Case Report

Cowherd's injury: Traumatic retrospondyloptosis of L1 over L2 in a 7-year-old child

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Abstract

Traumatic retrolisthesis of the first lumbar vertebra is a rare injury and only one case has been documented in the literature. We report a case of traumatic retrolisthesis of the first lumbar vertebra in a 7-year old child. He was injured after being dragged by a cow and presented with Frenkel grade A paraplegia. His plain radiographs revealed complete retrolisthesis of the first lumbar vertebra over the second. The patient was treated surgically with open reduction and sublaminar wire loop rectangle fixation. The patient showed Frankle grade D (Frankle grade) neurological recovery in the postoperative period over a period of 15 months. This case is reported in view of rarity and mechanism of injury is described.

Key words: Child, lumbar spine, retrospondyloptosis, trauma

Introduction

Fractures of the thoracic and lumbar spine in pediatric patients are relatively uncommon as compared to adults.[1] The incidence of complete and incomplete neurological injuries is almost equal.[2] The recovery of the neurologic function following severe traumatic spinal cord injury occurs with a significantly greater incidence in children than adults, and these improvements can occur over a prolonged postinjury period.[3] Although specific studies have not been reported in children, conus medullaris lesions have greater chances of recovery compared to the spinal cord injuries.[4] The posterior dislocation of the spine is a rare injury in children with most of the cases reported in adults.[5] Only one case of posterior dislocation at the L1–L2 level[5] and another at the lumbosacral junction[6] have been reported in the pediatric spine.

We report a rare case of a complete posterior dislocation (retrospondyloptosis) of the first lumbar vertebra over the second with complete neurological deficit.

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Case Report

A 7-year-old boy presented to the emergency department of our hospital after 1 week of injury to back. The patient had been grazing cattle and had wrapped the rope of a cow around his trunk. The cow started running suddenly and as a result the child sustained a sudden jerk to the trunk and was dragged to some distance [Figure 1]. The injury was associated with pain, deformity over back, and a complete loss of sensations and movements in both lower limbs. There was loss of bowel and bladder sensations.

On examination, there was kyphotic deformity in the back with few abrasions. A neurological examination revealed grade 0 power of all muscles around all the joints of both lower limbs. There was a complete loss of sensations at and below the D12 dermatome. Plantar, knee, ankle, and

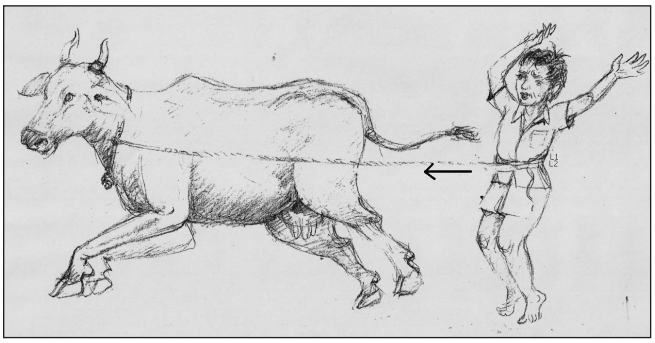

Figure 1: A sketch depicting the mechanism of injury and the direction of force resulting in "cowherd's injury" in this case

bulbocavernosus reflexes were absent (Frankel grade A paraplegia).

A radiographic examination revealed complete posterior translation of the first lumbar vertebra over the second (retrospondyloptosis; Figure 2a and b). A CT scan revealed the same displacement [Figure 2c and d]. No evidence of vertebral fracture was seen. MR imaging revealed the translation to be between the first lumbar body and the intervertebral disc between the first and second lumbar vertebra. The intervertebral disc maintained near-normal morphology [Figure 2e and f].

