antibody and serotonin assay were positive, and diagnosis of heparin-induced thrombocytopenia (HIT) was made. Skin biopsy was taken and showed thrombotic vasculopathy with minimal vasculitis. Patient was continued on anticoagulation for another three months after she was discharged from acute rehabilitation.
DISCUSSIONS: HIT is a life-threatening complication in patients exposed to heparin (either unfractionated or low molecular weight heparin), and typically presents with thrombocytopenia, bleeding and thrombosis. HIT without thrombocytope- nia is atypical and only occurs in 5% of patients with HIT. Skin necrosis can be the initial sign of HIT without thrombocytopenia and warrants additional hematologic workup. Diagnosis is based on clinical signs and symptoms as well as the presence of anti-platelet factor 4 heparin antibody, and functional assays including serotonin release assay or heparin-induced platelet activation assay. When HIT is suspected, all forms of heparin should be discontinued immediately. Anticoagulation with a non- heparin anticoagulant such as direct thrombin inhibitors or direct oral anticoagulants should be started in patients with presumptive clinical diagnosis of HIT.

CONCLUSIONS: In patients exposed to heparin who develop skin necrosis, HIT should be suspected even in the absence of thrombocytopenia. Heparin should be discontinued immediately to prevent fatal thromboembolic complications.

HIGH INTENSITY ISOKINETIC TRAINING IN A PATIENT WITH ISCHEMIC CARDIOPATHY

Pavel Loezia Maguna, Master In Sport Sciences, Villeda Meryly, Suarez Juan Antonio, PhD, Arteaga Jose Rodolfo, MD, and Davila Ana BelenMD

CASE DIAGNOSIS: Male, 55 old-year; three years lower myocardial infarction; stents in the right coronary and anterior descending artery. Pharmacological treatment: metropolit, hicrocholorhizide, clopidogrel, telmasartan. he has been performing classic interval training of moderate intensity for three years.

CASE DESCRIPTION: Isokinetic anaerobic power test (IsoAPT) was performed on a dynamometer con-trans LP 0.6 m/s, con-trans alternating, 10s at maximal effort, resting 90s, 2 sets; capilar lactate (Accutrend, Roche) 3 min post-effort; HR, BP, 1 and 3 min HR and BP recovery were measured. WHODAS 2.0 12-questions questionnaire, isometric hand dynamometry, 6-minute walk test and PWC-170 cycloergometer protocol was performed too. Training: IsoAPT, 4 sets, 3 times per week, 12 sessions.

DISCUSSIONS: The waist-to-height index decreased (0.56 vs 0.52), the pre-hemost strength increased (14.18 kg), the resting heart rate and blood pressure decreased. All this confers reduction of the general cardiovascular risk. The perception of disability by WHODAS 2.0 at the end was 0 (initial 23). A maximal ergometry was obtained with an increase in VO2 peak (15.2 vs 22.7 ml/kg/min) and adequate cardiovascular parameters recovery. In anaerobic power output, the heart rate remained below 80% of the theoretical maximum (70% max), and all cardiovascular parameters improved (cardiac reserve 41 vs 66 bpm). Lactate remained above the anaerobic threshold, with greater production at the end (5.8 vs 7.7 mmo/L), but with less perception of effort (Borg 13 vs 11); no arrhythmias or ischemia were observed on the electrocardiogram. This program has security comparable to that described in other isokinetic modalities, but requiring more activity as both limbs are involved.

CONCLUSIONS: We presents a training with acceptable and safe effects in a patient with low-risk ischemic heart disease, as well as favorable adaptations at the level of peripheral muscle strength and adaptations; with control of prescription variables in the isokinetic device, and shorter duration per session.

HIPS DON’T LIE: TREATING SEVERE GLUTEUS MEDII ATROPHY WITH ANABOLIC STEROIDS

Jonathan Ramin, DO, Stu Lam Koo, OMS-IV, Ariana Gluck, DO, and Joseph Herrera, DO, FAAPMR

CASE DIAGNOSIS: There was gluteus medius muscle atrophy.

CASE DESCRIPTION: 61 year old female presented with a worsening limp 3 months after a right total hip arthroplasty (THA) for severe osteoarthritis. Her operation was complicated by an incidental gluteus medius tear requiring perireative repair. Post-operatively, the patient required a rollator, had profound right hip abductor weakness, and a severe compensated Trendelenberg gait. Despite extensive physical therapy, weakness persisted. MRI revealed severe fatty atrophy of gluteus medius muscle. Electromyographic studies were normal. Tibial nerve H-reflex and M wave were recorded before and after Lumbosacral manipulation.

RESULTS: Fifty-Eight patients with low back pain aged between 20-60 years, who had no exclusion criteria were included. Tibial nerve H-reflex and M wave were recorded before and after Lumbosacral spinal manipulation.

CONCLUSIONS: Lumbar spinal manipulation significantly decreased the amplitude of the H-reflex and H/M amplitude ratio (P<0.05). H had no significant effect on H-reflex latency or M wave amplitude and latency (P>0.05). Lumbar spinal manipulation produces attenuation of alpha motoneuronal excitability.

CONCLUSIONS: These findings support this theory that manual spinal therapy can lead to a reduction in muscle tone.
OBJECTIVES: Hydrotherapy, an activity of scientific and rehabilitative interest in the neuromotor protocols, owes its value to the properties of water: indispensable cornerstone to improve motor potentiality, social interactions, activity levels, physiological functions. To date, no study evaluated the impact of water in a neuro-visual-motor perspective. Studies state that an environment rich in playful and proprioceptive activities can facilitate the development of motor-visual-social skills: water lends itself to neuro-motor rehabilitation pathways and influences and/or modifies the visual functionality.

DESIGN: The preliminary and experimental activities carried out in about 10 months were performed in water at 34° with 10 children (40% Ocular impairment, 60% CVI) including 6 treated in water and 4 in a control group, utilising the remarkable characteristics of light, the fluctuability of objects at various depth, the viscosity. Materials with different colour frequencies have been used capable of developing sinuous movements in contact with water. The children were evaluated with GMFM.

RESULTS: Changes in reaching and grasping movements were observed, monitored by the visual channel, more directional and fluid; adaptations in the processing of distance and modulation of the taking of objects placed in aquatic environment; improvements in all areas of the GMFM, specifically in the B-D-E.

CONCLUSIONS: We believe that a proprioceptive experience in aquatic environment influences neurormotor and neuromuscular development, in support of the dorsal system related to an ocular-manual monitoring. Starting from this assumption our aim is to deepen the study, structuring broad spectrum evaluation methods.

HYPERTONIC GLUCOSE INJECTION TREATS CHRONIC MUSCLE PAIN BY SUBSTANCE P AND ASIC1A PATHWAY

Der-Sheng Han, MD, PhD

OBJECTIVES: Prolotherapy is widely used in pain control and tissue repair in the field of physical medicine and rehabilitation. The classical model is injection with hypertonic glucose in muscle or perimysium. However, its analgesic mechanism is still inconclusive.

DESIGN: We employed the chronic hyperalgesia mouse model proposed by Shika et al. and determined the optimal prolotherapy injectant settings. The withdrawal response of mouse hind paws was defined as foot lifting when a 0.2-mN von Frey filament was applied. Mice were injected with pH 4.0 saline on days 0 and 1. The withdrawal responses shown before and after i.m. acid injection confirmed acid-induced mechanical hyperalgesia for the following prolotherapy. By using specific inhibitors to substance P and ASIC1a, Rv67580 and Pctx1 respectively, and Tac−/− knockout mice, we elucidated the molecular pathway involved in hypertonic prolotherapy injection.

RESULTS: Glucose at a concentration of 5% and 25% both had greatest analgesic effect. The injectant amount at 5ul and 20ul had a better analgesic effect than 10ul and 5ul. The analgesic effect by prolotherapy is abolished by Rv67580 and Pctx1. In Tac−/− knockout mice, injection with 20ul 5% glucose had no analgesic effect on chronic muscle pain.

CONCLUSIONS: The analgesia caused by 20ul 5% glucose is through substance P and ASIC1a pathway. The mechanism could be employed in future new drug development.

HYSTERECTOMIES ARE ASSOCIATED WITH AN INCREASED RISK OF OSTEOPOROSIS AND BONE FRACTURE: A POPULATION-BASED COHORT STUDY

Yingting Ye, MD, Peichen Li, MD, and Dahching Ding, MD, PhD

OBJECTIVES: Hysterectomy, a common treatment for a benign pathology, may be associated with osteoporosis or bone fracture risk. This study investigated osteoporosis or bone fracture risk in hysterectomized women in Taiwan.

DESIGN: We identified 8886 patients who had a hysterectomy between January 1, 2000, and December 31, 2012, from Taiwan’s National Health Insurance (NHI) Research Database. A comparison cohort, comprising 33711 age-matched patients who had not received hysterectomy, was created for comparison. We used 1:4 match by birthday year and gender. All hysterectomy and the comparison patients were followed up until diagnosis as having a hip fracture, with exclusion of death from the NHI system, death, or December 31, 2013. Patients were excluded if osteoporosis or hip fracture were diagnosed before or at the time of hysterectomy.

RESULTS: The adjusted hazard ratio (aHR) of subsequent osteoporosis or bone fracture was higher in the hysterectomy patients (1.16, 95% CI = 1.09–1.23) than in the comparison group during the follow-up period. In subgroup analysis, the oophorectomy status was not affected by the risk of osteoporosis or fracture. Regarding the fracture site, the aHR of vertebral fracture (1.28, 95% CI = 1.08–1.52) was higher than the comparison group. The risks of hip fracture and other fracture were no statistical significance between groups. In subgroup analysis with age, in hysterectomy group, osteoporosis and vertebral fracture were associated with high risk in 40-49 y group (aHR= 1.61, 95% CI = 1.36–1.91; aHR=1.49, 95% CI = 1.18-1.90).

CONCLUSIONS: We found that hysterectomized patients were associated with increased risks of developing an osteoporosis or a vertebral fracture. Further large-scale prospective studies are needed to explore whether the association exists.

IATROGENESIS ASSOCIATED TO INTENSIVE CARE UNITS - THE ROLE OF PHYSICAL AND REHABILITATION MEDICINE

Amilcar Cordeiro, MD, Inês Machado Vaz, MD, and Ismael Carneiro, MD

CASE DIAGNOSIS: The mortality rate associated to ICU is well studied, as its predictors. However, functional prognosis of patients admitted for prolonged time in ICU is not described nor the high functional incapacity due to its iatrogenesis. With this work we demonstrate the important role of PRM in the recovery of the functional status of these patients.

CASE DESCRIPTION: We present the case of a 39 years old male, previously autonomous in ADL with irrelevant medical history. He was taken to the ER after being found unconscious at home. Due to a left hemispheric acute subdural hematoma, he was submitted to craniotomy drainage. He was admitted in an ICU where he developed a septic shock with multi-organ dysfunction. After 362 days of hospitalization, he died due to severe complications of anticoagulation therapy and medical treatment adjustment, with disastrous consequences (peripheral and central deconditioning, chronic respiratory failure, partial amputation of the hands and transfibial bilateral, among others) the patient was clinically stable and was transferred to a rehabilitation center and submitted to an intensive rehabilitation program.

DISCUSSIONS: The medical support in ICU, its aggressive treatment, the anti-biotic therapy, and multiorgan support saves many lives. As this medical support is improving, the mortality rates associated to ICU care are decreasing. However, this aggressive approach is associated to iatrogenesis. Patients in need of a prolonged time in ICU hospitalization, present most of the times multiple comorbidities, complex clinical – functional settings and a high level of dependency and a require, often while inpatient, an interdisciplinarily holistic approach.

CONCLUSIONS: The authors present a paradigmatic picture of this situation. A great investment was made to save this patient life, but this led to a devastating functional incapacity. This case presents the importance of the rehabilitation after ICU hospitalization.

ICHTHYIOSIS IS NOT SKIN DEEP: A CASE REPORT

Kevin Frison, MD, and Collette Maduro, DO

CASE DIAGNOSIS: Early distal muscle contractures, brachycephaly, torticollis and muted primitive reflexes in the setting of lamellar ichthyosis

CASE DESCRIPTION: Patient is a 2-month-old male infant born at 35 weeks gestation due to premature rupture of membranes to parents who are first cousins with a perinatal course complicated by gestational diabetes and postnatal course complicated by sepsis due to diminished skin integrity. Patient was referred to rehab for concern of early distal muscle contractures in the bilateral hands and feet. Physical exam was notable for aforementioned symptoms in addition to left torticollis, asymmetrical brachycephaly, nail dystrophy, large plate-like scales covering the body and thickening of the skin of palms and feet. Primitive reflexes such as Babinski, palmar and plantar grasp were muted.

DISCUSSIONS: Lamellar ichthyosis is caused by mutations in the TGM1 gene and is inherited in an autosomal recessive fashion. The fact that the patient’s parents are first cousins significantly increased the risk of such a mutation. Furthermore, although there is a correlation between torticollis and asymmetric brachycephaly, it is to be considered that this patient was predisposed to contracture of his sternocleidomastoids due to tightening of skin areas of the neck, thus restricting range of motion. Lastly lamellar ichthyosis is known to cause distal muscle contractures which can explain some of the mutated physical exam findings. It should also be taken into consideration that there is a sensory component to this disease as the keratodermia diminishes sensation in the extremities.

CONCLUSIONS: Lamellar ichthyosis is a lifelong skin condition that can have profound effects beyond the skin. Muscle contractures may not be limited to distal extremities and the thickening of the skin has effect on sensory input. Lastly, given the constellation of symptoms, physician’s should be aware that many primitive reflexes may be present but not visible grossly.

IDIOPATHIC TRANSVERSE MYELITIS OR MULTIPLE SCLEROSIS? A CASE REPORT AND LITERATURE REVIEW

Mustafa Y. Broachwala, and Shaheen Jadidi, DO
CASE DIAGNOSIS: We report a case of idiopathic transverse myelitis (ITM) in a 56-year-old woman who presented with unilateral paresis and paresthesia in the left arm and leg that was initially thought to be multiple sclerosis (MS). The goal is for future clinicians to better distinguish between a diagnosis of ITM and MS, allowing for more appropriate and efficient management.

CASE DESCRIPTION: A 56-year-old African-American female with a past medical history of uncontrolled type II diabetes, hyperlipidemia, and hypertension presented to an emergency department with a 1-week history progressive numbness and weakness in both her left arm and leg, and urinary incontinence. There was an absence of DTR and loss of muscle strength in both the left extremities. Right patellar reflex and left knee reactive patellar reflex, Proprioception and vibratory sensation were diminished on the left side, a decreased pain and temperature sensation on the right. Lumbar puncture revealed signs of inflammation. The CSF was negative for inflammatory markers. MRI was performed revealing a contrast-enhancing lesion that extended from the caudal medulla to T6.

DISCUSSIONS: The key distinguishing elements that led to the “final” diagnosis of ITM in this case included the presentation of paresthesia and proprioceptive loss with lower extremity paresis, spasticity, and changes in bowel or bladder function. ITM tends to occupy more than 50% of the cross-sectional area of the spinal cord on MRI and tends to be central, uniform, and symmetric. In contrast, MS exhibits multiple peripheral, asymmetrically located with predilection for lateral and posterior funiculi.

CONCLUSIONS: In conclusion, the central nervous system can manifest with several inflammatory conditions. As the treatment of choice for inflammatory lesions of the spinal cord is nonsurgical management, accurate diagnosis of these lesions is paramount. When all other causes of myelitis are excluded through laboratory investigations, the diagnosis of idiopathic transverse myelitis (ITM) is made.

IMPACT OF 21 DAYS STANDARD SYSTEMIC REHABILITATION ON OXIDATIVE STRESS MARKERS AND INFLAMMATORY PARAMETERS IN PATIENTS WITH METABOLIC SYNDROME AND ADVANCED OSTEARTHRITIS

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OBJECTIVES: Objectives Oxidative stress-related pathological processes play crucial roles in the development of osteoarthritis (OA). Metabolic syndrome (MetS) and OA are known to share the mechanisms of inflammation, oxidative stress, common metabolites, and endothelial dysfunction.

DESIGN: 60 male patients, aged from 44 to 60 y. o., with advancedOS and MetS, were included in the study. The standard systemic rehabilitation was conducted for 21 days. The serum levels of selected inflammatory and oxidative stress markers such as lipofuscin (LPS), Creative protein (CRP), TnM, malondialdehyde (MDA), were assessed before and after the rehabilitation using commercially available the Bio-Plex, Multiplex System. For analyses, the Wilcoxon test was applied. Statistical significance was set at a p-value below 0.05.

RESULTS: The results are represented as median and lower; upper quartile: [1.12;1.54] μmol/l vs. 1.43(1.46;1.80) μmol/l, p< 0.001. The rehabilitation process reduced serum levels of MDA 1.31(1.21;1.54) μmol/l when compared to before rehabilitation results 1.43(1.46;1.80) μmol/l, p< 0.001. The rehabilitation process reduced serum levels of MDA 1.31(1.21;1.54) μmol/l when compared to before rehabilitation results 1.53(1.35;1.74) μmol/l, p< 0.001.

CONCLUSIONS: Systemic 21 days rehabilitation, as non-pharmacological treatment, has a beneficial effect on selected oxidative stress markers and inflammatory parameters in patients with OA and MetS. The 21 days of systemic rehabilitation therapy is efficient in OA and MetS subgroup of patients in reducing pain and disability.

IMPACT OF CARDIAC REHABILITATION AND CLINICAL DIETICIAN INTERDISCIPLINARY APPROACH FOR A PATIENT WITH ACUTE CORONARY SYNDROME IN SUDAN; CASE REPORT

Satty H. Saed, Specialist, Razaz Abdelrahman Ebrahim, Physiotherapist, Ghufran Ahmed Bon, Physiotherapist, Essna Abdulgadir Saadahmeda, Physiotherapist, Suhar Faroq Mohamed, Clinical Dietician, Rabah Mohammed Suliman, Clinical Dietician, Suha Faroog Mohamed, Clinical Dietician, and Raga Khalil Abdalla, Clinical Dietician

OBJECTIVES: Objectives: Oxidative stress-related pathological processes play crucial roles in the development of osteoarthritis (OA). Metabolic syndrome (MetS) and OA are known to share the mechanisms of inflammation, oxidative stress, common metabolites, and endothelial dysfunction.

RESULTS: The results are represented as median and lower; upper quartile: [1.12;1.54] μmol/l vs. 1.43(1.46;1.80) μmol/l, p< 0.001. The rehabilitation process reduced serum levels of MDA 1.31(1.21;1.54) μmol/l when compared to before rehabilitation results 1.53(1.35;1.74) μmol/l, p< 0.001.

CONCLUSIONS: Systemic 21 days rehabilitation, as non-pharmacological treatment, has a beneficial effect on selected oxidative stress markers and inflammatory parameters in patients with OA and MetS. The 21 days of systemic rehabilitation therapy is efficient in OA and MetS subgroup of patients in reducing pain and disability.
CASE DESCRIPTION: Admitted on 12-07-2018 with a sudden chest pain, sweating, heaviness and shortness of breathing. After three months the patient felt fatigue and impaired of activity daily life. She was referred to a physiotherapist and dietitian specialist in cardiac rehab clinic. She received aerobic training of 13 sessions consisting (warm up, conditioning and cool down) to improve cardiovascular endurance, using machine treadmill, cycling and arm-ergometer. For the purpose of improving cardiovascular endurance, reduce SOB, fatigue and chest pain during activity of daily living.

CONCLUSIONS: The treatment met the goals of cardiac rehabilitation in target heart rate of (87 in 25 mins to 129 in 60 mins). Clear improvement was noted in and cardiac status in the patient with acute coronary syndrome

IMPACT OF DISCHARGE DISPOSITION AND DEMOGRAPHICS ON LOST TO FOLLOW-UP AFTER ACUTE INPATIENT REHABILITATION

William E. Carter, MD, MPH, Kevin A. Forster, DO, and Amol Karmarkar, PhD, MPH

CASE DIAGNOSIS: It is unclear what patient characteristics make outpatient medical appointment attendance less likely after discharge from acute inpatient rehabilitation facilities. Appropriate and timely outpatient follow up may help to prevent complications, including hospital readmission. Failure to attend scheduled outpatient appointments can also impact outpatient clinic efficiency, increasing wait times for other patients. We hypothesized that those discharged to home would have highest outpatient medical follow up rate as compared to those with home health and skilled nursing facility discharge.

CASE DESCRIPTION: Retrospective study. Site: An acute inpatient rehabilitation from a single inner city academic level 1 trauma center. Methods: Uniform Data System for Medical Rehabilitation data were merged with the hospital appointment database, with follow-up appointment data for 1236 patients from 2017- June 2019. The rate of cancellations and no show appointments (combined) were calculated and grouped into quartiles. Using multinomial logistic regression, we modelled for very high lost to follow-up appointments, and compared that between those were discharged to home and home health; and home and skilled nursing facilities, controlling for patient-level demographic and clinical variables.

DISCUSSION: Using home discharge as a reference group, we found significant association between discharge to skilled nursing facility and higher rate of lost to follow-up (cancellations plus no show appointments: OR=1.93, 95% CI=1.39-2.68), and between discharge to home health with higher rate of lost to follow-up (OR=1.61, 95% CI=1.26-2.06).

CONCLUSIONS: Discharge disposition is strongly associated with outpatient medical follow-up appointment. Further investigation should be performed to better identify the etiologies and interventions to reduce missed appointments.

IMPACT OF ISOMETRIC EXERCISE TRAINING ON ISCHEMIC MYOCARDIAL COLLATERAL CIRCULATION FORMATION IN RATS WITH ACUTE MYOCARDIAL INFARCTION

Xiao Lu, MD, PhD, Xintong Zhang, PhD Student, Yu Zheng, MD, PhD, Lu Wang, MPHIL Student, Yihui Cheng, MPHIL Student, and Xia Zhang, MPHIL Student

OBJECTIVES: Non-invasive revascularization plays a pivotal role in patients with acute myocardial infarction (AMI). This experimental study investigates the potential role of isometric exercise (IE) training on the formation of collateral circulation after AMI.

DESIGN: Sprague-Dawley rats were randomized into six groups; the sham-operated group; the AMI group. The IE groups were not only exposed to AMI but treated with different training protocols as follows: the IE1, IE2 and IE3 group received IE training with a load of 100% for 20 times per day following 4, 8 and 12 weeks respectively; the IE4 and IE5 group had a load of 50% and 75% respectively; the IE6 and IE7 group had a daily frequency of 10 and 30 times respectively. IE training was performed with the rats vertically gripping on the fence. Functional, histological and cellular data were collected at the endpoint.

RESULTS: At the endpoint, LVEF and MIS were significantly higher in the IE2, IE3, IE4 and IE7 group as compared to that in the MI group. In the comparison among group IE1, IE2 and IE3, the IE2 group demonstrated significantly higher left ventricular ejection fraction (LVEF), myocardial infarction size (MIS), artery density (AD) number of monocytes (MNCs), smooth muscle cells (SMCs) and endothelial cells (ECs) as compared to those in the other IE groups. In the comparison among IE2, IE4 and IE5 group, significantly higher LVEF, MIS, AD, number of MNCs, SMCs and ECs were found in the IE2 group. In the comparison among IE2, IE6 and IE7, the IE2 group again showed the highest level of LVEF, MIS, AD, and number of SMCs and ECs.

CONCLUSIONS: IE training presented positive effects on the collateral circulation formation in rats with AMI. The superior training protocol is consisted of a daily frequency of 20 times with 100% load of IE training following 8 weeks.

IMPACT OF PERIOPERATIVE ACUPUNCTURE ON INTRAOPERATIVE AND POSTOPERATIVE OPIOID USE

Brandon Barndt, DO, George Raum, David R. Schulze, DO, Eric Twohey, Medical Student, and Ha Chris, DO

OBJECTIVES: To review the current literature highlighting the utility of using acupuncture to decrease postoperative opioid use. Acupuncture has been a treatment modality in eastern medicine for more than 2000 years. In recent decades, it has been regaining popularity for a variety of ailments in western medicine. Due to the recent opioid epidemic, many doctors are turning to multimodal pain management strategies. Acupuncture has shown to be an effective, low-cost, and low-risk option for pain management in recent studies. One interesting area is usage in the perioperative period, specifically when postoperative opioid use increases by 44% after short-stay surgical procedures. Acupuncture has been shown to be efficacious in reducing pain in the acute postoperative period.

DESIGN: Narrative review of fourteen studies from 1989-2018. Thirteen randomized control trials, 1 meta-analysis, and a total of 1387 patients were included in the review.

RESULTS: Eight of the fourteen studies showed a short-term decrease in opioid usage in patients that received acupuncture. Five studies showed no difference in opioid consumption. Timing of acupuncture and use of electric stimulation of needles seemed to have a positive impact on reducing opioid consumption. Four studies either started the acupuncture treatment post-procedure or continued it from pre-procedure. All four studies demonstrated positive effects on total patient-controlled analgesia (PCA) consumption, intraoperative opioid demand, or patient request for opioids. Six studies evaluated the usage of electric acupuncture (EA), and four of these demonstrated a positive impact on total PCA usage or intraoperative opioid use.

CONCLUSIONS: Acupuncture has long been seen as a useful pain management modality. Many promising studies exist showing the benefit of acupuncture for reducing post-operative pain, with EA appearing to be most effective at this point. Future studies are necessary in order to evaluate the most beneficial timing of application and technique.

IMPLANTABLE ELECTRICAL NEUROMODULATION TARGETING THE MULTIFIDUS (MF) MUSCLE: AN INNOVATIVE TREATMENT FOR CHRONIC MECHANICAL LOW BACK PAIN (CLBP)

Vinicius Tieppo Francisco, MD, Conan So, BS, MPH, Eric Twohey, Medical Student, David R. Schulze, DO, James E. Eubanks, MD, MS, and Chris Ha, DO

OBJECTIVES: To review the literature regarding the utilization of implantable neuromodulation of MF for the treatment of CLBP. The MF contributes to interssegmental spinal stability and is often atrophied due to atrophic muscle inhibition in CLBP. Therefore, it is hypothesized that MF neuromodulation may facilitate contraction and could be used to improve CLBP symptoms.

DESIGN: A MEDLINE search of studies from 2010-2019 with ‘multifidis AND neuromodulation’ keywords. 10 studies were found; 7 were included.

RESULTS: MF modulation involves an implantable neuromodulator that delivers episodic contractions via the MF or L2 medial branch of the dorsal rami. Studies showed spinal input from the MF may induce long-term changes in pain sensitivity for > 60 minutes. Limited studies demonstrated promising results with improvements in quality of life (QoL), pain, and disability (ODI). Multicenter studies demonstrated a 63%, 61% and 57% improvement in pain scale (NRS) at 3, 6 and 12 months follow-ups, respectively. ODI score improved by 52%, 57% and 60%, and EQ-5D (QoL) improved by 88%, 82% and 81%, respectively. Other studies demonstrated similar Results within 90 days and maintained through 2 years. A case series on MF neuromodulation produced clinically significant improvement in pain with 62% average reduction in pain sustained > 4 months with 73% reduction in disability (ODI). Finally, pain medication use was reduced by 83% and 74% on average in two studies.

CONCLUSIONS: There is a need for better treatment options for patients with CLBP who have failed existing conventional pain management. Some studies suggest MF neuromodulation Results in clinically meaningful, statistically significant, and lasting improvements in pain, disability, and QoL. Limitations include FDA
IMPORTEANCIA DE LAS ESTRATEGIAS DE REHABILITACION EN LA PREVENCION DE AMPUTACIONES ASOCIADAS A DIABETES MELLITUS (DM)

Ximena Nuculhueque, Medico Fisiatra, Katherina Hrizc, Kinesiologa, Raúl Valenzuela, Kinesiologo, y Natalia Milla, Ingeniero Estadistico

OBJECTIVES: El envejecimiento y estilos de vida aumentaron enfermedades crónicas en Chile. DM alcanza 12.3% Carga de enfermedad por DM 4.407.724 DALY, 49% YLD. Amputacion es 10-30 veces más en diabéticos. El 85% de estas son precedidas por úlcera. El impacto de esta complicacion se asocia a gran discapacidad y mayores gastos en salud. Propósito: Evidenciar el peso de las amputaciones asociadas a DM, con la finalidad de generar politicas públicas en rehabilitación de DM y sus complicaciones


RESULTS: Egresos hospitalarios por amputación de extremidades inferiores DM se incrementaron en 10.6% este periodo. Total 18.164 casos, Hombres 72% Promedio edad 65 años (21-103 años). El 30% 40-59 años y el 58% 60-79 años. El 92% de los pacientes ingresaron vía servicio de urgencia, Respecto a los niveles de amputación, del total de egresos y por clasificacion CIE 10 el 14,8% fue amputacion por encima de rodilla y el 11,1% amputaciones por debajo rodilla. El 76% de amputación cpm diagnostico de DM no inuino dependiente con complicaciones circulatorias periféricas.

CONCLUSIONS: A pesar de las fuertes politicas de prevención y control la DM y sus complicaciones, como las amputaciones, van en aumento en el país. El impacto social, laboral y economico de esta condición, amerita continuar fortaleciendo las medidas implementadas, pero obliga a incorporar estrategias de rehabilitacion preventivas y aumentar el acceso a ayudas tecnicas preventivas, lo que permite aspirar a retrasar el avance de las complicaciones y disminuir la tasa de amputaciones.

IMPROVEMENT OF CHEMICAL DEEP VEIN THROMBOSIS PROPHYLAXIS COVERAGE FOR STROKE AND TRAUMATIC BRAIN INJURY PATIENTS IN AN ACUTE INPATIENT REHABILITATION SETTING

Olga Komargodski, MD, Andrew McElroy, MD, Claudia Echaide, MS, and Jun Zhang, MD

OBJECTIVES: Deep Venous Thromboembolism (DVT) prophylaxis is an important aspect of the medical management of a patient in an Inpatient Rehabilitation setting. Practice shows that it is often omitted in the transition of care from an acute hospital to the Inpatient Rehabilitation. The aim of the study is to improve the rate of chemical DVT prophylaxis coverage by including the previous regimen in the pre-admission screen.

DESIGN: A historical cohort study of all 729 patients admitted to an acute inpatient rehabilitation center with a diagnosis of Stroke or Traumatic Brain Injury (TBI) from March 2018 to July 2019. Including DVT prophylaxis regimen during acute hospitalization in the pre-admission screen was implemented on May 20th, 2019. From March 2018 to July 2019. Including DVT prophylaxis regimen during acute hospitalization in the pre-admission screen was implemented on May 20th, 2019. Pre-intervention 647 patients with a diagnosis of Stroke or TBI were admitted to the Inpatient Rehabilitation. Based on the Medication Reconciliation from the acute hospital 475 (73%) patients were placed on chemical DVT prophylaxis, 172 (27%) were placed on mechanical prophylaxis only. In the mechanical prophylaxis group, chemical prophylaxis was appropriately contraindicated due to major bleeding in 127 (20%) of the patients, however, for 45 (7%) of the patients, the chemical prophylaxis was inappropriately stopped on discharge. The rate of DVT in the group that was on chemical prophylaxis since admission was 4.84%, the rate of DVT in the group that had an appropriate contraindication was 10.24%, the rate of DVT in the group that the regimen was inappropriately stopped was 8.89%. The intervention was applied to 81 patients. There was a 50% decrease in the rate of patients for whom the chemical DVT prophylaxis was inappropriately stopped during discharge.

CONCLUSIONS: Prophylaxis for DVT is an important aspect of the medical management of a patient in an Inpatient Rehabilitation setting. Including pre-admission DVT prophylaxis regimen may improve the transition of care and lower the rate of DVT.

IMPROVEMENT OF FIBROMYALGIA RELATED PAIN WITH PERIPHERAL NERVE STIMULATION OF THE AXILLARY NERVE/DELTOID MUSCLE

Chong C. Kim, MD, Maria Grabnar, MD, and Gerald Korty, MD

CASE DIAGNOSIS: Fibromyalgia, central sensitization

CASE DESCRIPTION: A 62 yo Male, with history of fibromyalgia was referred by Orthopedics for possible peripheral nerve stimulation (PNS) of the axillary nerve for chronic left shoulder pain. The patient had a rotator cuff tear, but was not cleared by his cardiologist for surgery, with subsequent frozen shoulder. He had pain and limited range of motion. The patient underwent a 60 day PNS placement (SPR Sprint) of the left deltoid/ axillary nerve endpoints with 80% improvement of this shoulder pain. Following the removal of the percutaneous electrode, he noted overall improvement of his body pain as well, over 50%. Subsequently, the patient was tapered off his duloxetine over 2 months with continued improvement of his overall generalized pain from fibromyalgia. On 6 month follow up, he noted return of his shoulder pain but continued relief from his generalized fibromyalgia body pain.

DISCUSSIONS: PNS has been studied and used for treatment of hemplegic shoulder pain. Additionally, PNS has been used for treatment of shoulder pain due to various etiologies, including shoulder impingement. Though it is unclear, nerve end points/ intramuscular stimulation with PNS has been studied and proposed to reverse central sensitization and may explain the improvement of the generalized body pain secondary to fibromyalgia.

CONCLUSIONS: We present a case report on the improvement of fibromyalgia related pain with the use of PNS.

IMPROVEMENT OF HAND FUNCTION USING ROBOT-ASSISTED REHABILITATION IN A PATIENT WITH NEUROMYELITIS OPTICA SPECTRUM DISORDER: A CASE STUDY

Yi Mei Chen, Master Degree, Szu Shen Lai, Master Degree, Chia Ju Hsieh, Bachelor Degree, and Wei Han Chang, MD, PhD

CASE DIAGNOSIS: In the present study, we presented a 41-year-old woman who was diagnosed as neuromyelitis optica spectrum disorder (NMOSD). The diagnosis criteria of NMOSD are spinal cord lesions that extend over 3 vertebral segments and combined with optic neuritis. It is an autoimmune inflammatory disorder representing with repeated myelitis, paralysis and blindness.

CASE DESCRIPTION: This 41-year-old woman was diagnosed with NMOSD which impaired her bilateral hand function. The patient couldn’t perform individual finger movements and felt the tightness of her right hand. Therefore, the patient was arranged with robot-assisted task-oriented rehabilitation for 20 sessions (5 times per week for 4 weeks). The robotic system applied in this study consists of two parts: (1) exoskeletal hand (Mirror Hand, HS 001, Rehabotics Medical Technology Corporation, Taiwan) installed on patient’s more-affected hand, the right hand, and (2) sen- sor glove installed on her less-affected hand, the left hand, to control the movement of the exoskeletal hand. In each session, the patient received 5 minutes of PROM exercise on more-affected hand manipulated by the exoskeletal hand, 5 minutes of robot-assisted bimanual grasping-and-releasing training, and 30 minutes of robot-assisted bimanual task-oriented training. MAS, ARAT, BBT, and MAL were administered before, after treatment period, and one-month follow-up post treatment.

DISCUSSIONS: As compared to the pre-treatment assessment, post-treatment assessment showed improvement in BBT, ARAT and MAL, and the perceived tightness in her right hand. The assessment of One-month followed-up also showed improvement in BBT and MAL that compared with post-treatment assessment. The results provide a preliminary evidence supporting the utility of robot-assisted task-oriented rehabilitation by enhancing the recovery of patient’s hand function up to at least one-month post treatment.

CONCLUSIONS: In this case study, we showed the effectiveness of a novel robot-assisted intervention to facilitate functional recovery of the affected hands in a patient with NMOSD.

IMPROVING SYMPTOM BURDEN IN INDIVIDUALS WITH PERSISTENT POST-CONCUSSIVE SYMPTOMS: A RANDOMIZED AEROBIC EXERCISE TRIAL

Leah J. Mercier, BSC, Ashley D. Harris, PhD, Sean P. Dukelow, MD, PhD, and Chantel T. Debert, MD, MSC

OBJECTIVES: Following mild traumatic brain injury (mTBI) up to 30% of adults will continue to experience persistent post-concussive symptoms (PPCS). Sub-symptom threshold aerobic exercise interventions have been demonstrated to speed recovery acutely following mTBI and decrease symptom burden in adolescents.
slow to recover from mTBI. Our objective is to evaluate symptom burden following a 6-week aerobic exercise protocol (AEP) compared to a low-intensity stretching protocol (SP) in adults with PPCS. The primary outcome is symptom burden measured using the Rivermead Post-concussion Symptom Questionnaire (RPQ). Secondary outcomes include measures of fatigue, mood, anxiety, dizziness, headache and sleep. We hypothesize that participants randomized to AEP will have significantly greater improvement in symptom burden as well as measures of specific symptoms compared to those in the SP following the intervention.

**DESIGN:** Thirty participants (18-65) with PPCS greater than 3 months (ICD-10 criteria) will be randomized to a 6-week AEP or SP. Participants will perform either aerobic or stretching activities 5-6 times/week for 20-30 minutes while wearing a heart rate (HR) monitor for the duration of the protocol and log activity in a daily online diary. The Buffalo Concussion Treadmill Test (BCTT) will be used to assess HR at point of symptom exacerbation. Prescribed target HR for the AEP will be 80% of max achieved on the BCTT and will be updated every 3-weeks with repeated BCTTs. The primary and secondary outcome measures will be completed at baseline and following the 6-week intervention (SP or AEP).

**RESULTS:** Fifty participants have been recruited, twelve of which are currently completing the intervention. Mean baseline RPQ sub-scores (RPQ-3 and RPQ-13) were 7.2 (SD=2.5) and 32.8 (SD=6.5). Data collection is ongoing.

**CONCLUSIONS:** This trial is uniquely situated to investigate the utility of a non-pharmacological intervention to decrease symptom burden in individuals with PPCS.

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**INCORPORATION OF VISCOSUPPLEMENTATION (VS) IN THE ROLE OF PROCEDURES AND EVENTS IN HEALTH OF THE BRAZILIAN NATIONAL AGENCY OF SUPPLEMENTARY HEALTH**

Eduardo M. Rocha, MD, Antonio M. Teippo, MD, Cyro S. Almeida, Jr, MD, Paulo C. Hanadan, MD, Marcia U. Renzani, PhD, Gustavo C. Campos, PhD, Claudio Gomes, MD, and Leonardo H. Cheng

**OBJECTIVES:** Provide scientific support for the incorporation of viscosupplementation in Brazil’s Role of Procedures and Events in Health of the National Supplementary Health Agency for the treatment of Osteoarthritis

**DESIGN:** This article was elaborated from an extensive review publications from Scholar Google, PubMed, such as, consensus, systematic reviews and meta-analyses, according to the referenced bibliography, predominantly of the last 8 years, and from papers of American College of Rheumatology (ACR), American Medical Society of Sports Medicine (AMSSM), European Consensus Statement on Viscosupplementation with Knee Osteoarthritis and Brazilian Consensus Statement on Viscosupplementation of the knee Osteoarthritis (COBRAVI).

**RESULTS:** Viscosupplementation, in cases of knee (KOA) and hip osteoarthritis (HOA), is safe, effective, efficient and cost effective supported by extensive review publications, such as consensus, systematic reviews and meta-analyses

**CONCLUSIONS:** Viscosupplementation is considered an important, effective and necessary treatment, not only in Knee Osteoarthritis and Hip Osteoarthritis, but also in different peripheral forms of osteoarthritis, with improvement of pain, function and overall patient performance, reaching favorable Results for longer periods than those obtained with the administration of analgesics, non-steroids and steroids anti-inflammatory drugs. The studies show better risk/benefit ratios of VS compared with these drugs treatments. This review demonstrates that VS reduced the economic burden of osteoarthritis in the health system as a result of delayed knee replacement. The Incorporation of Viscosupplementation (VS) in the Brazil’s Role of Procedures and Events in Health of the National Agency of Supplementary Health becomes an important tool to improve the Brazilian public health system.

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**INCREMENTAL ROLE OF HYPERTENSION FOR FRAX RISK IN OSTEOARTHRITIC PATIENTS**

Afshan Mahjabin, MBBS, MPH, Md Ziaul Islam, MBBS, MPH, PhD, and Mohammad Tanvirul Islam, MBBS, FCPS

**OBJECTIVES:** Background: Osteoporosis is a risk factor for hip and other fractures. Hypertension is a progressive silent disease affecting bone mass, leading to increased susceptibility to fractures. Objective: To determine the incremental role of hypertension for fracture risk in osteoporotic patients.

**DESIGN:** A total 106 patient with osteoporosis were included for this comparative cross sectional study which was conducted during the period of 1st January to 31st December, 2017 at two tertiary centers in Dhaka city. Patients were divided into hypertensive, non-osteoartritic and non-hypertensive osteoartritic groups. Data were collected by face to face interview using semi-structured questionnaire and checklist. Online assessment of fracture risk probability was done among the two groups by FRAX tool and statistical analysis was performed by Statistical Packages for Social Sciences (SPSS-23).

**RESULTS:** The study revealed that the mean ages were 62.57±9.222 years in hypertensive and 59.85±10.99 years in non-hypertensive patients. Among the patients, 67(63.2%) were hypertensive and 39(36.8%) were non-hypertensive. The mean duration of hypertension was 6.97±4.812 years in osteoporotic patients whereas the mean duration of osteoporosis were 8.04±4.962 years in hypertensive and 7.59±6.608 years

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**REFERENCES**

This article was elaborated from an extensive review publications from Scholar Google, PubMed, such as, consensus, systematic reviews and meta-analyses, according to the referenced bibliography, predominantly of the last 8 years, and from papers of American College of Rheumatology (ACR), American Medical Society of Sports Medicine (AMSSM), European Consensus Statement on Viscosupplementation with Knee Osteoarthritis and Brazilian Consensus Statement on Viscosupplementation of the knee Osteoarthritis (COBRAVI).

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**CONCLUSIONS:** Viscosupplementation is considered an important, effective and necessary treatment, not only in Knee Osteoarthritis and Hip Osteoarthritis, but also in different peripheral forms of osteoarthritis, with improvement of pain, function and overall patient performance, reaching favorable Results for longer periods than those obtained with the administration of analgesics, non-steroids and steroids anti-inflammatory drugs. The studies show better risk/benefit ratios of VS compared with these drugs treatments. This review demonstrates that VS reduced the economic burden of osteoarthritis in the health system as a result of delayed knee replacement. The Incorporation of Viscosupplementation (VS) in the Brazil’s Role of Procedures and Events in Health of the National Agency of Supplementary Health becomes an important tool to improve the Brazilian public health system.
in non-hypertensive patients. The difference of major osteoporotic fracture (MOF)& hip fracture (HF) risk by age was significantly ($\chi^2, p<0.05$) higher among the patients belonged to age group 70-79 years as well as comparatively higher in hypertensive patients. MOF risk by hypertension was comparatively higher among the hypertensive patients but it was not statistically significant ($\chi^2, p>0.05$). However, hip fracture (HF) risk by hypertension was comparatively higher among the hypertensive patients and it was statistically significant ($\chi^2, p<0.05$).

CONCLUSIONS: The study reflected that the fracture risk was significantly higher in hypertensive patients. These findings would enrich treatment protocol in hypertensive osteoporotic patients.

INDIVIDUAL, HEALTH SYSTEM, AND CONTEXTUAL BARRIERS AND FACILITATORS FOR THE IMPLEMENTATION OF CLINICAL PRACTICE GUIDELINES: A SYSTEMATIC METAREVIEW

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OBJECTIVES: The objective of the current study was to carry out a systematic meta-review of reviews that explore the barriers and facilitators for the implementation of CPGs.

METHODS: We conducted a meta-review, a systematic literature study of existing relevant systematic reviews. A search was conducted in the PubMed, Embase, Cochrane, Health System Evidence and International Guideline Library (Gin) databases. Systematic reviews that identified barriers or facilitators for the implementation of CPGs. The selection of the title and abstract, the evaluation of the full text and the extraction of the data were carried out by two independent reviewers. The synthesis could only be done by qualitatively analyzing the common, recurrent elements and their frequencies. The elements were grouped according to the contexts previously defined.

RESULTS: 25 systematic reviews were selected. The relevant barriers in the social political context were the absence of a leader, difficulties with teamwork and a lack of agreement with colleagues. Relevant barriers in the health system were a lack of time, financial problems and a lack of specialized personnel. Barriers of the CPGs themselves included a lack of clarity and a lack of credibility in the evidence. Regarding the individual, a lack of knowledge and confidence in oneself were relevant. Regarding patients, a negative attitude towards implementation, a lack of knowledge and sociocultural beliefs played a role. Some of the most frequent facilitators were consistent leadership, commitment of the members of the team, administrative support of the institution, existence of multidisciplinary teams, application of technology to improve the practice and education regarding the guidelines.

CONCLUSIONS: The multiple barriers and facilitators described in this systematic meta-review are factors that influence the implementation of evidence in clinical practice. Knowledge of these factors should contribute to the development of a theoretical basis for the creation of CPG implementation strategies in order to improve professional practice and health outcomes for patients.

INFLUENCE OF BIOFEEDBACK MEDIATED EXERCISE AND INTRA-ANAL ELECTRICAL STIMULATION ON IMPROVEMENT OF ANAL SPHINCTER CONTRACTION OF ANORECTAL MALFORMATION PATIENTS FOLLOWING CORRECTION SURGERY

Huanul Mubarak, PM&R Specialist, Tommy Habar, Paediatric Surgeon, Nilla Mayasari, PM&R Specialist, and Anshory Sahlan, PM&R Specialist

OBJECTIVES: Fecal incontinence commonly happened as residual symptoms in anorectal malformation following correction surgery. The condition represents personal hygiene matters and psychological distress of the children. Pelvic floor exercises proven to improve fecal and urinary incontinence of adults with several conditions, however this exercises unreliable to be performed by children right back, right mid pelvic floor exercises have been shown to improve strength of anal sphincter by gradual exercise on precise level of intensity. The authors are stressing on adjunct of intra-anal electrical stimulation to enhance contractility of the sphincter.

DESIGN: Thirty six post-surgical of anorectal malformation-patients (mean age 6.67±0.9 years old) were randomly sorted into two groups, the first group with biofeedback exercise and sham stimulation, and intervention group underwent biofeedback exercise plus 6 mA stimulation. Intervention was performed 12 times for 4 weeks. The level of anal sphincter contractility were recorded with Enraf Myomed 632 and unintentional voiding/defecation documented 3 times; before and after intervention, and three weeks post-treatment. Paired T-test to compare improvement among groups.

RESULTS: From Thirty six patients, both groups has shown significant effect in sphincter contraction at the end of program compare with pre-treatment values (p<0.05). No significant difference in both groups after 3 weeks compare with pre-treatment value (p>0.05). There was statistically significant difference of sphincter contraction strength improvements between study groups in the end of program (13,417±2.97 Hp vs 10,322±3.07 Hp; p<0.0001), however there is no significant difference after 3 weeks without program (7,372±1,85 vs 6,456±2.26). Fecal incontinence was not statistically improved in both study groups.

CONCLUSIONS: Our study confirmed that the suprapubic mediated exercise plus electrical stimulation seems more effective in increasing tone of sphincter sub-clinically than biofeedback mediated exercise alone. Nevertheless both seem does not improve fecal continence.

INFLUENCE OF VIRTUAL THERAPY ON THE REHABILITATION OF CHRONIC HEMIPARETIC INDIVIDUALS

Pedro Claudio G. de Castro, Nathany M. Azevedo, Daniel G. Gorosso, Andriette C. Turi, Denise V. Ayres, and Linamara R. Battistella, PROF DR

OBJECTIVES: INTRODUCTION: The virtual therapy (VT) trough video games with balance platform (BP) is efficient in physical rehabilitation and reaches results similar to conventional therapy. However, there is not always agreement between clinical tests and variables used to evaluate the balance of individuals with hemiparesis with force platforms, justifying the need for more extensive and detailed evaluations. OBJECTIVES: To verify the effectiveness of VT in the balance and mobility of participants with chronic stroke submitted to physical rehabilitation.

METHODS: 250 participants were recruited and 30 participants completed the study randomly divided into control (CON) and intervention (INT) groups. A blind assessor performed the balance and mobility assessment before and after the intervention. The balance was tested by the Berg Balance Scale (BBS) and by maintaining the upright posture for 60 seconds in open eyes (OE) and closed eyes (CE) conditions through the AMTI force platform with a frequency of acquisition of 1000 Hz. Mobility was assessed by the Rivermead Motor Assessment (RMA) and the效果

RESULTS: Both groups showed an increase in balance and mobility, but only the CON showed a statistically significant difference in the clinical scales after the intervention. Analysis of the values of Area 95 and VCO in the OE and / or CE condition showed that the participants presented a trend towards greater postural control after the intervention.

CONCLUSIONS: The conventional therapy plus VT was not superior to conventional therapy alone in relation to the Results obtained in the increase of balance and mobility in chronic hemiparetic individuals.

INHIBITORY RTMS IN POSTSTROKE NONFLUENT APHASIA FACILITATES FUNCTIONAL REORGANIZATION AND LANGUAGE RECOVERY: AN FMRI STUDY

Wang-Sheng Lin, MD, and Po-Yi Tsai, MD

OBJECTIVES: Although inhibitory repetitive transcranial magnetic stimulation (rTMS) for the treatment of nonfluent aphasia has been successfully explored, the exact mechanism associated with the neuroplasticity of this regimen remains unclear.

METHODS: 250 participants were recruited and 30 participants completed the study. Using 1 Hz rTMS intervention over right (R) pars triangularis for 10 consecutive weekdays and compared with the sham stimulation (n=13). All patients underwent resting-state functional magnetic resonance imaging (fMRI) and Con- cise Chinese Aphasia Test (CCAT) pre- and post-rTMS intervention.

RESULTS: After intervention, the experimental group exhibited significantly superior Results in total CCAT score, expression, conversation and description subtests (P=0.05). After rTMS, fractional amplitude of low frequency fluctuations (FAF) significantly more active in several cortical and subcortical areas including R superior temporal pole (BA 38), R superior temporal gyrus (BA 22), R mid- frontal gyrus (BA 46), R insular cortex and R caudate nucleus. Moreover, the R caudate nucleus and R middle frontal gyrus were associated with the clinical language performance.

CONCLUSIONS: Inhibitory rTMS protocol may facilitate language recovery without compromising benefical contralesional reorganization. Conversely, this regimen enhances the expression of newly organized areas for the improvement language performance in poststroke nonfluent aphasic patients, particularly the caudate nucleus and middle frontal gyrus, likely through intercortical modulating mechanisms.
INPATIENT REHABILITATION CONSIDERATIONS FOR A PATIENT WITH BIVENTRICULAR ASSIST DEVICE

Gerard J. D’Onofrio, MD, MBA, Daniel Oh, MD, and Akinpelumi Beckley, MD, MBA

CASE DIAGNOSIS: Debility in a patient with biventricular assist device.

CASE DESCRIPTION: A 41-year-old man with non-ischemic dilated cardiomyopathy status-post HeartMate™TMventricular assist devices (VAD) to both ventricles for a biventricular assist device (BiVAD). He had a six-month hospital admission prior to rehab admission. BiVAD was warranted due to persistent right venous failure. The rehabilitation team was familiar with caring for LVAD patients, however BiVAD care required additional training of staff and equipment. On exam, he had bilateral proximal muscle weakness, lost 100 pounds, and his right hip flexor was weaker than left due to prolonged immobilization of the right groin from ECMO. Left, non-dominant hand necrosis due to pressure also affected ability to manage the BiVAD. He progressed well through the rehabilitation program with ability to independently manage VADs and ambulate with rolling walker.

DISCUSSIONS: Important elements of BiVAD rehab are monitoring of fluid status, strengthening, and accommodating BiVAD equipment. Pulmonary edema/congestion should be monitored during exercise and associated physiologic changes, given that the VADs do not communicate despite having two pumps in closed arteriovenous circuits. Therapies should focus on modified transfers/mobilization, independence with BiVAD management, and adjusting both gait and transfers for changes in center of mass attributable to equipment. Heart failure is an increasingly common reason for acute rehabilitation admission, thus BiVADs are likely to be more common. Staff training should occur prior to accepting BiVAD patients so that logistical accommodations are made, such as having two emergency outlets for overnight charging and space for a charging station.

CONCLUSIONS: Most patients with BiVADs undergo explantation prior to hospital discharge, but for those who require long-term BiVAD support, acute rehabilitation can improve functional status to facilitate a safe return home.

INPATIENT REHABILITATION OF A 21-MONTH-OLD FEMALE WITH ACUTE MERCURY POISONING

Evan R. Zeldin, MD, and Leonardo Villarosa, MD

CASE DIAGNOSIS: A 21-month-old female with elemental mercury poisoning.

CASE DESCRIPTION: The patient initially presented to the ED with acute onset of abdominal pain, respiratory distress, and hypoxia. She was found to have pemphigus, pneumonemia, and metabolic acidosis. She was intubated and placed on ECMO. Social Services found high levels of mercury in her home, which was confirmed on blood testing. She was started on DMMA for chelation which resulted in profound cardiorespiratory improvement. She was weaned off ECMO and eventually admitted to the pediatric inpatient rehabilitation hospital. She was non-verbal, had significant developmental delay, exhibited frank aspiration on videofluoroscopic swallow study, required total assistance with age-appropriate ADLs, and needed maximal assistance with transfers. In 20 days, she has progressed to being more interactive, can eat 30 cheddar crackers and 15ml yogurt with therapeutic feeding, and walk 300 feet with supervision.

DISCUSSIONS: Elemental mercury is a rare toxin that can cause pulmonary, neurologic, and renal toxicity. Efforts to eliminate mercury from household products, such as older thermometers and compact fluorescent light bulbs, have led to a decline in exposure. Absorption occurs most commonly through the lungs as a vapor but it can also be absorbed through the gastrointestinal tract or skin. Chronic exposure results in tremor or insomnia, with severe cases resulting in permanent CNS damage. The diagnosis is made by measuring blood levels; treatment is supportive or with chelation. Because of the pulmonary and neurologic damage from mercury toxicity, patients often present with severe functional deficits which can benefit from intensive interdisciplinary therapies.

CONCLUSIONS: Elemental mercury poisoning is a rare cause of interstitial pneumonitis and neurologic problems. While rare, it should be considered in patients with a constellation of neurologic, pulmonary, and renal manifestations. These patients can benefit from an intensive inpatient rehabilitation program.

INSTITUTIONAL QUALITY: EXPLORING THE ASSOCIATION OF QUALITY CARE IN INPATIENT REHABILITATION FACILITIES AND ACUTE-CARE HOSPITALS

Jessica Marone, BA, and Jeanette Chung, PhD

OBJECTIVES: Although hospitals and Inpatient Rehabilitation Facilities (IRF) are often considered separate organizations, more than three-quarters of IRFs are hospital-based. Hospitals and IRF that share the same setting may benefit from spill-over effects of quality; quality in one institution in close proximity may influence quality in the other. In this analysis, we explored the correlation between healthcare quality in hospitals and hospital-based IRF.

DESIGN: Data sources included 2018 IRF Compare, 2018 Hospital Compare, and 2016 American Hospital Association (AHA) Annual Survey. The sample included 882 hospital-based IRF and associated hospitals. We selected 7 IRF Compare measures that had content-concordant hospital measure counterparts and examined the correlation across settings.

RESULTS: Hospital and IRF quality measures were significantly correlated for Clostridium difficile standardized infection ratios (r=0.169, p<0.001) and IRF discharge-to-community 30-day readmission rates (r=0.150, p<0.001), patient influenza vaccination rates (r=0.254, p<0.001), Medicare spending per beneficiary (MSPB) (r=0.346, p<0.001), and staff influenza vaccination rates (r=0.588, p<0.001). We found no correlation between IRF and hospital measures related to rates of pressure ulcers or falls.

CONCLUSIONS: Although 5 of 7 measures in our analyses demonstrated significant correlations between hospital and IRF settings, most were of low-to-moderate strength, and we found no correlation in the rates of pressure ulcers or falls. From an organizational standpoint, low cross-setting correlations may suggest areas of unexploited complementarities, impedances in internal flows of information and ideas, and potentially unrealized returns to prior investment in quality. Improving knowledge management within institutions may improve internal quality improvement and potentially expedite reporting.

INTEGRATED APPROACH ON DEVELOPING REHABILITATION SERVICES IN NORTHERN PROVINCE SRI LANKA

Akilendran Kulalingam, MBBS, DIP, MPA, MSC, FKHA

OBJECTIVES: General Objective - Finding out a way for developing rehabilitation services for physically disabled persons in North East Sri Lanka. Specific objectives - 1 To find out possibility of integration of private & public service sectors on rehabilitation care services in North & East in Sri Lanka 2 To find out the stakeholder opinion on integration of service sector in North & East in Sri Lanka 3 To find out inputs for policy on service sector integration in North East in Sri Lanka.

DISCUSSIONS: This is a qualitative study, having convenient judgemental sampling techniques to include the stakeholders from public, private, non-profit sectors and patients with disability; each sector having 10 participants as a research participants. All the interviews are based on open end questions and interviews are conducted by main researcher.

RESULTS: From this study 5 main thematic areas are identified as results. Those are; need on integration of sectors, need to have policy on handling integration, developing human resources into rehabilitation care, sustain rehabilitation care facilities by developing public sector within a time frame, gathering financial resources and advanced technologies into rehabilitation care services Northern Province of Sri Lanka.

CONCLUSIONS: Integrated private(profit/non-profit) and public system is much more helpful for developing rehabilitation health care for war affected developing countries perspective. Ventures for integration of sectors in rehabilitation section is identified as infrastructure maintenance, infrastructure development, investments, material supply and fleet management. It is recommended to integrate non-profit organizations than private profit services into war affected public rehabilitation care services.

INTEGRATED UPPER LIMB SPASTICITY MANAGEMENT INCLUDING BOTULINUM TOXIN A ON PATIENT-CENTRED GOAL ATTAINMENT: THE ULIS-III STUDY

Lynne Turner-Stokes, DM FRCP, Stephen Ashford, PhD, FCP, Klemens Fheodoroff, MD, Jorge Jacinto, MD, Allison Brashear, MD, MBA, Pascal Maisonobe, MSC, and Andreas Lysandropoulos, MD

OBJECTIVES: Describe data on real-life clinical practice and patient-centered goal attainment for integrated management of upper limb spasticity (ULS) including repeated botulinum toxin A (BoNT-A) injections.

DESIGN: ULIS-III was a prospective, observational, longitudinal (2-year) cohort study (NCT02454803) of integrated ULS management, including BoNT-A, starting January 2015 and completing December 2019. Eligible participants were ≥18 years with ULS in whom a decision had already been made to inject BoNT-A. The study was the first to use the Upper Limb Spasticity Index (ULSI), an assessment battery including a structured approach to goal attainment scaling (GAS) alongside a set of standardized measures. Participants continued with their usual concomitant therapies, which were recorded in the Upper Limb Focal Spasticity Therapy
Recording Schedule (ULSTR) to document the number/duration/type of therapies related to specific goals.

**RESULTS:** A total of 1004 participants from 14 countries were enrolled. Interim data for Treatment Cycle 1 (n=807) are reported here. 60.4% of participants saw a therapist after BoNT-A treatment: the most frequent therapy interventions were passive stretch (69.4%), splinting (25.7%) and strength-training (24.8%). Mean [95% CI] overall GAS T-scores were 49.9[49.4, 50.5] at end of cycle;69.4% of participants met their first primary treatment goal, with highest rates of achievement for primary goals related to passive (75.0%) vs. active function (52.1%). Standardised measures of spasticity, pain, involuntary movements, active and passive function all improved over treatment cycle.

