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FROM DEFICIT TO FUNCTIONALITY: REHABILITATION OF BRACHIAL PLEXUS PALSY IN A YOUNG ADULT PATIENT

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Disclosure statement

I have no actual or potential conflict of interest in relation to this program/presentation.

FROM DEFICIT TO FUNCTIONALITY: REHABILITATION OF BRACHIAL PLEXUS PALSY IN A YOUNG ADULT PATIENT

INTRODUCTION – THEORETICAL BACKGROUND

CASE PRESENTATION

- **Reason for Admission**
- **Medical History**
- **Clinical Examination / NMAK / Functional Assessment Scales**
- **Paraclinical Investigations**
- **Positive and Differential Diagnosis**
- **Treatment**
- **Clinical Evolution / Prognosis**
- **Possible Complications**

DISCUSSION & CONCLUSIONS

INTRODUCTION – THEORETICAL BACKGROUND

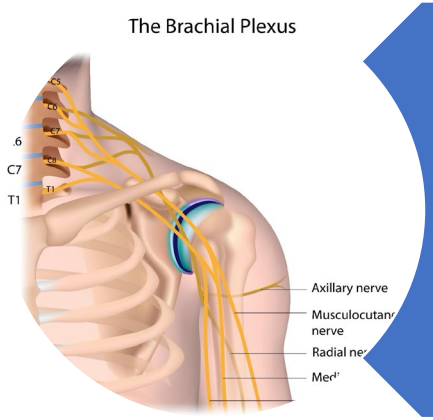


Figure 1. The Brachial Plexus

Brachial plexus palsy represents a complex disorder of the upper limb innervation, which may lead to:

- motor deficits
- sensory disturbances
- reduced functional independence of the upper limb in activities of daily living[1,2]

Epidemiology

- Increased incidence in road traffic accidents and occupational injuries
- More common in young, professionally active adults
- May also occur in ostetric settings (neonatal forms)[3]

1. ***Ferrante MA.*** *Brachial plexopathies: classification, causes, and consequences. Muscle Nerve. 2018.*
2. ***Van Alfen N.*** *Clinical and pathophysiology of brachial plexus injury. Hand Clin. 2016.*
3. ***Noland SS, Bishop AT, Spinner RJ, Shin AY.*** *Adult traumatic brachial plexus injuries. J Am Acad Orthop Surg. 2019.*

INTRODUCTION – THEORETICAL BACKGROUND

ETIOPATHOGENESIS – MECHANISMS OF INJURY

- **Nerve root avulsion**
- **Nerve rupture**
- **Neuropraxia (temporary conduction block)**

CLASSIFICATION[4]:

Table 1. Clasification of Brachial Plexus Injuries

BY SEVERITY	BY TOPOGRAPHY
Neuropraxia	Upper plexus lesions (C5-C6)
Axonotmesis	Lower plexus lesions (C8-T1)
Neurotmesis	Total plexus lesions

