

# Complex clinical and therapeutic rehabilitation approach of a patient with complete AIS/Frankel A tetraplegia post cervical spinal cord injury after accidental fall off a trailer and multiple complications occurring during disease progression - case study

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## Abstract

**Introduction:** Spinal cord injury is a complex neurologic condition that embeds multiple complications, which are often debilitating for patients as the disease progresses.

**Materials and Methods:** This paper presents a case of a 44-year-old patient with a longilin asthenic constitution and no previous medical history, who accidentally fell off a trailer resulting in burst fracture dislocation of C6/C7 associated with immediate loss and consciousness and onset of complete ASIA-A tetraplegia with C5 neurologic level. The patient received a complex nursing program, which included extensive debridement of the necrotic tissue, daily antiseptic wound dressing using Chloramine solution and silver sulfadiazine cream along with wide-spectrum antibiotic therapy with slow but favorable progression. During hospitalization the patient developed an episode of respiratory distress which responded favorably to Levocetirizine daily.

**Results:** The complex neuro-muscular rehabilitation program along with the medical treatment and surgical debridement the patient received have improved of the clinical outcome with the shrinkage of the pressure point lesions, adequate respiratory function which permitted the mobilization of the patient with the wheelchair.

**Conclusions:** Patients with spinal cord injuries are prone to a vast majority of complications including pressure sores complicated with necrotizing fasciitis and respiratory distress that could alter the quality of life. Proper monitoring and management of these kind of complications in the context of neuromuscular rehabilitation are necessary for the enhancement of the quality of life.

**Key words:** *spinal cord injury, tetraplegia, complications,*

## Introduction

Spinal cord injury is a complex neurologic condition that embeds multiple complications, which are often debilitating for patients as the disease progresses.

The American Spinal Injury Association classifies the spinal cord injuries as follows (1,6,7):

- A- Complete: no preservation of sensory or motor function
- B- Incomplete: sensory but no motor function preserved below the neurologic level
- C- Incomplete: motor function preserved below the neurologic level and key muscles have strength less than 3
- D- Incomplete: motor function preserved below the neurologic level and key muscles have strength equal or greater than 3
- E- Normal function both and sensory and motor

Unfortunately, patients with SCI often develop severe secondary complications which lead to increase number of rehospitalization and, decrease quality of life and increase morbidity and mortality. In literature, respiratory dysfunction and pressure

ulcers are amongst the most debilitating complications that occur in tetraplegic patients. This paper presents our approach to hemodynamically stabilize and treat these kinds of complications in a young tetraplegic ASIA -A patient.

**Case report:** a 44-year-old patient with a longilin asthenic constitution and no previous medical history, who accidentally fell off a trailer resulting in burst fracture dislocation of C6 / C7 associated with immediate loss and consciousness and onset of complete ASIA-A tetraplegia with C5 neurologic level.

The patient was admitted in the Neurosurgical Department II of the Teaching Emergency Hospital "Bagdasar Arseni" (TEHBA) in critical condition. Neurosurgical intervention was decided after hemodynamic and respiratory stabilization of the patient was achieved. After complex surgery the patient was transferred to the neurorehabilitation clinic of TEHBA with motor complete tetraplegia at

C5 level and a complex rehabilitation program adequate for this pathology was initiated.

Favorable in-house evolution pleaded for the patient to be discharged. Months later he returned to our clinic with multiple pressure ulcers stage III-IV located bilaterally on trochanters and severe necrotizing fasciitis localized at the level of coccyx.

The physical exam showed a cachexic patient with pale teguments and mucosae, multiple skin pressure ulcers stage III-IV located bilaterally on trochanters and severely infected massive stage IV ulcer on coccyx, poor chest expansion with decreased air entry, polypnea 22 breaths per minute, moist cough with pulmonary rales presented bilaterally, SpO<sub>2</sub> 86% spontaneously in atmospheric air corrected to 94% on O<sub>2</sub> therapy 2L/min; BP- 93/55mmHg; HR- 118bpm; chronic carrier of indwelling urinary catheter.

Neuro-myo-arthro-kinetic clinical examination (NMAK): cooperative, oriented to space, time and self, cranial nerves in normal limits without swallowing deficits, complete spastic tetraplegia C5 level with muscle strength 1/5 in the upper limbs and 0/5 in lower limbs.

