BALNEO RESEARCH JOURNAL
English Edition
eISSN 2069-7619 pISSN 2069-7597 ROMANIAN ASSOCIATION OF BALNEOLOGY

Very good neuromotor and psycho-cognitive rehabilitation outcomes in a post-TBI patient with initially severe fidget and breath insufficency with secondary eso-tracheal fistula, after necessity tracheostoma in subsequent important pulmonary complications - case report

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Balneo Research Journal DOI: http://dx.doi.org/10.12680/balneo.2020.400 Vol.11, No.4, December 2020 p: 545–548

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Abstract

The subject matter of the present scientific paper is the report of a sustained and persistent therapeutic rehabilitation team-run program in the case of a polytraumatized patient with severe TBI (severe psychomotor agitation and dislogia, bifrontal syndrome, post-traumatic encephalopathy) associated with locomotor and self-care dysfunction, neurogenic bladder and complicated with eso-tracheal fistula after necessity tracheostoma due to subsequent important pulmonary complications that led to a favorable progression despite the limitations imposed by the mental state of the patient during hospitalization and the presence of multiple severe pulmonary complications.

Keywords: *neuromuscular rehabilitation, traumatic brain injury, bifrontal syndrome, polytraumatism, eso-tracheal fistula,*

Introduction

Cranio-cerebral trauma (CCT), associated with other lesions occurring in polytraumatic context, is the most commonly encountered neurological pathology with vital risk, often the consequence of road accidents.(1)

Traumatic brain injury (TBI) is a nondegenerative, noncongenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness.(2,3)

Method: case presentation

The informed consent of the family and the approval of the Ethics Commission of „Bagdasar-Arseni Hospital" in Bucharest (no. 34137/18.11.2019) were obtained for the communication of this case.

We present the case of a 59-year-old male patient who suffered a road accident in May 2019. On July 2, 2019, the patient is admitted for the first time in the department of neuromuscular recovery for Psycho-cognitive status (with intense psychomotor agitation and dyslogia - frontal syndrome, post-traumatic encephalopathy), neuromotor status (mild paraplegia - hard to test) and dysphagia after severe TBI in polytraumatic context. He was in a altered general state, afebrile and had discrete bilateral periorbital bruising. Osteo-articular system was apparently integer. The patient was equilibrated from a cardiovascular, respiratory, digestive and renal point of view with oxigen saturation of 90% spontaneously, blood pressure of 110/60 mmHg and heart rate of 74 rhythmic beats per minute. At the time of admission, the patient had a fixed permeable urine probe. Regarding the neuromioarthrookinetic examination the patient was partially conscious, uncooperative, psychomotor agitated, temporally, spatially, auto and allopsychically disoriented and presented dyslogia swallowing disorder. Osteotendinous reflexes were normal, except in the left lower limb - diminished OTR. Motor control was present but the muscle strength was untestable due to changes in consciousness. Clinico-functionally, the patient keeped resting in bed, but was in extreme psychomotor agitation.

The patient was clinically and functionally assessed, according to the standardized protocols implemented in our clinic by means of the assessment grading scales: FAC (Functional Ambulation Category) = 0, FIM (Functional Independence Measure) cognitive = 5/35, FIM motor = 14/91, Modified Rankin Scale = 5/5, The Glasgow Outcome Scale Extended (GOS-E) = 3/8, Asworth = 0, Penn = 0, QoL (Quality of Life) (Flanagan completed by Burckhard) = impossible to test at admission, MMSE (Mini-mental state examination) = impossible to test at admission, MoCA (Montreal - Cognitive Assessment) = impossible to test at admission.

The patient was paraclinically examined in order to evaluate his biological reserve and his availability in bearing the recovery program. To this purpose, both laboratory and imaging investigations have been used. Due to the patient's complications, imaging investigations were performed at each admission in order to evaluate the recovery.

The radiography of the right shoulder (Fig. No.1 and Fig. No.2) shows the loss of the right glenohumeral overlap and the decrease of the right acromio-humeral interval

Figure No. 1 - Radiography of the right shoulder
Figure No. 2 - Radiography of the right shoulder
A brain CT scan (Fig. No. 3) was also performed in order to evaluate the patient neurological status. The result showed bifrontal sequelae lesions, right temporo-occipital microsquel, without other heterodense brain lesions and a normal-looking ventricular system.

