Mini-open transthoracic approach for resection of a calcified herniated thoracic disc and repair of the dural surface with fibrin glue: a case report

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ABSTRACT

This study reports a case of severe anterior compression of the spinal cord by a calcified herniated thoracic disc at the T9/10 level in a 46-year-old woman. She underwent resection of the calcified herniated thoracic disc and the integrated dura, using a microscopically assisted mini-open transthoracic approach. The remaining dura mater was shaped and repaired by alternate overlapping without suture. The dural surface was reinforced with a combination of fibrin glue and a polyglycolic acid sheet. This novel procedure prevented postoperative cerebrospinal fluid leakage. The patient made an excellent recovery, without any complications.

Key words: dura mater; intervertebral disc; thoracic vertebrae

INTRODUCTION

Symptomatic thoracic disc herniation accounts for 0.1% to 4% of all disc herniation that are treated surgically, although the incidence of thoracic disc herniation has been reported to be 11% to 37%. Surgical treatment for calcified thoracic disc herniation is challenging. Calcified lesions are often voluminous and adherent to the ventral dura mater. Despite development of numerous techniques, appropriate surgical procedures remain controversial. Complications after thoracic spinal surgery include pulmonary complications, neurological deficits, and cerebrospinal fluid (CSF) leakage. The overall complication rate after thoracoscopic treatment for thoracic disc herniation has been reported to be 15.6%, and dural tear occurred in 2 (1.2%) patients. The complication of CSF leakage into the pleural cavity can require lumbar and chest drainage, and surgical revision. Dural repair can be achieved using a collagen sponge with fibrin glue, and lumbar drainage can last for several days. We report a case of a calcified herniated thoracic disc treated with a novel surgical procedure to prevent postoperative CSF leakage.

CASE REPORT

In March 2008, a 46-year-old woman presented...
with myelopathy, with no history of trauma. Six years previously, she had experienced an episode of sudden back pain while walking, which recovered spontaneously days later, but she subsequently developed bilateral leg numbness. Her symptoms gradually worsened over the following years. Neurological examination revealed reduced sensation to pain and temperature in both lower extremities. The deep tendon reflexes of the lower extremities were slightly increased, but there was no muscle weakness.

Radiography showed increased density at the T6/7 and T9/10 levels consistent with calcification. Computed tomography (CT) revealed a calcified disc at the T9/10 intervertebral level extending into the spinal canal (Fig. 1a). Magnetic resonance imaging revealed decreased signal intensity at the lesion on T1- and T2-weighted images, indicating severe spinal cord compression. The spinal cord was deformed into a U-shape, owing to severe anterior compression by the calcified mass at the T9/10 level (Fig. 1b). A provisional diagnosis of a calcified herniated thoracic disc was made.

Due to the progressive neurologic deterioration, the patient underwent anterior decompression through a microscopically assisted mini-open transthoracic approach to avoid extensive damage to the chest wall. A 6-cm right thoracic skin incision was made over the 7th intercostal space. The proximal end of the rib and the disc space are collinear and help to orient the surgeon. The proximal 1 cm of the rib head was removed using a high-speed drill, and this exposed the posterior aspect of the vertebral body and the lateral surface of the right pedicle. Based on CT, the extent of bony resection required to achieve

![Figure 1](image1.png)

**Figure 1** (a) Computed tomography and (b) magnetic resonance imaging showing a calcified herniated thoracic disc at the T9/10 level compressing the spinal cord to a U-shape (arrows).

![Figure 2](image2.png)

**Figure 2** Dural repair: (a) a dural defect after resection of the calcified herniated thoracic disc: 2 slits are created (arrowheads) in the dura using scissors and the opposite ends of the dura are overlapped alternately (arrow), (b) intraoperative photograph showing the 2 slits (arrows), and (c) overlapping of the dura.
adequate decompression was determined. After removal of the posterior aspect of the vertebral body, calcification was detected. It was difficult to mobilise the calcified herniated thoracic disc, so it was decided to slowly grind it down using a high-speed diamond drill. The dura was found to be incorporated into the calcified disc herniation. The thinned, calcified disc with integrated dura was carefully moved away from the spinal cord to avoid injury to the spinal cord. The remaining dura was of sufficient size to overlap and cover the spinal cord, because the dura had been stretched and deformed over a long period (Fig. 2a). Therefore, 2 small slits were made in the dura using scissors (Fig. 2b), and the opposite ends of the dura were overlapped alternately to provide stabilisation of the dura (Fig. 2c). Dural sutures were not used. A polyglycolic acid sheet and fibrin glue were used to reinforce the dural repair.

Postoperatively, the patient made an excellent recovery without CSF leakage into the thoracic cavity or other complications. She had improved neurological function and achieved a stable and smooth gait. At the one-year follow-up, CT and MRI demonstrated no further compression of the spinal cord at the lesion level (Fig. 3).

**DISCUSSION**

Various modifications of surgical techniques for thoracic disc disease using the posterior or posterolateral approach have been reported.6,15–17 These approaches make visualisation of midline disc herniation difficult. In our patient, it was difficult to access the ventral side of the U-shaped spinal cord compressed by the calcified herniated thoracic disc. In addition, the dura was incorporated into the disc. In a report of 20 cases, 70% of thoracic disc herniations were transdural, and in 50% of these, the calcified disc penetrated the intradural space, leaving no remnant of dura behind.18

The anterior open transthoracic approach provides optimal ventral exposure and has been recommended.7,8,10,18,19 The use of a microscope to remove the calcified herniated disc under direct vision was safe and resulted in limited bone excision and thus avoided the need for fusion surgery. The use of an endoscope or microscope in a minimally invasive procedure has been reported.12,20–22 A major disadvantage of an endoscope is the loss of depth perception. Perioperative complications using thoracoscopy have been reported.18,23–25 Repairing a dural tear is a complicated task to achieve endoscopically.12,13,19 In our patient, the dura was stretched after a prolonged period of compression. The remaining dura was large enough to cover the spinal cord. Nonetheless, dural suture was difficult even with microscopic assistance, because of the limited working space. Our novel procedure of overlapping the dura was easy and effective in preventing postoperative CSF leakage.

**DISCLOSURE**

No conflicts of interest were declared by the authors.

**REFERENCES**