



# Mini-Thoracotomy and Microscopic Discectomy Without Fusion

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## Introduction

Thoracic disc herniation (TDH) occurrence rate in the general population is from 0.0001 to 0.1% [1, 2]. Surgical procedures in the thoracic spine make up only 0.15–4% of the procedures for disc herniation [3]. Several surgical techniques have been developed as follow:

- Posterolateral: Transpedicular, transfacet pedicle sparing
- Lateral: Costotransversectomy, extended lateral extracavitary
- Anterior: Transpleural thoracotomy, mini-thoracotomy with retropleural variation
- Thoracoscopic

Among them, thoracotomy and discectomy have advantages of direct visualization of central disc with minimum manipulation of cord but has potential risk of lung-related problems. However, chance

of pulmonary complication is low, compared to conventional thoracotomy and transpleural approach. Mini-thoracotomy and retropleural approach are less painful because it does not require rib resection. Chest tube is usually not inserted. Postoperative management is easier when CSF leakage occurs. This technique provides access to all levels under T4. Mini-thoracotomy with retropleural approach is preferred to reduce the pulmonary complications. Fusion is not required unless extensive bone resection or multilevel discectomies takes place [4].

## Indication

Thoracic disc herniation with either soft or calcified disc that located central or paramedian disc space with following symptoms:

- Progressing myelopathy
- Lower extremity weakness or paralysis
- Bowel or bladder dysfunction
- Back or radicular pain not responsive to conservative treatment

## Surgical Technique

The surgery is performed under general anesthesia using a double-lumen tube. Patient is positioned in lateral decubitus position with neuromonitoring.

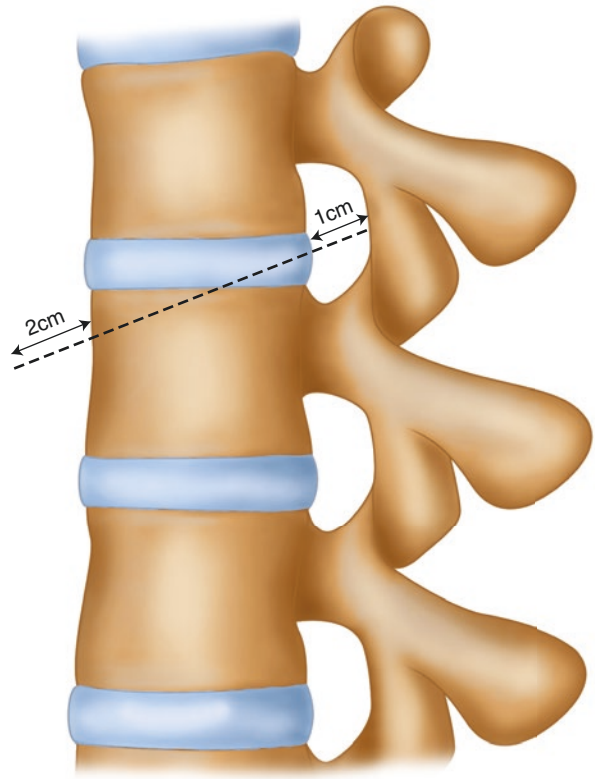
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**Fig. 1** Skin incision marking. 2 cm anterior and posterior to vertebral body



The side of the operation is chosen based on location of the herniated disc. Lower thoracic levels can be obscured by liver and one must consider Adamkiewicz's artery on the left side.

C-arm was used to confirm the correct level. 6–8 cm skin incision is drawn 2 cm anterior and 2 cm posterior to vertebral body on the most appropriate intercostal space checked with fluoroscopy, parallel to the ribs (Fig. 1).

