

## Traumatic Vertebral Body Second Lumbar over Third Lumbar Retrolisthesis in a Child: Reporting the First Case along with the Review of Relevant Literature

### Abstract

Traumatic retrolisthesis of the lumbar vertebrae is a rare entity in children. Only four such cases, two cases each of first lumbar–second lumbar (L1–L2) and L5–S1 retrolisthesis in children, have been reported so far in the English scientific literature. Here, we report a traumatic retrolisthesis of the L2 vertebra in an 8-year-old male child. He was injured when he lost control while playing, skidded, and fell into a 1-m deep drainage system hole. He presented with backache and urinary retention. His plain radiographs and noncontrast computed tomography of the lumbosacral spine revealed Meyerding Grade II retrolisthesis of the L2 vertebra over the third. The magnetic resonance imaging of the affected area revealed no significant canal narrowing, and there was no spinal cord compression or contusion. A urodynamic study was done which revealed a normal bladder function. The patient was given a trial of spontaneous urination by removing the Foley's catheter after 5 days of injury, and he passed urine normally. The patient was managed conservatively. He was discharged on day 7 with the advice of complete bed rest of 6 weeks and thoracolumbosacral orthoses. The patient has been in follow-up for the past 15 months, and his listhesis has completely resolved. The patient is ambulatory with no neurodeficit. This case is being presented in view of rarity. This is the first case report of L2 over L3 retrolisthesis in a child.

**Keywords:** *Conservative management, lumbar spine, pediatric trauma, retrolisthesis, spinal trauma*

### Introduction

Thoracolumbar spine fractures are relatively uncommon in the pediatric age group as compared to adults.<sup>[1]</sup> However, the incidence of neurological deficit, whether complete or incomplete, is reported to be almost equal.<sup>[1]</sup> Traumatic retrolisthesis of the second lumbar (L2) vertebra over the third is a rare injury. No such case has been previously documented in the literature. Here, we report a case of traumatic retrolisthesis of the L2 vertebra in an 8-year-old child who was managed conservatively and recovered completely. This case is being presented in view of rarity. This is the first case report of L2 over L3 retrolisthesis in a child.

### Case Report

An 8-year-old male child presented to our emergency with backache and urinary retention following fall. He was injured when he lost control while playing,

skidded, and fell into a 1-m deep drainage system hole. He was moving all of the four limbs adequately. He had Medical Research Council Grade 5 power in all four limbs. His bladder was palpable, but he had no urge of passing urine, so he was immediately catheterized on arrival. He had mild tenderness and swelling over the lumbar region, but no gross visible deformity. No sensory deficit was present. All superficial and deep tendon reflexes were within normal limit. His plain radiographs of the lumbosacral region [Figure 1] and noncontrast computed tomography [Figure 2] of the lumbosacral spine revealed Meyerding Grade II retrolisthesis of the L2 vertebra over the third. The magnetic resonance imaging [Figure 3] of the affected area revealed mild thecal sac indentation with no cord compression or contusion with no significant canal narrowing. A urodynamic study was done which revealed a normal bladder function. The patient was given a trial of spontaneous urination by removing the Foley's catheter after 5 days

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**How to cite this article:** Kaushal-Deep SM, Bhat AR. Traumatic vertebral body second lumbar over third lumbar retrolisthesis in a child: Reporting the first case along with the review of relevant literature. *Asian J Neurosurg* 2019;14:1298-301.

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### Access this article online

**Website:** [www.asianjns.org](http://www.asianjns.org)

**DOI:** 10.4103/ajns.AJNS\_93\_19

### Quick Response Code:



of injury, and he passed urine normally. The patient was managed conservatively. He was discharged on day 7 with the advice of complete bed rest of 6 weeks and thoracolumbosacral orthoses. Follow-up X-rays were done at regular intervals, which showed progressive resolution of listhesis. Twelve-month follow-up X-ray showed complete resolution of listhesis [Figure 4]. The patient has been in follow-up for the past 15 months and is ambulatory with no neurodeficit.

### Discussion

Spinal injuries are relatively uncommon in children. Fracture dislocations of the lumbar spine are further rare in the pediatric population. Retrolisthesis of the lumbar spine is a rare injury with very few cases described in adults and only four in pediatric spinal injuries<sup>[2-5]</sup> in the English language medical literature. These pediatric cases are tabulated in Table 1 along with the present case.

Ligamentous laxity and the elastic nature of the spinal column predispose children to have a spinal cord injury (SCI) even in the absence of an apparent injury of the vertebral column. Hyperflexion in association with

compression in high-energy injuries, along with vertical or rotational loads, appears to be the most likely cause for such dislocations.<sup>[5]</sup> Recovery of neurologic function has been found to occur with a significantly greater incidence in children as compared to adults even after severe traumatic SCI, and these improvements can occur following a long period after injury.<sup>[1,4]</sup> The mechanism of trauma, in all cases including our case, was an injury involving sudden jerk, leading to dislocation (listhesis) without any associated fracture. However, in the case reported by Rodrigues *et al.*, there was bilateral transverse process fracture of the L5 vertebra.<sup>[5]</sup> In their case, the presence of spina bifida occulta at L5 level also acted as an additional factor predisposing to traumatic spondylolisthesis. They have also mentioned a possible relationship between the presence of spina bifida and traumatic listhesis.

