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Case Report

Penetrating Stab-Wound Injury of the Thoracic Spinal Cord Without Neurological Deficits: A Case Report

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Abstract

Penetrating Spinal Cord Injury (SCI) is a rare form of traumatic injury to the spine, leading to serious effects on long-term morbidity and mortality. These injuries are mostly accompanied by neurological deficits. The benefit of surgical approach versus nonsurgical management of penetrating SCIs is a debated topic. Surgical approach must be done for progressive neurologic deficits or prolonged cerebrospinal fluid leakage. Penetrating SCIs have been shown to have devastating effects on morbidity and mortality. In this report, we present a patient who interestingly did not develop neurological deficits despite the transverse penetration of the spinal canal from posterior to anterior in the thoracic region. No case of thoracic spinal transverse injury has been reported in the literature.

Keywords: Spine Injury; Penetrating Injuries; Thoracic Region; Neurological Deficits

Introduction

Penetrating spinal cord injury (SCI) is a rare form of traumatic injury to the spine [1]. Each year, only a few cases are admitted to major trauma centers around the world [2]. In Western populations, SCI accounts for only 0.3-2.1% of spinal injuries [3]. Most authors advocate surgery to repair such injuries and to relieve spinal cord compression and debride foreign bodies that could lead to an infection or other complications [4]. As in all surgeries, the surgeon should weigh risks against benefits in patients with SCI. Therefore, the role of surgery in patients presenting without neurological deficits remains controversial [5].

Case Report

A 21-year-old male patient was admitted to our emergency department with a stab-wound injury in the back region. A signed consent was obtained from the patient to publish the case and also for the treatment. On examination, vital signs were stable, the patient was conscious, cooperative, oriented, had a Glasgow Coma Score (GCS) of 15/15 and motor and sensory examination was normal. Proprioceptive sensations were normal and deep tendon reflexes were normoactive. Anal tone was normal and there was no sphincter defect. The patient was brought to our hospital in the prone position due to the stab-wound injury in the back. Patient mobilization and movements were restricted in order to preserve neurological functions. Spinal Computed Tomography (CT) visualized a metallic opacity suggestive of a blade fragment at the T5-6 level, transversely penetrating the spinal canal from posterior and to anterior (Fig. 1).

The patient was immediately taken to surgery. He was placed on the table in the prone position and then the surgical site was painted with tincture of iodine and covered with sterile drapes. The entire procedure was conducted under general anesthesia. Two gr ceftriaxone of intravenous antibiotic prophylaxis was administered. An 8 cm skin incision was made around the wound site and the surgery was initiated. The entry point of the blade was exposed in the posterior aspect of the spinal canal according to the anatomy of the folds. A T5-6, subtotal laminectomy was performed and the blade was gently removed from the spinal

canal. After the blade was removed from the spinal canal, the cord was pushed laterally and mild edematous changes were observed in the spinal canal. After controlling the bleeding in the form of leakage from the spinal canal, the dura incision was sutured primarily. Duraplasty was performed by suturing the injured dura for approximately 2 cm and tightening the TISSEEL on it. The layers were closed to fit the anatomy (Fig. 2).

Considering that the patient was 21 years old, 1 dose of tetanus vaccine was administered under emergency conditions. Postoperative anaerobic metronidazole treatment was also given due to the risk of wound contamination. Additionally, 3x1 gr metronidazole and 2x 2 gr ceftriaxone dual antibiotics were given intravenously as long as the patient was hospitalized. The patient was mobilized on postoperative day 1 and was discharged on postoperative day 10. No complications developed during the postoperative three-month follow-up period.

Figure 1: Metallic opacity of the blade at the T5-6 level on Computed Tomography (CT); (A): Posterior penetration of the metal body into the spinal canal; (B): Metal foreign body penetrating the spinal canal transversely and stuck in the posterior segment of the spine. The spinal cord appears to be displaced to right side in the spinal canal in relation to the knife edge.

Figure 2: (A): Patient was placed in the prone position on the operating table; (B): Layers around the foreign body at the level of the thoracic spine were opened according to the anatomy; (C): Metal blade fragment removed during surgery.

Discussion

Stab-wound injuries of the spinal cord are rare isolated injuries [6]. The unusual nature of penetrating SCIs could be partly explained by the smaller target that the spine represents compared with larger targets of the body [7]. A study by Avila, et al., showed that penetrating SCIs are more common in black and male populations [8]. Although the blade usually retracts after being inserted, it sometimes remains embedded in the soft tissue and bone [9].

The benefit of surgical exploration versus nonsurgical management of penetrating SCIs is a debated topic. Surgical consideration is warranted for progressive neurologic deficits or prolonged Cerebrospinal Fluid (CSF) leakage [10]. Laminectomy is often indicated to remove foreign bodies, while fusion surgery may sometimes be required [11]. Utmost care should be taken to protect the patient from secondary injuries during surgical preparation. Penetrating SCIs have been shown to have devastating effects on long-term morbidity and mortality [12]. The role of spinal neuroplasticity following repair is of tantamount importance for spinal cord healing [13]. The injuries can affect the patient in numerous ways and the symptoms are associated to the level of cord injury and damage to specific neuronal tracts within the spinal cord. Injury to sensory afferents causes altered response to pain and temperature stimuli, two-point discrimination, vibration and proprioception. Furthermore, affected motor afferents may result in weakness or immobility [14]. Prophylactic vaccination is an important issue to keep in mind in patients with this type of dirty injury, taking into account the patient's age and vaccination times [15].

In the present study, we report on a patient who interestingly did not develop any neurological deficits despite the penetration of the spinal canal from posteriorly to anteriorly in the thoracic region. Development of neurological deficits is related to the direction and size of the blade tip penetrating the spinal cord [16]. The reporting of the present case conforms to CARE guidelines [17].

In our patient, we expected that the motor and sensory deficits or at least the proprioceptive senses would be affected in the horizontal anatomical incision of the midline and in the cord passing through the midline. However, surprisingly, all neurological functions including proprioception were preserved in our patient. Since the spinal cord floats in the spinal canal, we consider that the blade compressed but did not cut the spinal cord, which was a great chance for our patient. An extensive literature review indicated that such cases are remarkably rare [18].

Conclusion

Magnetic Resonance Imaging (MRI) can be used to determine the extent of anatomical injury from SCI, but may be deferred to the postoperative stage after removal of foreign body due to its potential ferromagnetic property. In contrast, CT can provide relevant information as a first-line investigation. Prompt surgical removal of the foreign body should be performed in a safe setting after stabilizing the patient. Moreover, surgical removal of the foreign body should be performed at the earliest time to avoid potential secondary injury and to prevent any neurological deficit. Sterilization procedures should be kept in mind to prevent infection at the wound site throughout surgery. Care should be taken not to cauterize the tissues to such an extent that they prevent healing.

Conflict of Interest

The authors declare that there is no conflict of interest.

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