

Case Report

Traumatic lumbar spondylolisthesis: A case report and review of literature

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ABSTRACT

Traumatic spondylolisthesis of the lumbosacral junction (SPL) is a spinal injury rarely seen in current practice. Few cases are reported in the literature. It arises from complex trauma of high-energy mechanisms. We discussed the case of a young patient. He is 24 years old without notable pathological history victim of a traffic road accident. Clinically, he has no sensory or motor deficit, it is a spinal trauma classified American spinal injury association E (ASIA E) with severe back pain. A whole-body CT scan performed on admission showed a grade 2 L5–S1 SPL. A lumbar MRI revealed a tear of the disc at L5–S1. We performed a laminectomy to decompress the dural sheath and cauda equina roots with transforaminal lumbar interbody fusion. A postoperative CT scan showed the reduction of the spondylolisthesis. Two months later, the patient resumed walking. Surgery is the gold standard for the management of traumatic SPL. The aim of surgery is to achieve neural structure decompression and obtain stability with fusion.

Keywords: Traumatic spondylolisthesis, Physiopathology, Management, Case report

INTRODUCTION

Spondylolisthesis (SPL) has several causes. According to Wiltse *et al.*,^[1] there are many types of SPL: Dysplastic, isthmic, degenerative, pathological, and traumatic. The SPL due to trauma is a spinal injury rarely seen in current practice that arises from complex trauma of high-energy mechanisms. This leads to important changes in intervertebral articulations.^[2] Because this injury leads to the destruction of spinal stability elements, particularly bone and discoligamentous elements, there is a substantial risk of neurological deficiency, and it is extremely unstable. Restoring stability and preventing secondary spinal cord and root compression are the goals of treatment. We discussed a case of L5–S1 SPL caused by a violent lumbar impact treated by decompression and transforaminal lumbar interbody fusion (TLIF) with a successful outcome.

CASE REPORT

We present the clinical case of a young patient aged 24, in excellent physical shape, victim of a traffic road accident, and presenting a lumbar spine trauma American spinal injury association E (ASIA E). He was a passenger, who

jumped from a moving vehicle after it was about to collide with another vehicle. On the physical examination, he had severe back pain preventing him from being in a strict supine position. He had no sensory-motor deficits, and the examination of the urogenital sphere did not reveal any bladder globe or other genital-sphincter disorders. A whole-body CT scan was performed on admission. At the spinal level, we noticed a fracture of the posteroinferior corner of L5 and an intracanal displacement of the fractured fragment, a fracture of the superior articular process of S1 and L5–S1 spondylolisthesis [Figure 1a]. A lumbar spine CT scan performed later to better study the lesion objectified a reduction of the spondyloptosis [Figure 1b].

An MRI revealed a lesion of the L5–S1 disc with disruption of the yellow ligament and the posterior common longitudinal ligament [Figure 1c]. The patient underwent open surgery with pedicle screw fixation of L5–S1, decompression of the dural sheath by laminectomy of L5 and S1, bilateral arthrotomy of L5–S1, discectomy of L5–S1, and placement of a cage filled with autograft by TLIF. Intraoperative fluoroscopy before the incision showed an anterior displacement of L5 on S1. At incision and after the release of paravertebral gutters,

