



## Clinical Study

# A modified posterolateral transpedicular approach to thoracolumbar corpectomy with nerve preservation and bilateral cage reconstruction



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## ABSTRACT

This retrospective study investigated the early results of a single-stage posterolateral transpedicular corpectomy and fusion in the thoracolumbar spine. A modified technique with nerve preservation and bilateral expandable cage implantation is described. Four patients with vertebral metastasis and one patient with vertebral osteomyelitis were included in this series. Two patients underwent two level corpectomies, whereas three patients underwent single level corpectomy. The mean follow-up was 3.3 months. No perioperative complication was encountered. Improvement in neurological status was observed in patients with preoperative neurological deficits. Vertebral height and sagittal and coronal deformity were corrected using the current technique. Bilateral cage implantation offers an additional advantage of asymmetrical reconstruction of the ventral column in cases of hemicorpectomy. Single-stage posterolateral transpedicular corpectomy and fusion is a useful approach to treat ventral thoracolumbar pathologies.

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## 1. Introduction

The thoracolumbar spine is commonly involved in many pathological conditions, including tumour, fracture or infection. Surgeries are often indicated for neural decompression and spinal stabilisation in these cases. Access to thoracolumbar vertebral bodies or discs via traditional transthoracic or retroperitoneal approaches carries significant morbidity [1,2]. Additional posterior stabilisation or decompression is often required, thus further increasing the risks of the operation [3,4].

Single-stage posterolateral transpedicular corpectomy has been described in an attempt to simplify the surgical approach for circumferential decompression and simultaneous stabilisation of the thoracolumbar spine [5–9]. Nerve roots are often sacrificed in order to accommodate the passage of a large ventral supporting construct. The present study describes a modified posterolateral transpedicular corpectomy with bilateral cage placement and nerve preservation.

## 2. Methods

This is a retrospective series of thoracolumbar corpectomy and fusion performed in the Department of Neurosurgery at The Royal Melbourne Hospital in 2012. All patients had preoperative MRI. CT scans were performed before and after surgery. American Spinal

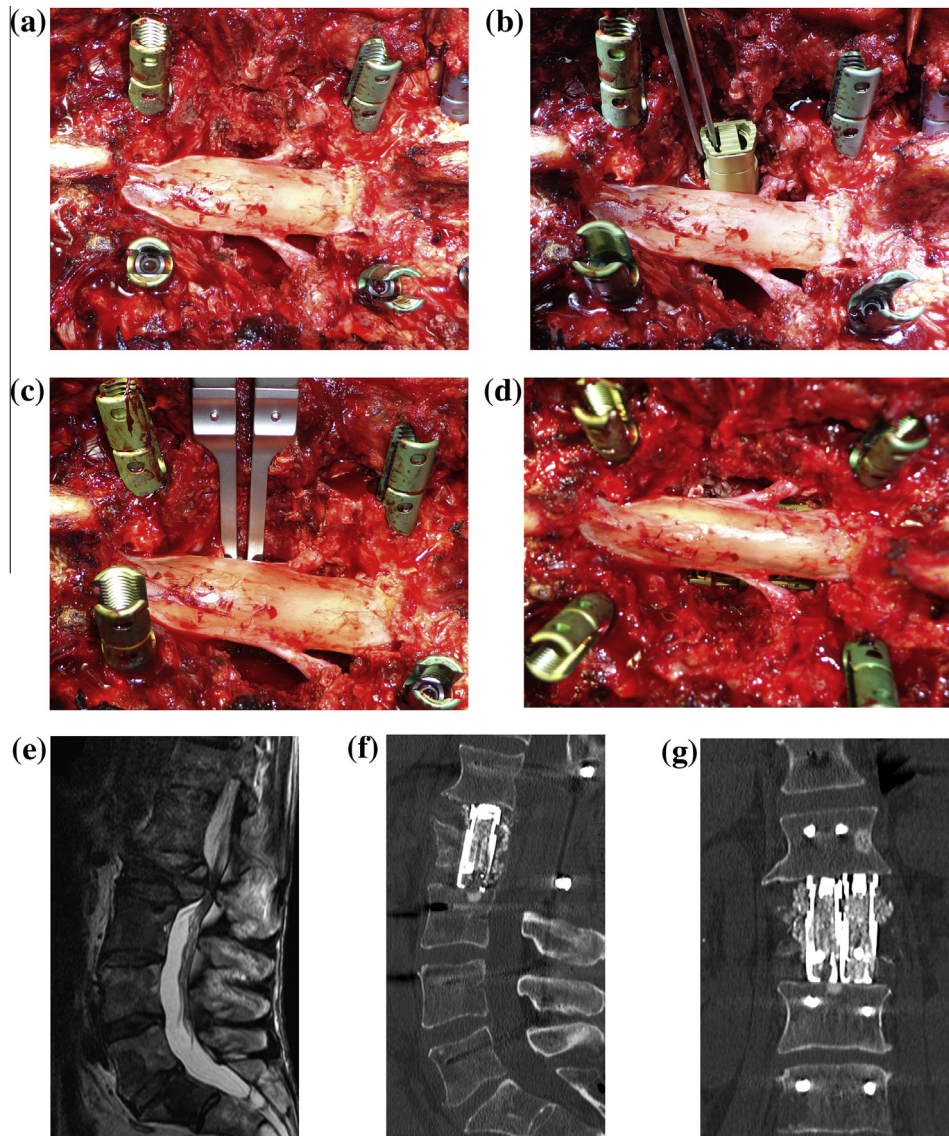
Injury Association (ASIA) impairment score was used to document the neurological function. Intraoperative blood loss, operative time, pre- and postoperative neurological function and the duration of hospital stay were analysed.

