

Complex therapeutical rehabilitation approach in the case of a polytrauma patient with traumatic brain and spinal cord injuries – Case report

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Abstract

The multidisciplinary approach of polytrauma cases including traumatic brain and spinal cord injuries, the survival represents one of the greatest challenges, but the decrease of dysfunction and minimizing the psycho-cognitive sequels are at least as important, regarding the patient’s future quality of life. **Material and method** Under THEBA Bioethics Commission approval (9181 / 11.04.2018), this paper presents a case of a 28-year-old patient with AIS / Frankel (A) paraplegia after a spinal cord injury SCI T3 level secondary to T4-T5 fracture surgically treated. SCI was associated with moderate traumatic brain injury TBI (subarachnoid haemorrhage), thoraco-abdominal contusion (pneumothorax stg, hepatic trauma) and multiple fractures (sternum and costal, operated), neurogenic bladder and bowel. This condition was due to a car accident, occurred on November 13, 2017.

The patient was admitted with a psycho-cognitive status, complete bilateral motor deficit in the lower limbs - paraplegia, sensitivity disorders anaesthesia type and sphincter disorders. The patient was clinically, paraclinical and functionally assessed according to the standardized protocols implemented in our clinic through the assessment scales: AIS, FIM, QoL-Quality of Life, Ashworth, Penn, FAC, WISCI II.

Results: The patient's evolution was slow but favourable. He benefited of neurosurgical care and had thoracic surgery to extract the osteosynthesis material at the sternum. Meanwhile he learned the technique of intermittent catheterisation. As a result of rehabilitation program the patients finally reached the level of wheelchair locomotion and have completely restored the cognitive function.

Conclusion: The multidisciplinary team approach consisting of physicians, kinetotherapist, nurses and auxiliary healthcare personnel was the key of the patient’s survival, eliminated the cognitive dysfunction and reduced as much as possible the locomotor one.

Key words: *Traumatic brain injuries, spinal cord injury Polytraumatism*

Introduction

Traumatic spinal cord injury (including it’s components) can permanently or for a period of time cause a decrease or loss of somatic functions (motor or sensitive) and affects autonomous system of the body parts that are found under the level of the lesion.

(1) Based on the part of the spinal cord that was damaged and it’s correspondent spinal nerve a spinal cord injury can be classified as: cervical, thoracal and lumbar each generating a specific motor deficit. (2) The injury can be either complete or incomplete. A complete injury causes loss of all motor and sensory function below the damaged level and in the case of incomplete injury partial motor or sensory function below the injury is preserved. (1,2)

Survival of the patient represents one of the greatest challenges when dealing with polytrauma cases, including those with traumatic brain and spinal cord injuries. When the patient becomes stable enough we have to focus on improving his future quality of life by decreasing dysfunction and minimizing the psycho-cognitive sequels. (3,4,6)

Materials and Methods:

Under THEBA Bioethics Commission approval (9181 / 11.04.2018), this paper presents a case of a 28-year-old patient with AIS / Frankel (A) paraplegia after a spinal cord injury SCI T3 level secondary to T4-T5 fracture surgically treated. SCI was associated with moderate traumatic brain injury TBI (subarachnoid haemorrhage), thoracic-abdominal contusion (pneumothorax stg, hepatic trauma) and multiple fractures (sternum and costal, operated), neurogenic bladder and bowel. This condition was due to a car accident, occurred on November 13, 2017.

The 28 years old male patient was admitted in our clinic division presenting paraplegia with complete motor deficit, sensory dysfunction, bladder and bowel disorders and severe locomotor and self-care dysfunction. On November 13, 2017 the patient was involved in a car accident (passenger) and suffered SCI secondary to T4-T5 fractures that were surgically treated. Beside the SCI, because of the car accident he also suffered: a moderate traumatic brain injury TBI (with subarachnoid haemorrhage), thoracic-

abdominal contusion (left lung pneumothorax and hepatic trauma) and multiple fractures: sternum and costal that were also surgically treated.

Clinical examination at admission revealed: conscious, alert, cooperant, temporo-spatial oriented, no special facial expression, median-cervical post-op closed scar, medio-sternal post-op scar with present stitches and third-degree gluteal pressure lesion.

The local clinical examination at admission revealed: cranial nerves examination: normal, normal upper limb muscular tonus, decreased lower limb muscular tonus, absent lower limb motor control at all levels. The patellar reflex and Achillean reflex were absent and the same for cutaneous plantar reflex. The patient can't walk, he just kept bed rest. ASIA motor exam points were: 50/50 points for the upper limbs and 0 /50 points for the lower limbs. ASIA sensory exam points were: light touch score: 46/ 112 points and pin prick score: 46/112 points.