**CONCLUSIONS:** The ULIS-III is the first study to use the ULSI in the assessment of BoNT-A effectiveness for upper-limb spasticity. Data captured in the ULSTR describe how therapies are used alongside BoNT-A treatment. First cycle data indicate that nearly 70% patients achieved their primary goal. Final analyses at 2 years will provide insights in how integrated treatment and treatment goals evolve, and how this impacts goal achievement over time.

**INTENSIVE EXERCISE USING BALANCE EXERCISE ASSIST ROBOT CAN SUPPORT LEARNING BALANCE ABILITIES IN HEALTHY SUBJECTS**

Kikuo Ota, Hirotaka Matsuura, and Hirohito Nakagami

**OBJECTIVES:** Balance Exercise Assist Robot (BEAR) has been developed and used to support learning balance abilities in Japan. BEAR consists of three exercise games. First, a standstill exercise, like rodeo, coping with perturbation. Subjects should stand still on top of the autonomous vehicle. Another two games, tennis and skiing, are moving exercises. Subjects should move the vehicle to aim at the target in the game by moving the COG dynamically. These balance exercises with BEAR were reported to get a great effects on balance activities indicated by Borg Balance Scale and TUG. However, the proper frequency of BEAR exercise is not exactly known.

**Purpose of the study:** to clarify the proper exercise frequencies of BEAR

**DESIGN:** Control study in healthy subjects Subjects; 30 volunteers were divided to two groups. Intensive group: 20 people, age 33.8±8.1 years old. Non-intensive group: 10 people, age 39.2±14.2 years old.

**Methods:** BEAR has 3 types of games (rodeo, tennis and skiing) and each game has 40 levels of difficulty. One session of BEAR exercise consists of 4 attempts in each game. Intensive group members played the BEAR 4 sessions a week. Non-intensive members played the BEAR once a week. All members played 8 sessions of BEAR. We evaluated the difference of learning speeds of the two groups.

**RESULTS:** Intensive group members reached the 40 levels in an average of 3.85 ±1.3 sessions, while non-intensive group members did an average of 4.82±1.8 sessions. All members in intensive group could reach the 40 levels within 4 sessions. However, three of the non-intensive members had to play 8 sessions to reach the 40 levels.

**CONCLUSIONS:** BEAR exercises had much better effects in the intensive exercise group (4 times a week) compare to the non-intensive exercise group (once a week) in healthy subjects.

**INTERNAL SHOULDER IMPINGEMENT IN PATIENTS WITH TETRAPELVIA**

Kemly M. Philip, MD, PhD, MBE, and Aiji Sambasivan, MD

**CASE DIAGNOSIS:** Internal shoulder impingement with glenohumeral arthralgia presenting as lateral shoulder pain in patients with tetraplegia.

**CASE DESCRIPTION:** A 24-year-old woman with spinal cord injury (SCI), C4 AIS B tetraplegia, after auto-pedestrian accident presented with a three-month history of progressive, posterior and lateral shoulder pain. On exam, she had sharp pain to the lateral humerus at the greater tuberosity with shoulder abduction greater than 100 degrees associated with a posterior palpable click, 4 of 5 manual muscle testing strength on elbow flexion and pronounced weakness otherwise. Right shoulder X-ray was negative for fracture or dislocation. Ultrasound examination suggested effusion in the glenohumeral joint to which 2cc of 1% lidocaine and 40mg Keraject was injected. Immediately after injection, patient reported complete resolution of her shoulder pain.

**DISCUSSIONS:** Persons with high SCI have diminished strength of muscles that function as dynamic stabilizers of the humeral head within the glenohumeral capsule; this contributes to excess glenohumeral motion, impinging rotator cuff tendons against the posterior-superior glenoid rim when the shoulder is abducted and externally rotated. Previous studies have observed an association with presence of effusion in the glenohumeral joint via ultrasound examination and shoulder pain in SCI suggesting that diminished muscle protection leads to increased risk for inflammation and pain development.

**CONCLUSIONS:** Shoulder pain is considered a major condition affecting functional disability and subsequent quality of life among patients with acute and chronic SCI. Corticosteroid injection to the glenohumeral joint should be considered among patients with tetraplegia who may be experiencing internal shoulder impingement secondary to weakness of the posterior shoulder that contributes to muscle imbalances that make them prone to shoulder injuries and pain. Musculoskeletal ultrasound is an effective tool to obtain dynamic anatomic information about the severity and etiology of shoulder pathology among patients with SCI.

**INTRA-ARTICULAR INJECTIONS OF BOTULINUM TOXIN TYPE A FOR OSTEARTHRITIC KNEE PAIN: A META-ANALYSIS**

Derek Schirmer, BA, Stephanie Modert, MPH, BA, David H. Sherwood, DO, and Barth Wright, PhD

**CASE DIAGNOSIS:** To assess the efficacy of intra-articular injection of Botulinum toxin A (BoNT/A) for the treatment of chronic refractory knee pain due to osteoarthritis.

**CASE DESCRIPTION:** Data Sources: The researchers searched PubMed, Google Scholar, Ovid MEDLINE(R), Ovid EMBASE, Ovid MEDLINE (R) In-Process and Other Non-Indexed Citations through May 30th, 2019. Trial selection: Clinical double-blinded randomized controlled trials that evaluated BoNT/A intra-articular injection in patients with chronic refractory knee pain due to osteoarthritis Data Extraction: Two independent reviewers conducted data extraction.

**RESULTS:** A total of 5 out of 55 records met inclusion criteria. Analysis ofVAS scores indicated a statistically significant decreased pain score in the BoNT/A treatment group than control for overall effect with WMD= -0.39 (95% CI: 0.11 to 0.67; P= 0.006; I2= 74%). Analysis indicated a statistically significant decreased total WOMAC score at 8 weeks and overall effect with WMD = 1.05 (95% CI: 0.22 to 2.09; P= 0.05; I2=94%); WMD = 0.61 (95% CI: 0.11 to 1.11; P= 0.02; I2= 87%) respectively.

**CONCLUSIONS:** The results of this meta-analysis indicate that, in patients with refractory osteoarthritic knee pain, intra-articular low dose (100u) Botulinum Toxin A treatment results in mild pain relief with decreased VAS and WOMAC total scores over 12 weeks.

**INTRADISCAL INJECTION OF DEHYDRATED HUMAN AMNION CHORION MEMBRANE FOR TREATMENT OF CHRONIC DISCOGENIC LOW BACK PAIN: A CASE SERIES**

Sean A. Lacey, DO, Steven P. Cohen, MD, and Michael B. Jacobs, MD, MPH

**CASE DESCRIPTION:** Intradiscal dHACM injection has 40 levels of difficulty. One session of BEAR exercise consists of 4 attempts in each game. Intensive group members reached the 40 levels in an average of 3.85 ±1.3 sessions, while non-intensive group members did an average of 4.82±1.8 sessions. All members in intensive group could reach the 40 levels within 4 sessions. However, three of the non-intensive members had to play 8 sessions to reach the 40 levels.

**CONCLUSIONS:** BEAR exercises had much better effects in the intensive exercise group (4 times a week) compare to the non-intensive exercise group (once a week) in healthy subjects.

**DISCUSSION:** Three patients with DLBP received intradiscal dHACM. Results seem to indicate a trend toward improvements in pain and function.

**CASE DESCRIPTION:** A 36-year-old female with a 6-year history of L5/S1 DLBP by MRI was treated with intradiscal dHACM injection at L5/S1. ODI and current/maximum NRS-Pain at initiation of treatment, 6 weeks and 3 months were 32 and 2/8, 20 and 2/5 and 18 and 2/4 respectively. A 37-year-old male with a 17-year history of L5/S1 DLBP by MRI and provocative discography was treated with intradiscal dHACM injection at L5/S1. ODI and current/maximum NRS-Pain at initiation of treatment, 6 weeks and 3 months were 29 and 8/9, 20 and 3/5 and 22 and 2/5 respectively.

**CONCLUSIONS:** Intradiscal injection of dHACM may help decrease pain, improve function and decrease the need for opioids or surgery in selected patients. Three patients from a military background and chronic DLBP were treated with intradiscal injection of dehydrated human amnion chorion membrane (dHACM) which contains growth factors that may stimulate mesenchymal stem cell recruitment. Diagnosis was established by MRI revealing disc disease with anatomically concordant pain. One patient underwent provocative discography as part of their evaluation.

**CASE DESCRIPTION:** A 48-year-old female with a 7-year history of L2/3 and L3/4 DLBP by MRI was treated with intradiscal dHACM injection at L2/3, L3/4 and L4/5. ODI and current/maximum NRS-Pain at initiation of treatment, 6 weeks and 3 months was 52 and 8/10, 46 and 7/9 and 50 and 5/9 respectively.

**DISCUSSIONS:** Three patients with DLBP received intradiscal dHACM. Results seem to indicate a trend toward improvements in pain and function.

**CONCLUSIONS:** Intradiscal injection of dHACM may help decrease pain, improve function and decrease the need for opioids or surgery in selected patients. Interventional and surgical treatments have been shown to provide modest benefit to a subset of patients, and the risks may outweigh the benefits. Randomized studies with large sample sizes are needed to identify the optimal dose regimen, refine selection criteria, and determine effectiveness.

**INTRATHECAL BACLOFEN FOR SEVERE GENERALIZED TETANUS**

Nicholas Annichiarico, DO, Andrew Savoie, DO, and Jamie Key, DO
CASE DIAGNOSIS: A 50 year-old male with no past medical history presented to the ED with one day of worsening abdominal spasms and trismus eight days after stepping on a nail; he was subsequently diagnosed with tetanus.

CASE DESCRIPTION: Tetanus toxoid vaccine was administered and the patient was admitted to the ICU. Two days of rapid escalation of his symptoms and rising serum creatinine kinase levels prompted systemic neuromuscular blockade with complete life support. A single trial dose of intrathecal baclofen was administered with successful results, prompting the placement of an intrathecal baclofen pump. Titration of baclofen yielded remarkable results, and the patient was able to come off of mechanical ventilation eight days after intrathecal pump placement (hospital day #22) and achievement of a sufficient intrathecal dose. He discharged home on hospital day #30.

DISCUSSIONS: The use of intrathecal baclofen in severe generalized tetanus has been studied in the past with variable catheter placement and presents a unique opportunity to drastically shorten the length of dependency on a ventilator and prolonged immobility with neuromuscular blockade, as well as to further study the pathophysiologic mechanism of spasticity. Clostridium tetani produces tetanosin which cleaves synaptic vesicle, a V-SNARE protein involved in neurotransmitter release from inhibitory interneurons, blocking the IPSP effects of GABA and glycine. Baclofen primarily affects the GABAb receptor which, via G-proteins, opens potassium channels, bringing alpha-motor neurons closer to the electrochemical equilibrium of potassium, thus hyperpolarizing the lower motor neuron thus decreasing muscular contraction.

CONCLUSIONS: The incidence of tetanus is low where vaccination is widespread. Nonetheless, it remains a lethal threat in under-vaccinated individuals. For those who contract severe generalized tetanus, selected use of intrathecal baclofen should play an early and integral role and has the potential to significantly decrease the burden of care in tetanus, including prolonged ICU admission, sedation, immobility, and the need for rehabilitation.

INTRATHECAL BACLOFEN FOR THE TREATMENT OF SPASTIC QUADRIPARESIS ARISING FROM PNEUMONIA-INDUCED ANOXIC BRAIN INJURY: A CASE REPORT

Chane Price, MD, MBS, Vincent M. Hsu, BS, and Javier A. Santana, MD

CASE DIAGNOSIS: Anoxia brain injury with spastic quadripareisis secondary to bilateral basal ganglia insult.

CASE DESCRIPTION: A previously healthy 19 year-old-male suffered respiratory distress and sepsis due to pneumococcal pneumonia that led to anoxic brain injury. He later developed severe muscle spasms that resulted in need for total assistance for all activities. Since his spasticity was responsive to oral baclofen, but sensitive to its sedating effects, he was referred to pain management for an intrathecal baclofen (ITB) pump placement. A trial of a 50-microgram bolus into the lumbar intrathecal space was effective in reducing spasticity, pain and dystonia. Given the successful trial with ITB, an intrathecal drug delivery system was implanted. The patient continues to improve with ITB treatment and physical therapy.

DISCUSSIONS: Survivors of severe brain injury often cope with life-long sequelae including chronic pain, cognitive impairment, muscle spasticity, decreased quality of life (QOL) and limited independence. Early rehabilitation can promote recovery and functional gains in the realm of activities of daily living (ADL). However, severe musculoskeletal impairments such as immobility and restricted movements are often the most disabling as these can restrict successful rehabilitation, promote bedsores and make providing care difficult. The literature shows that the use of ITB improves outcomes and satisfaction in many cases of spasticity related to acquired brain injury. To our knowledge, this is the first case report to describe a unique etiology of anoxic brain injury arising from pneumonia in an otherwise healthy patient.

CONCLUSIONS: Uncontrolled muscle spasms can drastically affect ADLs, QOL and pain from impaired motor function, limb contractures and immobility. Physiatrist must recognize that ITB treatment in adjacent to appropriate rehabilitation produces remarkable improvements of spasticity, pain and overall QOL, while minimizing side effects of baclofen.

IS LEVETIRACETAM EFFECTIVE AND ACTIVE ON CEREBELLAR SIGNS AND SYMPTOMS IN MULTIPLE SCLEROSIS PATIENTS? A MULTICENTER RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED CROSSOVER STUDY

Alessandro de Sere, MD, Margit Mueller, PT, Roberto Begarmaschi, MD, Claudia Cappetti, MD, Franceso Patti, MD, Domenico Antonio Restivo, MD, Maria Rosaria Stabile, MD, and Claudio Solaro, MD

OBJECTIVES: We aimed to evaluate the activity and efficacy of levetiracetam (LEV) on cerebellar signs and symptoms in patients affected by multiple sclerosis (MS).

DESIGN: In this multicenter double-blind, placebo-controlled crossover study we included right-handed MS patients showing prevalently cerebellar signs and symptoms that were randomly allocated into two different groups: Group 1 (firstly LEV and secondly placebo) and Group 2 (firstly placebo and secondly LEV). LEV was standardized to 500mg capsule or identical placebo capsule, reaching as maximum dose 3000mg. Clinical assessments were performed by an operator unaware of allocation at: T0 (baseline, day 1), T1 (after 3 weeks of first phase, day 22), T2 (after 2 weeks wash-out period, day 35) and T3 (after 3 weeks of second phase, day 56). Primary outcome was nine-hole peg test (9HPT) for both upper limbs. Secondary outcomes were: tremor activity of daily living questionnaire and a numeric rating scale to self-define upper limbs impairment. Furthermore, we investigated LEV activity performing reaching task on digitizing tablet.

RESULTS: We enrolled 45 patients (18 male, 30 female) affected by MS showing prevalently cerebellar signs and symptoms, mean aged 45.2±10.4 years, randomly allocated into two groups: 24 in Group 1 and 24 in Group 2. 9HPT lower (not significantly) in LEV phase in both groups; no significant intra-group differences were found in all outcomes. Twenty-four arms were responders (9HPT ≤ 20%) in LEV phase in Group 1 (T0-T1), 6 in placebo phase in Group 2 (T0-T1) and 10 in LEV phase in Group 2 (T2-T3). There was a reduction in all kinematic parameters after LEV phase in Group 1 (T0-T1). Minor side effects were experienced only by 5 patients.

CONCLUSIONS: We showed no significant differences between LEV and placebo in terms of effectiveness and activity in prevalently cerebellar MS patients; LEV was confirmed to be well tolerated and it seemed to induce a clinical response in the 50% of cases of MS, if administered as first treatment.

IS THE RISK OF LYMPHEDEMA LIFE-LONG FOLLOWING TREATMENT FOR GYNECOLOGIC CANCER? A CASE REPORT

Evelyn Qin, MD, MPH, Mandy Bowen, RN, BSN, and Wei Chen, MD, FACS

CASE DIAGNOSIS: Subclinical lymphedema is a condition where symptoms of edema are generally absent despite having an impaired lymphatic system and can be visualized with lymphographic imaging. It is thought to be present soon after lymphatic insult occurs, such as following oncologic surgeries and can persist for months to years before progressing to symptomatic stages.

CASE DESCRIPTION: In this case, we present a 64-year-old woman with a history of total abdominal hysterectomy and bilateral salpingo-oophorectomy who later developed right-sided lower extremity lymphedema. Initial imaging with indocyanine green (ICG) lymphography was positive for advanced lymphedema in the right leg and no detectable lymphatic injury in the left leg. Repeat lymphographic imaging several years later showed lymphatic damage in the left leg, with no reported symptoms, indicating subclinical lymphedema in what was thought to be a previously normal limb.

DISCUSSIONS: This case demonstrates what we believe is a case of pre-subclinical lymphedema in which initial lymphatic injury was present, but not visibly detectable with ICG lymphography until decades after the initial injury.

CONCLUSIONS: As a result, gynecologic cancer patients with normal lymphatic imaging may still be at risk for lymphedema long-term. This makes it important to monitor high-risk patients longitudinally, allowing for the earliest possible diagnosis and interventions, as lymphedema therapies are often more effective in the earliest stages.

ISOLATED ACHILLES SHORTENING RELATED PERIVENTRICULAR LEUKOMALACIA: CASE SERIES

Ga Yang Shim, MD, Seounghee Han, MD, and JongKyu KIM, MD, MS

CASE DESCRIPTION: 4 cases of isolated Achilles tendon shortening patients, who finally diagnosed with mild periventricular leukomalacia(PVL) in brain MR.

CASE DESCRIPTION: Case 1: An 8-year-old boy with tip-toe gait for 5 years showed of ankle dorsiflexion limitation, 5/5 degrees with knee flexion and 0/0 degree extension. There was a history of no characteristic sign. Brain MR showed asymmetry and mild enlargement of lateral ventricles, suggested PVL. Case 2: A 21-year-old male suffered from short Achilles tendon. His ankle dorsiflexion was 10/5 degrees with knee flexion and 0/0/5 extension. Brain MR showed wall irregularity of left lateral ventricular dorsal horn with mild thinning of adjacent white matter, suggested PVL. Case 3: A 13-year-old boy complained tip-toe walking with ankle dorsiflexion limited to 0/0 degree knee flexion and 0/0/5 extension. His brain MR suggested PVL. Case 4: A 5-year-old boy with ankle dorsiflexion limitation, 5/5 degrees with knee flexion and -5/-5 degrees with knee extension complained intermittent tip-toe walking with...
KETOCNIC DIET AND WERNICKE’S ENCEPHALOPATHY, IS THERE A CORRELATION? A PEDIATRIC CASE REPORT

Amanda E. Lindenberg, DO, OTR, Simra Javaid, DO, and Rajashree Srinivasan, MD

OBJECTIVES: Wernicke’s encephalopathy (WE) is a nutritional deficiency of thiamine, B1. It classically presents as a triad of mental status changes, oculosumotor abnormalities, and ataxia. The most common presenting symptom is altered mental status followed by vomiting. It is estimated that 16-21% of all pediatric presentations present with the classic triad. MRI diffuse-weighted images may reveal hyperintensities of subcortical structures. It is often under diagnosed in both the pediatric and adult population. Wernicke’s is most often associated with alcohol dependence, but also other etiologies including malignancy, parenteral nutrition, and gastrointestinal (GI) malformations. Although multiple causes have been described in the literature, the correlation between following a ketogenic diet and acquiring Wernicke’s has not previously been reported. Recommended treatment plan includes high dose intravenous thiamine supplementation.

DESIGN: 16-year-old previously healthy male who presented to the emergency department with eleven day history of headache and GI upset. The patient had lost over one hundred pounds over the past five months while following a “ketogenic” diet that primarily consisted of meat with occasional broccoli. He was subsequently diagnosed with Wernicke’s Encephalopathy.

RESULTS: Patient received five day course of IV thiamine and transferred to inpatient rehabilitation. Wernicke’s encephalopathy may be fatal in the pediatric population, therefore, it must be treated immediately if clinically suspected. Children presenting with Wernicke’s would benefit not only from early intervention but also intensive inpatient rehabilitation and comprehensive education regarding the role of food and exercise on weight loss.

CONCLUSIONS: This case illustrates the importance of including Wernicke’s in the differential diagnosis when a pediatric patient presents with rapid weight loss with diets like Keto. Wernicke’s encephalopathy may be fatal in the pediatric population, therefore, it must be treated immediately if clinically suspected. Children presenting with Wernicke’s would benefit not only from early intervention but also intensive inpatient rehabilitation and comprehensive education regarding the role of food and exercise on weight loss.

KNOWLEDGE AND EXPERIENCE OF PATIENT ENGAGEMENT AMONG PHYSIOTHERAPISTS IN NIGERIA

Comfort Adeosun, MBA, PhD, Chinedu Nwodo, BMR, and Nkiruka J. Awusioni, BMR, MSC

OBJECTIVES: Involving patients and their family in providing care is considered one of the key elements of promoting positive health outcomes, improving quality of care, patient experience and satisfaction. As part of a larger study on quality improvement in physiotherapy practice, this study explores the knowledge and experience of physiotherapists when providing care in Nigeria.

DESIGN: A self-assessment tool developed using the IHI patient engagement framework was distributed to physiotherapists in their conference. The tool assessed their knowledge and experience about patient-centred care in their organization. Data was collected on the concepts of dignity and honour, information sharing, patient participation and organizational culture. Qualitative data were collected using structured self-reported questions on perceived facilitators and barriers to patient engagement. Descriptive statistical analysis and thematic framework analysis were applied to the data.

RESULTS: All the participants (n = 99) believe in respect and dignity for patients. Data showed that 83.5% honour and respect patient’s choices and give room for them to decide their care; 90.5% believe in information-sharing with patients while 85.5% always ask their patients what was important to them. Only 77.5% seek patient and family feedback to improve the quality of care and departmental operations performance while 98.5% believe in patient participation.

CONCLUSIONS: The study reveals that the majority of patients receiving physiotherapy are involved in their care at the individual level of engagement. Future work on the acceptance and the role of patients at the organizational level is advocated. Patient opinions are also needed to corroborate the findings from this survey. The study contributes to the literature on patient engagement and quality improvement in developing countries.

LASER FOX EFFICACY IN ONCHYOMYCOSIS TREATMENT

Vianka Cisneros Perdomo, MS, Professor

OBJECTIVES: Analyze whether Fox laser therapy has better results than pharmacological treatment in patients with onychomycosis.

DESIGN: Experimental study was carried out in 84 patients diagnosed with onychomycosis treated by an outpatient department in the Podiatry Department of Julio Diaz Hospital, between January 2016 and January 2018. The patients were divided into two groups (experimental, treated with Laser Fox and control with drug treatment). All were evaluated before and after treatment using the onychomycosis severity index and mycological study. Estimation by interval and contrast of parametric hypothesis was made.

RESULTS: Patients aged 60 years and over (45.2% experimental group 42.9% control group), female sex (73.8% experimental group and 81% control group) and foot involvement (85.7% control group and 95.2% experimental group). The subungual distal and lateral onychomycosis predominated (47.6% experimental group and 50% control group) and filamentous fungi (59.5% control group and 64.3% experimental group). Before starting treatment both groups behaved similarly with severe OSI (20.7% ± 8.2 experimental group and 22.6% ± 7.1 control group), and positive results in the mycological study, at the end of treatment both groups evolved equally (20.7% ± 8.2 experimental group and 22.6% ± 7.1 control group).

CONCLUSIONS: Both treatments are equally effective for the treatment of onychomycosis.

LEG WEAKNESS CONSIDERATIONS WHEN CONFOUNDED BY MULTIPLE MEDICAL COMORBIDITIES IN MULTIPLE SCLEROSIS

Victoria Strickland, MD, and Mark Tommo, MD

CASE DIAGNOSIS: MS and acute leg weakness considerations.

CONCLUSIONS: This case illustrates the importance of including Wernicke’s in the differential diagnosis when a pediatric patient presents with rapid weight loss with diets like Keto. Wernicke’s encephalopathy may be fatal in the pediatric population, therefore, it must be treated immediately if clinically suspected. Children presenting with Wernicke’s would benefit not only from early intervention but also intensive inpatient rehabilitation and comprehensive education regarding the role of food and exercise on weight loss.
LEVEL OF AGREEMENT AMONG ADMISSION DECISION MAKERS IN REHABILITATION: A SURVEY ON THE ETHICAL ASPECTS

Alan Friedman, MD, Alan Jotkowitz, MD, and Ialy Treger, MD, PhD, MHA

OBJECTIVES: Given the paucity of rehabilitation beds available in our hospital, and the high demand for these beds, the decision of who to accept is a challenging one. Although admission criteria guidelines exist for certain specific diagnoses, there are no criteria as to admission priority across different diagnoses. To establish more definitive and ethical admission criteria, we surveyed the department heads and admission committee staff in the Physical Medicine and Rehabilitation hospitals in Israel.

DESIGN: We developed and disseminated a questionnaire that presented eleven clinical scenarios of ethical issues, related to whether or not a patient should be given preference for admission to the rehabilitation department. Respondents were asked to rank to what degree they agreed with the statements — ranging from 1 (“absolutely not”) to 5 (“definitely agree”). The scenarios stated that admission should be based on: 1) first come first served, 2) pre-morbid function, 3) certain diagnoses, 4) better long-term prognosis, 5) VIP status, 6) easier post-hospital disposition, 7) younger age, 8) better cognitive function, 9) earlier discharge is acceptable (if bed is needed), 10) existence of psychiatric history and 11) patient is homeless. Surveys of 30 respondents were analyzed and a level of agreement was examined.

RESULTS: Choices 1 and 2 were combined into “disagree” and choices 4 and 5 combined into “agree”. There was a high level of agreement amongst the respondents that neither VIP status nor disposition plans should have any impact on the decision. This applies equally to homeless patients. There was a low level of agreement regarding psychiatric patients. Interestingly, fully one-third of respondents were undecided whether or not age or long-term prognosis should play a role in these decisions.

CONCLUSIONS: Further prospective studies are needed to validate these findings, and clinical guidelines to help physicians make these determinations are needed.

LOCALIZATION AND EFFECTS OF A MIDBRAIN TARGET FOR DEEP BRAIN STIMULATION TO ENHANCE LOCOMOTION IN A LARGE ANIMAL MODEL

Quinn Tate, MD, Tyler Davis, MD, PhD, John D. Rolston, MD, PhD, and Candace L. Floyd, PhD

OBJECTIVES: Spinal cord injury (SCI) prevalence ranges widely throughout the world with reported ranges of 223–1,298 persons per million. Within this group, the percentage of SCI resulting in paraplegia ranges from 43-91%, with 48-60% of those injuries incomplete. Surveys of patient preferences for improvement in functional losses after SCI showed restored walking is consistently ranked as the top desire. While undergoing therapies, a patient with Multiple Sclerosis. Proper diagnosis and treatment is paramount to enhance locomotion in small animal models using SCI equivalent to a thoracic level. However, the kinematic effect is likely dampened without sensory feedback.

LARGEST ANIMAL MODEL

The porcine model demonstrated complex movements similar to locomotion. However, further prospective studies are needed to validate these findings.

LONGITUDINAL STUDY OF THE EFFECTS OF THE FIRST-YEAR APPLICATION OF THE THERASUIT METHOD ON THE EVOLUTION OF GAIT-RELATED GROSS MOTOR FUNCTION IN CHILDREN WITH CEREBRAL PALSY

Ana C. Frazao, Physiotherapist, Márcio Emílio D. Santos, Psychopedagogue, and Tania M. Frazao, Physiotherapist

CASE DIAGNOSIS: The aim of this research paper is to describe the process of motor function evolution in children with cerebral palsy, diagnosis: GMFCS 1,2, aged 4 to 10 years, after 4 blocks of intensive therapy with the TheraSuit Method. Each block consisted of sessions of three hours daily for 20 days for a total of four weeks. The treatment followed the intensive physiotherapy protocol of the TheraSuit methodology, treating the gait and UEU (Universal Exercise Unit - cage including Spider and pulley system). This procedure was repeated in four modules throughout the year.

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with intervals ranging from five to ten weeks between the intensive modules. To analyze the results, the items of GMFM-66 domains D and E related to gait improvement were studied. Family members adopted the selection of functional objectives for each therapeutic block, always focused on improving functional aspects of the patient’s daily life.

DISCUSSIONS: The improvement indexes presented minimum score level of 2 and maximum of 36.18, in domain D: standing; and E: walk, run and jump, minimum level 4.12 and maximum 36.11. In terms of quality and function, patients improved their autonomy to develop skills of daily activities such as feeding and personal hygiene, as well as improvement in their social participation within the school environment and family life. Pasty members reported greater confidence in how to care for their children, as they began to perceive a lower burden in relation to their view of the condition, which was different from their initial views. Teachers who are accompanied by the school inclusion program reported a more active participation in activities, engagement and relationships with classmates, both in daily school and social activities, birthday parties and shopping mall outings.

CONCLUSIONS: The results indicate that the application of intensive physical therapy treatment by Therassult Method in the described methodology produced a significant increase of the GMFM-66 score, in the first year, in domains D and E, presenting an improvement of the patient’s functional capacity, especially in the Domain E, 4.12 minimum points and 36.11 maximum, the annual program demonstrated a significant impact on the improvement of gait motor function in the evaluated patients.

LONGITUDINALLY INVESTIGATE THE MUSCLE STIFFNESS BY ACOUSTIC RADIATION FORCE IMPULSE SONOELASTOGRAPHY AND ITS ASSOCIATION WITH AGE AND MOBILITY IN PATIENTS WITH DUCHENNE MUSCULAR DYSTROPHY

Chiawei Lin, MD, MS, Ching-Cheng Chuang, PhD, Pe-Hsiang Tsui, PhD, Chia-Ling Chen, MS, Hsiao-Yuan Lee, MS, Meng-Ru Tsai, BS, Jeng-Yi Shieh, MD, and Wen-Chin Weng, MD

CASE DIAGNOSIS: Longitudinally investigate the muscle stiffness and its association with age and mobility in Duchenne Muscular Dystrophy (DMD) by sonoelastography.

CASE DESCRIPTION: 51 DMD patients (117.254 ± 51.396 months old) were followed in a six-month-interval for (1) the muscle stiffness measured as shear wave velocity (SWV), by Acoustic Radiation Force Impulse sonoelastography in bilateral deltoid (Del), biceps (Bic), rectus femoris (RF), tibialis anterior (TA), and gastrocnemius (Gas) muscle, (2) the six minute walk distance (6MWD), (3) the Mobility, categorized into 1: Ambulant, 2: Sitter, and 3: Non-Sitter. The Mixed Model Regression Analysis was applied to investigate the association between the SWV of muscle and two predictors (age and the mobility). Pearson’s correlation was performed to examine the relationships between the SWV of muscle and 6MWD in ambulant DMD. A P value < 0.05 was considered significant.

DISCUSSIONS: The SWV of muscles were significantly associated with (1) the age: Rt Del (β=0.011, p = 0.000), Lt Del (β=0.010, p = 0.000), Rt RF (β=0.006, p = 0.024), and Lt RF (β=0.007, p = 0.004), and with (2) the mobility: Rt Del (Mobility3 vs Mobility1, β=0.007, p=0.005), Lt Del (Mobility 3 vs Mobility 1, β=0.016, p=0.005), Lt TF (Mobility3 vs Mobility1, β=0.073, p=0.020), Mobility2 vs Mobility1, (β=0.050, p = 0.011), Lt TF (Mobility2 vs Mobility1, β=0.484, p = 0.019), and Lt Gas (Mobility1 vs Mobility3, β=0.176, p = 0.006). The 6MWD inversely correlated with the SWV of RF (Rt, r=−0.306, p = 0.049; Lt, r=−0.424, p=0.006).

CONCLUSIONS: Our study revealed that the muscle stiffness of DMD increased with age (Del and RF), but decreased when the mobility deteriorates to Non-Sitter stage (Del, TA, and Gas). Furthermore, the increased stiffness of RF would predict walking function decline in DMD ambulant.

LONG-TERM EFFECTS OF BOTULINUM TOxin TREATMENT FOR UPPER LIMB SPASTICITY IN A PATIENT WITH CHRONIC STROKE

Takayuki Mori, MD, PhD, and Shin-Ichi Izumi, MD, PhD

CASE DIAGNOSIS: A few studies have reported the long-term effects of botulinum treatment using Wolf Motor Function Test (WMFT). A 51-year-old Japanese man developed right internal capsule infarction, was admitted to our hospital and received rehabilitation. He recovered the ability to walk with a T-cane and orthosis, but left arm was weakened and family continued to accompany him.

CASE DESCRIPTION: At the workplace, the patient noticed that his left elbow and wrist joints gradually bent while walking and recognized the unnatural movement. For this condition, he received botulinum toxin A injection in the upper limb muscles every 3 or 4 months and was evaluated every 1 month after treatment using the WMFT. Furthermore, assessment using the Stroke Specific Quality Of Life (SS-QOL) scale was conducted just before and 1 month after an injection of botulinum toxin during the 2nd year. The performance time of the WMFT was reduced 1-2 months after injection, and this improvement persisted until 3 months after injection. SS-QOL findings revealed improvement in work, mood, energy, and social roles. He could continue work for 8 years until retirement and is still receiving botulinum toxin treatment.

DISCUSSIONS: In this study, we accurately judged the effect duration of botulinum treatment by measuring the task performance time of WMFT. Because WMFT is performed with flexion and extension of the finger, it could confirm the degree of improvement in upper limb spasticity in the actual movement. SS-QOL evaluation revealed improvement in items such as work and mood. Thus, the mental burden due to work could be reduced in this patient by treatment of his upper limb spasticity.

CONCLUSIONS: Assessment using WMFT is useful for assessing the long-term effect measurement after botulinum treatment for upper limb spasticity. Continued botulinum treatment in the long-term may improve the QOL of patients and have a good influence on their working ability.

LOW BACK PAIN IN ADOLESCENTS WITH SCOLIOSIS AND KYPHOSIS

Slavica D. Jandric, PROF, Predrag Kragulj, MD, and Drenka Šćezerov Zečević, Academician

OBJECTIVES: The presence of the low back pain in adolescents could be associated with postural disturbance of the spine. The aim of this study is to investigate association of the low back pain with scoliosis and kyphosis in adolescents.

DESIGN: This cross-sectional investigation involved 106 adolescents (53 girls and 53 boys), that were selected by random selection of attended class of the elementary schools. Average age was 11.7±0.7 years, ranged from 10 to 14 years and average value of BMI was 18.8±3.2 kg/m2. Modified original The physical activity and postural disturbance test was used for investigation and all participants completed it. This test includes two parts: The physical activity test which contains, among other questions, the question about presence of the low back pain and The test of postural disturbances which was used for postural screening. Children were classified as having normal findings, flexible postural disturbance or structural, nonflexible deformity. For statistical analysis ANOVA test was used in order to estimate association of the low back pain in adolescents with postural disturbance of the spine (scoliosis and kyphosis). Differences were statistically significant on the level of p<0.05.

RESULTS: Low back pain was present in 23 adolescents or 21.7% of participants. There were 39 or 37.1% adolescents with scoliosis and 26 or 24.5% with kyphosis. Structural scoliosis was registered in 5 children or 4.8%. It was shown that there was statistically significant association between presence of low back pain and scoliosis in adolescents (p=2.257, p<0.05), but there was no significant association between presence of low back pain and kyphosis (p=1.358, p>0.05).

CONCLUSIONS: Low back pain in adolescents with postural disturbance of the spine was significantly associated with scoliosis, but not with kyphosis. These findings could be useful in practice for prevention and management as well for basis for further investigation.

LUNG TRANSPLANTATION IN ACUTE REHABILITATION - A DESCRIPTIVE STUDY

Christian A. Nicolosi, Andrew Park, MD, Jordan Wyraw, DO, Jeri E. Foster, PhD, and William Niehaus, MD

OBJECTIVES: Among subjects who have had lung transplantation a major determinant of morbidity and mortality is heavily dependent on functional status before and after transplantation. To our knowledge the functional gains during acute rehabilitation is not understood in this population. Our objective was to describe functional outcomes, discharge trends, and common comorbidities in subjects who have had lung transplantation to assist expectations for improvement for rehabilitation professionals.

DESIGN: A retrospective chart review was performed to assess the change in Functional Independence Measure, and community discharge in 21 subjects who received a lung transplantation from January 2003- July 2018 and were admitted to acute rehabilitation. Other data collected included demographic data, disease specific information, and acute hospitalization factors.

RESULTS: Subjects undergoing rehabilitation following lung transplant had a median age of 56 years old. 52% received their transplant due to Interstitial Lung Disease. Median acute hospitalization was 26 days with 6 days median amount of ventilator support post transplantation. In the Rehabilitation unit, median length of stay was 10 days and length of stay efficiency was 3.1. Median admission FIM scores were
LYMPHEDEMA PRAEcox: A CLASSIC PRESENTATION OF A FORGOTTEN DIAGNOSIS
Emily J. Kivlehan, MD, and Ana-Marie Rojas, MD
CASE DESCRIPTION: A 15 year old female with a right ankle sprain 8 months prior presented with an insidious onset of right lower extremity (RLE) swelling. Pain developed and was exacerbated by an international flight. She was no longer able to fully participate in her sports. Ice, compression, elevation, warmth, anti-inflammatory, and empiric clindamycin were trialed with no improvement. She did report pitting decreased with acupuncture. RLE MRI, pelvic MRI, and ultrasound were unrevealing of an etiology. She was referred to physiatry, and we prescribed lymphedema therapy with occupational therapy. Initial measurements revealed RLE limb volume of 16.6% larger than LLE. Compressive decongestive therapies improved symptoms. She was educated on infection prevention, provided a home exercise program, and prescribed a compressive device.

DISCUSSIONS: Lymphedema praecox is a rare, primary form of lymphedema with onset between puberty and age 35. Primary lymphedema accounts for only 1% of lymphedema and includes lymphedema congenita, lymphedema praecox, and lymphedema tarda. It has been proposed that hormones and trauma trigger previously asymptomatic underlying lymphatic abnormalities. A lower extremity is most often affected, possibly due to gravity effects, but cases have been reported in the upper extremities as well. Lymphedema can have severe effects on function and wellbeing, and in this case our patient avoided her typical physical activities. Medical complications include recurrent cellulitis and lymphangiosarcoma. Treatment consists of elevation, compression, and CDT. If severe enough, surgeries such as the Charles procedure, in which superficial tissue is removed and covered with skin grafts, can be considered.

CONCLUSIONS: Providers should be aware of lymphedema praecox. Many of the cases in the literature presented after cellulitis had already occurred. Early identification is prudent so that appropriate therapies can be initiated to prevent progression and avoid complications. Further research into lymphedema praecox may help identify optimal management strategies to limit disability.

MALIGNANT TRANSFORMATION IN CHRONIC ULCERS: A CASE REPORT
Ganesh Yadav, MBBS, MD, Snigdha Mishra, MBBS, Anil K. Gupta, MBBS, MD, DNB, CEPC, Dileep Kumar, MBBS, MS, and Sudhir Mishra, MBBS, DNB
CASE DIAGNOSIS: Awareness of the potential for an ulcer to become a Marjolin’s ulcer is important for chronic wound management. We describe here two cases of chronic ulcers progressing to malignant transformation with two completely different scenario and injury pattern.

CASE DESCRIPTION: First case was a 41 years old male, a 24 years old traumatic paraplegia with bladder bowel involvement with ulcers, one in dormant stage at right gluteal region, another as fungating mass at outer inferior quadrant of left gluteal region, with evolution of the second wound as a neoaplastic mass. Second case was a 15 year old traumatic knee injury with open wound which resulted in insensate foot and chronic osteomyelitis with recurrent ulcer with transformation to malignant ulcer.

DISCUSSIONS: This report demonstrates association between chronic wounds and malignancy. It is essential that wound-care providers are aware of the clinical signs and symptoms of malignant degeneration in chronic wounds. Clinicians should pay close attention to all old ulcers and scars on routine physical examinations and carefully note changes from prior visits. Cost of treatment can go significantly higher in such cases. Patients and caregivers should be educated on symptoms to prompt earlier presentation. The aim of the treatment for cutaneous squamous cell carcinoma (cSCC) is the complete eradication of the tumor or metastases when possible. The diagnosis of cSCC should always be considered and ruled out in a chronic non-healing lesion.

CONCLUSIONS: Both cases highlight the progression of chronic ulcer to Marjolin’s ulcer. Awareness of known risk factors for the development of cSCC and a high index of suspicion is necessary for early detection and the prevention of metastatic disease. Prompt management of a chronic non-healing ulcer may preclude the development of a malignant transformation.
CASE DESCRIPTION: 20 year old female with PTSD admitted to inpatient rehabilitation after hospitalization for six month history of epigastric pain, regurgitation, and poor intake. Patient was diagnosed with Ruminating Syndrome and throughout the course of extensive hospital stay developed generalized debility and ADL impair- ment - specifically gait - without any acute injury. During inpatient rehabilitation pa- tient received tailored rehabilitation including extensive psychological counseling and comprehensive therapy including but not limited to art, horticultural, and music therapy. Patient was discharged with significant functional improvement and outpa- tient follow-up.

DISCUSSIONS: Ruminating Syndrome and FND are functional disorders whose diagnosis of structural insult pose obstacles to effective and efficient treatment and rehabilitation. These obstacles are often compounded in the setting of co- existing psychiatric conditions. Initial attempts at standard therapy for our patient resulted in minimal progress. It was not until extensive psychological counseling and introduction of non-traditional therapy approaches including art, music, and horticulture that we saw modest improvement. This case report exemplifies the in- terdependence between mind and function and the importance of a comprehensive rehabilitation therapy.

CONCLUSIONS: Rehabilitation is a multi-disciplinary practice. It is imperative for rehabilitation specialists to appreciate how tailored rehabilitative and psychologi- cal therapy can facilitate functional improvement in patients with functional medical diagnoses, especially in the setting of coexisting psychiatric diagnoses. Our goal is to promote awareness of a wider field of functional diagnosis that are seen as treatable in the in-patient acute rehab setting and to encourage continued and further involvement of clinical psychologists and non-traditional approaches in such efforts.

MANEJO CON ONDAS DE CHOQUE RADIALES EN FRACTURA DE MULTIPLES METACARPANOS CON RETARDO DE LA CONSOLIDACIÓN REPORTE DE CASO
Andersson L. Rozo, and Johnny A. Roman
CASE DIAGNOSIS: El proceso de consolidación de una fractura depende de muchos factores externos e internos del paciente, así como físicos y biológicos. Cuando se retarda el desarrollo del mismo se pueden usar diferentes estrategias como cirugía, manejo expectante y ondas de choque buscando mejorar esa condición.
CASE DESCRIPTION: Se presenta un paciente de 27 años quien sufrió accidente de trabajo con 3 fracturas en mano izquierda con compromiso del 2,4,5 y metacarpianos. La del 4 dedo consolidó adecuadamente, pero la del 2 y 5 no lo hicieron. Se dio manejo con ondas de choque radiales en 6 sesiones a 2 Burr 2000 golpes para el 2 dedo logrando un proceso espectacular consolidación ósea mientras que en el 5 no lo hubo por que no se hizo esta intervención, luego de este proceso el paciente volvió a sus actividades laborales mejorando inclusible los arcos de movimiento así como la capacidad de agarre y presión.
DISCUSSIONS: Se tuvo el 2 dedo como intervención y el 5 dedo como control dentro del mismo paciente, lográndose consolidación completa como esta descrito en la bibliografía en casos previo con ondas de choque radiales pero en este caso se logró con el 5, además mejorando en arcos de movimient y capacidad de hacer pinzas y presión, aunque no hubo mejora sobre la aligia. Se encontró que con las ondas de choque se logró realizar el proceso biológico de osteo formación adecuada para lograr que se consolidará.
CONCLUSIONS: Se ha demostrado que el manejo con ondas de choque es efectivo como un procedimiento terapéutico, se considera más económico y prácticamente libre de efectos secundarios para facilitar la consolidación retardada en fracturas en metacarpianos. Además de este proceso comprobado con el seguimiento en radiografía, también se puede ayudar a dar funcionalidad así como el reintegro a las actividades diarias del paciente.

MARBURG VARIANT: AN ACUTE RAPIDLY PROGRESSIVE TYPE OF MULTIPLE SCLEROSIS WITH EXTENSIVE DEMYELINATION
Nanichi A. Ramos Roldan, MD
CASE DIAGNOSIS: 25 year old female with rapidly progressive Marburg var- iant Multiple Sclerosis
CASE DESCRIPTION: Case of 25 year old right handed female who presented with memory difficulty, disorientation, slurred speech, and weakness of one day du- ration. Patient's head CT from referring hospital was remarkable for bilateral fronto- temporal hypodense lesions. On brain MRI from our institution multiple brain lesions suggestive of active demyelinating disease were identified. She had repeat imaging less than one week after admission with rapid progression of these lesions. Physical exam was remarkable for right hemiplegia, hyperreflexia, aphasia and pseudobulbar affect. Dur- ing therapies at hospitalization she was able to ambulate with standard walker. She continued rehabilitation program at home. A week after discharged patient had nausea and vomiting and was readmitted due to exacerbation of disease. On follow up brain imaging brain lesions were confluent. Weakness was now noted on left lower extrem- ity, and patient was started on rehabilitation program again during hospitalization, meeting goals of ambulation despite new neurological deficits.
DISCUSSIONS: Marburg variant multiple sclerosis is a rapidly progressive de- myelinating disease. It is an acute malignant form of multiple sclerosis characterized by multiple rapidly evolving brain lesions. Patients with this variant typically die within weeks to months. Brain Imaging is characterized by tumor like demyelinating plaques. Patients usually do not respond to treatment with steroids or plasma ex- change. However, in recent reports, response to cyclophosphamide has been shown. Patients treated early with cyclophosphamide have responded with increase in lifespan of up to 3 years after diagnosis.
CONCLUSIONS: Physicians should be aware of this unusual and rapidly pro- gressive variant of Multiple Sclerosis which continues with new options for treat- ment. Rapid identification of variant is essential for quicker treatment with non- established pharmacological therapies. Starting rehabilitation program during acute phase of disease leads to maximization of independence and functionality during progression of disease.

MECHANICAL IN-EXSUFFLATOR APPLICATION IMPROVED THE PEAK COUGH FLOW IN A PATIENT WITH MULTIPLE SYSTEM ATROPHY: A SINGLE-SUBJECT DESIGN
Ryoma Tanichi, RPT, Mayu Ueki, OTR, Yoshinobu M. Sato, RPT, Takako Makino, MD, Chigusa Watanabe, MD, PhD, and Yoshitide Harada, MD, PhD
OBJECTIVES: Multiple system atrophy (MSA) is a progressive neurodegenerative disorder leading to respiratory failure, which results from ineffective removal of airway secretions. In particular, vocal cord abductor paralysis is a specific feature of patients with MSA, and it can cause a reduction in their peak cough flow (PCF). Me- chanical in-exsufflator (MI-E) application is an effective method than manually as- sists coughing following maximum inspiration by air stacking, for improved PCF in patients with neuromuscular disease, as reported in numerous studies. However, it is unknown whether these methods can be applied in MSA. The purpose of this study was to demonstrate a short-term increase in PCF after MI-E application in a pa- tient with MSA.
DESIGN: A 61-year-old male patient with MSA took training in accordance with our hospital protocol. An ABA′B′ single-subject Design was adopted, and each phase lasted 1 week. Phases A and A′ consisted of manually assisted coughing training fol- lowing maximum inspiration by air stacking only. Phases B and B′ consisted of a combination with the above training and MI-E application. The PCF and vital capac- ity (VC) were measured across the four phases. Data were plotted, analyzed visually, and a two-standard deviation band method was used to evaluate improvement.
RESULTS: During A phase, the mean and standard deviation PCF value was 48 ± 24.6 L/min. Increases in the PCF in phases B (101 ± 37.8 L/min) and B′ (154 ± 32.9 L/min) were observed. There were no changes in VC during any of the phases.
CONCLUSIONS: Based on visual analysis and a two-standard deviation band method, MI-E application seemed to be useful for improving PCF over the study pe- riod in a patient with MSA. MI-E application could be effective in preventing respi- ratory complications in patients with MSA.

MEDIAN NERVE MUSCLE ELECTRICAL STIMULATION INDUCED CHANGES IN EFFECTIVE CONNECTIVITY IN SUBJECTS WITH STROKE AS ASSESSED WITH FUNCTIONAL NEAR-INFRARED
Yonghui Wang, Doctor
OBJECTIVES: The cortical plastic changes in response to median nerve muscle electrical stimulation (m-NMES) in stroke patients have not been entirely illustrated. This study aimed to investigate m-NMES-related changes in effective connectivity (EC) within a cortical network after stroke by using functional near-infrared spectro- scopy (fNIRS).
DESIGN: The cerebral oxygenation signals in bilateral prefrontal cortex (LPFC), motor cortex (LMC/RMC), and occipital lobe (LOL/ROL) of twenty stroke patients with right hemiplagia were measured by fNIRS in two conditions: (1) resting state and (2) m-NMES applied to the right wrist. Coupling function together with dyna- mical Bayesian inference was employed to assess m-NMES-related changes in EC among the cerebral low-frequency fluctuations.
RESULTS: Compared with the resting state, EC from LPFC and RFC to LOL was significantly increased during m-NMES state in stroke patients. Additionally, m-NMES triggered significantly higher coupling strength from LMC and LOL to RFC. The interregional main coupling direction was observed from LPFC to bilateral
motor and occipital areas in responding to m-NMES, suggesting that m-NMES could promote the regulation function of ipsilesional prefrontal areas in the functional network. m-NMES can induce muscle twitch of the stroke-affected hand involving a decreased neural coupling of the contralesional motor area on the ipsilesional motor cortex.

CONCLUSIONS: The m-NMES can trigger sensorimotor stimulations of the affected hand that sequentially involved functional reorganization of distant cortical areas after stroke. Investigating m-NMES-related changes in EC after stroke may help to further our understanding of the neural mechanisms underlying m-NMES.

MEDICINE ON THE FRONT LINES: FIGHTING THE NEW OPIUM WAR
Aaron B. Turk, MD Candidate

OBJECTIVES: To identify the nature, magnitude, and impact of the opioid epidemic; describe the effects of the opioid epidemic on individuals, families, and society; discuss the origins and supply sources of the opioids involved in the opioid epidemic, as well as the opioid epidemic’s historical context; describe potential means to decrease the availability and use of opioids; and describe potentially effective medical approaches to reverse the effects of opioid use and addiction.

DESIGN: Qualitative Case Study

RESULTS: The opioid epidemic has been devastating for America, and is progressively growing worse.

CONCLUSIONS: While it may be convenient for us as medical professionals to assign responsibility for fighting the opioid epidemic to the police departments in each locality, we cannot escape the fact that physicians are faced with the practical reality of this epidemic on a daily basis, both in the hospital setting and in private practice. As such, physicians have no choice but to become part of the battle against this threat. With training and knowledge of the best approaches to fighting this epidemic, physicians can serve an important and vital role in combating this epidemic on the front lines of the war on opioids.

METHODOLOGY OF A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED, DOSE RANGING, MULTI-CENTER TRIAL TO EVALUATE THE EFFICACY AND SAFETY OF DAXIBOTULINTUMOXINA FOR UPPER LIMB SPASTICITY IN ADULTS AFTER STROKE OR TRAUMATIC BRAIN INJURY
Atul T. Patel, MD, MHSA, Michael Munin, MD, Conor J. Gallagher, PhD, Merlin M. Njooja, MSC, and Daniel B. Snyder, PhD

OBJECTIVES: DaxibotulinumtoxinA for injection (DAXI; investigational) is a purified 150 kDa botulinum toxin type A devoid of accessory proteins in a lyophilized powder containing a proprietary stabilizing excipient peptide, with no animal-derived components or human serum albumin. An unmet need exists among spasticity patients and caregivers for a longer lasting treatment, and it is estimated less than 20% of patients receive treatment. Objective: To compare the safety and efficacy of a single treatment of DAXI at low, medium, and high doses versus placebo in reducing muscle tone of adults with upper limb spasticity (ULS) after a stroke or traumatic brain injury (TBI).

DESIGN: A Phase 2, randomized, double-blind, placebo-controlled, parallel-group, dose-ranging, 36-week, multi-center trial of 128 subjects; 18

CONCLUSIONS: Our results suggest that a reduction of ambulation capacity in children with CP as these factors increase quality of life. Children with CP have a greater energetic demand on movement than typically-developed (TD) children and demonstrate a reduction in walking ability as they age. Although weakness and inefficient movement play a role in the increased energetics, they do not completely explain the effect. Skeletal muscles are energetically demanding; the capacity for energy production is dictated by mitochondrial function, and mitochondrial function is strongly associated with movement capacity. Consequently, exploring the relationship between mitochondrial function and mobility may provide insight into increased energetics of movement.

DISCUSSIONS: To our knowledge, this is the first case describing infantile fibrosarcoma presenting as a BPI. Neonatal BPI is relatively common in pediatrics with incidence of 1/200. Most commonly the injury is related to complications during delivery and 50-90% of the patients recover without significant functional limitations. However, it is critical to recognize that certain conditions such as spinal cord injury and cancer can mimic BPI. Our patient’s history and examination were not consistent with BPI. Infantile fibrosarcoma is a spindle cell tumor with incidence of 24.5% of all soft tissue sarcomas in the first year of life. It has excellent prognosis with 5 year survival rate close to 90% when treated. Our patient’s arm function improved after being treated with chemotherapy.

CONCLUSIONS: This case emphasizes the importance of a thorough history and comprehensive physical exam to exclude mimics of BPI as well as the significance of interdisciplinary team communication.

MITOCHONDRIAL FUNCTION IS POSITIVELY ASSOCIATED WITH AMBULATORY CAPACITY IN FUNCTIONALLY AMBULATORY CHILDREN WITH CEREBRAL PALSY
Marysol Encarnacion, MSPH, Deborah Gaebler-Spira, MD, and Sudarshan Dayanidhi, MS, PhD

OBJECTIVES: Cerebral palsy (CP) is the most common pediatric physical disability worldwide, impacting children’s ability to function independently. Children with CP have varying functional abilities, which can be characterized using the Gross Motor Function Classification System (GMFCS) scale (lower levels showing higher functional capacity). Mobility and ambulation are rehabilitation goals for children with CP as these factors increase quality of life. Children with CP have a greater energetic demand on movement than typically-developed (TD) children and demonstrate a reduction in walking ability as they age. Although weakness and inefficient movement play a role in the increased energetics, they do not completely explain the effect. Skeletal muscles are energetically demanding; the capacity for energy production is dictated by mitochondrial function, and mitochondrial function is strongly associated with movement capacity. Consequently, exploring the relationship between mitochondrial function and mobility may provide insight into increased energetics of movement.

DESIGN: We explored this relationship using clinical measures and respirometry data. Biopsies (n=19) collected from muscles used for walking were obtained from children GMFCS I-III during clinical surgical care. These were analyzed to directly measure maximal mitochondrial phosphorylation and electron transport chain flux capacity. Ambulatory capacity was measured using 6-minute walk tests (n=7), muscle strength, and gait velocity (n=15) during routine therapy visits.

RESULTS: Functionally ambulatory children showed positive associations between mitochondrial function and ambulatory capacity measures (r2 values for gait velocity=0.39, muscle strength=0.33, 6-meter walk test=0.34, p< 0.05). Children with greater ambulatory capacity also had greater mitochondrial function.

CONCLUSIONS: Our results suggest that a reduction of ambulation capacity in children with CP may be explained in part by reduced mitochondrial function. These findings could inform future pediatric rehabilitation treatments that leverage the plasticity of the mitochondrial network.

MITOCHONDRIAL POLYMERASE GAMMA GENE MUTATION PRESENTING AS STATUS EPILEPTICUS AND LIVER FAILURE
Moorice Caparo, MD, and Susan Quinn, MD

CASE DIAGNOSIS: POLG Mutations

CASE DESCRIPTION: A 13-month-old boy with no past medical history presented to an acute care hospital due to first time seizure and status epilepticus in the setting of a RSV infection recently diagnosed by his pediatrician. The patient was intubated on site by EMS for airway protection and he was then admitted to the

MIMICS OF BRACHIAL PLEXUS INJURY: INFANTILE FIBROSARCOMA
Mi Ran Shin, MD, and Olga Morozova, MD

CASE DIAGNOSIS: Infantile fibrosarcoma

CASE DESCRIPTION: A 5 day old baby boy was admitted with the concern of neck mass. He was delivered vaginally without complication after an uneventful pregnancy with birth weight 2.6 kg. Ultrasound revealed right hemidiaphragm paralysis and right neck hematoma with increased vascularization. PM&R was consulted for right “Erb’s palsy.” On exam, the newborn had a right neck mass, no active neck or bilateral upper limb movements, and weak palmar grasp. Deep tendon reflexes in the upper limbs were not elicited. PM&R team did not find that the history and exam were consistent with traumatic brachial plexus injury (BPI), but was concerned about spinal cord injury and/or compression. Immediately, PM&R team recommended an MRI to the NICU team. The findings on the neck MRI were suggestive of infantile fibrosarcoma compressing cervical spinal cord. The patient was treated with chemotherapy and started showing improved arm movements within two weeks.

DISCUSSIONS: To our knowledge, this is the first case describing infantile fibrosarcoma presenting as a BPI. Neonatal BPI is relatively common in pediatrics with incidence of 1/200. Most commonly the injury is related to complications during delivery and 50-90% of the patients recover without significant functional limitations. However, it is critical to recognize that certain conditions such as spinal cord injury and cancer can mimic BPI. Our patient’s history and examination were not consistent with BPI. Infantile fibrosarcoma is a spindle cell tumor with incidence of 24.5% of all soft tissue sarcomas in the first year of life. It has excellent prognosis with 5 year survival rate close to 90% when treated. Our patient’s arm function improved after being treated with chemotherapy.

CONCLUSIONS: This case emphasizes the importance of a thorough history and comprehensive physical exam to exclude mimics of BPI as well as the significance of interdisciplinary team communication.
intensive care unit. His hospital course was complicated by refractory status epilepticus requiring multiple AEDs and liver failure. Once medically stable, patient was admitted for comprehensive pediatric rehabilitation. During his rehabilitation stay, genetic testing was finalized and he was found to have a mitochondrial polymerase gamma (POLG) mutation. His seizures were controlled with a combination of oxcarbazepine, clonazepam, levetiracetam, and lacosamide. His POLG mutation was managed with an IV mitochondrial cocktail consisting of N-Acetylcysteine, carnitine, riboflavin, thiamine, and folic acid. Given the severity of his genetic condition, goals of care were discussed.

DISCUSSIONS: POLG is a mitochondrial polymerase responsible for mitochondrial DNA replication. Mutations in POLG can cause a wide range of disorders, which vary in both age of onset and severity. These disorders comprise a continuous spectrum of overlapping symptoms and signs; and range from a rapidly fatal infantile cerebrohepatic disease to a progressive external ophthalmoplegia (PEO) that may not present until the sixth decade of life. POLG-related epilepsy is clinically heterogeneous, and the prognosis is, in part, influenced by the location of the variants in the gene and the presence of hepatic involvement. Medical management includes a combination of N-Acetylcysteine, carnitine, riboflavin, thiamine, and folic acid. There is a lack of research regarding management of POLG mutations in the post-acute setting.

CONCLUSIONS: Early diagnosis of POLG mutations can have a significant difference on the management and goals of rehabilitation therapy. More research needs to be conducted on the post acute management of POLG mutation.