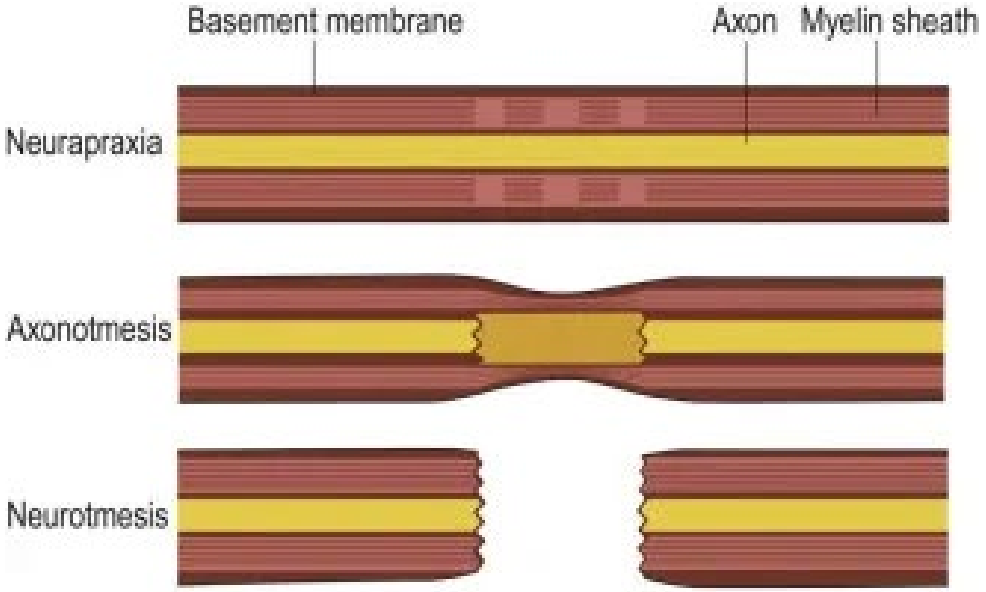


Figure 2. Types of Nerve Injury[5]

4. ***Sydney Sunderland.*** *A classification of peripheral nerve injuries. Brain. 1951.*
5. *https://musculoskeletalkey.com/physiology-of-nerve-injury-and-regeneration/*

INTRODUCTION – THEORETICAL BACKGROUND

DIAGNOSTIC:

- clinical examination: motor + sensory deficit
- functional assessment (ROM, MRC, scores)
- investigations: EMG, nerve conduction studies

COMPLICATIONS:

- muscle atrophy
- joint stiffness
- chronic_neuropathic_pain
- persistent_functional_disability

INTRODUCTION – THEORETICAL BACKGROUND

Conservative treatment
- drug treatment (anti-inflammatory, neurotrophic, antioxidant)
- temporary immobilization (if necessary)
- clinical and functional monitoring

Surgical treatment
- reconstructive neurosurgery
- neurorhaphy / nerve grafts
- nerve or muscle transfers

Physical Medicine and Rehabilitation
- kinesiotherapy (mobilization, toning)
- neuromuscular facilitation
- electrotherapy / electrostimulation
- functional reeducation





