

Case Report

Thoracic spine teardrop fracture – A case report

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ABSTRACT

This is a case report of a young man who suffered from an anterior inferior angle fracture (teardrop) of the thoracic spine at the dorsal spine third vertebra (D3). It was due to a road traffic accident and led to paraplegia and hypoesthesia below D7 dermatome. The patient was treated with decompression and posterior stabilization using pedicle screw fixation followed by physiotherapy. Teardrop fracture is a type of cervical fracture that is associated with high morbidity and mortality due to its instability, with no reported similar fracture pattern at the thoracic spine level. This is a unique case of a thoracic teardrop fracture that was treated surgically with a posterior approach, a good clinical outcome, and 18 months follow-up.

Keywords: Decompression, Paraplegia, Spine fracture, Teardrop, Thoracic spine

INTRODUCTION

Spine fractures that occur at the thoracic vertebra levels are mechanically more stable to axial and horizontal translation, and this is contributed to the unique sagittal orientation of facet joints and the presence of the costotransverse articulation of the thoracic spine segment. Making the surgical option of short segment in this region of the spine is adequate.^[1] Moreover, patients diagnosed with fracture-dislocation of the thoracic spine complicated with minimal or without spinal cord injury have been rarely reported. They merely account for 3% of all types of fracture-dislocations of the thoracic spine.^[2]

Teardrop fracture is a rare type of spinal fracture that represents up to 15% of all cervical fractures.^[3] This type of fracture was first described by Schneider and Khan in 1956 as a significant unstable fracture with a high incidence of neurological compromise.^[4] Since then, there have been many efforts in understanding and describing the morphology of such fractures. To date, the most used classification is that described by Korres *et al.*,^[5,6] dividing these fractures into extension and flexion types. To the best of our knowledge, there has been no previous report of such injury affecting the thoracic spine vertebra.

The extension teardrop fracture (ETDF) usually is due to a hyperextension force resulting in an avulsion fracture of the anterior-inferior angle of the vertebral body, while the anterior longitudinal ligament (ALL) remains intact. However, this type of fracture is rarely associated with a neurological compromise, with the majority of the cases are treated successfully with

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conservative management.^[7] On the other hand, flexion teardrop fractures (FTDFs) are considered highly unstable fractures with a high incidence of neurological deficit, usually, they are the result of a combination of strong axial and flexion forces, leading to a coronal plane fracture of the anterior-inferior angle of the vertebral body with retropulsion of the posterior fragment, impinging on the spinal cord leading to neurological compromise similar to our case.

There are several features associated with this fracture, including sagittal split fracture of the vertebral body, injury of the posterior ligaments, and increased interspinous space.^[3,8]

Surgical treatment, with either anterior or posterior stabilization with or without decompression, is almost always warranted except in very few cases of stable extension-type injuries of the axis.^[7] However, due to the unstable bone fracture and the risk of spinal cord injury aggravation, no consensus has been reached on the standard treatment of this rare category of spinal cord injury, and the purpose of this report is to present the clinical, functional, radiological features, as well as the operative technique of a rare thoracic spine teardrop fracture.

CASE REPORT

A 22-year-old man presented to the emergency trauma room following a road traffic accident. At the time of presentation, the patient had stable vital signs. He was conscious, alert, and oriented with a Glasgow Coma Scale of 15/15. The patient was shifted to the hospital on a spinal board and with a cervical collar applied by the paramedics at the scene. The trauma surgery team assessed the patient initially and implemented the advanced trauma life support protocol. He was deemed to be hemodynamically stable with no major systemic injuries. However, the patient was having pain and weakness in both lower extremities. Clinically, he was noted to have flaccid paralysis on both lower extremities, 0/5 in all myotomes in both lower extremities, 0/2 sensation below D7 dermatome, absent reflexes, as well as loss of anal tone according to the American Spinal Injury Association classification; this was consistent with ASIA A.

Radiographs and pan computed tomography revealed D3 fracture [Figure 1], left hemithorax, and fracture of the left 6th rib. Thoracic spine MRI showed a teardrop fracture of the anterior-inferior corner of D3 with minimal posterior displacement indenting on the adjacent spinal cord. Furthermore, a focal intramedullary area of bright T2 signal within the adjacent spinal cord denoting cord edema and/or ischemia was observed. In addition to this, there was minimal intraspinal epidural hematoma noted opposite D4 with a torn interspinous ligament and minimally widened facet joints opposite D3-4 disc level [Figure 2].

The patient underwent indirect reduction of the fracture fragment and posterior stabilization from D2 to D4

utilizing minimal invasive technique under fluoroscopic control in <8 h following the injury [Figure 3]. Neurological examination postoperatively remained

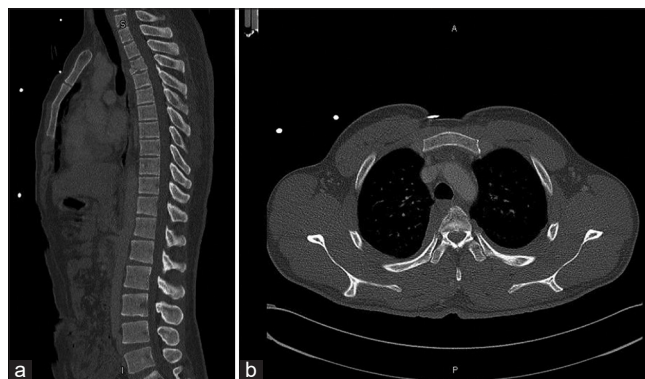


Figure 1: (a and b) Sagittal and axial cut CT scan showing the fracture of the 3rd thoracic vertebra (D3).

