



## Case Report

# Hyperextension thoracic spine fracture with complete neurological recovery after surgical fixation: A case report

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## ABSTRACT

**Background:** Hyperextension thoracic spine fractures (HTSFs) typically involve the anterior ligamentous complex of the spine. These patients often present with paraplegia and warrant early surgical reduction/fixation even though few deficits resolve. Here, we present the unusual case of a 40-year-old male whose paraparetic deficit resolved following reduction/fixation of a T7-T8 HTSF.

**Case Description:** A 40-year-old male presented with a thoracic computed tomography (CT) documented T7-T8 HTSF following a motor vehicle accident. His neurological examination revealed severe paraparesis, but without a sensory level (ASIA motor score 78). The chest CT angiogram scan revealed a hypodensity in the aorta, representing a small traumatic aortic dissection responsible for the patient's right hemothorax; 450 ml of blood was removed on chest tube placement. He underwent urgent/emergent thoracic spine reduction and fixation at the T7-T8 level. Within 5 postoperative months, he recovered fully neurological function (ASIA motor score 100).

**Conclusion:** We recommend urgent/emergent surgical reduction/stabilization for patients with thoracic HTSF to decrease offer the potential for neurological recovery and avoid secondary injury due to continued compression.

**Keywords:** Aortic dissection, Hyperextension thoracic spine fractures, Spinal cord injury, Traction, Trauma

## BACKGROUND

Hyperextension thoracic spine fractures (HTSFs) typically involve the anterior spinal ligamentous complex (i.e., AO classification type B3).<sup>[1]</sup> As patients have severe both acute neurological compromise and instability, urgent/emergent reduction and stabilization should be performed.<sup>[5]</sup> Here, we present a 40-year-old male who exhibited acute motor paraparesis with sensory preservation attributed to a T7/8 HTSF. Following urgent/emergent reduction and posterior fixation, the patient fully recovered neurological function within 5 postoperative months.

## CASE PRESENTATION

A 40-year-old male sustained a motor vehicle accident. The preliminary neurological examination revealed lower extremity paraparesis with sensory preservation and urinary retention; ASIA

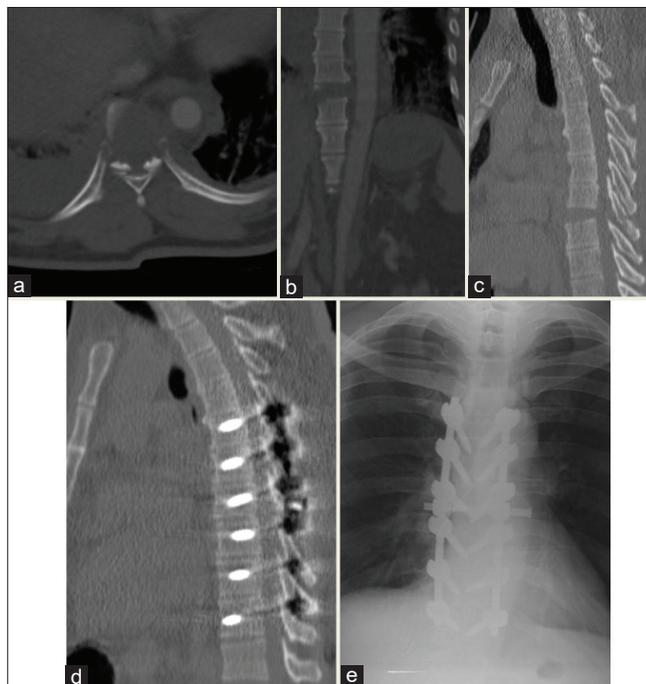
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motor score 78. The chest computed tomography (CT) angiogram revealed a hypodensity in the aorta, representing a small traumatic aortic dissection responsible for the patient's right hemothorax; 450 ml of blood was removed on chest tube placement. When the thoracic CT also demonstrated a T7-T8 HTSF, he underwent an emergent thoracic spine reduction/fixation procedure. Surgery at the T7 level warranted bilateral laminectomies and resection of the pars interarticularis; pedicle screws were placed bilaterally from T5 to T10, and following displacement/repositioning under direct fluoroscopic guidance, a posterior arthrodesis was performed [Figure 1]. Within 5 postoperative months, he had no residual neurological deficit (ASIA motor score 100), no sphincter dysfunction, and only complained of mild residual lower extremity paresthesias.