The patient obtained 35 points(max) at the FIM cognitive subtotal score and 87/112 points on the Quality of Life Scale

Some blood paraclinical investigations are summarized in table 1

Albumin	2.7
Iron	46
ALT/GPT	200
AST/GOT	110
RBC	3.00
HGB	8.90

Table 1 Paraclinical investigation

Chest X-ray revealed: a small area of atelectasis on the base of the left lung. Also he had multiple metal fixators: 2 of them on the superior thoracic vertebral column and osteosynthesis material for the sternum fracture and a severe T4 / T5 dislocation without reduction. The surgical intervention had the goal to stabilize the fracture/dislocation and not to reduce them, so the vital organs nearby could be protected.

During the hospitalization the patient was evaluated by doctors from several specialties such as plastic surgery for the pressure lesion. They recommended local rigorous hygiene and avoiding dorsal decubitus. Neurosurgical reevaluation of the surgical wound was made and suppression of suture threads as well. Infectious diseases doctor evaluated the patients for

the urinary tract infection with Proteus and recommended to be treated with antibiotic with the help of the drug sensitivity test.

The main diagnostic at discharge was: Psycho-cognitive and dysfunctional status: AIS / Frankel (A) paraplegia with T3 neurological level after a thoracic SCI (T4-T5 fracture/dislocation) in polytraumatic context. Moderate traumatic brain injury TBI (with subarachnoid haemorrhage). Thoracoabdominal contusion (left lung pneumothorax and hepatic trauma). Multiple fractures: sternum and costal that were also surgically treated. Third degree gluteal pressure lesion. Neurologic bladder and bowel.

For the rehabilitation program we had the main general objectives: (1) Fighting pain, (2) Regaining functionality that allows the patient self-care and locomotion, (3) Treating cardiovascular or respiratory diseases and preventing complications, (4) Improving the patient's psycho-cognitive status, mentally and emotionally (5) Socio-professional, family reintegration and improvement of quality of life.

Rehabilitation program specific first means are: sleeping on a anti-pressure lesion mattress, anti-pressure lesion pillow for the wheel chair, rise every 15-20 minutes in the hands for decompression, will not sit on the wheel chair longer than 2-4 hours interposed with a postural rest in decubitus of at least 30 minutes, avoid carbonated juices, fermenting foods (beans, peas, cabbage, etc.) and performing the management of colon evacuation - daily rectal cough is recommended.

During admission the patient was assessed and treated with the following drugs: anticoagulant, antibiotic, urinary disinfectant, painkiller, hydroelectrolytic rebalancing, additional albumin, iron supplement, neurotrophics and neuroprotectors. In this particular case physiotherapy was not necessary.

The kinetic objectives were: (1) To restore/ maintain joint mobility, (2) To promote proximal motor control of the lower limb (in order to obtain stability of the hips and posture at bedside in the wheel chair), (3) To train the transfers (from the wheel chair to bed and vice versa) and (4) Cardiorespiratory rehabilitation (kinesitherapy - bronchial drainage posture and effective cough training)

The kinetic objectives followed were:

1. Mobilization: passive and active-passive lower limbs mobilizations and active upper limbs mobilization

2. Kinetic bed side program: passive mobilizations
3. Kinetic program at the gym: bicycle – Motomed (passive mobilization for the lower limbs and active mobilization for the upper limbs), train at pulley. The principle aim was to maintain articular function and preventing heterotopic ossification with secondary ankyloses

Results:

The patient had a slow favorable progression. The pressure lesion was healed. FIM and ASIA motor and sensitive exams had the same results in all three admissions. The quality of life showed an improvement from the first admission: 87 points to the second one, 90 points. The tolerance for sitting position was increased so the patient could be mobilized in the wheelchair

At discharge the patient had independence in the wheelchair but needed a little help with the transfers. Ad vitam prognosis is favorable. Ad functionem prognosis was reserved because of complete paraplegia with secondary, severe locomotory disfunction. At labore prognosis was reserved because he was a courier and has no other competences at the moment.

He also had complications during the hospitalisation period. He developed a urinary tract infection with *Proteus* spp. treated with the help of the drug sensitivity test.

The particularity in this case is the severity of the thoracic medial vertebrae trauma with an upper level and the fracture of the sternum, both located in nearby the cardio-pulmonary system. In such cases, cardiorespiratory failure can occur at any time in the first 3 months until neuro-stabilization, therefore the most important objective in this case was the patient's survival.

Furthermore, the presence of a TBI with subarachnoid haemorrhage that in most cases causes cognitive dysfunction and in this particular case it did not.

Conclusions:

The multidisciplinary team approach consisting of physicians, physiotherapist, nurses and auxiliary healthcare personnel was the key of the patient's survival, reducing as much as possible the locomotor dysfunction

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