

# Thoracic Disc Herniation and Myelopathy

# 8

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## 8.1 Introduction

Thoracic disc herniation is a rare degenerative spine disease which only accounts for about 1% of surgically treated intervertebral disc pathologies [8].

Thus, even experienced spine surgeons only see a very limited number of these cases [5].

Typically, thoracic disc herniations cause a range of different unspecific symptoms and most patients already went through a variety of specialties and diagnostics until the proper diagnosis is made [1]. Its surgical therapy requires experience in indications and knowledge of 360° approaches in order to provide the optimal solution for each individual case.

This chapter will outline the specifics of thoracic disc herniation, its typical symptomatology, mandatory preoperative imaging and surgical approaches. Moreover, the rationale for the different surgical approaches is discussed.

At the end of this chapter the reader should be aware of the problems and pitfalls we face when treating thoracic disc herniation.

The aim of the presented case is therefore to emphasize these potential problems and lack of

evidence in the diagnosis and treatment of this disease. Such specifics are:

- prolonged history until diagnosis
- difficult indication for surgery
- complex choice of the proper approach depending on the lesion location, size and consistency
- giant calcified disc as a unique problem

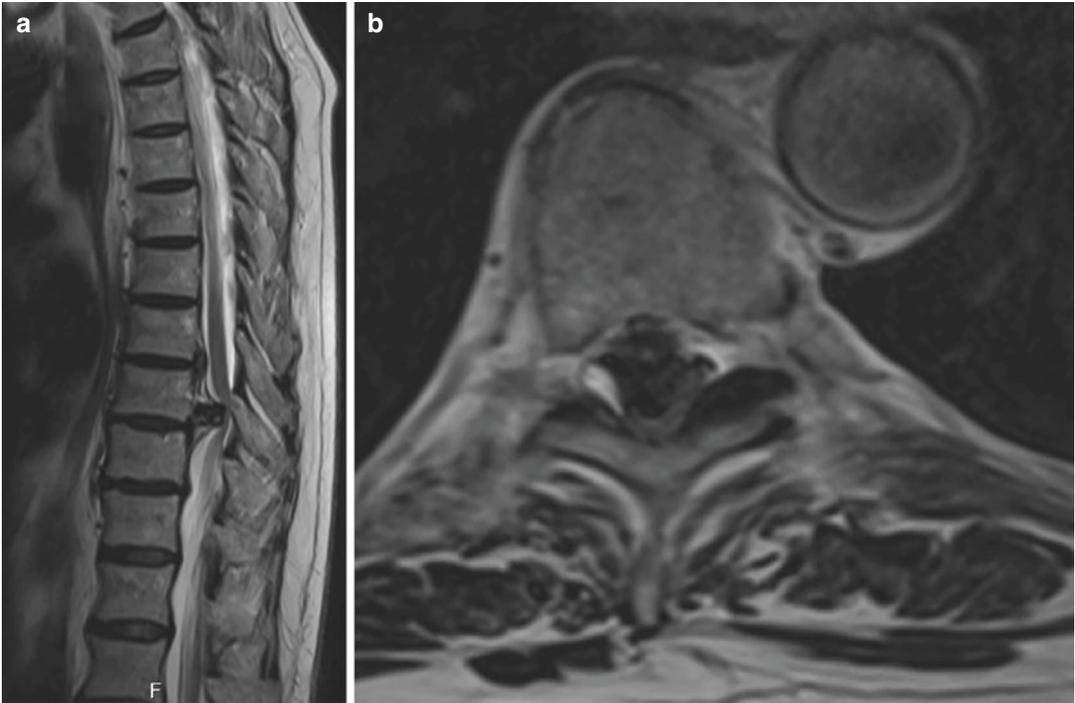
## 8.2 Case Description

A 71 y/o female patient suffered from thoracic and leg pain over the last years. Her neurological examination and evoked potentials were normal. She was finally referred to a neurologist who ordered a MRI scan. The scan showed a medial giant T8/9 disc causing severe spinal cord compression (Fig. 8.1). The initial CT scan shows calcification (Fig. 8.2).