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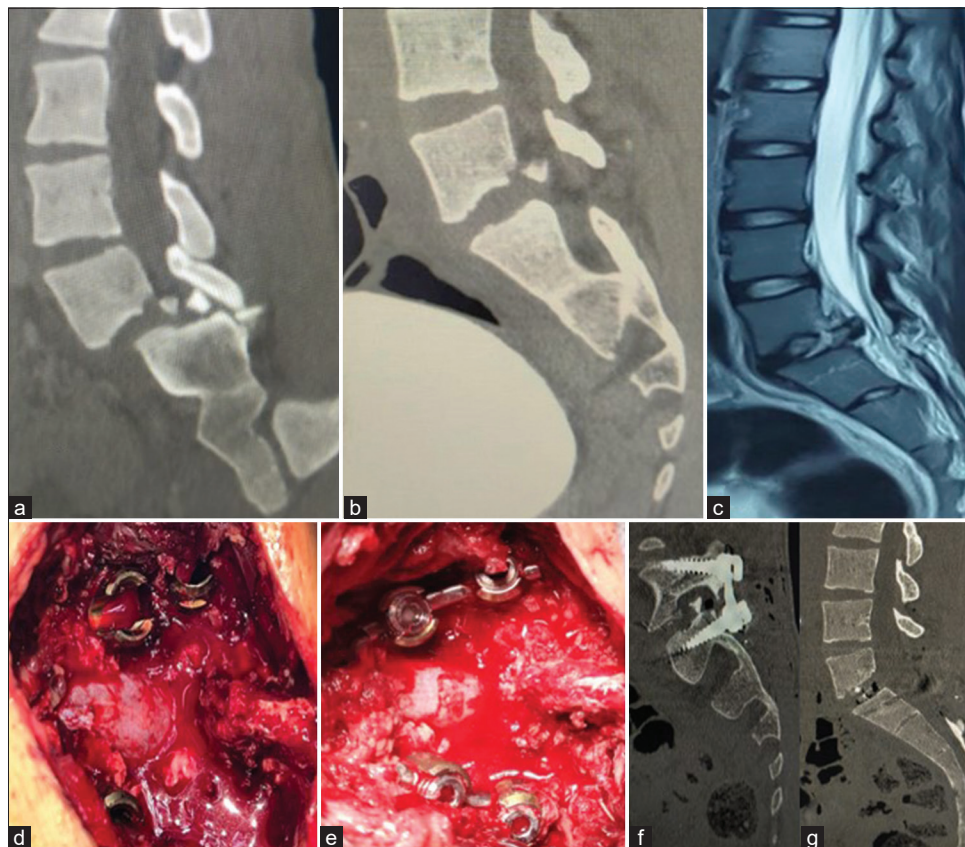


Figure 1: (a) Spine computed tomography (CT) scan showing a fracture of the posteroinferior corner of the vertebral body of L5 with intracanal displacement of the fractured fragment-spondylolisthesis (SPL) grade II L5–S1 and (b) CT scan showing a spontaneous reduction of the SPL. (c) Magnetic resonance imaging: lesion of the L5–S1 disc and (d and e) Intraoperative image before reduction showing a step between the level of the screws at L5 and S1. After placement of the rods, we can see a reduction of the dislocation. (f and g) Pedicle screw fixation of L5–S1 with transforaminal lumbar interbody fusion.

we noticed a fracture of the spinous process of L5, the paravertebral muscles were contused, and an abundant leakage of cerebrospinal fluid was seen. We performed an extended L5 laminectomy at the level of the canal sacred in front of S1. Ligament injuries (interspinous ligaments and ligamentum flavum) were confirmed. We discovered a breach of the dura mater, which was sutured. The screws were placed followed by a discectomy of L5–S1 with the placement of a cage. We also confirmed the disruption of the L5–S1 intervertebral disc. The gesture was then followed by the placement of the rods. The challenge was the reduction of the dislocation intraoperatively due to the lack of retaining screws. [Figures 1d and e] are intraoperative view before and after reduction. After the placement of the rods, the intraoperative check-up showed a reduction of the dislocation. Postoperatively, the patient did not present sensory-motor deficits or genitosphincterian disorders. Figure 1f and g showed the post-operative CT scan. Two months later, the patient resumed walking.

DISCUSSION

We report a unique case of traumatic lumbar spine SPL managed surgically with a good outcome. Traumatic SPLs are very unstable. They lead to lesions of the discoligamentous elements of the posterior column of the spine. Osteosynthesis with disc replacement remains the best therapeutic approach. According to biomechanical research, a facet dislocation requires the interaction of a rotation force and a hyperflexion mechanism that applies shearing stresses to the sacral bone.^[3-5] Spinal stability would be severely compromised in the absence of the osteoligamentous elements and the pars interarticularis. Traumatic lumbar SPL is an injury of the elements of stability of the spine associated with vertebral body listhesis.^[6] Our patient is a young adult victim of a high-kinetic accident with very severe lumbar pain preventing him from lying on his back. A significant decrease in pain intensity is observed postoperatively. Xu *et al.* reported an L3–L4 spondylolisthesis case. The patient was 42 years old, a

Table 1: Review of the literature on the management of traumatic spondylolisthesis.

