

Case Report

A rare case of Brown-Sequard syndrome caused by traumatic cervical epidural hematoma

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Abstract

Background: Brown-Sequard syndrome (BSS) is a well-known entity that is most commonly caused by a penetrating injury to the spinal cord (e.g., stab wound or gunshot wound). It is characterized by an ipsilateral weakness (damage to corticospinal tracts) and contralateral loss of pain and temperature two levels below the lesion (damage to lateral spinothalamic tracts). Although, rarely non-penetrating injuries, tumors, disc herniations, infections, autoimmune diseases, and epidural hematomas (non-penetrating trauma and spontaneous) have contributed to BSS syndromes, there are only four cases of BSS in the literature attributed to traumatic spinal epidural hematomas. Here, we add an additional case involving a 59-year-old male.

Case Description: A 59-year-old male presented with a Brown-Sequard syndrome (BSS) after a motor vehicle accident. The magnetic resonance imaging (MRI) demonstrated a cervical epidural hematoma at the C7–T1 level. Following a T1 laminectomy and C6–T1 fusion, his neurological deficit markedly improved. Within six postoperative months, he regained full motor function.

Conclusion: For this patient and others with a traumatic cervical epidural hematoma (C7T1) resulting in a BSS, early decompression (within 48 hours) should result in marked postoperative neurological improvement.

Key Words: Brown-Sequard, cervical epidural hematoma, spinal trauma

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BACKGROUND

Brown-Sequard syndrome (BSS) is a well-known entity that is most commonly caused by a penetrating injury to the spinal cord (e.g., stab wound or gunshot wound). First described in 1850, it is characterized by ipsilateral weakness (damage to corticospinal tracts) and contralateral loss of pain and temperature (e.g., two levels below the lesion reflecting damage to lateral spinothalamic tracts).^[2] Non-penetrating injuries causing BSS are exceedingly rare along with other infrequently encountered etiologies of BSS; tumors,^[5] disc herniations,^[8] infections, autoimmune diseases,

and epidural hematomas.^[5,7,13,18,20,21] To date, there were only four case reports in the literature of BSS caused by a traumatic spinal epidural hematoma.^[2,3,22] Early

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detection with computed tomography (CT) and MRI resulting in rapid surgical decompression/hematoma evacuation, resulted typically in improved neurological outcomes.^[6,7,10,11,20]

CASE DESCRIPTION

Presentation

A 59-year-old Caucasian male was involved in a rollover motor vehicle accident. He was immediately reported to have paresthesias in the both upper extremities accompanied by profound weakness in his left lower extremity.

Clinical examination

Upon arrival to the Emergency Department, his Glasgow Coma Score was 15, but he was complaining of severe cervicothoracic midline tenderness. The motor examination revealed a left hemiparesis (4/5 in distal upper extremity and 2/5 lower extremity) with no right-sided weakness. The sensory examination demonstrated allodynia at the right C7 dermatome, and diminished light touch and pinprick sensation below T1. Rectal tone was present. There was no hyperreflexia or clonus, but he had bilateral Babinski signs.

Imaging

The initial CT of the cervical spine showed multiple areas of chronic degenerative changes without any fractures. However, the STAT MRI revealed a left paramedian dorsal epidural hematoma at the C7–T1 level causing cord compression along with complete disruption of the ligamentum flavum and C7/T1 interspinous ligament [Figure 1].

Clinical course

The patient taken to the operating room emergently for a T1 laminectomy, evacuation of the C7/T1 epidural hematoma, and a C6–T1 instrumented

fusion [Figure 2]. He was placed postoperatively in a cervical-thoracic orthotic brace. His neurological examination immediately improved, for example, strength 4+/5 distal upper extremity and 4+/5 in lower extremity. He did, however, exhibit continued urinary retention on postoperative day 7, and was discharged with a Foley catheter along with a front-wheel walker. Upon his 6-month-follow-up visit, he was noted to be neurologically intact.