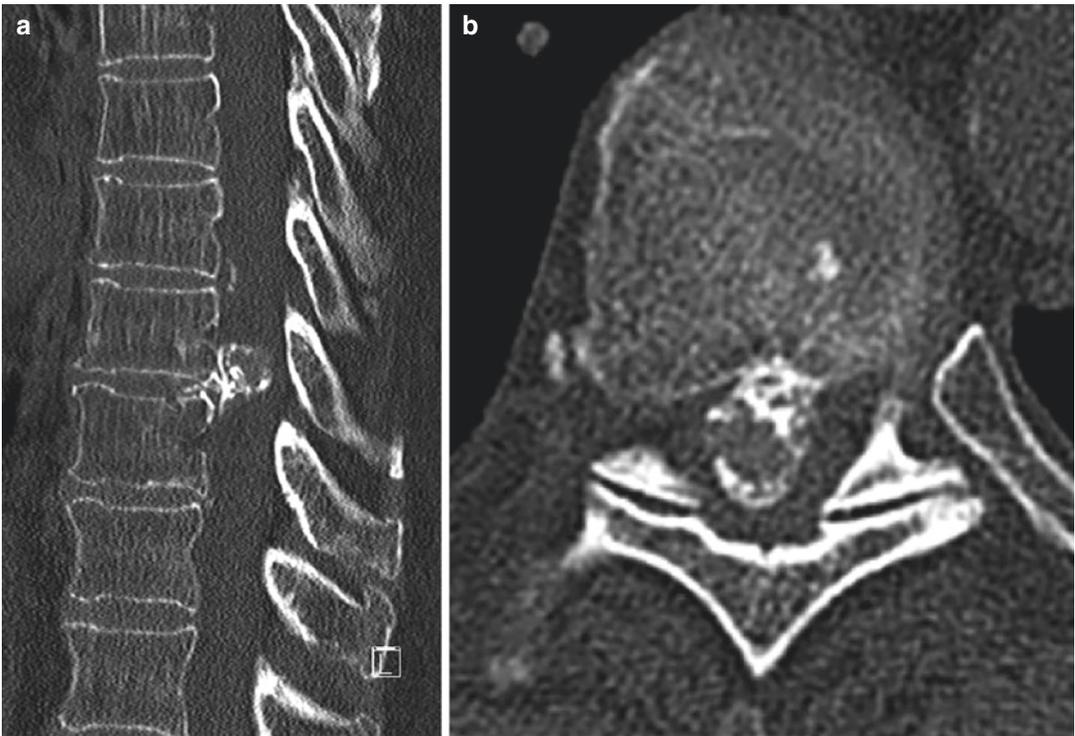
She was then operated in another center via a posterior approach with instrumentation. An attempt to resect the disc herniation via a posterolateral access failed. The patient was left with a complete paraplegia and some sensory function preserved (ASIA B). In a second surgery on the same day another attempt was made to resect the large calcified disc via an anterolateral, transthoracic approach, again without success and change in neurological status (Fig. 8.3). The patient was referred to a specialized spinal cord injury rehabilitation unit for para- and tetraplegic patients, from which our department was contacted for further evaluation of the case.

