Traumatic Posterior L4–L5 Fracture Dislocation of the Lumbar Spine: A Case Report

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Abstract

Study Design Case report.

Objective The diagnosis and surgical management of a patient with traumatic bilateral posterior dislocation of L4–L5 is presented with a thorough review of the existing literature.

Summary of Background Data Traumatic dislocation of L4–L5 has been reported in the English literature in only five cases; of these, only two were retrolisthesis.

Methods A 20-year-old patient was involved in a high-energy vehicular accident and presented with back pain and inability to ambulate. Neurological assessment showed motor strength grade 2/5 in the proximal lower-extremity muscle groups (L1–L3 myotomes) and 0/5 strength distally (L4–S1 myotomes); in addition, incontinence of sphincters was found. X-rays and computed tomography (CT) scan revealed a three-column ligamentous injury with posterior fracture-dislocation of the L4 vertebral body with complete posterior displacement of L4 to L5 vertebral body. The patient underwent posterior approach with reduction, transpedicular fixation, and posterolateral fusion with autologous bone graft.

Results At 1-year follow-up, the patient had recovered muscular strength in proximal lower-extremities muscle groups, sphincter function had fully recovered, and he was able to ambulate with crutches. There was no recovery of distal extremity sensorimotor function. Plain radiograph and CT scan showed good alignment and progressive maturation of his fusion procedure.

Conclusion Traumatic retrolisthesis of L4–L5 is a high-energy unstable fracture; reduction of the dislocation is challenging because of the heavy forces acting in the lower lumbar spine. Instrumented fusion restores alignment and maintains segmental stability.

Keywords
- thoracolumbar trauma
- traumatic retrolisthesis
- fracture-dislocation

Traumatic spondyloptosis, or grade 5 spondylolisthesis, is defined as greater than 100% traumatic subluxation of one vertebral body in the coronal or sagittal plane.[1]

Traumatic L5–S1 dislocation had been frequently reported[2–5]; on the other hand, there are few reports about traumatic dislocation of L4–L5. Only five cases are reported in the English literature,[6] two of which were retrolisthesis.[7,8] We report one case of L4–L5 traumatic posterior dislocation of L4 vertebral body caused by high-energy trauma. Both the L4 vertebral body and the vertebral column above were totally

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displaced posterior to the L5 vertebral body. The mechanism of injury, surgical management, and 1-year follow-up are evaluated.

Materials and Methods

Patient Presentation

A 20-year-old man under the influence of alcohol was in a car that rolled over; he received initial treatment in a community hospital where he was diagnosed with abdominal trauma that did not require any surgical treatment. A spinal cord injury with traumatic dislocation of L4–L5 was diagnosed and referred to our tertiary care orthopedic unit 10 days after the accident. The patient had ecchymosis of the lumbosacral region, motor strength grade 2/5 in the proximal lower-extremity muscle groups (L1–L3 myotomes) and 0/5 strength distally (L4–S1 myotomes), incontinence of sphincters, absence of rectal tone, and loss of perianal sensation. X-rays and computed tomography (CT) scan revealed a fracture of the L4 vertebral body with complete posterior dislocation of L4 to L5 vertebral body with maintenance of the anteroinferior corner of the L4 vertebral body in place (►**Figs. 1**, **2**, and **3**).

Operative Procedures and Intraoperative Findings

Because of the delay in surgical treatment, a halo-femoral traction was placed for 3 days before surgery to stabilize and to attempt reduction without achieving any favorable outcome. At the time of surgery, the patient underwent posterior reduction with pedicle screw– and rod-augmented fusion from L3 to S1. Reduction maneuvers included initial lengthening between L3–L4 and S1 screws, which allowed access to the L5 pedicle; L5 pedicle fixation; L3–L4 and L5–S1 lengthening; L4 laminectomy with access to the L4–L5 disc space; placement of a cob spinal elevator on the L4–L5 space, which served as a lever to achieve reduction in the coronal and sagittal plane; and finally a two-rod construct with a cross-link with posterolateral fusion enhanced with an allograft from L3 to S1. During surgery, there was no evidence of dural tear or cerebrospinal fluid leak. Bilateral amputation of nerve roots emerging form L4 foramen was observed.