MOBILIZATION OF EFFECTIVE MIND-BODY EXERCISE ON LOCAL COERULEUS-NOREPHINEPHINE AND VENTRAL TEMENTAL AREA-DOPAMINE SYSTEM IN INDIVIDUALS WITH MILD COGNITIVE IMPAIRMENT – A MULTIPLE MODEL MRI STUDY

Jing Tao, PhD, Rui Xia, PhD, Mou Li, N/A, Maoma Huang, Zhuzhen Li, Xiuli Chen, Joel Park, Georgia Wilson, Guang Xie, Guohua Zheng, PhD, Lidan Chen, PhD, and Jin Kong, PhD

OBJECTIVES: Mild cognitive impairment (MCI) is a common global health problem with unsatisfactory pharmacological treatments. This study aims to comparatively explore the modulation effect of Baduanjin, a popular mind-body exercise, and physical exercise on the cognitive function of patients with MCI.

DESIGN: 69 patients were randomized to Baduanjin, brisk walking, or healthy education control group for six months. The Montreal Cognitive Assessment (MoCA) and magnetic resonance imaging (MRI) scans were applied at baseline and at the end of the experiment. The resting state functional connectivity (rsFC) of key regions of the norepinephrine (locus coeruleus, LC) and dopamine (ventral tegmental area, VTA) systems, as well as grey matter volume changes (post-intervention minus pre-intervention) in key regions as indicated by rsFC analysis was investigated.

RESULTS: Compared to the brisk walking, the Baduanjin group significantly increased MoCA scores and increased the right LC and left VTA rsFC with the right anterior cingulate cortex (ACC). The rsFC of the right LC-right ACC and left VTA-right ACC were significantly associated with corresponding MoCA score after six months training across all subjects. Furthermore, we found increased grey matter volume in the right ACC in the Baduanjin group compared to the brisk walking and control groups.

CONCLUSIONS: Our results suggest Baduanjin can significantly modulate rsFC of norepinephrine (LC) and dopamine (VTA) systems, which may shed light on the mechanisms of mind-body intervention and aid in the development of new treatment for MCI.

MOVING TOWARDS SETTING MEASURABLE GOALS IN OCCUPATIONAL THERAPY TREATMENT DURING SUB-ACUTE REHABILITATION

Aliza Sagiv, MA, OTR, Yiftat Schwartz, MA, OTR, Tal Shatkani, and Aida Dynia

CASE DIAGNOSIS: Setting measurable goals during occupational therapy (OT) treatment is meaningful for the patient as well as an important tool for measuring improvement and change during the rehabilitation period. The challenge can be in setting functional goals during the sub-acute phase of rehabilitation that address components needed for a specific function are necessary.

CASE DESCRIPTION: The occupational therapy treatment plan refers to basic and extended activities of daily living (ADL), work and leisure, as well as functional components. In order to implement the treatment plan, as well as to inform the entire health care team regarding treatment focus, we started a process aimed at incorporating measurable treatment goals in periodic reports.

DISCUSSIONS: We encountered some obstacles including the difficulty of anticipating the dynamics of patients in sub-acute conditions. This difficulty leads the OT to avoid setting concrete challenges which might not be realistic. In addition, since the OT wanted to improve many different functional components, very often the goals were very general and not measurable. In order to overcome these challenges and institute the changes in measurable goal setting among the occupational therapists, we developed a database of goal examples. The OT staff underwent training in choosing goals from the database that was developed.

CONCLUSIONS: Before starting the implementation of the process we found that only 14% of the reports included measurable goals. Quarterly measurements, over the past year and a half, show a gradual increase in the setting of measurable goals and we are now at a point where 88% of the reports include measurable goals. It is still necessary to continue the implementation process in order to reach an even higher percentage. Furthermore, we intend to examine the effect of using measurable goals on patient satisfaction as well as its impact on other members of the treatment team.

MULTICENTER TESTING OF LONGSHI SCALE IN ASSESSMENT OF DISABILITY

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OBJECTIVES: Our previous publication suggests that pictorial-based Longshi scale could potentially provide an efficient way to assess activity of daily living of functional disabled patients. This study is to investigate factors that may influence disability assessment using Longshi Scale and the differences between Longshi Scale and Barthel’s modified Rankin(mRS) scales.

DESIGN: This is a cross-sectional study. We enrolled 721 subjects with disability in 9 urban hospitals located in the two provinces of Southeast China. The assessment was performed by both professionals and non-professionals. -test, ANOVA, Pearson correlation test and multiple liner regression were performed to analyze group differences and identify explanatory variables.

RESULTS: Longshi Scale had a strong positive correlation with Barthel’s Scale (r=0.868, P< 0.01) and a weak negative correlation with mRS (r=-0.185, P< 0.01). There were no statistical difference in the Results between the professionals’ and the non-professionals’ assessments using Longshi Scale (P=0.115). Both professionals and non-professionals utilized less time to complete assessment using Longshi Scale than using Barthel’s Scale (P< 0.01). There were significant differences in scores obtained among 9 hospitals in the two provinces of Southeast of China (F=8.034, P< 0.01). Social activities of subjects with disability can be positively predicted with the scores of Longshi Scale (Beta=0.251, P=0.001) as well as Barthel’s Scale (Beta=0.276, P< 0.01). Age had a weak negative correlation with Longshi scale (r=-0.163, P< 0.01).

CONCLUSIONS: The level of training does not cause significant variation in Longshi scale assessment; however, there are differences among different regions. Longshi scale has strong correlation with Barthel’s and weak correlation with mRS with shorter time of assessment and has the capacity to predict social activities of subject with disability.

MULTIDISCIPLINARY INPATIENT REHABILITATION APPROACH TO A PEDIATRIC PATIENT WITH FEBRILE INFECTION-RELATED EPILEPSY SYNDROME

Amanda Day, DO, Angela Sinner, DO, and Kathleen Von der Haar, MD

CASE DIAGNOSIS: Febrile Infection-Related Epilepsy Syndrome (Fires).

CASE DESCRIPTION: A previously healthy 10-year-old female presented with altered mental status as well as six-day history of fever, rhinorrhea, and headache. Initial laboratory and imaging findings were unremarkable. Shortly after admission to acute care the patient developed refractory status epilepticus. After extensive diagnostic evaluations throughout a prolonged hospitalization the patient was ultimately diagnosed with FIRES. Following hospitalization, complicated by significant refractory seizures, the patient was transferred to inpatient pediatric rehabilitation for multidisciplinary therapy. Initial rehabilitation examination noted fluctuating cognition as well as an apparent weakness in all limbs, with no movement demonstrated in bilateral lower limbs. A tracheostomy and gastrostomy tube were present. She was dependent for self-cares and bed mobility. Given significant lower limb weakness, electromyography was performed which demonstrated critical illness polyneuropathy.

DISCUSSIONS: Throughout her rehabilitation course, the patient continued experiencing seizures despite optimal medication. Her cognitive achievement was exhibited by inconsistent orientation. Fluctuating seizure activity impacted ability to participate in therapies. However, with gradual functional improvements the patient was decannulated and nutrition transitioned to oral. On rehabilitation day 88 she was discharged.
MULTI-MODAL AND MULTIDISCIPLINARY THERAPY FOR PAIN MANAGEMENT

Neha Shah, DO; Gaurish Soni, DO; Helen Afolarin, PHARM.D, MBA; Latanya Kennedy, DNP, MSN, APRN, ACNS-BC; and Victor Foosov, MD

OBJECTIVES: Problem Statement: Therapeutic duplication is the practice of prescribing multiple medications for the same indication or purpose without clear indications, leading to medication errors that reach the patient. All PRN pain medication orders are required to contain indications and parameters. In FY 19, only 60% of the PRN pain medication orders were found to be compliant and resulted in therapeutic duplication. Goal/Benefit: Create a multi-modal pain order set to improve PRN pain medication compliance to 90% by the end of FY 19. To integrate non-pharmacological agents in the pain order set to address pain early and aggressively.

DESIGN: Methods: DMAIC methodology. A literature review was performed to develop a standardized pain order set, which included multi-modal pharmacological agents and non-pharmacological pain agents (spiritual care pain relief program, psychological measures, TENS unit, hot/cold packs, etc.) Interventions: house-staff education-orders must contain clear instructions on when to administer each medication. Implementing a standardized pain order set. Ongoing audits to demonstrate compliance

RESULTS: - 92% pain medication order compliance in 6 months time frame-addressing overlapping parameters, missing indications, missing parameters and gaps in parameters. 63% percent pain order set utilization, with ongoing utilization. Increased use of non-pharmacological agents to address pain.

CONCLUSIONS: - Pain management order sets help ensure that the construction of PRN opioid orders have clear indications, avoidance of therapeutic duplication, and medical errors. The rising use of opioids to treat chronic pain is tied to a greater number of opioid prescriptions written by providers with limited training in pain management and addiction. Non-pharmacological strategies should be incorporated within pain order sets to restore function, mobility and reduce psycho-social stressors contributing to pain. Order sets should be developed with pain management experts and be accompanied by clinical education to ensure safe administration

MULTIPLE BARRIERS IN OBTAINING AN OPTIMAL REHABILITATION OF RETT SYNDROME IN INDONESIA: A CASE REPORT IN ICF ANALYSIS

Nita T. Reyne, PMR Resident, Dian M. Sari, Physiatrist, Farida Arisanti, Physiatrist, and Marietta Shanti, Physiatrist

CASE DIAGNOSIS: Rett syndrome (RS) is rare and predominantly affects girls. It is characterized by normal infancy followed by the loss of acquired behavioral, social and psychomotor skills. Hand-washing movement is typical. Mutation in methyl-C-phosphate-G-binding protein 2 is responsible for the modifications of neuron function in RS.

CASE DESCRIPTION: A five-year-old girl born from non-consanguineous parents, whom mother had a history of uncomplicated pregnancy and full-term normal delivery, presented to Rehabilitation Department and diagnosed with cerebral palsy (CP) two years ago, however, as time went by the characteristics of CP were seemed unlikely. Psychomotor retardation, hand-washing and mouthing movements, autistic-like syndrome, hyperventilation and breath-holding, as well as cold and bluish hands and feet were evident at the age of one and seizure at the age of three. Microcephaly was recorded since the age of four. Nowadays, she has treated as stage three RS although genetic testing has not been done due to its unavailability in Indonesia and no insurance coverage. Although her family finds it difficult to accept her diagnosis and prognosis, they are quite cooperative.

DISCUSSIONS: Formerly, she was diagnosed as CP Delay in recognizing and diagnosing RS, unavailability of insurance, and economical issues contribute to delayed optimal rehabilitation. Currently, pediatricians, pediatric neurologists, adult neurologists and physiatrist do not recognize this syndrome well. Now, she can have the Pediatric and Rehabilitation session regularly after covered by national health insurance.

CONCLUSIONS: The problems arise in low-income and developing countries may seem cliché. Low awareness and compliance, misdiagnosis, and inadequate management form a vicious cycle. Assessing children with developmental disabilities is challenging. Improvement of RS awareness as well as health services, systems and policies are expected in the future. Introduction to rare diseases should be done during specialist education. Therefore, the correct diagnosis may help in addressing issues related to disease management and working with immediate family.

MULTIPLE SCHEROIS MASQUERADING AS TRANSVERSE MYELITIS

Brant Smith, DO, Gaurish Soni, DO, and Padma Sriririnjui, MD

CASE DIAGNOSIS: Multiple Sclerosis presenting with acute, severe progression.

CASE DESCRIPTION: 53 year-old female with no past medical history who presented to a local community hospital with new-onset lower extremity weakness. She had progressive numbness from abdomen radiating to her back and down her legs. Patient was given a five-day course of steroids without improvement. There was further progression of the lower extremity paralysis and sensory loss from feet to her breasts. This was accompanied with new onset urinary retention. MRI Brain and spine revealed widespread communicating hydrocephalus, cord atrophy, and mild T1 hyperintensity consistent with multiple sclerosis. The patient was subsequently transferred to a tertiary center after failed high-dose steroid course. Patient was treated with therapeutic plasma exchange (PLEX) for acute attack of severe, steroid-refractory multiple sclerosis and eventually admitted to acute inpatient rehabilitation.

DISCUSSIONS: Multiple sclerosis is a well-studied disease that attacks the myelinated axons in the nervous system through a chronic autoimmune, inflammatory process. The severity of demyelination varies, and it’s progression can be unpredictable. The diagnosis is made with three presenting features. First, at least two different lesions within the white matter of the CNS. Second, the disease course must have some interval time between symptom presentation. In our case, the interval time was non-existent to minimal between symptom onset and disease course advancement. Lastly, CSF is obtained to confirm chronic inflammation.

CONCLUSIONS: The patient presented with what appeared to be acute transverse myelitis with motor and sensory loss below an identified spinal cord level. MS presenting acutely can involve an array of symptoms with varying degree; however, it is unusual that it presents as a rapidly, progressive symmetric weakness mimicking a myelitis with a spinal cord level. Based on the diagnostic criteria aforementioned, this case is an outlier in the interval between symptom presentation.

MULTISENSORIAL STIMULATION IN VERTICAL STANDING FOR VISUALLY IMPAIRED KIDS

Martino Avellis, PT

CASE DIAGNOSIS: In many clinical descriptions of children affected by CP, we have to face visual impairments or blindness, an added element of disability; besides having any difficulties in the psychomotor area, the visual impairments could complicate the rehabilitation path. For example, kids affected by blindness or visual impairments find it particularly hard to keep an upright posture even with the aid of traditional vertical stabilizers, which makes it more difficult for them to gain awareness of trunk control and lower limbs loading. Their perception of motion and of their own bodies is also often altered. That’s why we developed a vertical stabilizer that provides a sensory stimulation as it keeps the standing position.

CASE DESCRIPTION: The multisensory standing can be connected to an electronic device (e.g., tablet, smartphone, PC, radio…) thus providing the kid with audio and visual stimulation, while spreading the vibration produced by the sound in the whole frame. The focus on the pallesthesia is really important for visual impaired or blind kids (but also in other pathology groups) especially in order to give them an experience of body acknowledgement. Multisensory stimulation is very useful, for example, when the rehabilitation targets eye-hand coordination (with visually impaired kids) or sensory perception (with blind kids).

DISCUSSIONS: We are currently testing the reactions of a group of 10 kids at Hollman Center, a scientific institute specialized in supporting visually impaired children. The age range within the group is 24-48 months and the clinical situation is visual impairment/blindness associated to a CP or severe syndromes.

CONCLUSIONS: The test consists in using the standing in a standard configuration (without sensory stimulation) and in a multisensory configuration (with device connection). Our aim is to analyze the differences in compliance, attention, motivation and gratification, and performances.
MYOPATHY WITH TICK-BORNE ILLNESS: A CASE SERIES
David M. Crandell, MD

CASE DIAGNOSIS: According to the CDC, there were 5,323 confirmed cases of Lyme Disease in New England in 2017, making the region the epicenter of the disease. Limited information about the rehabilitation needs of individuals with Tick-Borne Illness (TBI) is available. This review of three patients with TBI who were admitted to an Inpatient Rehabilitation Facility with the diagnosis of myopathy.

CASE DESCRIPTION: The first patient, a 67-year-old male, experienced symptoms of malaise, fatigue, joint pain and weight loss. He was diagnosed with Lyme Disease and placed on Doxycycline. He developed worsening lethargy, fatigue and increase difficulty with ambulation with significant weakness in his legs and bilateral deltoids. A muscle biopsy was inconclusive. The second patient, a 69-year-old male, presented after fall due to leg weakness while on vacation in Martha's Vineyard. He had profound rhabdomyolysis and subsequent testing revealed acute Lyme Disease and a co-infection with Babesia. The third patient, a 60 year-old male, presented with flu-like symptoms and altered mental status and was found to be in septic shock from Anaplasmosis. His acute hospital course was complicated by hypoxic respiratory failure, acute renal failure and difficulty weaning from the ventilator requiring tracheotomy placement. He was diagnosed with a critical illness myopathy.

DISCUSSIONS: All three patients were subsequently transferred to an acute rehabilitation facility and received comprehensive interdisciplinary rehabilitation with noted improvement and a home discharge. Each patient was primarily impacted by their myopathy and generalized deconditioning. Identified problems included impaired mobility, difficulty with self-care and some neurogenic pain. Rehabilitation interventions included therapeutic exercise, gait aids, bathroom and safety equipment, orthotics, and pain management.

CONCLUSIONS: This case review demonstrates that patients with TBI with myopathy exhibit a high degree of functional impairment and may benefit from acute rehabilitation.

NEUROREHABILITATION TECHNIQUES TO REDUCE WEIGHT-BEARING ASYMMETRY IN STANDING AFTER STROKE: A SYSTEMATIC REVIEW WITH META-ANALYSIS
Grégoire Jeanson, MD, Rémi Gimot, MD, Camille Lemaire, MD, Marc Hommel, MD, PhD, and Dominic Pèrennou, MD, PhD

OBJECTIVES: After a stroke, loading lower limbs roughly symmetrically is a condition to recover balance and gait abilities, so represents a major rehabilitation challenge. Many specific interventions have been proposed, never systematically reviewed. We hypothesized that active techniques reduce weight-bearing asymmetry (WBA).

DESIGN: We performed a systematic review (SR) of MEDLINE up to Dec/31/2018, with additional hand searching. We identified clinical trials (including pilot studies) dealing with WBA in static standing in individuals with a hemispheric stroke. Extracted information included type of intervention, details on WBA assessments, and balance and gait outcomes. Two independent reviewers used a standard pre-prepared form for quality assessment; any discrepancies were resolved by consensus. Randomized controlled trials with a quality >10/20 were selected for random effect meta-analysis (MA). The main outcome was the percentage of bodyweight loaded on the paretic limb. The protocol was declared in Prospero (CRD42019127959).

RESULTS: Of 11814 studies identified, 289 were eligible, and 47 systematically reviewed (1244 individuals aged of 59.3 years [5.5]; median quality score 11 [Q1-Q3:9-12]; 6 intervention types). The MA (14 studies) found a global rehabilitation effect (size effect =0.51 [95%CI=0.15-0.86]; p=0.006), with a publication bias observed.

CONCLUSIONS: We herein present a case of 58-year-old man with severe heart failure who presented to an acute inpatient rehabilitation facility after undergoing an extensive and complicated hospital course requiring implantation of a Left Ventricular Assist Device (LVAD). We show here that a patient even with severe comorbidities such as ESRD can successfully discharge to the community with a status of Modified independent with transfers, ambulation, stairs and ADLs.

CONCLUSIONS: We thus present a case of severe heart failure requiring LVAD placement complicated with progression to ESRD. While the numbers of patients living with heart failure are increasing there are limited numbers of transplants available thus the utilization of LVAD’s are increasing. When planning for discharge from acute care hospitalization, LVAD patients should be considered for acute inpatient rehabilitation.

NEW FINDING OF TRACHEOESOPHAGEAL FISTULA USING TEAM APPROACH TO REHABILITATION IN A MEDICALLY COMPLEX, FRAIL WOMAN OF LOW SOCIOECONOMIC STATUS PREVIOUSLY IMMobilIZED AFTER ASSAULT CAUSING TRAUMATIC BRAIN INJURY
Andrew V. Tsitsilias, MD

CASE DIAGNOSIS: A 34-year-old, previously healthy, African American female presented with traumatic subdural hematoma after assault complicated by a prolonged hospital course requiring medically induced coma, delayed tracheostomy placement, and Percutaneous Endoscopic Gastrostomy tube insertion converted later to Gastrostomy-Jejunostomy tube due to recurrent multidrug resistant aspiration pneumonia. Upon arriving to the inpatient rehabilitation facility, retroposion of barium was visualized on modified barium swallow study leading to a new diagnosis of tracheoesophageal fistula at the carina.

CASE DESCRIPTION: During the rehabilitation course, after a 3-month acute care hospitalization, modified barium study was repeated to evaluate for continued aspiration. The speech therapist and radiation technologist visualized retrograde barium expulsion into the trachea without evidence of oropharyngeal dysfunction. Through a team-based approach, an eventual diagnosis of tracheoesophageal fistula was able to be made on bronchoscopic. To that date, previous imaging studies had not identified a communication between the trachea and esophagus.

DISCUSSIONS: This patient of African American descent and low socioeconomic status who was assaulted and suffered a traumatic brain injury is another unfortunate example of a person entering the hospital as a member of an extremely vulnerable population. The speech therapist who noticed the retrospousion during modified barium swallow approached the physician, which allowed for critical, specific imaging and visualization to be conducted. The patient was later evaluated for surgery to obliterate the fistula. This diagnostic workup showed the positive impact the team-based model of physiatry can have on patients.

CONCLUSIONS: Had it not been for the speech therapy and radiation technology teams, a vital diagnosis would have continued to have been missed, which undoubtedly would have led to increased morbidity in this 54-year-old, frail patient. The team approach to physiatry allowed for the minimization of aspiration risk and eventual surgical intervention, leading to a better outcome for this medically underserved patient.

NO FUNCTIONING HEART, KIDNEYS, OR GASTROINTESTINAL TRACT, BUT REHAB STILL WORKS!
Joseph M. Seldin, MD, Edward Degerman, MD, and David Nieves, MD

CASE DIAGNOSIS: We herein present a case of a 58-year-old man with severe heart failure who presented to an acute inpatient rehabilitation facility after undergoing an extensive and complicated hospital course requiring implantation of a Left Ventricular Assist Device (LVAD).

CASE DESCRIPTION: 58-year-old man with a severely dilated nonischemic cardiomyopathy with biventricular systolic heart failure (EF 15%), who underwent LVAD implantation. His post LVAD course was complicated by right heart failure, tracheostomy, pancytopenia/ischemic colitis s/p subtotal colectomy, subtotal cholecystectomy, end-ileostomy, gastrostomy, chronic renal disease progressing to ESRD requiring HD. With the patient’s strength gradually improving, PM&R was consulted. The patient remained hospitalized and followed closely until discharged to Acute Rehab with maximum assist for ambulation and minimum assist for transfers and ADLs. The patient participated in a vigorous rehabilitation program and was managed by physiatry and nephrology. The patient made functional gains and was able to be successfully discharged to the community with a status of Modified independent with transfers, ambulation, stairs and ADLs.

DISCUSSIONS: LVAD use for patient with severe heart failure as a bridge to heart transplant or destination therapy are increasing rapidly in the United States. We show here that a patient even with severe comorbidities such as ESRD can successfully participate in vigorous rehabilitation and benefit from acute inpatient services. Proper training regarding LVAD equipment and medical management for staff is needed however, in order to accommodate LVAD patients and can be accomplished in a timely manner.

CONCLUSIONS: We thus present a case of severe heart failure requiring LVAD placement complicated with progression to ESRD. While the numbers of patients living with heart failure are increasing there are limited numbers of transplants available thus the utilization of LVAD’s are increasing. When planning for discharge from acute care hospitalization, LVAD patients should be considered for acute inpatient rehabilitation.

NON-ALCOHOLIC THIAMINE DEFICIENCY WITH RESULTANT ENCEPHALOPATHY AND LOSS OF CAPACITY: A CASE REPORT
Anthony L. Cooper, DO, and Raymund Millan, MD

CASE DIAGNOSIS: Thiamine Deficiency and Wernicke Encephalopathy.

CASE DESCRIPTION: A 46 year old female with history of hypothyroidism was admitted after an elective posterior cervical decompressive laminectomy for cervical myelopathy. Of note, the patient chronically used laxatives for constipation secondary to hypothyroidism. The patient presented with 3/5 bilateral upper extremity, 4/5 bilateral lower extremity strength, and decreased sensation in her feet. She exhibited an atactic gait with ambulation. She required maximum assistance for mobility and transfers with therapy which was not consistent with her initial assessment. Her
enecomphalopathy prevented her from participating fully in therapies and she became more debilitated. As patient exhibited multiple loose stools her thiamine level was evaluated and found to be undetectable. Due to her poor capacity and insight, intravenous thiamine was administered and her thiamine level increased to 1μmol/L. She experienced resolution of encephalopathy with this treatment and was able to perform activities with modified independence upon discharge.

**DISCUSSIONS:** Wernicke encephalopathy presents with a triad of symptoms including encephalopathy, oculomotor dysfunction, and gait ataxia. Common etiologies include alcohol abuse, malabsorption disorder, or gastric surgery. In this case, the chronic use of laxatives lead to clinical pseudo-malabsorption leading to thiamine deficiency (16 items). The total raw score (0-6) of Wernicke’s encephalopathy is 2.

**CONCLUSIONS:** Thiamine Deficiency is a life threatening cause of encephalopathy requiring aggressive and early intervention. It is important to consider possible iatrogenic and patient habits when a clear etiology is not seen in the medical history. This patient overused laxatives to treat constipation secondary to hypothyroidism and developed thiamine deficiency.

**NON-TRAUMATIC BILATERAL FEMORAL NECK FRACTURES SECONDARY TO LONG TERM LMWH**
Shane N. Stone, MD, Frank Schirripa, DO, Chi-Chang D. Lin, MD, and Michael Schirripa, DO

**CASE DIAGNOSIS:** Bilateral femoral-neck fractures and left superior-acetabular fracture

**CASE DESCRIPTION:** An 85-year-old female with a history of Factor-V-Leiden Deficiency, Venous thromboembolism(on Dalteparin), lymphoma(status-post chemoradiotherapy), gastric cancer(status-post total gastrectomy and chemo-2010), and malabsorption was admitted(8/10/18) for bilateral femoral neck fractures and L. superior-acetabular fracture which occurred without fall/injury while walking at home(8/1/18) status-post bilateral hip arthroplasties. Only her right hip was symptomatic, while the contralateral fracture was an incidental finding. Despite limitations secondary to her injury, therapy included: Three hours of PT/OT 6 days/week. At discharge(8/31/18), she met prehab goals as demonstrated by FIM improvement.

**DISCUSSIONS:** Her medical history revealed non-modifiable and modifiable risk factors that increase her fracture risk. Non-modifiable factors include Age>65 years and female sex. Modifiable factors include reduced level of activity, increased fall risk, Osteoporosis(DEXA confirmed), Vitamin D and Calcium deficiency(labs were “normal” on admission). However, none of these factors explain how she experienced atrumatic fracture. Another mechanism, likely the chronic use of Dalteparin(low molecular weight heparin[LMWH]), weakened her bones enough to fracture atraumatically.

**CONCLUSIONS:** Although literature demonstrates risks of unfractionated heparin on bone fracture and osteopenia, limited research suggests that LMWH increases risk. Several studies look at pregnant women and one review includes non-pregnant patients. Data suggests potential effects on bone mineral density, but no direct fracture risk. However, there are patients on LMWH for longer periods of time and with other risk factors for fracture. Furthermore, in-vitro studies demonstrate that LMWH inhibits proliferation and protein synthesis of osteocalcin and alkaline phosphatase genes in osteoblasts. Therefore, research should be conducted on other populations and for longer periods to determine how LMWH effects osteopenia and fracture risk.

With an anticipated increased risk, there should be an increased frequency of screening with DEXA scans to assess for complications. Additionally, atrumatic fractures in this population should be screened for bilateral fractures to ensure appropriate care.

**NORMATIVE REFERENCE VALUES OF THE ALBERTA INFANT MOTOR SCALE FOR CHINESE CHILDREN**
Qing Du, PhD, and Xuan Zhou, Master

**OBJECTIVES:** The Alberta Infant Motor Scale (AIMS) is an assessment tool designed to evaluate the gross motor development. The reference values of AIMS in a cohort in Canada was determined. However, cross-cultural differences in motor performance scores of AIMS between Canadian and Brazilian children, Canadian and Dutch children have been found. The reliability and validity of AIMS in Chinese children have been reported. Whereas, the normative reference values in Chinese children have not been established. The aim of this study was to identify normative reference values of AIMS for Chinese children.

**DESIGN:** A total of 707 Chinese children (age range 0m-18m, 364 boys, 343 girls) were recruited from a birth cohort. AIMS assessments of all subjects were performed by trained examiners during 12 months, organized in 4 subscales: prone (21 items), supine (9 items), sitting (12 items), and standing (16 items). The total raw score (0-58 points) is obtained through the sum of the subscales’ scores.

**RESULTS:** The mean age of all children was 7.76±4.45 months. The mean total raw score of all children of 0-18 months was 29.88±17.98 points (0-3 months 9.22±2.43 points; 4-6 months 20.41±16.67 points; 7-9 months 36.52±9.59 points; 10-12 months 50.45±6.06 points; 13-15 months 52.30±5.47 points; 16-18 months 57.98±13.03 points). Increase trend in the total raw score was showed across age groups. Compared to the Canadian children, Chinese children demonstrated significantly lower total raw scores in most age groups.

**CONCLUSIONS:** This study presents useful normative reference values of AIMS for Chinese children. New normative reference values of AIMS for other countries is also needed.
OPEN-LIP SCHIZENCEPHALY AS A RARE CAUSE OF INFANTILE HEMIPARESIS
Nan Wang, MD, and Yuxi Chen, MD

CASE DIAGNOSIS: A boy was initially referred to rehabilitation clinic at 11 month for weakness of right arm and leg. He was born at 28 weeks by vaginal deliv- ery, and he suffered from apnea of prematurity requiring a NICU stay. At 7 months, baby was found to have increased head circumference. Head ultrasound showed an open cleft with extra-axial CSF in continuity with dilated lateral ventricles. MRI revealed a wide open gray matter cleft extending from left lateral ventricle to CSF over- lying the left brain consistent with left open lip schizencephaly.

CASE DESCRIPTION: Neuromuscular examination was remarkable for spasticity and inability to spontaneously move right upper and lower extremities, brisk deep tendon reflexes, and right hemichore and achilles tendon tightness. Physical and occupational therapies were started, and orthoses was prescribed. He received botox injection at 2 years of age for spasticity and right hamstring and Achilles tendons tightness, with clinical improvement on follow-up.

DISCUSSIONS: Schizencephaly is a rare developmental birth defect character- ized by abnormal cleft extending from the ependyma of the cerebral ventricles to pia matter. The cleft may be unilateral or bilateral, and has two morphological types, closed-lip and open-lip cleft. It is thought that a genetic or physical insult (ischemia, infection, or hemorrhage) that occurs during gestation disrupts neuronal migration, which normally forms the cerebral cortex from the germinal matrix. Patients typically present with paresis, seizures and developmental delay. The best diagnostic modality is MRI, which can identify the gray matter lining of the cleft extending from the ven- tricle to cortical surface. Treatment is mainly physical and cognitive rehabilitation, spasticity management to prevent early joint contracture, and seizure management. Orthopadic Surgery is indicated for tendon release when conservative treatment fails.

CONCLUSIONS: Schizencephaly can be considered as a differential diagnosis of infantile hemiparesis since early intervention can limit disability and improve quality of life.

ORGANIZATION OF POST-STROKE REHABILITATION SERVICES: CHANGES BETWEEN 2013 AND 2018 IN SERVICES PROVIDED BY HEALTH SYSTEM IN MONGOLIA
Baljinnyam Avirmed, PhD, Batchimeg Shirimen, MD, MS, Naranjantseg Tsegmid, MD, MS, and Batzorig Bayarsogt, MS

OBJECTIVES: Stroke related disabilities significantly decrease patients’ quality of life and post-stroke rehabilitation service is essential. Therefore, we studied post-stroke rehabilitation services and facilities provided in Mongolia between 2013 and 2018.

DESIGN: A longitudinal study was performed in a total of 47 Mongolian hospi- tals that provide stroke rehabilitation services. A questionnaire regarding the organiza- tional structure of rehabilitation units, equipment used, human resources, and adherence to recommended guidelines was developed and administered to specialists in these hospitals.

RESULTS: We recruited 47 (89%) out of 50 and 47 (94%) out of 53 hospitals delivering post-stroke rehabilitation service in 2013 and 2018 respectively. 25-34% of these hospitals provided post-stroke rehabilitation, with the majority being incapable of providing multidisciplinary team rehabilitation. The number of physiatrists and physical therapists increased significantly from 2013 to 2018 (p<.001) although the number of physical (p=.002) and occupational therapists (p=.001) was signifi- cantly lower in the rural areas. Utilization of Functional independence measures, namely, the Barthel index and modified Rankin scales were increased in 2018 com- pared to 2013.

CONCLUSIONS: The majority of post-stroke rehabilitation services are not im- proved since 2013. Consistent national programs and policies are required to provide adherence to post-stroke rehabilitation guideline recommendations and implementa- tion in clinical practice.

OSTEOCHONDRITIS DISSECANS OF THE TALAR DOME IN MONOZYGOTIC ADOLESCENT TWINS, A POSSIBLE GENETIC LINK
Evan Chernoff, DO, Saman Vojdani, MD, Matthew Pearl, MD, Wallach, MD, and David Komatsu, PhD

CASE DIAGNOSIS: Osteochondritis Dissecans of The Talar Dome in Monozyg- otic Adolescent Twins

CASE DESCRIPTION: Osteochondritis dissecans is a lesion of subchondral bone that can lead to delamination and eventual sequestration of a segment of the ar- ticular surface, with the potential for pain upon use of the affected joint. The exact cause of osteochondritis dissecans is still not known; however, it is believed that re- peated trauma and genetics play a role. Here we present two cases of pediatric mono- zygotic female twins (age 10) with similar talar osteochondritis dissecans lesions that underwent surgical intervention with arthroscopically-assisted drilling. While the eti- ology of osteochondritis dissecans remains unknown, the presence of similar lesions in these monozygotic twins, continues to support the role of genetic factors.

DISCUSSIONS: We present a rare case of medial talar dome OCD lesions in ad- olescent female homoygous twins (age 10) who underwent surgical interventions. Short-term follow-up showed this approach to be successful in treating the lesions and reducing pain. Previously described cases of OCD lesions in homozygous twins involving the medial talar dome were without surgical interventions. In addition, nu- merous other homozygous twins’ cases of OCD lesions have been reported in the el- bow, knee, and ankle, pointing to a genetic predisposition to OCD.

CONCLUSIONS: In conclusion, we present a interesting case of homozygous twins with similar medial talar OCD lesions. Although a genetic link has not been conclusively proven in all cases of OCD, this case report does raise an intriguing ques- tion regarding the genetic linkage of osteochondritis dissecans.

OSTEOCHONDROSIS SYNDROME/CENTRAL PONTINE MYELINOSIS WITHOUT SODIUM IMBALANCE
Brant Smith, DO, Gaurish Soni, DO, and Mahesh Ramachandran, MD

CASE DIAGNOSIS: Osmotic Demyelination Syndrome/Central Pontine Myelinosis without Sodium imbalance

CASE DESCRIPTION: 68 year old male with a history of alcohol abuse presented for a fall resulting in right shoulder pain. Was found to have a closed nondisplaced R humeral fracture and underwent open reduced internal fixation with- out complications. Fall was thought to be due to alcohol use. Postoperatively, patient stable and began therapies. Physical Therapist noted ataxic movement and investi- gated further that patient had six months of gait impairment, leading to frequent falls. Also, hypertreflexia and mild confusion was noted so Neurology was consulted. MRI Brain was done, areas of T2 prolongation within the central pons, with mild associ- ated expansion, concerning for osmotic demyelination syndrome. Of note, there were no findings suggesting Wernicke’s encephaophathy. Patient was given high- dose intravenous thiamine and transferred for acute inpatient rehabilitation. Course was complicated by a UTI; patient was able to function at a modified-independent level and be discharged home with appropriate resources on alcohol abstinence.

DISCUSSIONS: Osmotic demyelination syndrome commonly presents with quadriaparesis and neurocognitive changes alongside specific findings on brain MRI imaging. Originally, it was thought to be a complication of rapid correction of hyponatremia, however, other medical causes have now been recognized with re- lating to serum sodium. The patient’s symptoms had been initially attributed to his al- cohol abuse, which masked his true diagnosis.

CONCLUSIONS: The diagnosis and course of this case sheds to light the impor- tance of being aware of red flags for this disease. Additionally, the importance of the therapy team in raising those red flags exemplifies the importance of integrating reha- bilitation into patient care. Without an interdisciplinary team, the patient’s care may have been compromised.

OUTCOMES IN TRANSCRANIAL DIRECT CURRENT SIMULATION STUDIES AMONG PEOPLE WITH PARKINSON’S DISEASE. A SCOPING REVIEW
Mohammad Eteom, PhD

OBJECTIVES: The aim of the study was to review the outcomes in transcranial direct current stimulation trials among people with idiopathic Parkinson’s disease (PD).

DESIGN: The current study is scoping systematic review. Comprehensive search was performed in MEDLINE and SCOPUS databases until April 2019. ICDs Inter- ventional studies irrespective the study design in idiopathic PD were included.

RESULTS: 39 studies described in 41 articles were included. The outcomes were categorized into motor, cognitive, biomarkers, and quality of life and participation. The motor outcomes were Unified Parkinson disease, part 3 (UPDRS-III), Pelle- pegboard test for fine motor skills, spatio-temporal gait analyses, balance and mobili- ty outcomes, trunk performance, freezing of gait, upper limb freezing, and standing. The cognitive outcomes were to assess memory deficits, depression, language, reaction time, decision making, cognitive-visual tasks, dementia, memory, executive functions, fatigue, sleep, spathy, attention, theory of mind, fear of fall, and auditory verbal learning. Biomarkers were functional magnetic reasoning imaging, excitability of coticospinal tract, motor cortex and H-reflex, tibialis anterior to gastrocnemius la inhibition, tibialis anterior intercortical inhibition, and corticocortical coherence.

OUTCOMES IN TRANSCRANIAL DIRECT CURRENT SIMULATION STUDIES AMONG PEOPLE WITH PARKINSON’S DISEASE. A SCOPING REVIEW
Quality of life and participation outcomes were UPDRS-II, Parkinson disease questionne-39, and SF-36 health assessment survey. Finally, there is no study assess the pain, physical activity level, dystonia, postural deformities severity, or dysphasia. CONCLUSIONS: The current evidence shows a set of motor, cognitive, bio-markers, and quality of life outcomes that address WHO ICF frameworks. However, a number of important outcomes namely pain, physical activity level, dystonia, postural deformities severity, or dysphasia were not considered. Future studies should as-sess the effectiveness of IDCS Among PD in order to firm conclusion about the efficacy of this promising intervention.

PATIENTE CON ACCIDENTE CEREBROVASCULAR (ACV) DE TRONCO: SU COMPLEJIDAD Y LA RELEVANCIA DEL ABOINDAJE INTEGRAL Y ESPECIALIZADO EN REHABILITACIÓN

Luciana Ganeu Ghione, Daiana Cheng, Ayékin Matayoshi, Miriam A. Weinberg, MD, PhD, Micaela Nelli, Cecilia Del Valle Gonzalez, Romina Campodónico, Johanna Gomezello Gilbert, Alex Flores, Mariana Pariente, Jacqueline Jacquet, Florencia Guarriello, Belén Pozzi, N/A, Gabriela Durante, Maílen A. Tamanaha, Patricia S. Jakobowicz, Ramiro Senestrari, and Mariano Ignacio Martínez Navarro

OBJECTIVES: Hematoma intraparenquimatoso mesencéfalo-protuberancial, volcado ventricular, trastornos del sensorio, ventilatorios, de pares craneales altos, modos y juegos, de la movilidad y la sensibilidad secundarias. DESIGN: Paciente de 59 años que presentó el 19/05/19 cuadro neurológico agudo con deterioro del sensorio secundario a hematoma intraparenquimatoso mesencéfalo-protuberancial con volcado ventricular. Requirió intubación orotracheal, asistencia ventilatoria mecánica. Posteriormente traqueostomía por compromiso de pares craneales bajos y mal manejo de secreciones. Evolucionó con alteración de la mirada conjugada, paresia del VII par supraunocular, hemiparesia faciobraquial y ataxia braquial derecha leve. Alimentación enteral, esfínteres en pañal, sensorio fluctuante, trastorno del habla y el lenguaje. Ingresó a nuestro Centro de Rehabilitación el 12/06/19 realizándose evaluaciones de ingreso a fin de determinar objetivos de intervención. Inició abordajes por Fonoaudiología, Terapia Ocupacional, Kinesiología motora y respiratoria, Equipo psicosocial, Fisiatría, Clínica y Nutrición. Intervenciones ajustadas a sensorio, tolerancia y fatiga de la paciente. Evaluaciones estandarizadas para objetivar evolución. RESULTADOS: Paciente con múltiples alteraciones funcionales secundarias a enfermedad de base. Objetivos del tratamiento: cuidados artculares, posturales, nutricionales, respiratorios y de la piel, estimulación cognitiva, sensitiva- sensorial, deglutoria, de la comunicación, lenguaje y habla, entrenamiento del equilibrio y funcional en actividades de la vida diaria (AVD), equipamiento acorde y rehabilitación. La paciente comenzó un proceso de rehabilitación y mejoró notablemente la movilidad, el habla, el trastorno del lenguaje y la toma de decisiones. CONCLUSIONES: Dada la complejidad inicial del caso, fueron determinantes la coordinación, integración y flexibilidad desde cada área y en conjunto, a modo de ayudar a la paciente a cumplir sus expectativas y reinsertarse en su entorno social. El compromiso funcional secundario en pacientes con accidentes cerebrovasculares de tronco, determinan la relevancia del abordaje inter y transdisciplinario consensuado, a fin de potenciar el desarrollo funcional.

PAINFUL LEGS AND MOVING TOES (PLMT) SYNDROME IN A 67 YEARS OLD PARKINSONISM PATIENT: RESPONSE TO A BOTULINUM TOXIN APPLICATION PROTOCOL

Márcia M. Amorim, Yago Castro, Roberto Prado, Airon Lima, and Wesley Cunha

OBJECTIVES: A 67-year-old female patient with progressive left foot pain for 18 months, associated with movement disorders in the same limb and occasionally in the left upper limb. She had tried several medications: Prolopa 100/25, Arnabandale 100mg, Carbamazepine 400mg/day, Amitriptyline 75mg. On examination, she has involuntary flexion and extension of the left foot, with postural predominance of equin varus foot. Pain on palpation mainly of dorsiflexors and foot eversors. In addi-tion, extrapyramidal signs in the left hemibody and patellar hyperreflexia on the left. DESIGN: Under evaluation with neurologist, there was no change in the follow-ing exams: MR, electroneuromiography(EMG), iron, vitaminB12 and VDRL test. Patient did not respond to carbamazepine increase 600 mg/day in combination with 0.375 pramipexole. We injected 1000 units of AbobotulinumtoxinA in the following left lower limb points and their doses: Gastrocnemius 300U, Soleus 100U, Later Tibialis 150U, Flexor hallucis longus 100U, Adductor hallucis 25U, Tibialis longus 100U, Tibialis extensor hallucis longus 100U and Tibialis Previous 100U. Today, one week after application, patient already reports improvement. We are awaiting reevaluation within four weeks for the report to be completed.

PALLIATIVE REHABILITATION IN END-STAGE RENAL FAILURE: A CASE REPORT

Shaun-Loong Tham, MBBS, MRCP, MMED, and Alfred Wai Ping Seng, MBBS, MRCP

OBJECTIVES: End-Stage Renal Failure (ESRF) Palliative Rehabilitation DESIGN: A 64-year-old gentleman had progressive renal disease secondary to hypertension and diabetes mellitus. He declined Renal Replacement Therapy, despite having ESRF. In August 2019, he sustained a myocardial infarction with ensuing is-chemic cardiomyopathy. The following month, he presented a posterior circulation stroke. At the time, he was given a prognosis of 3-6 months in view of his declining renal function. He was admitted for rehabilitation given his state of debility. Though he had mild neurological dysfunction, physical therapy was hampered by symptoms of ESRF. The patient underwent goal-oriented inpatient interdisciplinary rehabilita-tion for 29 days and had improvements in his physical strength, endurance and func-tion. Care-giver training was provided to facilitate discharge back to home.

RESULTS: Rehabilitation and palliative care are similar in that the goal is not to seek cure, but to enhance quality-of-life. Comparatively, rehabilitative services are underutilized in palliative care patients. Whilst Palliative Care services provide symp-tom management and supportive care, Rehabilitation Services may be helpful in im-proving physical endurance, mobility, activities of daily living, pain relief, and the psyche (by maintaining independence). Thereby, also decreasing the burden on care-givers and family. Goal-setting with the patient is vital to ensure that realistic and meaningful goals are set to facilitate rehabilitation. There is a dearth of literature re-garding Palliative rehabilitation in ESRF. Our case highlights the complex medical and rehabilitative issues in such a case.

CONCLUSIONS: Palliative care patients do benefit from rehabilitation. This, however, needs to be contextualized to the patient’s stage of disease, symptoms and environment. In end-stage renal failure, the disabilities presented may go beyond symptoms of the organ-failure, and encompass complications of the underlying cause(s) and associated medical disorders. Rehabilitative efforts can be complex and protracted. And these have to be balanced against the goals established at the outset.

PARAPARESIS AS A RESULT OF NITROUS OXIDE (LAUGHING GAS) ABUSE: A CASE REPORT

Sony M. Issac, MD, Ajendra Sohal, MD, Hamza Khalid, DO, and Adam Isaacson, MD

CASE DIAGNOSIS: 22 year-old Asian male presented with acute onset of bilat-eral paraparesis

CASE DESCRIPTION: The patient initially presented for management of right lower extremity deep venous thrombosis and subsegmental pulmonary emboli and was incidentally found to have bilateral lower extremity weakness. MRI was negative for acute findings and upon further investigation, the patient was noted to have signifi-cantly low Vitamin B12 levels. The patient admitted to heavy daily recreational abuse of nitrous oxide canisters in "whippet" form for about two years and reported that he had one prior episode of bilateral paresis as a result of its use. The patient was previ-ously functionally independent and enrolled in college on a student visa. On admis-sion to acute inpatient rehab, the patient required maximal assistance with bed mobility, maximal assistance x 2 with transfers, and was unable to walk despite assis-tance, and was also incontinent of bladder. EMG noted bilateral motor axonal periph-eral neuropathy and NCV noted denervation but was limited by patient tolerance.

DISCUSSIONS: Several cases of nitrous oxide abuse leading to neurallogic im-pairment have been noted, and therefore the importance of Vitamin B12’s role in methylation and DNA synthesis should be stressed and taken into consideration when screening for new onset of weakness, especially in individuals most at risk for nitrous oxide abuse. Vitamin B12 supplementation and early therapeutic intervention is es-sential in optimizing return to function. Our patient was started on vitamin B12 sup-plementation and at time of inpatient discharge, progressed to a successful rehabilitative
outcome and was modified independent in ambulation with a rolling walker and bilateral AFO's. At the time of his 6 month follow up, the patient progressed to functional independence with ambulation with single-axis cane only.

CONCLUSIONS: Serious neurologic deficits may occur as a result of recreational Nitrous Oxide abuse.

PARENTS’ PERCEPTIONS OF AN EARLY MOBILITY AND COMMUNICATION PROTOCOL IN THE PEDIATRIC ICU
Rohini S. Rao, MD, MPH, Kailiyn J. Minchin, MS, CCC-SLP, and Kristina A. Bettens, MD
OBJECTIVES: Early mobility (EM) describes early physical activity in critical illness. Adult literature has shown decreased length of stay, weakness, delirium, and sedation needs in patients receiving EM. EM is not yet standard practice in pediatric ICUs, but several studies have shown feasibility. No study has assessed family perception of EM in pediatrics. This study describes parents’ perceptions of an EM and communication protocol in the pediatric ICU.

DESIGN: Prior to this study, a pediatric EM and communication protocol was initiated in both medical and surgical ICUs at a free-standing academic pediatric hospital. All patients were evaluated for EM at 72 hours of length of stay; patients over 12 months of age were evaluated for communication needs. Consented parents (n = 42) of patients on the protocol completed an electronic REDcap survey on their perceptions surrounding the safety, benefits, and barriers to EM and communication services. Parents rated statements using a Likert-type agreement scale and provided free-text comments.

RESULTS: Most parents agreed or strongly agreed that EM helped their child get stronger (76%), improved their child’s mood (57%), helped the parent be involved in their child’s care (86%), and improved their child’s overall experience (78%). Few parents (0-2%) strongly disagreed with the positive statements about EM. Most parents disagreed or strongly disagreed with statements relating to EM causing fear or pain. Parents had varying perceptions on ICU weakness. Parents agreed or strongly agreed that communication therapy improved overall experience in the ICU (75%). Free-text comments emphasized positive and meaningful relationships with rehab and unit staff.

CONCLUSIONS: Parents perceived EM and communication interventions as enriching to their children’s ICU experiences. Most parents did not perceive fear or pain in their children. Future research may consider family perceptions over time as well as correlation of parental perceptions with outcomes data.

PARK-EASE TRIAL: A RANDOMIZED CONTROLLED TRIAL TO STUDY THE EFFICACY OF EXERCISES IN EARLY-STAGE PARKINSON’S DISEASE
Rakthim Swarnakar, MBBS, MD, Sanjay Wadhwia, MBBS, DPMR, DNB, ICCBR, MAMS, FAMS, V Srikrumar, MBBS, MD, Vinay Goyal, MBBS, MD, DM, and V Snevinivas, BSC, MSC, PhD
OBJECTIVES: To evaluate the efficacy of exercises in early-stage Parkinson’s Disease by observing improvement in motor symptoms assessed by Unified Parkinson’s Disease Rating Scale (UPDRS) section III (motor section), improvement in non-motor symptoms assessed by UPDRS section I (mentation, behavior, and mood), improvement in activities of daily living (ADL) assessed by UPDRS sections II (for ADL) and VI (Schwab and England ADL Scale).

DESIGN: PARK-EASE trial (a randomized controlled trial) was conducted in individuals with newly diagnosed Parkinson’s Disease (PD) on a stable dose of PD medications with Hoehn and Yahr stage ≤ 2. The study was done in a rehabilitation care setting. Forty participants were randomized to the intervention group (structured exercises containing strengthening, stretching, aerobic, agility, trunk exercises) and control group (stretching exercises were done passively by care partner). Main outcome measures were UPDRS I, II, III, VI at baseline, 4 weeks, 8 weeks and 12 weeks.

RESULTS: The intervention group showed statistically more significant (p-value < 0.05) improvement in UPDRS I at 12 weeks (p = 0.035), UPDRS III at 12 weeks (p = 0.023) and in UPDRS VI at 8 weeks (p = 0.004) and 12 weeks (0.000). Improvement in the ADL section was more than the motor section of UPDRS.

CONCLUSIONS: This is a first randomized controlled trial to study the structured/exercises efficacy in early-stage PD. Results from this trial showed that structured exercises are efficacious in improving the ADL, motor symptoms and mention in early-stage PD. Exercises start to show improvement in non-motor symptoms and motor symptoms at least after 3 months of properly followed structured exercises regimes along with PD medications. Results also signify to institute structured exercises as an early rehabilitation intervention in early stages of PD.

PASSIVE RANGE-OF-MOTION EXERCISE AND BONE MINERALIZATION IN PRETERM INFANTS: A RANDOMIZED CONTROLLED TRIAL
Rania El Farrash, MD, Ibrahim Abou Seif, MD, Abeer K. El Zohiery, MD, Gehan Hamed, MD, and Rahmen Abou el Farid
OBJECTIVES: Background: Osteopenia of prematurity, also known as neonatal rickets, is one of the common diseases in very low birth weight premature infants. Mechanical strain is one of the most powerful stimulators of the bone formation and growth.

Objective: To assess the effect of range-of-motion exercise program on bone mineralization and somatic growth of very low birth weight (VLBW) infants.

DESIGN: A total of 36 VLBW infants were randomized into 18 VLBW infants receiving range-of-motion exercise and 18 VLBW control infants receiving tactile stimulation for 4 weeks. Laboratory investigations were performed at baseline and post exercise including serum calcium, serum phosphorus (s.P04), magnesium, alkaline phosphatase (ALP), urinary calcium/phosphate ratio, and serum carboxyterminal cross-linked telopeptide of type 1 collagen (CTX). Dual-energy X-ray absorptiometry was performed at the end of the exercise protocol to measure bone mineral content, bone mineral density (BMD), bone area, lean mass, and fat mass.

RESULTS: The weight and the rate of weight gain were significantly higher (p < 0.001) in the exercise group compared to the control group. Also, higher s.P04, lower ALP, and lower urinary calcium/phosphate ratio were observed post exercise in the exercise group (p = 0.001, p = 0.005, and p = 0.04, respectively) whereas, serum CTX showed no difference between the two groups (p = 0.250).

CONCLUSIONS: Although the sample size was small, we may be able to suggest favoring effects of range-of-motion exercise versus tactile stimulation on bone metabolism, BMD, and short-term growth in VLBW infants.

PATIENT CHARACTERISTICS AND PRACTICE PATTERNS IN A LARGE PEDIATRIC INTRATHecal BACLOfEN (ITB) PROGRAM
Joslyn Gober, DO, and Srufti P. Thomas, MD, PhD
OBJECTIVES: Understand the use of ITB in the pediatric setting. Identify key patient characteristics and how they may correlate with baclofen dosing and catheter placement.

DESIGN: Study type: single-center cross-sectional chart review. Inclusion criteria: patients with ITB pumps placed before 8/20/2018. Exclusion criteria: patients < 4yo, ITB pumps implanted on or after 8/20/2018 prior, ITB pumps planned for removal, and patients with incomplete data. Epidemiologic information included: age, gender, diagnosis, etiology, pattern of hypertonicity, and CNS imaging findings. ITB pump information included: date of implant, catheter tip level, baclofen concentration, total daily dose (mcg/d), and dosing type (simple continuous or flexed), where applicable flex dosing pattern.

RESULTS: A total of 166 patients were enrolled in the ITB program at the time of data extraction; 30 were excluded, leaving 136 enrolled. Patient ages ranged from 4 to 23 years. The majority of patients had the diagnosis of cerebral palsy with varying etiologies. However, there were also patients with hereditary spastic paraplegia and traumatic brain injuries acquired below the age of 2. Catheters were placed anywhere from the Foramen of Monroe to T12, with modes at C1 and T1. Patients predominately used 2000 mcg/ml baclofen, with only 22 patients using 500 mcg/ml, and daily dosing ranged from 85-2298 mcg. More patients with ITB were characterized as having mixed-tone or predominantly dystonia and they generally had higher daily doses of baclofen than those that were classified as having spasticity alone. Patients with mixed tone and predominantly dystonia used flex over simple continuous dosing more often than those with spasticity alone.

CONCLUSIONS: The majority of patients using ITB at our center have cerebral palsy. Higher ITB doses and flex dosing schedules are used more often in patients with mixed tone and predominantly dystonia.

PATIENT REPORTED SAFETY CONCERNS AFTER ACUTE INPATIENT CANCER REHABILITATION: A PROSPECTIVE SURVEY STUDY
Jegy Tennison, MD
OBJECTIVES: Previous studies in the literature examining experiences of patients after discharge determined that some feel that their needs on returning to the community were not adequately anticipated by hospital staff. Thus, the Objectives were to 1) assess cancer patients’ perceptions regarding safety after acute inpatient rehabilitation, both at discharge and approximately one month after discharge and 2) assess these patient’s perceptions of factors affecting continuity of care.

DESIGN: Patients who were discharged to a home setting were asked to complete the “Perceptions Regarding Safety after Rehabilitation” survey. This survey was created by study investigators to capture issues that arise in the immediate post-rehabilitation discharge period based on feedback from cancer rehabilitation physicians, nurses, and rehabilitation nurses. Patients also completed the following subscales from the Patient Continuity of Care Questionnaire, which has been shown to be valid and reliable: 1) information transfer to patients 2) management of communication among providers.

RESULTS: During the study period, September 2018 to April 2019, all 76 (100%) patients who completed the study reported feeling safe in the home setting and able to safely perform hygiene tasks, transfers, and walking after their hospital rehabilitation program, both upon discharge and approximately one month after discharge. Although 5 (7%) had fear of falling upon discharge, only 1 (1%) reported this one month after discharge. From the Patient Continuity of Care Questionnaire, the statement “different providers appeared to communicate well with each other while I was in hospital” had the most negative answers, with 3 (4%) disagreeing with the statement.

CONCLUSIONS: Cancer patients at our institution reported mostly positive perceptions of feeling safe upon discharge from acute inpatient rehabilitation and approximately one month after discharge.

PATIENT WITH TRANSVERSE MYELITIS WITH NEUROPATHIC PAIN THAT FAILED ALL CONSERVATIVE TREATMENT; SPINAL CORD STIMULATOR WAS PLACED WHICH RESULTED IN COMPLETE PAIN RELIEF

Jason Wei, MD

CASE DIAGNOSIS: Patient with transverse myelitis presents with neuropathic pain that has failed all conservative treatment of her pain. She was evaluated for placement with spinal cord stimulator to control her pain.

CASE DESCRIPTION: 65 year-old female presents to the hospital with gradual onset of intermittent bladder incontinence and acute bilateral lower extremity weakness. She was diagnosed with transverse myelitis due to her imaging studying showing hyperintense lesion in the thoracic spine. Since diagnosis of transverse myelitis, she has failed all conservative therapies to control her neuropathic pain. She was evaluated for placement of spinal cord stimulator which gave her complete resolution of her neuropathic pain.

DISCUSSION: Transverse myelitis is a rare neurological disorder that can present with neuropathic pain. Currently there is only a handful of cases in which transverse myelitis were treated with spinal cord stimulator. Here we present a patient who had complete resolution of her pain from a spinal cord stimulator placement.

CONCLUSIONS: Spinal cord stimulator should be considered in patients with transverse myelitis suffering from neuropathic pain who have exhausted all conservative treatments.

PATIENT, NURSING STAFF, AND PHYSICIAN PERCEPTIONS OF FACTORS AFFECTING PATIENT SLEEP QUALITY AT AN INPATIENT REHABILITATION HOSPITAL

Natasha Bhatia, MD, and Benjamin Sirutis, MD

OBJECTIVES: Prior research has illustrated that poor sleep and sleep deprivation negatively impact cognitive, hormonal, and metabolic processes. Most prior studies have focused on critically ill patients in the ICU. The purpose of this study is to evaluate the perceptions of patients, nursing staff, and resident physicians regarding which factors are most disruptive to patient sleep at an inpatient rehabilitation hospital. Ideally, the results of this study will serve as the foundation to guide future interventions to improve patients’ sleep and patient satisfaction throughout their rehabilitation course.

DESIGN: This cross-sectional study was performed at a free-standing acute inpatient rehabilitation hospital affiliated with an academic institution. Exclusion criteria included cognitive deficits that made patients unable to answer the survey independently. The Ten-Item Potential Hospital Sleep Disruptions and Noises Questionnaire (PHSDNQ) survey was administered to patients, nurses, and resident physicians to evaluate each group’s perceptions of sleep disturbances in the inpatient rehabilitation setting.

RESULTS: 10 Patients, 24 staff members, and 1 resident physician answered the survey. The top five patient-perceived barriers to sleep were: medications, noise, tests, light, and pain. The top five staff-perceived barriers to sleep: tests, light, vitals, pain, and alarms. The free response section was significant for one patient and two staff members mentioning “TV’s” as a significant contributor to noise.

CONCLUSIONS: In general, staff members’ perceptions of sleep disturbances were aligned with patients’ reported disturbing factors. Both staff and patients identified tests, light sources, and pain as significant perceived barriers to sleep. Patients also identified medication administration and noise as causes of poor sleep. Potential interventions to address these findings could include clustering medication administration when possible to prevent overnight administration, holding overnight vital signs checks in stable patients, providing all patients with sleeping masks or earplugs, enforcing a “curfew” for TV usage, and addressing pain management by clinical staff.

PATIENT-REPORTED OUTCOMES AS DETERMINANTS OF RETURN TO WORK AND HEALTH-RELATED QUALITY OF LIFE 6 MONTHS AFTER CARDIAC REHABILITATION

Annett Salzwedel, DR, Iryna Koran, MD, Karl Wegscheider, PhD, and Heinz Völker, MD

OBJECTIVES: Multi-component cardiac rehabilitation (CR) is to be conducted to achieve improved prognosis, superior health-related quality of life (HRQL) and social integration. We aimed to identify predictors of return to work (RTW) and HRQL among cardiovascular risk factors and physical performance as well as patient-reported outcome measures (PROMs) modifiable during CR.