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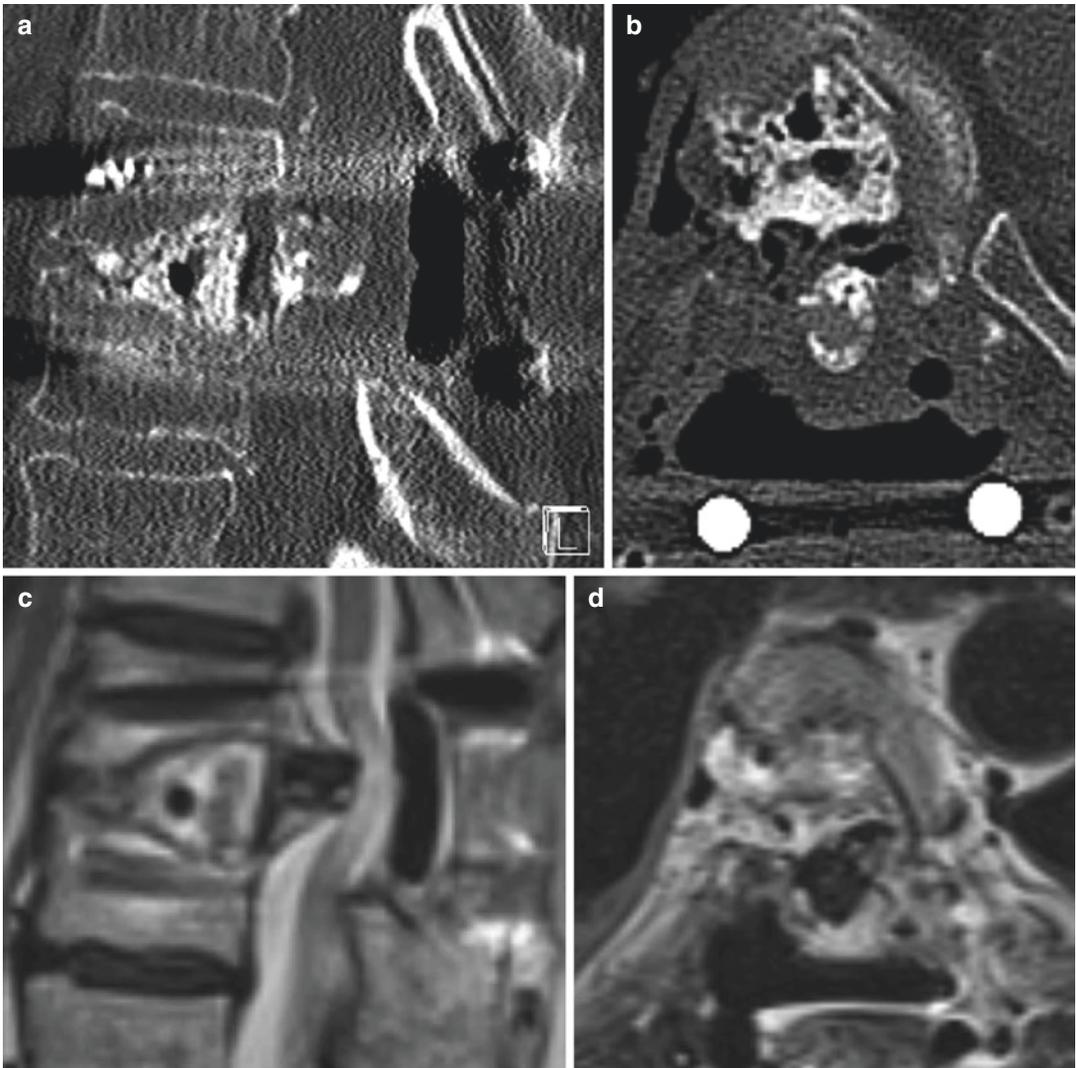
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**Fig. 8.1** MRI scan on outpatient visit. The MRI scan shows a giant T8/9 disc herniation causing severe ventral spinal cord compression. Sagittal **a** and, axial slices **b**



**Fig. 8.2** Preoperative CT scan. The CT on sagittal (**a**) and axial (**b**) slices confirms the calcification in the center of the herniated disc as suspected in the MRI scan



**Fig. 8.3** CT and MRI scans after the first surgeries. The CT **a, b** still shows the GIANT calcified disc after the initial surgeries. MRI **c, d** shows still severe spinal cord compression

Due to the persistent space-occupying effect and small chance of improving the sensory deficit her doctors referred the patient to our department. Physical examination confirmed persisting incomplete spinal cord injury ASIA B at L1. The relative indication for surgery was discussed in detail with the patient and her family. A posterolateral transdural approach was finally chosen to resect the calcified disc (Fig. 8.4).

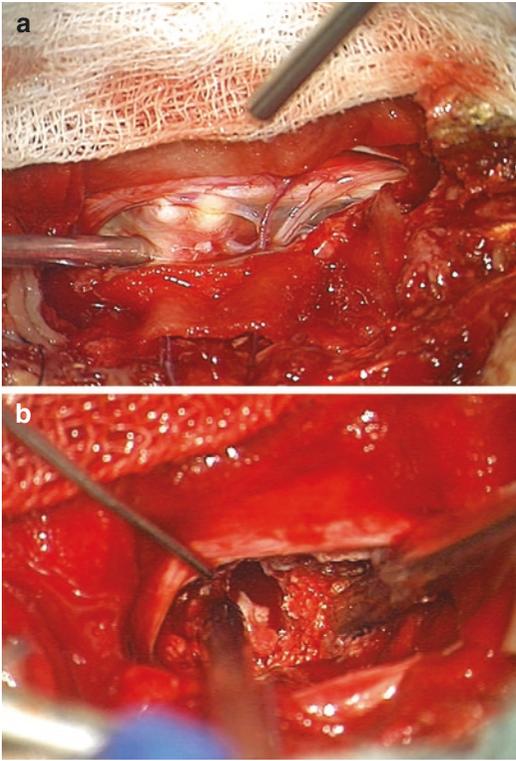
Surgery went without adverse events and the patient did not show further deterioration. Sufficient decompression was confirmed by postoperative CT scan on the first postoperative day

(Fig. 8.5). The patient was transferred back to her rehabilitation unit and has no change in status 3 months after surgery.

