Case Report

Progressive subluxation of thoracic wedge compression fracture with unidentified PLC injury

Dr. Thalluri Gopala Krishnaiah* Dr. Voleti Surya Prakash Rao**

Abstract:
Assessment of the integrity of posterior ligament complex injury (PLC) is the most important factor for identifying unstable thoracolumbar fractures. There are clinical and radiological criteria for the assessment of PLC injury initially, confirmed further by MRI. The PLC injury can be present in a patient who didn’t fulfill the plain radiograph criteria. We report such an injury in a 29 yrs old man who sustained T9 wedge compression fracture. It looks stable fracture with no PLC injury according to the plain radiograph criteria and it was managed conservatively without doing MRI. But he developed progressive subluxation after 3wks when he was mobilized. The MRI showed PLC injury and he underwent long segment posterior pedicle screw fixation and fusion. This case shows the importance of MRI in assessment of PLC injury and the reliability of TLICSS classification system in the management of thoraco-lumbar fractures.

Key words: Thoraco lumbar fractures, posterior ligament complex (PLC) injury, plain radiograph criteria
Introduction:
Assessment of the integrity of posterior ligament complex injury (PLC) is the most important factor for identifying unstable thoracolumbar fractures. Though there are clinical and plain radiograph criteria for the assessment of PLC (1, 2, 3), there is little to no supportive clinical evidence that they are reliable indicators of PLC injury. More than 50% of vertebral body height loss or segmental kyphosis more than 30 degrees or abnormally increased Interspinous distance is indicators of PLC disruption. The presence of PLC disruption can occur with injuries that do not fulfill these criteria. MRI is the investigation of choice for proper assessment of PLC. We are reporting such a problem in a 26 years old male who sustained a T9 vertebral fracture with unidentified PLC injury which leads to a progressive subluxation thereafter.

Case history
29yr old man came to our spine hospital with c/o progressive pain in back and paraesthesia in both lower limbs for last 1 week. He had sustained a fall from two wheeler 4 weeks back, for which he was evaluated at local hospital. Patient had no neurological deficit. He was told that he had a small fracture of back bone and was advised bed rest for 3 weeks. After three weeks this patient started ambulation once his pain had come down with brace support. The present complaint started after he started walking, gradually increasing in severity, associated with paraesthesia in both lower limbs. The pain aggravated on walking, prolonged standing and sitting and was relieved with bed rest. Patient had normal bowel and bladder function. On examination, patient had tenderness at T-9 with mild kyphosis. Neurological examination revealed decreased sensory perception to fine touch below T12 bilaterally and no motor deficits. Initial radiograph showed isolated T9 wedge fracture without any subluxation (Image 1) but subsequent fresh radiograph after three weeks had shown T9 wedge compression fracture with anterior subluxation. (Images 2 a & b) Anterior vertebral height, angle of focal kyphosis and amount of translation are given in the table 1. MRI revealed compression over spinal cord and posterior ligament complex injury. (Image3a & b)
As the subluxation is progressive with impending neurological deficit, he was taken up for spinal stabilization surgery. Through posterior midline approach, posterior midline approach, posterior elements exposed. Supraspinous and interspinous ligament tear present at
T9 vertebral body level. T9 vertebral lamina fracture present, facet joints are intact. Pedicle screws applied in two segments above and below. Alignment of the spine and fracture reduction achieved with contoured interconnecting rods. Fixation is stable. Posterior spinal fusion done from T7 to T11 vertebrae. Postoperatively patient had good relief of symptoms and was able to walk well. Post op radiograph showed good alignment of spine with reduction of subluxation. (image 4) Patient returned to work after 6 week of surgery. At six months follow up patient x-rays showed good healing and patient is free of any symptoms.