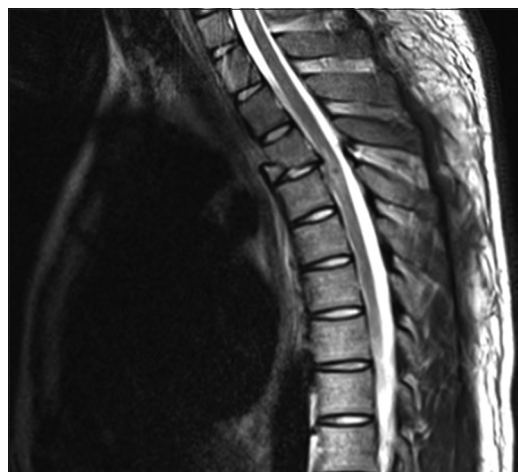


Figure 2: T2-weighted MRI sagittal section of the thoracic spine showing D3 teardrop fracture with impingement of the adjacent spinal cord by the posterior fragment.

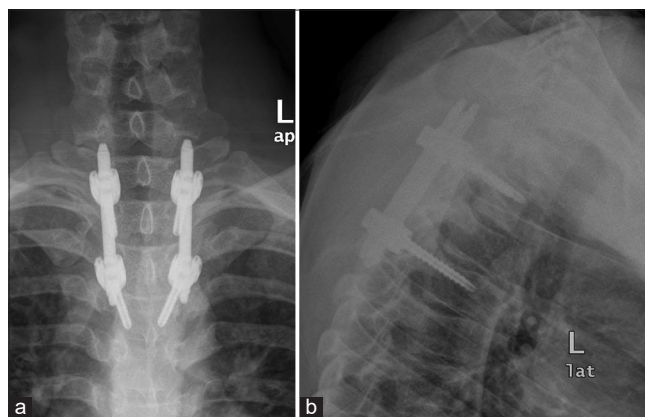


Figure 3: Post-operative radiographs of the thoracic spine showing posterior pedicle screw fixation in the AP (a) and lateral (b) positions.

the same with paraplegia and hyposensation below D7 dermatome.

The patient was transferred after 7 days with a clean, dry wound to rehabilitation service. During the rehabilitation program and after 18 months follow-up, the patient experienced improvement of his neurological status, and during his final follow-up, his neurological examination, the patient was able to move his lower limbs against gravity, which was consistent with ASIA C.

DISCUSSION

While conservative management was shown to be effective with ETDF in the absence of cervical instability or neurological deficit, it is inferior to operative management for the majority of FTDF. This been contributed to the worse neurological outcome, prolonged immobilization, and associated complications with these injuries.^[9] On the other hand, surgical management has been associated with better neurological outcomes, early mobilization, and providing cervical spine stability.^[7]

The anterior cervical approach, which was introduced by Smith and Robinson, Bailey and Badgley,^[10,11] is very popular for treating such fractures in the lower cervical spine. It provides easy access to the fractured vertebra making plating and fixation easier with relatively minimal complication. While accessing the superior thoracic spine with this approach becomes limited by the thoracic inlet, some authors have reported satisfactory outcomes accessing the superior thoracic spine by modifying this approach with manipulations of the sternum, manubrium, clavicle, or a combination of them.^[12-16]

Flexion-distraction fractures of the thoracolumbar spine have been treated reliably and safely with pedicle screws. While it is not the same as the FTDF, it shares a similar hyperflexion mechanism of the fracture.^[17] Published reports have demonstrated that anterior approach, posterior approach, and anterior combined with posterior approach surgeries are efficacious therapies of fracture-dislocation of the thoracic spine. However, none of these approaches can achieve complete reduction. In addition, both the anterior approach and combined approach are likely to cause severe trauma, which severely limits clinical application. Along with the clinical application of thoracic pedicle screw, rapid advancement has been obtained in the clinical treatment of the thoracic spinal injury.^[2]

Due to the disruption of the integrity of the posterior ligaments in our case, the posterior approach was preferred. Stable reduction of the posterior fragment of the fracture was achieved with short-segment fixation including a vertebra above and below the fracture as the thoracic vertebra is having much more support than other vertebrae in the body

and this is due to the configuration of the rib cage, which provides more stability to the instrumentation making the need for more instrumentation limited. This fixation fortunately led to functional and neurological improvement, and early mobilization in our patient.

CONCLUSION

Although neurological involvement is an indication for surgical fixation, clinical improvement has always been expectant, and a higher level of evidence is needed to reach a better conclusion regarding which surgical treatment option gives the best outcomes.

AUTHORS' CONTRIBUTIONS

TT collected and organized the data, IM and WA wrote the manuscript, and MH and AA revised and provided critical input. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

ETHICAL APPROVAL

The authors confirm that this report had been prepared in accordance with COPE roles and regulations. Given the nature of the report, the IRB review was not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his clinical information and images to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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