

## Case Report



# Acute Translation Fracture of the Lumbar Spine With Increased Motoric Outcomes: A Case Report

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### Conflict of Interest

The authors have no financial conflicts of interest.

## ABSTRACT

Translation fracture of the lumbar spine is a rare but serious condition that necessitates prompt medical attention. This injury can cause nerve damage, spinal cord compression, and other complications that can affect motor function. The motoric outcomes of this fracture type depend on a variety of factors, including the severity and location of the fracture, the age and general health of the patient, and the timeliness and effectiveness of treatment. Accurate diagnosis and treatment of these injuries is important to prevent further neurological damage and improve motoric outcomes. Here we present the case of a male patient with a translation fracture at the L1-L2 level with AO spine type C who underwent immediate realignment and posterior stabilization, and subsequently participated in an early rehabilitation program, resulting in improved neurologic function. Thoracolumbar fracture with lateral dislocation is very rare and significant experience is needed to determine which management strategy can ensure the best outcome.

**Keywords:** Lumbar vertebrae; Spinal fractures; Spinal cord compression

## INTRODUCTION

Spinal injuries account for approximately 3% of all injury cases, with the majority of these injuries involving the thoracolumbar region. However, thoracolumbar fracture-dislocations are relatively infrequent.<sup>5,9)</sup> The thoracolumbar area of the spine is the region most sensitive to severe injury, as it acts a transition zone between the relatively stable and immobile thoracic spine and the flexible lumbar spine.<sup>5,12)</sup> As such, high-energy trauma frequently causes injuries in the thoracolumbar area, including falls from great heights, traffic accidents, extreme sports, and work-related injuries.<sup>5,8)</sup> Conversely, the lumbar spine becomes less stiff as the distance from the thoracic area increases. As such, degenerative disorders are more likely to occur distally, while traumatic injuries are more likely to occur superiorly within the thoracolumbar region.<sup>12)</sup> Fracture-dislocations, which commonly result from high-energy trauma, are the most common type of fracture associated with brain impairment and accompanying bone injuries.<sup>2,4)</sup> Here, we present the case of a 52-year-old male who experienced a translation fracture at the L1-L2 level with AO spine type C. The patient was treated with immediate realignment, posterior stabilization, and an early rehabilitation program, ultimately achieving improved neurological function.

## CASE REPORT

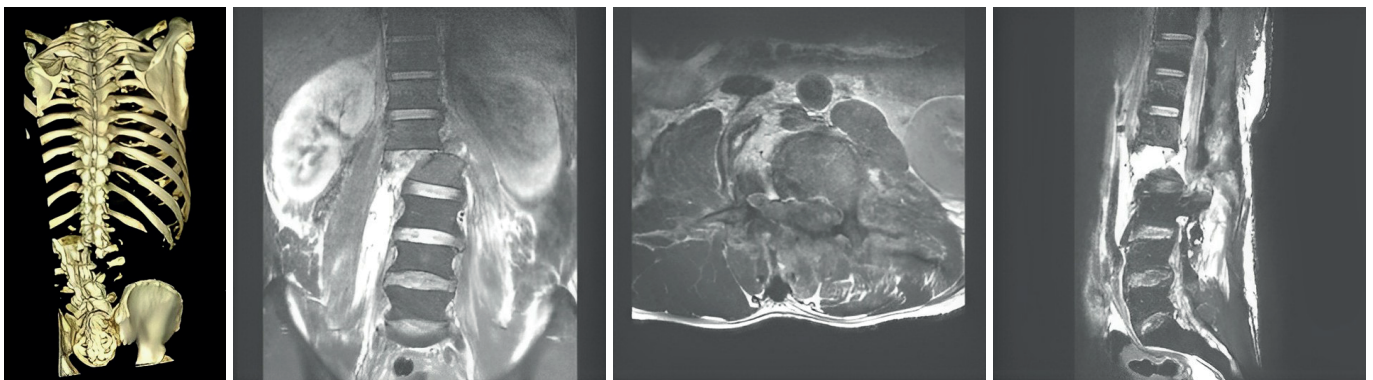
A 52-year-old male was admitted to the emergency room after experiencing lower back pain, numbness, and paraplegia following a fall from a tree of approximately 20 m in height. Radiological examinations revealed a translation fracture affecting the L1 and L2 vertebrae, classified as AO spine type C. This fracture was causing spinal cord compression and resultant neurological deficits, as shown in **FIGURE 1**. The abdominal aorta showed no changes induced by trauma, and no signs of dissection (**FIGURE 2**).

