



International Journal of Case Reports (ISSN:2572-8776)



UNEXPECTED COMBINED DOUBLE POSTERIOR AND ANTERIOR APPROACH TO TREAT THORACIC DISC HERNIATION: A CASE REPORT

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ABSTRACT

Introduction: Although frequently observed in magnetic resonance images, symptomatic thoracic disc herniations are rare. Surgical treatment is indicated when patients suffer from functional symptoms with no response to medical treatment, when neurologic symptoms appear or worsen or in the event of myelopathy. Posterolateral approaches are commonly accepted as the treatment for lateral and mediolateral disc herniations and non-calcified medial herniations. On the other hand, anterior approaches have been accepted to treat gigantic calcified medial disc herniations.

Case presentation: This case report presents on a 57-year-old female patient suffering from thoracolumbar pain and impairment. The magnetic resonance study showed images compatible with a posteromedial T12-L1 disc herniation that, after medical treatment failure, required surgical treatment. Initially, a posterior approach was performed, resulting in the immediate postoperative period in motor and sensitive deficit of the lower left limb, so a surgical reintervention was performed using an anterior approach, obtaining good clinical and functional results.

Conclusion: Thoracic disc herniations are uncommon. Surgical indication is decided in the presence of neurologic symptoms. Neurologic injury is a common complication due to the lesion's characteristics and it can also be secondary to the surgical procedure. An adequate election of the surgical approach may minimize neurologic injuries.

Keywords: Case Reports, Intervertebral Disc Degeneration, Orthopedic Procedures, Spinal Cord Injury, Spine

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How to cite this article:

MARÍA CARMEN VIEJOBUEÑO-MAYORDOMO, ANA VERDEJO-GONZÁLEZ, DAVID RUIZ PICAZO, JOSÉ RAMÍREZ-VILLAESCUSA Ph.D.. UNEXPECTED COMBINED DOUBLE POSTERIOR AND ANTERIOR APPROACH TO TREAT THORACIC DISC HERNIATION: A CASE REPORT. International Journal of Case Reports, 2021, 5:250.



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Website: <http://escipub.com/>

INTRODUCTION

Thoracic disc herniations are a relatively rare occurrence and just represent 1% of surgically treated disc pathology. Although seen in 11-37% of imaging tests, symptomatic disc herniations just represent 0,15-1,8% of all disc herniations, with an 1/1000000 incidence [1].

Mostly affected discs in 75% of cases are those below T7, as the lower thoracic spine is the most mobile one [2], being the T11-T12 disc the most vulnerable one, with a high risk of medullar compression. It has a central or paracentral location in 94% of cases [3] and it's frequently calcified in up to 42% of cases [4]. Usually, thoracic disc herniations are asymptomatic [2,5], and unspecific symptoms such as myelopathy or radicular compression are less common, which leads to a difficult diagnosis [4,6].

Surgical treatment may have potentially serious complications related to both the characteristics and location of the lesion and to its own treatment. Consequently, an adequate selection of both the patient and the surgical approach is needed in order to minimize neurologic injury [7]. We present on a case of a thoracic disc herniation surgically treated using a double posterior and anterior approach which led to an intraoper-

ative neurologic injury.

CASE REPORT

This case report presents on a 57-year-old female patient who, for a few months, had been suffering from thoracolumbar pain and walking difficulty with an anterior bending of the rachis which led to severe disability and the need of a walker for wandering around. As her personal medical history, forty years ago she was diagnosed with L5-S1 spondylolisthesis, surgically treated 20 years ago with a posterior removal of the instrumentation material. During the clinical exam, the patient had neither motor deficit nor altered bowel or bladder function.

Radiographs in the coronal plane showed signs of previous laminectomy and without a normal spinal curvature with a bony bridge between the lumbar transverse processes and the sacrum, compatible with L4-S1 lumbosacral fusion, as well as a discrete thoracolumbar kyphosis associated with lordosis loss in the sagittal plane (Figure 1). In magnetic resonance (MR) images, a T12-L1 disc injury was observed, hypointense in T1 and hyperintense in T2 weighted images, showing cord compression. These findings were compatible with a posteromedial disc herniation (Figure 2).



Figure 1.-Preoperative sagittal and coronal radiographs of the thoracolumbar spine.



Figure 2.-Preoperative MR study. Sagittal and axial cuts on T1, T2 and STIR sequences and MR myelography showing a T12-L1 thoracic disc herniation and an isointense signal in T11-T12-L1 compatible with myelopathy.