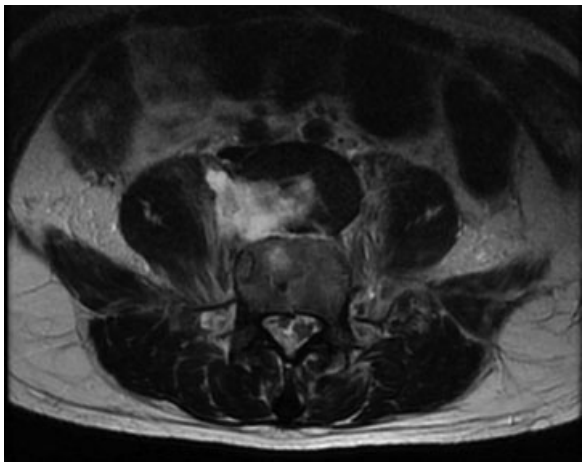

Figure 2 Magnetic resonance imaging, axial view, showing the L4 vertebral body posterior to L5.

Figure 1 Preoperative computed tomography scan, sagittal view, showing complete L4–L5 posterior dislocation.

Figure 3 Magnetic resonance imaging, sagittal view, showing integrity of the intervertebral disc L4–L5.

Figure 4 One-year follow-up postoperative supine computed tomography scout image showing anteroposterior view of the internal fixation from L3 to S1.

Figure 6 Computed tomography scan reconstruction at 1-year follow-up, showing appropriate fusion.

Postoperative Course

The patient had improved movement in both lower extremities after surgery. The muscular strength reached 5/5 in proximal lower-extremities muscle groups (L1–L3 myotomes) and 0/5 distally (L4–S1 myotomes). Function of the sphincters and perianal sensation fully recovered. At 1-year follow-up, the patient was able to ambulate with crutches. Plain radiograph and CT scan showed good alignment and progressive maturation of his fusion procedure (►**Figs. 4**, **5**, and **6**).

Figure 5 One-year follow-up lateral view X-ray showing appropriate reduction and internal fixation.

Discussion

High-energy force is required to create a complete fracture-dislocation of the lumbar spine. To the best of our knowledge, there are only two cases of traumatic retrolisthesis previously reported in the English literature; a direct shearing force at the lower lumbar area was described as the mechanism causing the dislocation in both cases. In the first case, Abdel-Fattah and Rizk[7] described a total posterior dislocation of L4 vertebral body behind L5; surgical treatment consisted of reduction and internal fixation with a sacral rod and two Harrington rods. Good reduction was obtained immediately; however, loss of reduction was observed at 2 months' follow-up, and implants were removed at 7 months' follow-up. The authors reported that the patient was asymptomatic, neurologically intact, and solidly fused.

The other case was reported by Ahmed[8] et al, who described a traumatic retrolisthesis of L4 vertebra without complete displacement of the vertebral body; posterior reduction and internal fixation with pedicle screws and rods from L3 to L5 and discectomy were performed, and interbody fusion with a mesh cage was achieved. Full motor and sensory function was reported at 2 years' follow-up. In our case, we did not use any anterior support but a cage in the L4–L5 interbody space may have been helpful in lordosis restoration and to provide stability.

Unlike the two previous reports, our patient only recovered muscular strength in the levels above the lesion. No motor function recovered from L4 or lower levels. At the time of the surgical procedure, a complete section of the L4 roots was observed bilaterally, making this neurological outcome predictable.

Surgical treatment was indicated because the three-column disruption makes this lesion highly unstable.

Conclusions

Traumatic posterior fracture dislocation of L4–L5 is rare and usually results from a high-energy trauma. This report represents the third documented retrolisthesis case in the English literature. The patient was successfully treated with open reduction, decompression, internal fixation with transpedicular screws, and posterolateral fusion.

Disclosures
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