## DISCUSSION

HTSFs are rare.<sup>[3]</sup> Due to typical significant accompanying neurological deficits and instability, these unstable fractures typically require timely reduction/internal fixation.<sup>[5]</sup>



**Figure 1:** The computed tomography (CT) scan of the thoracic spine with contrast for detect of vascular injury showed the bilateral head of seventh ribs fracture and right huge hemothorax on an axial view (a). Furthermore, we could see a widening of T7-8 disc space on coronal reconstruction (b) with a small avulsion of the superior endplate of T8. Furthermore, a small hypodensity in the adjacent aorta could be seen that was treated with traumatic aortic dissection diagnosis (b). Sagittal view reconstruction (c) revealed a fracture of the T7 spinous process. Postoperative CT scan in sagittal view (d) and anteroposterior view X-ray (e) showed normal alignment of the previously displaced thoracic spine.

## Spontaneous versus surgical reduction of HTSF

In some cases, external bracing alone may be utilized where there is a spontaneous reduction of the HTSF. Choy *et al.* utilized complete bed rest for 16 weeks in a patient who demonstrated spontaneous fixation (e.g., the 16-week CT scan confirmed adequate anterior osteophyte bridging).<sup>[3]</sup> In Shin *et al.*, the patient with a neurologic deficit that had progressed over 20 days ultimately underwent a delayed reduction/fusion.<sup>[6]</sup> Here, as our patient had a gap between the two T7-T8 endplates that did not spontaneously return to baseline, he warranted an open T7 laminectomy followed by reduction with posterior T5-T10 fixation.

## Goal of HTSF treatment

One of the surgical goals in treating patients with HTSF is the decompression of neural tissues (i.e., as in our patient undergoing bilateral limited T7 laminectomy with resection of the pars interarticularis) and the provision of simultaneous reduction/stabilization (i.e., to prevent further spinal cord injury). Elgafy *et al.* and Shin *et al.*, respectively, performed spinal decompressions in their patients utilizing laminectomies with spinous process resections.<sup>[5,6]</sup> Bailey *et al.*, like many other surgeons, did not perform posterior decompression for HTSF, but rather solely chose posterior reduction/fixation alone.<sup>[1]</sup>

## Early reduction/fixation warranted

Patients with HTSF and anterior disk space widening warrant early surgical reduction/fixation to provide immediate stability and to potentiate neurological recovery while avoiding secondary compressive injury. The number of vertebral levels requiring fusion ranges from 2 to 13.<sup>[4-6]</sup> In our patient, we fused six vertebrae (three vertebrae above three below the HTSF) using 12 pedicle screws. Postoperatively, we also used a thoracic lumbar sacral orthosis for 3 months.

## Residual deficits after surgery for HTSF

Rare patients with significant preoperative neurological deficits attributed to HTSF improve with surgery, while the majority do not.<sup>[2,4]</sup> Here, our patient with an initial ASIA motor score of 78 improved after surgery to 100, regaining full normal function (e.g., with reduction/fixation).

## Etiology and evidence of aortic dissection with HTSF

Aortic dissection can be attributed to acute widening of the distance between the HTSF endplates (i.e., seen on CT), resulting in a tethering/a stretch injury to the aorta over the posterior vertebral bodies. In our patient, a hypodensity seen in the aorta 3 cm below the fracture was diagnosed as a small traumatic aortic dissection responsible for the patient's

450 cc hemothorax. In other patients, additional findings may include esophageal and tracheal injuries.

## CONCLUSION

In this case, an initially paraparetic patient with sensory preservation attributed to a T7-T8 HTSF urgently (i.e., postadmission day 1) underwent bilateral laminectomies at T7 with bilateral T5-T10 pedicle screw fixation. Within 5 postoperative months, the patient was neurologically intact.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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