Medical treatment based on analgesics and gabapentin was prescribed with no clinical response, therefore surgical treatment was decided. Under somatosensory (SSEP) and motor (PM) evoked potential monitoring, a posterior approach was used, performing a T12-L1 transfacet and costotransversectomy, with left inferior

T12 and superior L1 facetectomies, a left T12-L1 transfacet joint discectomy and a T12-L1 circumferential arthrodesis using pedicular screws, autologous bone and the placement of an interbody polyeter-eter-ketone (PEEK) implant by a unilateral left approach (Figure 3).

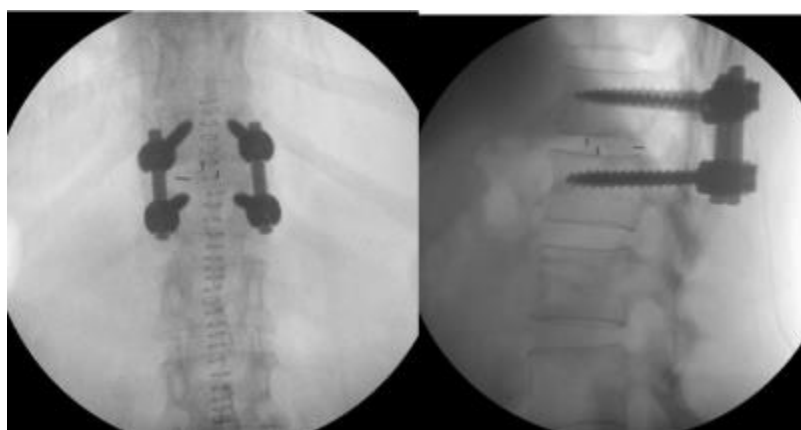


Figure 3.-Intraoperative fluoroscopic image after discectomy, pedicle screws instrumentation and intersomatic PEEK implant placement in T12-L1.

During the procedure, left SSEP and PM potentials were lost and remained this way during the immediate postoperative period, undergoing

sensory and motor deficits on the left lower limb with a grade 2/5 on muscle groups innervated by L2 and L3, and a grade 0/5 on L4-L5-S1 muscle

groups. The patient also experienced right lower limb pain without any sensory or motor deficit. An urgent MR study showed a right T12-L1

posterolateral disc fragment compressing the spinal cord (Figure 4).



Figure 4.-Postoperative MR study. Right posterolateral disc fragment extruded.



Figure 5.-Two-year follow-up anterior-posterior and lateral radiographs.

Urgent surgical reintervention was then decided using a posterior approach, finding it impossible to extract the right disc fragment due to potential's loss with the mobilization of the spinal cord.

After confirming, under radioscopy and thoracoscopic procedures, that T12-L1 was the injured level, an anterior approach by an anterior thoracotomy was utilized, performing an anterior

discectomy and testing out anterior spinal cord decompression.

During the postoperative period, an improvement in hip flexion and knee extension as well as a start of dorsal and plantar left ankle flexion were observed. The patient was followed up in our medical office one, two and six months and two years after the procedure, observing a substantial clinical and radiological improvement.

DISCUSSION

Thoracic disc herniations make up only 0,1-3% of all disc ruptures, being more common during the third and fifth decades, with a higher incidence in males and representing up to 0,15-4% of disc surgery [4,6]. In up to 75% of cases, thoracic disc herniations occur between T8-T12 and, as seen in our patient, T11-T12 is the most vulnerable disc since at this level the posterior longitudinal ligament is weaker and more mobile. Only 4% of thoracic disc herniations occur between T1 and T4 [2]. The majority of them have a central or paracentral location [3]. A characteristic feature of thoracic disc herniations is its calcification propensity [8].

Thoracic spinal cord is more vulnerable to compression since it can be compressed by intradural extension, the flattening of the thecal sac by thoracic kyphosis, the narrow diameter of the thoracic spinal cord and its poor vascularization [9]. Hence, in surgical approach's selection we should minimize spinal cord mobilization.

Thoracic disc herniation's natural history shows that patients can remain asymptomatic for long periods of time and that acute myelopathy is an uncommon feature. In patients suffering from acute myelopathy, surgical treatment must be taken into account because up to 77% of them undergo clinical improvement after it [2,5,10].

Herniated discs can have a big volume, being named giant thoracic disc herniations those that

occupy more than 40% of the spinal cord in CT or MR imaging. Herniated discs are usually calcified in these cases, which increases the risk of intradural extension (15-70% of cases) [6]. Quint et al., found that up to 42% of surgically treated thoracic disc herniations were calcified and up to 60% of them showed some degree of neurologic deficit [4].