Traumatic lumbar dislocations are highly complex and unstable injuries. They frequently require operative stabilization, especially in the presence of a complete or an incomplete neurological injury, for spinal stability and

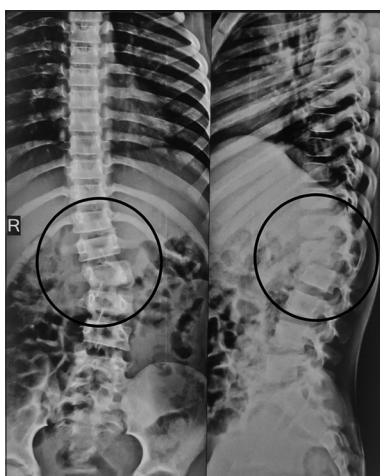


Figure 1: X-ray anteroposterior and lateral views showing kyphosis and traumatic spondylolisthesis



Figure 2: Noncontrast computed tomography lumbosacral spine showing Meyerding Grade II retrolisthesis of second lumbar over the third lumbar vertebra

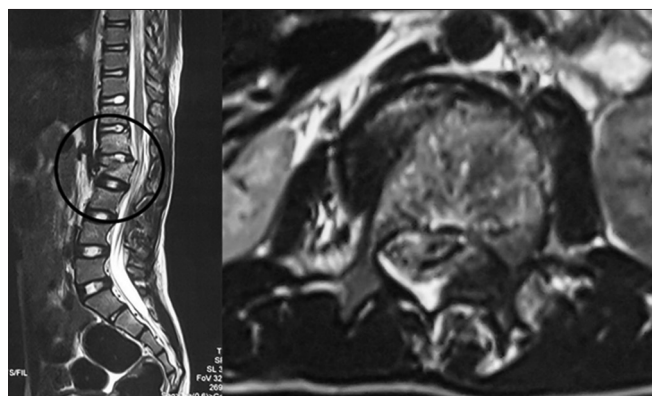


Figure 3: T2-weighted magnetic resonance imaging sagittal and axial views showing mild thecal indentation with mild canal narrowing

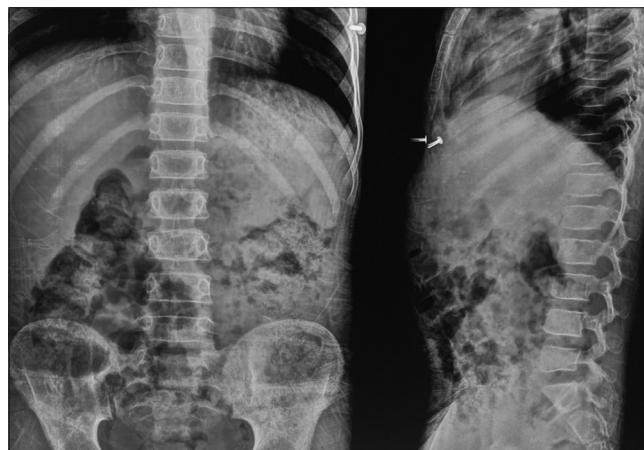


Figure 4: Follow-up X-ray at 12 months showing resolved listhesis and kyphosis by conservative management