The patient presented with severe neurological deficits prior to surgery. His ASIA score was A, indicating a complete lack of sensory and motor function below the injury level. Motor evaluation revealed no motor function, and the patient presented with complete sensory deficit. The bulbocavernosus reflex was absent.

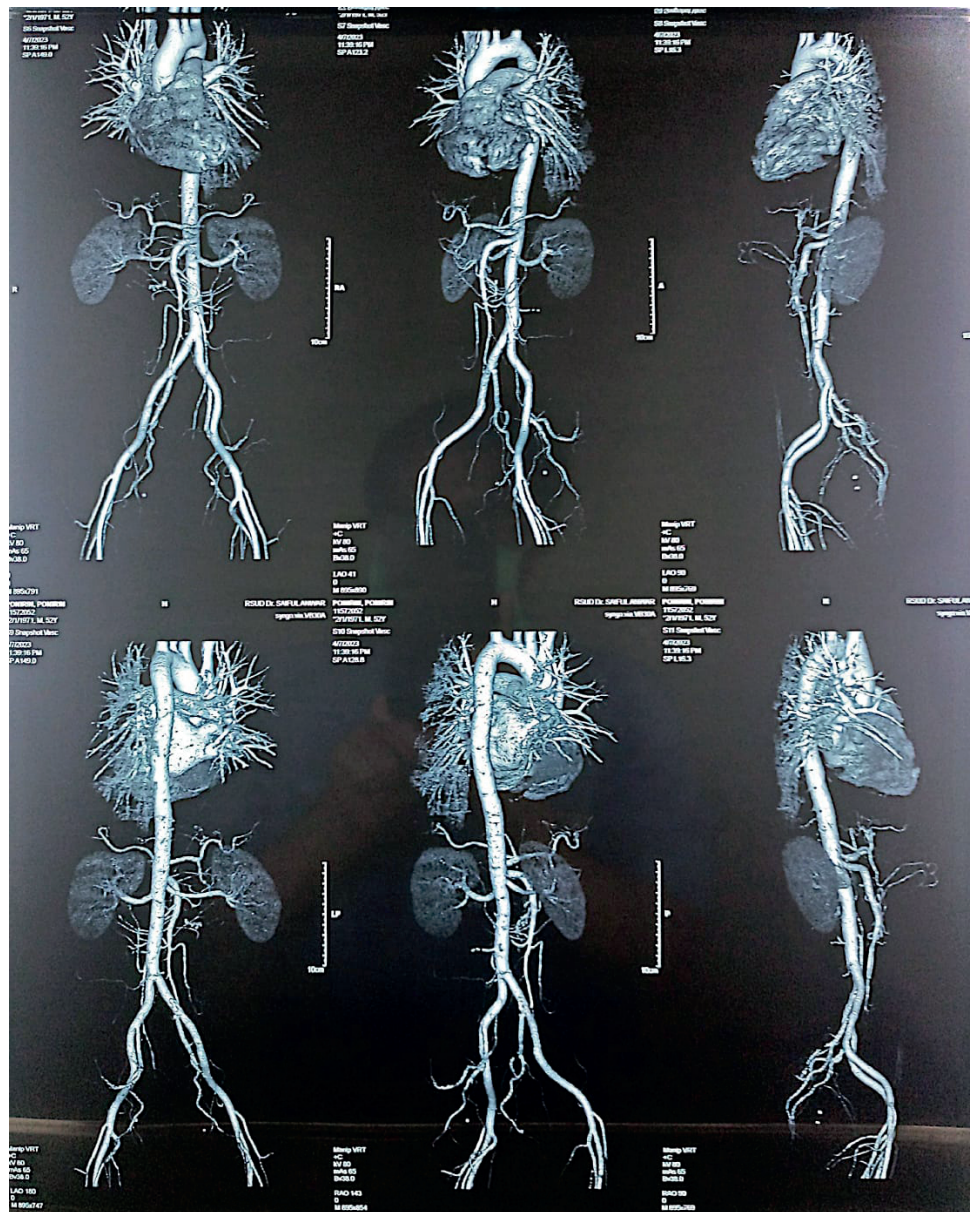
Steroids were administered during the perioperative period to mitigate inflammation and reduce potential spinal cord edema. Urgent surgical intervention was deemed necessary, and was performed promptly on day 2 post-injury. The primary goal of surgery was to stabilize the spine and alleviate spinal cord compression. Treatment involved a modified spinal decompression posterior, comprising a decompressive laminectomy and pedicle screw fixation spanning from the T11 to L4, as depicted in **FIGURE 3**. Fracture reduction was performed under general anesthesia.