Authors	Liu and Menga 2021	Xu et al. 2020	Park et al. 2020	Papaioannou et al. 2021	Fok and Cheung 2019	Ver et al. 2019	Barwar 2021	Koruga et al. 2020	Sasagawa 2022	Hu et al. 2022
Study design	Case report	Case report and literature review	Case report	Case report	Case report	Systematic review and case series	Case report	Case report	Case report	Case series 28 cases
Age (Years)	24	42	65	53	40	30.5	24	48	60	NR
Level	L3-4	L3-4	L5-S1	L4-5	L4-5	NR	L4-5	L1-2	L4-L5	NR
Neurological statut	Radiculopathy	Back pain+spinal deformity	Cauda equina syndrome	Normal	Cauda equina syndrome	Back pain+ neurologic deficits	ASIA A	ASIA D	Frankel D	NR
Management	DR+PSF+ interbody fusion through a lateral approach	DR+PSF+ interbody fusion	Posterior DR+PSF+and anterior reconstruction	DR+PSF	DR+ instrumented fusion	DR+PSF+ interbody fusion	DR+PSF+ TLIF	PSF via posterior approach	Minimally invasive surgery anteroposterior and OLIF	PSF+PLIF

NR: Not reported, OLIF: Oblique lumbar interbody fusion, PLIF: Posterior lumbar interbody fusion, PSF: Pedicle screw fixation, DR: Decompression and reduction, TLIF: Transforaminal lumbar interbody fusion, ASIA: American spinal injury association

victim of a work accident due to a fall. He had severe back pain and had no neurological damage.^[7] Barwar reported the case of traumatic L4–L5 SPL with cauda equina syndrome treated surgically. When the patient was seen in the follow-up, he was recovered from the deficit.^[8] Signs vary from asymptomatic patients with lower back pain to patients with neurological deficits up to cauda equina syndrome.

The radiological and intraoperative lesion assessment showed in our case a fracture of the spinous and laminae of L5, a contusion at the level of the yellow ligament and a tear of the disc. Note also that the spondylolisthesis was reduced spontaneously. This testifies to the instability of the lesion. The high kinetic mechanism is responsible of lesions of the posterior ligamentous structures; the facets and the vertebrae body fractures, and anterior sliding of the L5 vertebrae body. This leads to instability at the level of the three columns of Denis. The instability criteria are, apart from root compression, the strongest argument to indicate osteosynthesis.

Osteosynthesis combined with posterior intervertebral fusion is the most used technique described in the literature. Some cases of traumatic SPL in literature are summarized in Table 1.^[6-15] The optimal therapeutic strategy depends on the expertise of each surgical team but also on the different bone and discoligamentous lesions presented by the patient. The technical platform and the osteosynthesis implants available are also taken into consideration. Our patient has benefited from a TLIF. Due to technical innovations and improvements in implants, combined approaches are more and more implemented.

CONCLUSION

Post-traumatic SPL is rare; it is caused by high kinetic mechanisms associating with hyperflexion, rotation, and distraction. It is associated with discoligamentous lesions making it unstable. Surgery is the gold standard for its management. The aim of surgery is to decompress and stabilize with subsequent fusion.

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Authors’ contributions

Dognon Kossi François de Paule Adjiou: Conceptualization, Writing original draft-editing. Salma Abbas: Review and editing. El Manouni Othmane: Review and editing. Meriem Kajeou: Review and editing. Hakkou El Mehdi: Supervision, Validation. Abdessamad El Ouahabi: Supervision, Validation.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

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

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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