



Case Report

Traumatic lateral spondyloptosis of L2 with complete neurological deficit: A case report

Zhao Jindong, Lan Qing*

Department of Spinal Surgery, The Fifth Hospital of Harbin, Harbin City 150040, Heilongjiang Province, PR China

ARTICLE INFO

Keywords:

Traumatic spondyloptosis
Corpectomy
Neurological deficit
Spinal fusion
Replantation *in situ*

ABSTRACT

Traumatic spondyloptosis of the lumbar spine is an uncommon and severe clinical entity, which is defined as complete fracture dislocation and subluxation (> 100%) of one vertebral body in the coronal or sagittal plane from its adjacent vertebra. In coronal spondyloptosis the subluxated vertebral bodies lie beside each other, and the condition is lateraloptosis.

Clinical case: A male patient aged 56 years had multiple injuries with complete neurological deficit. Computed tomography(CT) revealed as spondyloptosis, which L2 detached from the rest of the spine, spinal canal stenosis, sagittal imbalance, and angular kyphosis. We performed an *en bloc* corpectomy and iliac bone combined part of the vertebra body replanted *in situ* with posterior transpedicular fixation of T12-L4, with the sagittal balance recovered and motor function improved progressively.

Conclusion: Traumatic spondyloptosis requires an early resolution by a trained surgical team to ensure sagittal re-alignment for a progressive neurological recovery.

Introduction

Thoracolumbar vertebral fractures most commonly affect the thoracolumbar junction(T11-L2) [1]. One of the most severe injuries is fracture-dislocation. Complete fracture-dislocation and subluxation (> 100%) of one vertebral body in the coronal or sagittal plane from its adjacent vertebra is defined as spondyloptosis. In coronal spondyloptosis the subluxated vertebral bodies lie beside each other, and the condition is lateraloptosis [2]. Spondyloptosis is usually associated with a severe neurological deficit, with 80% of case leading to complete paraplegia [3]. Usually high-energy traumas cause traumatic spondyloptosis with multisystem collateral damage, where multidisciplinary intervention becomes essential [4].

The management of spondyloptosis is a complex surgical process, while unstable injuries requiring operative fixations to restore the alignment and prevent the deformity for an ideal postoperative retrieval [5].

Traumatic spondyloptosis is extremely rare, with a lack of case reports in the literature [6], especially, lateraloptosis [2]. Here we are reporting a case of traumatic L2 lateraloptosis with complete paraplegia.

Clinical case

The patient was a 56-year-old male who had a high-energy polytraumatism after falls. On initial neurological assessment, the patient had 0/5 strength in the lower extremities. The sensation was absent in the lower extremities. The rectal tone was flaccid, all

* Corresponding author.

E-mail addresses: zhaojindong1025@163.com (Z. Jindong), 15004510096@163.com (L. Qing).<https://doi.org/10.1016/j.tcr.2020.100339>

Accepted 27 July 2020

Available online 29 July 2020

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Fig. 1. A preoperative X-ray demonstrating a fracture dislocation with a lateral displacement of L2.

this commonly classified as American Spinal Injury Association (ASIA) A [7]. A lumbar spine X-ray, CT and MRI revealed L2 vertebral lateral displacement detached from the rest of the spine with the spinal canal stenosis associated with the sagittal imbalance and angular kyphosis (Figs. 1–3).

The patient had a multisystem trauma with fractures of the right-side ribs from the third to the ninth. He had a right hemothorax that required a chest drain. Furthermore, the patient had fractures of both the transverse processes of T12, L1 and L3. However, there were no additional fractures in the thoracic or cervical spine.

Sixteen hours after injury, he was transferred for operational procedures emergently to address his lumbar spine injuries under



Fig. 2. A preoperative parasagittal/transverse CT demonstrating an angular kyphosis and a lateral displacement.