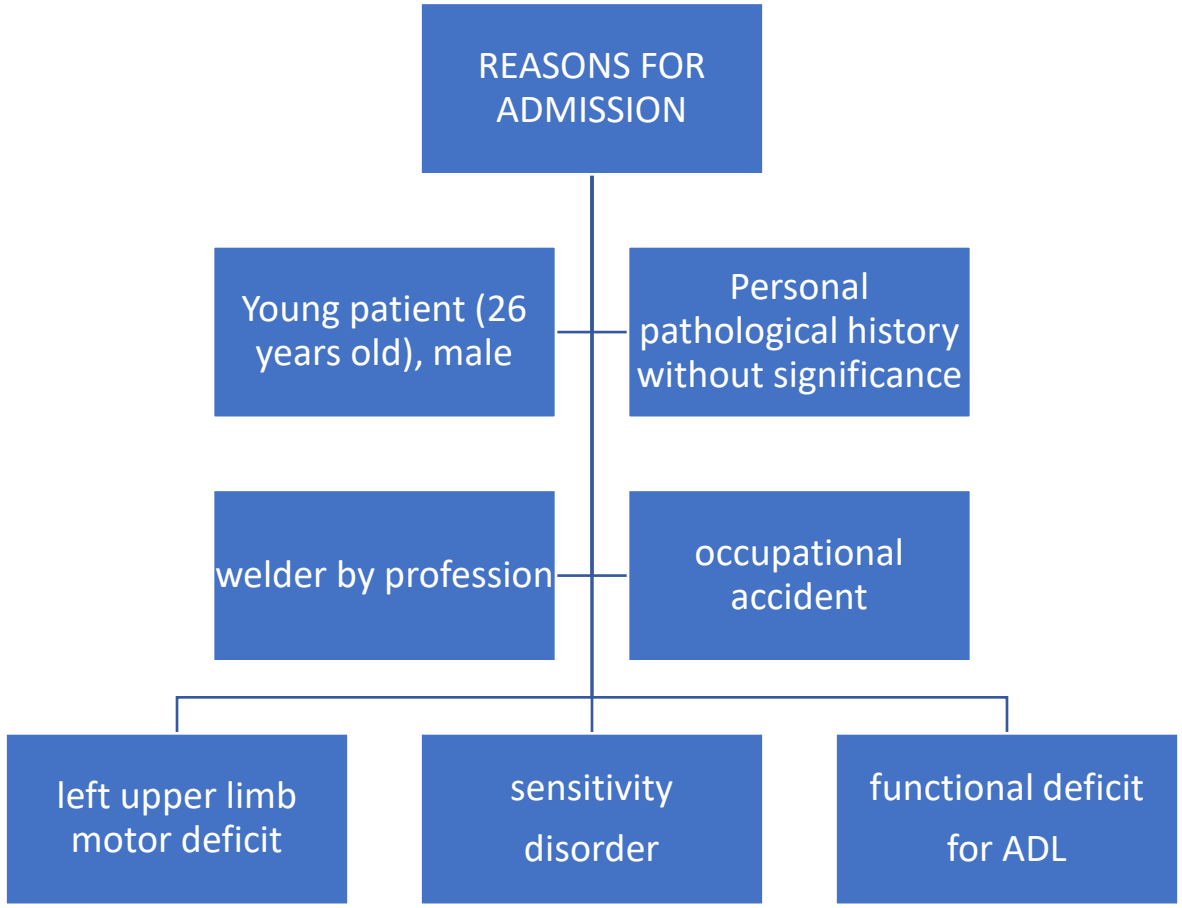
THE OBJECTIVE OF THE PRESENTATION

Evaluation of the results of a structured rehabilitation program in a young patient with