## 8.3 Discussion of the Case

### 8.3.1 Indication

This patient only suffered from leg and back pain. Evoked potentials were normal as well as her clinical findings. Patients suffering from axial or radicular pain are usually not treated surgi-



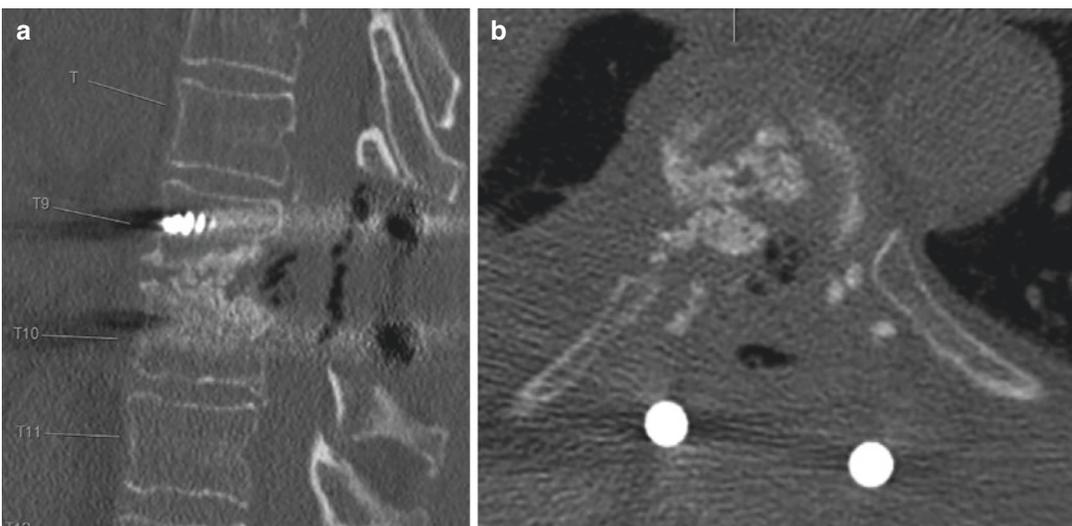
**Fig. 8.4** Intraoperative exposure. This intraoperative picture shows the transdural posterolateral exposure of the disc herniation before **a** and after **b** resection. The spinal cord as the structure at risk can be visualized and therefore spared in an optimal way. Cutting the dentate ligaments or even a rootlet releases the spinal cord for careful rotational mobilization

cally. Conservative treatment by steroidal or non-steroidal anti-inflammatory drugs and physical therapy are frequently reported options [8]. Nonetheless, patient with severe complaints that do not improve by conservative therapy can be evaluated for surgery. The decision to operate is mainly influenced by size, localization, and consistency of the prolapse, i.e. a lateral soft prolapse harbors a much lower threshold for surgical treatment, because of a much lower risk profile of the procedure.

In this case of a giant calcified disc, the threshold would however be very high, because the complication rates for the surgical treatment of thoracic disc herniation, being reported to be up to 30% [7, 8].

Hence, there is no evidence whom, when, and how to operate on thoracic disc herniations because no larger series, let alone trials, exist; it is a rare disease. Yet, the natural history of thoracic disc herniation indicates that patients might remain asymptomatic for a long period of time and that it is unlikely that they develop any acute myelopathy [10].

In patients suffering from myelopathy and being diagnosed with a thoracic disc herniation, surgery should be discussed since up to 77% of patients show an improvement of myelopathic symptoms after surgery [7, 9]. In patients without



**Fig. 8.5** Postoperative CT scan. The postoperative CT scan shows the resection of the calcified herniation on sagittal **a** and axial slices **b**

apparent symptoms, evoked potentials are recommended since these allow for early detection of clinically unapparent myelopathy. However, it is unclear in thoracic myelopathy whether impairment of evoked potentials might then be regarded as an indication for surgery.