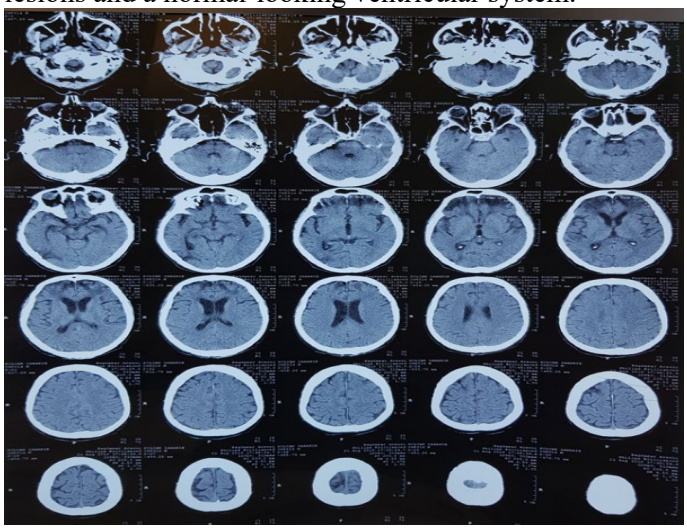


Figure No. 3 - Brain CT scan
The results of the chest CT scan (Fig. No. 5, Fig. No. 6) revealed right anterior closed pneumothorax with a thickness of 5 cm, right pleurisy with a thickness of 3.7 cm, right basal noncompressive atelectasis with a thickness of 2.2 cm, cavity lesion with thick walls located in the medial segment of the lingula with dimensions of 3/4 cm , atelectatic blade in the left lower lobe and mediastinum with normal appearance.

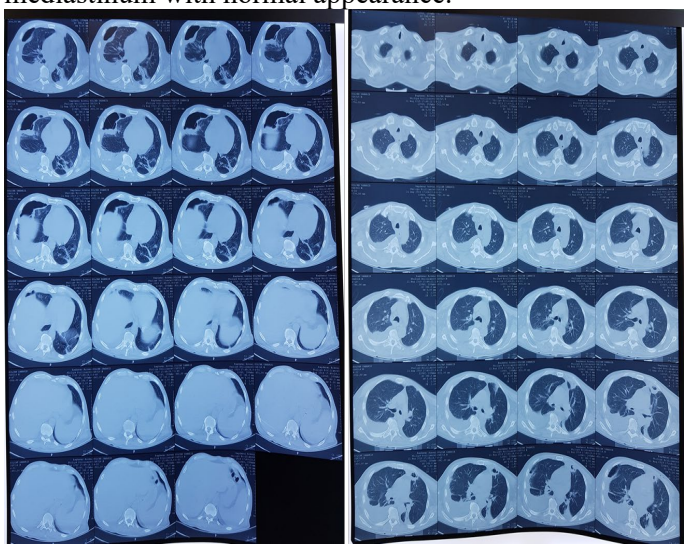


Figure No. 5 - Chest CT scan
Figure No. 6 - Chest CT scan
After the clinical and paraclinical investigation of the patient (moderate hypoalbuminemia, low glucose tolerance, discrete hypernatremia, moderate hypertriglyceridemia, mild leukocytosis, moderate hyperchromic anemia, hyposideremia, severe inflammatory biological syndrome) the diagnosis at admission and at 72 hours was established: „Psycho-cognitive status (with intense psychomotor agitation and dyslogia - frontal syndrome, post-traumatic encephalopathy), neuromotor status (mild paraplegia - hard to test) and dysphagia after severe TBI in polytraumatic context (road accident – 8.05.2019)".
The main general objectives of the neurorehabilitation program were: combating pain and regaining functionality that allows the patient self-grooming and locomotion, treating the associated pulmonary/respiratory diseases and preventing complications, improving the patient's psycho-cognitive, mental and emotional status and obtaining socio-professional, respectively family reestablishment in order to improve patient's quality of life (4).

