Case Report

Post-traumatic L4-L5 spondyloptosis with cauda equina syndrome: A case report

Nilesh Barwar, MS (Orthopaedics), Associate Professor*

Department of Trauma & Emergency (Orthopaedics), AIIMS, Jodhpur, India

ARTICLE INFO

Keywords:
- Traumatic lumbar spondyloptosis with intact thecal sac

ABSTRACT

Spondyloptosis at a lumbar level is usually encountered in an isthmic or a dysplastic types of spondylolisthesis. Post-traumatic lumbar spondyloptosis is comparatively a rare entity. As the injury involves a complete failure of all the osteo-ligamentous structures, it is highly unstable and has a high probability of a complete neurological deficit. On the contrary, the injury also has a lot of chances of meaningful neurological recovery if realignment and stabilization are done on an urgent basis. Here we report a case of L4-L5 post-traumatic spondyloptosis with complete motor weakness below the injury level with sensory and bowel & bladder dysfunction. The neurological injury recovered significantly within four months of operative reduction, decompression, and stabilization.

Introduction

Disrupting all the columns of the spine, a traumatic spondyloptosis is a devastating injury. As the soft tissue constraints like ALL, PLL, and posterior ligamentous structures are completely torn, this translational injury is highly unstable [1]. There is a serious biomechanical failure of the spinal column and such injuries could only happen in the ones which involve a great amount of energy, viz. a fall from a significant height, a fall of a heavyweight on to the body, and motor vehicle crashes, etc. [2]. Traumatic spondylolisthesis is frequently reported at lumbosacral junction, but there are a limited number of cases in the literature about complete translation at L4-L5 [3,4]. Here we report a case of L4-L5 post-traumatic spondyloptosis with an intraoperative finding of intact thecal sac and significant recovery of the neurological function in the follow-up period.

Case presentation

In our emergency department, we received a case of a lumbar spine injury with paraplegia in a 24-year-old female. On asking history, it was a freak accident as a tractor was parked in an agricultural field with an engine key inserted. She tried to remove the key as children were playing around. Accidentally, the key was turned in the wrong direction and the engine got started and the vehicle suddenly moved forward as it was in the gear. As a result, the patient suffered a run-over injury as she was standing on the ground.

The patient was assessed and managed according to the advanced trauma life support (ATLS) protocol. On clinical evaluation, she was fully conscious with GCS 15/15. Her vitals were in normal range except she couldn't pass urine. A lower backache with tenderness was present in the lumbar spine. On careful logrolling, there was a step-off in the lower lumbar region. Neurological examination

* Corresponding author at: Department of Trauma & Emergency (Orthopaedics) AIIMS, Jodhpur, India - 302005.
E-mail address: nileshbarwar123@gmail.com.

https://doi.org/10.1016/j.tcr.2021.100475
Accepted 17 April 2021
Available online 21 April 2021
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revealed that there was a complete paraplegia with a sensory deficit below his mid-thighs (ASIA grade A). The perianal sensation was absent and so was the voluntary anal control. Deep tendon reflexes in lower limbs were absent. Babinski’s reflex was mute. In the upper limbs, neurological examination was normal. She did not have any signs of head injury, chest injury, and pelvic injury, etc. Her functional scoring was done using the Japanese orthopaedic Association (JOA) score [5] and it was 8 out of 17.

Considering lower back pain and paraplegia, radiographic studies were performed [Fig. 1(A, B)]. There was a complete translation of the L4 vertebral body over the L5 with the L5 superior endplate coming in to direct contact with the inferior aspect of the L4 pedicles. Pars fractures of L4 on both sides were present. A CT scan was done to better elucidate the injury. In the axial plane, there were two vertebral bodies in one section with left side translation of L4 as well [Fig. 2(A, B, C, D)]. On MRI study, vertebral canal compromise was seen with an obvious discontinuity of the thecal sac in a T2 weighted sagittal section [Fig. 3(A, B, C, D, E)]. Considering severe injury of highly unstable nature, we took the case for the operative procedure on the same day.