DESIGN: Prospective occupational multi-center study, enrolment between 05/2017 and 05/2018 in 12 German rehabilitation centers. Besides general data (e.g. age, gender, diagnoses), parameters of risk factor management (e.g. smoking, lipid profile, hypertension, lifestyle change motivation), physical performance (e.g. maximum exercise capacity, endurance training load, 6-min walking distance), and PROMs (e.g. depression, anxiety, HRQL, subjective well-being, somatic and mental health, pain, general self-efficacy, pension desire as well as self-assessment of occupational prognosis using several questionnaires) were documented at CR admission and discharge. 6 months after discharge, status of RTW and HRQL (SF-12) were captured by a follow-up (FU) survey.

RESULTS: From 1262 patients (547 ≥7 years, 77% men), 864 patients (69%) returned to work. Pension desire, negative self-assessed occupational prognosis, heart-focussed anxiety, incident major life events, smoking and heart failure were negatively, higher endurance training load, HRQL and work stress as assessed during CR were positively associated with RTW. HRQL after 6 months was determined more by PROMs (e.g. pension desire, anxiety, physical/mental HRQL in SF-12, physical/mental health in IRES-24, stress, well-being and self-efficacy), while clinical parameters or physical performance were of subordinate importance.

CONCLUSIONS: Several PROMs predominantly influenced RTW and HRQL in heart-diseased patients. Therefore, the multi-component CR approach focusing on psycho-social support is crucial for subjective health prognosis and social integration.

PAUCITY OF CLINICAL PRACTICE GUIDELINES FOR REHABILITATION OF BURNS’ SURVIVORS

Naomi Lynn Gerber, MD, Rati Deshpande, MBBS/MD, Shruthi Prabhakar, NONE, Cindy Cai, PhD, Steven Garfinkel, PhD, J. Mary Louise Pomeroy, MPH, Peter Esselman, MD, MPT, and Jeffrey C. Schneider, MD

OBJECTIVES: Clinical practice guidelines (CPGs) offer the most direct route from research to practice. CPGs result from clinical trials that establish strong evidence to assure quality, hence assist practitioners in providing best practices for effective treatment. CPGs provide information and guidance about care and are particularly helpful in an underserved field, such as burns rehabilitation. Only 32 states have burn centers. We searched for rehabilitation CPGs for burn injury patients and determined whether they might provide needed treatment support.

DESIGN: PubMed search was performed using the search terms: “Burns AND Clinical Practice Guidelines AND Rehabilitation”. Three reviewers determined whether guideline development followed an established, accepted vetting process such as IOM. “Rehabilitation” required evidence of treatment aimed to improve, maintain or restore human function and/or provide treatment(s) designed to facilitate the process of recovery.

RESULTS: 148 articles generated from the original search terms. After adding the term “functional outcome”, 59 remained for full text review and 18 remained eligible after full review. When articles were scored for inclusion of both rehabilitation

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AND function or functional outcome AND guideline vetting, 4 articles remained. All 4 were institutionally-based, involving acute and post-acute care. Only 1 of 18 was a community-based guideline. There were 9 articles that had no recorded vetting process that addressed rehabilitation as an outcome.

CONCLUSIONS: There is a paucity of published CGPs relevant to clinical rehabilitation for burn survivors. These authors believe this is likely a result of a several factors: 1. Few published intervention trials and only rarely randomized controlled trials addressing rehabilitation needs of burn survivors in post-acute care; 2. Limited data available to establish the evidence to inform practice; 3. Most studies are performed by non-rehabilitation professionals in acute care settings.

PERIPHERAL NEUROPATHIC PAIN: A REVIEW OF THE LITERATURE
Faheem Mahomed, MD, Caroline Bremick, DO, Kendall Hulik, DO, Allan Larr, MD, and Nicholas Fleming, DO

OBJECTIVES: To provide a comprehensive and thorough review of the existing literature with regards to the identification and management of neuropathic pain in the pediatric population. Specifically, to provide an updated and concise analysis of the current pharmacological, interventional, and alternative modalities of treatment of neuropathic pain in the pediatric population.

DESIGN: An exhaustive literature review of the relevant published works was completed. Our literature review was conducted using PubMed, OVID, and Google Scholar databases. Over 400 articles were surveyed (after exclusion criteria applied), which included, but was not limited to various case reports, randomized controlled trials, systematic reviews, retrospective cohort studies, and case series. Searches were conducted using the following key words: 'Pedicicr,' 'Neuropathic Pain,' 'Neuralgia,' 'Therapy, 'Diet Therapy,' 'Drug Therapy,' 'Rehabilitation'. Articles were excluded based on pre-determined criteria (i.e., written in English, availability of full text, age 0-18, date of article publication, level of evidence rating). General and overall recommendations for treatment of neuropathic pain in the pediatric population were generated and organized within our review based on overall level of evidence rating of the treatment modalities studied in each of the surveyed articles.

RESULTS: Through conduction of this literature review we were able to devise an up to date collection of guidelines regarding identification, management, and treatment of neuropathic pain in the pediatric population. Treatment and management modalities included pharmacologic interventions (i.e., Gabapentin, Lyrica, Lidocaine, Tricyclic Anti-depressants), surgical and invasive interventions (i.e., Nerve block, spinal cord stimulator), physical modalities (i.e., exercise, physical therapy) as well as other miscellaneous treatments (i.e., psychological therapy).

CONCLUSIONS: Through our study, current pediatric neuropathic pain treatments as well as management and identification strategies were identified and outlined in detail, and an up to date collection of guidelines and recommendations were provided for the treatment of neuropathic pain in the pediatric population.

PEDIATRIC REHABILITATION OF AN ADOLESCENT WITH ALCAPA
Emily Wang, MD

CASE DIAGNOSIS: In the normal heart, the left coronary artery arises from the aorta and provides the left ventricle with oxygenated blood. When the left coronary artery arises abnormally from the pulmonary artery, this is known as ALCAPA, or Anomalous Left Coronary Artery from the Pulmonary Artery. Ischemia or infarction of the left ventricle develops due to coronary steal. ALCAPA is an extremely rare congenital heart defect, occurring in 0.5% of individuals with congenital heart disease. This condition is typically diagnosed in infancy and rarely manifests in adolescents or adults.

CASE DESCRIPTION: A 14 year-old girl was found unresponsive in cardiac arrest. Family initiated CPR, ROSC achieved after nearly 16 minutes. CT angio graph found an anomalous left coronary from the pulmonary artery (ALCAPA). Her course was complicated by mild hypoxemic encephalopathy. She underwent left coronary artery re-implantation into the left aortic coronary cusp. The patient was ultimately transferred to acute inpatient rehabilitation with significant improvement.

DISCUSSIONS: This patient likely had extensive collateral vessels that supplied the left ventricle with adequate oxygenated blood from the right coronary circulation. Her pediatric rehabilitation regimen included speech and swallow for oropharyngeal dysphagia, OT for deficits in memory and problem solving, and PT for loss of balance and gait instability requiring close supervision while ambulating. She also required neuropsychology and psychiatry for mood lability, anxiety, and agitation.

CONCLUSIONS: This case involves cardiopulmonary pediatric rehabilitation and pediatric traumatic brain injury. The patient presented with deficits in functional mobility, cognitive ability, as well as emotional and adjustment disorders in an adolescent following an acute event. In addition to lifelong cardiac followup, this patient will require lifelong physical medicine and rehabilitation followup as well. She will have ongoing speech, occupational, and physical therapies in order to restore function to her cognitive baseline and return to prior roles as daughter, friend, sister, student, and athlete.

PERCEIVED STIGMATIZATION AND SOCIAL ACCEPTANCE IN INFORMAL CAREGIVERS OF CHILDREN WITH CEREBRAL PALSY IN KANO, NIGERIA
Jibrin S. Usman, MSC, Abdullahi Sani, B, and Umaru M. Badaru, PhD

OBJECTIVES: Considering the increasing number of children with cerebral palsy (CP) and their caregivers, emphasis should be geared towards components such as social acceptance/support and stigmatization. The study was aimed at evaluating the experience of caregivers of children with CP with regard to stigmatization and social acceptance in Kano.

DESIGN: This is a cross sectional study comprising total of 101 caregivers of children with CP who met the study criteria. They were recruited from four major Hospitals in Kano metropolis, Nigeria. Berger stigma scale questionnaire and Multidimensional scale of perceive social support (MSPSS) were used to assess the level of stigmatization and social acceptance/support respectively in care givers of children with cerebral palsy analyzed using descriptive statistics of mean, SD, frequencies and percentages as well as Inferential statistics of independent t-test and Pearson correlation using SPSS version 20.0 at significance level of p≤0.05.

RESULTS: Majority of the participants (99%) were females and most of them 42 (41.6%) fall between 26-35 years of age. Most respondents 100 (99%) are married with majority 49(48.5%) having senior secondary certificate and only 13 (12.9%) are employed. 13-24 months of care giving accounted for the highest (53.7%) percentage of care giving duration. The study revealed that 67.3% of the respondents reported minimal stigmatization and 63.4% reported minimal emotional disturbance. 71.3% of the respondents were satisfied with the social acceptance/support they received. There was no significant relationship between duration of CP with stigmatization (p >0.05) and social support (p >0.05). There was no significant gender difference in stigmatization (P >0.05) and social support (P >0.05).

CONCLUSIONS: Stigmatization among caregivers of children with CP was minimal; the social acceptance/support level was quite satisfactory. It is therefore vital to always pay attention to stigmatization and social acceptance/support level of caregivers of children with CP during rehabilitation.

PERCEPTIONS OF BURDEN OF SPASTICITY AND TREATMENT SATISFACTION AMONG POST-STROKE PATIENTS OVER THE COURSE OF A BOTULINUM TOXIN TYPE-A (BONT-A) TREATMENT CYCLE: AN ETHNOGRAPHIC STUDY
Jorge Jacinto, MD, Andreas Lysandropoulos, MD, and Antony Fulford Smith, MBBS

OBJECTIVES: The concept of individualized patient care relies on good clinician understanding of patients’ lived experiences of treatment. The ethnographic approach allows multidimensional insights into the patient experience through comprehensive observation of participants in their real-life environment. We aimed to design an ethnographical study following patients over a botulinum toxin type-A (BoNT-A) treatment cycle to inform individualized treatment.

DESIGN: The REBOT study (NCT03995524) is a prospective observational study conducted in France, Italy, UK and USA. Forty eligible participants, aged 18-75 years, will be recruited via patient support groups. Participants must be ambulatory, receiving regular BoNT-A treatment for post-stroke spasticity and must have completed ≥2 prior injection cycles. Informal caregivers of post-stroke patients with spasticity will also be followed. The study is conducted in 3 stages. In Stage 1, consenting participants undergo in-depth qualitative interviews to collect demographic, clinical information and overall perception of the disease history, burden and treatment. Stage 2 is a 16-week ethnography observation period using a dedicated smartphone application for collation of questionnaire data (containing the Patient-Reported Impact of Spasticity Measure [PRISM], EQ-5D-5L and WHODAS parameters), photographs, videos and audio material. Stage3 is a further qualitative in-depth interview to assess treatment course satisfaction.

RESULTS: The primary outcome is the degree of functional limitations in daily life activities (i.e. physical functioning) associated with post-stroke spasticity. Exploratory ethnographic data will be analyzed using a specific ethnography analysis tool based on PowerBI and will be presented descriptively. The study will also evaluate the repercussions of spasticity and treatment outcomes on carers’ lives.

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CONCLUSIONS: To our knowledge, this is the first ethnographic study following participants with post-stroke spasticity treated with BoNT-A. This approach has been shown to capture patients’ and caregivers’ experiences of a full BoNT-A treatment cycle, including the onset, peak, and trough of BoNT-A treatment effects.

PERIPHERAL NERVE STIMULATION FOR AXIAL CHRONIC LOW BACK PAIN IN FAILED BACK SYNDROME
Chong C. Kim, MD, Stephen Despins, MD, and RJ Wisnner, MD
CASE DIAGNOSIS: Axial chronic low back pain in failed back surgery CASE DESCRIPTION: A 67 yo Male, with history of back surgery with hardware present with axial chronic low back pain (LBSP). He had tried and failed all conservative care, including physical therapy, medications and various injections. The pain was constant and did not radiate. He was told he was not a candidate for further surgery. After discussion, he elected to try a percutaneous peripheral nerve stimulation (PNS). The patient underwent a 60-day PNS placement with stimulation of the medial branch nerve/ multifidus muscle at the L3 vertebral level with 80% improvement of his LDP during the treatment period. Following the removal of the percutaneous electrode, he noted continued improvement at 3 months. On 6-month follow-up, the patient noted 50% relief and was able to golf 18 holes twice a week, which he had not done in over 2 yrs prior to the PNS.

DISCUSSIONS: PNS has been studied and used for various conditions, including LBSP. PNS has been shown to be an effective non-opioid, minimally invasive, percutaneous, reversible treatment option with potential to be used for prolonged pain relief and improvement of function.

CONCLUSIONS: We present a case report on the improvement of axial chronic LBSP in a failed back syndrome patient.

PERIPHERAL NERVE STIMULATOR FOR THE TREATMENT OF REFRACTORY GROIN PAIN SECONDARY TO OBTURATOR NERVE ENTRAPMENT: A CASE REPORT
Salah Eldin H. Mohamed, MD, and David Spinner, DO, RMSK, CIPS, FAAPMR
CASE DIAGNOSIS: Obturator Nerve Entrapment
CASE DESCRIPTION: This is a 29-year-old male presented with chronic left groin pain. Multiple injections, maximized dose of medications and procedures over the years have failed to alleviate his pain. He continued to complain of burning/sharp pain in his groin. We therefore attempted obturator nerve stimulator to treat his refractory groin/medial thigh pain.

DISCUSSIONS: Peripheral nerve stimulation (PNS) is a useful treatment for chronic pain. This case report describes the first participant treated with a PNS for refractory groin/medial thigh pain. Medial thigh pain and groin pain are often difficult to diagnose due to the various structures that are passing through the region. One cannot easily identify the cause for groin and/or lower extremity pain is obturator nerve (ON) entrapment. Previous studies reported that the obturator nerve is one of the nerves that provides innervation to the anterior hip capsule. The PNS was implanted using a complement of fluoroscopic and ultrasound guidance in the obturator canal. Fluoroscopic guidance was used to identify the previously described radiographic “teardrop” to localized ON. Ultrasound guidance was used in diving below major vasculature in the groin as the PNS is threaded to the obturator canal.

CONCLUSIONS: This case report demonstrates the feasibility of a single-lead, implantable PNS system through a single ~1 cm incision for refractory groin pain secondary to ON entrapment.

PERSIAN VALIDATION ADAPTATION OF ACTIONABLE BLADDER SYMPTOM SCREENING TOOL AMONG PARTICIPANTS WITH MULTIPLE SCLEROSIS
Mohaddesh Azadvari, Assistant Professor, Abdorreza Nasser Moghadassi, Assistant Professor, Amirreza Azimi, Associate Professor, Farzaneh Sharifiaghdas, Professor, Seyeed Zahra Ermani Razavi, Assistant Professor, Sharareh Eskandari, Assistant Professor, Mohaddesh Azadvari, Assistant Professor, Mohammad Ali Sahraei, Assistant Professor and Mohammad Ali Sahraei, Assistant Professor, Professor
OBJECTIVES: Multiple sclerosis (MS) is the most neurologic disease among individuals of 20-45 years. About 75% of MS patients report bladder problems that have a moderate-high impact on their life. The present study aimed to translate and determine the validity and reliability of the Persian version of ABSTST questionnaire.

PHASE I RANDOMIZED SINGLE BLINDED CONTROLLED STUDY INVESTIGATING THE POTENTIAL BENEFIT OF AEROBIC EXERCISE IN DEGENERATIVE CEREBELLAR DISEASE
Scott Barbuto, MD, PhD, Joel Stein, MD, Dario Martelli, PhD, Isorraine Omofooma, BA, Sheng-Han Kuo, MD, Michael O’Dell, MD, and Sunil Agrawal, PhD
OBJECTIVES: To investigate whether people with cerebellar degeneration can perform rigorous aerobic exercise and to assess the clinical impact of the training.

DESIGN: Randomized single-blinded controlled, feasibility study comparing aerobic training to no training. Setting: Home intervention, assessments conducted at an academic medical center. Subjects: Twenty adults with cerebellar degeneration. Intervention: Aerobic training consisted of four-weeks of stationary bicycle training, five times per week for 30-minute sessions. Intensity ranged from 65 to 80% of the participants mean age was 50 years (standard deviation 12.65) and average Scale for the Assessment and Rating of Ataxia score was 9.6 (standard deviation 3.13). Ten participants were randomized to aerobic training and ten to no training. Seven participants in the aerobic group attained target training duration, frequency, and intensity. There was a mean reduction of ataxia severity of 2.1 points (standard deviation 1.26) with four-weeks of aerobic training whereas ataxia severity increased by 0.3 (standard deviation 0.62) in the control subjects over the same time period. Walking ability, speed, balance measures, and fitness also improved in subjects who performed aerobic exercise.

CONCLUSIONS: Rigorous aerobic training is feasible in people with cerebellar degeneration. Improvements in ataxia, balance, and gait are promising.

DESIGN: The standard validation process for preparing the Persian version of ABSTST was performed by means of an expert committee. After a pilot study and confirming the harmonized translated form, we tested the final version of questionnaire on 40 patients with a definite diagnosis of MS symptoms, once at the baseline and another after two weeks in order to prevent recall-induced agreement. Test-retest reliability was calculated as Spearman’s correlation coefficient.

RESULTS: Also, content validity indices, as well as internal consistency were analyzed in STATA. Forty participants with the mean age of 38.8 years were included in this study. Only 20% of them were male. The Persian version achieved a good internal consistency with a Cronbach’s value of 0.91, relatively similar to the original version. The coefficients for measuring the correlation between each item score with the total score of our questionnaire were between 0.58-0.89. This value confirmed an appropriate validity for the Persian version of ABSTST. Regarding test-retest reliability assessment, total Spearman’s coefficient was 0.85; with 0.84 for the severity of symptoms and 0.87 for the impact of urolurgic disorders on patients’ social life.

CONCLUSIONS: Current results proved that this accurate questionnaire could be used to investigate urinary symptoms among Persian-speaking MS patients.

PHANTOM KNEE PAIN: TREATMENT OF CHRONIC KNEE PAIN AFTER REMOVAL OF A TOTAL KNEE REPLACEMENT
Angel Docobo, MS
OBJECTIVES: The infrapatellar branch of the saphenous nerve has gained attention in recent years as a common source of chronic medial knee pain following knee surgery. The anatomic variability of this nerve branch places it susceptible to iatrogenic injury. It has been well documented that ultrasound-guided nerve blocks, radiofrequency ablation and cryoablation, distal to the adductor canal, have brought exceptional pain relief to patients. However, there have not been any cases reported in which a patient experiences saphenous neuralgia, while imaging demonstrates complete absence of a knee joint; what we describe as “Phantom Knee Pain.”

DESIGN: In this case, we present a 51-year old female who reports chronic knee pain after removal of a total knee replacement. After her initial surgery, the joint was infected by MRSA, and required removal. The patient underwent an osteotomy and her joints were autofused together. The lead the patient to become wheel-chair dependent and require an external brace. Imaging shows absence of a joint space.

RESULTS: We performed an infrapatellar nerve block to confirm the diagnosis of her medial knee pain, and subsequently treat the pain with peripheral nerve stimulation.

CONCLUSIONS: This case addresses a treatment approach to the unique situation of chronic knee pain after removal of a total knee replacement.
Abstracts

PHYSIATRY IN HAITI: SERVING WITHOUT RESOURCES
Kevin T. Ozment, MD, BS, Abdihakim A. Mohamoud, BS, and Deena Hassaballa, DO

CASE DIAGNOSIS: Idiopathic Parkinson’s

CASE DESCRIPTION: 71 y.o. male with history of Parkinson’s Disease (PD) diagnosed in 1997 who presented with increased falls, progressive debility, and severe constipation prompting acute care admission. Hospitalization consisted of multiple complications including recurrent small bowel obstruction s/p resection, encephalopathy, and dysphagia. His acute inpatient rehabilitation was complicated by significant neurogenic orthostatic hypotension (nOH) secondary to autonomic dysfunction (AD). Symptoms restricted therapy with swings in SBP from 200s to 40s at times. Non-pharmacologic measures utilized were abdominal binders, compression stockings, dietary changes, horizontal therapies, and postprandial delay of therapies. Pharmacologic measures included removing aggravating factors, midodrine, rasagiline, salt tabs, and augmenting sinemet. Further implementation of pharmaceuticals continues to be explored including droxidopa.

DISCUSSIONS: Functional gains were limited by his symptomatic nOH. This result in fluctuations of mobility varying between contact guard assist to total assist based on symptoms. Careful team communication was pivotal to address the issues related to the AD. Various pharmacological and non-pharmacological efforts significantly altered his level of symptomatic impairment during therapy. A 2017 JAMA publication demonstrated that early diagnosis of AD in PD patients is an independent risk factor for rapid disease progression and decreased survival time. Given the paucity of reports on rehabilitation outcomes of similar cases, this report aims to present the complex rehabilitation course involved in this disease. It is crucial for the Physiatrist to have multiple treatment options in their “Parkinson’s toolbox” to maximize functional outcomes in this population. Close communication between the Physiatrist, nursing, and rehabilitation team is imperative to further optimize care for this population.

CONCLUSIONS: The severity of this nOH is a rare presentation of long-standing PD. PD with debilitating nOH presents with therapeutic limitations, significant impact on quality of life, and increased mortality. Optimal care involves a true multidisciplinary approach to assess the multitude of factors involved.

PLATELET RICH PLASMA (PRP) IN MILD TO MODERATE OSTEOARTHRITIS OF KNEE JOINT: 30 CASES
Mohammad Moniruzzaman, MBBS, FCPS

OBJECTIVES: The capacity of articular cartilage is limited to heal due to low mitotic potential of chondrocyte in vivo. Thus defect in the Joint cartilage progress to osteoarthritis (OA). To address this limitation, the use of Platelet Rich Plasma (PRP) was investigated. The objective was to find out the efficacy of PRP in mild to moderate osteoarthritis (OA) of knee joint.

DESIGN: It is a prospective experimental study. We recruited thirty patients of osteoarthritis knee joints treated by PRP from 1st June to 31st December, 2018. According to radiological grading of knee OA, 12(40%) were in grade-1, 11(36.66%) were in grade-2, 7(23.33%) were in grade-3. Each patient took PRP at 1 month interval for 3 months. With all aseptic precautions, 10cc PRP was injected by Ultrasound (US) guided into knee joint followed by planned rehabilitation program at 2 weeks and 3 follow up was taken at 4 weeks, 8 weeks & 12 weeks. The mean Platelets count were 200±45.58 (mean±SD) X 10^3/μl.

RESULTS: At 4 week, 8 weeks & 12 week, the mean VAS became for right knee joint was 4.09±1.10, 3.04±1.19, 2.10±1.24 and for left knee joint was 4.01±1.05, 2.08±1.16, 1.27±1.11 respectively. The tenderness index for right knee joint was 3.00±0.40, 2.00±0.35, 1.00±0.75 and for left knee joint 2.75±0.40, 2.00±0.35, 1.00±0.40. Among the study population, the mean range of motion (ROM) for right knee joint was 110.25±3.75, 120.60±5.50, 130.66±5.75 and for left knee joint was 125.66±4.70, 128.40±5.10, 131.33±5.45. Mean Oxford Knee Score (OKS) was 37±6.00, 43±6.31, 45±0.00 at same intervals respectively (p<.001).

CONCLUSIONS: Approach to PRP into mild to moderate Knee OA can reduce disability and prevent the early progression of osteoarthritis. Though the outcome is good in this small study, large scale study is recommended.

PLATELET RICH PLASMA IN KNEE OSTEOARTHRITIS AS MEASURED BY FLEXION RANGE OF MOTION AND VISUAL ANALOG SCALE
Max H. Epstein, MD, Peter C. Yeh, MD, Shiv J. Patel, BS, Brett Heldt, BS, Omalide Sokunbi, BS, and Prathap Jayaram, MD

OBJECTIVES: To determine the efficacy of Platelet Rich Plasma (PRP) on knee osteoarthritis (OA) as measured by flexion range of motion (ROM) and pain by visual analog scale (VAS).

DESIGN: Prospective clinical study. Data was collected on all patients with knee osteoarthritis who received PRP injections from one sports medicine physician from August 2018 to September 2019. Both pain and range of motion was measured at baseline and at follow-up visits using VAS (0 = no pain, and 10 = worst pain) and a goniometer, respectively, by the same physician. Injections were performed with ultrasound guidance. Data analysis for flexion ROM and VAS was carried out using one-way ANOVA to analyze values at baseline, 3 weeks, 6 weeks, 12 weeks, and 18 weeks.

RESULTS: The study yielded 30 patients with knee OA(10 males, 20 females) with an average age of 64.56 years old (SD=11.47). Of these 30 patients there was 53 documented ROM measurements from 13 total patients. The mean flexion ROM at baseline was 122 degrees, 125 degrees at 3 weeks, 125 degrees at 6 weeks, 126 degrees at 12 weeks, and 127 degrees at 18 weeks. There was 46 documented VAS measurements from 12 total patients. The mean VAS at baseline was 4.8, 2.9 at 3 weeks, 2.1 at 6 weeks, 2.9 at 12 weeks, and 2.7 at 18 weeks. One-way ANOVA demonstrated no significant difference between the five time points for flexion ROM (p = .546) and mean VAS (p = .108). All 30 patients in this study did not have recorded baseline measurements as they were either lost to follow-up, or did not have documented baseline measurements.

CONCLUSIONS: This study shows a trend of increased knee flexion ROM and decreased pain by VAS in patients with knee OA after PRP; however, there was no significant difference among the groups at any time point in follow-up.

PLATELET-RICH FIBRIN MEMBRANE – AS A LOCAL AUTOLOGOUS BLOOD TISSUE GRAFT FOR PRESSURE INJURY HEALING IN A SPINAL CORD INJURY PATIENT: A CASE REPORT
Raktim Swarnakar, MBBS, MD, Hafis Rahman, MBBS, MD, and V Sitharam, MBBS, MD

CASE DIAGNOSIS: A 25-year-old right-handed male with post-operated traumatic spinal cord injury sequelae paraplegia, neurogenic bowel, and bladder and with pressure injury (PI) in left greater trochanter, came for rehabilitation care. This PI was a chronic non-healing one (grade II according to the National Pressure Ulcer Advisory Panel, NPUAP new guidelines 2016) which did not show improvement on normal saline (0.9%) dressing for the past 3 months. His neurological level of injury was D10 and American Spinal Injury Association (ASIA) Impairment Scale was A.

CASE DESCRIPTION: PI at left GT was treated with Platelet Rich Fibrin (PRF) membrane. A 10 ml blood sample was taken from the patient’s antecubital vein without anticoagulant which was immediately (within 2 mins) centrifuged at 3200 rpm for 10 minutes using REMI (R-8C Plus) centrifuge. At the end of centrifugation,
a natural fibrin matrix gel was obtained and it was converted into a membrane by compressing it, then it was placed over the ulcer base and covered with a sterile dressing and was left in-situ for 7 days. PRF dressing was done weekly for 4 weeks under all aseptic precautions. Routine rehabilitation care simultaneously was also followed. There were no wound complications, and weekly baseline and weekly wound measurements were done with Spinal Cord Impairment Pressure Ulcer Monitoring Tool (SCI-PUMT).

DISCUSSIONS: Baseline SCI-PUMT was 6 and lastly at 3-week score was 2 and at 4-week PI was healed completely. PRF is considered as second-generation Platelet Rich Plasma (PRP) and PRF contains more growth factors which helps in wound healing. There are no studies on PRF healing by PRF membrane use in SCI population. FABER and FADIR on the right. MRI of her hips showed bilateral labral tears.

CONCLUSIONS: This is the first case report of PI healing by PRF membrane use in SCI population. Autologous Platelet-Rich Fibrin (PRF) is simpler, cost-effective and a safe new approach towards pressure injury managements in SCI people.

POST-LIVER TRANSPLANTATION PATIENTS BENEFIT FROM INPATIENT REHABILITATION

Jamie A. Sibel, MD, and Shangming Zhang, MD

OBJECTIVES: End-stage liver disease (ESLD) is a common cause of morbidity and mortality. Liver transplantation is the only absolute treatment for ESLD. 8,000 liver transplantsations are performed in the US each year. Common early postoperative complications include graft dysfunction, pleural effusion, acute respiratory failure, atelectasis, hemodynamic complications, bleeding and thrombosis. Many patients develop critical illness myopathy which is one of the Inpatient Rehabilitation Facility 60% compliant conditions. These complications increase morbidity and mortality after liver transplantation. Inpatient rehabilitation after liver transplantation may decrease post-operative complications and improve functional outcomes.

DESIGN: A retrospective chart review evaluated 63 adult patients who were admitted to Penn State Rehabilitation Hospital from 2010 to 2017 after liver transplantation. Functional Independence Measure (FIM) was measured on admission and discharge from inpatient rehabilitation. Age, gender, and medical comorbidities were recorded. Length of stay, number of acute care transfers and discharge destination from the rehabilitation hospital were also recorded.

RESULTS: Average FIM gain was 21.5 ± 14.8. Average FIM efficiency (FIM change/day) was 2.13 ± 1.55, greater than the national benchmark. There were 18 transfers from the rehabilitation hospital to the acute care hospital (28.6%). There were common medical reasons for the acute transfers. Average length of stay at the rehabilitation hospital was 12 ± 6.82 days and the majority of our post-liver transplantation patients were discharged from the rehabilitation hospital to the community.

CONCLUSIONS: Our post-liver transplantation patients demonstrated significant improvements in functional status as signified by FIM gains achieved during acute inpatient rehabilitation. Patients post-liver transplantation have high medical complexities and frequent complications, as evidenced by the high acute transfer rate.

Optimizing the pre-admission screening process could decrease the number of acute transfers. The majority of patients returned home after discharge from the rehabilitation hospital. In summary, post-liver transplantation patients are excellent candidates for acute inpatient rehabilitation.

POST-POLYMYELOITIS SYNDROME TREATMENT WITH HUMAN IMMUNOGLOBULINS: A RETROSPECTIVE STUDY

Isabelle Laffont, MD, PhD, Vincent Moizidard, MD, and Raul Juntas Morales, MD

OBJECTIVES: Post-polymyelitis syndrome (PPS) refers to the loss of strength associated with clinical and functional deterioration experienced by many polymyelitis survivors several decades after primary infection. The pathophysiology of PPS isn’t fully understood, leading to the lack of universal treatment. However, a dysimmunitar origin is often mentioned. The objective of the study was to evaluate the effect of intravenous immunoglobulin (IVIG) treatment on clinical and isokinetic parameters in patients with PPS.

CONCLUSIONS: We carried out a descriptive retrospective study on patients who received IVIG for PPS between 2009 and 2018. The doses administered were 0.4 mg/kg/day for 5 days, most often repeated 3 times at one-month intervals. The included patients received pre- and post-therapeutic evaluation based on clinical criteria (6-minute walk test, 10-meter walking speed and pain drawing with VAS-Visual Analog Scale) and isokinetic criteria by muscle strength measurement on quadiceps and hamstrings.

RESULTS: A total of 26 IVIG cures were performed on 8 men and 7 women, mean age 60±10 years, and an average duration of evolution of the PPS of 10 years. After treatment, the walking perimeter increased by a mean of 26.24 SD : 44.19; p = 0.072 meters, the walking speed remained unchanged around 0.84 (SD : 0.25) m/s, the pain VAS decreased by an average of -1.16 (SD : 1.78 p=0,09) points and a gain in muscle strength was observed on 11 out of 12 patients who performed isokinetic tests. The subgroup analysis showed a better force improvement in patients with quadiceps muscle testing > 3/5 before treatment.

CONCLUSIONS: Our study tends to show a clinical benefit on walking, pain and muscle strength in patients with PPS treated with IVIG. The muscle strength improvement is better for patients with moderate muscular weakness.
CASE DESCRIPTION: A 65-year-old former college rugby female player with a 7-year history of radiographically diagnosed bilateral hip osteoarthritis (OA) and right labral tear who received one hyaluronic acid and two hip corticosteroid injections presented with worsening intermittent hip pain, right worse than left, and decreased range of motion. Physical exam was significant for positive FABER, FAIRD, Stinchfield, and Scour tests. In addition to hip OA, she was diagnosed with concomitant gluteus tendinopathy and underwent ultrasound-guided micro-fragmented adipose tissue transfers into bilateral hips with an immediate 50% reduction in pain. Two months later, she had a right hip platelet-rich plasma (PRP) injection with near complete resolution of symptoms 8 months post-injection.

DISCUSSIONS: OA is one of the leading causes of chronic hip pain. While many modalities aim to slow progression or ameliorate pain, there are no agents to completely halt disease progression. Biologic injections like PRP have been proposed to induce inflammation and healing through increased delivery of signaling proteins. While PRP is often used for a variety of musculoskeletal conditions, its efficacy in hip OA is variable and has not been well studied. This case follows a patient with both symptomatic and functional improvement in hip pain as measured via an abbreviated version of the Hip Disability and Osteoarthritis Outcome Score (HOOS), where higher scores represent a greater degree of hip disability. Her baseline score was 36, which improved to 16 at 8-months and increased to 20 at 10-months. Overall, her hip disability score improved following these interventions.

CONCLUSIONS: PRP for hip OA has mixed Results. Our case follows one successful instance where the patient improved in pain and range of motion after a stem cell-derived injection and PRP-booster. This presents encouraging results of PRP in hip OA, which can set a framework for further controlled studies.

PREVAILING NASAL SYMPHYSIS DURING CARDIOPULMONARY EXERCISE TESTS BY A TIME AND FREQUENCY DOMAIN ANALYSIS OF HEART RATE VARIABILITY
Naoki Wada, MD, PhD, Junich Tomono, MD, PhD, Bao Shuo, MS, Minor Kuroski, MD, Yoko Ibe, MD, PhD, Yuniko Nakao, MD, PhD, and Masayuki Tazawa, MD, PhD

OBJECTIVES: The cardiopulmonary exercise test (CPX) is an indispensable test for determining a proper load in cardiac rehabilitation. Even in healthy subjects, vasovagal syncope (VS) may occur during the test. To prevent VS, cool-down is performed after loading; however, the symptoms of VS are observed in a certain percentage of patients. The purpose of this study is to predict VS during the CPX by evaluating the vagus nerve function with a time and frequency domain analysis of heart rate variability (HRV).

DESIGN: We evaluated 76 subjects of 20 to < 80 years of age who underwent a CPX in our hospital. The study protocol was approved by the Institutional Review Board of our hospital and written informed consent was obtained from all participants. An analysis of HRV was performed 5 min before the CPX with the subject at rest using a portable electrocardiograph. The patient’s heart rate and blood pressure were continuously recorded during the CPX. VS was defined by symptomatic syncope or a 20 mmHg decrease in systolic blood pressure from the baseline value. Subjects were divided into two groups according to the occurrence of VS during CPX. An autoregressive model was used for the spectral analysis of HRV.

RESULTS: Fifteen (19.7%) patients had VS during or in the first 5 min after CPX. Seven (9%) patients had symptomatic VS. In the spectral analysis of HRV, significant differences in the normalized low frequency unit (nLF) and normalized high frequency unit (nHF) values were recognized between the two groups. A logistic model identified a significant association between the LF/HF ratio and the occurrence of VS in 15 subjects.

CONCLUSIONS: The time and frequency domain analysis of HRV was useful for predicting VS during CPX. This non-invasive ECG analysis might provide useful information for people engaged in cardiopulmonary exercise testing.

PREHABILITATION IN A PEDIATRIC TRANSPLANT CANDIDATE: A CASE REPORT
Cynthia M. Lai, BS, Cristina M. Brea, MD, and Seema Khurana, DO

CASE DIAGNOSIS: Short bowel syndrome, awaiting intestinal transplant

CASE DESCRIPTION: This case is an 11-year-old male with intussusception and ischemic bowel injury requiring bowel resection. He had been hospitalized since age 4 for continuous total parenteral nutrition and thus had significant functional decline. Prior to presentation, he ceased ambulating because of septic arthritis, osteomyelitis, and low motivation. He presented to the hospital for evaluation for intestinal transplant, but the transplant team would not consider him a candidate until he was able to ambulate. To attain this goal, the patient was admitted to inpatient rehabilitation where he was weaned off TPN, learned feeding and cognitive skills, and increased his strength and functional mobility. He was discharged to day rehabilitation to continue making functional gains prior to transplantation.

DISCUSSIONS: Prehabilitation is gaining popularity as more patients undergo life-saving procedures such as organ transplants, multi-joint replacements, and surgical resections of cancer, associated with drastic changes in functional status. Studies in adults have shown significant increases in post-operative functional capacities in patients participating in prehabilitation compared to standard rehabilitation. Prehabilitation in organ transplantation, although more difficult to study due to unpredictable wait times, has also showed improved outcomes. Few studies describe prehabilitation in organ transplantation, however, evidence suggests it can decrease morbidity associated with surgery and improve functional outcomes.

CONCLUSIONS: In this case, prehabilitation was deemed necessary by the transplant team to qualify for transplantation. After inpatient prehabilitation, the patient made enough functional gains to ambulate at wheelchair level with minimal assistance. He progressed in a day program to ambulating 300ft using LiteGait and thus qualified for the transplant list. Although current results are promising, further studies are needed to measure the benefits of prehabilitation in the pediatric population.

PREVALENCE AND CHARACTERISTICS OF PATIENTS WITH CARDIAC PATHOLOGY, AND IF THEY FULLY MET CRITERIA TO ENTER CARDIAC REHABILITATION: EXTERNAL CONSULTATION OF THE CARDIOLOGY SERVICE OF THE LUIS URIA DE LA OLIVA HOSPITAL, 2018
Gudelia Guispe Barra, and Yovanna Camargo Fuentes

CASE DIAGNOSIS: To analyze if the patients who attended an outpatient department of the Cardiology Service of the LUO Hospital meet the indications and conditions to enter Cardiac Rehabilitation

CASE DESCRIPTION: Descriptive, cross-sectional, retrospective study. The universe was 383 clinical records, applying inclusion and exclusion criteria, 178 clinical records were worked from 2018.

DISCUSSIONS: Of 178 patients, 55% female sex and 45% male sex, most frequently age over 60 years, 47% have a history of Systemic Arterial Hypertension, frequent heart disease was hypertensive with 45%, 88.6% met the conditions and indications to be part of Cardiac Rehabilitation, the behavior that the Cardiologist took was based on drugs, diet and 1% was transferred to the Physical Medicine and Rehabilitation Service.

CONCLUSIONS: When analyzing the characteristics, most comply with the relevant indications and conditions to be sent to Physical Medicine and Rehabilitation and thus be able to initiate Cardiac Rehabilitation, but unfortunately, they are not transferred from the Cardiology Service, probably due to the lack of information.
PREVALENCE OF DEPRESSION, ANXIETY AND SOCIO-DEMOGRAPHIC CORRELATE ON QUALITY OF LIFE IN INDIVIDUALS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Aisha K. B. Al-Musa, MSC, and Sulaiman Bashir Mohammed, BPT

OBJECTIVES: Chronic obstructive pulmonary disease (COPD) is a condition that significantly impact health status, compounded with psychological implications. COPD is a progressive, preventable respiratory disorder mostly caused by smoking. It is a major cause of morbidity and mortality; it is associated with a high rate of depression and anxiety which consequently affect their quality of life. This study investigated the influence of depression and anxiety on the quality of life of individuals with COPD and their socio-demographic correlates.

DESIGN: The design is a cross-sectional survey. Fifty-seven participants were recruited from two hospitals using a consecutive sampling. Beck Depression Inventory Questionnaire, Beck Anxiety Inventory Questionnaire and Short Form 36 (SF-36) were used to assess depression, anxiety and quality of life respectively. Data was summarized using descriptive statistics, inferential statistics of Spearman Rank Correlation and Chi-square were used to analyze the data at p≤0.05.

RESULTS: Moderate depression 13(22.8%) and mild anxiety 33(57.9%) existed among participants. 36(63.2%) have poor quality of life. The result shows a negative linear relationship between quality of life and depression (r = -0.75) and anxiety (r= -0.82). No significant association existed between level of depression and age (p=0.38), occupation (p=0.35), disease severity level (p=0.12), marital status (p=0.50) and clinical comorbidity (p=0.49), however, significant association existed between depression and gender (p=0.02) and educational level (p=0.02). Anxiety shows no significant association with all the socio-demographics studied, age (p=0.57), gender (p=0.13), educational level (p=0.13), occupation (p=0.84), clinical comorbidity (p=0.87), marital status (p=0.41), and disease (p=0.44) severity level.

CONCLUSIONS: Mild to moderate psychological disturbance is present, it negatively affect the quality of life. Gender and educational level were determinant of the level of depression. Psychological disturbance should be evaluated in this population, its evaluation will help in identifying the presence on time and further improve their quality of life, reduce morbidity and mortality.

PROGRAMME TO IMPROVE THE PATIENT’S EXPERIENCE IN REHABILITATION: NURSING AND CARE IN ACCORDANCE WITH THE INSTITUTIONAL VALUES AND CARE CENTRED ON THE PERSON

Maria F. Colón, Miriam A. Weinberg, MdDICO, and Emile Schenk

OBJECTIVES: General Objective: Promote and encourage attitudes and professional actions in the framework of the values of the institution. Specific Objectives: Reduce the number of complaints; Reduce everyday conflicts; Improve internal communication; Incorporate the concept of attention centered on the person.

DESIGN: Trabajo de carater descriptivo. Meetings with Medical Department, Nursing Department and Team of Nursing Supervisors. Monthly meetings with nursing teams. Register in field notebook. Evaluation of meetings. Register of complaints and problematic situations expressed by patients and family members. Weekly survey on satisfaction of needs. The work was divided in two stages: Diagnosis and Execution. An evaluation was carried out to monitor and plan the following semester. 30 monthly meetings were held - without supervisors, with the participation of all the staff. Evaluation: 57 nurses (81% of the team).

RESULTS: 61% considered that these meetings acted as a space of contention. 51% considered that they facilitated communication between teams. 49% found strategies in this space to improve the quality of care.

57% considered that a reduction of everyday conflicts was achieved through this programme.

CONCLUSIONS: Through induction and specific training we achieved: Reduction of complaints and improvement in the experience of the patient. Better management of problematic situations. Improvement in professional attitudes impacting on the work environment and consolidation of teamwork. Improvement in communication between each nursing team and the different shifts. Transmission of institutional values in a framework of care centered on the person.

PROGRAMS ON FORMING SYSTEMS OF COMPREHENSIVE REHABILITATION AND HABILITATION FOR PERSONS WITH DISABILITIES: MONITORING IN REGIONS OF RUSSIA

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OBJECTIVES: The ratification of the Convention on the Rights of Persons with Disabilities caused challenges in the legislation and the structure of rehabilitation system in the Russian Federation. The research aimed at the integration of persons with disabilities into society, one of the main objectives was to ensure equal access for disabled people to priority facilities and services in the everyday life.

DESIGN: The Ministry of Labour and Social Protection of the Russian Federation approved the evaluation with the 4 indicators: an integrated approach; satisfaction of persons with disabilities; staffing of organizations; the information base in a region.

The analysis of the regional programs was carried out in compliance with the developed approach, formation of an integrated approach to the rehabilitation and habilitation, creation of conditions for professional development and employment, development of early interventions, organization of assisted living.

RESULTS: 18 regional programs were analyzed. Only 7 programs reflected an integrated approach to rehabilitation and habilitation. An increase of professional development and employment for people with disabilities was written in 10 programs. 16 programs included measures to form an integrated approach to early interventions for children and their families. 16 programs demonstrated the arrangement and provision of training apartments for persons with disabilities. The input from the regional budget in funds allocated to the programs ranged from 7% to 57%.

CONCLUSIONS: The formation of the system of comprehensive rehabilitation and habilitation for persons with disabilities met the lack of practice in the development of programs and understanding of complexity in evaluation of the needs for every person. The described approach, the identified errors in creating programs for the formation of the comprehensive rehabilitation and habilitation system for persons with disabilities in the Russian regions will help specialists working on the programs for the next period.

PROGRESSING AGE AND FACTORS RELATED TO SEVERE SCOLIOSIS IN CEREBRAL PALSY PATIENTS

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OBJECTIVES: To investigate the age at which scoliosis progresses to a severe condition and identify factors related to severe scoliosis in cerebral palsy patients.

DESIGN: This retrospective study included 51 patients aged ≥15 years. Cobb angle was measured over time through X-ray examination. Patients were divided into the following groups according to their final Cobb angle: < 60°, 60°-100°, and ≥100° groups. The age at which the Cobb angle was ≥20° was considered among groups. Moreover, the age at which a significant difference in Cobb angle occurred among the groups was considered the age at which scoliosis worsened. Association of the final Cobb angle with the location of curve, Gross Motor Functional Classification System (GMFCS), capability of turning over, orthosis use, hip dislocation, tracheotomy, and gastric fistula was examined.

RESULTS: Mean ages at which the Cobb angle was ≥20° were showing that the ≥100° group was significantly younger. From 9 years of age, a significant difference was noted in Cobb angle between the < 60° and ≥100° groups. From 13 to 19 years, significant difference in Cobb angle was observed between among the two or three groups. GMFCS, capability of turning over, hip dislocation, and gastric fistula were showed different among the three groups.

CONCLUSIONS: Scoliosis progressed to the severe form (Cobb angle ≥100°) at 9 years of age. Moreover, scoliosis is aggravated during the growth period. The cause of deterioration of the scoliosis was considered to be severe CP with low motor function levels and problems with internal functions.

PROLONGED HEMIPARESIS ASSOCIATED WITH INTRATHECAL METHOTREXATE NEUROTOXICITY

Mihir Joshi, MD, and Christian Niedzwecki, DO

CASE DIAGNOSIS: Left hemiplegia secondary to methotrexate neurotoxicity. The patient is an 11-year-old girl with T-cell ALL, receiving intrathecal methotrexate chemotherapy.

CASE DESCRIPTION: The patient presented to the hospital two weeks after receiving intrathecal (IT) methotrexate, with acute-onset fever, left hemiparesis, and left facial droop. Stroke workup was negative and imaging was suggestive of methotrexate neurotoxicity. Due to this and her history, she was started on leucovorin and dextromethorphan for neurotoxicity rescue. The PM&R consult service was requested to evaluate the patient given her persisting deficits despite physical therapy and occupational therapy. The case presentation was submitted to the 2019 International Recommendations in Integrated Rehabilitation Unit (IRU) admission for more comprehensive functional rehabilitation. The patient was admitted to the IRU and began multi-modality therapy modeled after approaches successfully used in other pediatric brain injury patients. After a 21-day stay on the...
inpatient rehabilitation unit she was discharged home with significant but incomplete functional recovery (WeeFIM/R change 24 points, efficiency 1.20). She continues to have residual left hemiplegia 3 months after discharge.

**DISCUSSIONS:** Methotrexate is widely used in ALL, with strong CNS efficacy for treatment or prophylactic purposes. Methotrexate neurotoxicity is usually reported as a transient condition from which patients usually experience complete neurologic recovery. This is the first reported case, in our searching, of focal neurologic deficits persisting for several weeks after IT methotrexate infusion. Additionally, this case demonstrates the effectiveness of a comprehensive inpatient neuro-rehabilitation program in restoring functional independence post-methotrexate neurotoxicity.

**CONCLUSIONS:** This study demonstrates the difficulty of analyzing the outcomes of methotrexate neurotoxicity, functional deficits and neuro-imaging changes may persist for weeks to months. Fortunately, these functional deficits may also respond to a comprehensive inpatient neuro-rehabilitation program. Significantly, it suggests that acquired brain injuries of an atypical nature may still respond positively to pragmatic neuro-rehabilitative approaches modeled on ischemic or traumatic brain injury populations.

**PROMOTING NURSE AND PHYSICIAN COMMUNICATION THROUGH STANDARDIZED BEDSIDE ROUNDS**

Steven Tjines, DO, and MeiLani Mapa, MD

**OBJECTIVES:** Inadequate communication between nurses and physicians frequently leads to suboptimal patient care. One significant example is the mismanagement of neurogenic bowel in patients with brain injury, which can lead to serious complications including delirium, fecal impaction, increased LOS, and increased morbidity/mortality.

**DESIGN:** In 2017 over a three-month period, we found that a majority of patients admitted to the brain injury unit had been constipated during their inpatient rehabilitation. Twenty-six patients with TBI, SDH, SAH, or ICH admitted into our in-patient rehabilitation unit were reviewed. 21 of 26 patients (77%) had less than one bowel movement every other day. 19 out of 26 (70%) had less than three bowel movements per week. We considered multiple factors that may impact the execution and follow up of constipation management and a quality improvement project was initiated: standardized physician and nurse rounding to include a communication tool on bowel habits and regimens. Our aim for this quality improvement project was for 50% of all traumatic brain injury patients admitted in the brain injury unit to have a bowel movement at least three times per week.

**RESULTS:** Since the standardization of the nurse and physician rounding, we achieved our aim of at least 50% of our traumatic brain injury patients having bowel movements at least three times per week. The number of patients achieving this went from 30% before the implementation of standardized nurse and physician rounding, to 95% after this implementation for a total increase of 65%.

**CONCLUSIONS:** Fractured communication between physicians and nursing leads to issues in many aspects of patient care. By implementing a standardized communication tool for our daily nurse and physician rounds, we improved quality outcomes and patient care. Daily nurse and physician rounding with a standardized communication tool may continue to improve the quality of care among other patient populations as well.

**PROSPECTIVE OBSERVATIONAL STUDY TO FOLLOW UP A COHORT OF PARKINSON’S PATIENTS DURING A 4-WEEK REHABILITATION OUTPATIENT STAY**

Emilie Leblong, MD, MSc, Anne-Laure Roy, MD, Bastien Fradet, MSc, Audrey Riou, MD, Estelle Ceze, OT, Alexandra Rouxel, PH, Benoît Nicolas, MD, and Philippe Gallien, MD, PhD

**OBJECTIVES:** To evaluate the effectiveness of a 4-week program in a rehabilitation center for reconditioning and exercise in Parkinson’s patients.

**DESIGN:** Observational, prospective, monocentric study, cohort follow-up of Parkinson’s patients or related patients over 2 years consisting of the implementation of a rehabilitation program in groups of 4 to 6 people for 4 weeks in ON at a rate of 3 days/week based on rehabilitation to effort, global and analytical. 113 patients participated, average age was 67.9 years (min 44 years, max 83 years), average diagnostic time 8.4 years (SD 5.2), Hoehm and Yahr 2.6 (SD 0.6), UPDRS II+III 24.8 (SD 9.4). Statistically significant differences were observed across all clinical balance and walking tests (Time Up and Go p=0.04, Time to test 10m at comfortable speed p=0.02 and fast p=0.03, distance covered in 2 minutes p=0.0004 and in 6 minutes p<0.0001). The results are statistically significant on global and fine grips outside the Nine Hole Peg test on the left.

**RESULTS:** Statistically significant on global and fine grips outside the Nine Hole Peg test on the left. 113 patients participated, average age was 67.9 years (min 44 years, max 83 years), average diagnostic time 8.4 years (SD 5.2), Hoehm and Yahr 2.6 (SD 0.6), UPDRS II+III 24.8 (SD 9.4). Statistically significant

**PULMONARY EMBOLISM DIAGNOSIS DURING FOLLOW-UP IMAGING AFTER ACUTE INPATIENT REHABILITATION ADMISSION SCREENING CHEST X-RAY IN A PATIENT WITH GLOBILOASTOMA MULTIFOLIAE**

Eric Tam, MD, Emily Hon, MS4, and Eric L. Aitschuler, MD, PhD

**CASE DIAGNOSIS:** Pulmonary embolism
CASE DESCRIPTION: 70 year-old male with history of hypertension presented to the ED for 24 hours of right upper extremity weakness and dysarthria. CT showed a left fronto-parietal brain mass. Preoperative CXR was negative for significant findings. A left craniotomy with sulcal tumour resection was performed. Post-operatively patient developed complete left lower extremity weakness. On admission to acute inpatient rehabilitation, routine admission Dopplers were negative but chest x-ray showed retrocardiac opacity. On day 2 after admission, patient developed altered mental status for 30 seconds. Patient’s vitals stabilized and intravenous fluids were started. CT chest with contrast showed pulmonary emboli straddling bilateral main pulmonary arterial branches. Medicine consult recommended IVT for venous thromboembolism prophylaxis, as no surgical interventions were planned or needed. Surgical service was contacted and patient was sent back to previous hospital’s medicine service.

DISCUSSIONS: This case suggests the need for the development of an admission protocol for rehabilitation facilities taking patients in hypercoagulable states. A search of the literature found that there are no published admission protocols for cancer rehabilitation patients. Furthermore, patients with cancer had twice the incidence of VTE, PE and DVT as patients without cancer. 5.2% of cancer patients have venous thromboembolism either prior to or during the course of inpatient rehabilitation and 1.8% of cancer patients have had pulmonary embolisms during acute rehabilitation. A different study showed that 3% of brain cancer patients who underwent brain surgery developed DVT and/or PE in the peri-operative period.

CONCLUSIONS: This case highlights the need for the development of an admission protocol for rehabilitation facilities particularly when admitting patients in hypercoagulable states. A risk-cost-benefit study should be able to provide further guidance.

PULMONARY EMBOLISM DIAGNOSED WITH THE USE OF ELECTROCARDIOGRAPHY IN ACUTE REHABILITATION: A CASE REPORT
Nitin Prabhakar, MD, Alpha Anders, BS, Conan So, BS, MPH, and Ninad Karandikar, MD

CASE DESCRIPTION: We present a case of angiogram confirmed pulmonary embolism (PE) diagnosed by abnormal ECG findings of S1Q3T3 in a polytransfused patient on an acute rehabilitation unit.

CASE DESCRIPTION: The patient maintained multiple orthopedic injuries after a motorcycle accident requiring aggressive post-operative pain management and lower extremity immobilization. Upon transfer to acute rehabilitation three weeks after initial injury, he presented with intermittent tachycardia without other vital sign abnormalities. The patient did not have classic symptoms of pleuritic pain, hemoptysis, dyspnea, or tachypnea and had been on prophylactic anticoagulation transfer to our institution. His intermittent tachycardia and vague discomfort were initially attributed to pain and anxiety. Upon further workup of his persistent tachycardia, ECG findings showed normal sinus rhythm, with S wave in lead I, Q wave, and inverted T wave in lead III, which raised suspicion for PE. Subsequent CT pulmonary angiogram showed an acute, small pulmonary embolism in the subsegmental pulmonary arteries of the right middle lobe.

DISCUSSIONS: Due to the poor sensitivity & specificity of most EKG findings, electrocardiography should not be used standalone in the diagnosis of PE. Given the risk factors for VTE present in most patients on inpatient rehabilitation units, it is vital that providers in this setting remain vigilant to the possibility of undetected pulmonary embolism and recognize the electrocardiographic abnormalities that may be present. Although the risk of progressive or recurrent venous thromboembolism (VTE) is lower in subsegmental PE compared to large PE, due to the continued mobility restrictions in our patient, we opted for therapeutic anticoagulation.

CONCLUSIONS: In the case of high-risk rehabilitation patients, such as those with functional lower limb immobilization, it is important to consider the risk of thromboembolism events despite appropriate VTE prophylaxis.

Rapid Improvement in Stroke Rehabilitation After Knee Intra-Articular Steroid Injection: A Case Report
Steven Funnell, MD, MS, and John Baratta, MD, MBA
CASE DIAGNOSIS: Ischemic left putamen stroke in the setting of left knee osteoarthritis.
CASE DESCRIPTION: A 59-year-old male was admitted to acute inpatient rehabilitation (AIR) 3 days after sustaining an ischemic left putamen stroke. His AM-PAC score prior to inpatient rehabilitation was 13/24 and he demonstrated right-sided hemiparesis/ataxic gait. AIR admission examination noted a left knee effusion, joint line tenderness, and decreased range of motion. Initial therapy sessions were limited by left knee pain and stiffness, thought secondary to compensatory gait. X-rays were notable for osteoarthritis and confirmed a joint effusion. Using landmark guidance and a medial approach, 13 mLs of serous fluid were aspirated followed by injection of 9 mL of 1% lidocaine and 1 mL of triamcinolone 40 mg/mL. The patient noted immediate pain relief which was sustained for the remainder of his admission. Subsequent therapy sessions revealed a dramatic improvement in his function. His AM-PAC improved to 24/24 5 days following the injection and he was discharged home.

DISCUSSIONS: This patient’s stroke rehabilitation progress was greatly limited by his coexisting left knee osteoarthritis. After undergoing a joint aspiration and steroid injection, the patient experienced significant pain relief and had a dramatically improved functional recovery. To our knowledge, there have been no studies that have analyzed the pattern or effects of peripheral joint steroid injections in the post-stroke population during AIR.

CONCLUSIONS: We suspect that when intra-articular interventions are selected for the appropriate patient there can be a reduction in admission length and significant improvement in AM-PAC score. We also suspect that there may be a large number of such cases that have gone unreported in the literature.

RARE CASE OF A TIC-INDUCED CERVICAL MYELOPATHY IN A CHILD
Lauren Fetsko, DO, Joselyn Gober, DO, and Rochelle Dy, MD
CASE DIAGNOSIS: Cervical myelopathy (CM) as a result of motor tics has been reported but rare, particularly in the pediatric population.
CASE DESCRIPTION: This is a case of an 11-year-old male with history of Tourette Syndrome, OCD and anxiety who developed new onset neck tics. Later, he developed paresthesias, fine motor deficits and gait difficulty, with physical examination suggestive of upper motor neuron injury. Spine MRI revealed patchy areas of enhancement, for which he was treated with steroids for myelopathy of unknown origin. Although symptoms improved initially, his neck tics became more violent and he developed quadriparesis and gait abnormality. Repeat Spine MRI was significant for myelomalacia at C5-6, with mild spondylotic changes. No surgical intervention was recommended. He was trialed on various medications for tic management. Despite better control of his tics, the long-term effects from the cervical myelopathy ensued, resulting in functional decline due to severe lower limb spasticity limiting his ambulation.

DISCUSSIONS: Violent repetitive tics involving head and neck motions can cause spondylotic changes and predispose the spinal cord to injury. In this case, his
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医疗历史被复杂的额外精神疾病导致的延迟治疗，导致在适当的医疗的延迟处理。此外，这些延迟可能不客观的医疗，这些延迟在适当的医疗的管理的延迟恶化了这个患者的功能性后果的重复性和由于脊髓的损伤。

**CONCLUSIONS:** The high level of suspicion for traumatic myelopathy should be considered when evaluating and treating patients with tics and other movement disorders. It is important to control the symptoms early in order to prevent the development of a spinal cord injury.

**RARE CRANIAL NERVE INVOLVEMENT (PROGRESSIVE DYSPHAGIA) IN A PATIENT WITH CHRONIC INFLAMMATORY DEMYELINATING POLYNEUROPATHY: A CASE REPORT**
Fabienne Saint-Preux, MD, Francis Lopez, MD, and Jeffrey Fine, MD

**CASE DIAGNOSIS:** 64-year-old male with progressive dysphagia likely secondary to chronic inflammatory demyelinating polyneuropathy (CIDP).