DISCUSSION

BSS secondary to a spinal epidural hematomas (SEDH) are extremely rare. In a meta-analysis conducted by Kreppel *et al.*^[9] in 2003, 613 cases of SEDH were reviewed between 1826 and 1996; seven were observed to cause BSS. Since then, 10 additional cases have been reported in the literature.^[3]

Although non-surgical management may be feasible without a neurological deficit, for those with neurological dysfunction, urgent surgical decompression is warranted.^[4,14]

The incidence of spontaneous SEDH is rare, reported in 0.1 per 100,000 people.^[12] Riaz *et al.*^[16] reported in 2007 that incidence was approximately 6.4 cases per year with the incidence increasing due to improved access to appropriate imaging modalities. The most common causes of spontaneous SEDH are typically neoplasm, coagulopathy (iatrogenic or intrinsic), pregnancy, and vascular malformations.^[1,9,11,15-17,19]

In the setting of high-impact trauma, such as that experienced by our patient; development of a SEDH at the lower cervical levels was likely related to the rotatory/whiplash mechanism of injury most pronounced at these levels. Some controversy exists regarding whether the etiology of bleeding is arterial or venous in this condition.

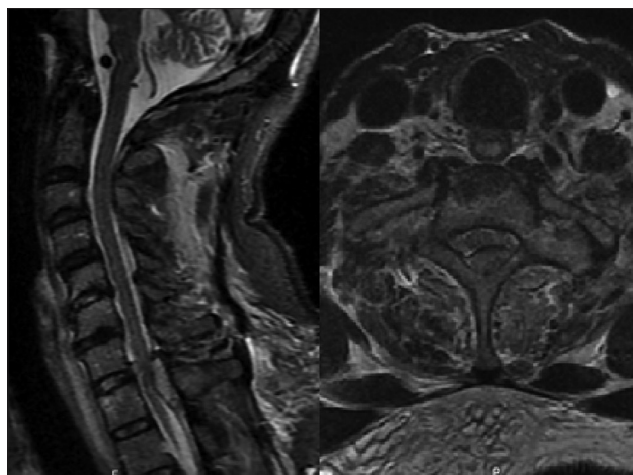


Figure 1: Preoperative MRI cervical spine sagittal STIR (left) and axial T2 (right) showing dorsal epidural hematoma causing cord compression at C7–T1



Figure 2: Postoperative cervical spine AP/lateral XR showing C6–T1 fusion construct with lateral mass screws at C6 and T1 pedicle screws

There are a number of surgical approaches to posterior cervicothoracic epidural hematomas such as laminectomy, hemilaminectomy, and laminoplasty. Alternatively, for a symptomatic anterior SEDH, a direct approach such as a discectomy or corpectomy would likely be utilized.

We believe that urgent surgical decompression and evacuation of the hematoma played a vital role in our patient's neurological recovery. Yoon *et al.*^[21] in 2012 reported improved neurological outcomes for patients with incomplete neurological injuries if surgical decompression was performed within 12 hours of symptom onset. Others share this opinion.^[10,21] In a review of 330 cases by Groen and van Alphen^[6], favorable outcomes occurred in those decompressed within 36 hours. In a series of 30 surgically treated patients, Lawton *et al.*^[11] found the most favorable outcomes occurred in those who went to surgery within 24 hours. Our patient was taken to the operating room within 3 hours of presentation; others described improved outcomes if surgery is performed within 12 hours of symptoms onset. Although, there are documented cases of spontaneous recovery and regression with non-operative management, we believe this management should only occur in those with mild symptomatology without neurological deficits.^[4]

CONCLUSION

Penetrating spinal trauma rarely results in a BSS attributed to a posterior cervicothoracic epidural hematoma. Immediate surgical management should be pursued if the patient has a significant neurological deficit (e.g., incomplete spinal cord injury) to avoid further irreversible symptoms progression.

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Conflicts of interest

There are no conflicts of interest.

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