**Table 1: Characteristics of all the traumatic lumbar listhesis reported in the English medical literature**

	Case 1	Case 2	Case 3	Case 4	Case 5
Authors	Yazici <i>et al.</i> <sup>[2]</sup>	Verhelst <i>et al.</i> <sup>[3]</sup>	Yadav <i>et al.</i> <sup>[4]</sup>	Rodrigues <i>et al.</i> <sup>[5]</sup>	Our case
Years	1999	2009	2011	2013	2019
Clinical presentation	Lower back pain with impaired motor function in the lower limbs	Lower back pain with a complete loss of sensations and movements in both lower limbs, loss of bowel and bladder sensations	Lower back pain with kyphotic deformity and a complete loss of sensations and movements in both lower limbs, loss of bowel and bladder sensations	Lower back pain with local edema, impaired motor function, and lack of sensations in the lower limbs	Lower back pain with urinary retention
Neurological deficit	Incomplete flaccid paraplegia (Grade III power) in bilateral lower limbs	Complete flaccid paralysis beneath L3 with a complete loss of perineal sensations and loss of anal sphincter tone; knee, ankle, and bulbocavernosus reflex absent	Grade 0 power of all muscles around all the joints of both lower limbs with complete loss of sensations at and below the D12 dermatome with complete absence of plantar, knee, ankle, and bulbocavernosus reflexes (Frankel Grade A paraplegia)	Muscular strength Grade 4 in L4, L5, and S1 on the right side; in the left side, Grade 2 power to L4 region; and Grade 1-L5 and S1 (Frankel Grade B); paresthesia in the left L4, L5, and S1 dermatomes	None
Associated injuries	None	Morel-Lavallée lesion over the left hip and gluteal area; hemoperitoneum (hepatic laceration)	None	None	None
Radiological findings	L1-L2 dislocation with no fracture	L5-S1 spondyloptosis with left-sided sacral fracture with minimal displacement with right pedicular fracture at S1 with right-sided transverse process fracture of L2, L3, and L4; and avulsion of spinous process of L2 and L3	Posterior translation of the first lumbar vertebra (L1) over the second (L2) (retrospondyloptosis)	Traumatic spondylolisthesis between the fifth lumbar (L5) and the first sacral vertebrae (S1)	L2-L3 Meyerding Grade II retrolisthesis
Management	Surgically stabilized by posterior approach using modified Luque frame with sublaminar wires	L4-S1 laminectomy with extended posterior transpedicular screw rod from L3 to S2 with allograft	Open posterior reduction and internal fixation with 5-mm loop rectangle and sublaminar wires and posterior spinal fusion at four segments (D12-L3) with decortication of posterior elements and allograft	Posterior spinal decompression on day 1 followed by dural repair with fibrin glue and L4-S1 transpedicular fixation by posterior approach on day 7 followed by L5-S1 discectomy and interbody fusion with an anterior cage with an autologous iliac crest graft through an anterior retroperitoneal access	Conservative
Complications	None but implant removed at 26 months	Infection at hip laceration site	Loss of reduction due to breakage of wire loop managed by plaster of paris spinal jacket for 6 weeks followed by mobilization and Taylor's spinal brace application for further 6 weeks	CSF leak, L5, S1 nerve root injury, incomplete reduction	None
Recovery	Complete neurological recovery at 6 months	Complete cauda equina syndrome beneath L3 with no return of bladder or sphincter function	Frankel Grade D (complete recovery of sensations in lower limbs along with bowel, bladder sensations with Grade 4 power in bilateral lower limbs, and the patient is ambulatory)	Left-sided L4 motor deficit	Complete neurological recovery
Follow-up period	26 months	12 months	15 months	24 months	15 months

CSF – Cerebrospinal fluid

alignment, pain reduction, and the recovery of neurological functions.<sup>[4,5]</sup> Rehabilitation is particularly important in patients with a complete neurological injury, which is aided by operative spinal stabilization. At least two levels above and two levels below should be surgically stabilized.<sup>[1,4]</sup> Yazici *et al.* did a four-level instrumentation with a modified Luque frame.<sup>[2]</sup> However, Verhelst *et al.* performed four-level posterior pedicle screw fixation.<sup>[3]</sup> Yadav *et al.* also managed their case with posterior spinal fusion at four segments, using 5-mm loop rectangle and sublaminar wires with decortication of posterior elements and allograft.<sup>[4]</sup> Wire fixation was done due to financial constraints which further led to the loss of reduction later on, and the patient was put on Taylor brace for 6 weeks. Listhesis subsequently improved on follow-up in association with remodeling of the spine. Rodrigues *et al.* first performed a posterior spinal decompression. After 7 days, they performed an anterior second stage partial reduction of the slip with L4, L5, and S1 bilateral pedicle screws along with dural repair. Again after one week, they performed an anterior retroperitoneal L5–S1 discectomy and interbody fusion with an anterior cage with an autologous iliac crest graft.<sup>[5]</sup> Because our patient had only Grade II listhesis with no neurodeficit, we managed our patient conservatively. Listhesis in our patient resolved gradually over a period of 12 months.

Among the four cases of lumbar spine retrolisthesis reported in the literature, one had a complete neurological deficit which did not recover on follow-up,<sup>[2]</sup> whereas the other had an incomplete deficit which recovered completely at 6-month follow-up<sup>[3]</sup>. It is difficult to comment on spinal shocks in injuries at the level of conus, because the absence of the bulbocavernosus reflex can be a part of the traumatic conus medullaris syndrome itself as was in case 3.<sup>[4]</sup> In this case, the patient had a complete neurological deficit, but demonstrated a sequential recovery after surgery. In case 4 as well, the patient had a significant neurological deficit which improved significantly at 2-year follow-up, and the patient was ambulatory.<sup>[5]</sup>

The case reported by us is the fifth case of traumatic lumbar spondylolisthesis in children and the first case of

L2 over L3 spondylolisthesis. This is also the case with least degree of retrolisthesis (Grade II) and hence the only conservatively managed case among the reported cases.

### Consent

Informed consent has been taken from the patient's father for publication of this case report, and the same has been submitted to the journal at the time of submission of the manuscript.

### Declaration of patients consent

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

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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