**Operative procedure**

The patient was positioned prone. As soon as we positioned the patient, to our surprise, there was a complete automatic reduction of the injury in the fluoroscopic study. L3 to L5 posterior exposure was done under aseptic precautions. The broken L4 posterior elements were removed. Contrary to our assumption, the dural sac was intact and no CSF leak was found. In the right side of the canal at the level of L4, a free facetal fragment was found, which was removed. The L4-L5 plane was completely unstable and we could mobilize the spine segment in both sagittal and coronal planes even with a thumb pressure to the spine processes.

![Fig. 1. AP (A) & Lat (B) views involving thoraco-lumbo-sacral spine. Meyerding grade V translational injury (spondyloptosis) at L4-L5.](image-url)
Considering the unstable injury, we fixed the spine with pedicle screws in L3, L4, and L5 with two rods (Medtronics, USA). A towel clip was used to stabilize the vertebral bodies while inserting pedicle screws. The screws were placed using a freehand technique with some fluoroscopic assistance. The L4-L5 inter-body area was prepared, a discectomy was done and an inter-body cage of size eleven with bone graft was placed. The construct was tightened. Vertebral canal and L4 roots decompression were ensured [Fig. 4 (A, B)]. Facetal decortication and fusion were done. Fluoroscopy was used for spine alignment assessment, reduction, and implant placement.

Post-operative course

The management of vitals was ensured. Physiotherapy and rehabilitation were started. Neurological recovery started on day 2 with some flickering movement that began to appear in quadriceps on both sides. Sitting and wheelchair mobilization were encouraged. By the end of 3rd month, neurological function improved with 4/5 motor power around both the hips and knees (AISA-D). Around ankles, though it improved with a plantar flexion of 3/5 and a dorsiflexion of 2/5, yet it was less than that of around the hips and knees. Skin sensation was completely normalized. Bladder and bowel function improved and the patient was able to pass urine herself. In her recent visit at seven months, she was walking independently with some clumsiness (JOA Score: 14.5/17). The construct was stable and no sign of instability was visualized. Considering the recovery track record, in times to come, the neurological function would improve further.

Discussion

At the lumbosacral junction, a dysplastic or an isthmic nature of spondyloptosis is an important cause of the lower backache [6]. However, Post-traumatic 100% translation of the spine segments is a disastrous injury. It can happen at any level, yet it has more tendency to happen at the junctional areas of the spine where mobile and rigid segments meet. At the thoracolumbar junction, the spondyloptosis is less forgiving as it damages the spinal cord [7]. However, if it happens in lumbar or lumbosacral junctional areas, chances of neurological recovery are great [8]. The nerve roots and rootlets behave like peripheral nerves. Hence, early restoration of the continuity and the stability of the vertebral canal is of paramount importance.

Operative reduction and three-column fixation of the spine provide an optimum environment for the neural structures to recover. The disrupted inter-body level should better be fused as the intervening disc is often-times disrupted along with posterior element injury. Since a single motion segment fixation and fusion may not give an appropriate stability, it may be prudent, as in our case, to involve one more motion segment for a rigid stabilization [9].

Despite a wild translational injury, the thecal sac might be intact, and every such injury should be given the highest priority as far as operative management is concerned [10]. Further, the injury in the lumbar area could have a great potential for recovery as well. Instrumented fusion is appropriate and it serves dual purposes of realignment & decompression and rigid stabilization.
Conclusion

Traumatic spondyloptosis in the lumbar spine is a grave injury with subsequent serious neurological deficit. In such an injury, spine segments are completely unstable as the soft and bony constraints are jeopardized. Prone positioning of the patient itself helps in the reduction of the significant translation. Even after a great amount of vertebral body translation, the dural continuity may still be intact, particularly at the lower lumbar region owing to its wide inherent vertebral canal. Besides, the injury has a promising recovery pattern, provided early reduction and stabilization are executed.

Abbreviations

| Abbreviation | Description |
|--------------|-------------|
| ALL          | anterior longitudinal ligament |
| PLL          | posterior longitudinal ligament |
| ASIA         | American Spine Injury Association |

Fig. 3. (A, B, C, D, E): T2 weighted MRI with sagittal, coronal and axial sections showing apparent thecal sac discontinuity. Normal appearance of the thecal sac at L5 vertebral body.
Funding

Nil.

Declaration of competing interest

None.

Acknowledgment

A written and informed consent was taken from the patient for publication.

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