

Missed Chance Fracture of Lumbar Vertebra presenting as Cauda Equina Syndrome: A Case Report and Review of Literature

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ABSTRACT

Chance fractures of the thoracolumbar spine are being increasingly reported due to the increase in motor vehicle accidents. These are often missed injuries unless careful attention is paid to clinical examination and analysis of various imaging modalities. This can result in grave neurological complications. Here, we report a case of missed Chance fracture in a 55-year-old male which went on to develop cauda equina syndrome. A review of literature and radiological signs which should be looked into for avoiding missing such injuries are presented.

Keywords: Chance fractures, Cauda equina syndrome, Kyphosis.

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INTRODUCTION

A 55 years old man presented to our orthopedic department with complains of severe backpain, incontinence of bladder and weakness of both lower limbs below the knee. He was not able to walk without support. He gives history of fall into well 4 weeks back followed by backache. He consulted a local service where X-ray of the dorsolumbar spine was taken (Fig. 1). He was diagnosed to have compression fracture of L2 and had no neurological involvement. He was sent home with brace and supportive medications. Patient was advised bedrest at that time and asked to review after 4 weeks. No further imaging studies were performed at that time. Patient had started ambulating without medical advice when he presented to us with his present problem. His present X-ray is shown (Fig. 2).

He has a 40° kyphotic deformity with L1 vertebra telescoping into L2 with severe compression of Conus and Cauda equina roots (Fig. 3).

Review of initial X-rays shows that it is a case of injury to the posterior ligamentous complex with a small bony fragment extending along the pedicle and anterior body—missed osseoligamentous Chance fracture. The index X-rays show the widened interspinous distance. This indicates injury to the posterior ligamentous complex. A cursory look at the index X-ray had made the injury to be branded as a stable compression fracture.

Considering the unstable injury with Cauda equina syndrome, patient underwent surgical stabilization with deformity correction and decompression. In the prone position, pedicle screws were inserted from D12 to L3 at all levels taking into account the kyphosis. Temporary rod was placed on the right side for provisional stabilization to proceed with surgical releases and deformity correction. The dura and roots were found to be exposed without bone cover and stretched over the kyphus. The dura was embedded in fibrotic tissue. At this juncture, we proceeded to lateral extracavitary approach where the L1,2 intervertebral space was approached laterally. The L2 and L1 roots were identified from distal to proximal which helped to dissect out the dura and roots without damage. L1,2 intervertebral disk was curetted out and the anterior surgical release was completed with careful use of Cobb elevator. At this stage, deformity correction was achieved by sequential distraction and translation using the persuader. Cancellous graft was placed in the L1,2 intervertebral space and compressed to form a stable construct. Thorough decompression of dura and roots was performed. The postoperative X-ray is shown (Fig. 4).

Patient was mobilized with thoracolumbosacral orthosis and underwent physiotherapy. Patient showed good neurological recovery with improvement in motor power and bladder functions. He had a fair degree of low back ache at the last follow-up.

DISCUSSION

Chance fractures of the vertebra were first described by George Q Chance¹ in 1948. He described a transverse fracture extending from the spinous processes across the

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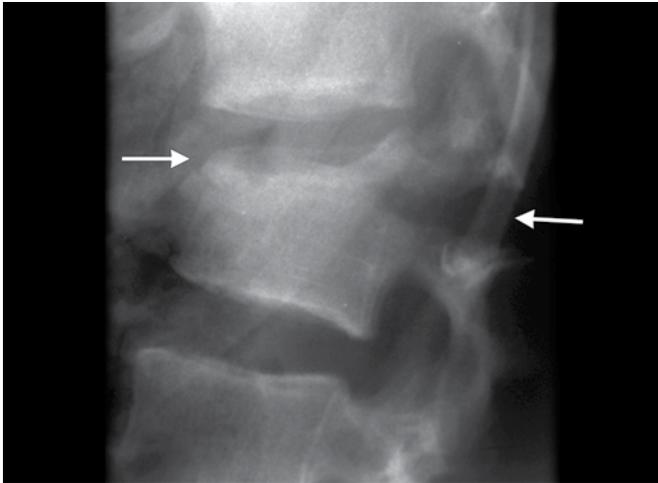


Fig. 1: The widened interspinous distance which suggests the injury to PLC



Fig. 2: The unstable kyphosis of 40°



Fig. 3: Magnetic resonance imaging shows severe compression of Conus cauda region