brachial plexus paresis, using:

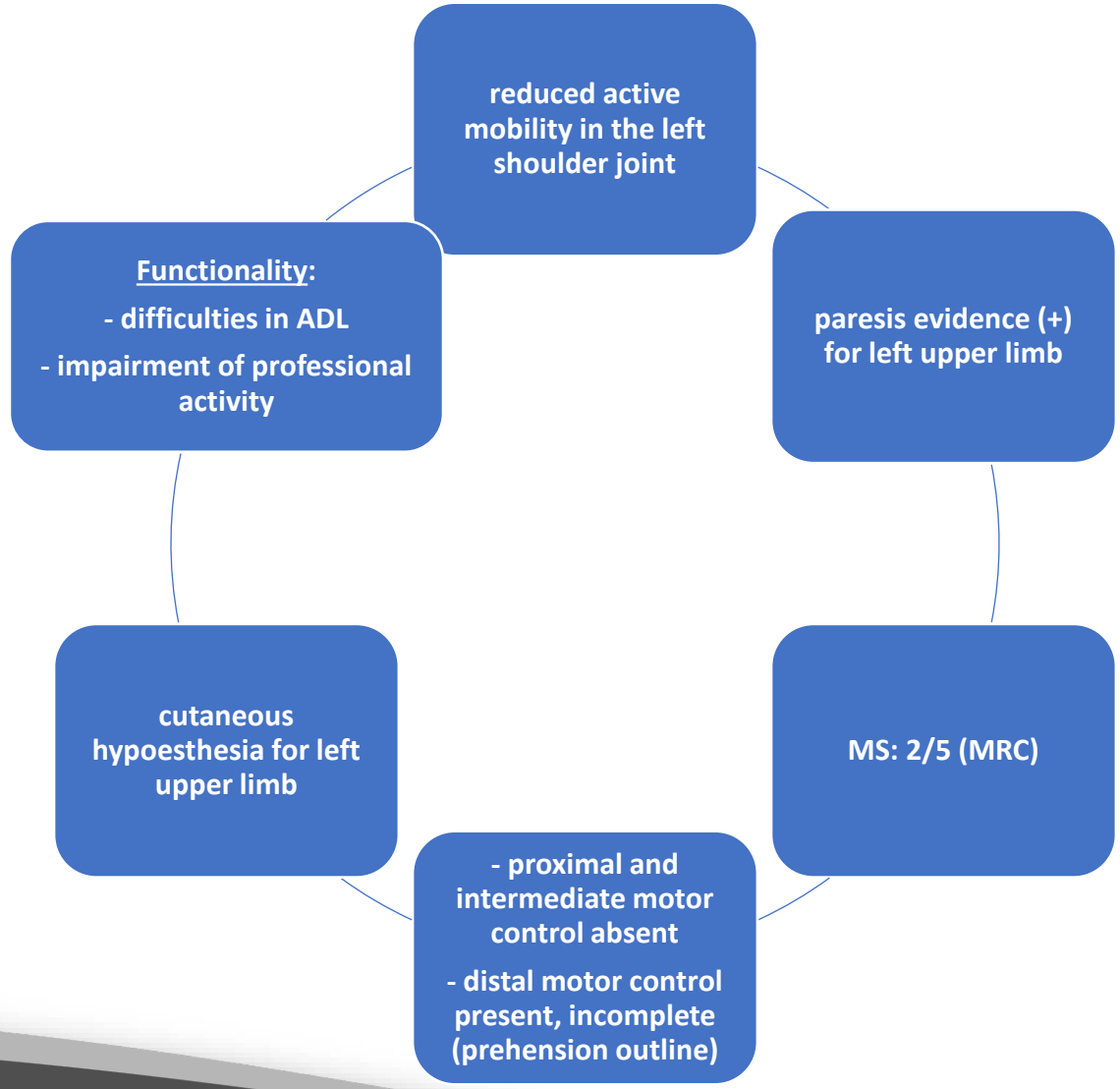
- clinical assessment
- joint ROM
- muscle strength testing
- serial functional scores