Evolution

During the hospital stay, the patient underwent a complex recovery program that included pharmaceutical treatment with antibiotics, antimicotic, supplements with human albumin, antialgic-antipyretic, gastric protectors, anxiolytic-tranquilizer, neurotrophs, vitamin B supplements, vitamin supplements, amino acid supplements, probiotic, butiferone derivative, barbiturate, antigoagulant, xanthine derivative, loop diuretic, supplements magnesium, urinary antiseptics, neuroleptic-antipsychotic, antidepressant, mucolytic, prokinetic, iron supplements and physical treatment (kinesiotherapy). The recovery team collaborated with other specialists to provide the patient with a complete, individualized recovery plan, based on the particularities of the case.
For managing the psycho-cognitive and mental status, the psychiatrist was consulted repeatedly. The patient received psychiatric treatment for the severe psychomotor agitation that was adjusted each time a new medication that could have interacted with psychotropes was added to the therapeutic scheme.
Before mobilization, the patient had to be investigated for bronchopneumonia and other respiratory complications. The mobilization was made gradually, starting with physiotherapy at the patient's bedside. The physical-kinetic rehabilitation program included at first the prevention of amyotrophy, maintanance of joint mobility and quality of articular movement and then reeducation of the patients'orthostatic posture, teaching the patient to perform the transfer from bed to orthostatic position and relearning of the fine motor skills of the wrists, hands and fingers.

Results

During the 1st admission, the patient presented a stationary evolution from a functional point of view, burdened by complications. Due to bronchopneumonia with Acinetobacter baumanii and Klebsiella favored by the presence of swallowing disorders - abolished neck throat reflex, a complex antibiotic regimen had to be administered to the patient (Meropenem, Vancomycin)

and isolation was required; the installation of the gastrostomy was delayed until the end of the antibiotic treatment. Following the consultation requested to the thoracic surgery unit, a bronchoscopy is performed which detects an eso-tracheal fistula with surgical indication. The patient's preoperative preparation is initiated and then transferred for the operation. Jejunostomy was performed before surgery. Postoperatively, the patient's evolution is favorable from a surgical point of view, but an altered general condition persists, the patient being loaded with tracheobronchial secretions, having a partially effective cough and being difficult to cooperate with.

During the 2nd admission, the patient has a very good evolution, but burdened by the complex polypathological context. After 3 weeks of polyantibiotherapy and antifungal medication, the treatment is stopped but during the next 3 weeks the patient intermittently has a fever. Two blood cultures are performed and the results are negative. The care is continued through respiratory physiotherapy with aerosols with saline serum and Colistin. During the hospitalization, the patient is re-evaluated imagistically (Fig. No. 7, 8, 9, 10, 11) and a control consultation at thoracic surgery is requested.

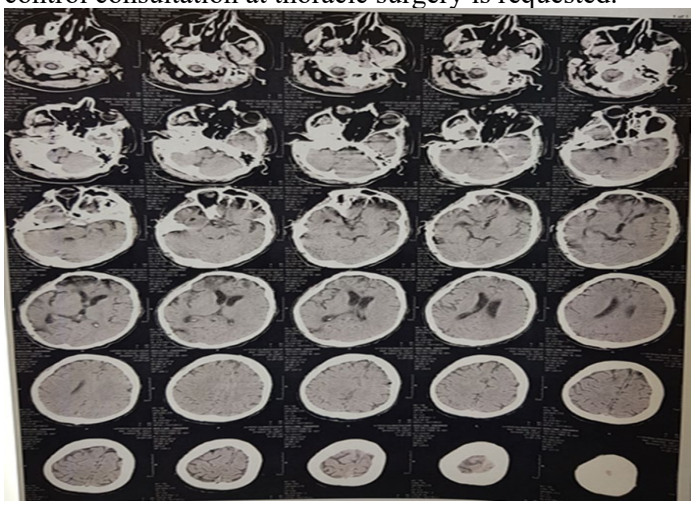
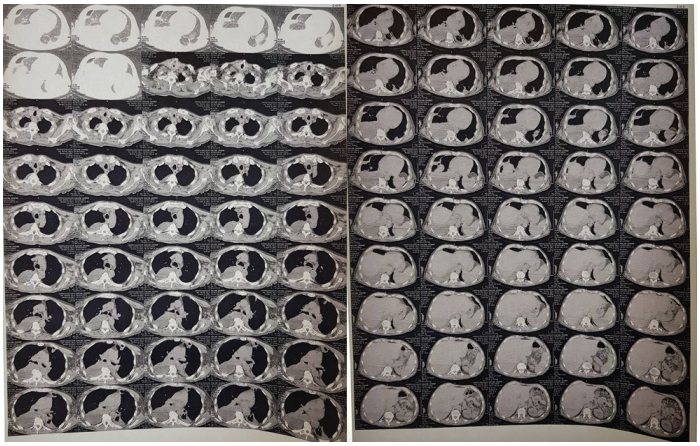