Scales: Modified Ashworth = 0 / 5, Penn = 0/4, GOS-E = 3, Rankin = 5, FAC = 0, FIM motor = 11/91, Cognitive FIM = 27/35.

Paraclinical examination revealed leukocytosis, severe iron deficiency anemia, electrolytic disturbances especially hyponatremia and hypopotassemia. Following the clinical and paraclinical examination, the patient was initiated on a complex rehabilitation program.

The main goal was the hemodynamic stabilization of the patient to prevent further multiorgan dysfunction. Wide-spectrum systemic antibiotic therapy was immediately introduced in the therapeutic plan being followed by targeted therapy according to the antibiogram. Oxygen supplementation via nasal cannula was given until spontaneous SpO<sub>2</sub> remained stable at 96% in the atmospheric air. Also, Levocetirizine was administered twice a day to reduce the mucus. Levocetirizine is an antihistamine which acts by decreasing the histamine H1 receptors and is usually used in allergic rhinitis (2). In this case it was used for its side effect to dry out the pulmonary mucus and decrease the wet cough.

Moreover, extensive debridement of the necrotic tissues present on the ulcerated pressure points was performed by a specialized plastic surgeon.

The wounds were then dressed daily for about a month using an antiseptic solution followed by silver sulfadiazine cream. The antiseptic solution used was a hypochlorous acid solution which ensures reduction of the microbial load and prevents the recurrence of pathogens. It has been demonstrated that hypochlorous acid is very effective against bacterial, viral, and fungal pathogens in a short time period<sup>3</sup>. Hypochlorous acid is an important component of our own immune system formed and released by macrophages during phagocytosis<sup>3</sup>. In the body, it kills pathogens by inhibition of protein synthesis, decreased oxygen uptake, oxidation of respiratory components, decreased adenosine triphosphate production, breaks in DNA, and depressed DNA synthesis (3).

On the other hand, the silver sulfadiazine cream used to treat this patient is a common topical antimicrobial used for decades in the treatment of burn (4). It is thought that the silver ions bind with the DNA of the organism, releasing the sulfonide which interferes with the metabolic pathway of the microbes (5). It is most effective against *P. aeruginosa* and the enterics, and equally effective as any antifungal drug against *C. albicans* and *S. aureus* (5).

The pictures below illustrate the trochanteral and coccyx pressure ulcers before and after being surgically addressed and treated with hypochlorous acid solution and silver sulfadiazine topical cream. The evolution was slowly favorable.



Upon discharge, it was recommended to continue the wound treatment at home until complete regeneration of normal skin over the lesions. Physical therapy was also recommended in order to strengthen the thoracic muscles and avoid further pulmonary complications.

**Results:** The complex neuro-muscular rehabilitation program along with the medical treatment and surgical debridement the patient received have improved of the clinical outcome with the shrinkage of the pressure point lesions, adequate respiratory function which permitted the mobilization of the patient with the wheelchair.

Healing of wounds that involve the deep dermal layer takes longer than the superficial ones because they are more susceptible to bacterial infections which often leads to disintegrated necrosis of the skin as seen in this patient<sup>4</sup>. Adequate cleaning of the wounds and silver compounds with antimicrobial activity are used worldwide to prevent infections<sup>4</sup>. Silver sulfadiazine has been considered “gold standard” topical treatment for wounds because is painless on application and it can be used with or without dressing<sup>4</sup>.

Moreover, early hemodynamic stabilization of a critically ill tetraplegic patient has a significant effect on outcome. Respiratory disfunctions are very common in cervical tetraplegic patients due to inefficient respiratory muscles. Therefore, proper rehabilitation techniques which include training of the respiratory muscles, respiratory physiotherapy to aid the expectoration of secretions are crucial in the management of respiratory complications.

**Conclusions:** Patients with spinal cord injuries are prone to a vast majority of complications including pressure sores complicated with necrotizing fasciitis and respiratory distress that could alter the quality of life and even lead to multiorgan dysfunction. Proper monitoring and management of these kind of complications in the context of neuromuscular rehabilitation are necessary for the enhancement of the quality of life.

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