### 2.1. Surgical technique

Corpectomy and decompression was achieved via a single-stage posterolateral transpedicular approach (Fig. 1). All patients were anaesthetised with endotracheal general anaesthesia. The patients were placed prone on a Wilson frame. An intraoperative radiograph was taken to localise the pathological level. A midline incision was made, thoracolumbar fascia was divided and paraspinous muscles were dissected in a subperiosteal fashion and retracted. Bilateral pedicles screws, three levels above and below the corpectomy level, were placed under fluoroscopic guidance and electromyographic monitoring. Laminectomies were performed to decompress the spinal cord at the levels of the pathology. Pedicles at the diseased levels were removed to further decompress the spinal cord and the nerve roots. Discectomies were performed above and below the level of the corpectomy. The corpectomy was performed via a transpedicular approach using a combination of rongeurs, curettes and osteotomes. Compressive lesions ventral to the spinal cord were removed from a posterolateral angle. The posterior longitudinal ligament was removed to ensure a circumferential decompression of the spinal cord. The ventral limit of the corpectomy was reached once the anterior longitudinal ligament was seen. Depending on the primary pathology, a thin layer

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**Fig. 1.** Intraoperative photographs showing (a) L2 corpectomy in Patient 2 via a posterolateral transpedicular approach, showing circumferential decompression at the corpectomy site and exiting L2 nerve roots, (b) insertion of the expandable cage in an anteroposterior direction through the space between adjacent nerve roots, (c) distraction of the expandable cage using a standard cage distractor and (d) final position of bilateral expanded cages. (e) Preoperative sagittal T2-weighted MRI. Postoperative (f) sagittal CT scan and (g) coronal CT scan showing cage placement.

of bone was often left unresected posterior to the anterior longitudinal ligament to protect the great vessels. Adjacent cartilaginous endplates above and below the corpectomy site were removed.

To prepare for cage insertion in the thoracic spine, the medial parts of the rib heads were partially removed to create a space fitting the diameter of the cage. A titanium expandable cage (TeCorp, Alphatec Spine, Carlsbad, CA, USA) of the appropriate size was then placed into the corpectomy site. The cage was first inserted in an anteroposterior trajectory between adjacent nerve roots above and below the corpectomy site (Fig. 1b). Once inside the corpectomy space, the cage was turned 90 degrees to align with the sagittal plane. The cage was then expanded and locked under fluoroscopic guidance to correct the loss of vertebral height, kyphotic or coronal deformity (Fig. 1c). The contralateral cage was then placed in a similar fashion (Fig. 1d). All nerve roots were preserved in this procedure.

Artificial bone grafts were placed around and inside the cages. Bilateral rods were placed and locked. In patients with kyphotic deformity, compression was applied over the corpectomy level to

further correct the deformity. Two crosslinks were placed. Transverse processes, facet joints and laminae of the stabilised levels were then decorticated and posterolateral fusion with artificial bone grafts was performed. A large suction drain was placed in the epidural space. The wound was closed in layers.

### 3. Results

The current series included five patients, four men and one woman. The average age of this group was 65 years, with a range from 58–77. The primary pathologies were vertebral metastases in four patients, and vertebral osteomyelitis and collapse in one patient. Four cases involved the thoracic spine, whereas one was in the lumbar region. Single level corpectomy was performed in three patients and two level corpectomies in two patients. Bilateral cages were placed into the corpectomy site in all patients. No nerve root was damaged or sacrificed during the procedures. The average operative time was 6.6 hours and the average intraoperative blood loss was 1100 ml. The data are summarised in Table 1.

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