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Penetrating thoracic spine injury causing haemothorax. A case report

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Keywords
penetrating spine injury, thoracic spine injury, haemothorax, missile injury

Abstract

Background. Penetrating spine injuries can cause catastrophic complications to the patient, and it demands immense medical care to minimize the insult. Mainly, it occurs in the military field; however, it has become more prevalent among civilians due to gun availability. The thoracic spine is the most affected part, followed by the cervical and lumbar spine.

Case report. A 15-year-old teenage boy had a penetrating injury to the thoracic (T10) vertebrae due to a missile bullet that resulted in bilateral lower limb weakness and required him to undergo decompressive laminectomy. During surgery, a missed hemothorax was discovered incidentally.

Conclusion. To the best of the author's knowledge, this case of penetrating thoracic spine injury due to a missile bullet associated with missed hemothorax has not been previously reported. This paper discusses the importance of early detection and treatment of injuries associated with penetrating spine trauma to improve patient survival and disability.

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Introduction

Penetrating spine injuries can lead to devastating effects on the patient, representing a significant challenge to the patient and the treating surgeon. Although most penetrating spine injuries occur in the military field, the ubiquity of guns in our society makes them more prevalent among the civilian population. These injuries can be due to any cause, such as a knife, nail, or sharp object but missile bullet injuries due to gunshots represent an important cause. It accounts for about 17-21% of all traumatic spine injuries. It is regarded as the third most common

cause of spine injuries in the civilian population after falls from height and motor vehicle accidents [4].

The thoracic spine represents the most affected part, followed by the cervical and lumbar spine [9]. The complications due to penetrating thoracic spine injuries can extend beyond the trauma to involve neural elements, supporting structures, and other organs, such as neurological compromise, vascular damage, spine instability, and cerebrospinal fluid (CSF) leakage [6]. Hemothorax is also a significant complication associated with spine injuries and may occur due to damage to pulmonary parenchyma, heart, intercostal vessels, and major intrathoracic vessels [3].

However, associated missed hemothorax due to penetrating spine injury has rarely been reported. In this paper, the authors report a case of a teenage boy who was presented with a missile bullet injury to the back and then discovered to have a missed hemothorax intraoperatively that required further surgical care and postoperative management.

CASE REPORT

A 15-year-old teenage male presented to the emergency department with a missile injury to his back; during the physical examination, he was conscious and alert, and there was bilateral lower limb weakness with grade 1 power. Moreover, there were two entry points in the mid-back region at the thoracic 10 (T10) vertebrae level but without an exit site. After the appropriate management and stabilization, a spine X-ray was ordered (Fig.1), which revealed two large foreign bodies (metallic fragments) about 2.5-3 cm in size located at the level of T10.

Figure 1. Spine x-ray of both anteroposterior (**a**) and lateral (**b**) views showing two metallic fragments at the level of T10. Also, (**c**) shows the extracted foreign bodies.

Computed Tomography (CT) scan (Fig.2) has been done and revealed two fragments of foreign bodies at the level of T10 that cross the transverse process and extend to the left pleural cavity. The patient had incomplete spinal cord injury and CSF leakage, which renders in performing decompressive laminectomy surgery with foreign bodies (bullet) extraction.

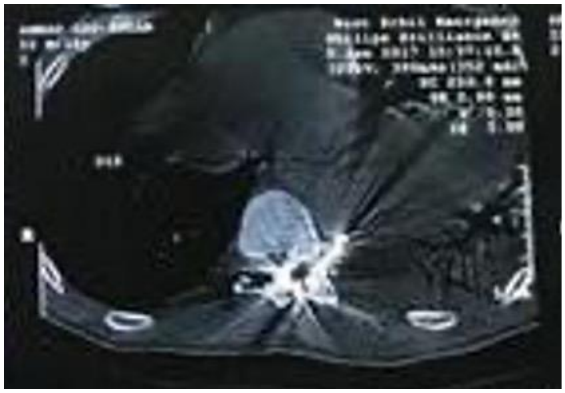

Figure 2. A plain axial CT scan of the spine showing foreign bodies that crosses the transverse process and extends to the left pleural space.