improving the function of the affected upper limb

CASE REPORT


REASONS FOR ADMISSION
Young patient (26 years old), male
Personal pathological history without significance
welder by profession
occupational accident
left upper limb motor deficit
sensitivity disorder
functional deficit for ADL

INITIAL EVALUATION



INITIAL EVALUATION SCALES/SCORES

VAS:	MRC:	Quick Dash:	FIM motor:
• 9/10	• 2/5 deltoid (C5) • 2/5 biceps (C5-C6) • 2/5 triceps (C7) • 3/5 wrist extensors (C6) • 3/5 finger flexors (C8)	• 75/100	• 71/91

Initial data indicate severe disability, with major difficulty in performing ADLs

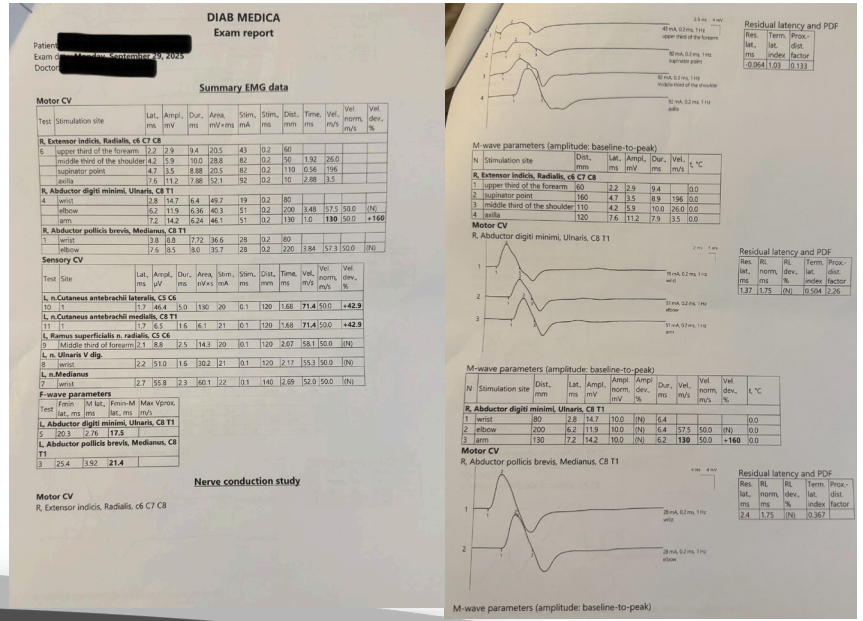
PARACLINICAL INVESTIGATIONS

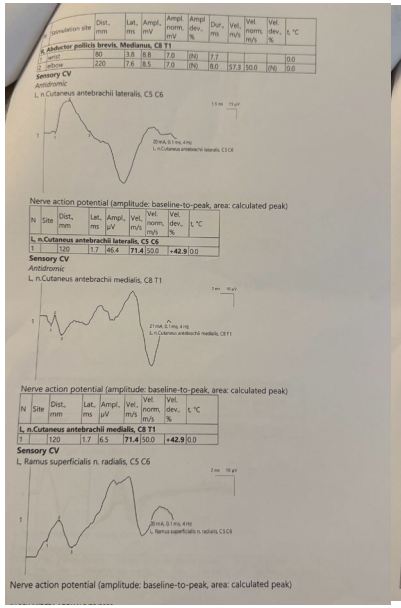
NORMAL

- **Laboratory tests**: absent inflammatory markers, HLG with normal values
- **Skull CT Scan**: within normal limits
- **Chest X-ray**: – minimal enhancement of the bilateral infrahilar peribronchovascular interstitium, no active pleural lesions, heart within dimensional limits X-ray

MODIFIED

- **ELECTROMYOGRAPHY**: Changes suggestive of left superior brachial plexus lesion, with possible Parsonage-Turner syndrome-like appearance.
- **!!! Post-traumatic clinical context supports mechanical etiology.**
- **CERVICAL SPINE MRI**: posterior disc protrusion C5-C6, without root contacts, outlines of postero-inferior C5 and postero-superior C6 osteophytes





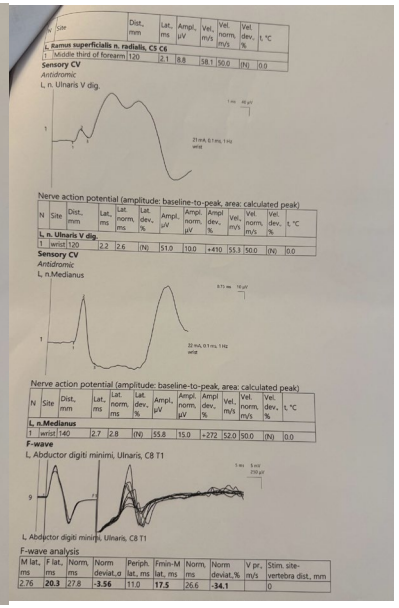


Figure 3. Patient electromyography

POSITIVE / DIFFERENTIAL DIAGNOSIS

POSITIVE DIAGNOSIS

1. Left brachial plexus paresis
2. Cervical discopathy C5-C6 stage II
3. Severe functional deficit for the left upper limb

DIFFERENTIAL DIAGNOSIS

- Parsonage-Turner Syndrome
- Cervical Radiculopathy (C5-C6)
- Isolated Peripheral Nerve Injury (e.g. Axillary / Radial / Median / Ulnar Nerve)
- Stroke
- Muscle or Tendon Injury of the Shoulder

→ EXCLUDED IN THE CLINICAL AND PARACLINICAL CONTEXT

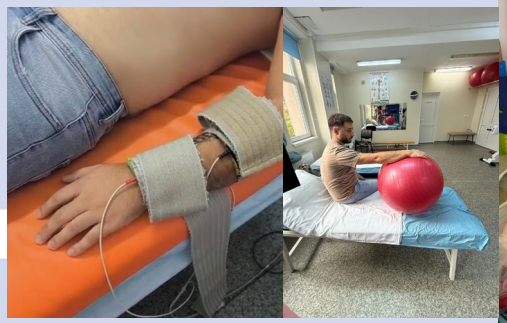
Conservative management

1. drug treatment:

- neurotrophic: Nyrvusal plus C, Actovegin, Alanerv 600
- antioxidants: Thiossen 600
- medication for neuropathic pain: Gabaran
- anti-inflammatories

2. immobilization for 3 weeks in a sling-type upper limb support orthosis

3. periodic clinical and functional monitoring





PM&R treatment

- **laser therapy** – for analgesic, trophic and tissue regeneration effect
- **longitudinal ionogalvanization** with KI 1% at the cathode – for nerve conduction stimulation
- **exponential current electrostimulation** – for preventing muscle atrophy, maintaining nerve excitability and stimulating reinnervation
- **TECAR therapy** – for stimulating local vascularization, pain reduction and tissue regeneration effect
- **magnetotherapy** – for pain and inflammation reduction effect, stimulating healing
- **deep oscillation** – for reducing edema
- **trophic massage** of the left upper limb associated with lymphatic drainage maneuvers
- **individualized kinesiotherapy** – for increasing ROM & MS in the left upper limb, functional reeducation

CLINICAL-FUNCTIONAL EVOLUTION

Table 2. Evolution on the assessment scales before and after treatment

ASSESSMENT SCALE	SCORE BEFORE TREATMENT	SCORE AFTER TREATMENT
VAS	9/10	2/10
QUICK DASH	75/100	11.4/100
FIM MOTOR	71/91	91/91

The evolution of the scores demonstrates the efficiency of the recovery program, with a major impact on the patient's function and independence.

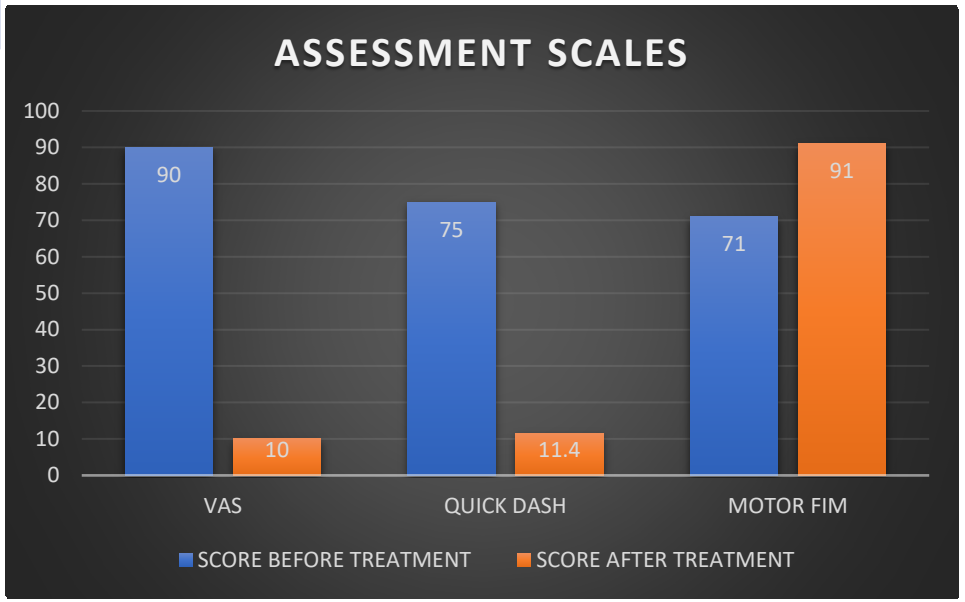


Figure 4. Evolution on the assessment scales before and after treatment

POSSIBLE COMPLICATIONS



Osteo-articular complications:

- adhesive capsulitis
- joint stiffness in the shoulder/ elbow/ wrist
- limited mobility
- degenerative changes secondary to bad postures



Neurological complications:

- persistent neuropathic pain
- paresthesias
- residual motor deficit



Functional complications:

- limitation of daily activities
- decreased work capacity
- impaired grip and function of the upper limbr



Psychological and social complications:

- anxiety
- depressive symptoms
- decreased quality of life
- difficulties in socio-professional reintegration

In the absence of adequate treatment, these complications can lead to significant functional disability.