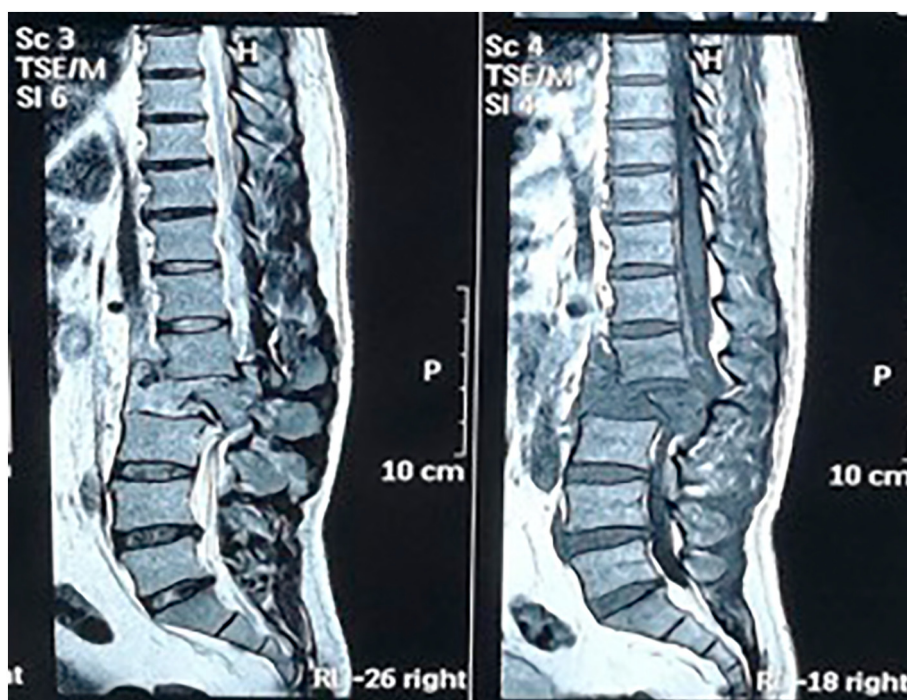


Fig. 3. A preoperative sagittal MRI showing ligamentous instability and complete compression of the thecal sac and cauda equina.

general anesthesia. He underwent a T12 to L4 posterior instrumented fusion with L2 corpectomy and placement of iliac bone combined part of the L2 vertebral body *in situ* (Fig. 4-5). The entirety of the case was performed from a posterior approach. Intraoperatively, the thecal sac had been destroyed, and there was significant nerve root injury apparent.

Postoperatively, the patient's strength in left lower extremity improved to 1/5 with sensation recovered in the anterolateral thigh of left (ASIA B). But otherwise continued to be a functionally complete paraplegic without bowel or bladder control in 48 h. The patient's strength in left lower extremity and hip flexion of right improved to 3/5 and 2/5, respectively, after half a year (ASIA C). One year after surgery, the CT of lumbar spine of patient demonstrated that L1-3 interbody bone graft being stable without collapse and displacement, along with a continuous trabecular passage in sagittal plane. In coronal plane, the fusion was in L1-3 posterolateral bone graft (Fig. 6).

Discussion

Traumatic lumbar spondyloptosis most frequently occurs at the L4-L5 and L5-S1 levels and is associated with severe neurological