**CASE DESCRIPTION:** 64-year-old male presents with lower extremity weakness prompting recent use of straight cane for ambulation. Physical exam showed weakness in the hands, bilateral lower extremities, absent reflexes, decreased proprioception, vibration, pinprick sensation andSteppage gait. Electromyography of the lower extremities demonstrated absent nerve conduction studies; needle EMG studies demonstrated active denervation. Muscle biopsy demonstrated moderate-severe muscle fiber atrophy consistent with chronic inflammatory demyelinating polyneuropathy (CIDP). 5 day course of IVIG improved foot mobility and hand and foot numbness however patient endorsed dysphagia confirmed by speech evaluation. Modified barium swallow study (MBS) revealed oropharyngeal dysphagia. No acute pathology was noted with fiber optic nasolaryngoscopy; CT Neck revealed no masses. Diet downgraded to pureed diet as patient was no longer tolerating liquids. Repeat MBS showed worsening oropharyngeal dysphagia. Ultimately, PEG tube was placed and management with IVIG and steroids continued. MBS 6 weeks later revealed some improvement in pharyngeal phase of swallowing.

**DISCUSSIONS:** Chronic inflammatory demyelinating polyneuropathy (CIDP) is an inflammatory neuropathy characterized by slow, progressive, symmetrical sensorimotor dysfunction. CIDP is classified as an autoimmune disorder and treated as such, with IVIG and/or steroids being the mainstay of treatment. There exists multiple phenotypic variants of CIDP and considerable variation in the clinical presentation of this disorder however patients usually present with some combination of sensory and/or motor involvement of the upper and lower limbs. Cranial nerve involvement presenting as dysphagia is rare.

**CONCLUSIONS:** Cranial nerve involvement in CIDP is rarely, if ever, seen. Though rare, dysphagia (CN IX/X) must be considered a sequela of CIDP especially after other causes of dysphagia are ruled out. IVIG may be an effective treatment for CIDP with CN IX/X palsy presenting as dysphagia. MBS can be used to gauge response to treatment.

**RARE DIAGNOSIS: INFANTILE BOTULISM AFTER KARO (CORN) SYRUP INGESTION**
Dana Branch, MD, Dawn Deike, DO, and Charles Sisung, MD

**CASE DIAGNOSIS:** A 4-month-old male presented with acute flaccid paralysis after ingesting Karo corn syrup consistent with infantile botulism.

**CASE DESCRIPTION:** A 4-month-old previously appropriately developing male presented with poor oral intake, lethargy, weak cry, and poor head control. History was significant for infection of Karo syrup as a home remedy for constipation. Physical examination was notable for hypotonia, hyporeflexia, and impending respiratory failure requiring urgent intubation. Electromyography (EMG) findings were consistent with a presynaptic neuromuscular junction disorder, likely infantile botulism. He was treated with human botulinum immune globulin (BabyBig) with improvement in neurologic and respiratory status. A 10-day course of acute inpatient rehabilitation with focus on strength, neuromotor training, feeding tolerance, and facilitating developmental milestones resulted in improved head and trunk control, rolling to both sides, and bottle feeding without aspiration. Follow-up at age 7 months revealed normal strength, improvements in tone and feeding, and appropriate developmental milestones.

**DISCUSSIONS:** Ingestion of food contaminated with botulinum neurotoxins (BoNT) has been associated with the development of acute flaccid paralysis in a presynaptic neuromuscular junction disorder known as botulism. Diagnosis can be difficult and is usually based on history and clinical findings. Timely administration of antitoxin is essential to prevent respiratory failure and death, which occurs in 50-60% of untreated BoNT intoxication cases. While ingestion of honey is a known risk factor for infant botulism, the development of botulism after ingestion of corn syrup is relatively rare. In this case, early clinical diagnosis supported by EMG findings, administration of BabyBig, and targeted therapies led to a marked improvement in strength, respiratory status, and return to normal development and function.

**CONCLUSIONS:** Medical providers should consider botulism in infants who develop progressive bulbar and muscular weakness with corresponding ingestion history. Early diagnosis and treatment combined with acute inpatient rehabilitation can result in return to normal strength, development, and function.

**RATE OF RETURN TO ACUTE CARE WHEN ARRIVING AFTER 5PM: A SINGLE INSTITUTION ANALYSIS**
Jennifer Hankenson, MD, and Michael Wronen, MD

**CASE DIAGNOSIS:** Many acute rehabilitation hospitals have a significant number of their admissions arriving in the evenings. This can lead to patient frustrations and more seriously adverse outcomes. The objective of this research project is to discuss the data for return to acute care (RTAC) from a large, acute rehabilitation hospital from 2017-2018 and include emerging data from 2019.

**CASE DESCRIPTION:** This study looked retrospectively at the number of patients admitted after 5pm from the 2017 and 2018 calendar year that subsequently had a RTAC. Analysis was performed to see if there was statistical significance between acute care re-admission if patients were admitted after their primary teams had left for the day. Patient's admitted after 5pm were most often admitted by on call providers.

**DISCUSSIONS:** In CY2017 2034 patients were admitted after 5pm (46.7% of admissions). 262 (12.8%) patients had a RTAC. 57 (21.8%) patients were re-admitted within 3 days of admission to acute rehabilitation. This was higher than the national weighted re-admission rate average of 8.95% and but on par with the regional average of 12.19%. In CY2018 2001 (41%) patients were admitted after 5pm. 261 (13%) of these patients had a RTAC. 59 (22.6%) were re-admitted within 3 days of admission to AR. This was again higher than the national weighted re-admission rate average of 8.97% and slightly higher than the regional average of 12.11%. 14.39% of patients admitted after 5pm over the two calendar years had a RTAC versus only 11.84% admitted before 5pm. This result was found to be statistically significant.

**CONCLUSIONS:** Almost half of this institution's admissions arrived after 5pm. A statistically significant correlation was found between re-admission rates and admission after 5pm (over the 2 year period). The percentage of admissions after 5pm is higher than comparable studies but had similar RTAC rates.

**RATINGS OF PERCEIVED DIFFICULTY DETERMINES THE INTENSITY OF BALANCE EXERCISES**
Saud F. Alsubaie, DR, Gregory Marchetti, DR, Susan Whitney, DR, Kathleen Sienko, DR, Joseph Furman, DR, Brooke Klatt, DR, and Patrick Sparto, DR

**OBJECTIVES:** Balance exercises have been found beneficial for older adults and individuals with balance and vestibular disorders in improving balance and reducing number of fall incidences. Unfortunately, there is insufficient evidence of a method to determine the difficulty of balance exercises that can be used in the clinic. In this study, we developed a rating scale similar to the rating scale of perceived exercise for aerobic and resistance exercises, and our goal is to assess the reliability and validity of the rating scale in a wide range of balance exercises.

**DESIGN:** Sixty-two healthy adult participants (18 ± 2 years) with mean age of 55 ± 20 years (50%/male) participated in the study and performed 24 standing balance exercises (4 trails). The exercises’ conditions were standing on firm or foam surface, keeping eyes open or closed, standing on feet apart or semi-tandem, and keeping head still or moving in yaw or pitch planes. Ratings of perceived difficulty were recorded on a scale from 0 (very easy) to 10 (very hard), and body sway was quantified using an inertial sensor. The ratings of perceived difficulty of balance exercises were validated by comparing them with body sway measurements using a linear regression model, and their test-retest reliability was assessed using a weighted kappa coefficient.

**RESULTS:** Ratings of perceived difficulty of balance exercises were found valid and reliable demonstrating moderate to strong correlations with body sway measurements and demonstrating fair to substantial test-retest reliability.

**CONCLUSIONS:** The scale of ratings of perceived difficulty was found valid and reliable and can be used in clinic to determine the intensity of balance exercises.

**RECOMMENDATIONS IN REHABILITATION OF METABOLIC CONDITIONS**
Paolo Capodagli, MD, Emanuele Giusti, MS, and Amelia Brunani, MD
OBJECTIVES: Given the rates of persons with disabilities or postacute conditions who are also obese, it appears of importance for PRM specialists to familiarize with principles in Rehabilitation of Metabolic conditions.

DESIGN: Obesity is a chronic condition often associated with multiple comorbidities which can have disabling consequences. Most research on obesity treatment has focused on life-style modification, pharmacological treatment and on bariatric surgery. Unfortunately, being severe obesity chronic and disabling, such “weight centered” approach has excluded those patients with advanced disease stage (with established/ end stage organ damage, significant/severe psychopathology and functional limitations), who are either poor candidates for surgery or in whom weight loss alone (especially in sarcopenic obesity) is unlikely to significantly reverse quality of life reduction and disability. If advanced-stage obesity represents a disabling disease in a multidimensional perspective, therefore a multidisciplinary and integrated rehabilitative approach is required.

RESULTS: According to current guidelines, the management of severe obesity in a rehabilitative setting should be multidisciplinary and characterized by the integration of nutritional, physical/functional rehabilitation, psycho-educational, and rehabilitative nursing interventions in relation to the clinical complexity of obesity. The intensity of the rehabilitative interventions should depend on the level of severity and comorbidities, frailty of the psychic status, degree of disability and quality of life of the patient. The rehabilitative setting must be structurally adequate to the needs of patients with excess of body mass with availability of bariatric lifting and transferring aids.

CONCLUSIONS: The existing recommendations in Rehabilitation of obese patients will be revised and the current advances in guide lines development according to the GRADE method and WHO recommendations will be presented.

RECOVERY OF HAND FUNCTION INDUCED BY HIGH-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION DURING HAND GRIP TRAINING IN POST-STROKE PATIENTS: A PILOT RANDOMIZED CONTROLLED TRIAL

Yawen Yang, BS, Wenxuan Pan, MS, Lin Gu, MS, and Qing Xie, MS

OBJECTIVES: Brain stimulation and motor training together are probably to be synergistic in enhancing functional neuroplastic changes that exceed the period of intervention and result in more prominent improvements. The research is to determine the effect of repetitive transcranial magnetic stimulation (rTMS) applied to primary motor cortex (M1) with simultaneous hand grip training on recovery of hand function in post-stroke survivors.

DESIGN: Twenty-six stroke patients recruited from inpatient and outpatient were randomized into rTMS+hand grip training synchronously (Group A), rTMS alone (Group B), or rTMS+sham+hand grip training synchronously (Group C). The total rTMS pulses and total duration of hand grip training were the same in these groups. Measures of Jebsen-Taylor Hand Function Test (JTHFT), grip strength, Fugl-Meyer Assessment of Upper Limb (FMA-UL), and Modified Barthel Index (MBI) were tested at baseline and after 3 months of intervention.

RESULTS: Participants of Group A displayed more excellent score changes in the JTHFT after 2 weeks of intervention compared to the Group C (P< 0.05). Scores on the FMA-UL enhanced significantly in Group A and B after 2 weeks, compared with the control group, the P values were 0.004 and 0.026 respectively. No significant correlations were found between changes in grip strength and MBI of the different interventions.

CONCLUSIONS: rTMS+hand grip training synchronously and rTMS alone were both capable to facilitate the recovery of hand function. The combination of rTMS and hand grip training maybe a more promising intervention for post-stroke patients.

REFRACTORY PAIN AFTER TOTAL KNEE ARTHROPLASTY TREATED WITH PERIARTICULAR PROLOThERAPY

Ryan D. Turchi, MD, Shane M. Davis, MD, Armand Ardestani, BS, Edward Barawid, DO

CASE DESCRIPTION: Chronic pain after total knee arthroplasty

CASE DESCRIPTION: We present 3 cases of patients with chronic knee pain after total knee arthroplasty. Each case was refractory to conservative management. All 3 patients underwent periartricular prolotherapy injections with improvement in pain and function. In our 3 patients, a solution consisting of 2cc 50% dextrose, 2 cc normal saline, and 1cc of 1% lidocaine was used and injected into periartricular tendinous knee joint. With excarnation of the patients on follow up clinic visit, it was found that the patients experienced greater than 50% improvement of their subjective pain symptoms.
DISCUSSIONS: In AVN, this intrinsic regeneration capacity have lost. Cultured MSCs shows good clinical outcome only in early stage before collapse. Herniou et al, good clinical outcome in 116 patients (189 hip). When patients were operated before collapse, hip replacement was done in 9in145 hips.

CONCLUSIONS: The capacity of ASCs to differentiate into muscle was recently shown. It has the ability to differentiate into chondrocytes, fibroblasts, and other musculoskeletal tissue. The intrinsic regeneration capacity have lost. Cultured MSCs shows good clinical outcome only in early stage before collapse. Herniou et al, good clinical outcome in 116 patients (189 hip). When patients were operated before collapse, hip replacement was done in 9in145 hips.

REGENERATION OF LIGATION BY ADIPOSE TISSUE-DERIVED MESENCHYMAL STEM CELLS (AT-MSCs)-2 CASE REPORT

Mohammad Moniruzzaman, MBBS, FCPS

CASE DIAGNOSIS: Diagnosis: Case-1: Mr A, 48 years, Dhaka came on 2nd February, 2019 with the complaints of pain in the right shoulder during playing Golf for last 3 months. On exam, mild tenderness (gr-III) over supraspinatus (SS) and empty can sign was positive. In US & MRI found that there was linear articular partial thickness tear in SS tendon. Case-2: Mr. B, a 72 years, businessman from Dhaka came on 5 March, 2019 with the complaints of chronic low back pain with the failure of response to repeated physiotherapy and medications for last 3 years. On exam, tenderness (gr-III) over lumber interspensive space (midline), both SLR 900, flexion of upper spine was painful. US of low back shows tear of intestines ligament (IS lig) at L2-L3, L4-L5, L5-S1 level.

CASE DESCRIPTION: Both patients were advised to take Adipose Tissue-Derived Mesenchymal Stem Cells (AT-MSCs) into tear area for one time. With all aseptic precautions, after collection of 10ml liposaprate by liposaprate harvestor, 10ml AT-MSCs was achieved from each patient. US guided 2 ml AT-MSCs was given in tear of SS (case-1) & each tear of IS lig (case-2). After 2 weeks, they started rehab program and follow-up (FU) every 2 weeks interval for 3 months. After 3 months, FU US & MRI shows that there was filling of gap by fibriller regeneration of SS tendon (case-1) and IS lig (case-2).

DISCUSSIONS: Adipose stem cells are the richest source of stem cells in the body. It has the ability to differentiate into chondrocytes, fibroblasts, and other musculoskeletal tissue. The capacity of ASCs to differentiate into muscle was recently demonstrated in vitro and in vivo.

REHAB BEYOND BORDERS: A CASE OF PARAPLEgia SECONDARY TO MILIARY TUBERCULOSIS HIGHLIGHTING THE NEED FOR PHYSIATRIC COLLABORATION AT A HOSPITAL IN TANZANIA

Kaile Elson, DO

CASE DIAGNOSIS: Paraplegia Secondary to Miliary Tuberculosis

CASE DESCRIPTION: A 13 yo girl living in rural Tanzania presented to a regional referral center with a 3 months of paraplegia, incontinence, and severe decubitus ulcers. She was briefly admitted at a local hospital at the onset of her symptoms, but was discharged without a diagnosis, adaptive equipment, or education. She was diagnosed with disseminated spinal tuberculosis leading to her neurological impairments. In the absence of formal physiatric evaluation, the initial plan was constrained to range of motion exercises. After physiatric evaluation by a visiting specialist, a plan was formulated with goals of skin preservation, upper extremity strengthening, and progression towards independent transfers. The family was provided detailed education on how to facilitate this and help prevent further functional decline.

DISCUSSIONS: As of 2009, there were only six documented physicians specializing in physiatry in sub-Saharan Africa serving a population of 1.06 billion. At most hospitals in sub-Saharan Africa, the only form of rehabilitation consists of physical therapy, and they are often not involved early on. The particular hospital referenced above had an affiliation with a US based academic medical center that sends physiatrists to participate in patient care and education, which facilitated the rehabilitation of this patient. Many of the patient’s medical issues may have been prevented by improved education and training. This highlights the importance of a team based approach to care, as well as involvement of physiatry.

CONCLUSIONS: While pathologies considered unusual in the US are more common in other areas of the world, the rehabilitation needs are often similar. Cases like this one highlight the need for physiatric intervention in settings where formalized rehabilitation is not readily available. In particular, this case focuses on the need for physiatric evaluation and how it facilitates long-term goal directed care focused on increased function and prevention of further decline.

REHAB IN A PEDIATRIC PATIENT WITH WORKING DIAGNOSIS OF CHOREA-NEUROACANTHOCYTOSIS: A CASE REPORT

Firas Rafai, DO, Mary Keen, MD, Larissa Pavone, MD, Neha Kohli, MD, and Anton Dietzen, MD

CASE DIAGNOSIS: Deconditioning and underlying Neuroacanthocytosis

CASE DESCRIPTION: 18 year-old male with a PMHx significant for developmental delay and working diagnosis of neuroacanthocytosis with new onset dysphagia s/p PEG tube placement. Patient was hospitalized shortly after PEG tube placement 2/2 fever and leukocytosis. Patient was started on zosyn after chest x-ray showed diffusely increased interstitial markings and patchy right middle lobe airspace opacities. Patient was recommended for acute inpatient rehabilitation 2/2 deconditioning and progression of his rare neuromuscular disorder requiring intensive acute inpatient rehabilitation with a comprehensive team approach.

CONCLUSIONS: Neuroacanthocytosis encompasses a group of genetically heterogenous disorders characterized by neurologic signs and symptoms associated with acanthocytosis, an abnormality of red blood cells. Neuroacanthocytosis causes neurologic problems which usually consist of movement disorders, ataxia, axonal neuropathy, seizures and cognitive deterioration. While most literature does discuss the symptoms of this disease as well as its inevitable progression, there is no discussion of the role of rehab in their disease course.

CONCLUSIONS: Chorea-Neuroacanthocytosis is a rare genetic movement disorder with very little discussion in the physiatry literature regarding the role of acute inpatient rehabilitation to improve the quality of life or potential prolongation of disease progression. Our case report will help shed light on the potential for short term improvements in function and quality of life with acute inpatient rehabilitation as well as guide our colleagues with their expectations for prognosis.

REHAB TO ICU: RAPID PROGRESSION OF RHEUMATOID VASCUlitis

Vivek Nagar, MD/MBA, Andrew Bloomfield, MD, MPHIL, BSC, and Maria Jouvin-Castro, MD

CASE DIAGNOSIS: Rheumatoid vasculitis manifesting as mononeuritis multiplex, stroke, and multiple gastrointestinal perforations.

CASE DESCRIPTION: 60 year-old female smoker with comorbidities including rheumatoid arthritis presented to hospital with bilateral leg weakness and pain involving ambulation. Initial lumbar MRI showed degenerative disease without findings concerning for radiculopathy or stenosis. Serologies were not consistent with RA flare, however RA was treated actively with increase in prednisone dosage. One week after patient was transferred to acute rehabilitation, patient developed right wrist drop. Brain imaging was negative for stroke. Over the next two days, patient developed worsening proximal progression of bilateral upper extremity weakness associated with pain. Patient was transferred to hospital where intravenous steroids and lumbar puncture was performed concerning for demyelinating disease, which was negative. Eventually, nerve and muscle biopsy confirmed vasculitis, thought to be secondary to rheumatoid vasculitis. Unfortunately, patient quickly suffered complications from systemic vasculitis involving small and medium vessels, including strokes, bowel perforations, multi-organ failure and ultimately death.

DISCUSSIONS: Rheumatoid vasculitis (RV) is uncommon with an annual incidence among rheumatoid arthritis (RA) patients to less than 1 percent. However, the onset of RV may be associated with older age and cigarette smoking. Approximately 40 percent of patients with RV have a sensory neuropathy, and up to 20 percent develop manifestations of a mixed motor or sensory neuropathy. Early in the process, nerve involvement is unilateral. Within days to weeks, however, the process may develop a more symmetric appearance. Biopsy results ultimately guide treatment since the aggressive immunosuppression to improve prognosis may result in substantial toxicity.

CONCLUSIONS: This case is an unusually rapid progression of rheumatoid vasculitis. Given the lethal complications highlighted in this case, recognizing the symptoms and progression of rheumatoid vasculitis to hasten diagnosis and treatment to improve prognosis is crucial, and must be known to all rehabilitation specialists.

REHABILITATION GAINS IN A PATIENT WITH PLATYPNEA-O RTHODEOXIA SYNDROME: A CASE REPORT

Ryan Coy, MD, and Sudeep Mehta, MD

CASE DIAGNOSIS: Platypnea-orthodeoxia syndrome secondary to position dependent right-to-left inter-atrial shunt.

CASE DESCRIPTION: An 80 year-old male with a history of multiple thoracic compression fractures and kyphoscoliosis presented with several months of dyspnea
when standing and functional decline. The patient’s oxygen saturation was in the 90’s while supine but consistently dropped to the 60’s with standing or sitting upright. Increased supplemental oxygen had no effect on blood oxygen saturation when standing. Physical therapy and occupation therapy worked with the patient on bed exercises due to poor upright activity tolerance. No significant initial functional improvements were seen. Transesophageal echocardiogram showed no inter-atrial shunt and right-sided cardiac catheterization revealed normal pressures. The patient was eventually found to have a positional right to left inter-atrial shunt on transesophageal echocardiogram performed in the Semi-Fowler’s position. The patient underwent percutaneous closure of the defect and was admitted to inpatient rehabilitation. He progressed functionally with moderate/minimal assistance to supervision with ambulation and activities of daily living.

DISCUSSIONS: Platypnea-orthodeoxia syndrome is a rare disorder consisting of dyspnea and decreased arterial oxygenation with a right-to-left vascular shunt that only occurs with upright posture. It was first described in 1949 and only about 200 cases have been published. There are several case reports of patients with vertebral compression fractures and an inter-atrial defect who developed platypnea-orthodeoxia syndrome. It is thought that the anatomical changes combined with gravity can cause the aorta to pull on the inter-atrial septum and open previously undiagnosed inter-atrial defects such as an atrial septal defect, patent foramen ovale, or atrial septal aneurysm can become pathologic. The rehabilitation gains for our patient were significant only after closure of the defect.

CONCLUSIONS: Patients diagnosed with platypnea-orthodeoxia syndrome need correction of their right-to-left vascular shunt to make significant functional gains.
improvements in hand dexterity. Nevertheless, she made significant functional gains, achieving modified independence with bed mobility and many activities of daily living.

**DISCUSSIONS:** HLH is a highly morbid syndrome of immune dysregulation, which has rarely been associated with axonal polyneuropathy. Critical illness polyneuromyopathy (CIPNM) is a more common etiology of weakness; CIPNM has variable outcomes, with most recovery occurring within 6 to 12 months. Without a nerve biopsy, it is unclear if this patient’s impairments are the result of isolated CIPNM or are compounded by HLH-associated polyneuropathy. Her very limited recovery certainly raises concern for a confounding HLH-associated polyneuropathy.

**CONCLUSIONS:** This case reports a severe, heretofore irreversible polyneuropathy in a patient with HLH, despite the severity of her neuropathy, the patient benefitted from comprehensive rehabilitation, making significant functional gains.

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**REHABILITATION OF SPINAL CORD INJURY AT LOW RESOURCE SETTINGS – AN EXPERIENCE OF SPINAL INJURY REHABILITATION CENTRE (SIRC), NEPAL**

Raju Dhakal, MBBS, MD

**CASE DIAGNOSIS:** Background: Spinal cord system of care in specialized unit by dedicated multidisciplinary team is essential. Recently government of Nepal has recognized spinal cord injury is severe and complex conditions and has provision of under-deprived fund though the fund is small. Spinal Injury Rehabilitation Center is a case the specialized 51 inpatients capacity, not for profit making hospital led 10 years action plan in collaboration with ministry of health and population which has included at least one fully equipped rehabilitation center or unit with rehabilitation task force including physical medicine and rehabilitation physicians though its implementation is very slow. Purposes: 1. To present the Nepalese perspective of spinal cord injury rehabilitation at spinal injury rehabilitation center 2. To highlight the challenges and opportunities to establish spinal cord system of care in Nepal

**DISCUSSIONS:** There is only one dedicated specialized spinal injury rehabilitation center in Nepal. Spinal Injury Rehabilitation Center has already rehabilitated more than twenty five hundreds sever spinal injured all over the country and has envisioned to have at least spinal care unit in seven provinces of Nepal. Spinal Injury Rehabilitation Center is actively involved in enhancing knowledge, skills and attitudes of health care workers in spinal care by providing national level training, actively participating and leading national policy in spinal cord system of care. SIRC has continuously working prevention of spinal injury and community reintegration program after spinal cord injury.

**CONCLUSIONS:** Comprehensive spinal cord injury rehabilitation is challenging in low resource set up because of inadequate resources, improper health care systems and poverty. Low resource country should unite to develop their own proper spinal care protocol which is suitable according to their resources to provide the quality of comprehensive spinal rehabilitation care pathways and there is intense need to find out the solutions for the self sustainability of such rehabilitation center.

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**REHABILITATION SERVICES IN NORTHERN KWAZULU-NATAL, SOUTH AFRICA AND SERVICE PROVIDERS’ KNOWLEDGE AND ATTITUDES TOWARDS PUBLIC PRIVATE PARTNERSHIPS**

Thayananthie Nadasan, PhD, Senzelwe Mazibuko, MPhylso, and Oladapo M. Olagbegi, PhD

**OBJECTIVES:** Rehabilitation assists persons with disabilities attain physical independence and self-determination. Rehabilitation services in rural uThungulu District, KwaZulu-Natal, South Africa are covered by public sector which is limited, with physiotherapists working in multidisciplinary teams. Consequently, achieving rehabilitation goals of functional independence is affected. Public and private rehabilitation service providers working together can help to combat this problem. This study explored current knowledge, attitude, rehabilitation service practices in uThungulu and possibility of Public Private Partnerships (PPP)

**DESIGN:** Sample of 50 (37 public, 13 private) rehabilitation service providers were interviewed; using mixed methods exploratory case study. Using focus groups, individual interviews and questionnaires, information on their perception of availability, accessibility and equitability of rehabilitation services was requested.

**RESULTS:** Practitioners reported poor rehabilitation service provision due to poor socio-economic circumstances, limited multidisciplinary rehabilitation and poor service delivery. 64% reported that rehabilitation was not sufficient, 92% reported working in multidisciplinary teams with human resource shortages. 69% reported non-availability of designated rehabilitation units. Professionals in rehabilitation units evaluated the effectiveness of rehabilitation programme significantly more positively than those without designated units (U= 98.5, p=0.01). Positive correlation found between participants’ perceptions of managerial support and perceived rehabilitation programme effectiveness (r= 0.45, p<0.01). A weak, positive, statistically significant correlation between perceived effectiveness of rehabilitation programme and ease of administrative process was found (r=0.29, p= 0.04). Two thirds (66%) did not know about PPP, only a third (34%) knew about it.

**CONCLUSIONS:** Rehabilitation service in uThungulu is provided in hospital departments and less so at community-based centres (clinics). Rehabilitation services are multidisciplinary but were perceived negatively due to lack of equipment, absence of designated rehabilitation units, human resource shortages, lack of managerial support and cumbersome administrative processes. Most providers were not aware of PPPs. Providers aware of PPPs reported a positive potential for PPPs as vehicles of rehabilitation service provision.

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**RELATIONSHIP OF VISUAL-MOTOR INTEGRATION AND HANDWRITING SKILLS IN THE CHILDREN WITH LEARNING DISABILITIES**

Khia Nyein Yin, MB, BS, M MED SC, Voo Siew Ching, BSC, MSC, Chan Saliong, MBBS MRCP, Fatimah Almneddy, MBBS, M MED SC, and Ohnum Htwe, MBBS, M MED SC

**OBJECTIVES:** Children with learning disabilities are at risk of having visual-motor integration (VMI) deficits. VMI is essential for handwriting performance. Handwriting difficulty is the most common purpose of referral to school-based therapy service. In Malaysia, there is no school based therapy service in public schools. The aims of this study were to examine the VMI and handwriting skills of children with learning disabilities and to investigate the relationship between their VMI and handwriting skills.

**DESIGN:** This study included 6 to 12 year old 121 primary school children (95 male, 26 female) with learning disabilities (autism spectrum disorder, attention deficit hyperactive disorder, Down syndrome, intellectual disability, specific learning disability, hearing impairment, visual impairment and speech impairment) from special education classes in 4 primary schools where there is no school based therapy service. The children who could not follow the instruction for the assessment tests were excluded. Beery developmental test of VMI 5thed and Test of Handwriting skills-R were administered.

**RESULTS:** Students obtained VMI score below average to very low were 69.4% (n=84) and average to very high were 30.5% (n=37). Students obtained visual perceptual result below average to very low were 62.0% (n=75) and average to very high were 38.0% (n=46). Seventy six percent of the students (n=92) obtained motor coordination result below average to very low and 24% (n=29) were with average to very high. The students obtained THS-R result ordinal score below average to very low were 72.8% (n=88) while average and above average were 27.3% (n=33). Correlation between VMI and THS was significant at high level (r = 0.76, p < 0.01).

**CONCLUSIONS:** VMI skills should be considered when the children with learning disabilities have hand writing difficulties. These study findings showed that school based therapy service is necessary in Malaysia school system for special education.

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**REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (rTMS) FOR THE MANAGEMENT OF POST-STROKE IMPAIRMENTS: AN OVERVIEW OF SYSTEMATIC REVIEWS**

Charlotte Rosselin, N/A, Woo-jin Kim, PRM, Bhasker Amatya, DMEDSC, MPH, MD, Pouya Hafezi, DR, and Fary Khan, MBBS, MD

**OBJECTIVES:** Stroke is one of the leading causes of long term neurological disability in adults worldwide, and is related to motor and non-motor impairments. It induces abnormal neuronal activity causes disruption in the regular interhemispheric communication, which can be reestablished by repetitive transcranial magnetic stimulation (rTMS). The aim of this review is to systematically evaluate evidence from published systematic reviews of clinical trials to determine effectiveness of rTMS in post-stroke adult population.

**DESIGN:** Cochrane Library database, MEDLINE, CINAHL, EMBASE, and PubMed were comprehensively searched for systematic reviews evaluating efficacy of rTMS interventions for various post-stroke complications till January 15, 2019. Three reviewers independently screened and shortlisted the selected reviews and independently assessed the methodological quality of each included review using the Assessment of Multiple Systematic Reviews (AMSTAR) appraisal tool. The quality of evidence for each outcome evaluated within the included reviews.
was appraised with the Grade of Recommendation, Assessment, Development and Evaluation (GRADE).

RESULTS: 12 systematic reviews (9117 participants) evaluating the effect of rTMS on motor and non-motor (aphasia, depression, dysphagia and cognition) functions after stroke were included. Evidence for some of the studies were downgraded from actual evidence reported by the authors, mainly due to imprecision and inconsistency of findings, use of different outcome measures and inclusion of non RCTs with poor methodology quality. The overall findings suggest beneficial effect of rTMS with ‘moderate quality’ evidence on dysphagia or cognitive impairment, ‘low to moderate quality’ evidence on any motor function, and ‘low quality’ evidence on aphasia and cognition.

CONCLUSIONS: There was a noticeable heterogeneity amongst the included reviews. Therefore, pooling data for quantitative analyses was not possible, and best-evidence syntheses was described using qualitative analyses. Despite wide use of rTMS in stroke population, there is still lack of high-quality evidence of its effectiveness to improve post-stroke impairments.

RESOLUTION OF CHRONIC BRUXISM AFTER DISCONTINUATION OF FLUOXETINE IN PATIENT WITH REMOTE STROKES: A CASE REPORT

Melissa Osborn, MD, and Lynn Vidakovic, MD

CASE DIAGNOSIS: 69 year old right-handed male with history of strokes involving the left middle cerebral artery and right pons with resulting right hemiparesis and non-fluent aphasia.

CASE DESCRIPTION: Upon admission to acute inpatient rehabilitation, the patient presented with reports of severe bruxism over the past year to the point of "grinding down" multiple teeth requiring dental extraction. He had been started on fluoxetine 20mg daily for motor recovery after a stroke six years prior to presentation. Fluoxetine was continued indefinitely, presumably for mood management. Past medical history also included diabetes mellitus, hypertension, lupus anticoagulant, and recent hospitalization for acute kidney injury and L1 compression fracture. Upon admission to acute inpatient rehabilitation, fluoxetine was discontinued due to bruxism. Ten days later, the patient’s bruxism had improved significantly and he was able to sleep better. By discharge one month later, his bruxism had resolved, and his mood remained stable. This improvement was sustained upon phone follow up with the patient two months after initial presentation.

DISCUSSIONS: Since fluoxetine has been shown to improve motor recovery when given for 90 days after acute ischemic stroke in the 2011 FLAME trial, patients are often started on selective serotonin reuptake inhibitors (SSRIs) such as Fluoxetine after stroke. To our knowledge, this is the first report of bruxism as a side effect of an SSRI in a stroke patient.

CONCLUSIONS: Given the common prescription of fluoxetine to patients following stroke, it is critical for clinicians to keep in mind the side effect profile of SSRIs, which may include bruxism and can be resolved by medication discontinuation.

RETROSPECTIVE ANALYSIS OF SOMATOSENSORY EVOKED POTENTIALS SUGGEST DIFFERENCES IN UNDERLYING NEUROPHYSIOLOGY BETWEEN SUBTYPES OF MULTIPLE SCLEROSIS: WHITE MATTER DEMYELINATION IS DECREASED IN PPMs COMPARED TO RMSs AND SPMS

Sarah B. Simmons, MD, PhD, and George Kraft, MD, MS

CASE DIAGNOSIS: Multiple sclerosis (MS) is an immune-mediated disease of the central nervous system (CNS) characterized by demyelination and axonal loss, encompassing several clinical subtypes—relapsing-remitting MS (RRMS), secondary progressive MS (SPMS), and primary progressive MS (PPMS). Strategies for treating progressive forms of MS (SPMS and PPMS) are limited, and therefore a better understanding of underlying pathogenic mechanisms is essential. The goal of this study was to investigate differences in underlying neurophysiology between subtypes of MS. Specifically, we sought to explore the association between CNS nerve conduction slowing—demonstrated to be an electrophysiological indicator of demyelination—and MS subtype: PPMS, RRMS or SPMS.

RESULTS: Patients with RRMS and those who transitioned to SPMS had a much higher prevalence of CNS conduction slowing compared to patients with PPMs. This has important implications for underlying disease pathophysiology and supports the idea that disease progression may occur independently from demyelination in patients with PPMs.
RETROSPECTIVE CHART REVIEW STUDY EVALUATING MEXILETINE USE IN CHRONIC PAIN MANAGEMENT

Michael V. Lin, MD, Amy E. Lovell, PA, Michelle Polak-Tunis, MD, Nathan J. Radun, MD, and Nalini Sehgal, MD

OBJECTIVES: To evaluate clinical use of mexiletine by exploring the indications, dosing, tolerability, side effects, and efficacy in patients with chronic pain diagnoses.

DESIGN: This retrospective chart review study included patients who had been prescribed the oral lidocaine analog, mexiletine, at a chronic pain management clinic between April 2016 and April 2019. Study data accessed in the electronic medical record were collected and managed using REDCap electronic data capture tools. Descriptive and clinical variables recorded for patients who were prescribed mexiletine for chronic pain included a previous intravenous (IV) lidocaine trial, chronic pain diagnoses, percent pain relief and change in numerical rating scale at follow-up visits, as well as side effects, and duration of use.

RESULTS: Among the 91 patients (62.6% female) included in the analysis, the most common pain diagnosis was neuropathy (48.4%). Other common pain diagnoses seen in our study population were axial low back pain (39.6%), and fibromyalgia (24.2%). Eighty-seven percent of patients in the study had a trial of IV lidocaine prior to starting mexiletine; 72% of these patients cited short duration of pain relief on IV lidocaine as a reason for their oral mexiletine trial. Pain was improved by greater than 30% in 33% of patients started on mexiletine who had quantitative pain relief data (N=36) available in the medical chart, however 60% of the study population discontinued mexiletine, largely due to mild-moderate gastrointestinal side effects, such as nausea.

CONCLUSIONS: Mexiletine is an oral lidocaine analog that has variable efficacy as a third line analgesic agent for neuropathic pain, and which may occasionally offer clinical benefit to those with non-neurogenic pain diagnoses. However, tolerability of this agent is often limited by the high incidence of side effects. Additional studies are needed to better characterize the efficacy of mexiletine for neuropathic and non-neurogenic pain syndrome.

RETROSPECTIVE STUDY ABOUT REHABILITATION AFTER LUMBER DISK SURGERY IN PATIENTS HOSPITALIZED DURING YEAR 2018 IN OUR SANATORIUM

Viordica G. Marin, MD, PhD, Sibel I. Demiring, MD, PhD, and Roxana - Elena Ahnans

OBJECTIVES: A better screening of this patients regarding their age, number of lumbar disk surgery, level of disk surgical intervention, possible cause of disk hernia, symptoms at admission, clinical evaluation and type of medical and balneal treatment applied in Sanatorium.

DESIGN: In year 2018, in Balneal and Rehabilitation Sanatorium of Techirghiol were hospitalized 823 patients with lumbar disk surgery.

RESULTS: Complex rehabilitation programs (medical and balneal treatment, physical therapy, massage and kinesiotherapy) are available for individuals after lumbar disk surgery, level of disk surgical intervention, possible cause of disk hernia, symptoms at admission, clinical evaluation and type of medical and balneal treatment applied in Sanatorium.

CONCLUSIONS: Complex rehabilitation programs (medical and balneal treatment, physical therapy, massage and kinesiotherapy) are available for individuals after lumbar disk surgery, level of disk surgical intervention, possible cause of disk hernia, symptoms at admission, clinical evaluation and type of medical and balneal treatment applied in Sanatorium.

REVIEW OF SIX CASES OF ACUTE FLACCID MYELITIS (AFM) THAT PRESENTED TO CHILDREN’S HOSPITAL OF WISCONSIN - MILWAUKEE CAMPUS IN 2018

Charlotte Ball, MD, and Karin Goodfriend, MD, MPT

CASE DIAGNOSIS: Six children with diagnoses of confirmed (3/6) or suspected (3/6) acute flaccid myelitis (AFM).

CASE DESCRIPTION: Six children, ranging in age from 15 months to 12 years, were diagnosed with acute flaccid myelitis (AFM). All presented with weakness following a viral prodrome consisting of fever (6/6), rhinorrhea (4/6), and cough (3/6). Two patients were treated with high-dose steroids followed by plasma exchange therapy (PLEX) and intravenous immunoglobulin (IVig), while the other four were treated with IVig alone. Two of the six patients (those treated with steroids and PLEX in addition to IVig) required mechanical ventilation, and one eventually required tracheotomy. At discharge, all children had ongoing deficits, and five of the six required inpatient rehabilitation. At 3-6 months post-diagnosis, one patient remained mechanically ventilated; three were planning for nerve transfer surgeries due to continued motor deficits; and one demonstrated a complete recovery.

DISCUSSIONS: All patients with AFM presented with acute weakness following a viral prodrome. Despite thorough workup, no unifying infectious etiology was identified. Notably, none of the patients tested positive for Enterovirus, which has been implicated in previous outbreaks. The two patients treated with high-dose steroids and PLEX in addition to IVig experienced clinical decerebrospinal fluid following initiation of treatment manifesting with respiratory failure requiring mechanical ventilation. One of these patients continued to require mechanical ventilation six months after initial presentation. Most of the patients described in this series (5/6) had ongoing motor deficits after 3-6 months, which is consistent with previously described cases of AFM.

CONCLUSIONS: Our experiences support the Center for Disease Controls’ guidelines to treat AFM with IVig alone due to concerns for ineffectiveness and even deleterious effects of steroids and PLEX. We also support the early involvement of a multidisciplinary rehabilitation team including physiatry, neurology, plastic surgery, physical therapy, occupational therapy, speech therapy, and psychology.

REVIEW OF USING ABDOMINAL FUNCTIONAL ELECTRICAL STIMULATION IN SPINAL CORD INJURY PATIENTS TO DECREASE RESPIRATORY COMPLICATIONS

Yunna L. Sinskey, MD, and Nickolas L. Meyerkord, DO

OBJECTIVES: Respiratory failure is the primary cause of morbidity/mortality in spinal cord injury (SCI) patients. SCI patients commonly have impaired respiratory muscle functions making it difficult to clear airways often resulting in respiratory complications. Functional electrical stimulation (FES) is a non-invasive application of electrical pulses to a motor nerve, causing muscles to contract. For patients with impaired ventilatory respiration, FES can be applied to the abdominal muscles (Abdominal-FES) to activate paralyzed respiratory muscles.

DESIGN: Literature search was performed on PubMed for peer-reviewed articles that investigated the effect of FES on respiratory function in human subjects. Keywords used were electrical stimulation or functional electrical stimulation or muscle stimulation, and respiratory function or respiration or cough or tidal volume.

RESULTS: Results of Abdominal-FES can be largely divided into two categories: acute and chronic effects. Acutely, the use of Abdominal-FES improves cough peak flow in SCI patients causing immediate effective cough in tetraplegic patients. FES applied repeatedly overtime to paralyzed abdominal muscles also improves muscle strength and endurance, further assisting respiratory functions. Chronically, Abdominal-FES has also resulted in decreased duration of ventilatory support, decreased duration to achieve tracheostomy decannulation, and reduction of respiratory complications including pneumonia, atelectasis, ventilatory failure.

CONCLUSIONS: Abdominal-FES is effective in significantly decreasing pulmonary complications in SCI patients both in acute and chronic settings. These combined results may overall improve quality of life, morbidity, and mortality. Furthermore, given the noninvasive nature of FES, cheap utilization cost, and decreased ventilatory duration, Abdominal-FES has high potential to result in significant cost savings in patients who require acute ventilatory support in the ICU. This effect suggests a possible expanded use of Abdominal-FES to all SCI patients regardless of prior history of respiratory failure or need of ventilation.

RHYTHMIC AUDITORY STIMULATION IMPROVED ABNORMAL CO-CONTRACTION AND UPPER EXTREMITY MOTOR FUNCTION AFTER STROKE: A PILOT STUDY

Rujin Tian, PT, MSC, Bei Zhang, MD, MSC, and Yulian Zhu, PT, PhD

OBJECTIVES: To explore the effectiveness of rhythmic auditory stimulation (RAS) on the motor function of the upper limb in post-stroke hemiparesis.

DESIGN: This was a randomized controlled study. Thirty stroke patients were randomly assigned to the RAS group (N=15) and the control group (N=15). Besides routine daily therapies, the RAS group received an additional 30 minutes’ RAS therapy, while the control group received additional 15
SAFETY AND EFFICACY OF ONABOTULINUM TOXIN A INJECTIONS TO THE SALIVARY GLANDS IN INFANTS
Chong Tae Kim, MD, PhD, and Danielle Brant, CRNP

OBJECTIVES: Drooling is a common medical problem in infants, especially infants with severe developmental impairments. Anticholinergic medications are used to decrease drooling as first line of treatment. However, because anticholinergic medications can cause generalized systemic effects, focal treatment exclusively targeting the salivary glands is considered as second line treatment. The safety and efficacy of Onabotulinum toxin A (BTX) treatment that are widely administered in children (>2 years old) and adults are also safe and effective for use in infants for drooling management.

RESULTS: Most patients were male, in the 60s, had an ischemic stroke within 6 months, classified as Brunnstrom Stage IV on enrollment. Primary stroke area was the basal ganglia in both groups. The between-group comparison showed statistically significant difference of 48.3% less co-contraction duration in the RAS group than the control group after the interventions between both elbow extension and elbow flexion. No statistical difference was found between groups nor intra-group for the co-contraction index. However, an inverse trend between groups was observed, which favored triiceps activation in the RAS group. The ability to perform activity of daily living, using the MBI, improved after the interventions in both groups (p < 0.01 for each group), and was significantly higher in the RAS group than the control group (p < 0.05).

CONCLUSIONS: Rhythmic auditory stimulation helped reduce abnormal co-contraction and improved upper extremity motor functions after stroke. It should be incorporated into the standard post-stroke rehabilitation regimen.
CONCLUSIONS: Sarcopenia is an independent risk factor for increased mortality and morbidity in gastrointestinal surgery. This argues for implementing screening for sarcopenia when considering risk factors for surgery.

SERUM VITAMIN D STATUS IN ACUTE TRAUMATIC SPINAL CORD INJURY

Mariana C. de Carvalho, DR, Daniel R. De Souza, DR, and Marta Imamura, DR

OBJECTIVES: To assess and quantify vitamin D levels among in patients with acute spinal cord injury (SCI) to provide evidence of the need for routine vitamin D supplementation in the acute phase of traumatic SCI.

DESIGN: Retrospective chart review. The electronic medical records of all patients with acute traumatic SCI admitted to the study facility between January 2011 and June 2012 were consulted.

RESULTS: Of 51 charts reviewed, 35 were included in the study. Patient age ranged from 17 to 76 years. Thirty-one patients (86.6%) were male. In 52.9%, the outcome was tetraplegia. Falls were the most common cause of SCI (51.4%), followed by motor vehicle accidents (motorcycle, 22.9%; automobile, 11.4%). Vitamin D levels were deficient in 22.9% of patients and insufficient in 68.6%. There was no significant association between vitamin D levels and sex, age, etiology, or level/extent of injury.

CONCLUSIONS: Most patients with acute SCI have vitamin D insufficiency or deficiency. Vitamin D replacement should begin during acute care, as vitamin D deficiency is known to be a contributing factor to bone and muscle frailty, osteoporosis, and fractures, which may cause additional disability in these patients. Changing the standard of care for this population can increase survival and improve quality of life.

SEVERE THORACIC NEURALGIA TREATED BY SEGMENTAL INCOCBOTULINUMTOXINA SUBCUTANEOUS AND INTRAMUSCULAR INFILTRATION: CASE REPORT

Keryl Motta-Valencia, MD, Rocío C. Delgado-Díaz, MD, Ady M. Correa-Mendoza, MD, Eduardo Maldonado-Colón, MD, Anabel Jimenez-Figueroa, MD, and Joanne Gonzalez-Feliciano, MD

CASE DIAGNOSIS: A 71 year old male with medical history of myocardial infarction s/p aortocoronary bypass surgery (CABG x4) in 2018, had developed shingles burning right hemithorax pain, of one year duration since his emergent surgery.

CASE DESCRIPTION: Patient's pain interfered with sleep, was exacerbated by soft tactile stimuli including friction from clothes, and mildly alleviated upon squeezing a pillow against his chest as sensory trick. Examination showed allosthenia, hyperpathia and dysesthesias along right T7-T10 dermatomal distribution. Clinical impression was a possible intercostal neuralgia versus post-thoracotomy pain syndrome, refractory to mainstay pharmacotherapy and intercostal nerve block for T9-T10 levels; hence, IncobotulinumtoxinA infiltration trial was offered.

DISCUSSIONS: Initially IncobotulinumtoxinA 150 units was infiltrated, by placing a subtotal 100 units subcutaneously among forty 2.5 unit flares at 1.5cm of each other, distributed along affected right hemithorax dermatomes T7-T10 from mid-axillary line to abdominal and peri-scar regions. The remaining 50 units were administered at corresponding right T7-T10 dorsal skin and paraspinals using electromyographic guidance. Patient reported pain relief in just 3 days. During the 12 week’s reassessment, patient presented mild and tolerable residuals of pain only affecting a narrowed anatomical region over right T7-T8 abdominal region. Decision was made to omit infiltration on right T9-T10 abdomen for the second IncobotulinumtoxinA trial.

CONCLUSIONS: Our experience showed that a once chronic, intractable hemithorax pain with neuropathic qualities was responsive to a single IncobotulinumtoxinA infiltration, achieving greater than 50% pain relief. We hypothesize this patient’s exceptional treatment response was mediated by our injection technique - learned from previous clinical experience, which targets the whole sclerotome segment. We hypothesize this injection technique, when performed with neurotoxin, advances the onset of pain relief and facilitates a longstanding sustained therapeutic response, possibly mediating modulatory effects on chronic pain.

SHOULDER OSTEOARTHRITIS AND SPASTICITY: ARTHROPLASTY LEADS TO AN OVERALL IMPROVEMENT IN UPPER LIMB FUNCTION

Isabelle Laffont, MD, PhD, Flavia Coroain, MD, and Bertrand Coulet, MD, PhD

OBJECTIVES: In spastic patients, shoulder osteoarthritis of the impaired upper limb can lead to pain and limited mobility and increase the functional impairment. Results of shoulder arthroplasty in spastic patients have been poorly studied.

DESIGN: We performed a retrospective, monocentric study collecting pre- and postoperative data from patients who underwent a shoulder arthroplasty between 2008 and 2019 in our department: use of anti-spastic treatments, Upper Extremity Fugl-Meyer Score (UE-FMS), QuickDASH score, a subjective self-evaluation, evaluation of pain on a visual analog scale (VAS) and a radiographic examination.

RESULTS: We included 10 shoulders in 9 patients: 1 ischemic stroke, 2 hemorhagic stroke, 2 cerebral palsies, 1 traumatic Brain injury and 1 multiple sclerosis. The mean age at surgery was 63 years old (range 57 to 72) and the mean follow-up time was 32 months (16 to 60). Four patients had regularly received botulinum toxin injections before surgery. The mean modified Ashworth score was 3.2/5 (2 to 4) preoperatively and 1.1/5 (0 to 3) postoperatively (p<0.01). Active mobility, Constant score, and QuickDASH score were improved and pain was reduced significantly (p<0.05). Both proximal and distal subscores of the Fugl-Meyer scale were improved significantly, from 15.4/42 to 33.1/42 and 8.1/24 to 17/24, respectively (p=0.02). All patients were satisfied or very satisfied. We noted 2 cases of posterior subluxation and 2 of anterior subluxation preoperatively. Postoperatively, one anterior subluxation relapsed due to Propionibacterium acneus infection with rupture of the subscapularis tendon.

CONCLUSIONS: Shoulder arthroplasty in patients with spastic disorders of the upper limb is safe, can decrease pain and spasticity and improve mobility and function.

SIDELYING TEST: A BETTER TOOL FOR DIAGNOSING BENIGN PAROXYSMAL POSITIONAL VERTIGO COMPARED WITH DIX HALL PIKE MANEUVER IN PATIENTS WITH VESTIBULAR MIGRAINE

Puneet Dhihialvi, DPT

OBJECTIVES: The purpose of this report is to show higher sensitivity with sidelying test when diagnosing BPPV patients with underlying migraine oculomotor abnormalities.

DESIGN: A 34 y/o F with a family history of migraines was referred to vestibular physical therapy with chronic intractable migraines without aura and dizziness two years post diagnosis. Initial evaluation at ENT showed normal audiometry, normal MRI, tinnitus & headache & working diagnosis for Meniere’s disease vs Vestibular migraine made. (VNG) demonstrated uniplanar upbeat L. torsional nystagmus and treatment for L. PSCC cupulolithiasis was done. Diagnosis changed to VM as patient non responsive to treatment. Initial evaluation at VPT patient tested -ve with R DHP maneuver and +ve with L DHP showing left torsional nystagmus that did not fatigue but had onset latency of 5 seconds, treated for L. PC cupulolithiasis with Semont’s maneuver (SM). However SM at initial step demonstrated upbeat R torsional

**RESULTS:** Patient had complete resolution of her symptoms. Patient followed up a year later and reported of being asymptomatic since last treatment for R PC canalithiasis. Her migraine improved and she gets occasional symptoms controlled by PRN medications. Patient had successful intervention with vestibular physical therapy for right posterior semicircular canal with modified Epley’s maneuver.

**CONCLUSIONS:** An underlying central positional nystagmus along with symptoms of migraine resulted in difficulty in differentially diagnosing patient with RP-BPPV nystagmus. Headache maneuver resulted in picture similar to posterior canal cupulolithiasis. The addition of Sidelying Test helped to differentiate between the two conditions. Presence of upbeating R torsional nystagmus in L sidelying test might be explained by location of otoïth in the long arm of the posterior Canal close to the common crus.

**SIT TO STAND TEST AND ITS RELATIONSHIP WITH MUSCLE MASS, STRENGTH AND FUNCTIONAL ABILITY AND ITS ROLE IN THE DIAGNOSIS OF SARCOPENIA IN THE COMMUNITY**

Sherman Xian Yang Yee, Yue Sien Ng, MBBS, MRCP, FAMS, Aisyah Latib, Huda Abu Bakar Mukhlis, Jolene Chien Yee Ho, Charissa Wan Cheen Koh, Theresa Hwee Heem Kwek, Shu Min Mah, Ee Ling Tay, and Vanessa Zi Lin Voong

**OBJECTIVES:** Sit to stand chair stands (STS) is a good proxy for lower limb strength, functional performance and muscle power. Decline in muscle quality, comprising of both strength and power components, and muscle mass are diagnostic criteria of Sarcopenia. The association between muscle mass and quality is less clear depending on the type of physical assessment used to measure muscle quality. This study aims to examine if STS is a basic strength, power or functional ability physiologic construct through correlation analyses with other physical performance measures.

**DESIGN:** 550 Community-dwelling adults > 55 years were recruited on a community platform for seniors in the screening and diagnosis of Sarcopenia and Frailty, from Senior Centers, in Singapore. Physical performance measures used included the time to 5 STS (SSTS) and 30s timed STS (30STS), grip strength, gait speed and 6-minute walk test. Skeletal muscle index (SMI) was calculated from appendicular BIA muscle mass measurements over height squared.

**RESULTS:** STS was associated with grip strength (30STS r=0.236, 5STS r= -0.214), gait speed (30STS r= -0.443, 5STS r= -0.475) and 6-minute walk test (30STS r=0.568, 5STS r= -0.524). Grip strength had a weaker degree of association to gait speed (r=0.296) and 6-minute walk test (r=0.320). No significant correlation existed between SMI and other physical performance measures except for the 6-minute walk test (r= -0.131).

**CONCLUSIONS:** Muscle quality measures like STS and grip strength have no significant association with muscle mass. STS tests have a stronger degree of association with functional physical measures like gait speed and 6-minute walk test than grip strength. This shows that STS tests may be a more holistic and easier to perform test that can be conducted in the community in the diagnosis of Sarcopenia. In addition, the STS can be converted to a functional exercise easily in the community.

**SMOKING CESATION AND DULOXETINE TOXICITY: A CASE REPORT**

Neha Kohli, MD, Nadia Tancredi, PHARM D, Gaurish Soni, DO, and Padma Sririgiraju, MD

**CASE DIAGNOSIS:** Duloxetine toxicity in the setting of smoking cessation

**CASE DESCRIPTION:** RP is a 62-year-old male with severe cardiac history, requiring ventricular assist device placement. Patient quit smoking and presented to a hospital three days later with lightheadedness and vomiting and was found to be in ventricular tachycardia. Patient was stabilized and continued his home medications including amiodarone, digoxin, carvedilol, spironolactone, and duloxetine. He began developing myoclonic jerks on day five after smoking cessation. His QTC was prolonged, so duloxetine was held and myoclonic jerks subsided. Duloxetine was restarted and myoclonic jerks recurred. Neurology attributed symptoms to neurotoxic effects of amiodarone. Patient then developed total body myoclonus and was started on levetiracetam. Myoclonus started to decrease with LVAD placement and thinking that the neurological events could be related to hypoxia. After LVAD placement, he continued to have myoclonus despite increased levetiracetam and clonazepam. It was not until duloxetine was significantly decreased that myoclonus and nausea subsided.

**DISCUSSIONS:** Polycyclic aromatic hydrocarbons (PAHs) in cigarettes are well-known inducers of cytochrome P450 (CYP) isoenzymes, specifically CYP1A2. CYP1A2 induction by smoking increases the metabolic clearance of enzyme substrates, necessitating higher doses to achieve therapeutic efficacy. Similarly, smoking cessation results in a gradual decrease in CYP1A2 activity, which is likely what caused myoclonic jerks in the patient.

**CONCLUSIONS:** Physiatry is a collaborative field and every team member has their area of expertise. In this case, it was the pharmacists who noted this toxic effect. Drug interactions involving the discontinuation of an enzyme inducer remain a hidden danger. Although computerized surveillance systems alert clinicians of interactions when an offending drug is introduced, they do not alert when a drug is discontinued. It is crucial to remember to not rely solely on these systems, as the lack of proper medication reconciliation can lead to devastating outcomes.

**SPONTANEOUS SPINAL CORD INFARCT WITH FULL RECOVERY IN A TEENAGER: A CASE REPORT**

Katherine Rief, MD, Dara Jones, MD, and Hana Azizi, MD

**CASE DIAGNOSIS:** Anterior cord syndrome secondary to spinal cord infarct

**CASE DESCRIPTION:** A healthy 14-year-old female developed paresthesias in her legs followed by progressive weakness over 2 days. She was eventually unable to walk and developed urinary incontinence. Examination demonstrated bilateral flaccid paralysis of lower limbs, absent deep tendon reflexes and a sensory level of T7. She had intact vibration and proprioception, but impaired pain and temperature sensation. Lab tests and lumbar puncture did not show findings consistent with infection, transverse myelitis or acute inflammatory demyelinating polyneuropathy. Spinal MRI showed abnormal T2 enhancement of the ventral thoracic spinal cord consistent with a spinal cord infarct. Despite a negative hypercoagulability and vascular workup, she was empirically anticoagulated with enoxaparin for 2 months and continues to take aspirin indefinitely. With intensive inpatient rehabilitation, our patient regained bladder continence along with dramatic improvement in strength. Today she ambulates independently without the aid of an assistive device.

**DISCUSSIONS:** Spinal cord infarction is a rare but potentially devastating disease in children. Risk factors in children include trauma or intra-operative vascular injury, genetic or acquired hypercoagulability, infection, and vasculitis. However, in many cases the cause of spinal cord ischemia is never discovered. Differentiating from other causes of flaccid paralysis and identifying reversible causes is the first priority. Recovery after spinal cord ischemia is rarely complete. Though few studies have been conducted given the rarity of the condition, an estimated 70-85% of patients will have residual gait difficulties. Our case demonstrates good recovery is possible.

**CONCLUSIONS:** Ischemic etiology should be considered in a child with flaccid paralysis even in the absence of known risk factors. Though reported recovery from spinal cord infarct is typically limited, some cases do have the potential for near complete recovery.

**STANDARDIZATION AND 6-MONTH PRELIMINARY CLINICAL DATA ON A NEW FREEZE-THAWING TECHNICAL PROTOCOL FOR LP-PRP PREPARATION AND CRYOPRESERVATION FOR UTILIZATION IN REGENERATIVE REHABILITATION**

Guillerme Ferreira-Dos-Santos, MD, MSC, André Caiado, MD, MSC, Sérgio Rodrigues Gonçalves, MD, MSC, Luís Gago Horta, MD, PhD, and Pedro Soares Branco, MD, PhD

**CASE DIAGNOSIS:** Although many basic, preclinical and clinical trials have shown the ability of leucocyte-poor platelet-rich plasma (LP-PRP) to significantly improve symptomatic mild to moderate hip and/or knee osteoarthritis, to date there is no general consensus on the optimal way of obtaining platelet-rich plasma preparations, specifically with respect to concentration of blood components. As such, variation exists in the platelet-rich plasma collection protocols and preparation characteristics depending on the system utilized. In this Technical Protocol paper, the authors present a new standardized freeze-thawing technique for LP-PRP preparation and cryopreservation, which has been shown to be superior to currently available techniques based solely on centrifugation (in regards to the release of α-granule growth factors). Additionally, the authors present preliminary clinical data on the first 6 months of utilization of this new technique in the setting of a Regenerative Medicine Outpatient Clinic in a tertiary university hospital center.