PROGNOSIS

PROGNOSIS AD VITAM

is favorable, in the absence of significant comorbidities, the patient presenting a good general condition.

PROGNOSIS AD FUNCTIONEM

is good, highlighted by significant improvement in muscle strength, pain reduction and functional rehabilitation of the upper limb under complex treatment.

PROGNOSIS AD LABORUM

is favorable, the patient having the potential to reintegrate into professional activities, depending on the functional demand of the upper limb.

CONCLUSIONS

Early, individualized and multidisciplinary rehabilitation is essential in brachial plexus paresis, which can lead to significant functional recovery and socio-professional reintegration.

→ FUTURE OUTLOOK

→ Personalized rehabilitation protocols

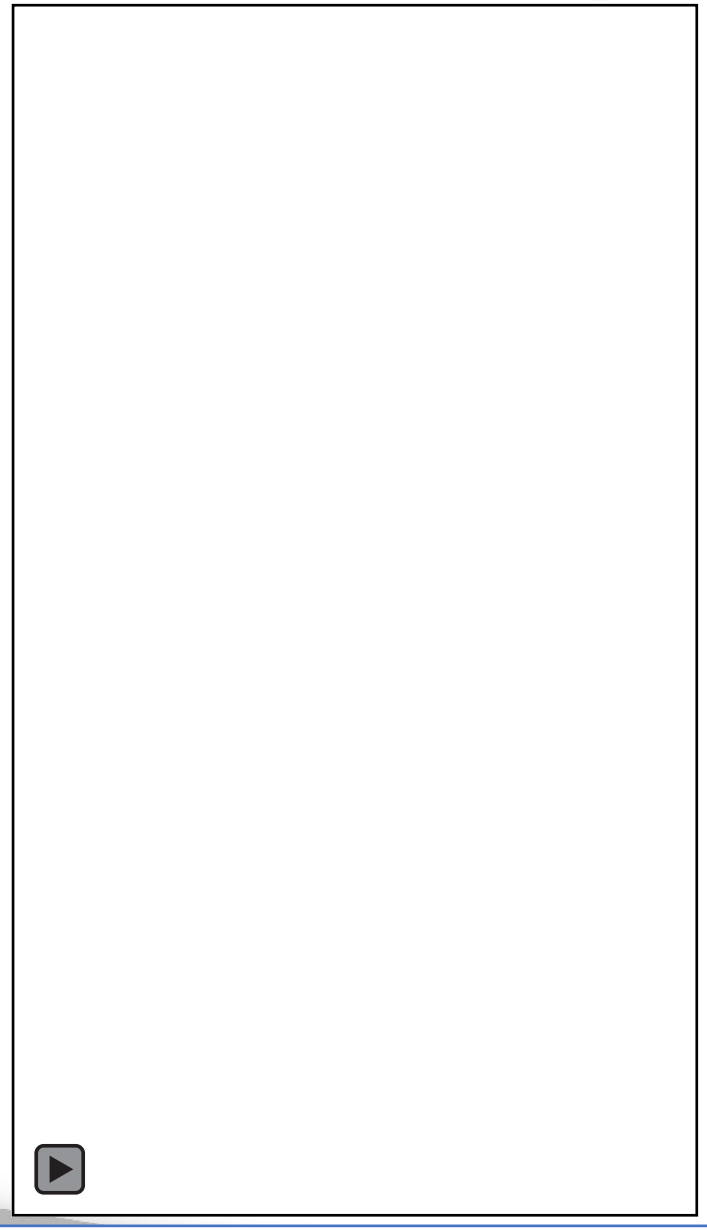
→ Modern technologies (VR, FES)

→ Tele-rehabilitation

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