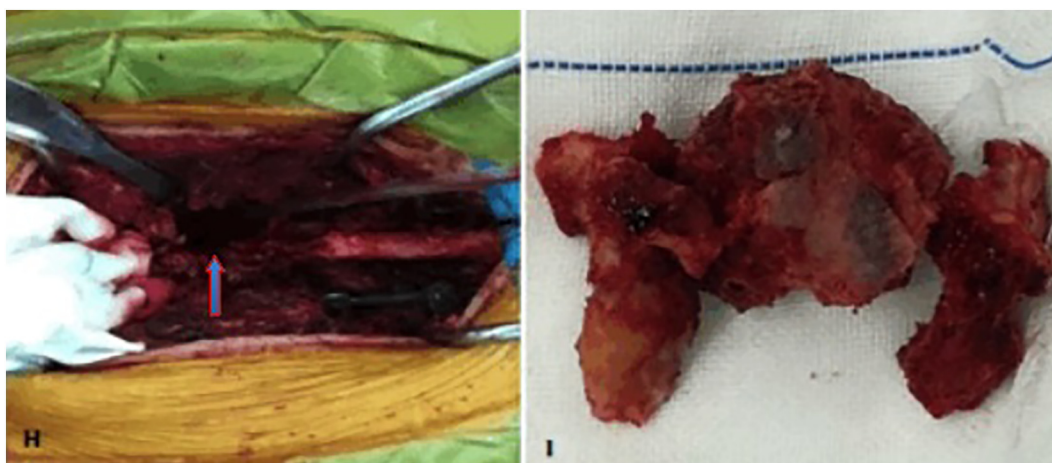


Fig. 4. This is an intraoperative photograph of the fractured L2 *in situ* (arrow) and the part of vertebral body after *en bloc* removal.

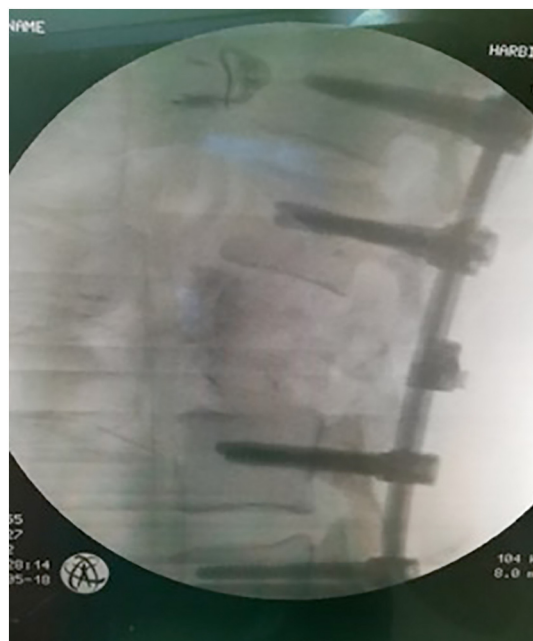


Fig. 5. A Intraoperative fluoroscopy showing fixation of the spine from T12-L4. The iliac bone combined part of the L2 vertebra body replanted at the L2 level.



Fig. 6. 1 year follow-up, there were fusion in L1–3 interbody and posterolateral bone graft.

deficit [8]. The injury mechanism of the patient would be compatible with the shear-type of fracture-dislocation, according to the report of Denis group [9], where all three columns were disrupted. The lateraloptosis reported here is resulted from the mechanism of shearing and axial compression. These injuries have the highest association with spinal cord injury of all fracture types [10]. However, early recognition of injuries and treatment are crucial in the preservation and neurological recovery.

Traumatic lateraloptosis means complete absolute instability of spinal structure, where conservative treatment shown to be ineffective. Therefore, surgery is the only option. It is a remarkably uncommon injury, and in most cases, the lumbar vertebral body dislocates anteriorly or posteriorly relative to the adjacent vertebral body, and a lateraloptosis is more even rare [11,12]. There are no guided managements. Thus, surgical treatments of these injuries remain to be challenging [13].

In our case, we removed the laterally dislocated L2 vertebrae and reconstructed the anterior column by placing an iliac bone combined with a part of the vertebra body of L2 *in situ*. Given the notoriously management of L2 corpectomy and significant ligamentous instability of this injury, we elected to perform a concomitant posterior instrumented fusion. To provide sufficient support for our anterior construct, we used posterior pedicle screws of T12-L4 to prevent failure during flexion. This construct would

be optimal for the long-term fusion.

The procedures here restored the stability of the three columns and the normal sequence of the spine, preventing further deformity and allowing the neurological recovery and an earlier rehabilitation training. As shown in postoperative follow-up one year after operation, the intervertebral bone graft fusion suggested a good replantation of the dislocated vertebral body. Currently, as there is no standard treatment guideline for these injuries, the case here would have significant guidance and reference for other similar cases.

Conclusions

Traumatic lateral apophysis of the L2 vertebral level are rare injuries that are associated with severe neurological deficit. It is inherently unstable fractures requiring surgery to restore anatomic alignment allowing a progressive neurological recovery. The treatment varies with individual specialty. a posterior instrumented fusion with the anterior column reconstruction to aid fusion. It is also essential giving priority to handle life-threatening injuries that need multidisciplinary intervention.

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