**CASE DESCRIPTION:** Candidates are submitted to a pre-collection clinical evaluation and blood testing, in accordance with European regulations for autologous blood donation. Approved patients undergo peripheral collection of 450 milliliters of whole blood which is then processed by centrifugation. A soft spin separates platelet-rich...
Abstracts

STATE OF REHABILITATION “CARE SERVICES” AND “CARE DELIVERY”: A REHABILITATION QUALITY ASSESSMENT IN BURUNDI

Ella C. Ininahauze, Alexis Sinzakaraye, Eric Havyarimana, and Eloge MPUNDU

OBJECTIVES: Many people in Burundi experience a certain form of impairment due to the lack of adequate rehabilitation needed care. A physical and rehabilitation medicine program was initiated since 2008 by the Ministry of Health with the support of development partners. Information on the state of rehabilitation structures were lacking. The study consisted of the development of a Rehabilitation Quality Assessment Tool useful in evaluating the care service quality and the care delivery quality; and consequently, highlight the needs and lacks of rehabilitation structures.

DESIGN: The developed tool was validated by a rehabilitation professional committee. The tool is divided into two sub-tools. The first sub-tool assessing the care service quality consists of 3 parts: infrastructure; equipment and materials; human resources. The second sub-tool assessing the care delivery quality consists of 9 parts: patient reception, initial medical examination, initial physical examination, physical therapeutic treatment, final physical examination, feedback to the physician, final medical examination, referencing system, and internal organization. The tool was adapted to the levels of burundian health pyramid system. Each sub-tool was provided with a total of a 100 based quotation and items have been provided points according to their impact on the care service or care delivery quality.

RESULTS: Among the 24 evaluated rehabilitation structures, 7 (29.16%) had 70 points out of 100 and above thus are of good quality, 7 (29.16%) had between 45 and 69 points and are of moderate quality, and 10 (41.67%) have under 45 points and are of bad quality.

CONCLUSIONS: A majority of rehabilitation structures are of bad quality, and delivery quality and thus need rehabilitation strengthening. The findings are attribute to a wider acceptance and future development of new technical approaches to LP-PRP preparation and cryopreservation, possibly contributing to a future international consensus on the optimal way of obtaining LP-PRP concentrates.

STIFF- PERSON SYNDROME: HOW TO SPOT THE ZEBRAS

Tiffany Lau, MD, and Sudhir Vaidya, MD

CASE DIAGNOSIS: A 58 year old male and a 70 year old female both diagnosed with Stiff Person Syndrome (SPS) were admitted to acute inpatient rehabilitation after a course of Intravenous Immunoglobulin (IVIG) with decreased functioning from STIFF-PERSON SYNDROME: HOW TO SPOT THE ZEBRAS and delivery quality and thus need rehabilitation strengthening. The findings are attribute to a wider acceptance and future development of new technical approaches to LP-PRP preparation and cryopreservation, possibly contributing to a future international consensus on the optimal way of obtaining LP-PRP concentrates.

STUDY OF RELIABILITY OF THE CHINESE VERSION OF THE AMERICAN CARE SCALE (DURING HOSPITALIZATION) IN THE ASSESSMENT FOR STROKE RECOVERY

Hailong Zhan, Master, and Bi Sheng, Doctorate

OBJECTIVES: Objective To analyze the reliability of the Chinese version of the American Continuity Assessment Record and Evaluation (CARE) scale in stroke recovery during hospitalization.

DESIGN: Thirty stroke inpatients participated in this study, including 7 cerebral hemorrhage convalescence and 23 cerebral infarction convalescence. During hospitalization, the evaluation scale was divided into five categories, and the inter-rater reliability and retest reliability were studied respectively.

RESULTS: In terms of inter-group reliability, the intra-group correlation coefficient (ICC) of cognitive function, daily living self-care ability, mobility and bladder and intestinal control ability ranged from 0.72 to 0.99; in terms of re-test reliability, the intra-group correlation coefficient (ICC) of cognitive function, daily living self-care ability, mobility and bladder and intestinal control ability was 0.72 to 0.99. 0.60.

CONCLUSIONS: The Chinese version of the American CARE scale has good reliability in assessing various functional impairments during the recovery period of stroke. It can help the rehabilitation workers to set more practical rehabilitation goals and formulate rehabilitation treatment programs that are consistent with the goals.

STUDY ON THE CORRELATION BETWEEN ATTENTION AND MOTOR FUNCTION IN CHILDREN WITH HEMIPLEGIA

Xuan O. Xia, Moxian Chenlijuan Ao, Xin Tang, and Fangyuan Meng

OBJECTIVES: Study the relationship between attention and motor function in children with hemiplegia.

DESIGN: Using attention network test (mean response time, correct rate, error rate, miss rate) and gross motor function measure (A. lying position and turning over, B. sitting position, C. climbing and squatting, D. standing, E. walking, running and jumping) a comprehensive assessment of 32 children with hemiplegia. Spearman correlation analysis was used to analyze the correlation between attention and motor function.

RESULTS: There were correlations between the four functional areas of the motor function B, C, D and E in the hemiplegia group, and the network correctness rate, error rate and missing rate. The correlation was roughly moderate (r=-0.47~0.44).

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CONCLUSIONS: The Chinese version of the American CARE scale has good reliability in assessing various functional impairments during the recovery period of stroke. It can help the rehabilitation workers to set more practical rehabilitation goals and formulate rehabilitation treatment programs that are consistent with the goals.

CASE DESCRIPTION: Each patient was undergoing symptomatic treatment for their muscle stiffening with scheduled benzodiazepines. Both presented to acute inpatient rehabilitation after IVIG infusions with worsening ambulation. Each of these patients’ diagnosis was found only after being incorrectly diagnosed and treated for Parkinson’s disease. Each of these patients underwent testing for (+) glutamic acid decarboxylase (GAD) antibody and both were found to be positive for GAD antibody. SPS can be commonly mistaken for Parkinson’s disease. Patients with SPS are often plagued with frequent falls, limited mobility and progressive decline.

DISCUSSIONS: Stiff Person Syndrome (SPS) is a rare, progressive syndrome that affects the nervous system, specifically the brain and spinal cord. It is characterized by recurrent episode of muscle stiffness, rigidity and painful muscle spasms. Over time patients affected by this syndrome can develop abnormal posturing of the spine and other muscles, this can affect activities of daily living and ambulation. Most people with stiff person syndrome have antibodies that are made to attack glutamic acid decarboxylase (GAD). GAD is a protein in some neurons involved in making a substance called gamma-aminobutyric acid (GABA), which is responsible for controlling muscle movement.

CONCLUSIONS: Despite the progressive nature of SPS, short acute inpatient rehabilitation admissions can improve patients’ functional gains after acute care treatment of SPS especially post IVIG infusions and allow these patients to gain maximum functionality and ultimately be discharged home. It is important to recognize the rare diagnoses to help the patients’ achieve their best functional outcomes and best direct their rehabilitation course.

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SUCCESSFUL INTEGRATION OF PSYCHIATRIC AND PHYSICAL REHABILITATION FOR FUNCTIONAL NEUROLOGIC SYNDROME IN THE ACUTE INPATIENT REHABILITATION SETTING: A CASE REPORT

Lauren E. Woo, MD, and Leslie Rydyberg, MD

CASE DIAGNOSIS: A 21-year-old female with chronic post-traumatic stress disorder (PTSD) and recurrent severe major depressive disorder (MDD) presented with progressive weakness and dysarthria. Imaging of brain and spinal cord was normal. Guillian-Barre syndrome was ruled out due to preserved reflexes and lack of albuminocytologic dissociation, with spontaneous improvement in symptoms after 48 hours. Neurology suggested functional overlay on exam, and no further diagnosis was provided. On presentation to acute inpatient rehabilitation (AIR), Psychiatry confirmed a diagnosis of functional neurologic disorder (FND).

CASE DESCRIPTION: Insurance approved a unique arrangement to cover an inpatient rehabilitation stay with concurrent inpatient trauma work which included grounding strategies, trigger identification, hypervigilance education, breathing exercises, visualization, and behavioral exposures. Psychiatry managed medications and educated therapists on trauma work. Recreational therapy included art, music, and social activities. Functional Independence Measure (FIM) scores improved as follows: supervision to independence for eating; minimal assistance to modified independent for (mod-I) for bathing, moderate assistance to mod-I for bed transfers, and total assistance to mod-I for walking and wheelchair use. He was discharged home with supervision.

DISCUSSIONS: Trauma can be a catalyst for FND; thus, it is appropriate to address physical and psychiatric symptoms together. Emotionally charged situations may provoke fluctuating symptoms, and a functional decline was observed when our patient experienced distressing life events, prompting more emotional support and time for processing.

CONCLUSIONS: Treatment and safe placement for patients with PTSD and FND is challenging due to their complex psychologic and physical needs. An interdisciplinary approach to treatment is feasible in AIR, providing a unique opportunity for close collaboration between a full scope of providers. An extended stay allows additional progress, and clear communication with the patient regarding the diagnosis, its legitimacy, and its potential for reversal are also key in the approach to treatment of FND.

SUCCESSFUL TREATMENT OF ADHESIVE CAPSULITIS OF THE HIP: A CASE SERIES

James F. Wyss, MD/PT; and Roger A. Sanguino, MS

CASE DIAGNOSIS: Adhesive Capsulitis of the Hip

CASE DESCRIPTION: A 54-year-old male with severe and intermittent R-hip pain and tightness. Pain described as sharp/stiff and severe (10/10) with walking, stretching and weight bearing activities. Physical exam revealed an antalgic gait, ROM markedly restricted (IR:20° ER:5° Flexion: 40-45°), FABER and FADIR positive for constrictant right hip pain. MRI revealed thickening and hyperintensity of the capsule and some thinning of the cartilage with high-grade degeneration. He proceeded with an US-guided R Intra-articular hip injection. A 56-year-old female with CLBP presented with insidious onset of R buttock, posterior thigh and calf pain three months ago. Pain was achy/sharp with tightness, rated 7/10. Physical exam revealed antalgic gait, right sciatic notch tenderness, R hip abductor weakness 4/5, FADEIR was positive, R-side stump test was positive producing posterior thigh pain. MRI revealed prominent lateral hip joint thickening. She proceeded with an US-guided R intra-articular hip injection.

DISCUSSIONS: Although there are no clear guidelines to rate the stages of ACH, like there are for Adhesive capsulitis of the shoulder, clinically we can make a determination that case1 was in early stage two of ACH. This is the ideal time for intervention with a corticosteroid injection, for which he reported 100% improvement after a single injection with no reoccurrence of pain in over a year. The same could be said about case 2, although she was in all likelihood more advanced into the second freezing stage.

CONCLUSIONS: Early diagnosis is challenging, but in our opinion critical to success with treatment, and we are hoping that presenting these cases increases the awareness of this condition. These two cases of ACH in the acute stages demonstrated positive outcomes utilizing nonsurgical intervention, specifically intra-articular injections with steroid and anesthetic.

SUCCESSFUL TREATMENT OF BURN WOUNDS WITH BANANA LEAVES IN NORTHEASTERN INDIAN RURAL COMMUNITIES

Kanakadurga R. Poduri, MD, Brian Tucker, MBBS, and Pritesh Patel, MD

CASE DIAGNOSIS: Second degree Burn wounds

SUCCESSFUL TREATMENT OF HYPERHIDROSIS IN A PATIENT WITH A THORACIC SPINAL CORD INJURY USING LUMBAR SYMPATHETIC NEUROLYSIS UNDER FLUOROSCOPIC GUIDANCE

Amir Rizkala, MD, Samuel P. Brown, DO, and Jennifer Gray, DO

CASE DIAGNOSIS: Hyperhidrosis

CASE DESCRIPTION: The patient is a 64-year-old woman with a complete T8 spinal cord injury (ASIA A), which was sustained at 10 years of age. This resulted in, among other symptoms, in right lower extremity sweating, which was constant. A right lumbar sympathetic nerve block was performed under fluoroscopic guidance with needle placement at the anterolateral aspect of the L3 vertebral body using bupivacaine and methylprednisolone. The patient reported 100% resolution of her symptoms lasting 24 hours. Approximately 2 months later, a right lumbar sympathetic neurolysis using phenol in the aforementioned location was performed. This resulted in a 60% reduction in symptoms and lasted 3 months after the procedure. Four months after this, the patient underwent another right lumbar sympathetic neurolysis. In this case, an additional injection was placed in the middle anterolateral aspect of the L2 vertebral body. Patient reported 100% relief of her hyperhidrosis for the following 4 months.

DISCUSSIONS: The rates and treatments of hyperhidrosis in the setting of spinal cord injury has not been studied in decades. Treatments used to treat both hyperhidrosis and hyperhidrosis in this problem. Botulinum toxin A is a common agent used for hyperhidrosis but would not be a feasible option in light of the unlikely effectiveness over larger areas of coverage. The above case demonstrated an effective means of resolving this significant symptom quickly and effectively with no observed systemic side effects and should be considered in SCI patients with lower extremity hyperhidrosis.

CONCLUSIONS: Fluoroscopically-guided lumbar sympathetic neurolysis may be an effective means of treating patients with hyperhidrosis secondary to thoracic spinal cord injury. Further investigation is needed, however.

SUDDEN ONSET OF HEMIPLEGIA AND SENSORY DEFICIT AFTER MILD TRAUMATIC BRAIN INJURY IN A 13-YEAR-OLD

Giuseppe Amore, MD, MPH

CASE DIAGNOSIS: Conversion Disorder after mild Traumatic Brain Injury

CASE DESCRIPTION: Patient presented with a right-sided facial droop, hemiplegia, and decreased sensation of upper and lower extremities. Computed tomography of her head and Magnetic Resonance Imaging of her brain and spine were unremarkable. Numerous infectious disease and hypercoagulable blood tests were negative. Patient reportedly suffered a mild traumatic brain injury (TBI) while playing sports 1 week prior to admission. On presentation to inpatient rehabilitation, she complained of numbness in the right maxillary and mandibular distribution of the facial nerve. Interestingly, sensation and motor function remained intact on the right...
side of her forehead only. Her remaining cranial nerves were intact. Deep tendon reflexes were intact throughout without the presence of pathological reflexes. Upon initiating physical therapy, she was able ambulate 60 feet with a quad-based cane with moderate assistance. Upon discharge from inpatient rehab, she was able to ambulate up to 180 feet with large quad-based cane with moderate assistance.

**DISCUSSIONS:** During the evaluation of weakness in a child, it is essential to rule-out different organic and potentially life-threatening etiologies. However, if an organic cause cannot be determined, a diagnosis of conversion disorder may explain the sudden onset weakness. Conversion disorder occurs more commonly in girls than boys and is most prevalent between the ages of 10 to 15 years old. Education about the disorder, cognitive behavioral therapy, and physical therapy are the most effective treatment options available.

**CONCLUSIONS:** There are limited studies addressing Conversion Disorder arising from a mild TBI in children. This case is a unique example of this rare complication.

**SURGICAL HIP RELLOCATION WITH FEMORAL VARUS DEROTATIONAL OSTEOTOMY IN TWO CHILDREN WITH SPINAL MUSCLE ATROPHY TYPE 2 TREATED WITH NUSINERSEN**

Supreet Deshpande, MD, Emily Gladstone, DO, and Mark Gormley, MD

**CASE DIAGNOSIS:** Surgical Hip Relocation with Femoral Varus Derotational Osteotomy (VDRO) in Two Children With Spinal Muscle Atrophy (SMA) Type 2 Treated with Nusinersen

**CASE DESCRIPTION:** We present two cases of femoral VDRO for hip subluxation in children with SMA type 2 treated with nusinersen. Reimer’s migration index (MI) was used pre-operatively and post-operatively to quantify hip subluxation. The first patient is a 4-year-old male treated with 9 doses of nusinersen, with a pre-operative MI of 40% bilaterally. Post-operatively his hips have remained stable with only minimal subluxation. Post-operative migration indices are as follows: 1 month (20% right, 10% left), 3 months (20% right, 15% left), 10 months (25% right, 20% left) and 13 months (25% right, 15% left). The second patient is a 5-year-old male treated with 11 doses of nusinersen with a pre-operative MI of 40% on the right and 70% on the left. At approximately 1 and 9 months post-operatively, his hips remain fully contained.

**DISCUSSIONS:** Almost all children with SMA 2 will have severe hip subluxation or dislocation, but historically these children do not undergo surgical hip relocation because studies indicate that virtually all hips will re-dislocate due to weakness in the hip stabilizing muscles. With nusinersen, children are reaching previously unattainable motor milestones, likely due to improved muscle integrity with treatment. This improved muscle integrity may be crucial in allowing hips to remain well-located after surgical intervention. Given, spinal muscle atrophy’s changing phenotype with nusinersen, it is more important than ever to protect the hips of the children who have the potential to ambulate. If long-term hip stability is achieved, surgical intervention may be more appropriate than conservative management in SMA.

**CONCLUSIONS:** Surgical hip relocation is potentially promising in children SMA treated with nusinersen due to changes in muscular integrity. Further follow-up is needed to determine long-term outcomes with surgical intervention.

**SUSPECTED CANDIDA AURIS INFECTION IN A PATIENT ON ACUTE INPATIENT REHABILITATION: PRECAUTIONS, PITFALLS AND PROMISE**

Anusha Lekshminarayanan, MD, and Eric L. Altschuler, MD, PhD

**CASE DIAGNOSIS:** A 65 year-old male with history of hypertension, type 2 diabetes presented with right foot infection. Hospitalization was complicated by gas gangrene requiring right ankle guillotine disarticulation. Eight days later, he underwent right below knee amputation (BKA). Cultures were sent. Initial cultures showed fungal infection, source was determined to be Candida species. Infection control, Infectious disease and the State Department of Health were involved for species identification and patient was placed on contact isolation for presumed Candida auris infection. Patient was admitted to acute inpatient rehabilitation (AIR) unit a week later.

**CASE DESCRIPTION:** In AIR, patient was on strict contact isolation in an isolation room. Per protocol, after proper hand hygiene, gowns and gloves were donned prior to entering the room and equipment like stethoscopes or measuring tape were left in the room. Prior to exiting the room, equipment used stayed in the room and the gloves and gown were discarded in the trash can and proper hand hygiene observed. PT and OT were initially administered in the room. Therapy equipment needed to be reused was cleaned with bleach. Infection control agreed with patient being able to walk in the stairs and corridor when no other patients present provided providers wore appropriate personal protective equipment. Stair rails needed to be cleaned with bleach after use. Isolation was discontinued when cultures showed C. orthopsilosis sensitive to fluconazole when necessary.

**DISCUSSIONS:** Candida auris is a global multi-drug resistant hospital acquired fungal infection first found in NYC in 2013 and subsequently in at least nine other states. 98% of 51 NYC isolates were resistant to fluconazole.

**CONCLUSIONS:** C. auris can be a life-threatening infection due to drug resistance. However, we show that with appropriate precautions C. auris should not impair AIR.

**SUSTAINED GAINS IN RARE VIRAL ASSOCIATED NEUROLOGICAL DISEASE: IMPACT OF LONG TERM REHABILITATION IN PATIENT WITH ACUTE FLACCID MYELITIS**

Jordan C. Hui, DO, Katherine Chen, DO, and Louis Dizon, MD

**CASE DIAGNOSIS:** Acute flaccid myelitis is a syndrome of the spinal cord that result in edema of the spinal cord, leading to rapid onset of weakness throughout the musculoskeletal system. The disease limit swallowing, speaking ability, and limb strength. Often patients have poor outcomes but intensive and specialized therapy is important for recovery.

**CASE DESCRIPTION:** We are presenting a case of a 2 year-old male who developed left arm paralysis, left sided facial droop, ataxia and altered mental status that began after a 7 day course of URI symptoms. Initial concern was for infectious process but workup was negative. Workup imaging of the CS spine with MRI was suggestive of cervical transverse myelitis and patient was diagnosed with acute flaccid myelitis and sent to acute pediatric rehabilitation.

**DISCUSSIONS:** Acute flaccid myelitis (AFM) is a polio-like syndrome. AFM has been linked to many viruses such as enterovirus and West Nile Virus. In this case, 18 months after the AFM onset, the patient is still continuing with physical and occupational therapy with significant improvement but with functional and motor deficits compared to baseline. In polioymyelitis, surviving motor neurons can undergo functional recovery with maximal reinnervation at 2 years post-disease. In this case, the patient was able to recover a functional range of motion due to the combined efforts of his therapies. Aquatic rehabilitation in the setting of AFM could be a beneficial modality during the recovery process.

**CONCLUSIONS:** It is imperative for patients with AFM to initiate acute rehab early in the disease process. However, it is important to note that from our 2 years of follow up, patients can still recover after 4 months as the motor neurons can still achieve maximal reinnervation after. Multiple therapy modalities not only improve muscle function but also reduce pain in patients with AFM.

**SWIMMING EXERCISE IN LOW WATER TEMPERATURE FOR TREATING PAINFUL DIABETIC NEUROPATHY**

Mo Xin Li, BSC, and Ching-Hsia Hung, Doctor

**OBJECTIVES:** Painful diabetic neuropathy (PDN) is one of the most common complications in patients with diabetes. PDN is typically express by mechanical and/or thermal hypersensitivity, which reduce the patients’ quality of life.

Swimming exercise and a lowered body temperature have benefits to attenuate neuropathic pain and to protect the nerve from damage, respectively. The previous study demonstrated the antiallodynic effect of swimming training in normal temperature (35±1°C) water, but the effect of swimming training in low temperature (25±1°C) water remains unknown. The purpose of this study was to evaluate the effectiveness of swimming in low-temperature water for attenuating pain in rats with PDN.

**DESIGN:** PDN was induced by streptozotocin (STZ) injection in male Sprague-Dawley rats, and mechanical and thermal sensitivities were measured by von Frey filament and plantar test (Hargreaves’ Method), respectively. Rats with unstable behavior test were dropped out. Animals swam in a temperature-controlled swimming pool (25±1°C) for 1 week, assistance was given when necessary to prevent drowning, and neurobehavior tests were performed before swimming and 1 hour, 2 hours, and 24 hours after swimming.

**RESULTS:** The antiallodynic effect was observed at 2 hours and 24 hours after swimming. After 1-week exercise training, the mechanical hypersensitivity was significantly alleviated and lasted for 48 hours. There were no significant changes in thermal sensitivity after STZ injection or swimming exercise.

**CONCLUSIONS:** We showed that 1-week swimming training in low water temperature ameliorates mechanical hypersensitivity at 2 hours, 24 hours and 48 hours after swimming intervention in STZ-induced rats with PDN.
SYNDROME OF IRREVERSIBLE LITHIUM-EFFECTUATED NEUROTOXICITY AND THE FUNCTIONAL OUTCOMES OF REHABILITATION
Eric Lindsay, MD, Blake Kalie, MD, and Sharleen Suico, MD

CASE DESCRIPTION: Syndrome of Irreversible Lithium-Effectuated Neurotoxicity

RESULTS: Conservative management based on NSAID, ROM exercises and electrotherapy; (2) mirror therapy + sham tDCS and (3) mirror therapy + tDCS. Assessments into one of the three study treatments for two weeks on a daily basis: (1) mirror therapy; (2) mirror therapy + sham tDCS and (3) mirror therapy + tDCS. Assessments of nonvariant GBS including tetraplegia and respiratory failure demonstrating typical symptoms, brainstem dysfunction and dementia. Despite his weakness, the patient was able to utilize his minimal toe strength to communicate yes/no responses. In addition to toe movements, the patient did eventually regain head movements at time of discharge to a skilled nursing facility. Nonetheless, patient made minimal gains during a 6 week stay at acute rehabilitation.

DISCUSSIONS: Typically, Miller Fisher Syndrome presents with diplopia or ataxia and found to have cranial nerve deficits involving CN III, VII, IX, X, and XII. Although there have been cases of tetraparesis in this variant of GBS, there have only been a handful of reported cases of such dense tetraplegia with limited strength and respiratory failure requiring mechanical ventilation. CONCLUSIONS: Though not typical for Miller Fisher Syndrome, a patient can have both the typical findings of the syndrome (CN deficits) and more common findings of nonvariant GBS including tetraplegia and respiratory failure demonstrating that Miller Fisher Syndrome can be a devastating disease process.

TETRAPLEGIA IN A PATIENT WITH MILLER FISHER VARIANT OF GUILLAIN BARRE SYNDROME
Shiv Patel, MD, and Isaac Hernandez Jimenez, MD

CASE DIAGNOSIS: Miller Fisher Syndrome

CONCLUSIONS: As a newly set up rehabilitation center with limited services in hospital, case of brachial plexus injury with poly-trauma was a first for the team to deliver. However, integrated and harmonized teamwork coupled with efficient utilization of available equipment and a patient-centered approach resulted in achieving optimal functional outcome.

TEAMWORK RESULTED IN SIGNIFICANT ARM FUNCTION IMPROVEMENT ON RIGHT-HANDED GENTLEMEN WITH POST NEUROLYSIS OF RIGHT BRACHIAL PLEXUS INJURY FOLLOWING POLY-TRAUMA ACCIDENT
Lunaw Win, MBBS, MMedSC, and Thiri Aung, MD

CASE DIAGNOSIS: Severe right brachial plexus injury and poly-trauma

CONCLUSIONS: This study presents a 57-year-old male with a past medical history of relapsing remitting multiple sclerosis was discovered to have Miller Fisher Variant of GBS, or Miller Fisher Syndrome, who presented to an acute rehabilitation facility with respiratory failure requiring mechanical ventilation, tetraplegia, and cranial nerve deficits. Upon admission, patient found to have cranial nerve deficits, areflexia, hypotonia, and profound tetraplegia with only 2 out of 5 muscle strength of bilateral EHL. Despite his weakness, the patient was able to utilize his minimal toe strength to communicate yes/no responses. In addition to toe movements, the patient did eventually regain head movements at time of discharge to a skilled nursing facility. Nonetheless, patient made minimal gains during a 6 week stay at acute rehabilitation.

DISCUSSIONS: Typically, Miller Fisher Syndrome presents with diplopia or ataxia and found to have cranial nerve deficits involving CN III, VII, IX, X, and XII. Although there have been cases of tetraparesis in this variant of GBS, there have only been a handful of reported cases of such dense tetraplegia with limited strength and respiratory failure requiring mechanical ventilation. CONCLUSIONS: Though not typical for Miller Fisher Syndrome, a patient can have both the typical findings of the syndrome (CN deficits) and more common findings of nonvariant GBS including tetraplegia and respiratory failure demonstrating that Miller Fisher Syndrome can be a devastating disease process.

THE ADDITIVE ANALGESIC EFFECT OF TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS) TOGETHER WITH MIRROR THERAPY FOR THE TREATMENT OF PHANTOM PAIN
Nitza Segal, MA, Roi Treister, Doctor, Dorit Pud, Professor, and Hagay Amir, DR

CASE DIAGNOSIS: Miller Fisher Syndrome

CONCLUSIONS: As a newly set up rehabilitation center with limited services in hospital, case of brachial plexus injury with poly-trauma was a first for the team to deliver. However, integrated and harmonized teamwork coupled with efficient utilization of available equipment and a patient-centered approach resulted in achieving optimal functional outcome.

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THE APPLICATION OF AUTOLOGOUS PLATELET-RICH PLASMA INJECTION AND PLATELET-RICH PLASMA GEL TO IMPROVE CHRONIC WOUND HEALING AND REHABILITATION

Xi J, MD, Hongying Jiang, Hongelen He, MD, and YAN LIU, BS

CASE DIAGNOSIS: Chronic wounds are wounds that fail to proceed through the normal phases. The specific treatment and rehabilitation therapy for chronic wounds remains a challenge to rehabilitation physicians, severely affecting the rehabilitation process. The concept of wound rehabilitation has been valued recently. Platelet-rich plasma (PRP) has been used as a concentrate of multiple growth factors to stimulate tissue repair and regeneration. In this study, we retrospectively assessed the effect of PRP and PRP gel for chronic wounds.

CASE DESCRIPTION: 19 patients were treated with PRP and PRP gel once a week. 45ml Blood was withdrawn and mixed with 5ml sodium citrate to prepare 10ml PRP. 5ml PRP was injected into the wound edge and the rest 5ml PRP was used to form PPP gel. PRP gel was sprayed upon the wound, covering the whole wound. Wounds were covered with a normal dressing.

DISCUSSIONS: Among the 19 patients, 3 were traumatic wounds, 3 postoperative infectious wounds and 13 wounds pressure ulcers (category III-IV). All wounds were previously treated with traditional wound care over 1 month but showed no significant healing. Main medical history and diagnoses include 4 open fracture operations, 2 complex fracture operations, 1 of Alzheimers disease, 1 resection of thoracic spine, nipple, 1 hemiplegia and 8 spinal cord injury (6 ASIA-A, 1 ASIA-B, and 1 ASIA-D). No fistula was detected. The average treatment duration was 1.387 months. 63% of wounds had reached completely closure and 2 wounds reached over 85%. 4 wounds ended up to surgical treatment due to unaltered impaired healing or severe due to wound infection. No patient complained about systematic fever or discomfort during PRP and PRP gel treatment.

CONCLUSIONS: This retrospective study demonstrated that PRP and PRP gel has an enhanced effect on chronic wound healing of different etiologies. It is an enlightening and promising way to utilize PRP therapy technology into clinical rehabilitation.

THE ASSESSMENT OF NUTRITIONAL STATUS AND ITS EFFECTS ON FUNCTIONAL OUTCOME AND FALLS IN PARKINSON’S DISEASE

Berna Celik, MD, MSC, Nurdan Paker, MD, Associate Professor, Goksen Goksenoglu, MD, Cemil Atalay, MD, Belgin Erhan, MD, and Berrin Gunduz, Associate Professor

OBJECTIVES: Malnutrition is a common condition in the elderly and could have serious effects in the aging population. Malnutrition could interfere with ambulation and functional recovery in Parkinson’s disease (PD). The aim of this study was to evaluate the nutritional status of patients with PD and its effects on functional outcome and falls.

DESIGN: The study included 50 patients with PD (28 female, 22 male) with a mean age 68.4±8.96 yrs (min-max, 45-86). Disease duration was 71.68±63.87 months (1-192). A full physical examination was performed. Patient classification according to the Hoehn Yahr staging was as follows: 0-4%, 1-38%, 2-8%, 3-16%, 4-32%, 5-2%. Patients were administered Mini Nutritional Assessment Scale (MNAS) to evaluate nutritional status, Mini Mental Test (MMT), and Functional Ambulation Scale to evaluate their functional status. The number of falls within the last 6 months was questioned and recorded. Routine laboratory evaluation was performed.

RESULTS: The mean MNAS and MMT were 23.4±3.9 (min-max, 13-29) and 21.1±4.10 (10-29, respectively). The frequencies for Functional Ambulation Scale were as follows: 0-4%, 1-2%, 2-12%, 3-10%, 4-24%, 5-48%. The mean number of falls within the last 6 months was 1.82±3.31 (0-15). A significant correlation was found between MNAS with MMT (p=0.000, r=0.502); number of falls with Functional Ambulation Scale and MNAS (p=0.003, r=0.415; p=0.002, r=-0.429 respectively). A significant correlation between disease duration with MMT was found (p=0.023, r=0.356). No significant correlation was found between disease duration and MNAS. A significant positive correlation between hemoglobin and hematocrit (p=0.023, r=-0.356). A significant positive correlation between hemoglobin and hematocrit with MNAS was found (p=0.002, r=0.421 and p=0.003, r=0.421 respectively).

CONCLUSIONS: Chronic wounds are wounds that fail to proceed through the normal phases. The specific treatment and rehabilitation therapy for chronic wounds remains a challenge to rehabilitation physicians, severely affecting the rehabilitation process. The concept of wound rehabilitation has been valued recently. Platelet-rich plasma (PRP) has been used as a concentrate of multiple growth factors to stimulate tissue repair and regeneration. In this study, we retrospectively assessed the effect of PRP and PRP gel for chronic wounds.

THE CHALLENGING OF NATURAL DISASTER REHABILITATION MEDICINE IN INDONESIA

Maria R. Rachmawati, PhD, Dian Naka Erwistati, MD, Anshory Sahlan, MD, Shinta Primanuri, MD, and Hermilawaty Absabkar, MD

OBJECTIVES: Aim of the study was to fine the description of the health problem after disaster, as a challenge for natural disaster Rehabilitation Medicine in Indonesia.

DESIGN: Descriptive study of the 2016 Jogja earthquake, the 2018 Palu earthquake, and the 2018 Lombok earthquake that have Rehabilitation Medicine Services.

RESULTS: The Data of spinal cord injury (SCI) from Jogja earthquake in 2006, i.e. 42 patients; consisted 32 men (76%), age was 44.5 (28-60). The data from Palu earthquake in 2018, i.e. 38 cases of trauma, age was 58 (10-65), consisted of 14 (37%) amputations; 9 (64%) men, 22 fractures; 15 (65%) women; consisted inferior limb 17 (45%), vertebrae 4 (1%), superior limb 1 (0,3%), SCI 10(3,3%); trauma cipitus 1(0,3%). The data from Lombok earth quake in 2018, there were 85 patients who need rehabilitation management, consisted 52 (61%) fractures, 10 (12%) SCI, 9 (11%) amputation, and 14 (16%) others. Post-earthquake Jogia STCs are members of an active legal association, while patients of the Palu and Lombok earthquakes are under the supervision.

CONCLUSIONS: There were still many cases have not reported. The data collected were incomplete; there were no data about the type of fracture, level of SCI, and the function test. The geography condition caused there are still many trauma victims who have not been supervised and managed. Most of patients were in productive age, which need supported to be active and productive. The data of the trauma after natural disaster in this study has shown the high demand of the data of the function and health status. Rehabilitation Medicine program in natural disaster need to start from the acute to the long term period systematically, and need collaboration with government, health facilities, and social organizations, to improve the health status and quality of life of the patients continuously.

THE COMPARISON OF SARCOPENIA PREVALENCE BETWEEN ELDERLY IN COMMUNITY DWELLING AND NURSING HOME IN INDONESIA

Maria R. Rachmawati, PhD, Siti Nuhonni, MD, Magdalena Wartono, MD, Maria R. Rachmawati, PhD, Dian Naka Eriawati, MD, Anshory Sahlan, MD, and Debora Pranata, MD

OBJECTIVES: Aim of the study was to compare the prevalence of sarcopenia between elderly who lived in community dwelling and nursing home.

DESIGN: A cross-sectional study, subjects recruited by convenience sampling from a private hospital, and a nursing home. Diagnosed a sarcopenia by using the 5th Asian Working Group for Sarcopenia (AWGS) for: Appendicular Skeletal Muscle Mass (ASM); Hand Grip Strength (HGS); and Gait Speed (GS) for men and women were; 7 and 5.7 Kg/m2; 26 and 18 Kg; and 0.8 and 0.8 m/s.

THE APPLICATION OF AUTOLOGOUS PLATELET-RICH PLASMA INJECTION AND PLATELET-RICH PLASMA GEL TO IMPROVE CHRONIC WOUND HEALING AND REHABILITATION
RESULTS: There were 183 elderly (47% men) on community dwelling, and 62 elderly (40% men) on nursing home. The value of ASM, HGS, and GS in men from community dwelling were higher 8.8 vs 7.5 kg/m² (p<0.001), 25.9 vs 17.7 Kg (p<0.001), and 1.5 vs 0.8 m/s (p<0.001), while the value of GS in women from community dwelling were higher 1.3 vs 0.73 m/s (p<0.008), and similar on ASM and HGS. The percentage of lower ASM, HGS, and GS in men were all higher on elderly from nursing home; 40% vs 3.5% (p<0.001), 88% vs 49% (p<0.001), and 44% vs 3.5% (p<0.001). In women, the ASM were similar 8.1% vs 7.2% (p=0.86), while the percentage of lower HGS and GS were higher on nursing home; 84% vs 49.5% (p<0.001), and 65% vs 7.2% (p<0.001).

CONCLUSIONS: Elderly men from nursing home have lower muscle mass and physical performance, while elderly women from nursing home have lower physical performance.

THE CURVED-TIMED UP AND GO TEST: A NEW TOOL TO EVALUATE BALANCE AND MOBILITY IN PARKINSON’S DISEASE
Giorgio Ferriero, MD, PhD, and Monica Parati, EING
OBJECTIVES: To study with Parkinson’s disease (PD) present often balance disorders. The Timed Up and Go (TUG) test is a validated test to assess balance and mobility disorders even in this population. Since curved walking—a functional walking—is affected in patients with PD we have developed a new test to assess balance and mobility disorders in the curved walking: the curved-TUG (c-TUG). Aim of this work is to offer a preliminary validation of the c-TUG in PD.

DESIGN: The c-TUG is similar to the TUG except for the walking direction that is curved. Patients have to walk along a colored line on the floor having a radius of 1.2 meters. Stride length and duration of the stance phase differ between the inner and outer leg. In this way one leg will be the inner in the going, while will be the outer in the coming. At the moment, eighteen patients with PD (74 yo ± 6; 10 males) have been included in this study. Mean disease duration was 9 years ±4. Mean UPDRS score was 41.2 ±19.7. They were assessed by means of c-TUG, TUG, Berg Balance Scale (BBS), Falls Efficacy Scale (FES), and 10-Meter Walk Test (10MWT). To provide evidence of concurrent validity of the c-TUG we tested our a priori hypothesis, which was to find a Spearman’s correlation between c-TUG and BBS better than TUG, not with 10MWT.

RESULTS: Preliminary results showed that both c-TUG and TUG correlated significantly (p<0.05) with BBS (r=0.66 and 0.57) and 10MWT (r=0.81 and 0.89), not with FES (0.50 and 0.49).

CONCLUSIONS: Considering these preliminary data, we can assume that the c-TUG could be a viable option to assess balance and mobility in PD, probably better than the TUG. These results need to be confirmed in a larger sample.

THE DEMOGRAPHIC AND DISABILITY CHARACTERISTICS OF INDIVIDUALS WHO REGULARLY ATTEND AN URBAN ADAPTIVE FITNESS CENTER: AN OBSERVATIONAL STUDY
Sindhoor Nalla, DO, MHS, Kevin Huang, DO, Jacqueline Spangenberg, BS, and Prakash Jayabalan, MD, PhD

OBJECTIVES: Specialized adaptive fitness centers provide equipment and staff that can improve physical activity engagement in those with disabilities. However, there is a lack of knowledge regarding the demographics and level of disability in those who regularly attend such facilities. The cross-sectional study aimed to evaluate this in those who regularly attend a specialized urban adaptive fitness center associated with an academic rehabilitation hospital.

DESIGN: Participants who regularly attend the urban adaptive fitness center included in this study. Recruits completed a specialized demographics intake form and the internationally validated World Health Organization Disability Assessment Schedule (WHODAS) 2.0, evaluating disability in six domains: cognition, mobility, self-care, getting along, life activities, and participation. Survey results were converted into disability domain scores and total summary scores, ranging from 0 (no disability) to 100 (total disability). Results were compared to WHO published normalized values in the general population.

RESULTS: Sixty-three (n=63) participants with mean age of 52.9±14.2 years completed the survey. They were grouped into five diagnostic categories: spinal cord injury (30.2%), traumatic brain injury (14.3%), stroke (22.2%), other neurologic disease (26.6%), and chronic medical disease (12.7%). Of our population studied, 69.9% live alone, 96.2% exercise at least two times weekly, 77.7% never smoke, 42.2% participate in daily living ability of patients with post-stroke cognitive impairment.

CONCLUSIONS: Although participants at this urban adaptive fitness center had a higher level of disability than 80-90% of the general population, active participation was realistic and feasible. Next steps will be to assess the factors associated with attending such a facility and impact on community integration.

THE EFFECT OF A THERAPEUTIC REGIMEN OF TRADITIONAL CHINESE MEDICINE REHABILITATION FOR POST-STROKE COGNITIVE IMPAIRMENT
Jia Huang, PhD, and Lidian Chen, PhD

OBJECTIVES: Post-stroke cognitive impairment (PSCI) limits the recovery of patients, reduces the quality of life, and increases the economic and social burden of patients and their families. Therefore, effective rehabilitation treatment is crucial. The main purpose of this research is to propose a low-cost, more effective rehabilitation treatment program, and confirm the long-term efficacy of the TCM rehabilitation treatment program on PSCI.

DESIGN: This study used a prospective, multicenter, randomized controlled trial. A total of 416 voluntary participants who met the inclusion criteria were enrolled from 7 inpatient and outpatient stroke rehabilitation units and were randomly assigned to the TCM rehabilitation group and the cognitive training (CT) group. The intervention duration was 12 weeks (30 minutes a day, 5 days a week). The primary and secondary outcomes will be assessed at baseline, 12 weeks (end of the intervention), and 36 weeks (after 24 weeks of follow-up).

RESULTS: 416 participants were included. The results showed that the overall cognitive function (P=0.0132) and orientation ability (P=0.0264) were improved, so as during the follow-up period. The MBI scores before and after treatment was statistically significant (P=0.001), and continued to follow-up period (P=0.0023), and the improvement of ADL was statistically significant (P=0.0005); the overall cognitive function of the intervention group was further improved (P=0.0052) and continued until the follow-up (P=0.0048). The visual-spatial structure (P = 0.0217, 0.0035) and the speech function (P = 0.0145, 0.0151) continued from the treatment follow-up period, while the orientation power treatment period was not statistically significant (P = 0.0986). However, significant improvement (P = 0.0060) was followed by a significant improvement in WMS scores after intervention (P = 0.0256), long-term memory improvement (P = 0.0325).

CONCLUSIONS: Therapeutic Regimen of Traditional Chinese Medicine Rehabilitation has a significant effect on improving the overall cognitive function and the daily living ability of patients with post-stroke cognitive impairment.

THE EFFECT OF BLIND PLATELET RICH PLASMA INTRA-ARTICULAR INJECTIONS ON MENISCAL KNEE INJURIES IN THE VETERAN POPULATION
Scott Klass, MD, MS, ATC, CSCS, Martin Weaver, MD, Xavier Aviles, MD, Lauren Abratt, MD, and Elizabeth Felix, PhD

OBJECTIVES: To determine the efficacy of blind Platelet Rich Plasma (PRP) intra-articular injections of the knee in alleviating symptoms associated with meniscal injury in the veteran population.

DESIGN: This study took place at an Outpatient Veteran Affairs Healthcare Phisiatry Clinic. 29 male and 5 female veterans aged 35 to 81 years old (average 59.62 ± 11.67) with meniscal injury, who failed conservative treatments, undergoing blind PRP intra-articular knee injection were included. Patients were surveyed for pre-intervention Visual Analog Scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and Knee Injury and Osteoarthritis Outcome Score (KOOS). Pre-intervention and post-intervention scores were compared amongst those with a documented meniscal injury.

RESULTS: A paired t-test, pre- and post-NRS demonstrated an improvement of 1.3808 (SD 2.2631, p = 0.02). Total WOMAC scores and its constituent components including pain, stiffness, and ADLs all improved by a mean of 8.794 (SD 17.404, p = 0.006), 2.030 (SD 3.909, p = 0.005), 0.909 (SD 1.684, p = 0.004), and 6.794 (SD 12.533, p = 0.003). Similarly, total KOOS scores and sub-scores for pain and symptoms improved by a mean of 5.08824 (SD 10.81628, p = 0.010), 4.34783 (SD 8.29901, p = 0.020), and 2.47862 (SD 4.96231, p = 0.003). Improvement in NRS quality of the life (QOL) scores (0.40909, SD 3.48683) were not found to be significant (p = 0.588).

CONCLUSIONS: Blind intra-articular PRP injections produced a statistically significant improvement in NRS, WOMAC (total, pain, stiffness, and ADLs), and
KOOS (total, pain, and symptoms), suggesting a possible beneficial treatment. This study is limited by the lack of a control group, and a patient sample overrepresented by males and age greater than 50 years old.

THE EFFECT OF LEG RAISING EXERCISE IN IMPROVING BALANCE AND REDUCING RISK OF FALLS FOR GERIATRIC PATIENTS
Ahmed S. Hansen

OBJECTIVES: To assess the relative effectiveness of leg raising exercise to improve balance and reducing risk of falls in elderly adults. To raise awareness of known risk factors of fall in elderly adult. To improve balance in elderly adults and enhance gait stability.

DESIGN: cross sectional controlled trial study community based.

RESULTS: By using this exercise regimen there is a way to improve balance and prevent falls in elderly the ranges were improved from 20 for normal TUG test and 35 high risk to 35 low risk and 25 high risk with a mean of 20 moderate risk of fall. There was no improvement in withdrawal of assistive devices. Significant improve in Timed Up and Go Test time.

CONCLUSIONS: So Timed Up and Go Test associated with exercise regimen can be considered as another solution to decrease the risk of falls in elders.

THE EFFECT OF PARTICIPATION IN A HOME TELEHEALTH PROGRAM OF CREATIVE ARTS THERAPY ON QUALITY OF LIFE AND POSITIVE AND NEGATIVE AFFECT ON VETERANS: AN INTERIM REPORT
Charles E. Levy, MD, Heather Spooner, MA, ATR-BC, Diane Langston, MM, MT-BC, MJ Jung Lee, PhD, and Sergio Romero, PhD

OBJECTIVES: The Rural Veterans TeleRehabilitation Initiative (RVTRI) is a clinical Veterans Health Administration service delivering art and music therapy to rural Veterans at home through telehealth. Aims: 1) enhance Veterans’ overall health and wellbeing 2) improve Veterans’ quality of life 3) allow Veterans opportunities to communicate, externalize and process life events 4) expand access to creative arts therapies for rural Veterans by through telehealth.

DESIGN: We report on 68 consecutive Veterans enrolled from January 2015-August 2018 who completed at least 6 weeks of treatment. The effect of creative art sessions on positive and negative affect and quality of life were evaluated by comparing pre- and post-scores on Positive and Negative Affect Schedule-Expanded Form (PANAS-X) and World Health Organization Quality of Life (WHOQOL)-BREF.

RESULTS: PANAS-X: A paired t-test indicated a significant improvement in the general positive affect scores between pre- and post-sessions; t(59) = 3.44, p < 0.01 and t(58) = 4.49, p < 0.01 sequentially. The top three items with the largest improvement in general positive affect were: proud (0.45), strong (0.38), and interested (0.32). Except for alert item, all items in general positive affect domain represented higher scores in post-sessions as compared to pre-sessions. WHOQOL-BREF: Paired t-tests demonstrated domain scores were statistically higher in the physical health and psychological domains than pre-sessions; t(59) = 3.45, p < 0.05 and t(58) = 4.49, p < 0.01 sequentially. However, the paired t-test for physical health domain was not sufficiently powered (1-α = 0.55). No significant differences were identified in social relationships and environment domain scores; V=377, p = 0.25 and t (61) = 0.09, p = 0.54 sequentially.

CONCLUSIONS: Providing creative arts therapy via telehealth successfully increases access. The RVTRI appears to be an effective treatment option for improving Veterans’ overall emotional outlook and perceived quality of life. The positive feedback obtained from participants suggests that expanding this program to additional participants is warranted

THE EFFECT OF TRANSCRANIAL DIRECT CURRENT STIMULATION ASSOCIATED WITH VIDEO GAMES ON THE BALANCE OF THE ELDERLY: PILOT STUDY
André J. Kunitake, MSC, João Carlos F. Corrêa, PhD, Solange Z. Heinz, Physiotherapist, Anita M. Gravato, Klaine Nascimento, Soraia M. Silva, PhD, and Fernanda I. Corrêa, PhD

OBJECTIVES: To evaluate the effect of video game associated tDCS on elderly balance.

DESIGN: Pilot study of a blinded, controlled, randomized clinical trial. Fifteen elderly women (70.9 ± 7.18) years old, with a history of falls, participated in the study. The balance of the volunteers was evaluated by the Mini Balance Evaluation Systems Test (Mini-BESTest) before, after treatment and 30 days after the end of the treatment. The volunteers were randomized into three treatment groups: Control group (video game balance training), group 1 (active iDCS associated video game), group 2 (sham iDCS associated video game). Balance training was realized on the Wii Board Balance and Wii Fit video game for 30 minutes, twice a week for four weeks, 8 sessions total. iDCS was applied with anode electrode over the dominant dorsal prefrontal cortex (CPF DL; F3) and cathode over the supraorbital region contralateral to the anode, 2mA intensity during the initial 20 minutes of video game training.

RESULTS: Improvement in Mini-BESTest score was observed at the end of the intervention (8 sessions) for the control (3.4; p = 0.01) and group 1 (6.2; p = 0.01), keeping without differences when compared post-intervention vs. -30-day follow-up. No improvements were observed for group 2 after treatment (1.2 p = 0.35) and follow-Up. Although the post-intervention Mini-BESTest score was better for the active group, it was not possible to statistically confirm whether it was more effective than the control group (post active vs. post control p = 0.06).

CONCLUSIONS: There was an improvement in the balance of the elderly in the control group and active iDCS, without enhancing the effects of iDCS.

THE EFFECT OF VISUAL TRAINING OF REPETITIVE STIMULI FOR HOMONYMOUS HEMIANOPIA IN STROKE PATIENTS
Seiji Etoh, MD, PhD, Atsuko Ogata, MD, PhD, Michiko Arima, MD, PhD, Kentaro Kawamura, MD, and Megumi Shimodzono, MD, PhD

OBJECTIVES: The objective of this study was to determine the effect of visual training of repetitive stimuli as a rehabilitation intervention on visual field defects in stroke patients. Visual training of repetitive stimuli consists of a specific pattern of stimulation that is directed at the border of the blind field.

DESIGN: This study evaluated 45 stroke patients with homonymous visual field defect from retrochiasmatic lesions treated with visual training of repetitive stimuli. Patients made effort to recognize the light at the border of the blind field during the 2-week training session. The main outcome measures was the change in area of visual field evaluated by perimeter. The impact of age, time from onset and initial visual field defect were analyzed.

RESULTS: The mean absolute improvement was 1.9±3.7%. Improvements of >3% was noted in 35.6% of patients. 8 out of 23 chronic patients (28 months from onset) improved the visual field. Age, time from onset and initial visual field defect did not influence the degree of field expansion.

CONCLUSIONS: Visual training of repetitive stimuli improves stimulus detection and results in enlargement of visual field as measured on static perimeter. It may be a useful rehabilitative intervention for patients with visual field defects from retrochiasmatic lesions.

THE EFFECTIVENESS OF FUNCTIONAL ELECTRICAL STIMULATION FOR THE TREATMENT OF SHOULDER SUBLUXATION AFTER STROKE
Linh Chi Bui, Doctor, and Kim Lien Nguyen Thi, Doctor

OBJECTIVES: Shoulder subluxation is one of the common secondary complications after stroke, which decreases significantly the upper limb function of patients. There have not been any effective methods to deal with this problem. This study was conducted to investigate the effectiveness of functional electrical stimulation (FES) for the treatment of shoulder subluxation after stroke.

DESIGN: A total of 44 patients with shoulder subluxation after the first stroke were included in the interventional and follow-up study. The patients were randomly divided into the study and control groups. All patients were put on a rehabilitation program using conventional methods (occupational therapy and physiotherapy) while the study group patients were additionally applied FES to supraspinatus and posterior deltoid muscles for 4 weeks.

RESULTS: The amount of change in the distance of shoulder subluxation after intervention in the study and control groups was 6.0 (4.7-10.2) and 2.2 (-0.3-2.5) mm, respectively. The changes in total Fugl-Meyer Assessment (FMA) scores between pre and post interventional period in the study and control groups were 5.0 (3.5-8.3) and 2.5 (2.0-4.1) scores, respectively. There was a significant difference between the two groups for the amount of change in shoulder subluxation distance, shoulder subluxation level and total FMA score in favor of the study group. The comparison of Barthel Index change and hemiplegic shoulder Visual Analog Scale value one showed no significant difference between the groups.
THE EFFECTS OF HIGH-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION OVER LESIONED DIAPHRAGMATIC MOTOR CORTEX ON RESPIRATORY FUNCTION FOR CEREBRAL INFARCTION PATIENTS

Peng Huang, Lyuu Zhao, Luxi Shen, and Meng Fan

OBJECTIVES: Diaphragm weakness due to cerebral infarction may contribute to the reduced respiratory function in stroke patients. Transcranial magnetic stimulation (TMS) over diaphragmatic motor cortex existing at a position approximately 3 cm lateral and 2 cm anterior to C2 international 10-20 electroencephalogram electrode placement system can evoke the compound muscle action potentials of contralateral diaphragm. Repetitive transcranial magnetic stimulation (rTMS), was used to modulate cortical excitability in the lesioned hemisphere. In particular, the high-frequency rTMS (25Hz) stimulates the lesioned hemisphere and promotes motor cortical excitability in the lesioned hemisphere. The aim of this study was to explore the effects of high-frequency rTMS over lesioned diaphragmatic motor cortex on respiratory function for cerebral infarction patients.

DESIGN: Forty cerebral infarction patients after 3-month stroke, aged between 18-70 were recruited. The brain CT and MRI confirmed these patients were the first stroke and they were without ignorance dysfunction. Participants were randomly divided into experimental group (n=20) and control group (n=20), the experimental group was provided with real rTMS treatment of lesioned diaphragmatic motor cortex at 8 Hz, 100% resting motor threshold (RMT) and 1200 pulses, and the control group was provided with sham rTMS. Both groups received routine rehabilitation treatments. All the treatments were performed once daily, 5 days weekly for 4 weeks. Pulmonary function tests (PFT) were used to evaluate the respiratory function, the forced vital capacity (FVC), the forced expiratory flow at one second (FEV1), the FEV1/FVC ratio, the peak expiratory flow (PEF), the maximal inspiratory pressure (MIP) and the maximal expiratory pressure (MEP) were quantified before and after treatment.

RESULTS: After four weeks, FVC, FEV1, FEV1/FVC, PEF, MIP, and MEP were significantly increased (P<0.05). The experimental group had significantly improved in terms of FVC, FEV1, FEV1/FVC, PEF, MIP, and MEP compared with the control group (P<0.05).

CONCLUSIONS: These results suggest that high-frequency rTMS can promote the respiratory function in cerebral infarction patients after stroke.

THE EFFECTS OF STRENGTH TRAINING IN THE HEMATOPOIETIC STEM CELL TRANSPLANT (HSCT) POPULATION: A NARRATIVE REVIEW

Eric Twohey, Conan So, BS, MPH, James E. Eubanks, MD, MS, Ed R. Schulte, DO, Nicole Tortolincas, N/A, and George Baum, BA

OBJECTIVES: To investigate the impact that strength training has on functional outcomes in the HSCT population. HSCT is an effective form of cancer treatment, but it is associated with significant fatigue and a decline in quality of life. The HSCT population has many risk factors that contribute to decreased function, one of which is skeletal muscle wasting. Strength training is an attractive intervention for this population as it is more effective in minimizing skeletal muscle wasting than aerobic exercise, however the role of strength training is unclear.

DESIGN: A systematic review of the MEDLINE database was performed in July 2019. Search terms included resistance or strength training, exercise, physical activity, and HSCT. Studies were included if they examined how strength training or combined strength/aerobics impacted functional outcomes via the 6-minute walk test, strength, or fatigue in the HSCT population.

RESULTS: There were 12 (11 RCT, 1 Pilot) eligible studies (2 strength training, 10 strength/aerobics). Strength and aerobic training led to an 8-11% increase in walking distance via the 6 minute walk test (6MWT) in 4-5 studies with intervention ranging from 4-15 weeks, increased maximal isometric force in 3/8 studies with intervention ranging from 4-18 weeks, and heterogenous effects on fatigue (no effect=3, improve=1, worsen=1). The effects of strength training alone on fatigue is unclear (no effect=1, improve=1).

CONCLUSIONS: Strength and aerobic training were shown to be feasible in the HSCT population and had positive benefits in improving functional outcomes such as the 6MWT and strength, but minimal effect on fatigue levels. This study was limited by variable study population and multiple measures of function. Additional research is necessary to determine the most beneficial timing and length of exercise regimens to effectively improve patient functioning, without exceeding patient work capacity.
OBJECTIVES: The Lee Silverman Voice Treatment BIG (LSVT-BIG) is a short intensive training that has been shown to improve motor function in patients with Parkinson’s disease. In the Netherlands it has been implemented as a multidisciplinary treatment. A physical therapist aims to improve the quality of movement while an occupational therapist works on integrating these movements in daily life activities. The effects of this approach have not yet been evaluated.

DESIGN: A retrospective cohort study was performed at the rehabilitation department of the Meander Medical Center in the Netherlands. Patients that participated between January 2016 and July 2017 were included. Motor function was assessed at baseline (T2), after four weeks of treatment (T4) and at follow-up (T10). Standardized tests were used as advised in the national treatment guideline for Parkinson’s disease. Supplemented with the Functional Score, a LSVT-BIG specific measure.

RESULTS: 61 patients were included, three of which (temporarily) discontinued treatment for non-treatment related reasons. Significant improvement of motor function was shown for all patients at T4 and T10. The effect size differed per test as shown here with measurements at T4: Modified Parkinson Activity Scale (15%, 0.8 SD), 6 Minute Walk Test (10%, 0.5 SD), Timed Up and Go test (24%, 0.6 SD), Five Times Sit To Stand (22%, 0.5 SD), Timetted Balance (10%, 0.7 SD), Timetti Gait (14%, 0.7 SD), Functional Score (43%, 2.4 SD). At T10 all patients were interviewed, no negative treatment effects were indicated.

CONCLUSIONS: After readily implementing a multidisciplinary form of LSVT-BIG for patients with Parkinson’s disease, motor function improved in all participants.

THE GERMAN SPINAL CORD INJURY SURVEY LEADS TO A POLICY BRIEF TO THE MINISTRY OF HEALTH IN BERLIN ON THE WORLD SCI DAY 2019

Yörk B. Kalkie, MBa; Andrea J. Bökel, MSC; Christoph M. Gutenbrunner, DR., and Christian Strem, DR.

CASE DIAGNOSIS: Multiple organizations like UN and WHO call for the collection of internationally comparable data on living and supply conditions of people with disabilities. The German Spinal Cord Injury Survey aims at collecting reliable data of people with SCI and developing recommendations for actions to be taken by policymakers and other decision-makers. Infrastructure and resources for the approximately 140,000 people in Germany living with tetra-, paraplegia and spina bifida have to be improved.

CASE DESCRIPTION: 8 of 27 SCI Centers in Germany took part in the GerSci Survey in 2017. A standardized questionnaire was sent to 5598 patients being older than 18 years. 1479 patients were included in data analysis. Asked for equipment, attitudes and environment most barriers were seen on the environment side. Inadequate access to a potential workplace was seen by 22.7%, inadequate transportation was seen by 15.5%.

DISCUSSIONS: There is a need for better transportation system and better access to workplaces in Germany as an implemented focus group showed. A policy brief was written in a consensus process of the German speaking Medical Society of Paraplegiologie and the German Society of Physical and Rehabilitative Medicine, the supporting community of paraplegics in Germany and the Hannover Medical School as Study Centre to make demands to the German Ministry of Health on SCI Day. 8 of 27 SCI Centers in Germany took part in the GerSci Survey in 2017. Infrastructure and resources for the approximately 140,000 people in Germany living with tetra-, paraplegia and spina bifida have to be improved.

CONCLUSIONS: A policy brief given to the Ministry of health enhances the stakeholder dialogue with the aim to realize the requested improvements in infrastructure and resources in Germany for people also with SCI.

