

The Posterior Ligamentous Complex in Thoracic and Lumbar Fractures: Intact and with Deficit

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Introduction

Current paradigms for the treatment of spinal fractures rely on clinical, radiographic and MRI criteria to decide on management. The posterior ligamentous complex (PLC) though evasive, and difficult to quantitate is integral to these paradigms. This review is intended to evaluate the frequency of PLC disruption in thoracic and lumbar burst fractures in patents with deficit or intact.

Methods

A retrospective review of thoracic and lumbar burst fractures with retrievable MRI studies was performed. A total of 101 patients were available. Based on the MRI studies, the status of the posterior ligamentous complex (PLC) was assessed for integrity or disruption.

Results

There were 67 intact patients, and 34 with deficit. Patients who were intact (30 M, 37 F) had a mean age of 45+/-18 years. The residual canal, and kyphotic angle measured 58+/-15%, and 3+/-9%. Of the 67 intact patients, 9 had disrupted PLC. Based on standard neurosurgical criteria, 16 of the intact patients required surgery. Of the patients with deficit (22 M, 12 F), the residual canal and kyphotic angle measured 49+/-19%, and 2.5+/-11% respectively. The PLC was disrupted in 11 of 34 (p=0.034 compared to the intact). All of the patients with deficit underwent surgery for decompression and stabilization.

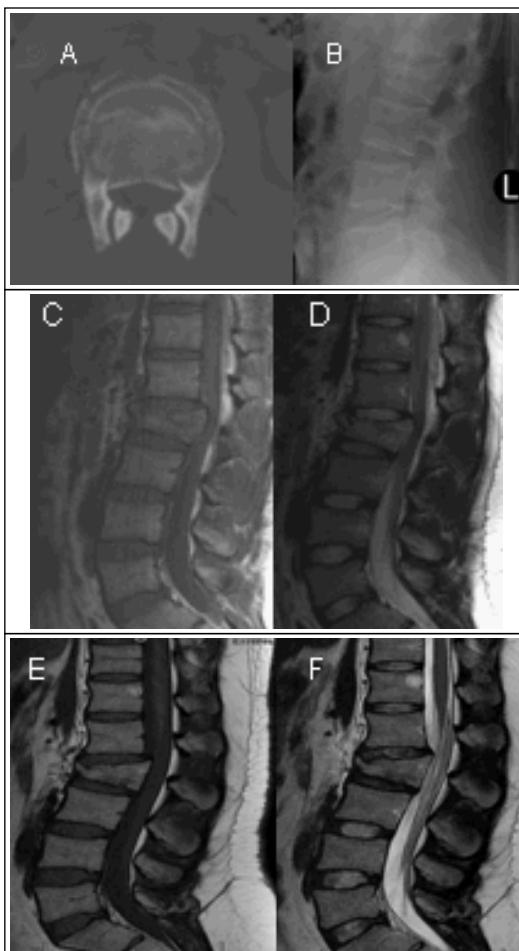
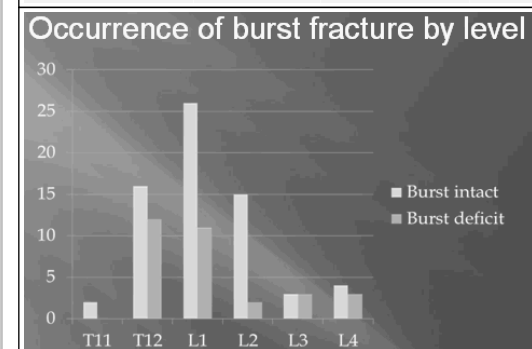


Figure 1. A 19-year-old man fell from a height of 20 feet landing on his feet. On the day of injury, he complains of back pain without deficit. Lateral plain film showed a burst fracture of L2. CT scan (a, b), and sagittal T-1 and T-2 weighted MRI (c, d) show the retropulsion of bone with a residual canal of 75% and minimal kyphosis. Though the posterior longitudinal ligament is stretched, the inter- and supra-spinous ligaments and ligamentum flavum are preserved. The patient was treated non-operatively and hospitalized for 11 days. He did well and was followed annually for 3 years. He returned 8 years later with complaints of 6 months of back and leg pain. X-rays showed an angulation of 15°. The T-1 and T-2 MRI (e, f) shows remodeling of the spine without canal compromise, but persistence of kyphosis. Patient is being treated conservatively with anti-inflammatories.



Figure 2. A 53-year-old lady fell from her deck a height of 8 ft. She was neurologically intact in severe pain. Axial (a) and sagittal (b) CT scan show the L1 body fragmentation, and retropulsion affecting predominantly the upper half of the body. T-2 (c) and STIR (d) MRI show the burst fracture of L1 with retropulsion of bone into the canal, without posterior ligamentous disruption. After 5 days of hospitalization she was discharged in a thoracolumbar brace and on analgesics. She was readmitted 10 days later because of pain, but without deficit. She underwent surgery 18 days after her injury through a left flank approach. A corpectomy of L1 was performed with grafting using a carbon fiber reinforced polymer cage (CFRP, DePuySpine), packed with the patient's own bone. AP (f), and lateral images (e) radiographs obtained 18 months later show corrected alignment.

| | Intact | Deficit | p |
|----------------|---------|-----------|-------|
| No. patients | 67 | 32 | |
| Gender | 30M/37F | 22M/10F | |
| Age | 45+/-18 | 49+/-21 | |
| ASIA | 5 | 3.6+/-1.0 | |
| Residual canal | 58+/-15 | 48+/-18 | 0.002 |
| Kyphosis adm | 3+/-9 | 2+/-11 | NS |
| PLC disruption | 7/67 | 9/32 | 0.034 |
| Surgery | 16/67 | 32/32 | |
| Follow-up (mo) | 14+/-14 | 20+/-19 | |



Conclusions

The PLC disruption was significantly more prevalent in burst fractures with deficit (p=0.034). In the intact patients, PLC disruption was more prevalent in the cohort undergoing surgery (p=0.001). Notwithstanding the importance of the PLC, treatment of burst fractures should take into account clinical, CT, as well as MRI criteria.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Better understand the role the posterior ligamentous complex has in patients with burst fractures with or without neurological deficit, 2) Describe the importance of the patient's clinical picture along with a multi-image modality approach to treating patients with burst fractures and posterior ligamentous complex integrity, 3) Identify an effective treatment strategy for patients with burst fractures and posterior ligamentous complex disruption.