### 8.3.2 Choice of Approach

Despite being a rare disease, there are a variety of reports describing a range of different approaches. In general, there is not one single gold standard approach for thoracic disc herniations and each approach has particular advantages and disadvantages for a given individual case [8]. The only common consensus is that a strictly posterior approach, i.e. a laminectomy is no longer considered an option, because of high risk for neurological injury [1, 4]. In general one can divide the approaches used today into posterolateral and anterolateral ones.

It is further commonly accepted that the former are well suited for lateral and mediolateral disc herniations and eventually for medial ones which are not calcified. [7, 8].

The latter are classically used for calcified larger medial discs, i.e. giant ones like the case described. Potential posterolateral variations are costotransversectomy, transpedicular, and transfacet pedicle-sparing approaches. Anterolateral approaches are transthoracic either endoscopic or mini-open and transpleural or retropleural approaches. For an orphan disease according to these authors a redundancy of minor variations.

A further debatable issue is which patient needs additional instrumented fusion. There is no clear guideline for this and left to the individual surgeon's preference [3, 6].

While some authors advocate for lateral (transfacet/transpedicular) approaches [11], most others agree on the necessity of anterior (transthoracic) approaches in cases of calcified large medial discs [2]. In the majority of articles published, posterolateral approaches are only recommended for soft and lateral calcified herniations.

On the presented case, the literature and our experience are quite clear and speak against laminectomy. A posterolateral approach to resect the lesion is also not considered the best choice nowadays by the majority of peers, since the exposure of the prolapse, especially if calcified is far from being easy and the risk for spinal cord injury is high, as evidenced by the outcome.

Whether an instrumented fusion would have been necessary at all is a matter of debate; to do so before resection of the space-occupying lesion, as it has been done here, is certainly very risky.

The majority of experienced spine surgeons would have used an anterolateral transthoracic approach for resection of this giant calcified disc provided it would have been symptomatic. The default method nowadays would be via a mini-open approach as opposed to an endoscopic one, which has been popular 10–15 years ago. Nowadays the majority of surgeons having used endoscopy have gone back to mini-open for this indication, due to the intrinsic surgical difficulties in handling this type of pathology with very long instruments without adequate 3D vision [7]. Specifically, the tight adherence of this pathology to the dura prohibits smooth and careful handling. As for now the additional use of instrumented fusion is up to the discretion of the surgeon and follows no clear recommendations.

An alternative to the above more commonly accepted solutions for initial surgery in a giant calcified disc would be according to us an initially counterintuitive concept: the posterior transdural approach as described by Coppes et al. in 2012 [3]. It has evoked quite a lot of resistance, but probably just because it is unusual and unknown especially for surgeons not used to treat intradural pathology [5]. However looking at it from a more sober perspective it applies very sound principles known from other fields of surgery, i.e. that the best way to protect a structure during surgery is to visualize it. Further this takes into account that giant calcified discs are probably a different entity than the normal disc and behave in an OPLL-like fashion being very adherent to the dura. In essence, these lesion can be resected similar to a ventrally located intradural meningioma.

### 8.3.3 Accordance with the Literature Guidelines

As discussed above, guidelines cannot be derived from the literature. However, the indication for treatment as well as the surgical approach were most probably not in accordance with the current common consensus of the majority of peers. Yet the same accounts for the authors' preferred method.

#### Level of Evidence: C

The level of evidence available to date is poor by only consisting of larger retrospective single center cohorts. Only one series provides data on retrospective data on multiple centers [9].

#### Pearls

- the major factors in terms of surgery are calcification, location, and size
- preoperative CT scan of the segment is therefore mandatory
- large calcified cases should be regarded (and treated) as OPLL-like lesions and resected like intradural extramedullary pathologies

### 8.4 Conclusions and Take Home Message

Although being seen on MRI scans quite frequently, symptomatic thoracic disc herniation is a very rare disease. These lesions can cause myelopathy or radicular pain and should only be treated when symptomatic. Common consensus is that symptomatic lateral soft disc herniations can be treated rather safely with posterolateral approaches alone. Anterolateral mini open approaches are the most widely used and safest options for large calcified lesions. However, they still have considerable morbidity. Therefore the future surgical treatment of the latter lesions

should eventually be regarded in analogy to intradural extramedullary tumors.

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