Surgery was performed with the patient placed under general anesthesia in the pronated position. A linear incision was made according to the alignment of T11–L4, and the paraspinal muscles were separated using a monopolar technique to reach the lateral facet. Examination revealed a dislocation of the L1 towards the L2 to the right, accompanied by multiple fragmented fractures in the lamina and spinous processes of both the L1 and L2, in addition to irregular facets. Pedicle screw installation was performed from the T11 to L4, followed by spinal rod insertion to stabilize the vertebral column.

Left-sided decompression was systematically performed, with bending applied to the L1 and L2 following pedicle screw installation to distract the dislocated area. Posterior stabilization was conducted after securing the dislocation area with screws. During the procedure, a dura mater tear was identified, exposing a tear with a macroscopically intact spinal cord. Subsequently, dura closure was performed to ensure the integrity of the spinal cord and surrounding tissues.



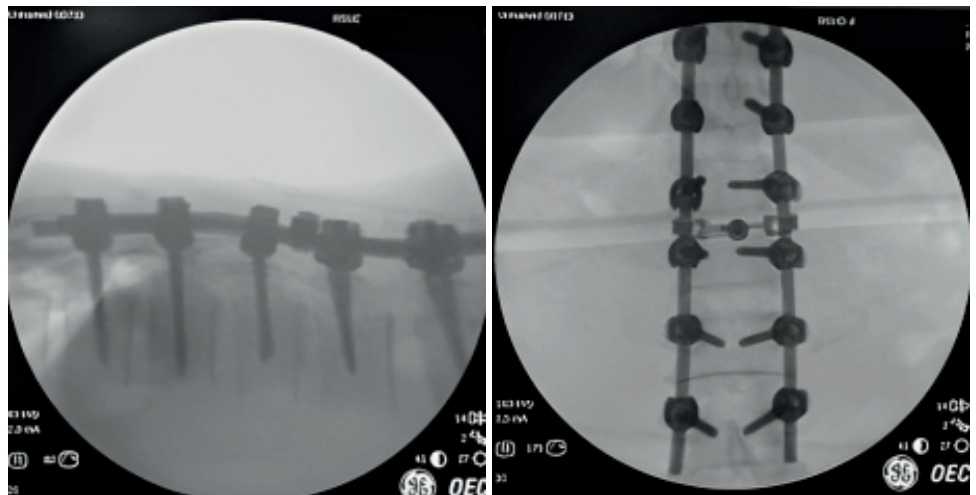
**FIGURE 1.** Computed tomography and magnetic resonance imaging revealed L1–L2 translation fracture (AO spine type C).