Figure No. 7 - Brain CT scan - sequelae lesions located supratentorially bilateral, more significant at the anterior bifrontal level



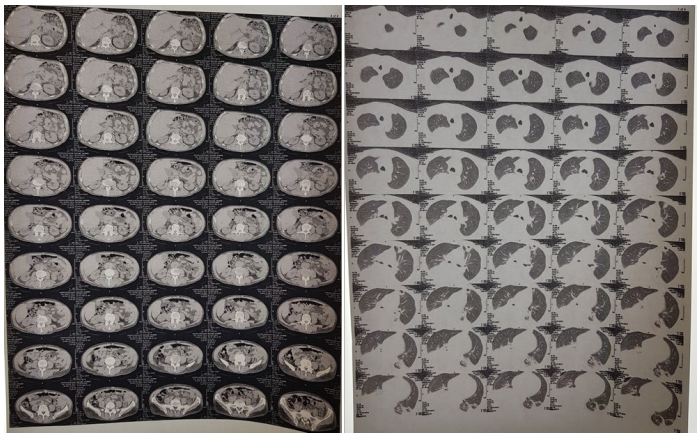


Figure No. 8, 9, 10, 11 – Chest and abdomen CT scan - right hydro-pneumothorax, atelectasis at the level of the lower lobes, cavity-like lesion located subpleurally anterior at the level of the lingula

The natural evolution of the frontal syndrome is observed, from psychomotor agitation to apathy and indifference. Therefore the psychiatric treatment is adjusted, after requesting a consultation from the specialist. At the NMAK examination, muscular strength is now 3/5 at all levels. During the hospitalization, the patient snatches his jejunostoma and needs local treatment; the jejunostoma and fixed permeable urine probe are suppressed during this hospitalization. In the last days of hospitalization, a series of febrile seizures begins. The blood culture is repeted and the patient is transferred to the infectious diseases department for specific treatment.

At the 3nd admission, the patient keeps sitting position at the edge of the bed and can take a few steps supported bilaterally. Balanced cardio-respiratory during hospitalization, the patient shows a favorable evolution until discharge. During hospitalization, imaging investigations (X-ray, CT – Fig. No. 12, 13, 14, 15) and thoracic surgery consultation are repeated.

Figure No. 12 - Thoraco-pulmonary X-ray - opacity with traction on the neighboring pleura, located in the lower third of the right hemithorax, probably fibro-sequelae and bilateral accentuated reticulo-micronodular drawing

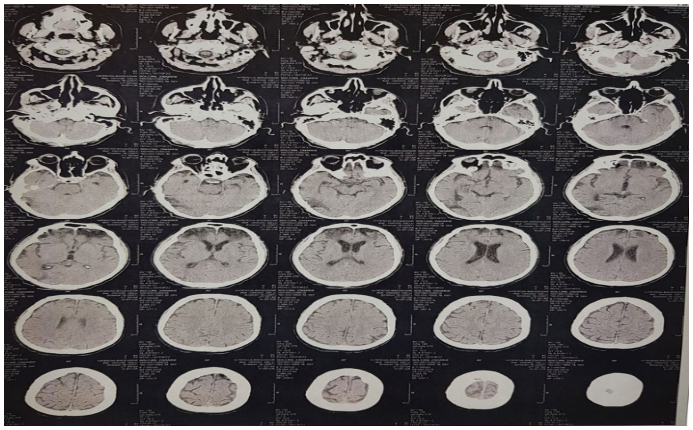


Figure No. 13 – Brain CT scan - temporo-basal, bilateral frontal and right parietal cortico-subcortical sequelae