THE HEMODYNAMIC RESPONSE FOLLOWING EIGHT WEEKS OF EXERCISE-BASED CARDIAC REHABILITATION AFTER CORONARY ARTERY BYPASS GRAFTING IN SAUDI ARABIA: A RETROSPECTIVE ANALYSIS

Ahmad M. Osailan, PhD, and Gaber S. Soliman, PhD

CASE DIAGNOSIS: Cardiac rehabilitation has been implemented to some extent worldwide as management of post-operative Coronary artery bypass grafting (CABG). However, studies about the effect of exercise training on hemodynamic responses of the heart using Incremental shuttle walking (ISWT) test are limited in Saudi Arabia.

CASE DESCRIPTION: Fifteen CABG (51.4 ± 6.4 years, 14 male, 1 female) patients without altering their medication were enrolled in (phase 3) hospital-based cardiac rehabilitation for 2011 until 2012 for supervised individual exercise training sessions (three times per week for 8 weeks) for sixty minutes at moderate intensity. Patients performed two (ISW1 & ISW2), one before exercise training program and one after, during which resting systolic blood pressure (SBP) and diastolic blood pressure (DBP), post ISWT SBP and DBP, Resting heart rate (HR), peak HR, heart rate recovery (HRR) (which was defined as the absolute change from peak HR to one minute post-peak HR) and rate pressure product (RPP) at rest and at the end of the ISWT were measured. Exercise training sessions included both aerobic and resistance exercise, which was preceded by a cooling down period and followed by a recovery period in the end.

DISCUSSIONS: Paired t-test showed a significant reduction in both resting SBP (p<0.05 and DBP (p<0.03), and significant increase in post-ISWT SBP (p<0.04), peak HR (p<0.003), HRR (p<0.03), and RPP at maximum (p<0.002) after 8 weeks of supervised exercise training. Also, there was a significant increase in the speed and distance achieved on ISWT2 (p'<0.001) after the training program.

CONCLUSIONS: Cardiac rehabilitation supervised exercise training for 8 weeks was effective in improving hemodynamic responses and functional exercise capacity in CABG patients. Cardiac rehabilitation should be implemented more frequently and health care providers should be aware of the importance of it. Further research is needed in this area to confirm these findings.

THE IMPACT OF EPILEPSY, MYASTHENIA GRAVIS AND MULTIPLE SCLEROSIS ON PREGNANCY AND FAMILY PLANNING

Maha Edrees, MBBS, Mohammed Alanazy, MBBS, MSC, MD, Asiri Alanood, MBBS, and Taim Muayqil, MBBS, MSC, MD, FRCP(C)

OBJECTIVES: Women with a neurological disease are usually afraid from the effect of the disease itself or from adverse effects of disease-specific medications on the development of the fetus. Our aim is to assess the impact of epilepsy, Myasthenia Gravis (MG) and Multiple Sclerosis (MS) on family planning.

DESIGN: This is a cross-sectional survey study. Data were collected using 3 standardized questionnaires in the neurology clinic at a university hospital. A total of 272 Adult women with epilepsy, MG and MS were involved in our study. All data were analyzed using SPSS (version 22).

RESULTS: A total of 272 Adult women with epilepsy, 69 MG, and 120 MS women participated with a mean age of 29.9±8.0 years. Median scores of knowledge for epilepsy, MG, and MS patients were 5/12 with an interquartile range (IQR) of 2-7, 6/12 (IQR 3-8), and 5/12 (IQR 2-8), respectively. The proportion of women who abstained...
from or postponed pregnancy were 41.2% and 31.4%, respectively. Older age was independently associated with the decision to abstain from pregnancy (OR 1.14, 95% CI 1.04 - 1.25) and a higher level of knowledge was independently associated with encouraging other women to have children (OR 1.3, 95% CI 1.11 - 1.53).

CONCLUSIONS: A considerable impact on family planning was found due to epilepsy, MG and MS that resulted in abstinence or postponement of pregnancy and the contributing factors were identified. Knowledge about the influence of epilepsy, MG and MS on pregnancy and vice versa was overall low. Furthermore, the majority of the women in our study would encourage other women to have children. A higher level of education, absence history of ICU admission and experiencing pregnancy after diagnosis were predictors for encouraging pregnancy. The involvement of a multidisciplinary team and importance of comprehensive counseling should be provided to women with epilepsy, MG and MS.

THE IMPACT OF PATIENT CANCELLATIONS ON PHYSICAL THERAPY OUTCOMES
Zachary Walston, PT, DPT, OCS

OBJECTIVES: ‘Adherence’ is often referred to in healthcare literature, but the definition is not consistent. One of common definitions is “when patient’s behaviors coincide with healthcare providers’ recommendations for health and medical advice”. While we have evidence on possible causes of poor compliance, there is a paucity in the literature assessing the impact of patient compliance to care on outcomes, particularly with respect to appointment cancellations and no-shows. Missing appointments has the potential to substantially impact the effectiveness of care being delivered. The purpose of this retrospective observational study is to analyze the potential impact of cancellations on outpatient PT functional outcomes.

DESIGN: This study is a retrospective observational analysis. Data from a sample of convenience, consisting of outcome data and past medical history within the FOTO database from 2 outpatient PT clinics. Inclusion criteria include ‘body part regions’ of lumbar spine, shoulder, or knee in FOTO Functional Status (FS) Patient-Reported Outcome Measure (PROM) and completed episode of care. Repeated measures analysis of variance (ANOVA) was used to determine any within group differences of cancel rate, number of visits, and last pain rating with respect to FS status change (worsening FS, failure to achieve minimally clinically important improvement (MCID), and exceeding MCII) for lumbar, knee, and shoulder categories. Pearson Correlation analysis was used to assess correlation between cancellation rate and FS change, change in pain, and number of treatment visits.

RESULTS: Final statistical analysis was performed on 937 total patients (289 knee, 412, low back, 236 shoulder). The mean age for all patients was 50.493 years old and 56.8% of the patients were female. The mean cancel rate across all patients was 15.945%, the mean FS change was 17.878 units, the mean change in pain was 2.235 points, and the mean number of visits was 18.186. When categorizing cancel rate by outcome, a significant (p< 0.05) inverse relationship between cancellation rate and FS change was observed in shoulder and knee patients. Exceeding MCID compared to failing to meet MCID. The number of treatment visits provided in the plan of care had significant inverse relationship with the cancellation rate and a direct relationship with the FS change for shoulder and knee pain patients. Pearson correlation analysis revealed weak or no correlations for all variables in relation to cancel rate.

CONCLUSIONS: Increased cancellations may potentially negatively impact physical therapy outcomes in patients seeking care for lumbar, knee, or shoulder impairments. There are several potential reasons for increased cancellations leading to decreased functional improvements such as achieving the necessary dosage (intensity, volume, frequency), patient expectations, and the complexity of the case. Future research is needed to understand the specific factors that lead to increased cancellations and how to increase patient compliance. The results of this study show the importance of further research in this area and the need for clinicians to monitor and implement tools and strategies to minimize the potential negative impact of poor patient compliance.

THE LITTLE MERMAID, SUDDEN LOSS OF SPEECH IN A 5-YEAR-OLD GIRL: A CASE REPORT
Heidi Chen, MD, Vera A. Tseltina, MD, Hana Azizi, MD, and Jared Levin, MD

CASE DIAGNOSIS: +GAD65 autoimmune encephalitis with aphasia

CASE DESCRIPTION: A 5-year-old girl initially diagnosed with acute cerebellar ataxia presented 3 months after moderate clinical improvement with worsening ataxia, drooling, decreased mentation, and emesis following viral illness. She was diagnosed with +GAD65 autoimmune encephalitis after lumbar puncture and MRI revealed new inflammation in the bilateral frontal and temporal lobes. Hospital course was notable for further neurological decline including sudden loss of speech despite treatment with IVIG and methylprednisolone; treatment was then transitioned to weekly Rituximab. Initial physical examination in acute inpatient rehabilitation was significant for decreased attention and cognition, global aphasia, dysphagia, mixed tone, dysrythmus, truncal ataxia, left sided weakness and hemineglect. Her motor function and cognition are slowly improving following completion of four cycles of Rituximab and ongoing multidisciplinary rehabilitation with PT, OT, and SLP. She currently ambulates with moderate assistance using a walker and bilateral hinged AFOs and demonstrates preference for flavored intraluminal stimulation over vibratory perioral stimulation.

DISCUSSIONS: Anti-GAD65 antibodies is commonly associated with type 1 diabetes mellitus, appearing in approximately 80% of new cases. Neurological phenomena of anti-GAD65 antibody are much more rare and may manifest as limbic encephalitis, epilepsy, cerebellar ataxia, and stiff-person syndrome. Furthermore, while dysarthria has been reported in the past, global aphasia has not yet been reported. GAD65 autoimmunity response to immunotherapy is variable with approximately 50% of affected individuals improving functionally. This patient’s inflammatory process has impacted her neurological status globally rendering her dependent for all age appropriate ADLs. She requires significant multidisciplinary rehabilitation for functional optimization and close medical monitoring for prevention of further neurological deterioration.

CONCLUSIONS: Sudden aphasia can present as a feature of GAD65 autoimmune encephalitis which may further complicate the process of functional recovery in affected individuals. This emphasizes the need for a multidisciplinary approach to improve functional outcomes and decrease caregiver burden.

THE RACE FOR READMISSION REDUCTION: PRIMARY CARE FOLLOW-UP APPOINTMENTS REDUCE DEBILITY READMISSION FROM ACUTE INPATIENT REHABILITATION FACILITIES
David H. Sherwood, DO, Sarah M. Eickmeyer, MD, Alexandra N. Arickxx, MD, Benjamin D. Gill, DO, MBA, Derek Schimmer, BA, Anthony E. Jackson, MD, and Ying Shu, MS

OBJECTIVES: Reduce the 30-day readmission rate in the debility population with rapid PCP follow-up within seven business days of discharge from IRF

DESIGN: The study was structured as a prospective cohort design. During the 6-month intervention phase, the primary resident physician caring for each patient in our cohort was responsible for establishing a rapid PCP follow-up appointment within 7 business days of discharge for each patient admitted with a primary admission diagnosis of debility. Outcome measures included PCP follow up date, whether the follow-up was inside or outside the hospital system, and if the patient was readmitted within 30 days of discharge. A subsequent, blinded review process performed by two physicians confirmed the accuracy of the 30-day readmission data.

RESULTS: Of those who received the intervention, 7% were readmitted (p=0.018) within 30 days of discharge. Of those who did not receive the intervention, 56% were readmitted within 30 days of discharge.

CONCLUSIONS: There was a statistically significant reduction in 30-day readmissions with our intervention of rapid PCP follow-up post-IRF discharge for patients admitted with a primary diagnosis of debility. We theorize that rapid PCP follow up serves as a way-point to recognize issues and errors before they escalate into a problem warranting readmission. It may be best practice to institute a rapid PCP follow-up for all discharges to reduce 30 day readmissions and improve patient care after IRF admission.

THE RELATIONSHIP BETWEEN SERUM 25 HYDROXY VITAMIN D LEVELS AND MUSCULOSKELETAL SIDE EFFECTS IN PATIENTS USING ISOTRETINOIN
Cevriye Mükkoğlu, and Nermin Karaosmanoğlu

OBJECTIVES: Isotretinoin (ISO) has been used in the treatment of patients with severe acne vulgaris (AV) that is resistant to standard therapy with systemic antibiotics and topical agents, over the last few decades. The aim of this study was to investigate the relationship between ISO-induced musculoskeletal adverse effects and serum 25 hydroxy (OH) vitamin D levels.

DESIGN: 87 patients with AV who had musculoskeletal side effects due to ISO, included as adverse effect (AE) group. 90 patients with AV, without any adverse events associated with ISO, were recruited as control (C) group. Locomotor system examination of the participants was performed by the same clinician. Serum biochemistry parameters and 25 (OH) vitamin D levels were measured. Patients in the AE group were divided into three subgroups according to serum 25 (OH) vitamin D levels. Patients with serum 25 (OH) vitamin D level is lower than 10 ng/ml, was
Abstracts

THE ROLE OF HYPERBARIC OXYGEN THERAPY (HBOT) IN REHABILITATION MEDICINE FOR THE TREATMENT OF DIABETIC FOOT ULCER (DFU) AND WOUND HEALING

Anthony Batri, Vinicius Tieppo Francio, MD, George Raum, BA, James E. Eubanks, MS, MD, Brandon Barndt, DO, and Evan Cohen, DO

OBJECTIVES: To review the efficacy of HBOT for the treatment of DFU and wound healing. The use of HBOT for wounds is considered controversial and understudied, yet its use for DFU has been recommended by clinical guidelines. Due to controversial data, this review aims to discuss HBOT for DFU and wound care in the rehab settings.


RESULTS: HBOT is not currently considered medically necessary for superficial wounds. A 2018 study showed that HBOT was effective in improving the healing rate of only Wagner grade 3 and 4 DFU. HBOT is recommended as an adjunctive only after thirty consecutive days of standard wound therapy without improvement, and used in addition to standard care for Wagner grade 3 and 4 DFU. A 2011 meta-analysis showed risk reduction of major amputation of 0.31 when HBOT was used, predicting a NNT of 4. Furthermore, a 2013 review showed a decrease in major amputation using HBOT for DFU. Conversely, a 2016 RCT revealed no statistical significance using HBOT with standard care, however there was evidence that HBOT improves healing in patients with wounds from oncologic radiation therapy. A 2017 meta-analysis showed that HBOT reduced DFU size, but did not increase healing rate.

CONCLUSIONS: HBOT use is under study for superficial wounds. It is recommended for chronic Wagner class III and IV DFUs that are unresponsive to at least thirty days of standard care. HBOT has been shown to reduce the risk of major amputation and may improve the chance of healing in diabetic ulcers. The application of HBOT to diabetic adult patients may be justified when available; however, economic evaluations should be undertaken (explored/perform).

THE ROLE OF MULTIDISCIPLINARY INPATIENT REHABILITATION IN CENTRAL PONTEINE MYELINOLYSIS

Neha Shah, DO, Noel Rao, MD, and Shaheen Jadidi, DO

CASE DIAGNOSIS: Central Pontine Myelinolysis

CASE DESCRIPTION: 39-year-old female with history of alcohol abuse (1 standardized drink/day for 3 weeks), decreased from 2 standardized drinks/day for 3 years) and depression. Presented with progressive lower extremity weakness over four days. She presented with dysphagia, impaired cognition, and loss of bowel and bladder function. Initial labs revealed (Na+ 132, and K+ 3.0). Hypokalemia was treated standardized drink/day for 3 weeks, decreased from 2 standardized drinks/day for 3

RESULTS: AE and C groups were similar in aspect of age and gender (p >0.05). There was no statistically significant difference between these groups in terms of the mean serum vitamin D levels (p=0.17). Also, there was no significant difference between three subgroups in AE group, in terms of arthralgia (p=0.30), myalgia (p=0.29), low back pain (p=0.10) and sacroilitis (p=0.17). In addition, there was no statistically significant correlation between the serum vitamin D levels and age, cumulative dose of ISO, arthralgia, myalgia and sacroilitis parameters in AE group (p >0.05).

CONCLUSIONS: We found similar serum 25 hydroxy vitamin D levels between the AE and C groups and no significant difference in aspect of musculoskeletal adverse events in AE subgroups. We may conclude that vitamin D deficiency has no effect on the musculoskeletal adverse effects in patients using ISO for AV.

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THE SAFETY OF AEROBIC EXERCISE IN SICKLE CELL DISEASE: A SYSTEMATIC REVIEW

Xiaorong Hu, MD, Lauren Gornoski, DPT, Jianan Li, MD, Leighton Chan, MD, MPH, and Simge Yontner, MD

CASE DIAGNOSIS: Reduced physical capacity is common in patients with sickle cell disease (SCD). Regular physical activity results in improvement in red blood cell deformability and decreases blood viscosity, inflammation and endothelial activation, therefore leading to improved vascular function and decreased risk of vaso-occlusive crises. This study systematically reviewed available scientific evidence regarding the safety of acute maximal and submaximal exercise testing, as well as endurance exercise in individuals with SCD.

CASE DESCRIPTION: PubMed/Medline, Embase, Scopus, Web of Science and Cochrane Central library were searched using specific keywords with no limit on publication date. 4057 citations were retrieved, including adults and children with the diagnosis of SCD in an exercise intervention program. Narrative synthesis approach was performed to examine

RESULTS: The Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework was used to assess methodological quality of the selected studies.

DISCUSSIONS: Fifteen articles fulfilled inclusion criteria; 2 RCT’s, 8 cohort studies and 5 single arm studies. In total, 15 articles consisted of 299 SCD participants with the mean age of 25.7±5.6 yrs. Of the studies, 8 performed acute exercise testing and 7 studies employed aerobic exercise training. No study reported exercise related pain crisis within 24 hours. One long-term follow up study reported the frequency of pain crisis within 6 months after maximal exercise, and no difference was found compared with 6 months before exercise. In 4 submaximal exercise studies, RBC deformability (elongation index) remained unchanged suggestive of no increased risk for microvascular blockage or oxidative stress markers exhibited and no deleterious effects on RBC deformability.

CONCLUSIONS: Maximal and submaximal exercise appear safe and well-tolerated for patients with SCD. No serious adverse events were reported during submaximal exercise and only 2 studies revealed pain crises post maximal exercise testing. Supervised or home-based endurance exercise may also be considered safe for SCD patients.

THE ROLE OF REHABILITATION IN CASE OF A KOOLEN-DE VRIES SYNDROME

Boróka-Panna Gáspár, and Sînziana Călușteanu

CASE DIAGNOSIS: A characteristic intellectual disability, a facial dysmorphic, motric and sensitiv affections have been described in a specific genetic disease, a microdeletion of 17q21.31 chromosome or heterozygous mutations on KANSL1 gene, pathology named by researchers Koolen and de Vries in 2006.

CASE DESCRIPTION: A colorful clinical panel with repetitive epileptiform manifestation, gait control disturbances, severe recurrent fatigability periods in a young girl’s case were initiated further investigations, respectively, the genetic analyzé by SNP array method presented by the 17q21.31 duplication on KANSL1 gene, approximate 81kb, the third exon from 15. The first clinical signs have been found approximately 3 years before genomic diagnosis (at the age of 3), a sudden vomiting after a generalized hypotonic crisis, bilateral mydriasis.

DISCUSSIONS: In the knowledge of a distinct diagnosis we could implement a comprehensive, targeted rehabilitation program, according to age, disease severity and evolution, comorbidities. The long term rehabilitation program included a management of daily activities, educational, vocational and behavioral therapy, physio-kinetotherapy inpatient and home, occupational (art and game) therapy. Improvements of the cognitive and functional status have been observed, under treatment leading to the amelioration of the hypotonia, ataxia, dyspraxia, coordination and attention deficit, psychomotor agitation, there were no present sign of epilepsy. The family support plays a key role in a multidisciplinary team work, we could conduct a supervised series of rehabilitation procedures, where each was a deliberately “milestone” in her fruitful evolution.

CONCLUSIONS: Our study highlights the importance of a long term, individualized rehabilitation treatment in a relative rare, novel and underdiagnosed genetic disorder.

THE SAFETY OF AEROBIC EXERCISE IN SICKLE CELL DISEASE: A SYSTEMATIC REVIEW

Xiaorong Hu, MD, Lauren Gornoski, DPT, Jianan Li, MD, Leighton Chan, MD, MPH, and Simge Yontner, MD

CASE DIAGNOSIS: Reduced physical capacity is common in patients with sickle cell disease (SCD). Regular physical activity results in improvement in red blood cell deformability and decreases blood viscosity, inflammation and endothelial activation, therefore leading to improved vascular function and decreased risk of vaso-occlusive crises. This study systematically reviewed available scientific evidence regarding the safety of acute maximal and submaximal exercise testing, as well as endurance exercise in individuals with SCD.

CASE DESCRIPTION: PubMed/Medline, Embase, Scopus, Web of Science and Cochrane Central library were searched using specific keywords with no limit on publication date. 4057 citations were retrieved, including adults and children with the diagnosis of SCD in an exercise intervention program. Narrative synthesis approach was performed to examine

RESULTS: The Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework was used to assess methodological quality of the selected studies.

DISCUSSIONS: Fifteen articles fulfilled inclusion criteria; 2 RCT’s, 8 cohort studies and 5 single arm studies. In total, 15 articles consisted of 299 SCD participants with the mean age of 25.7±5.6 yrs. Of the studies, 8 performed acute exercise testing and 7 studies employed aerobic exercise training. No study reported exercise related pain crisis within 24 hours. One long-term follow up study reported the frequency of pain crisis within 6 months after maximal exercise, and no difference was found compared with 6 months before exercise. In 4 submaximal exercise studies, RBC deformability (elongation index) remained unchanged suggestive of no increased risk for microvascular blockage or oxidative stress markers exhibited and no deleterious effects on RBC deformability.

CONCLUSIONS: Maximal and submaximal exercise appear safe and well-tolerated for patients with SCD. No serious adverse events were reported during submaximal exercise and only 2 studies revealed pain crises post maximal exercise testing. Supervised or home-based endurance exercise may also be considered safe for SCD patients.
THE SCALP ACUPUNCTURE TOGETHER WITH THE DUAL TASK THERAPY VERSUS THE DUAL TASK THERAPY ALONE, IN PATIENTS WITH PARKINSON’S DISEASE
Claudia G. Mejia Rojas

OBJECTIVES: To determine the motor response of the scalp acupuncture together with the dual task therapy versus the dual task therapy alone, in patients with parkinson’s disease.

DESIGN: 28 patients with Parkinson’s Disease. Hoehn and Yahr stage I, II and III; disease time between 2-13 years; all in “on” stadium; cognitive impairment was ruled out with the MOCA scale. All provided informed consent before participating in the study. 02 groups each of 14 patients. The group “A”, received SC plus ADTT, while, the group “B” received DTT only. In the SC, stainless steel needles were inserted into DU20, GB20, and the Chorea-Tremor Controlled Zone, 20-min, once weekly, for 16 weeks. In the DTT, the patient walking 30 minutes, 3 times per week, for 16 weeks, simultaneously, the supervisor asks questions such as: mathematical operations. To determine the motor response, an UPDRS III assessment was performed in all patients before and after treatment.

RESULTS: Patients were 28: 9 women, 19 men, with 61 (±13) years of age. MoCA scores of 29 (±1), disease time: 7 (±5), Stages Hoehn & Yahr II the majority. The UPDRS III scores were significantly decreased in both groups, especially in the group “A”. In the group “A” the UPDRS III Score decreased an average of 11 points; while, in the group “B” an average of 6 points, only. Adverse effect reported: headache. Nobody left the therapy.

CONCLUSIONS: The improvement of the SC motor symptoms of Parkinson’s disease is remarkable. The reported adverse effects are minimal and the adequacy quite good. The effect of SC should not be discussed, and although the mechanism of action has not yet been clarified. Physician should considered SC within the protocol of treatment. We need to have a consensus the most effective points.

THE SUCCESSFUL REHABILITATION OF A COMPLICATED MVA PATIENT ON A VENTILATOR: A CASE REPORT
Michael S. Hansen, MD, MBA, Eric Jonsvold, and Mark Steinhauer, MD

CASE DIAGNOSIS: Poly-trauma status post-MVC and subsequent ICU stay including mechanical ventilation

CASE DESCRIPTION: A 66-year-old male presented to the Emergency Department post-motor vehicle accident with a right frontoparietal subdural hematoma with right-to-left midline shift. He underwent a right craniotomy and hematoma evacuation. Subsequent re-assessment showed significant recurrence of hematoma, which necessitated re-evacuation two days later. The patient failed extubation due to hospital-acquired pneumonia requiring a tracheostomy and PEG tube. After 14 days in the hospital (including an ICU stay), the patient was transferred to the Rehabilitation Department—while still on the Ventilation/Tracheostomy/PEG combinata for comprehensive therapy services.

DISCUSSIONS: Initial rehabilitation course was challenging with acute pulmonary embolism requiring a brief return to acute care, however, the patient achieved a steady recovery with comprehensive rehabilitation program with significant improvement in FIM scores (22 to 91) (Average FIM score: 1.4 to 5.7) during his stay in acute rehabilitation. His tracheostomy was decannulated and his PEG tube was removed. At the time of discharge to home, he was either completely independent or modified independent on all ADL’s.

CONCLUSIONS: Early and aggressive physical, occupational, and speech therapies improve odds of return to independent function in patients that have had traumatic decline in function. Early Physiatrist consults ought to be considered in all patients who are not functionally at baseline, and ventilators should not be considered an absolute barrier to therapy.

THE TDCS IS EFFICIENT TO REDUCE UNILATERAL SPATIAL NEGLECT AFTER STROKE?: AN ONGOING TRIAL

OBJECTIVES: To evaluate the effects of Transcranial Direct Current Electrostimulation (TDCS) on Unilateral Spatial Neglect (USN) after stroke in the right hemisphere and to compare the effectiveness of anodic, cathodic and sham modality.

DESIGN: Clinical trial, randomized, double-blind and multicenter study. Subjects diagnosed with stroke (minimum 3 weeks and maximum 1 year) in the right parietal lobe, confirmed by imaging examination and diagnosed with USN were included (score below 129 on the gold standard for diagnosis of USN, Behavior Inattention Test - BIT). Patients were randomized into 3 groups: 1 - P4 anodic stimulation (right parietal); 2 - P3 cathodic stimulation (left parietal); 3 - sham group. All patients received physical therapy immediately after stimulation, twice a week, totaling 15 sessions. The evaluator was blinded to treatment. The BIT was applied on the first (D1) and fifteenth (D15) day of stimulation.

RESULTS: Of the 779 patients identified with stroke within 15 months, 37 met the inclusion criteria after screening. Of these, four were excluded. The 33 patients who completed the protocol were randomized into: Anodic (n = 11), Cathodic (n = 11) and Sham (n = 11) stimulation. The 3 groups showed improvement in NEU after treatment; however, patients in the anodic stimulation group had better results in the BIT evaluation at D15, with statistical difference between groups (p = 0.02). There was no statistical significance when comparing the evolution of D1 to D15 (p = 0.05).

CONCLUSIONS: Anodic TDCS in the right parietal region seems to have a beneficial effect in the treatment of post-stroke NEU, but these are partial results, with incomplete sample size. Improvement of NEU, regardless of treatment group, is due to physical therapy and seems to be optimized by anodic stimulation.

THE USE OF ACUPUNCTURE FOR SCAR RELEASE AND PAIN RELIEF AFTER AN ELECTRICAL BURN
Mary Grace G. Senseng, DO, MABS, Gerard Dysico, MD, Jaimee Lyne, MS, Sydney Sherman, BS, Michael Aibninder, MPH, and Kamberlee Thompson, BS, MS

CASE DIAGNOSIS: 25% TBSA electrical burn to face, neck, chest, abdomen, and hands; painful scarring

CASE DESCRIPTION: 49 year-old male who sustained work-related electrical burns on 4/5/17 presented to Stroger Burn Unit with 25% TBSA full thickness and partial thickness burns to face, neck, chest, abdomen, and hands; s/p ecchymotyrpion and split-thickness skin graft to hands. He completed a 1.5 month acute rehabilitation stay and presented to PM&R for outpatient follow up with myofascial pain related to scars, PTSD-like symptoms and insomnia. He had been on gabapentin prior to evaluation. The burn distribution raised concerns for dermatomal and ventral myofascial pain patterns along the abdomen. Acupuncture initiated on 7/2018. Various acupuncture techniques were used: scar release for pain control, Tai Yin-Yang Ming Meridian subset to address ventral scarring and contracture over abdomen, and the “4 Gates treatment” for PTSD (encompassing LI4 and LV3 points bilaterally). Electrical and laser stimulation were included in later sessions to enhance the treatments.

DISCUSSIONS: Up to 77% of severe burn patients develop pathologic burn scars, characterized by peripheral hyperalgesia poorly responsive to conventional treatment. Managing pain and anxiety are major treatment goals since both can delay healing. Acupuncture might be beneficial for functional recovery by decreasing peripheral hyperalgesia and increasing endogenous production of naturally occurring analgesics, endorphins and enkephalins. Tailored treatments using subcutaneous points around the wound can increase angiogenesis, modulate the inflammatory process, and improve wound healing.

CONCLUSIONS: Patient has been receiving electro-acupuncture with concurrent laser stimulation biweekly since 2018. Previous studies suggested insufficient evidence regarding burn acupuncture efficacy. In this case, patient has demonstrated notable regression of hypertrophic abdominal scar and clinically significant improvement in pain, correlating with treatments. Further studies outlining standardized treatment approaches are needed to ascertain acupuncture’s efficaciousness in treating scars and reducing pain and anxiety.

THE USE OF STANDARDIZED MODULAR MULTIFUNCTIONAL COMPLEX FOR REHABILITATION OF PATIENTS WITH DISEASES AND INJURIES OF THE CENTRAL AND PERIPHERAL NERVOUS SYSTEM
Vladimir Luchenkov, PhD, Galina Ivanova, Professor, Evgeny Kryukov, Professor, Dmitry Iskra, Professor, and Denis Davydov, Professor

OBJECTIVES: The purpose of the study was to explore the possibility and effectiveness of rehabilitation trainer “Captain”

DESIGN: The study involved 1,700 people aged 55 to 65 with ischemic stroke in the right hemisphere and blood supply of the left hemisphere cerebral artery. Lesions began 3 to 18 days after the stroke. To assess the results of rehabilitation we used scales and questionnaires. Trainer “Captain” consists of seven functional blocks. Patients performed ten exercises on the simulator. Classes were held 3 times a week for 60 minutes with
the instructor and independently. The findings were assessed before the first train, and on the sixteenth day.

**RESULTS:** All patients noted positive dynamics in the rehabilitation process. Injuries weren’t recorded. 3-4 points during the initial examination fell to 2-3 points when re-evaluated in the SCID and modified Rankin scale. NIHSS: 7-8 points dropped to 4-5 points. MMSE: 26-27 points increased to 27-28 points. The Barthel index: 20-25 points increased to 50-60 points. Visual Analog Scale, VAS: 10-35 points increased to 60-85 points. The duration of rehabilitation was reduced by 30%. Disability patients decreased by 25-30%, motor function in hands improved to 45-80%, in the legs -by 70-80%, statelocomotor function increased by 45%.

**CONCLUSIONS:** The use of multifunctional rehabilitation trainer "Captain" is effective for complex rehabilitation of patients with stroke. The efficiency of the simulator is confirmed by objective data. Training on the simulator helps restore movements of the upper and lower extremities. The simulator is available to patients and does not require constant monitoring by experts during training. Use of the simulator "Captain" allows you to cut costs, continue rehabilitation at home, increase the motivation of the patient to quickly return to the social environment and proceed with the previously performed labor activities.

**THE VALUE OF OSTEOPATHIC MANIPULATION IN THE TREATMENT OF HIP AND BACK PAIN IN A BREAST CANCER PATIENT WITH OSSUS METASTASES**

Marla A. Petriello, DO, Cristina Kline-Quiroz, DO, and Patrick Martone, DO

**CASE DIAGNOSIS:** 69 year-old patient with ER+ PR+ HER2+ breast cancer with skeletal metastases to the cervical, thoracic, and lumbar spine, ribs, pelvis, sacrum, and right femoral head.

**CASE DESCRIPTION:** A 69 year-old female with breast cancer metastatic to multiple skeletal sites presented with significant hip and low back pain, limited ROM, and gait impairment. She had previously undergone palliative radiation to the hip with minimal improvements. She was currently taking oxycodone and gabapentin for pain. The patient underwent a session of osteopathic manipulative treatment (OMT) including myofascial release and muscle energy. She reported immediate 30% improvement in pain and improved gait pattern. Her hip ROM improved in internal rotation, external rotation, and extension. Her posture improved with resolution of her previous anterior trunk lean. Although her pain medication utilization in the short term remained unchanged, her reported pain score improved by 60% at her subsequent treatment session.

**DISCUSSIONS:** This case demonstrates the potential use of OMT to treat chronic severe pain in cancer patients with osseous metastasis. The pain experienced by cancer patients has the potential to negatively impact mobility, function, emotions, and quality of life. It is imperative to optimize the treatment of cancer pain within a comprehensive and integrated care plan. Caring for patients with bone metastasis presents several clinical challenges including increased fracture risk, disease progression and decreased quality of life. Additionally, traditional treatments may be only partially effective. In this case OMT involving myofascial release and muscle energy was an efficacious adjutant treatment.

**CONCLUSIONS:** Osteopathic manipulation involving myofascial release and muscle energy may be a safe and effective treatment modality for pain in cancer patients with osseous metastasis. OMT can be a valuable adjunct in the treatment plan to improve pain control and maximize function and quality of life. However, more research regarding treatment protocols and patient selection is needed.

**THERAPEUTIC INTERVENTIONS FOR LATERAL AXIAL DYSTONIA (PISA SYNDROME) IN IDIOPATHIC PARKINSON’S DISEASE**

Mohammad Etooom, PhD

**OBJECTIVES:** To systematically review the current therapeutic interventions for lateral axial dystonia (Pisa Syndrome) in Idiopathic Parkinson's disease.

**DESIGN:** A scoping systematic review. A comprehensive search was conducted through MEDLINE and SCOPUS databases. Articles were included if they were published in the form of systematic reviews or meta-analyses, and not clinical trials. The search was conducted in July 2019.

**RESULTS:** Eighteen studies described in 19 articles were included. The study patients were from Spain, France, and the United States. The interventions included pharmacological therapy (5 articles), physical therapy (4 articles), and psychological interventions (2 articles). The outcomes measured included disability, quality of life, and disease progression.

**CONCLUSIONS:** The current evidence suggests that multidisciplinary approaches, including pharmacological therapy, physical therapy, and psychological interventions, might be effective in managing lateral axial dystonia in idiopathic Parkinson's disease. However, the need for larger, well-designed randomized controlled trials to confirm these findings is apparent.

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**THEORY AND PRACTICE OF CANCER REHABILITATION IN A REVISED PERSPECTIVE**

Jegy Tennon, MD

**OBJECTIVES:** Cancer care has been declared to be in a state of crisis because of the growing demand for services and increasing complexity of treatment, and cancer care costs are expected to continue to dramatically increase. Reducing hospital readmissions has the potential to decrease health care costs and improve health care quality and patient experiences. Many studies have evaluated 30-day hospital readmission rate (HRR) in cancer patients, and many studies have evaluated 30-day HRR after inpatient rehabilitation. However, to our knowledge, no study has evaluated 30-day HRR specifically in patients with cancer who have undergone acute inpatient rehabilitation. The objective of this study was to identify the 30-day HRR after acute inpatient cancer rehabilitation.

**DESIGN:** This was a secondary retrospective analysis evaluating the 30-day HRR in cancer patients who were already enrolled in a prospective survey study evaluating their perceptions about safety after an acute inpatient rehabilitation program. The inclusion criteria for the prospective survey study were patient discharged to home setting without previously completing these surveys, English speaker, and no moderate to severe cognitive deficits.

**RESULTS:** Between September 2018 and April 2019, 76 patients had completed the prospective survey study, and 19 of these 76 patients were readmitted within 30 days after discharge. Thus, the 30-day HRR was 25%.

**CONCLUSIONS:** The 30-day HRR of 25% after acute inpatient cancer rehabilitation is close to the 30-day HRR reported in many studies evaluating cancer patients and higher than the HRR reported in several studies evaluating patients after inpatient rehabilitation.

**TIMING OF PERIPHERAL NERVE STIMULATION AND MOTOR THERAPY IN SEVERE STROKE PATIENTS: A FEASIBILITY STUDY**

Lumy Sawaki, MD, PhD, Elizabeth Powell, MS, and Joseph R. Mallory, MD, MPH

**OBJECTIVES:** Approximately 40% of stroke survivors have severe impairments that reduce quality of life and require special care. Severe impairment cases have been historically underrepresented in stroke research. Peripheral nerve stimulation (PNS) is a neuromodulation technique that applies transcutaneous electrical currents to upregulate neuroplasticity. It has been demonstrated in previous studies that PNS delivered before motor therapy can improve motor function in patients with severe post-stroke motor deficits. It is possible that PNS during therapy could result in further benefits due to decreased membrane thresholds associated with motor neuron activity during voluntary muscle contraction. The objective of this study was to determine if PNS delivered during motor therapy would yield greater improvements compared to PNS delivered before motor therapy and sham PNS.

**DESIGN:** Ten participants with chronic stroke and severe motor deficit were enrolled after obtaining informed consent. Chronic was defined as occurring more than 12 months from stroke. Severe motor deficit was defined as Fugl-Meyer Assessment (FMA) score between 7 and 34. Participants were randomly assigned into one of the three groups: (1) sham PNS during motor therapy, (2) active PNS before motor therapy, or (3) active PNS during motor therapy. FMA was the primary outcome measure and was collected by a therapist not involved with interventions.

**RESULTS:** Mean changes in FMA were 2.8, 5.7, and 9.7 for sham PNS, active PNS before motor therapy and active PNS during motor therapy, respectively. Active PNS during therapy led to greater improvement in motor function compared to active PNS before therapy (p<0.01) as well as sham PNS (p<0.0006).

**CONCLUSIONS:** Our study provided initial evidence that active PNS during motor therapy may yield greater functional motor recovery in participants with chronic and severe motor deficits. Our findings need to be corroborated in future studies with a larger sample size.
TREAT TO BANK OR NOT TO BANK? – THE USE OF AUGMENTATIVE AND ALTERNATIVE COMMUNICATION IN A PATIENT WITH AMYOTROPHIC LATERAL SCLEROSIS

Jasmin Harounian, MD, and Miguel Escalon, MD, MPH

CASE DIAGNOSIS: 68-year-old female with amyotrophic lateral sclerosis (ALS)

CASE DESCRIPTION: A 68-year-old female presents with acute right-hand weakness and dysphagia after a 6-month history of progressive left hemiparesis and recurrent falls. Her exam reveals both upper and lower motor neuron symptoms concerning for amyotrophic lateral sclerosis (ALS), which is confirmed on electromyography. Modified barium swallow study shows moderate oropharyngeal dysphagia resulting in aspiration of thin liquids and reduced swallow efficiency for all other consistencies. She is subsequently admitted to inpatient rehabilitation in anticipation of her future mobility needs and lifestyle adaptations. Her SLP evaluation is significant for moderate to severe dysphonia, imprecise articulation, and reduced vocal intensity with 60-75% sentence intelligibility. Given the progressive nature of her disease process, the patient is offered options for voice banking and appropriate evaluation for the process is performed prior to her discharge home.

DISCUSSIONS: Roughly 80-95% of ALS patients are unable to meet their daily communication needs using natural speech. Augmentative and alternative communication (AAC) provides individuals whose natural speech is not functional with a means of communication. As opposed to a pre-populated robotic speech generator, voice banking is a type of AAC that allows ALS patients to maintain their sense of identity and empowerment by synthesizing recordings of their own voice intonations and expressions, ultimately improving overall quality of life.

CONCLUSIONS: Timely AAC assessments during inpatient rehabilitation are paramount in ensuring patients with neurodegenerative diseases, especially ALS, can communicate their needs and continue to direct their care despite disease progression.

TO COMPARE EFFICACY OF INTRAARTICULAR INJECTION WITH PLATELET RICH PLASMA, HIGH MOLECULAR WEIGHT HYALURONIC ACID AND METHYL PREDNISOLONE IN OSTEOARTHRITIS OF KNEE

Subhasish Pati, MD, Rajesh Pramanik, MD (PMR), MRCP, and Rathindranath Halder, MD

CASE DIAGNOSIS: Comparison of Efficacy between Platelet rich plasma, hyaluronic acid and methyl prednisolone in osteoarthritis of knee

CASE DESCRIPTION: three arm parallel group open level randomized control trial

DISCUSSIONS: In 0 to 6 weeks Steroid has more reduction inVAS followed by Hyaluronic acid (HA) and then PRP. In 6 to 12 weeks steroid fails to show further decrease in VAS but Both HA and PRP has effects in reducing the VAS. Finally, we see over all effects from 0 to 12 weeks effects HA is superior than PRP followed by steroid. VAS score over time, shows similar response response like VAS with steroid failing to show improvement in WOMAC from 6 to 12 weeks as compared to HA and PRP. Initial weeks steroid has best response. But over time HA followed by PRP is better. 50 feet walking time, long duration (0 to 12 weeks) both HA and PRP are superior to steroid. Short term (0 to 6 weeks) steroid is better

CONCLUSIONS: 1. Statistically significant (p< 0.001) improvement pattern is seen due to intraarticular injection of steroid, high molecular weight hyaluronic acid and platelet rich plasma. 2. Intra group comparison shows: a. Maximum improvement pattern at end of 12 weeks is seen due HA (68.34% in VAS, 66.37% in WOMAC and 52.55% in 50 feet walking time) followed by PRP (63.83% in VAS, 63.96% in WOMAC and 44.83% in 50 feet walking time). b. The improvement pattern was consistent over 12 weeks period due to intra articular injection of steroid, HA and PRP with respect to VAS, WOMAC and 50 feet walking time. c. Although there is statistically significant improvement with intra articular injection of steroid upto 6 weeks, the improvement pattern OF VAS, WOMAC and 50 feet walking time decreased in long term.

TO TREAT OR NOT TO TREAT? SPINRAZA THERAPY IN A 10-MONTH-OLD FEMALE WITH SMA1: A CASE REPORT

Neha Anand, and Kristen E. Taylor, DO

CASE DIAGNOSIS: 10-month-old female with SMA type 1, chronic respiratory failure with tracheostomy, ventilator dependence, GERD, and dysphagia with G-tube dependence

CASE DESCRIPTION: Patient with Spinal Muscular Atrophy (SMA) Type 1 began treatment with Spinraza at 3 months of age with good functional maintenance of motion and strength. Roughly six months after initial hospitalization and rehabilitation, the patient presented to the hospital following respiratory arrest at home secondary to incidental decannulation and achieved ROSC but suffered a significant hypoxic ischemic brain injury further complicated by worsened cognition, a decline in physical function and muscle spasticity. Following her 30-minute respiratory arrest, MRI of the brain revealed global hypoxic ischemic injury to the bilateral hemispheres with significant cerebral edema and extensive multifurcated subdural hematomas. She was weaned down from initially increased ventilator support to her prior settings of pressure control with supplemental oxygen bleed-in. She demonstrated new signs of posturing attributed to new dystonia and spasticity related to her brain injury. She maintained a dysconjugate gaze and no appropriate interaction with family or medical staff.

DISCUSSIONS: Currently, Spinraza is approved for treatment of SMA type 0 to 5 and costs $750,000 for the first year and $375,000 for every year thereafter for the life of the patient. While this treatment can significantly alter the functional and developmental course of a child’s life, further investigation into the specific inclusion and exclusion criteria should occur.

CONCLUSIONS: In patients with SMA type 0 through 5, collaborative efforts need to be made to complete a cost-effective analysis prior to the initiation or continuation of Spinraza therapy for optimization of treatment, particularly for those children who face abrupt changes in physical or cognitive abilities secondary to additional medical issues. Ultimately, this expensive treatment should be given to patients who will receive a functional improvement or maintenance of current level.

TOPICAL COMPOUNDED PAIN MEDICATION IN A METROPOLITAN SETTING: OFF-LABEL USE & REIMBURSEMENT

Donato Borrillo, MD, JD, MS

CASE DIAGNOSIS: As a response to the opioid epidemic, both the FDA and State of Florida have encouraged alternative treatment modalities, including the use of compounded topical pain medication. Our objective was to survey pharmacies that serve a large metropolitan area, to assess compounding practices. These compounds treat a variety of chronic conditions and their use and availability is essential. Trends related to use, reimbursement, medical necessity, and availability were surveyed.

CASE DESCRIPTION: In July 2019, we surveyed six hundred and eighty (680) Pharmacy Compounding Accreditation Board (PCAB) approved pharmacies in Jacksonville Florida, with four hundred sixty (460) respondents (67%). These pharmacies serve the most populous city in Florida, the most populous city in the southeastern United States, and the largest contiguous city in the United States. The survey was anonymous and office manager targeted. Nominal and ordinal data were collected and tabulated.

DISCUSSIONS: Of the four hundred and sixty (460) respondents, two hundred and eighty-six (286) admitted to the preparation of topical pain formulas (62%). Practices included the use of non-traditional (off label) use of ingredients, such as aripiprazole, by forty-nine (49) of the respondents (10%) and a trend toward complex multi-ingredient formulas. An additional one hundred and twenty-six (126) respondents were willing to fill non-traditional ingredients (27%). Trends related to decreasing reimbursement for these non-traditional topical formulations were observed, and an increase in the use of pre-authorization.

CONCLUSIONS: This pilot study confirms that the pharmaceutical compounding of topical pain medication remains essential as a prescribing practice in the field of pain management. Prescribing practices are often off-label. We recommend a more in-depth study of prescribing practices and patient outcomes. Prescribers continue to use medication off-label in an effort to find new uses for old drugs. This off-label use is in both indication and route of delivery (i.e. topical instead of oral).

TOWARD THE DEVELOPMENT OF NATIONAL REHABILITATION STRATEGIC PLAN IN JORDAN

Ali Al Rjoub, Professor, Jaber Aldaad, DR, and Natalia Mohammed, DR

CASE DIAGNOSIS: Jordan is recognized as one of the most important medical destinations in the region. Its position, climate, stability, hospitality, and on top of that the medical expertise that are present in Jordan today play very important role in this reputation especially when talking about medical tourism.

CASE DESCRIPTION: Rehabilitation is provided by many entities with Ministry of Health (MOH) being on top of the list. The MOH provides comprehensive rehabilitation services provided by a team of physiatrists, physiotherapists, occupational therapists, speech therapists, psychosocial workers, and prosthesis & orthosis specialists.
Rehabilitation is gaining greater focus recently by the WHO, in fact, WHO is intending to make rehabilitation services an essential element in the strategic planning for the coming years. Such news was received with pleasure in Jordan, as we were seeking this for many years. The fact that the recently-opened channels with the WHO has led to important meetings, using the development of a shared-ground to proceed. This was also achieved by connecting through many international organizations such as Humanity & Inclusion.

DISCUSSIONS: The strategic planning for Rehabilitation in Jordan is facing many obstacles; including refugee crisis, economic crisis, lack of understanding of importance of rehab services among peer medical specialties, regression of the leading role of rehab providers, and also the lack of supervising unified umbrella to control the distribution of rehab services.

CONCLUSIONS: Despite the mentioned obstacles, we are keen to proceed with the planning, in fact the first step of assessment of the current situation of rehabilitation in Jordan was successfully carried-out, and the results were delivered to the entitled entities. A lot of efforts are to be done, but with insistence and collaboration with other peer-Arab countries and sharing of experience we can achieve the first Arab-wide Strategic planning supervised by the WHO.

TRACHEOSTOMY IS ASSOCIATED WITH DELAYED DEVELOPMENT OF HEAD CONTROL AND ROLLING IN INFANTS

Hyun Lee Shin, MS, and Hyung-Ik Shin, PhD

OBJECTIVES: By comparing the scores of Gross Motor Function Measure-88 (GMFM-88) about head control and rolling of infants with and without tracheostomies, the authors attempt to evaluate the effect of infantile tracheostomy on early motor development.

DESIGN: Medical records and GMFM of subjects were retrospectively reviewed. Finally, 33 patients with tracheostomies and 132 patients without tracheostomies were matched by gestational age (GA), birth weight (BW) and corrected age when GMFM was performed using propensity score matching. Scores of GMFM in head control and rolling in different positions were compared by using generalized estimating equation (GEE).

RESULTS: Tracheostomized infants showed lower score in head control in supine position and in pull to sit maneuver in multivariate GEE (p=0.008, 0.004, respectively). However, there was no difference between groups in head lifting in prone position and head lifting while holding thorax by examiner. Rolling from prone to supine was different between groups (p=0.002), while rolling from supine to prone was not.

CONCLUSIONS: Infantile tracheostomy can influence early motor development in head control and rolling in specific positions. This finding could help clinicians to establish intervention plans for this patient group such as encouraging prone positions to enhance motor development.

TRANSFERSAL DIRECTIONAL CURRENT STIMULATION (TDCS) FOR TREATMENT OF FREEZING OF GAIT: PRELIMINARY FINDINGS

Mohammad Alwardat, PhD, Simona Scalise, MD, Giulia Di Lazzaro, MD, PhD, Tommaso Schirinzì, MD, PhD, Chiara Salimei, PhD, and Antonio Pisani, MD, PhD

OBJECTIVES: Freezing of gait (FOG) is one of the most disturbing and least properly understood gait phenomenon in people with Parkinson’s disease (PD). Several lines of evidence suggest that FOG is not only a motor problem, but can also arise from deficits in executive functions, a cognitive domain mediated by the dorsolateral prefrontal cortex (DLPFC). Over time, FOG may become refractory to pharmacological treatments. Transcranial direct current stimulation (tDCS) is a low-cost, non-invasive neuromodulatory technique, currently considered a valuable option to fill the gap of pharmacotherapy in PD. The primary aim of this study was to evaluate the effect of antodal tDCS over the left DLPFC in PD patients with FOG.

DESIGN: Seven PD patients with FOG underwent tDCS over left DLPFC. The protocol included 20 minutes of tDCS of 2mA intensity for 10 separate sessions (5 in a week), using a pair of large sponges soaked in saline solution. Unified Parkinson’s Disease Rating Scale (UPDRS-II-III), Hoehn and Yahr (HY), New Freezing of Gait Questionnaire (NFOGQ), Berg Balance Scale (BBS) were performed at baseline (T0), after last stimulation (T1) and one month later (T2). Moreover, kinematic parameters of gait abnormalities were measured by means of wearable devices (MOVIT G16) in order to obtain an objective and reproducible evaluation.

RESULTS: Significant improvements of FOG, as assessed by NFOGQ, along with a significant reduction in the UPDRS-III were observed post anodal stimulation and after 1 month. Additionally, balance as measured by BBS showed significant improvement post stimulation and after 1 month of follow up.

CONCLUSIONS: Coherently with the hypothesis that cognitive executive circuit plays a role in FOG, we may consider anodal tDCS of the left DLPFC as a potential adjunctive therapy in PD patients with FOG.

TRANSFERNAL DIRECTIONAL CURRENT STIMULATION (TDCS) AND REHABILITATION IN PARKINSON’S DISEASE: A LONG-TERM WINNING SYNERGY

Nicola Marotta, MD, Andrea Demeco, MD, Angelo Indino, MD, Gerardo de Scorpio, MD, Roberto Bianchini, MD, Cania Marinaro, MD, Illaria Pino, MD, and Antonio Annandolà, MD

OBJECTIVES: To demonstrate the effectiveness of tDCS associated with rehabilitation in maintaining gait improvements and balance in patients with Parkinson’s disease.

DESIGN: We enrolled 16 patients (10 males, 6 females; age 60±7.2) with PD and 2.5-4 grade of H&Y. The patients were randomly assigned to group A: underwent conventional rehabilitation therapy combined with tDCS (n=8) and control group B: underwent rehabilitation therapy alone. 10 sessions of tDCS with a 2mA intensity, (left dorsolateral prefrontal cortex, DLPFC and primary motor cortex, M1) were applied. Fall risk index using computerized balance board, gait parameters using sensorized treadmill and Time, up&go (TUG) using inertial sensor were used to evaluate. At beginning of the treatment (T0), at the end (T1) and after 1 month (T2) the patients were examined.

RESULTS: In step length from 46.5(7.3) at T0 to 54.7(9.7) at T1, in TUG test from 13.4(6.6) at T0 to 10.3(3.1) at T1, in Fall Risk Index from 1.7(0.2) to 1.1(0.3), significant improvements were reported in both groups (p<.05). But at T2 these results were maintained (p<.05) only in group A compared to group B.

CONCLUSIONS: The synergy of the tDCS and rehabilitative treatment, doesn’t makes the latter more effective, but more lasting. This demonstrated thanks to an instrumental analysis that becomes essential.

TRANSITION IN CARE: A STUDY OF PATIENTS WITH CEREBRAL PALSY AND THEIR CAREGIVERS AND THEIR ACCESS TO ADULT CARE SERVICES

Donald F. Distel, MD, MBA, Kelly Heath, MD, and Yahira Acevedo-Santiago, MD

OBJECTIVES: Transitions between pediatric and adult healthcare is an area that has gained increased attention in recent years as inadequate transitions have been linked to higher costs and worse outcomes. Children with Cerebral Palsy (CP) have access to a wealth of services that are often lost as an adult, making this an ideal population to study the transition of care process. The objective of this research was to gain information about the transitional experience, such as differences in services provided and barriers to the process, that could be useful in identifying solutions to improve the process.

DESIGN: This is a cross-sectional study. Subjects were identified through the Penn Data Store. Enrolled subjects completed an online survey using REDCap.

RESULTS: Of 125 patients identified, 9 subjects completed the REDCap survey. 100% of participants received physical therapy as a pediatric patient and 33% received PT as an adult. 56% of participants reported access to either a social worker or case manager as a pediatric patient, while 44% reported access to these services as an adult. 67% of participants experienced barriers to transition, with difficulty finding a physician that cares for patients with CP (56%) and insurance issues (33%) being the most commonly reported barriers. The median satisfaction with the transition process as reported on a visual analog scale (1-100) was 30.

CONCLUSIONS: With an increase in longevity, the need to transition from pediatric to adult care has become an increasing focus of interest for patients with CP. Our research shows that there is a decrease in access to services following the transition and that most patients are dissatisfied with the process. Further research needs to be conducted to identify barriers and potential solutions to this process which could ultimately lead to improved patient outcomes and lower healthcare costs.

TRATAMIENTO DE SÍNDROME DE DOLOR POST-MASTECTOMÍA CON TOXINA BOTULÍNICA

RosaF.P. Chiesa Estomba, Luis Monléon Llorente, Marco Escribano Rodríguez, Jose Adrián Castro Portal, Lucía Garvin Ocampos, and Concepción Cuenca González

OBJECTIVES: La prevalencia de dolor post-mastectomía varía de 20% a 68%. La toxina botulinica es una opción terapéutica para tratar el dolor en estos pacientes asociado a contractura del pectoral. El objetivo es evaluar los cambios producidos
en dolor, movilidad, estado de ánimo y consecución de objetivos tras infiltración de toxina botulinica en pectoral mayor

**DESIGN:** Estudio analítico cuasi-experimental, 37 pacientes, de julio de 2014 a Diciembre 2017. Las variables analizadas: edad, sexo, presencia de linfedema, intensidad del dolor (Escala Visual Analógica), tipo de dolor (cuestionario DNA), limitación de movilidad, actividad física, ansiedad y depresión (escala Goldberg), impresión de mejoria (PGH-Y) e consecución de objetivos (escala GAS). Dichos cuestionarios se cumplimentaron previo al procedimiento y al mes.

**RESULTS:** La edad media de la muestra fue de 57,24; todos de sexo femenino. Tiempo medio de dolor de 41,5 meses. Se observó mejoria en la intensidad del dolor (EVA pre 7,28 – EVA post 4,18), estado de ansiedad (pre 4,86; post 3,03) y en depresión (pre 3,91; post 2,83). Tipo de dolor registrado neuropático (30,5%), nociceptivo (33,3%) y mixto (36,11%). Se observó mayor disminución de dolor neuropático (EVA post 3,55) respecto a dolor mixto (EVA post 4,58), la actividad física también se asoció a mayor mejoria de dolor, no estadísticamente significativo en ambos casos. En PGH-I se obtuvieron mejorías en el 60% de las pacientes. Hay consecución de objetivos (escala GAS) para la ganancia articular en el 100% de pacientes; en ABVD y calidad de vida en un 93,9% y para el dolor en el 78,9%.

**CONCLUSIONS:** Las pacientes con dolor residual post-cirugía de cáncer de mama tratadas con toxina botulinica presentan mejora en su estado de ánimo, obtienen alivio y consiguen alcanzar los objetivos propuestos. Es necesario realizar más estudios con mayor muestra y seguimiento a largo plazo.

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**TREATMENT OF CHRONIC EPIDONDYLITIS WITH BOTULINUM TOXIN - LITERATURE REVIEW, MODIFIED INJECTION SCHEME AND CASE REPORT**

Stephan Grüner, DR, Axel Schulz, and Marcela Lippert-Grüner

**CASE DIAGNOSIS:** Epidondylitis humeroradialis HER

**CASE DESCRIPTION:** Botulinumtoxininjections in chronic EHR, although off-label, is among the well-known applications. In a systematic literature review, eight RCTs could be identified. Four of the 5 studies in chronic courses versus pla-cebo showed significant therapeutic benefits. One study in acute cases versus corticoste-roides and one study in chronic cases versus surgery showed non-inferiority. Following the sensorimotor concept with the dual mode of action, another pilot study demonstrated equivalent of botulinum toxin injection at the tendon versus intramuscular versus corticosteroid at the tendon. Based on these findings, our working group developed a modified injection scheme at three points on the tendon and two muscular sites, assisted by ultrasound and functional tests. In one of our first cases, an operative dermatologist with treatment-refractory course was able to restore his workingability for almost 1 year with similar result after follow-up injection.

**DISCUSSIONS:** Epidondylitis humeroradialis is a damage to the tendon of the extensors of the wrist and fingers. Following the known mechanism of botulinum toxin with chemical denervation of the motor endplate, classical injections are intramuscular. Botulinum toxin, however, seems to be also able to support sensory pain inhibition, especially via the blockade of CGRP. With our modified injection scheme you can use both mechanisms of action with optimal use of the package sizes of mostly 50 U. At the same time, this method of dose reduction could also minimize muscle atrophy without any noticeable loss of effect. Sonographic controlled function tests minimize the risk of unwanted double injections into the same muscle, with the aim of infiltrating EDC and ECBB.

**CONCLUSIONS:** The modified injection regimen of botulinum toxin in epicondylitis humeroradialis of our working group botulinum toxin of IGOST could represent a resource-sparing and side-effect-reducing injection alternative. The first pilot cases have been promising, a review in clinical trials remains to be seen.

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**TREATMENT OF CHRONIC NON-HEALING NEUROPATHIC ULCER USING AUTOLOGOUS PLATELET RICH PLASMA (PRP): A CASE REPORT**

Ameya D. Joshi, MD, Sumeedh N. More, and Amit S. Mhambre, DNB-PMR

**DIAGNOSIS:** Neuropathic ulcer Results from repetitive trauma to hyposensate distal extremities, usually on weight-bearing bony prominences. Non-healing ulcers have a significant impact on the personal, professional and social level of an individual. Autologous platelet-rich plasma contains fibrin and high concentra-tion of growth factors, which potentially has the potential for cell healing. In a clinical setting, the practice of using autologous PRP is trending but needs more supportive evidence. This case report documents management of chronic non-healing neuropathic ulcer on dorsum of the left foot with equino-varus deformity in a child of spinal dysraphism.

**CASE DESCRIPTION:** An 11-year-old male child with paraplegia, left equino-varus deformity with dorsal foot ulceration, as sequelae to spinal dysraphism was brought by mother for rehabilitation treatment. The ulcer wasn’t responding to the tradi-tional approach of wound healing along with off-loading. With the informed con-sent of patient the local application of autologous PRP was approved and aimed at wound healing. Wound therapy with the local application of autologous PRP using a double centrifuge tech-nique was done once a week for 3 times. A below-knee plaster cast was given as pro-tective dressing with complete offloading. Treatment response was monitored with pressure ulcer scale for healing (PUSH 3.0).

**DISCUSSIONS:** The wound area, exudate and tissue type was documented in weekly follow up. The initial score was 13 which reduced to 7 after 3 weekly sessions of PRP therapy. A total score of 0 with PUSH scale was achieved at the end of 5th week suggestive of complete wound healing.

**CONCLUSIONS:** Advanced wound therapy with the local application of autol-ogous PRP seems to be a promising alternative to traditional wound-healing techniques with biocompatible safety and significant clinical efficacy. Large scale studies are needed to establish it as an ideal therapy for chronic non-healing wound management.