**FIGURE 2.** The abdominal aorta shows no changes from trauma and no signs of dissection.

Following surgery, a postoperative rehabilitation regimen was rapidly initiated, ultimately promoting the restoration of partial motor function and sensory perception within the legs. Steroids and medication were prescribed by the doctor to aid in neurorecovery. The patient was followed up periodically, with motor intention and neurological function measured every 2 weeks. The patient's motor evaluation improved to an MRC score of 3, with hypoesthesia showing improvement compared to preoperatively. His autonomic function remained stable at the 2nd month of evaluation.

Informed consent was obtained from the patient included in this study.



**FIGURE 3.** Intraoperative evaluation with C-arm.

## DISCUSSION

Fracture-dislocation, which often results from high-energy trauma, is the fracture type most commonly associated with brain impairment and accompanying bone injuries. Spinal injuries involving complete fracture and dislocation often result in a complete loss of neurological function below the injury site,<sup>10)</sup> while thoracolumbar fracture-dislocation has been shown to significantly reduce spinal stability.<sup>5)</sup> The combination of shear, rotation, and flexion-extension damage affects the bone columns and the associated ligamentous structures<sup>1,7)</sup>; as a result, this condition significantly impacts the quality of life of individuals suffering from these injuries.<sup>6)</sup>

Early and accurate diagnosis plays a critical role in avoiding inappropriate maneuvers among patients with thoracolumbar spinal fractures and dislocations. The risk of harm to the spinal cord and the potential emergence of unintended neurological deficits are significant due to the considerable instability within the compromised spine.<sup>6,13)</sup> In this particular case, the patient underwent a thorough diagnostic evaluation, encompassing both computed tomography (CT) scanning and magnetic resonance imaging examination. Although plain radiographic findings facilitate the visualization of vertebral column injuries, CT scans provide a more comprehensive assessment, with a higher degree of precision.

The primary goal of management in individuals with fracture-dislocation injuries is to realign and stabilize the affected vertebrae in order to avoid unintentional neurological impairments.<sup>14)</sup> Early decompression and fusion have proven to be more beneficial than nonoperative treatment in the event of incomplete spinal cord injuries.<sup>6)</sup> Due to the severity of this bone fracture, the suggested procedures for realignment and fixation are posterior placement, reduction, multilevel instrumentation, and fusion. Conversely, conservative treatment is advised for elderly patients, those harboring severe underlying diseases, or those with grave complications.<sup>11)</sup>

Long-term sequelae, such as late neurological degeneration in patients with preserved neurology, kyphosis, and chronic pain, can have a significant negative impact on quality of life. The key to successful management is adherence to two fundamental principles: biomechanical stability and neurological optimization.<sup>5)</sup> Posterior fixation techniques such

as Luque rods, Hartshill rectangles with sublaminar wires, hook and Harrington rods, among others, have significantly evolved over the last few decades.

Fracture dislocation is the most common form of unstable vertebral injury, affecting three spinal columns. The pedicle screw procedure, which allows 3-column fixation from a posterior approach, has revolutionized fixation strength in spine surgery.<sup>3,5)</sup> Most fracture-dislocations do not require anterior surgery; however, in rare occasions, injuries with anterior columns which remain deficient after posterior reconstruction may necessitate a second-stage anterior approach.<sup>13)</sup> As a result, such injuries should be reduced and appropriately repaired as soon as possible.<sup>5,7,12)</sup>

## CONCLUSION

Complete lateral dislocation of the thoracolumbar spine is extremely rare. Healthcare professionals should maintain a high level of suspicion of spinal fractures in patients with a recent history of high-energy trauma, and should promptly request CT scans to accurately assess the condition of the spinal cord. The early detection of spinal fractures is vital in preventing unintentional neurological damage that may arise from incorrect procedures. While total lateral dislocation of the lumbar spine is often linked to cord transection and subsequent paraplegia, our recent case suggests the potential for complete neurological recovery. Surgical restoration with extended fixation should be considered for patients with complete traumatic lumbar dislocations and stable hemodynamics.

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