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Technical Note

# Posterior Interbody Fusion using Cage for T4 Bursting Fracture

**Seok Won Kim, M.D., Seung Myung Lee, M.D., Ho Shin, M.D.**

*Department of Neurosurgery, College of Medicine, Chosun University, Gwangju, Korea*

We report a case of T4 bursting fracture with paraparesis that recovered by posterior approach. A 47-year-old man presented with paraparesis (grade Ⅲ) which had progressed rapidly after motor cycle accident. After sacrificing the T4 nerve root (right), posterior interbody fusion using cage following T4 corpectomy and T3-4, T4-5 discectomy was performed. After operation, lower extremities motor power improved and he could walk after one month. And this is the first report of posterior approach using cage by corpectomy and two level discectomy in case of upper thoracic burst fracture in Korea.

**KEY WORDS :** Upper thoracic burst fracture · Posterior interbody fusion.

## Introduction

The ideal surgical modality for upper thoracic burst fracture consists of anterior decompression and anterior middle column stabilization. The posterior approach can not decompress the compromised spinal canal directly, and it may cause the spinal instability later. But, it is familiar to the neurosurgeon and less invasive method. And in upper thoracic region, posterior approach has several advantages. It can reduce more easily the kyphotic curvature due to small size of body and adjacent muscles, and the rib cage contributed to spinal stability alter[2,6,8].

Authors report a patient who has been recovered from paraparesis due to T4 burst fracture by operating posterior interbody fusion using cage by T4 corpectomy and T3-4, T4-5 discectomy.

## Case Report

A-47-year old man presented with paraparesis after traumatic accident. When he arrived at the hospital, his motor power was Grade Ⅳ and there were hypoaesthesia below T5 dermatome. Voiding and bulbocarvenous reflex are intact, however. Thoracic MRI (magnetic resonance imaging) showed T4 burst fracture with vertebral body compression(compression rate 80%) and kyphosis(kyphotic angle 40°) (Fig. 1).

**Fig. 1.** Thoracic magnetic resonance images show the thoracic kypthosis that resulted from a burst fracture at T4 body.

We decided to perform T4 corpectomy and interbody fusion by posterior approach. The T4 posterior segment was removed by using drill and rongeur. Then dura sac and both T4 nerve roots were exposed. Right T4 nerve root was sacrified and right pedicle was removed by drilling(Fig. 2). We made enough space to remove vertebral body by using instruments. After total T4 corpectomy, T3-4 and T4-5 discetomy was performed.

**Fig. 2.** This picture shows intraoperative finding of sacrification of right T4 dorsal root.

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• Address for reprints : Seung Myung Lee, M.D., Department of Neurosurgery, College of Medicine, Chosun University, 588 Seoseok-dong, Dong-gu, Gwangju 501-717, Korea
Tel : 062)220-3120, 3126 Fax : 062)227-4575
E-mail : chosunns@hanmail.net

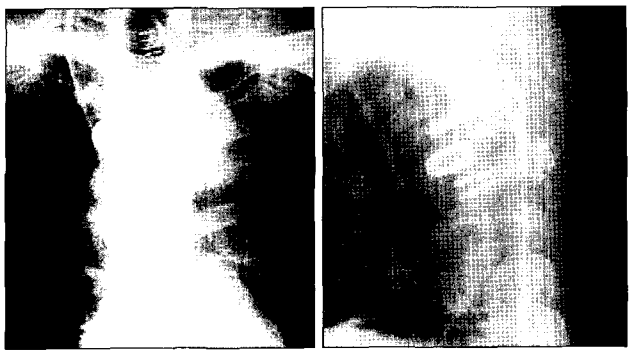

**Fig. 3.** Postoperative radiographs show well located pedicle screws at T3, T5 vertebra and correction of kyphotic deformity.

Pedicular screws were inserted to T3 and T5 body and connect the rod between screws. The kyphosis was reduced by distracting and extending the neck using the rod holder which was connected to rod. Postoperative thoracic radiography showed correction of kyphotic deformity(kyphotic angle 12°)(Fig. 3). After operation, he could walk without aid after 1month.

## Discussion

In the thoracic fracture, if it were unstable injury with a bone fragment compressing from the anterior side or ruptured disc material, the anterior decompression and fusion by transthoracic approach is the basic treatment principle[1].

Decompression of anterior lesions in the upper thoracic spine is difficult, because the sternum, thoracic kyphosis, narrowness of the spinal canal, and presence of major vessels act as physical constraints, and because the anatomy is unfamiliar to most neurosurgeons[2,3,5].

In fact, since the posterior approach can not remove the anterior bony fragment, only posterior approach can be incomplete surgery. But, in this case, the kyphotic angle according to cobb's method was 40°, the vertebral compression rate reached 80% above, the dorsal root of the thoracic vertebra ran backward and innervated around the facet of the spinal articular process, divided into the medial and lateral branch, innervated the dermis of the thoracic spious process and the posterior thorax, took the advantage of the point that the cutting would not cause specific neurological deficit, and thus decompression was achieved by performing total corpectomy with the sacrifice of the dorsal root, all three columns were fixed using transpedicular screwing, performing distraction, fixed the rod, and kyphosis was able to be corrected. Although the fixation using transpedicular screwings has been shown to be superior, however, for the upper thoracic fracture, because of the anatomical characteristic of the thoracic spine, the pedicle is located adjacent to the spinal cord and may damage the spinal cord, in comparison with the lumbar vertebra area, the spinal canal is too narrow and may misplace screwings, if the diameter of screw were too large, it may cause the injury of spinal cord, and if it were too small, it may cause the fracture of screwing, and thus its use was limited[4,7].

Particularly, in the case of the upper thorax, the anatomical structure is difficult to assess by simple radiography and thus the risk during surgery is amplified. However, since the use of transpedicular screwing in the thoracic vertebra area by some authors, the advance of the knowledge of the anatomy of the throacic vertebra canal and the biomechanical study on transpedicular screwing have been carried out actively, and the application of transpedicular screwing has been expanded gradually to the upper thoracic vertebra. The important point in the internal fixation of the thoracic transpedicular screwing is the understanding of the thoracic vertebra and the spinal canal, sufficient assessment of radiology results such as simple radiography and computerized tomography prior to surgery, magnetic resonance imaging, etc., experience through many operations, cautions and carefulness during surgery, that may reduce complications to the minimum, such transpedicular screwing is considered a surgical method without specific problems if it were not displaced severely, and we also obtained a good result of thoracic transpedicular screwing procedure after corpectomy.

## Conclusion

For the upper thoracic fracture patient who require direct anterior decompression, this approach is considered as a useful alternative method and posterior instrumentation can reduce kyphosis more effectively. This approach provides excellent exposure of the upper thoracic vertebrae for neural decompression and it allows simultaneous posterior fixation.

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