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**TREATMENT OF SEVERE CONSTIPATION IN CHRONIC SPINAL CORD INJURY WITH PYRIDOSTIGMINE: A CASE REPORT**

Philippines Cabahug, MD

**CASE DIAGNOSIS:** Severe Constipation in Chronic Spinal Cord Injury (SCI) Refractory to Standard Pharmacologic Management

**CASE DESCRIPTION:** A 62-year-old female with C4 incomplete tetraplegia presented with severe constipation secondary to neurogenic bowel. Initial bowel reg-imen consisted of daily senna, docusate-benzoate suppository, with polyethylene glycol 3350 and enemas as needed. Constipation worsened 2 years post injury after iron deficiency treatment. Periods of no bowel movements (BM’s) lasted 2-6 weeks, in spite of increasing bowel medications, mechanical stimulation and addition of linactotide, methylultracetone and Magicrete. She had monthly emergency room visits for bowel cleanseout. Neurogenic bowel dysfunction score (NBD) was 25, consis-tent with severe constipation. Whole gut transit study showed severely delayed colon transit. Other treatment options were considered. Pyridostigmine was trialed to aug-ment autonomic function. Within one week, patient regained daily BMs. The only side effect was diarrhea, which resolved. Dose was optimized to 180 mg TID. At 10 months she needed less bowel medications, and had improved NBD (17) and Bristol scores (from 2 to 3).

**DISCUSSIONS:** Management strategies of neurogenic bowel after SCI include diet modification, activity, pharmacologic and mechanical stimulation, transanal irri-gation (TAI) and surgery (colostomy, ileostomy). Pyridostigmine is an anticholines-terase inhibitor that increases gastrointestinal motility and reduces colonic dis tense. There are reports on pyridostigmine for constipation associated with auto-nomic neuropathy, Parkinson's disease, post-polio and pediatric gastric motility disor-ders. In this case, patient maximized standard treatment. Other options were not feasible. The TAI system was not covered by insurance. Patient had limited function to manage a cecostomy or ileostomy independently on days when she had no care-giver support. In this case, pyridostigmine treatment resulted in clinical improvement in bowel function and quality of life...

**CONCLUSIONS:** In severe cases of neurogenic constipation in SCI refractory to standard management, pyridostigmine may be considered as an alternative prior to pursuing surgery.

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**TRIAL ON THE ROLE OF THE THERAPEUTIC SWIMMING IN THE PROPHYLAXY OF SCOLIOSIS IN C+ LEFT FOR GIRLS IN THE PREPUBERTY PERIOD**

Săinziana Călina Silisteanu, Elena Vizitiu, Borîka-Panna Gâspâr, Mihaï Constantinescu, and Andrei E. Silisteanu

**OBJECTIVES:** The objective of the trial was to find and implement the most ef-ficient means in therapeutic swimming in order to prevent scoliosis in C+ left for girls in the prepuberty period.

**DESIGN:** The trial was conducted in the Complex of Swimming and Kinetic Therapy of, Stefan cel Mare University of Suceava, for a period of 6 months, with 3 sessions a week. The trial included 29 girls aged 9-13 who did not know how to swim. The week comprised 3 sessions of Swimming and 3 sets of Physical Fitness, with a total of 34 sessions. The girls were divided into two groups: group L1 (15 girls) who received kinetic therapy and group L2 (14 girls) who received kinetic therapy and means of the therapeutic swimming, in order to keep fit, with the
optimum morphological-functional status. The kinetic therapy program contained akinetic and kinetic techniques, the mobilization of the backbone. The used swimming procedures were back, crawl and breast.

RESULTS: The obtained results were statistically significant for both groups for all the moments of assessing the indexes. There was improvement in the respiratory and cardiac function, but also in the somatic indicators.

CONCLUSIONS: The kinetic therapeutic treatment added to the means of therapeutic swimming allowed the improvement of the functional and somatic parameters. The therapeutic swimming proved its efficiency in the prophylactics and the correction of the scoliosis.

TWO CASES OF SEVERE PUSHER SYNDROME TREATED BY VISUAL BLOCK THERAPY
Lixia Zhang, MD, Qian Zhang, MS, and Wei He, BS
CASE DIAGNOSIS: Severe Pusher Syndrome
CASE DESCRIPTION: 1. The lack of spatial orientation is the main problem. 2. Both patients have significant lateral spatial neglect. 3. Both patients all poured heavily on the affected side and showed strong resistance when trying to correct them. 4. Severe flexion pattern of hemplegic side legs emerged when standing with assistance; 5. Abnormal characteristics of Scale for Contraversive Pushing (SCP) evaluation was 1 point.

DISCUSSION: 1. Block the visual input of both eyes by wearing eye patches, conduct orientation guided sitting and walking exercises. 2. Carry out 24-hours rehabilitation management according to dynamic evaluation in the treatment process, strengthen the establishment of spatial orientation and the formation of implicit memory. Fugl-Meyer and ADL were evaluated before treatment, at first time treatment and 1 week treatment.

RESULTS: the time of reaching sitting and standing balance, walking recovery was significantly reduced in 2 patients. Compared with conventional treatment for pusher syndrome, there was a statistical difference (p < 0.001), suggesting that visual blocking therapy can significantly improve the balance function and daily self-care ability of patients with severe pusher syndrome after stroke.

CONCLUSIONS: Compared with conventional rehabilitation training, visual block therapy guided by Central Integration Technique (CT) can effectively improve patients' balance function and ADL ability, so that patients can significantly shorten the treatment cycle and return to family and society as soon as possible.

ULTRASONOGRAPHIC ASSESSMENT OF SEVERITY IN CARPAL TUNNEL SYNDROME
Arash Babaei-Ghazani, MD, Peyman Roomizadeh, and Shirin Aryan, DDS
OBJECTIVES: To review the ultrasonographic assessments of carpal tunnel syndrome and investigate the overall estimates of cross-sectional areas (CSA) of the median nerve measured by ultrasonography in accordance with the electrodiagnostic classification of carpal tunnel syndrome (CTS) severity.

DESIGN: Web of Science, MEDLINE (PubMed) and EMBASE (Ovid) were searched for studies reporting the CTS, and median nerve CSA measured by ultrasonography for mild, moderate and severe CTS based on electrodiagnostic study.

RESULTS: Overall, 866 citations were retrieved and checked for eligibility. Finally, 16 articles were included for meta-analysis. These studies included a total sample of 2,292 wrists including 776 mild, 823 moderate and 693 severe CTS. The pooled analysis revealed a mean CSA of 11.64 mm2 (95% CI: 11.23-12.05 mm2; P< 0.001) for mild CTS; a mean CSA of 13.74 mm2 (95% CI: 12.59-14.89 mm2; P< 0.001) for moderate CTS; and a mean CSA of 16.80 mm2 (95% CI: 14.50-19.11 mm2; P< 0.001) for severe CTS.

CONCLUSIONS: The values obtained in this study have clinical utility in ultrasonographic assessment of patients with CTS. For mild CTS a mean CSA of 11.64 mm2 (95% CI: 11.23-12.05 mm2; P< 0.001); for moderate CTS a mean CSA of 13.74 mm2 (95% CI: 12.59-14.89 mm2; P< 0.001); and for severe CTS a mean CSA of 16.80 mm2 (95% CI: 14.50-19.11 mm2; P< 0.001) is applicable.

ULTRASOUND GUIDED INJECTION OF SUBSCAPULARIS MUSCLE IN HEMIPLEGIC SHOULDER PAIN
Jeremie Bordes, PhD, Julie Perou-auffaut, PhD, Maxence Compagnat, PhD, Jean-Yves Salle, PR, and Jean-christophe Daviet, PR
OBJECTIVES: Hemiplegic shoulder pain (HSP) is responsible for functional discomfort for dressing, undressing and grasping. It is also the cause of severe pain. The subscapular muscle, a powerful internal rotator and shoulder adductor, is one of the muscles responsible for this spasticity, as are the pectoral muscles and the large round muscle.

DESIGN: Due to its close relationship with noble structures such as axillary vessels, brachial plexus and axillary nerve, subscapular muscle is rarely injected by PRM physicians due to complications that may occur during its injection. Ultrasound is a promising way to reduce the risk of this procedure.

RESULTS: As a first step in the presentation, we will review the literature on subscapular injection techniques with clinical and ultrasound identification. Then, we will describe in a precise and practical way the sonoanatomy of the subscapular muscle by axillary route. Finally, we will present a clinical case of subscapular injection under ultrasound guidance in a patient with a spastic shoulder.

CONCLUSIONS: Ultrasound allows the subscapular muscle to be safely injected by the axillary route because it visualizes the noble structures around the muscle.

ULTRASOUND GUIDED VISCOSUPPLEMENTATION IN HIP OSTEARTHRITIS IN COMBINATION WITH COMPLEX REHABILITATION TREATMENT
Sibel I. Demirgian, MD, PhD, Viorica G. Marin, MD, PhD, and Roxana - Elena Almasan
OBJECTIVES: The aim of the study was to assess the effectiveness of an ultrasound-guided intra-articular hip injection of a single dose of high-weight hyaluronic acid (HA) combined with complex balneal and kinetic therapy in the treatment of hip osteoarthritis.

DESIGN: This was a single site, prospective, open-label, investigator-initiated study. Sixty patients were enrolled and received complex balneal and physical kinetic treatment during 12 days, combined with one intra-articular ultrasound guided injection, at the end of treatment. The study was conducted between June 2016 and December 2017 in Balneal and Rehabilitation Sanatorium Tychigho. Clinical evaluations were performed at baseline using VAS scale and Harris Hip Score (HHS). After one month and 6 months patients were called and asked about the symptoms. One year after the injection, the patients returned to the clinic to perform a follow-up and final visit through the VAS scale and Harris Hip Score (HHS).

RESULTS: The mean values of VAS recorded at baseline was 6.79, (2.15 std. dev). The mean values of VAS recorded one month after treatment was 2.10, (1.88 std.dev). The mean values of VAS recorded six month after treatment was 1.51, (1.98 std.dev). The values of Harris Score 1 were between 20 is 91, with mean values 62.72 and standard deviation 16.22. No adverse effects were registered.

CONCLUSIONS: The primary endpoint consisted in the evaluation of the Harris Hip Score over one-year follow-up, where we observed a significant improvement when compared to baseline. The second endpoint was pain using VAS, who presented a statistically significant improvement in all follow up visit (VAS 1, VAS6, VAS12) (P< 0.0001). Also we can note the reduction of NSAIDS intake by patients to modulate theirs symptoms. The association of HA in hip OA with complex rehabilitation treatment has been shown to have favorable effects (increase ROM, decrease pain).

ULTRASOUND-GUIDED RADIOFREQUENCY ABLATION OF THE SUPERIOR CLUNEAL NERVE: A CASE REPORT
Colton Hickman, DO, Sudhun Ho, MD, Kentaro Onishi, DO, and Michael O'Connell, DO
CASE DIAGNOSIS: Superior cluneal nerve (SCN) dysfunction after posterior iliac crest bone procurement.

CASE DESCRIPTION: A 68-year-old female with a history of spinal stenosis presented with left-sided low back and buttock pain with symptom onset shortly after undergoing an L2-L5 laminectomy and fusion with harvesting of a left posterior iliac crest bone graft. Concordant pain was reproduced with palpation just lateral to her PSIS over the left iliac crest. Diagnostic injections were performed resulting in 100% relief of her symptoms which were attributed to SCN dysfunction secondary to iatrogenic trauma. The decision was made to proceed with sonographically-guided radiofrequency ablation of the SCN. At her six-week follow-up, her numeric pain scale level was reduced from a constant 7/10 to a 2/10 on an intermittent basis with improved comfort in performing her daily activities.

DISCUSSIONS: SCN dysfunction is an infrequently recognized pain generator in patients presenting with low back and buttock pain. Because of its anatomic location, the SCN is particularly susceptible to both spontaneous entrapment and iatrogenic trauma during posterior iliac crest bone procurement procedures. To date, the most commonly reported imaging-guided procedure for SCN dysfunction is fluoroscopically-guided local anesthetic/corticosteroid injections which may lead to non-specific analgesic effects as opposed to specific nerve blockade. Comparatively, sonographic guidance may provide several advantages in the management of SCN
dysfunction, including: localization of the needle in relation to the nerve, lower cost, and no radiation exposure.

**CONCLUSIONS:** SCN dysfunction is a common complication after posterior iliac crest bone procurement. We describe a case of successful treatment with sonographically-guided continuous radiofrequency ablation. To our knowledge, the combination of ultrasound and continuous radiofrequency ablation in the treatment of SCN dysfunction has not been previously reported. This combination potentially offers clinicians a new treatment approach in the management of SCN dysfunction. Future research is needed to establish the efficacy of this procedure.

**ULTRASOUND-GUIDED STEROID INJECTION WITH HYDRODISSECTION IN CARPAL TUNNEL SYNDROME: A QUASI-EXPERIMENTAL STUDY**

Iris Sylvan L. Carpio, MD, and Gilmore Senolos, MD

**CASE DESCRIPTION:** This study aims to determine the clinical disease-specific and region-specific improvements following ultrasound-guided median nerve hydrodissection among patients diagnosed to have carpal tunnel syndrome at the Rehabilitation Medicine Out-patient department. It additionally intends to identify adverse events during the study period. General objectives: To determine the clinical change in carpal tunnel syndrome symptoms; To describe the therapeutic effects of hydrodissection in carpal tunnel syndrome. Specific objectives:

- To determine the average reduction in disease-specific clinical outcome; To determine the average reduction in region-specific clinical outcome; To define the statistical significance in improvements in both outcome measures; To identify adverse and serious adverse events.

**CASE DESCRIPTION:** This is a quasi-experimental study including all adult patients diagnosed to have carpal tunnel syndrome at the rehabilitation medicine outpatient department. The study design and informed consent form has been reviewed and approved by the institutional review board. All consenting participants must be 18 years old and above, and must meet the electroclinical diagnostic criteria for carpal tunnel syndrome set by the American Association of Electrodiagnostic Medicine, American Academy of Neurology, and American Academy of Physical Medicine and Rehabilitation. The included consenting participants will be required to completely answer the pre-treatment assessment questionnaires. These include the following recommended instruments by the AAOs: Boston Carpal Tunnel Questionnaire; Disabilities of the Arm, Shoulder and Hand. All participants will be treated with nighttime splinting for two weeks and ultrasound-guided hydrodissection of the median nerve and flexor retinaculum using methylprednisolone, lidocaine, and 5% dextrose water. Post-treatment assessment will be done at specific intervals.

**DISCUSSIONS:** An average reduction of 16.44 ± 5.74 points was observed in the BCTQ from baseline to 6 months. Similarly, a 30.72 ± 21.45, 36.15 ± 24.26 and 50± 0-point reduction from baseline to 6 months was seen in DASH, DASH-W and DASH-SFP modules, respectively. The average percentage reduction in scores at 6 months were 76.07 ± 22.50, 73.07 ± 25.53, 74.10 ± 56.22, and 100 ± 0 for BCTQ, DASH, DASH-W and DASH-SFP, respectively. There was significant difference between the disability scores at baseline to interval evaluations, except for BCTQ and DASH at 3 months and DASH-SFP among moderate CTS. For all, except DASH-SFP there was statistical difference between disability scores from baseline to interval evaluations for severe CTS. There were no adverse or serious adverse events throughout the study.

**CONCLUSIONS:** This study, utilizing appropriate outcome measures, showed that ultrasound-guided steroid injection with hydrodissection and splinting significantly reduced CTS disease-specific symptoms by 76% and region-specific disability by 73% for up to 6 months with no adverse or serious adverse events. With the high incidence of carpal tunnel syndrome and its limited non-surgical treatment options, ultrasound-guided steroid injection with hydrodissection and splinting is a safe and may be an invaluable treatment option to reduce CTS disability.

**UNDERSTANDING PHYSICAL ACTIVITY BEHAVIOUR IN PEOPLE LIVING WITH PARKINSON’S DISEASE: A QUALITATIVE STUDY**

Jennifer L. McGinley, PT PhD, Mary Danoudis, Belinda Bilney, PhD, Meg Morris, PhD, and Rosemary Higgins

**OBJECTIVES:** Exercise limits disability progression in people with Parkinson's disease (PD) and individuals with higher levels of physical activity (PA) have better function, mobility and quality of life. Despite this, most people with PD are sedentary, and do not meet recommended PA levels. Successful interventions to maintain or increase physical activity over long periods are scarce, and approaches using behaviourial interventions are emerging. Understanding of factors that influence activity and exercise can provide insights into further development of interventions and health service provision by multidisciplinary teams. This study aimed to investigate how Australians with PD perceive participation in physical activity and to identify barriers and enablers.

**DESIGN:** This qualitative exploratory study conducted focus groups including 22 people with PD; 15 males, mean age 64.1 years (SD; 11.4), disease duration 6.8 years (SD 4.1), including young onset (n = 6), older onset (n = 8) and a group from rural locations (n = 8). Themes explored included knowledge and personal experiences of PA and facilitators and barriers. Data were audio-recorded and transcribed. A qualitative thematic analysis was conducted based on the COMB (Capability Opportunity Motivation Behaviour) model.

**RESULTS:** Participants identified the interrelationships of capability, opportunity and motivation in terms of barriers and facilitators of sustained PA. Themes arising showed participants identified psychological capability as vital to maintaining activity levels, identifying determination and flexibility as key factors. Access, time and information were barriers, and expert health professional advice, social support and peer mentors were important enablers. Shame and stigma were also identified as barriers to participation and disease acceptance as a facilitator.

**CONCLUSIONS:** Interdisciplinary rehabilitation programs for people with PD are needed. These programs must consider both psychological and physical barriers to regular physical activity in people with PD. Further behavioural analysis of determinants of factors associated with sustained physical activity may guide selection of interventions.

**UNUSUAL NEUROLOGIC COMPLICATION OF INFLUENZA IN PRE-adolescent**

Mi Ran Shin, MD, and Melissa Fleming, MD

**CASE DIAGNOSIS:** Acute influenza-associated encephalopathy/encephalitis

**CASE DESCRIPTION:** An 11-year-old female presented to ED with fever, nausea, vomiting, and altered mental status. Her only positive history was missing the flu vaccine. Her spinal tap was positive for influenza A and she was treated with Oseltamivir. MRI of the brain showed hemorrhagic encephalitis involving bilateral thalami. She initially only responded to painful stimuli, with inability to communicate; she had previously been an honor-roll student. She had omorhor dyspraxia requiring NG tube feeding. She was transferred to inpatient rehabilitation after one week. Initially, she was able to take only a few steps, had cognitive impairments with poor situational awareness and aphasia, and had dysphagia. After 15 days, she was on regular consistency diet and ambulated for more than 30 minutes. However she had residual cognitive impairments including restlessness and mild aonomous aphasia.

**DISCUSSIONS:** Incidence of influenza-associated encephalopathy in pediatrics peaks between 6 to 18 months of age. It has mostly been reported from Japan and Taiwan. It is a severe disorder with a fatality of around 30%, and one third with persistent neurosensibility. The most severe form is acute necrotizing encephalopathy involving necrosis of thalamus and other deep brain structures. We present an unusual case in an American 11 year-old with hemorrhagic encephalopathy who recovered relatively well with minimal neurologic dysfunction after intensive rehabilitation. This emphasizes the importance of recommending the flu vaccine in pediatrics and the positive impact of intensive rehabilitation in recovery of this disease.

**CONCLUSIONS:** Influenza encephalopathy in pediatrics older than 18 months old without any immunologic compromise is rare. We present an unusual case where the patient was treated with antiviral treatment followed by intensive rehabilitation with excellent recovery compared to initial neurologic presentation. This case also emphasizes the importance of routine pediatric flu vaccine to minimize such complications.

**USE OF A COMPACT, SEATED ELLIPTICAL DEVICE FOR DECREASING DISABILITY AND INCREASING WALKING DISTANCE IN PATIENTS WITH LUMBAR SPINAL STENOSIS: A PILOT STUDY**

Howard W. Robinson, MD, Theresa Watkins, PTA, Mary Conway, PT MOMT, Vineet Shah, DO, MPH, and Dangaia Sims, PhD

**OBJECTIVES:** There is minimal to no information regarding the role of pedaling at a prescribed mild to moderate intensity on a compact, seated elliptical device has on pain, disability and walking distance. We examine whether a daily, aerobic exercise program for 30 consecutive days on a compact, seated elliptical device as a supplement to traditional options will improve Oswestry disability index scores (ODI), and 6-minute walking distance (6-MWD).

**DESIGN:** 10 patients were enrolled. Participants were screened for the presence of lumbar spinal stenosis. Each participant answered an ODI questionnaire and was measured for a 6-MWD. All 10 participants were given a compact seated elliptical...
device and instructed on its safe use and a schedule to adhere to with the device. Each participant continued with standard treatment of lumbar spinal stenosis. After 30 days of treatment and use of the compact, seated elliptical device, the participants were retested on the 6-MWD and filled out the ODI questionnaire.

RESULTS: 1 Participant dropped out. We found improvements in both the ODI and the 6-MWD with all of the remaining participants. Average walking distance was 611 feet prior to treatment and improved to 948 feet post treatment. The minimum participant improvement was 23% and the largest improvement seen was 900%. The Oswestry Disability Index (ODI) averaged 47% initially. Average post treatment ODI was 29%. The minimum decrease was 5% and the maximum was 75%.

We have shown that using a compact, seated elliptical device is safe and effective as a supplement to treatments. The ODI and 6-MWD improved significantly. It is unclear if the improvements of ODI and 6-MWD are related to increased strength, better proprioception or neuroplasticity. It is noted that multiple participants were able to discard assistive devices. They felt stronger and more secure when walking.

USE OF BOTULINUM TOxin IN CONJUNCTION WITH INTRatheCAL Baclofen FOR Management OF GenerateD Spasticity: A CASE SERIES

Cristina M. Brea, MD, Mukti Gandhi, MBBS, Earl Biag, MD, Luis Lopez, and Soema Khurana, DO

CASE DESCRIPTION: Three patients with generalized spasticity secondary to Cerebral Palsy (CP), hemorrhagic stroke, and cervical spinal cord injury (SCI).

CASE DiAGNOSIS: Patients were seen at clinic for intrathecal baclofen (ITB) pump management for generalized spasticity. Patient 1 is a 23 year-old male with CP implanted with an ITB pump in 2016, receiving a stable dose of baclofen at 797.8 mcg/day. Patient 2 is a 29 year-old female with hemorrhagic stroke, implanted in 2013, receiving a stable dose of 780.9 mcg/day. Patient 3 is a 66 year-old male with cervical SCI implanted in 2010, receiving a stable dose of 1012.5 mcg/day. All three patients reported improvement in bilateral lower extremity (LE) spasticity with ITB but complained of continued upper extremity (UE) spasticity causing pain and interfering with ADLs. Botulinum toxin injections were provided to target UE muscles to alleviate hand spasticity not adequately treated with ITB. All patients reported significantly decreased UE spasticity with subsequent improvement in fine motor function.

DiScussIons: ITB pumps have been widely used in patients with treatment resistant spasticity, either from limited effect of oral medication or adverse reactions, with positive results. Although the ITB catheters were inserted at high thoracic levels, their efficacy in UE spasticity is widely variable. Studies thus far have not adequately evaluated adjunct therapy with ITB to optimize both upper and lower extremities.

CONCLUSIONS: The use of botulinum toxin to target spasticity in the hands and fingers in conjunction with ITB for LE spasticity, as evidenced by this case series, can have significant effects on quality of life. Further research is required to investigate the complimentary effect of using both ITB and botulinum toxin to manage generalized spasticity with the goal of increasing independence and fine motor skills.

USE OF BotULINUM TOxin IN REFractory POST-tRAUMATIC BRuxism: A CASe REPORT

Maricarmen Cruz-Jimenez, MD

CASE Diagnosis: Refractory bruxism

CASE DESCRIPTION: 31 y/o male patient prisoner of war, who suffered from bilateral temporomandibular joint (TMJ) dysfunction secondary to blunt trauma events to face and jaw six years before the evaluation. Before the visit, he had received dental and maxillofacial surgeon care, and completed physical therapy with unsuccessful outcomes in improving pain or jaw motion. He reported continuous 10/10 pain and locking of the mandible associated to headaches; pain provoked irritability, poor tolerance to unpredictable daily events, and difficulties in his transition into civilian life. The patient was referred for botulinum toxin injections to manage severe bruxism, which interfered with feeding, hygiene, and communication due to oral motion restrictions. The patient was feeding on a liquid diet. He presented bilateral TMJ pain and tenderness, bilateral masseter muscles hypertrophy, impaired sensation on the right V3 zone, and severely impaired mouth opening of 7 mm.

DiScussIons: The patient was injected every four months with onabotulinum toxin during a 13-month period. Injections were done on both temporalsis muscles (15 units each) and masseter muscles (using electromyography, 10 units each). There were no complications in any of the procedures. The patient reported progressive improvement of symptoms, including less TMJ pain and less migraine events, improved ability to consume other food textures and alternatives, being understood better when he spoke, less irritability, and having the sensation that clinical improvements had rescued his life back. The mouth opened 3 cm at the end of the treating period.

CONCLUSIONS: Botulinum toxin is a safe therapeutic option in the management of bruxism. Even when there are less expensive alternatives available to improve symptomatology, incorporating these injections early in the care plan can improve the primary outcome of pain and motion, as well as secondary outcomes related to quality of life as eating, communication, wellbeing and self-worth.

USE OF BotULINUM TOxin TO FACILITATE REHABILITATION OF SPORTS RELATED MUSCLE INJURIES

Marie Hewett, DO, and Laura Hobart-Porter, DO

CASE Diagnosis: Left hamstring pain and decreased range of motion resulting from a remote sports-related injury.

CASE Description: A 16-year-old male athlete presents with persistent pain in the left hamstring region and an inability to fully extend the left leg. He was initially seen at an outside facility and an MRI obtained reportedly showed fluid around his left hamstring indicating a possible tear. Range of motion failed to improve with three rounds of PT and PRP injections, and his gait deteriorated as a result of his acquired hamstring tightness. A trial of Botox as off-label use was administered to facilitate a sustained stretch with casting with the hopes of avoiding surgical intervention. After this treatment and continued therapies, he had markedly improved range of motion and was able to achieve full extension and regain normal gait. He was able to resume sports without additional injury and maintain gains in range and gait.

DiScussIons: Physiatrists often use botulinum toxin injections for localized treatment of muscle spasticity resulting from a wide variety of clinical diagnoses. The objective of this clinical case is to highlight the concept of using botulinum toxin injections to facilitate rehabilitation of sports-related muscle injuries. In some cases, providing this short-term decrease in muscle overactivity allows for achieving a good stretch of targeted muscle groups and return of appropriate function to the injured area.

CONCLUSIONS: In this case, botulinum toxin was used in an athlete with a chronic hamstring injury resulting in pain and decreased range of motion. This novel use of botulinum toxin allowed this patient to avoid surgical intervention and should be a consideration in similar chronic injuries with extreme muscle tightness that is resistant to other conservative measures.

USE OF RADIAL SHock WAVes THerAPY FOR SPasticity DiFFicult HANDlIng: A CASe REPORT

Carolina Gómez Gil, Jorge Díaz Ruiz, Carolina González Alvarado, and Nelson F. Orozco

CASE Diagnosis: Spasticity is a motor and sensory disturbance due to upper motor neuron pathology and it is a limitation in daily activities. Ischemic or hemorrhagic stroke can cause spasticity and it is one of the limitations for patients, because some of them may be resistant to traditional treatments.

CASE Description: A 70 year-old female patient with spastic hemiparesis due to ischemic stroke in 2007, required multiple surgical interventions in upper left limb, she was refractory to treatment with botulinum toxin and oral baclofen. In upper left limb spasticity in the Ashworth scale was 4, wrist flexion 10°, wrist extension 20°, pronation 0°, supination 10° and lower left limb with equine foot. We started treatment with radial shock waves 5 sessions separated by a week in upper left limb 2000 waves over round pronator and carpal radial flexor, in lower left limb 1000 waves over medial gastrocnemius and 600 waves over soleus. Its frequency was 6 Hz and the intensity 2 Barr. At the end in upper left limb wrist flexion 24°, wrist extension 30°, pronation 45° and supination 85°.

DiScussIons: The usual management sometimes is unsuccessful in a specific group of patients with spasticity during clinical practice, some case and control studies and meta-analysis support the addition of other types of therapies. Radial shock waves were included in the complementary options to reduce spasticity in these cases. That case shows the objective response of a female patient to this type of management, and thus upholds the scientific evidence.

CONCLUSIONS: The use of radial shock wave therapy in our patient refractory to previous treatments showed changes with improvement of range of motion and subsequently in reduction of spasticity.

USE OF SLEEP QUESTIONNAIRES IN SPINA BIFIDA CLINIC IMPROVES REFERRALS TO SLEEP MEDICINE: A CROSS SECTIONAL PILOT STUDY

Laura Hobart-Porter, DO, Supriya Jambhekar, MD, and Drake Enderlin
OBJECTIVES: Sleep related disorders are highly prevalent in the myelomeningocele population. Etiologies include sleep disordered breathing, insomnia, and behavioral factors. Untreated, sleep disorders can result in cognitive and motor impairments; poor sleep has also been implicated in premature death. Our aim was to assess the prevalence of sleep disorders within our own local population, improving access to sleep clinic and polysomnography.

DESIGN: Childhood Sleep Habits Questionnaires and Pediatric Sleep Questionnaires (previously validated) were distributed to families at scheduled Spinal Cord Disorders clinic visits. Based upon questionnaire results, families were offered a polysomnography and/or a sleep clinic visit. Referral patterns throughout the program were compared with the number of referrals for sleep clinic visits (obtained via chart review) as well as the visit in which questionnaire was obtained.

RESULTS: During the trial period (June 6, 2019 to July 9, 2019), 60 patients met inclusion criteria (history of myelomeningocele). 55 patients opted to complete the questionnaires. Of these, 42% (n= 23) met criteria for sleep clinic referral with 31% (n= 17) meeting referral criteria for polysomnography. Completed referrals were compared with baseline data from the entire population served (n=279) in which only 3 sleep clinic referrals and 5 polysomnography referrals were made over 6-month period preceding any interventions (June 1, 2018-December 31, 2018).

CONCLUSIONS: The use of standardized questionnaires dramatically increased referrals to both sleep clinic and polysomnography. Results of these referrals have uncovered multiple sleep disorders, all of which would have been left unrecognized and untreated. In addition, there is a clear need to revise these specifically to the myelomeningocele. Future work should focus on refining existing questionnaires and standardizing completion of these with clinic visits.

USE OF SUPERSONIC ACOUSTIC WAVES FOR MOTOR FUNCTION CORRECTION IN PATIENT WITH PARKINSON’S DISEASE

Kenneth C. Vincent, DPM

CASE DIAGNOSIS: 72 yr old male with a 26 yr history of Parkinson’s Disease (PD) presented at our clinic with complaints of worsening freezing of gait (FOG) syndrome despite compliance to levodopa and movement therapy. FOG worsens at doorways, and when turning to sit.

CASE DESCRIPTION: Baseline and post-intervention assessments utilized: gait video recordings, FOG-Questionnaire (FOG-Q), and subjective feedback.

Intervention comprised of two sessions of high-density supersonic acoustic-wave therapy (SAWT), conducted at a five-day interval. Impulses were aimed at muscle groups and plexuses of interest. Intervention was carried out 5 hrs. after peak levodopa serum levels to limit or negate confounding pharmacogenic influence of movement changes. There were no changes to prescribed medication or physical therapy regimes.

DISCUSSIONS: FOG is a major debilitating movement syndrome that is yet to be fully elucidated, affecting the quality of life (QUALY) of PD patients. It is reported that approximately 81% of patients experiencing FOG would have been in the second decade of PD diagnosis. There is presently no treatment to ameliorate FOG in PD patients. This prospective case study describes outcomes after SAWT intervention.

Video gait recording indicate improvement. FOG-Q scored baseline vs post-intervention (17/24; 9/24), while patient’s and caregiver’s subjective statements reported improvement in emotion, cognition, and QUALY.

CONCLUSIONS: PD related FOG is a multifactorial syndrome that severely impacts PD patients and their extended circle of family and friends. The is presently a lack of meaningful interventions to ameliorate this condition, and therefore investigations of methods and modalities that could help PD patients regain greater movement independence is necessary. SAWT presents a potential intervention in a safe, non-invasive, and systematically neutral option that warrants further investigation to determine its application for FOG in PD.

USE OF THE CLIMBING TREADWALL IN PHYSICAL REHABILITATION: A PILOT STUDY

Kathryn B. Bartolo, MD, Hannah Aura Shoval, MD, Ghaith J. Androwis, PhD, Ella C. D’Amico, BS, Joanne Hunt, OTD, OTR, Katelyn Pris, MOT/OR/L, and JenFu Cheng, MD

OBJECTIVES: A treadmill is a vertical, rotating, exercise machine that simulates rock climbing with minimal equipment requirements. The purpose of this study was to investigate the application of the treadmill in a physical rehabilitation setting with spinal cord injury patients. To our knowledge, there is no prior literature on this topic.

DESIGN: A prospective pilot study with historical control comprised of 18 children with hemiplegic cerebral palsy. All subjects participated in a three-week intensive occupational therapy program in either 2017 or 2018. The 2018 program (n=9) included daily treadmill climbing session while the 2017 program (n=9) did not. Otherwise, the programs were equivalent. The primary outcome measures were scores on the Melbourne Assessment of Unilateral Upper Limb Function (MUUL) and Assisting Hand Assessment (AHA) which were recorded at the start and end of the program for each subject. Propensity score differences were calculated for both outcome measures. Paired t-tests were used to compare the overall change in MUUL and AHA scores between the years.

RESULTS: There was significant improvement in 2018 MUUL scores (MD ± SD, 5.11 ± 4.08; 95% CI, -8.24 to -1.98; P = 0.006). No significant difference was found between MUUL scores from 2017 (MD ± SD, 1.33 ± 6.26; 95% CI -6.15 to 3.48; P = 0.541). Similarly, AHA scores from 2018 showed significant improvement (MD ± SD, 3.33 ± 2.92; 95% CI -5.57 to 1.09; P = 0.009) while those from 2017 did not (MD ± SD, 2.33 ± 5.02; 95% CI -6.19 to 1.53; P = 0.201).

CONCLUSIONS: Our findings suggest potential value in using the climbing treadmill as a novel tool for therapeutic exercise in physical rehabilitation. Thus, further investigation in this area is warranted. Results from this exploratory pilot study will help guide the design of a full-scale, randomized clinical study on this topic.

USE OF VIDEO-FIBRO-LARYNGOSCOPE WITH SWALLOPING ASSESSMENT DURING DECANNUATION PROTOCOL AND SWALLOPPING ASSESSMENTS IN PATIENTS WITH DYSPHAGIA

Micaela Nelli, Miriam A. Weinberg, Jacqueline Jacquet, Marianela Pariente, Gabriela Colabella, Martin Durunda, Daniela N. Benvenuti, and Maria Viti, Doctor

OBJECTIVES: Describe demographic and clinical features of patients tested with FEES. Describe test results and the correlation with clinical evaluation.

DESIGN: Descriptive, retrospective study. Population and sample: Patients admitted to the center from May 2018 to June 2019 with dysphagia who were tested with FEES.

RESULTS: During the assessment period, one hundred and ninety-eight persons were admitted. One hundred and sixteen patients (58.56%) had dysphagia and FEES was performed on thirty-three patients after being assessed by speech therapists and physiotherapists. The average age of patients tested was 70; 16 males, 17 females. Twenty-one patients (63.6%) were admitted with a tracheostomy; 9 patients had mechanical ventilation which was later removed. Anatomical alterations were found in four patients, three with surgical indications. Decannulation was performed on two of the patients after surgery. The average time from first Blue Dye Test to FEES: 32 days. Decannulation was performed on fifteen patients (71.4%). In seven, the process was carried out during a diagnostic procedure. Average time to decannulation from mechanical ventilation removal: 53 days. Average time to decannulation from admission: 71 days. Thirty enteral feeding patients were admitted, seven of which continued with enteral feeding after being discharged or referred.

CONCLUSIONS: This first study provided us with the demographic and clinical features of our patients during this first year of work, allowing us to organize and improve practices in order to achieve better results in rehabilitation. Through our protocol in the use of FEES it was possible to confirm dysphagia clinical judgement in one hundred percent of our patients, ensure appropriate therapeutic decisions and avoid complications in the process of decannulation and feeding.

USEFULNESS OF EAT-10 AND DYMUS FOR SCREENING DYSPHAGIA RISK IN OLDER PEOPLE UNDERGONE TOTAL HIP OR KNEE ARTHROPLASTY: A CROSS-SECTIONAL STUDY

Alessandro de Sire, MD, Alice Giachero, SLP, Shara De Santi, SLP, Katia Inglese, SLP, and Claudio Solaro, MD

OBJECTIVES: We aimed to evaluate if Eating Assessment Tool (EAT-10) and the DYsphagia in Multiple Sclerosis (DYMUS), commonly used in patients affected by neurological disorders, might be considered as useful screening tests for dysphagia risk in older adults undergone total hip (THA) or knee arthroplasty (TKA).

DESIGN: In this cross-sectional study we recruited patients undergone total hip or knee arthroplasty, aged ≥ 65 years, referring to Orthopaedics Rehabilitation Unit; they were assessed at the second hospitalization by a speech-language pathologist through three different dysphagia risk screening tools: Bedside Swallowing Assessment (BAS), EAT-10, and DYMUS. Study population was divided into two groups, according to BAS results: group 1 (pathological BAS) and group 2 (normal BAS). Moreover, we evaluated differences between these two groups in terms of different cut-offs of EAT-10 and DYMUS.

RESULTS: In this cross-sectional study, we included 261 participants (85 male, 176 female), mean aged 75±0.56 years, undergone a total joint replacement (131
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Dysphagia screening through scales commonly used in patients affected by neurological disorders, such as BSA, EA-T-10, and DYMUS, might be considered useful in patients referring to Orthopaedic Rehabilitation Units.

**TECHNICIAN VS NURSE: EFFECTIVENESS OF ASSESSMENT AND MANAGEMENT**

Michael S. Jaffe, DO

**OBJECTIVES:** The Pain Management department (PNM) of our healthcare system set a goal to cut down the number of patients using over 300 Morphine Equivalent Daily Dose (MEDD) of opiates.

**DESIGN:** We adapted guidelines Designed to empower our primary care physicians (PCPs) to have “Power of the Pen” to reduce the use of opioid prescriptions for chronic pain.

**PNM Guidelines for Opiate Prescribing:**
1. 28 day prescribing/ refill cycles for all opiates.
2. Maximum quantity of all opiates at quantity 200.
3. Urine Drug Screens (UDS) minimums
4. Office visits minimums for all patients on opiate therapy.
5. Mandatory Administrative Wearing for all aberrant substance use behaviors with referral to Chemical Dependency.
6. Stopped use of Oxycotin / Opana due to high tampering in our system.
7. Used Suboxone for patients with Opiate Use Disorder and Chronic Pain.
8. Mandatory PNM consultations for all patients over 300 MEDD
9. Email Dr. Advice access for UDS interpretation and opiate questions.
10. Instituting "ceiling doses" for at 90 MEDD for all new start for chronic opiate therapy.

**RESULTS:** After 2.5 years we reduced patients taking greater than 300 Morphine Equivalent Daily Dose (MEDD) of opiate by 72%. For opiate use across all MEDD during the same time period, there was a reduction of 28%.

**CONCLUSIONS:** Our PNM department demonstrated by educating our healthcare providers on opiate prescribing guidelines, a substantial reduction in MEDD use can be achieved for the safety and efficacy of our patients.

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**UTILITY OF ACOUSTIC-WAVES TO STIMULATE REGENERATION IN AGING SKELETAL MUSCLES**

Kenneth C. Vincent, DPM

**CASE DESCRIPTION:** Six adults, three type II diabetics with a mean age of 62 complaining of weakness in grip strength and balance presented at our clinic. The decision to improve skeletal muscle (SM) strength, and balance utilizing supersonic acoustic-waves (Flashwave MMC, Nonvasiv Medical, Germany), conducted at UTI with appropriate symptoms and >105CFUs of bacteria while not noted that 78% urine cultures from ABUTI ICP patients were collected for culture collection date. Our study consisted of 192 patients that received a urine culture during the same time period, there was a reduction of 28%.

**RESULTS:** After 2.5 years we reduced patients taking greater than 300 Morphine Equivalent Daily Dose (MEDD) of opiate by 72%. For opiate use across all MEDD during the same time period, there was a reduction of 28%.

**CONCLUSIONS:** Significant overtreatment of ABUTI was found within our total population. Producing a UA algorithm that reliably predicts UTI among voiding patients, we can improve UTI diagnosis and potentially prevent treatment of ABUTIs. While overtreatment rates within ICP groups were higher, our UA algorithm sensitivity and negative predictive value were decreased. Notably, the majority of patients were cultured based on non-specific indications, suggesting over-culturing ICP patients increases the risk for overtreatment of ABUTI.

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**TREATMENT OF HEMIPARKINSONISM: A SYSTEMATIC REVIEW**

Elliot Berger, Ami Hughes, PhD, Chris Butler, PharmD, and Janna Williams, MD

**OBJECTIVES:** While asymptomatic bacteriuria (ABUTI) is common within the rehabilitation population, its treatment can lead to adverse events and bacterial resistance that can limit a patient’s ability to participate in rehabilitation sessions. Our study assessed treatment of ABUTI and validated a new urinalysis (UA) interpretation algorithm to improve UTI diagnostic accuracy.

**RESULTS:** Retrospective study collecting data for the following: urinalysis Results (leukocyte esterase, nitrite, WBC, RBC, bacteria), antibiotic prescribed (agent, duration, dose), neurogenic bladder, culture indications, hospital service, age, and culture collection date. Our study consisted of 192 patients that received a urine culture from April 2018 to May 2019 at ShirleyRyan Ability Lab (acute inpatient rehabilitation hospital). They were divided into two groups: voiding patients (n=100) and patients on intermittent catheter program (ICP) (n=92). Half of the cultures were documented as UTI with appropriate symptoms and >105CFUs of bacteria while the other half were documented as ABUTI.

**RESULTS:** Therapeutic antibiotics were prescribed to 34% of voiding patients and 59% of ICP patients with ABUTI. Using our new UA algorithm, 92% voiding patients with UTI had positive UA while 62% ABUTI patients had negative UA (92% sensitivity, 89% negative predictive value). These values were decreased with the ICP group and neurogenic bladder subgroup. We also noted that 78% urine cultures from ABUTI ICP patients were collected for non-specific symptoms.

**CONCLUSIONS:** Significant overtreatment of ABUTI was found within our total population. Producing a UA algorithm that reliably predicts UTI among voiding patients, we can improve UTI diagnosis and potentially prevent treatment of ABUTIs. While overtreatment rates within ICP groups were higher, our UA algorithm sensitivity and negative predictive value were decreased. Notably, the majority of patients were cultured based on non-specific indications, suggesting over-culturing ICP patients increases the risk for overtreatment of ABUTI.

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**DEPRESSIVE MOODS WITH PARKINSON DISEASE: SYMPTOMS: AIM FOR TREATMENT**

Michael S. Jaffe, DO

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**CASE DESCRIPTION:** Six adults, three type II diabetics with a mean age of 62 complaining of weakness in grip strength and balance presented at our clinic. The decision to improve skeletal muscle (SM) strength, and balance utilizing supersonic acoustic-waves (Flashwave MMC, Nonvasiv Medical, Germany), conducted at five-day intervals.

**DISCUSSIONS:** Sarcopenia and the ensuing consequence of dynapenia causes loss of independence, frailty, emotional distress, balance disorders increasing risk of falls, fractures, and untimely mortality, presenting a significant socioeconomic and healthcare challenge especially in developed nations due to increased longevity. The observations of this case study suggest that high density supersonic acoustic-waves could improve SM quality, strength and motor function. The safety and systemic neutrality of this intervention warrants further research.

**CONCLUSIONS:** FOG associated with PD is a health issues that severely impacts the quality of life of the PD patient and their extended circle of family and friends. Given the lack of meaningful interventions to ameliorate this condition requires the investigation of methods and modalities that could help PD patient regain...
greater movement independence. SAW presents a potential intervention that could offer a safe, non-invasive, and systemically neutral option. Further investigation is required to assess SAW and its potential use for FOG in PD.

UTILIZATION OF AXILLARY PERIPHERAL NERVE STIMULATION FOR PAINFUL END-STAGE SYNDROME:
A TWO-PATIENT CASE REPORT

Hannie S. Batdal, MD, Sargo Nepal, BS, John T. Mansfield, DO, and Mehul J. Desai, MD, MPH

CASE DIAGNOSIS: Subject one is a 95-year-old female with chronic right shoulder pain due to end-stage shoulder osteoarthritis (OA). Subject two is a 76-year-old female with chronic right shoulder pain due to end-stage OA and rotator cuff tendinopathy. Both patients completed extensive conservative management without successful longitudinal relief. Due to their age, comorbidities, and personal considerations, both patients elected to pursue axillary peripheral nerve stimulation (PNS) rather than surgical intervention.

CASE DESCRIPTION: A single lead stimulator implant was placed under ultrasound guidance along the course of the axillary nerve within the quadrangular space. Subjects then completed pre- and post-implant surveys regarding pain scores, opioid requirements, and whether or not they would recommend this therapy to others with chronic pain. At 64 days post-implant, subject one reported a 70% reduction in pain, a 50% reduction in opioid requirements, and recommended the therapy. At 44 days post-implant, subject two reported a 78% reduction in pain, no longer requiring opioids, and also recommended the therapy.

DISCUSSIONS: The sensory innervation of the shoulder joint is supplied primarily by the axillary and suprascapular nerves. The axillary nerve supplies the anterior-inferior and posteroinferior joint capsule, as well as the humeral head. The suprascapular nerve supplies the posteroinferior joint capsule, as well as the glenoid. Axillary and suprascapular nerve blocks are established methods to provide analgesia for painful shoulder joints. However, to date, there are no studies assessing the efficacy of axillary PNS for the management of painful glenohumeral joint OA.

CONCLUSIONS: Axillary PNS may provide an alternative treatment option for painful end-stage glenohumeral joint OA that both reduces reliance on opioids and is ultra-minimally invasive. Moreover, this option could be especially beneficial for those who are poor surgical candidates or are not amenable to surgery. Of course, despite these encouraging results, additional research is necessary to establish what these cases have indicated.

VALIDATION OF A SELF-ASSESSMENT QUESTIONNAIRE FOR PATIENTS WITH ORTHOSTATIC POSTURAL TACHYCARDIA SYNDROME

Jean-Baptiste Gorotis, Doctor, and Marc Labrunee, Doctor

OBJECTIVES: Postural tachycardia syndrome (POTS) is a multifactorial syndrome defined by an increase in heart rate greater than 30bpm, within the first 10 minutes after standing in the absence of orthostatic hypotension. This diagnostic testing algorithm currently does not have a validated evaluation questionnaire specific to POTS that takes into account the deficiencies and level of disability felt.

DESIGN: Based on the clinical examination, we developed a POTS self-assessment questionnaire on 31 items targeting impairments, activity limitations and participation restrictions, evaluated on a cohort of 30 POTS patients compared to 15 healthy controls at Toulouse University Hospital. A multidimensional score of 155 points was defined after validation of a clinical research file submitted to the French High Authority for Health.

RESULTS: The reproducibility of the questionnaire found statistically significant results on the three domains with Cronbach coefficients of 0.967 / 0.939 / 0.992 respectively as well as on the total score: Cronbach at 0.972. The results of the validity of the internal structure of the questionnaire on the total score found a coefficient of 0.94. The validity of the external structure found by measure of the correlation with the OIQ scores a Pearson coefficient at 0.72 / p < 0.0001, EuroQol at 0.67 / p < 0.0001, VAS-EuroQol at -0.77 / p < 0.0001 and COMPASS31 at 0.61 / p < 0.0001. The validity of divergent external structure was well confirmed with a Pearson coefficient of 0.25; p = 0.191 with the HAD score.

CONCLUSIONS: Validity, reproducibility and sensitivity to change are excellent. The creation of a validated POTS self-assessment questionnaire in French would allow for better patient management, particularly on the evaluation of the effect of the treatments put in place and the care pathway. This questionnaire would standardize practices around multidisciplinary teams and become the POTS's gold standard evaluation.

VALIDATION OF AN INSTRUMENT TO IDENTIFY BARRIERS TO THE IMPLEMENTATION OF THE CLINICAL PRACTICE GUIDELINES FOR AMPUTEES (GPCAMP-B)


OBJECTIVES: The clinical practice guidelines for the diagnosis and preoperative, intraoperative and postoperative treatment of the amputated person, the prescription of the prosthesis and the integral rehabilitation (GPCAMP) was published in 2016 and the barriers that affect its implementation in the country are unknown. Recently, an instrument to measure the perception of barriers in the implementation of the GPCAMP was developed. The purpose of this study was to determine its psychometric properties.

DESIGN: A validation study of scales was carried out by analyzing the construct validity, internal consistency and test-retest reliability of the GPCAMP barriers identification instrument. The study involved workers from academic and health institutions.

RESULTS: The questionnaire contains four domains and 25 items. Validation was performed with 545 participants. Internal consistency was adequate in the four domains, with Cronbach’s alpha values between 0.76 and 0.83. Test-retest reliability in 58 participants yielded intraclass correlation coefficients between 0.51 and 0.59. A lack of knowledge of GPCAMP was one of the most important outcomes of this study, as it was found that only 27% of the participants were aware of GPCAMP.

CONCLUSIONS: A new instrument is proposed to identify the perception of barriers of the GPCAMP and thus be able to design strategies aimed at improving its implementation. There is a lack of dissemination of these guidelines and this study reinforces the need to design strategies to publicize the guidelines so that the efforts and resources that have been invested in their preparation are not lost. While there are individual efforts in the country to implement CPG, a structured national policy is needed to achieve this objective, and studies such as this could be used as a diagnostic tool for these barriers and facilitators to improve this implementation.

VENOUS THROMBOEMBOLISM (VTE) IN GLOBIOLASTOMA MULTIFORME (GBM) PATIENT IN SETTING OF DUPLICATED INFERIOR VENA CAVA

Prabhav P. Deo, MD, and Priya V. Mhatre, MD

CASE DIAGNOSIS: Pulmonary embolism and acute deep venous thrombosis in a GBM patient after dual inferior vena cava (IVC) filter placement.

CASE DESCRIPTION: A 50 year-old gentleman with IVC duplication, GBM, seizure disorder, thrombocytopenia, and subdural hemorrhage presented for inpatient rehabilitation with left-sided weakness and cognitive impairments after repeat craniotomy, tumor resection, and dual IVC filter placement. After filter placement, the patient was instructed to avoid strenuous activity, heavy lifting, and bending at the waist. Shortly after admission, he developed unilateral left leg edema and was diagnosed with acute deep vein thromboses of the femoral, popliteal, gastrocnemius, and peroneal veins. Two weeks later, he developed pleuritic chest pain, requiring transfer to an acute care hospital. CT angiogram showed acute and chronic pulmonary emboli (PE). He was treated with intravenous heparin and transitioned to subcutaneous enoxaparin. He was transferred back to complete therapy and was discharged home without further complications.

DISCUSSIONS: VTE can cause significant disability due to pain, edema, and decreased mobility. Patients with intracranial malignancy are considered poor candidates for VTE chemoprophylaxis due to effects of chemotherapy, radiation, and surgery. In this case, dual IVC filters were placed due to recent surgery and thrombocytopenia. Complications of IVC filter placement in patients with intracranial malignancy include PE, recurrent venous thrombosis, and postphlebitic syndrome. This is particularly important for cancer patients undergoing inpatient rehabilitation, where they are engaging in physical activity. Computational models suggest that exercise may promote propagation of thrombus along the IVC. His duplicated IVC may have further contributed to multiple pulmonary emboli.

CONCLUSIONS: VTE poses a significant risk for patients with intracranial malignancy. Despite frequent use of IVC filters, complication rates are high. The utility of an IVC filter may be lower for patients engaging in intense physical activity. This should be taken into consideration when treating VTE in the inpatient rehabilitation population.

WATCH ME JULU, THEN ECMO: A CASE REPORT OF ARDS DUE TO VAPING

Simra Javaid, DO, and Clarice Sinn, MD
Abstracts

CASE DIAGNOSIS: Among high school students, the use of electronic cigarettes, or vaping, has increased from 11.7% to 20.8% between 2017 and 2018. E-cigarettes usually contain nicotine, but can also be used as a delivery system for marijuana and other drugs. However, due to minimal regulation by the Food and Drug Administration (FDA), the content between different e-cigarette products varies considerably and can contain inconsistent amounts of heavy metals like lead, volatile organic compounds, and other cancer-causing agents. There has been a recent spike of reports linking e-cigarettes and severe lung disease in young adults. The Centers for Disease Control (CDC) is currently investigating this link.

CASE DESCRIPTION: 16-year-old female with history of e-cigarette use initially presented with complaints of intractable emesis and abdominal pain, who upon admission, became tachypneic and febrile, appearing to have acute respiratory distress syndrome (ARDS). She subsequently required intubation, three chest tubes, and extracorporeal membrane oxygenation (ECMO) due to impaired gas exchange. Local reports indicated the dangers vaping imposes. However, children that present with ARDS and extracorporeal membrane oxygenation (ECMO) due to impaired gas exchange. Per reports, there has only been one previous adolescent who has walked while being on ECMO due to respiratory illness unrelated to vaping.

CONCLUSIONS: This case illustrates the need not only for more regulation of e-cigarettes, both regarding contents and legal age, but also for physicians to be cognizant of the dangers vaping imposes. However, children that present with ARDS from vaping, may benefit from early mobility intervention to prevent deconditioning, including potential ambulation while on ECMO.

WHEN DOES THE EFFECT OF PHENOL NEUROLYSIS REACH ITS PEAK? A PRELIMINARY LONGITUDINAL OBSERVATION IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY

Bei Zhang, MD, MSC, Gerard E. Francisco, MD, and Sheng Li, MD, PhD

CASE DIAGNOSIS: To examine the time course of the effect of phenol neurolysis on spasticity in patients with severe traumatic brain injury (TBI).

CASE DESCRIPTION: This was a preliminary longitudinal study. Six patients with severe TBI who received phenol neurolysis to the motor branches of the musculocutaneous nerve were selected. Phenol neurolysis was performed by an experienced physiatrist under ultrasound and electrical stimulation guidance. Patients also received intensive passive range of motion exercises, casting, and individualized therapies. The resting angle of the elbow was defined as the angle the elbow joint rested comfortably in a most extended position without stretching. It was measured with a goniometer before the injection (Pre-injection), immediately after the injection (Post-injection), at 2 hours (Post-2hrs), 24 hours (Post-24hrs), 7 days (Post-7ds), 14 days (Post-14ds) and 6 weeks (Post-6wks) after the injection. The changes in the resting ROMs over time were analyzed.

DISCUSSIONS: The cohort consisted of 3 male and 3 female patients (33.3 ±15.3 years old; 80.7±28.6 days post-TBI, left/right 3:3). An average of 2.4±0.5 ml phenol was used per musculocutaneous nerve. The resting elbow angles were 74.7 ±21.3° (Pre-injection), 112.3±13.5° (Post-injection), 111.2±22.0° (Post-2hrs), 118.5 ±10.8° (Post-24hrs), 146.2±10.6° (Post-7ds), 143.3±8.7° (Post-14ds), 149.0±13.4° (Post-6wks). Using the repeated measures ANOVA with a Greenhouse-Geisser correction to explore the resting angles change at Post-injection, Post-7ds, Post-14ds and Post-6wks, the mean resting angles were statistically different among the time points (N=5 due to data completeness; F (1,940, 7,760) = 46.490, p < 0.01). Post hoc tests revealed that significant improvements occurred immediately after the injection (between Pre-injection and Post-injection with a 37.7±10.3° increment, ~50%) and 7 days later (between Post-24hrs and Post-7ds with a 27.0±9.5° increment, ~27%).

CONCLUSIONS: Our study suggested the effect of phenol neurolysis reached its peak within the first week after the injection. Repeated phenol injection within one week is not recommended.

WHEN TRIGGER POINTS MASQUERADE AS SPASTICITY: IS BOTOX THE ANSWER?

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CASE DIAGNOSIS: Spastic Hemiplegia

CASE DESCRIPTION: A 56-year-old female with a past medical history of two cerebrovascular accidents presented with residual left sided spastic hemiparesis, complaining of the inability to move her left upper extremity and complete her routine activities of daily living. All five digits were flexed at the MCP, PIP, and DIP joints with difficult passive movement, consistent with a Modified Ashworth Score (MAS) of 3. The treatment plan was to administer botulinum toxin type A (Botox) injections for hypertonicity of the finger flexors, thought to be sequelae from her prior CVA. The botulinum toxin was reconstituted with 0.9% normal saline, and a total of 100U were divided equally amongst the flexor digitorum sublimis and flexor digitorum profundus muscles. Within minutes upon receiving injections, patient had marked improvement in passive and active range of motion of her digits with increased extension. MAS Scores for the flexor digitorum muscle tone decreased from 3 to 1.

DISCUSSIONS: The MAS, a qualitative measure of the velocity-dependent resistance to passive stretch, can provide indication for treatment with botulinum toxin. Botox inhibits the release of acetylcholine providing neuromuscular blockade and subsequent muscle relaxation. However initial therapeutic effect is not seen until 72 hours, with a peak effect at 3 weeks. The immediate onset of relief in this patient indicates that the cause of the muscle contraction was a myofascial trigger point in the FDS and FDP, rather than true spasticity. Simple needle insertion provided symptomatic relief for this patient.

CONCLUSIONS: Myofascial trigger points may be so significant that they may appear to be spasticity. While Botox is very effective for spasticity, current evidence does not support its use for myofascial pain. An algorithm is necessary to assess the cause of muscle contraction prior to injecting medication with potential adverse effects.

WHIPLASH INJURY: WHAT IS NEW IN THE MANAGEMENT?

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OBJECTIVES: Whiplash associated disorders are defined as injuries secondary to an acceleration-deceleration mechanism, that typically occurs with vehicle collisions. Annually worldwide, the number of medical consultations for acute whiplash injuries is 235-300 per 100,000 inhabitants. The treatment includes multiple interventions, and is associated with high direct and indirect costs. The prognosis is usually favorable: 85% of patients return to their previous activities within six months after the injury.

The objective of this study is to present an update of the clinical and therapeutic management of whiplash.

DESIGN: Based on the literature and clinical practice guidelines of the last 5 years, a review of the literature on the management of acute whiplash syndrome was performed.

RESULTS: The treatments that showed scientific evidence of efficacy are: Reassure the patient and encourage him to stay active and not to restrict the daily life activities (level B). Active exercises: ROM, muscular resistance, stabilization, coordination, strengthening, McKenzie (level B). Pharmacological Therapy (Consensus): Simple analgesics, first line, NSAIDs, second line. Opioids exclusively for patients with severe pain (VAS > 8) and with muscular or neurological symptoms.

CONCLUSIONS: In the management of acute whiplash syndrome, measures that have shown solid evidence of effectiveness are considered first line. Treatments with limited evidence (Manual therapy, manipulations, Kinesio Taping, trigger point puncture) are not routinely recommended. Its application has to be closely monitored and maintained exclusively if it provides measurable benefits, in terms of pain and disability. We consider that the role of the rehabilitation physician is crucial in the clinical and therapeutic management of this clinical entity.