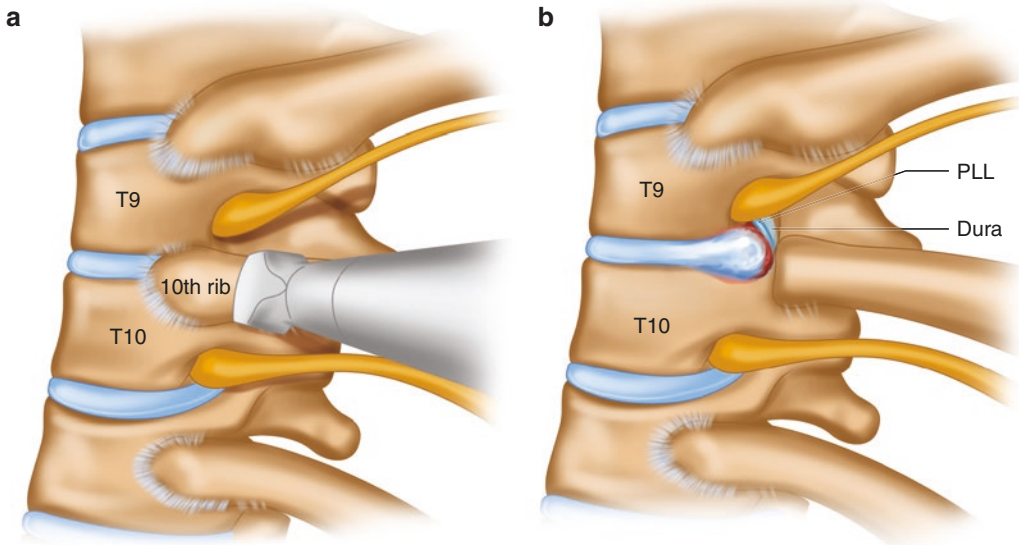
Subcutaneous tissue and intercostal muscles are divided with electrocautery. Superior edge of the rib that is overlying the disc space is preferred to avoid the neurovascular bundle at the inferior rib. Dissection is carried down to the rib in a subperiosteal fashion. Ribs are not usually cut in discectomy cases. Extra or retro-pleural approach is made. The retractors are placed to spread ribs. A wet sponge is used to retract the lung and pleura. Deflation of ipsilateral lung or decrease in the tidal volume is helpful for better visualization of surgical field.

Surgeon stand ventral to patient and assistant is standing at the backside. Rib heads are used

as anatomical landmarks, the lateral aspect of the vertebral pedicles are identified. The segmental vessels above and below the disc space are identified and clipped or coagulated if necessary.

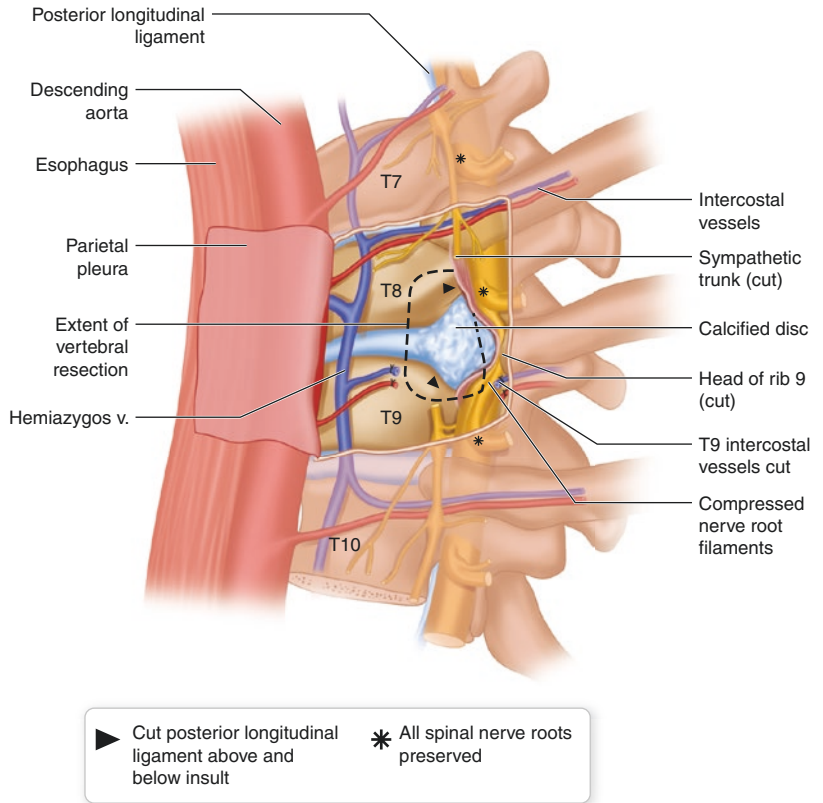
A marker is placed into the disc and radiographic confirmation of the level is obtained. Resection of the head of the rib to view the anterior margin of the posterior disc (Fig. 2). After identification of the neuroforamen (Fig. 3), the inferolateral vertebral body above the disc and superolateral vertebral body below the disc are drilled in conical shape along with portion of the inferior and superior pedicles. Check the tilting of operating tables while drilling, because wrong direction or anatomical orientation might damage neural tissues.

