

Surgical Treatment of Spinal Cord Trauma Caused by a Sharp Weapon Retained in the Thoracic Spine

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ABSTRACT

Introduction: Traumatic brain injuries (TBI) caused by bladed weapons are more common in male patients between 16 and 30 years of age and can cause severe neurological sequelae.

Objectives: To describe the case of a patient who was the victim of a stabbing attack, with thoracic SCI and hemopneumothorax, treated surgically.

Methods: Medical records were analyzed and an integrative literature review was carried out.

Case report: F.A.B., female, 46 years old, admitted to the Emergency Department with multiple stab wounds to the left posterior thoracic region. Computed tomography (CT) of the chest and thoracic spine revealed: moderate hemopneumothorax on the left and spinal cord transection by a metallic foreign body at the level of the T9 and T10 thoracic vertebrae. Neurological examination identified Brown-Sèquard syndrome, with asymmetrical paresis and hypoalgesia on the less paretic side. On admission to hospital, thoracic drainage and right hemilaminectomy at T10 were performed to remove fragments of the bladed weapon from the thoracic spine, “local toilette” and correction of the cerebrospinal fluid fistula. On the seventh postoperative day, she presented with fever and chest pain, and a chest CT scan showed a retained hemothorax on the left. She underwent video-assisted pleuroscopy and drainage of around 1000 ml of pleural fluid, which was sent for culture, with no microbial growth. Empirical intravenous antibiotic therapy was also carried out to treat pleural empyema. The patient showed clinical improvement, lung re-expansion, was discharged from hospital and was referred for motor rehabilitation.

Results: MTRs due to retained sharp objects are rare. Immediate neurological deficits occur due to direct injury by the foreign body, compression of a bone fragment in the spinal canal or ischemia secondary to vascular injury.

Conclusion: Prompt medical attention with CT scans allows for the planning of early surgical procedures, which reduce potential sequelae and improve the neurological prognosis of victims of blunt force trauma.

Keywords

Spinal cord injury, Thoracic spinal cord, Bladed weapon, CSF fistula, Hemoneumothorax.

Introduction

Traumatic spinal cord injury (SCI) is a highly complex clinical

condition with a major functional and social impact on those affected. Although it is most commonly caused by car accidents and falls, stab wounds represent an important cause of SCI in certain urban regions [1,2]. These cases have been observed more often in young adult males.

Penetrating stab wounds can result in partial or complete spinal cord injuries, depending on the depth and location of the injury [3]. In addition to direct damage to the spinal cord, there is an increased risk of associated complications such as cerebrospinal fluid fistulas, infections and hemothorax [4]. The surgical approach in these cases depends on the stability of the injury, the presence of a foreign body and the associated neurological impairment [5].

In cases of thoracic injury, the proximity to vital structures such as the lungs and great vessels makes the clinical and surgical management of patients more complex. Therapeutic planning must take into account not only the existence of the primary injury, but also the secondary mechanisms of tissue damage, such as edema, ischemia and the release of inflammatory mediators [4].

In addition, early diagnosis using imaging tests, such as computed tomography, and timely surgical intervention are determining factors in the patient's functional prognosis [6]. The following is a report of a rare case of thoracic TRM caused by a knife stuck in the thoracic spine, with a surgical approach and favorable evolution.

Case Report

A 46-year-old female patient was admitted to the emergency department following a physical assault with a bladed weapon. She had multiple puncture wounds, the main one located in the left posterior thoracic region, with evidence of a retained metal object.

Computed tomography of the chest and thoracic spine revealed moderate hemopneumothorax on the left and a metallic foreign body transfixing the spinal canal between T9 and T10, with signs of spinal cord transection. Neurological examination showed asymmetrical paresis, predominant loss of strength in the right hemisphere and contralateral sensory loss, compatible with Brown-Séquard syndrome.

Thoracic drainage was performed, followed by right hemilaminectomy at T10 to remove the metal fragments, local "toilette" and correction of the cerebrospinal fluid fistula.

On the seventh postoperative day, the patient developed fever and chest pain. A new chest CT scan showed a retained hemothorax on the left. Video pleuroscopy was performed and 1000 ml of pleural fluid was drained. The material was sent for culture, which was negative. Empirical intravenous antibiotic therapy was started, with a good clinical response. After improving, the patient was discharged from hospital and referred for intensive motor rehabilitation.

Discussion

Penetrating spinal injuries caused by white weapons with an object retained in the spinal column are rare, especially at the thoracic level, and represent a considerable diagnostic and therapeutic challenge [1,2]. In these cases, the presence of a foreign body in the spinal canal contraindicates its removal outside the surgical environment, and a planned neurosurgical approach in a specialized center is essential [6].

The case described illustrates a neurological picture compatible with Brown-Séquard syndrome, a condition classically associated with penetrating spinal cord injuries [3,7]. This syndrome is characterized by motor and proprioceptive impairment ipsilateral to the injury, associated with loss of contralateral thermal and pain sensitivity, as observed in the patient. The occurrence of incomplete syndromes such as this one is usually associated with a better functional prognosis, especially when treatment is started early [3,5].

From a pathophysiological point of view, neurological damage in SCI results from the combination of primary trauma - represented by the direct injury caused by the blade - and secondary mechanisms, such as edema, ischemia, inflammation and cell apoptosis, which contribute to the progression of the neurological deficit [4]. Early surgical intervention aims to limit these processes and preserve residual neurological function.

The cerebrospinal fluid fistula seen in this case was the result of the dura mater being breached by the stabbing weapon. This complication is common in penetrating injuries and, if not treated properly, can develop into serious infections such as meningitis or pseudomeningocele formation [6]. Intraoperative correction of the fistula is essential to avoid such outcomes.

In addition to spinal cord injury, hemopneumothorax is a frequent complication of penetrating chest trauma and requires close monitoring. In the case described, the patient evolved with a retained hemothorax, which was successfully managed by video pleuroscopy, a minimally invasive technique considered the gold standard in the approach to organized pleural effusions [8]. Effective drainage, combined with early empirical antibiotic therapy, was decisive in preventing progression to pleural empyema.

It is worth highlighting the importance of early and multidisciplinary rehabilitation in the functional recovery of patients with TRM. Evidence shows that intensive physiotherapy, started as soon as possible after clinical stabilization, significantly improves motor outcomes, reduces secondary complications and has a positive impact on patients' quality of life [9].

Therefore, this case reinforces the relevance of integrated and protocol-based care, involving imaging diagnosis, early surgical intervention, management of thoracic complications and specialized rehabilitation, as recommended in the current guidelines for the treatment of penetrating SCI [4-6].

Conclusion

This case highlights the importance of rapid diagnosis and appropriate surgical management in penetrating spinal cord injuries with a retained foreign body. The multidisciplinary approach, combining neurosurgery, thoracic surgery and physiotherapy, was essential for the patient's positive outcome.

The literature reinforces that neurological prognosis depends on the degree of initial injury and the speed with which surgical treatment

and rehabilitation are instituted [5,9]. Cases with incomplete injury, such as Brown-Séquard syndrome, have a better chance of functional recovery.

This case also highlights the need for high clinical suspicion for complications such as retained hemothorax and cerebrospinal fluid fistula, which require specific management. Early intervention and intensive post-operative support were decisive for a good clinical outcome.

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