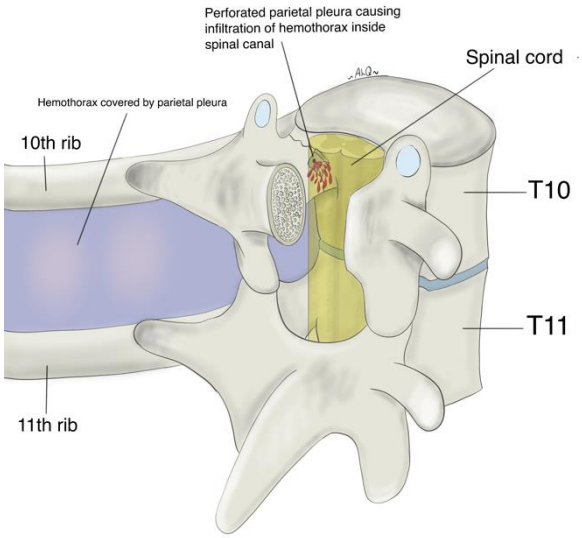

Figure 3. Artistic depiction shows the site of the penetrating bullet to the spinal cord and extending to the parietal pleura.

During surgery, total T10 laminectomy and partial T11 laminectomy were done with midline bullet extraction, then removal of stacked shell from pedicle area. After extraction, a gush of dark-tinged bleeding swung with each ventilation. In the beginning, the source of blood was suspected to be from the fractured bone in the lateral part of the vertebral ring, which stopped using bone wax and

direct compression. However, the gush of blood still came with each ventilation, so there was also a suspicion of associated missed hemothorax that required further cardiovascular care. After chest tube insertion, the collecting system is filled with blood, and the suspicion of hemothorax is confirmed (Fig.3). A few days after the laminectomy surgery, the patient underwent another surgery for partial lobectomy due to a collapsed left lung. On the follow-up, the patient was stable, had normal respiration, and the chest tube was removed. Upon discharge, his paraparesis improved to grade 4.

Discussion

Penetrating spine injuries represent a significant cause of morbidity and mortality in the military field; however, nowadays, it has also become more prevalent among the general population due to the availability of firearms. Male victims are disproportionately affected higher (78-91%) than females, with high incidence during the third decade of life [4,8]. However, in this case, the victim was a male in a child age group who had a penetrating spine injury due to a missile bullet.

Thoracic spine penetrating injuries cause complications such as myelopathy, central nervous system infections, CSF leak following dural tear, spinal instability, and delayed neurological deficits [6,7]. Of these complications, our patient had CSF leakage with partial neurological compromise. Furthermore, according to Manzone et al., early removal of a foreign body in penetrating spinal injury may reduce myelopathy, infection, and delayed neurological deficits. Hence, the patient underwent laminectomy surgery for correction and bullet and shell extraction [5].

Thoracic spine fractures are associated with pleural collection; for example, in a study of 72 patients with thoracic spine fractures, 24% were found to have hemothorax [1]. Usually, the hemothorax results from bleeding from the edge of the bone at the unstable fracture site; hence the stabilization of the thoracic spine controls the bleeding [2]. However, in this patient, a gush of blood after extraction of the foreign bodies fluctuated with each ventilation, even after stabilizing the fractured bone with bone wax and direct compression. The bleeding did not stop; therefore, a suspicion of missed hemothorax was confirmed after tube thoracotomy insertion, which resulted in patient stabilization. This hemothorax occurs due to the bullet's penetration of the parietal pleura.

Hemothorax is usually detected and treated at admission during advanced trauma life support (ATLS) protocol due to the significant risk of late complications [10]. However, this patient had no signs of respiratory compromise before surgery, and the imaging did not show any signs of pleural effusion, so the diagnosis was missed and firstly present during surgery.

To the best of the authors' knowledge, this presentation of penetrating thoracic spine injury due to a missile bullet associated with missed hemothorax has not been previously reported. This paper refers to the importance of early detection and treatment of injuries associated with penetrating spine trauma, especially hemothorax, as it can raise the mortality and morbidity of the patient.

Conclusion

Penetrating spine injuries due to missile bullets are increasing nowadays. It can lead to many complications that increase mortality and morbidity. In this case, we present a patient who had missed hemothorax that was discovered and treated intraoperatively.

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