Neurosurgical forum

Letters to the editor

Thoracic fracture-dislocations

TO THE EDITOR: We read with interest the article by Barcelos and Botelho² (Barcelos ACES, Botelho RV: Treatment of subacute thoracic spine fracture-dislocation by total vertebrectomy and spine shortening. Technical note. *J Neurosurg Spine* 18:194–200, February 2013). Spinal fracture-dislocations are the most unstable 3-column injuries. They are associated with a high incidence of spinal cord injury on presentation. The degree of subluxation in the sagittal and coronal planes is variable and ranges from mild to total spondyloptosis.⁸ Surgical management of these fractures is always pursued with the goals of achieving reduction, realignment, and stabilization.

The authors' technical note featured 2 cases of high thoracic fracture-dislocations that for some reason were managed in a subacute fashion. The operation involved dorsal transpedicular resection of the partially dislocated vertebral body, realignment, and pedicle screw fixation. This resulted in spinal shortening, as the anterior column was not reconstructed following the vertebrectomy. This technique was applied in 2 patients with thoracic fracture-dislocations whose fractures could not be reduced. The technique is quite novel and rarely reported as a surgical strategy to fix these fractures.¹

We have managed a number of fracture-dislocations in the cervical, thoracic, and thoracolumbar regions acutely and, less commonly, subacutely and have been successful in attaining reduction and near-anatomical alignment through one approach: dorsal pedicle screw fixation. We found that even in severe cases involving total spondyloptosis of one vertebral body over the other in the coronal, sagittal, or both planes, reduction can be achieved through various means, one of which would be the application of reduction pedicle screws using distractive forces and the removal of the superior articular facets in certain instances.^{6,8} Ultimately these fractures will relocate as they are highly unstable, especially with the aid of intraoperative neuromuscular blockade (Fig. 1). Corpectomy and anterior column reconstruction in fracture-dislocations is rarely required, as the load-sharing score of the fractured vertebral body or bodies involved is usually < 6, and this is because the mechanism of injury lacks a significant axial vector component.

Dorsal vertebrectomy and vertebral column resections are excellent strategies to manage burst fractures, tumors that involve the vertebral body, and scoliosis cases with fixed axial and rotatory deformities.^{5,7} Following dorsal resection of the vertebral body, the anterior column is almost always reconstructed with strut grafts, titanium, or even carbon fiber and polyetheretherketone (PEEK) cages. This is to preserve load sharing and, more importantly, to avoid spinal column shortening and hence potential buckling and deformity of the spinal cord itself, which is in turn associated with neurological injury.⁴

FIG. 1. Sagittal CT scan showing a fracture-dislocation with near-total spondyloptosis of T5–6 (left). This was managed with long-segment posterior pedicle screw fixation achieving anatomical alignment (right).

Both patients in the technical report had suffered complete spinal cord injury with an American Spinal Injury Association (ASIA) Grade A on presentation. The reported chance of neurological improvement in these fractures is grim but is not nil.^{6,8} Spinal shortening, especially at the level of the thoracic spinal cord, would probably render the potential chances for recovery even lower. Moreover, while the spinal alignment following this procedure is anatomical, a potentially deformed and buckled spinal cord or dural sac would still be associated with a higher risk of posttraumatic syrinx formation with time.³

Because of the aforementioned potential issues, we find that the technique described is appropriate in extreme and exceptional circumstances when the dislocations cannot be reduced with conventional techniques (due to fracture healing), and hence we congratulate the authors on this contribution.

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Disclosure

The authors report no conflict of interest.

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RESPONSE: We thank Drs. Dahdaleh and Lindley for their interest in our paper and valuable comments.

In the period from February 2010 to February 2013, 70 patients with thoracic and lumbar fractures underwent surgery in our service. Only 2 presented with complete fracture-dislocation. Both patients were managed in the subacute phase because of clinical complications (Case 1, 15 weeks) and late referral (Case 2, 8 weeks).

Realignment through the application of reduction pedicle screws using distractive forces and the removal of the superior articular facets is certainly useful in the acute phase.⁵ According to Wang and Zhu,⁸ “deformity correction was completely achieved in all the fracture-dislocations that were subjected to surgery within 3 weeks and was partly achieved in those subjected to surgery after 3 weeks.” In the subacute phase, the injury is more rigid because of some degree of fracture healing. We agree that if the reduction is fully accomplished, corpectomy is unnecessary in most cases once the inferior vertebral body presents only a subtle fracture of the upper endplate. Dorsal vertebrectomy should be followed by anterior column reconstruction with structural grafts or titanium cages if there is a long gap between the adjacent vertebrae. If there is a short gap, it can be filled with autologous cancellous bone without compromise to the fusion.

The chances of neurological improvement in complete spinal cord injuries (ASIA Grade A) is grim, despite many efforts of the scientific community.^{2,3} So far, traumatic paraplegia patients are not expected to present with a considerable increase in motor function, and even when there is improvement on the ASIA Impairment Scale, it does not imply a better functional outcome than that achieved by those who persist with ASIA Grade A.⁶ In fact, although spondylectomy and spinal shortening promote canal clearance, there is a potential risk of buckling of the spinal cord and dural sac, and some percentage of these cases may present posttraumatic syringomyelia. However, its frequency is still to be proven. Besides, it is not yet possible to determine if the syringomyelia rate would increase by the technique we have described. Post-traumatic syringomyelia seems to be caused by the spinal cord injury itself and the scarring or tethering of the

spinal cord to the surrounding dura mater.¹ Nevertheless, spinal shortening has been used extensively with satisfactory results in the treatment of neurologically intact patients with severe deformities.⁷

In conclusion, we agree that in flexible spine fracture-dislocations, the first choice of treatment should be dorsal reduction and instrumentation. In some fracture-dislocations, resection of the injured disc and partial corpectomy of the inferior vertebra might be enough to allow reduction and superimposition of the adjacent vertebrae. If a satisfactory reduction is accomplished, an anterior approach is precluded. If realignment is not achieved, the neurological status can guide the surgical procedure. In incomplete spinal cord-injured patients, the combined anteroposterior or posterolateral approaches, followed by corpectomy, spinal cord decompression, and stabilization, are the most recommended techniques. In paraplegic patients, which corresponds to the majority of the complete fracture-dislocations,⁴ the combined or posterolateral approaches are also useful, but vertebrectomy followed by spinal shortening and dorsal instrumentation is a reasonable and effective option, with possibly fewer approach-related risks.

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