

Percutaneous Pedicle Screws in Spine Trauma: Indications and Outcomes

Yasunori Nagahama MD; Nader S. Dahdaleh MD; Andrew James Grossbach MD; Patrick W. Hitchon MD

Department of Neurosurgery, University of Iowa Hospitals and Clinics

Department of Neurosurgery, Northwestern University Feinberg School of Medicine



Introduction

Minimally invasive surgery with percutaneous pedicle screw (PPS) instrumentation has been shown to have some advantages over open surgery. These advantages include shorter operative times, decreased blood loss, shorter hospital stays, lower complication rates, and costeffectiveness. The data on minimally invasive surgery has been predominantly in the treatment of degenerative disease. However, minimally invasive techniques may be used in spine trauma when direct decompression of the neural elements is not needed. These minimally invasive techniques rely upon healing of the fractures instead of the traditional posterolateral fusion for long-term stability. The authors herein describe the use of PPS in spine trauma.

Methods

Over the past 3 years, PPS has been used in 30 cases of thoracic and lumbar fractures. These fractures extended from T5-L5. Twelve patients had flexion-distraction injuries, 8 patients had burst fractures, 6 patients had extension fractures, 3 patients had fracture dislocations, and 1 patient had a flexion compression fracture.

Results

There were no neurological complications in any of these patients. The average hospital stay was 7 + / - 5 days. The average improvement in deformity was estimated at 6.6 degrees on the sagittal images. The neurologic status based on the ASIA scale remained the same postoperatively and at the time of the initial follow -up, except for one patient for whom the scale improved from D to E. One patient had to be taken back to the operating room for revision of a pedicle screw, and another patient with associated risk factors developed spinal infection distant from the site of surgery.

Preoperative thoracolumbar CT for a 24 year-old male with L1 Chance fracture

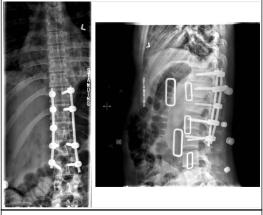


CT thoracolumbar without contrast for a 24 year-old male with L1 Chance fracture and disruption of the posterior ligamentous complex.

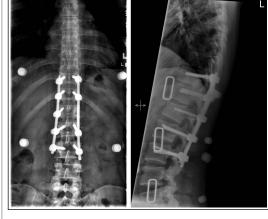
Preopeartive sagittal T2 and STIR MRI



Postoperative AP/Lateral standing films



Follow-up AP/Lateral standing films



Conclusions

PPS instrumentation is appropriate in the treatment of spine trauma where direct decompression is not necessary, as in flexion distraction injuries and extension fractures. Here we show good initial results from PPS when dealing with a variety of spine fractures, although long-term follow-up is needed.

Learning Objectives

By the conclusion of this session, participants should be able to describe the importance and effectiveness of minimally invasive surgery with PPS instrumentation in the treatment of spine trauma.

References

- 1. Grossbach AJ, et al. Flexion-distraction injuries of the thoracolumbar spine: open fusion versus percutaneous pedicle screw fixation. Neurosurg Focus 2013;35:1-6.
- 2. Ni WF, et al. Percutaneous pedicle screw fixation for neurologic intact thoracolumbar burst fractures. J Spinal Disord Tech 2010;23:530-537.
- 3. Verlaan JJ, et al. Surgical treatment of traumatic fractures of the thoracic and lumbar spine: a systematic review of the literature on techniques, complications, and outcome. Spine (Phila Pa 1976) 2004;29:803-14