Open reduction and internal fixation of the dislocation was planned. The surgery was done through the posterior midline approach. A complete reduction was easy to achieve but was very unstable. A spinous process of L2 was grasped by a towel clip to facilitate reduction [Figure 3a and b]. Interspinous ligaments were removed and space was created for the passage of 18 gauge stainless steel wire loops around the laminae; intraoperative neurological monitoring was not available. Stabilization was done using 5-mm loop rectangle and sublaminar wires with two levels above and two below the affected segment. The choice of the implant was dictated by the socioeconomic status and the availability of the implant. Intraoperatively, an image intensifier was used to confirm the final complete reduction. The posterior spinal fusion at four segments was performed with decortication of posterior elements and allograft. Postoperative radiographs revealed loss of reduction probably due to the breakage of the wire loop [Figure 3c and d]. A plaster of Paris spinal jacket was applied for 6 weeks followed by mobilization with Taylor's spinal brace.

The patient showed neurological recovery in the form of paresthesias in both lower limbs after 1 week of surgery. Gradually, the sensations improved further and at 9 weeks, the patient had complete sensory recovery. Bladder and bowel sensations were regained at 2 weeks and in the following 2 weeks, the patient had complete control of bowel/bladder functions. The motor function was last to return with flickering movements of toes at 5 weeks. The functions improved gradually over the next 4 weeks in an asymmetrical fashion with more recovery on the left side. The power was grade 3 at the hip and knee and grade 2 at the ankle by 9 weeks after trauma [Figure 4]. The motor functions continued to improve and at 15 months, the patient is a community ambulator with a walking frame (Frenkel grade D). Radiographs and CT scan of the sagittal section showed remodeling of the spinal canal [Figure 3e and f].

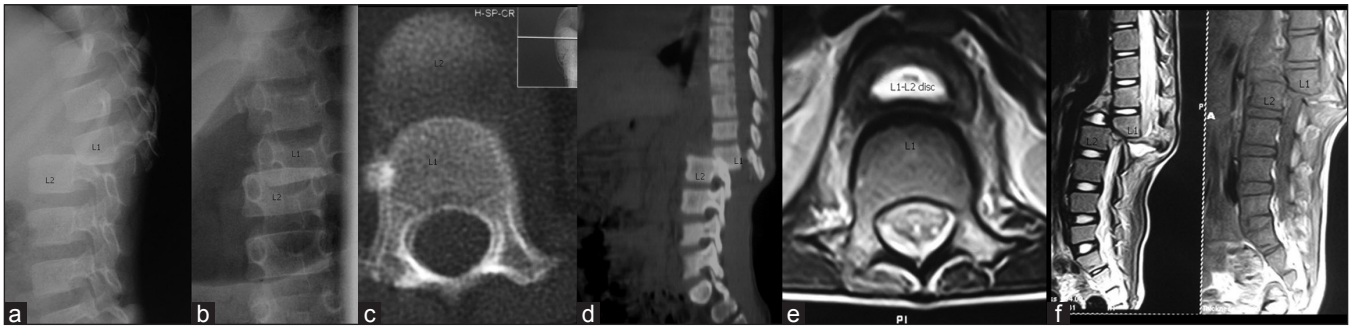

Figure 2: Anteroposterior (a) and lateral (b) radiographs of the dorsolumbar spine showing retrospondyloptosis of L1 over L2. (c) CT scan (axial section) showing a double vertebra sign; reconstructed sagittal section (d) showing retrospondyloptosis of L1 over L2. The T2-weighted MRI section showing the L1–L2 disc attached to L1 as seen in both axial (e) and saggital (f) cuts; intervertebral disc and L1 vertebra visualized in the same transverse section

