

Reduction of Significant Retropulsed Fragment by Posterior Approach in L4 Burst Fracture

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Abstract

28-year old gentleman was involved in an RTA and sustained a burst fracture of L4 with 90% canal compromise (Figure 1). He had a significant neurological deficit in both lower limbs, involving bilateral L4, L5 and S1 nerve roots, associated with loss of sensation and power. The patient had sacral sparing with well-preserved perineal sensation. Considering significant neurological deficit there were 2 options to treat his fracture were available:

- Anterior surgery, removal the retropulsed fragment, restoration of anterior column with implant followed by posterior screw fixation.
- Posterior surgery only, decompression and spinal stabilization.

The posterior surgery was contemplated and satisfactory result was achieved.

Keywords: Anterior Surgery; Burst Fracture; Trauma

Introduction

Thoracic and lumbar fractures represent approximately 50% of neurologic spinal trauma. They lead to paraplegia or cauda equina syndrome depending on the level injured. Progressive neurological deterioration in the presence of substantial canal compromise is an indication for surgical decompression and stabilization. If surgical treatment is chosen, further debate arises over the appropriate type of approach, anterior vs posterior, scientific evidence is lacking for the superiority of one surgical technique over the other in view of morbidity [1]. Vertebroectomy, decompression and reconstruction of anterior column is preferred method of treatment in burst fractures with neurological deficit. We have successfully treated burst fracture of L4 with significant canal compromise and neurological injury through posterior approach. We believe our posterior approach can be an effective, safe and less traumatic and should be used in selected cases.

Methods

Our posterior technique applies features of posterior subtraction osteotomy in order to get a safe access to the retropulsed fragments without causing further neurological damage.

The patient is positioned prone on Montreal mattress, following spinal exposure the posterior element of L4 including laminae, spinal process, transverse processes and a part of L4/5 and L3/4 facet joints were completely excised, then pedicles are exposed on both sides, pilot holes are made in the pedicles and one third of proximal pedicles are removed, this allows a safe access to the posterior aspect of the dura and retropulsed fragments. Prior to this, ligamentum flavum should be completely removed this facilitates the circumferentially exposure of the dura and allows easy access to the posterior fragments without causing any further damage to the neural tissue.

When the fragments from both sides were fully exposed by gentle retraction of the dura then posterior wall impactor (Globus osteotomy set) or punch is then used to push the displaced retropulsed fragments to its normal place (posterior vertebral body), this manoeuvre should be performed several times with great care from both side to ensure that there is no further compression on the dura and neural tissue. When the decompression is completed, holes are made in the pedicles of L3, L5 and remaining part of L4 and contoured rods are secured to the head of screws (Figure 3) Decortication of transverse processes is performed and a combination of local bone and vitos is laid on both paravertebral gutters. Wound is closed under superficial and deep drains.

Results

This is the first report on posterior reduction of significant retropulsed fragment in patient who had L4 burst fracture with neurological deficit. The patient’s operation was uneventful and in the following weeks showed a remarkable neurological improvement in both lower limbs leaving him with mild residual foot drop on the right side. Neurological improvement on L4, S1 and left L5 nerve roots were rapid and complete and we believe this was due to rapid removal of fragments from spinal canal and decompression. Comparison of pre and post op scans showed complete decompression and disappearance of the fragments in the canal (Figure 1 and 2). The highlight of this technique is that, through a posterior approach, removal of the retropulsed fragments eliminated the need to anterior surgery and hence minimized the morbidity associated two-stage surgery if the patient had initial anterior surgery. We are sure that the same result would have been achieved by anterior surgery but with increased risk of blood loss through corpectomy, morbidity and duration of surgery. The patient was able to walk with foot drop splint 4 weeks after surgery.

There is no doubt that anterior surgery in the form of a corpectomy and removal of the fragment would have caused more bleeding and morbidity and still necessitated further posterior surgery. This technique is recommended in the lumbar region, below the level of L1 where the conus medullaris ends and damage to the spinal cord is avoided.