The space created from partial vertebrectomy allows corridor for ventral displacement of the disc material off the dura (Fig. 4). Careful dissection between the dura and calcified disc herniation is performed. The disc fragment can be displaced ventral cavity. Ipsilateral nerve root and thecal sac are exposed. Central canal and

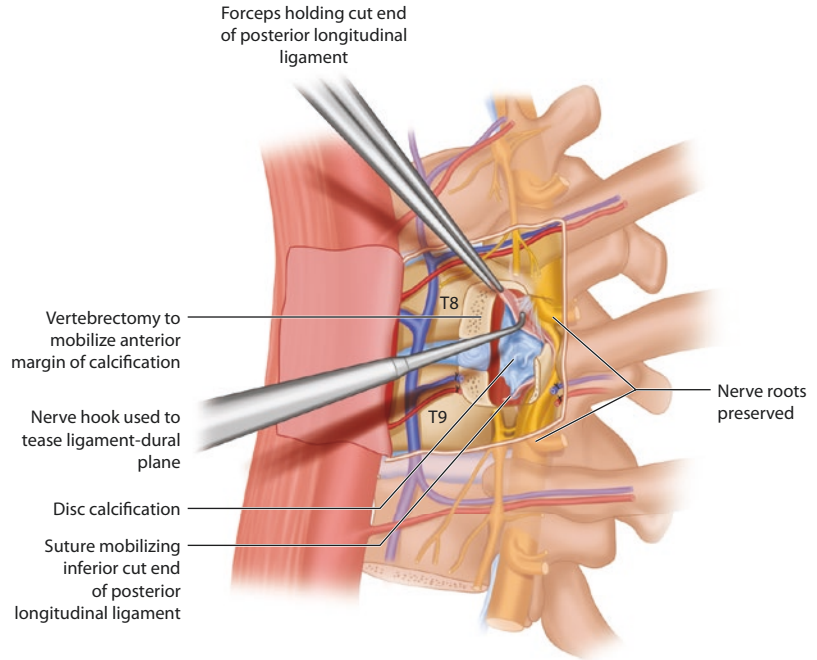


**Fig. 2** (a) Rib head is drilled (b) to expose posterior disc space

**Fig. 3** Neural foramen is identified



**Fig. 4** Partial vertebrectomy was performed to create space. Layer between PLL and dural sheath is identified



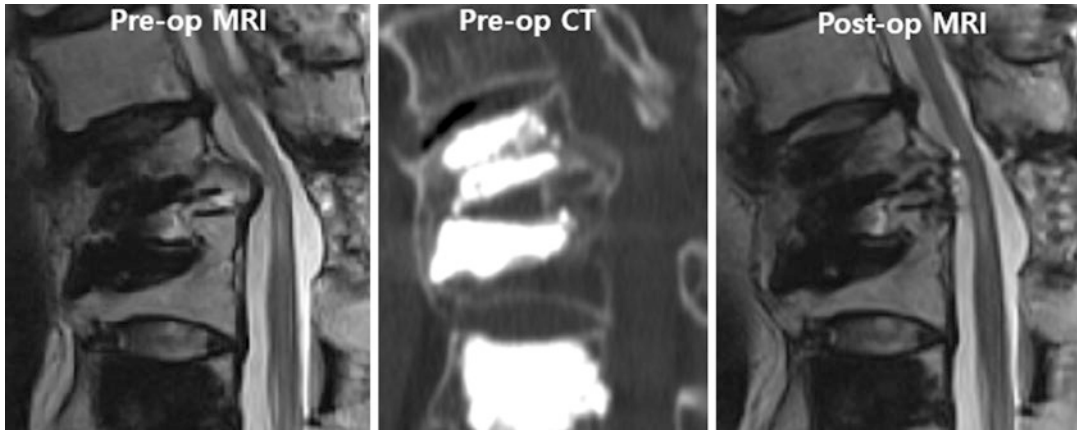
contralateral dural sac are visualized after complete decompression. Wound is closed after secure hemostasis with chest drain.

### Postoperative Consideration

Visceral pleura could be torn but insertion of chest tube is not always mandatory. Instead, chest drain is inserted on the dependent portion to drain pleural effusion and discharge at the end of surgery. Pneumonia, atelectasis, pleural effusion, and intercostal neuralgia are possible complications.

### Case Illustration

A 70-year-old woman presented with a severe burning pain on both lower extremities. She had been using wheelchair for 5 years due to motor weakness. Her MRI revealed T11–12 thoracic osteophyte formation with kyphotic deformity which is compressing the spinal cord (Fig. 5). Mini-thoracotomy with retropleural approach was performed to decompress disc and osteophytes. The patient's leg pain decreased from VAS 9 to 1. Post-op MRI showed good decompression of the spinal cord.



**Fig. 5** Pre-op images show T11–12 spinal cord compression by disc and osteophyte. Patient underwent T11, T12, L1 vertebroplasty previously and kyphosis progressed.

Since T11–12 levels are fused, no instrumentation was planned. Osteophyte compressing spinal cord has been removed on post-op MRI

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## Summary

Mini-thoracotomy and microscopic discectomy without fusion is a good treatment option for centrally herniated thoracic disc. Calcified disc or osteophyte can be also removed with high-speed drill.

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## References

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