**Discussion**

Most of the wedge compression fractures are stable and can be managed conservatively. In an isolated wedge compression fracture assessment of PLC injury is needed to rule out flexion distraction injury. These are potentially unstable fractures which needs stabilization. More than 50% of vertebral body height loss or segmental kyphosis more than 30 degrees or abnormally increased Interspinous distance is indicators of PLC disruption (3, 4). The presence or absence of PLC disruption can occur with injuries that do not fulfill or exceed these criteria, respectively. In such instances MRI is an important tool in assessing the integrity of the PLC (5). In our case the initial body height loss was 38.25%, segmental kyphosis is 18 degrees and sagittal translation is 1.48mm only making it a stable wedge compression fracture without PLC disruption according to above criteria (Table-1). The attending surgeon managed conservatively with bed rest and mobilized with brace. MRI was not done initially. Subsequently as the patient started walking, progressive subluxation occurred (translation of 8.1mm and focal kyphosis 35 degrees) as it is an unstable fracture. The subsequent MRI taken after 3 wks is showing PLC disruption clearly (Image-3). Posterior ligament complex (PLC) disruption may present in injuries that do not fulfill the plain radiograph criteria. Careful clinical examination is needed to look and feel for the PLC tenderness and disruption, further aided by imaging like MRI to prevent this kind of complications.

Assessment of the spinal stability is the most important factor for the management of thoraco lumbar fractures. Many classification systems are evolved over a period of time for identifying the unstable fractures. The decision whether to treat these injuries surgically or conservatively depends
on the initial instability and predicting future mechanical failure. The PLC has received increasing attention for the independent prediction of thoracolumbar injury stability. The PLC includes the supraspinous ligament, interspinous ligament, ligamentum flavum, and the facet joint capsules. Segmental kyphosis greater than 30 degrees has been suggested by several investigators as a critical point beyond which PLC disruption is likely. Based on in vitro biomechanical data, a loss of more than 50% of vertebral body height is another strong indicator of posterior instability. Despite the reproduction of these criteria in various textbooks and articles throughout the years, there is little to no supportive clinical evidence that they are reliable indicators of PLC injury. The presence or absence of PLC disruption can occur with injuries that do not fulfill or exceed these criteria, respectively. This case report is a good example, where PLC disruption can occur without fulfilling these criteria. MRI scan may improve diagnostic sensitivity of PLC injury, especially fat suppression MRI scan\(^5\). Thoracolumbar Injury Classification and Severity Score (TLICSS) represent the most recent evolution in thoracolumbar fracture management\(^6,7\). It gives comprehensive and integrated morphological and mechanistic classification with prognostic and treatment directed predictive value. This classification system has included PLC injury as criteria to identify unstable fractures. MRI scan should be done in clinically suspected unstable wedge compression fractures before managing conservatively to rule out PLC injury. We have tried to bring out this important fact while managing these injuries that in significant wedging of the anterior column, posterior complex injury should be purposefully looked for so that these gradual subluxation do not happen.

References
5. Lee HM, Kim HS, Kim DJ, et al. Reliability of magnetic resonance imaging

<table>
<thead>
<tr>
<th>Duration</th>
<th>Anterior vertebral Height (%)</th>
<th>Posterior vertebral Height (%)</th>
<th>Kyphosis (degrees)</th>
<th>Translation (mm)</th>
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<tbody>
<tr>
<td>Immediately after injury</td>
<td>62.75</td>
<td>97.43</td>
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<td>1.5</td>
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<tr>
<td>After 4 weeks</td>
<td>74.22</td>
<td>90.72</td>
<td>35</td>
<td>8.1</td>
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<td>Postoperatively</td>
<td>85.55%</td>
<td>90.17%</td>
<td>19</td>
<td>1.29</td>
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</tbody>
</table>

Image 1: Radiograph immediately after injury

Image 2a & 2b: radiographs after 4 weeks showing progressive subluxation

Image -2a

Image -2b
Image 3a & 3b: MRI after 4 weeks showing PLC injury

Image 4: Postoperative radiograph showing good alignment of spine