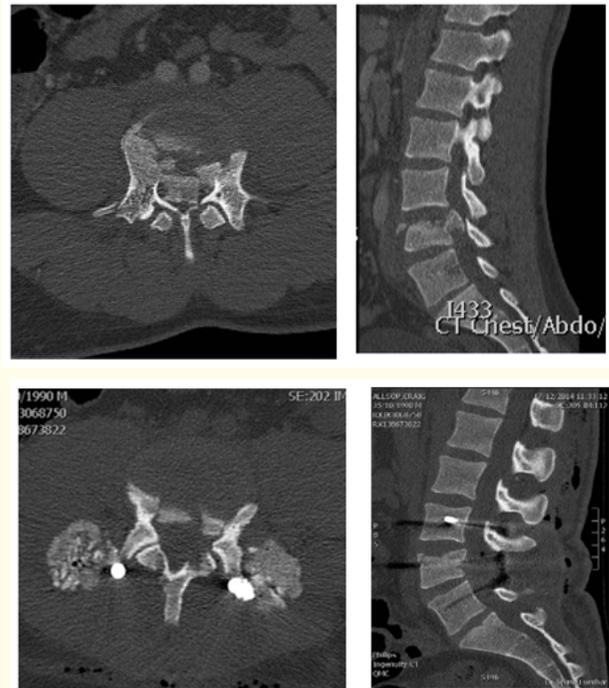


Figure 1: Axial and sagittal views of CT Scan show retropulsed fragment causing significant canal compromise.

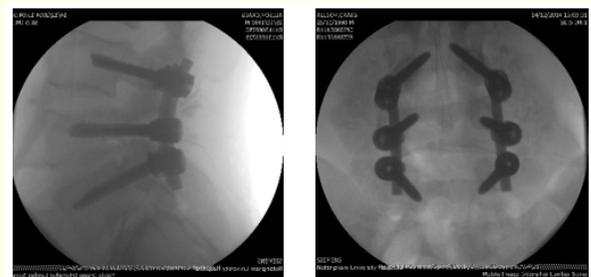


Figure 2: Post-op CT Scan show canal clearance, using posterior approach only.

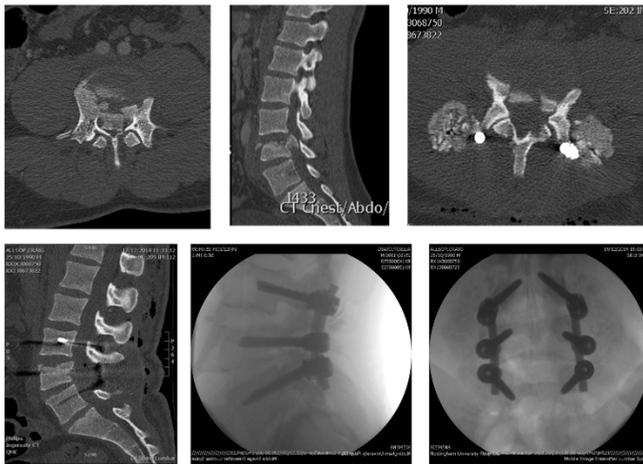


Figure 3: Intra-op and post-op images show short segment pedicle screw fixation from L3-L5.

Conclusion

Debate arises over the appropriate type of approach for the treatment of thoracolumbar burst fractures with neurological compromise [2]. Scientific evidence is lacking for the superiority of one surgical technique over the other. Posterior surgery decreases surgical trauma and time and can be effective and safe surgical method for selected cases. An early posterior stabilization with additional bone grafting allows for a stable fixation of the spine with restoration of the dorsal tension band function, the possibility of early mobilization. Some investigators believe spinal canal compromise in patients presenting with neurological deficits cannot adequately be resolved by a dorsal approach alone requires anterior decompression. Most investigators recommend a surgical decompression in the setting of major neurological deficit, progressive neurological loss, and substantial compromise of the spinal canal. Finally an accurate assessment of complications will lead to scientific and clinical progress towards appropriate approach.

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