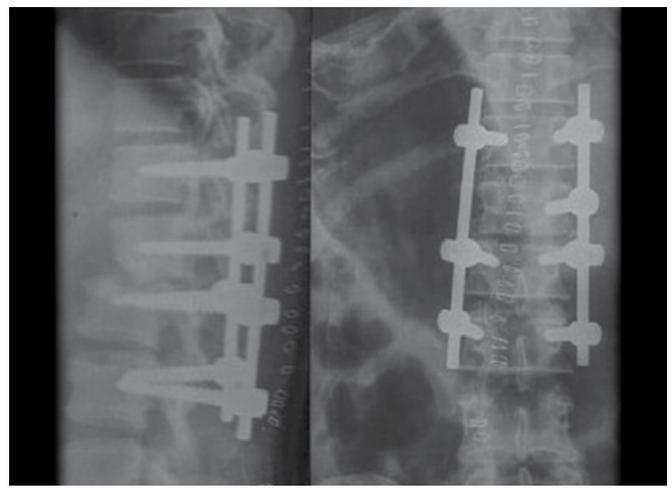
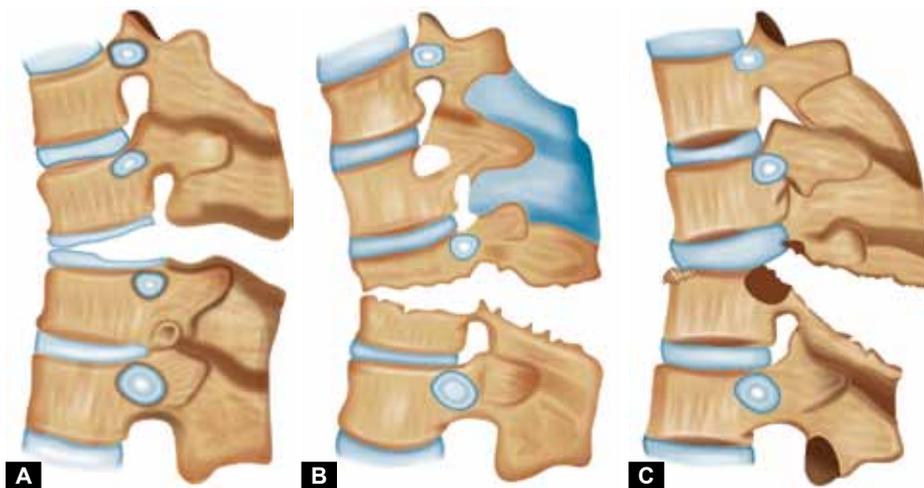


Fig. 4: Postoperative X-ray showing the correction achieved



Figs 5A to C: (A) Pure ligamentous Chance fracture, (B) Bony Chance fracture and (C) Partly osseous and ligamentous Chance

pedicles into the vertebral body. This type of fracture came to be known as bony chance fracture. Later two more types of Chance fractures were described. One was pure ligamentous type where the injury started from interspinous ligaments and went across the interdiscal space. Third type of injury is a

combined ligamentous and bony injury (Figs 5A to C). Most frequent site is the segment between D11 and L2. In children, the injury can be lower down in the lumbar vertebra.

Chance fracture is increasingly reported due to increasing motor vehicle accidents where there is sudden deceleration

while wearing a seat belt.² It is a flexion-distraction injury where the spinal axis of motion is anterior, and the posterior structures of the spine fail first. The same injury can also occur when there is hyperflexion of the spine across an anterior obstacle. Gertzbein and Court-Brown³ have described a Chance burst fracture where there is a component of axial loading in addition to the hyperflexion mechanism.

Injury to abdominal viscera and great vessels can also occur with this type of injury.⁴

Due to the predominant ligamentous nature in type 2 and 3 Chance fractures, it is often a missed injury. Bernstein⁵ et al have described the following signs for detection of these injuries:

1. In the anteroposterior (AP) view of the spine, there is radiolucency in the upper half of the lower vertebra that is injured due to absent overlap of adjacent vertebra empty vertebra sign.⁵
2. A horizontal fracture of the transverse process suggests a flexion-distraction injury.⁶
3. In the lateral view, careful attention should be paid to the interspinous distance. Increased interspinous distance is a tell-tale indicator of disrupted posterior ligamentous complex.⁶
4. In axial computed tomography (CT) section, the facet joints will show that the inferior articular process of the upper vertebra is not articulating with superior articular process of lower vertebra. This is known as naked facet sign or perched facet sign.⁷
5. Serial axial CT shows loss of definiteness of the pedicles—dissolving pedicle sign.⁵
6. Magnetic resonance imaging (MRI) shows transverse fracture line with low signal intensity surrounded by high signal intensity in cases of bony Chance fracture—sandwich sign.⁸
7. Magnetic resonance imaging (MRI) shows the disruption of posterior ligaments.⁸

Bony Chance fractures have high potential for healing and can be managed in hyperextension casts.

Ligamentous Chance fractures will require posterior instrumented fusion for stability and healing. Otherwise

these injuries have potential for back pain and neurological deterioration. Posterior compression instrumentation with posterolateral fusion is advised. One should be careful in using compression instrumentation in Chance burst fractures where there can be retropulsion of bony fragments. Some authors advise using hook-based instrumentation as they feel that insertion of pedicle screws in the unstable segment has the potential for causing neural and vascular injury. We use pedicle screw-based instrumentation in all cases.

CONCLUSION

Chance-type fractures are increasing due to seat belt injuries. These can present with subtle radiological findings. Careful assessment of X-rays, CT scans and MR imaging is needed to diagnose these injuries. Neglected Chance fractures have potential for causing spinal deformity, backache and neurological deterioration.

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