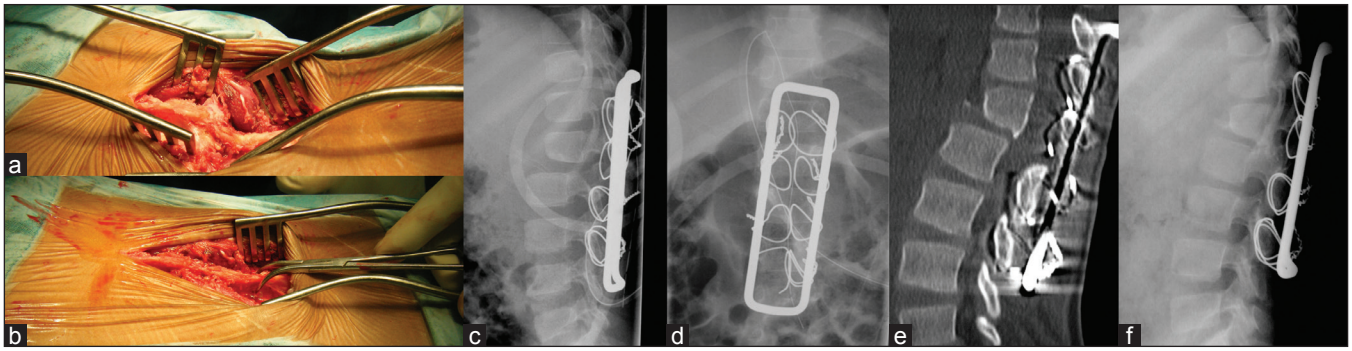

Figure 3: Intraoperative photographs demonstrating the deformity in the spine and the reduction maneuver done (a and b). Postoperative anteroposterior and lateral radiographs of the dorsolumbar spine depicting the loss of preoperative reduction obtained probably due to the breakage of the wire loop (c and d). Lateral radiograph (e) and sagittal CT section of the dorsolumbar region (f) without any further deterioration in the anteroposterior vertebral alignment at 15-month follow-up showing remodeling of the spinal canal

Figure 4: Clinical radiograph showing power at hip (flexion) and knee (extension) at fifteen months follow-up

Discussion

Spinal injuries are relatively rare in children. Fracture dislocations of the lumbar spine are further uncommon in comparison to cervical spine injuries. Retrolisthesis of the lumbar spine is a rare injury with very few cases described in adults and only two in pediatric spines.[5,6] One of the reported cases had retrolisthesis at the lumbosacral junction and the other a traumatic retrolisthesis of the first lumbar vertebra.

The elasticity of the spinal column and ligament laxity predisposes the children to have a spinal cord injury in the absence of an obvious injury of the spinal column. However, the recovery of neurological deficits occurs with a higher incidence and neurological recovery appears over a delayed period of time.[3] Among the two cases of lumbar spine retrolisthesis reported in the literature, one had a complete neurological deficit which did not recover on follow up[6] while the other had an incomplete deficit which recovered completely at 6-month follow up.[5] 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 our case.[7]

Fracture dislocations are very unstable injuries and require operative stabilization whether they are associated with a complete or an incomplete neurological injury. In patients with a complete neurological injury, the stabilization aids in rehabilitation. At least two levels above and two levels below should be instrumented.[1] Yazici *et al*.[5] did a four-level instrumentation with a modified Luque frame while Verhelst *et al*.[6] performed four-level posterior pedicle screw fixation. A posterior fusion was done in both cases.

The mechanism of trauma in our case was unique. The child's spine suffered a sudden jerk (because of the cow pulling the rope) which carried with it the second lumbar vertebra and the spine inferior to it [Figure 1]. The bruises were indirect markers of the causative force. There was no bony injury, but a pure dislocation. Under anesthesia, the reduction could be achieved easily but was unstable. The fixation was done using a loop rectangle with sublaminar wires at two vertebrae above and two vertebrae below the lesion. A total of four levels were included to provide optimal stability. Posterior fusion was done using allograft. However, there was loss of reduction in the postoperative period indicating that the number of levels instrumented with the rectangle was inadequate. With very little literature available regarding the options of treatment in such injuries, we wish to highlight that fixation required in such severe injuries should be more secure than is normally recommended for spinal injuries.

The case reported by us is the second of its kind reported in the literature. The first reported by Yazici *et al*. had an incomplete neurological injury which recovered completely at 6-month follow-up.[5] In our case, the patient had a complete neurological deficit but demonstrated sequential recovery after surgery.

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