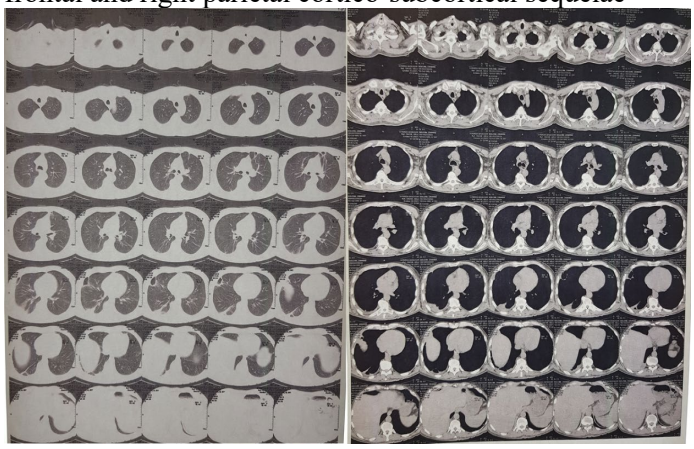


Figure No. 14, 15 – Chest CT scan - right pleural effusion, closed pneumothorax with a thickness of 15 mm at the level of the pleura corresponding to LMD, 15 mm subpleural lingular cavity lesion that draws nearby bronchial passages, foci of right postero-basal atelectasis

The patient is scheduled for a control bronchoscopy and endoscopy, but is not cooperative and the investigation cannot be carried out.

At the NMAK examination, muscle strength is:

upper right limb - 4/5 at all levels; upper left limb - 5/5 at all levels

lower right limb: 4/5 proximal and intermediate, plantar flexion - 4/5, dorsiflexion - 2/5, toe flexion - 3/5, toe extension - 2/5

lower left limb: 4/5 proximal and intermediate, plantar flexion - 4/5, dorsiflexion - 1/5, toe flexion - 3/5, toe extension - 1/5

Functionally at discharge, the patient walks between the parallel bars without assistance and for distances of 20-30 m with a walking frame. Can climb and descend a few steps with support on the railing and surveillance. The psycho-cognitive / mental and emotional status are improved.

After three admissions in the neuromuscular recovery clinic, before discharge, the results of the recovery program were evaluated using the same scales applied at the admission (Table No.1).

Scale	First Admission 2.07	2nd Admission 20.08	3rd admission 1.10
FAC	0	3	3
FIM cognitive	5	11	26
FIM motor	14	20	47
GOS-E	3	3	4
Rankin	5	4	4
Asworth	0	0	0
Penn	0	0	0
QOL	impossible to test	impossible to test	88
MMSE	impossible to test	impossible to test	24
MoCA	impossible to test	impossible to test	19

Table No.1 Evaluation scales at admission and discharge

Prognosis

The patient's prognosis is favorable, except for possibility of returning to work al least for the moment (at vitam: favorable, at functionem: favorable, at laborem: reserved), provided that the recommendations from the discharge will be respected (continuing the recovery program according to the instructions given at discharge, regular check-up at the neuromuscular recovery clinic, re-evaluation in the infectious diseases/ pneumology unit, performing upper digestive endoscopy and bronchoscopy under general anesthesia).

Conclusions

The combined and complex rehabilitation led to a complete cognition remission and complete locomotor regaining at discharge, the patient progressed from psycho-cognitive status after severe CCT (GCS=4) in polytraumatic context associated with antero-retrograde amnesia related to trauma and severe locomotor and self-care dysfunction to psycho-cognitive status in marked improvement, with the patient verticalization, maintaining orthostatism and independent mobilization over long distances.

The favorable progression emerged after a persistent therapeutic rehabilitation team-run program despite the limitations imposed by the mental state of the patient during hospitalization and the presence of multiple severe pulmonary complications that required treatment performed in collaboration with other specialists.

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