The beginning symptoms may vary, being pain the most common clinical sign (92% of cases), followed by different degrees of neurologic deficit (myelopathy) and/or radicular pain. Our patient referred thoracolumbar pain and severe impairment, needing the use of a walker for wandering around with an anterior trunk bending to increase spinal cord space. Sedestation and decubitus clinical exams showed neither lower limbs deficit nor altered bowel or bladder functions.

Surgical treatment of thoracic disc herniations is recommended when neurologic symptoms appear or worsen with no clinical response to medical therapy. The presence of myelopathy signs in MR images (hypointense in T1 and intramedullary hyperintense in T2) even in the absence of neurologic symptoms, can be an indicator for surgery, before the appearance and irreversibility of these clinical signs [9]. The type of surgical approach is mainly decided by the size, location and consistency (soft or calcified) of the herniation. Complications aren't rare, taking place in up to 30% of gigantic calcified thoracic disc herniations [10].

In general, there isn't just one surgical approach to treat thoracic disc herniations. Approach's election depends on both patient's characteristics (medical history, weight), the location (central, lateral) and size and type (soft, calcified) of the herniation [9]. The broad consensus is that, when doing a laminectomy to treat thoracic disc

herniations, a posterior approach isn't the right choice due to its high risk of producing neurologic injuries [11]. This surgery can be performed through posterior (transpedicular and transfacetar approaches preserving the pedicle), posterolateral (costotransversectomy and lateral extracavitary) an anterior approach (transpleural thoracotomy, thoracoscopy, minithoracotomy) [9,11]. Mulier et al., performed a systematic review in which they compared transthoracic, lateral and posterolateral approaches, observing a complete neurologic recovery in 93% of patients after a transthoracic approach versus 87% recovery after a posterolateral one and 80% after a lateral one [12].

Posterior and posterolateral approaches are indicated to treat lateral and medial-lateral herniations as well as in non-calcified medial herniations. On the other hand, anterior approaches are indicated in the treatment of big calcified medial herniations [11]. There is controversy as to when additional instrumented fusion is needed, although it has been established in transfacetar or transpedicular posterior approaches that compromise segmental stability. In our patient, segment fusion was considered in the transfacetar approach with unilateral facetectomy. Microscopic posterior thoracic discectomy and microendoscopic discectomy techniques have been suggested as alternatives to reducing open posterior approaches' morbidity, obtaining an improvement in blood loss and better punctuations in scores used a year after surgery [13].

Transthoracic anterior approaches provide a direct vision of the herniation and they've been recommended in central and/or calcified herniations [6,14]. Nevertheless, thoracotomy's morbidity has stimulated the development of thoracoscopic discectomy. Wait et al., limited thoracoscopy indications to small non-calcified

anterior disc herniations (>40% of the spinal cord) located between T4-T11 in patients without morbid obesity and that hadn't undergone any previous thoracic surgeries [15]. Quint et al. performed a study of 167 cases of calcified (42%) and non-calcified (58%) disc herniations, in which they observed that thoracoscopy was useful to reduce pain and to provide neurologic recovery, obtaining 80% of good results after a two-year follow-up [4]. Gille et al., reported 18 cases of gigantic thoracic disc herniations treated with thoracoscopy (3 with intradural extension and 8 with dura mater adhesions). Dura mater disruption occurred in 7 out of 11 cases and 4 of them required an open surgery revision [16]. Recently, transpleural discectomy microinvasive techniques using a lateral retropleural transthoracic approach, open surgery and thoracoscopy show really good results in 80% of cases [17,18].

Taking everything into account, treatment should be individualized depending on the characteristics of both the patient and the lesion. In our case, after medical treatment failure, a transfacet posterior approach with discectomy and pedicular screws fusion and PEEK implant was performed. During the postoperative period, MR images confirmed that right side pain was being caused by the extrusion of the right disc material, which made necessary a second right posterior approach. Due to the impossibility of performing a right discectomy because of potentials loss after spinal cord mobilisation, a third intervention using an anterior approach was performed, and resulted in symptoms disappearance and a progressive improvement of neurologic function. Two years after the surgery, the patient recovered full lower limb function with no bladder or bowel alterations and with autonomous walking.

CONCLUSION

Thoracic disc herniations are uncommon. Surgical indication is decided in the presence of neurologic symptoms. The election of the approach depends on the characteristics of the patient and the type (soft or calcified), size and location (central, lateral) of the lesion. Neurologic injury is a common complication due to the lesion's characteristics and it can also be secondary to the surgical procedure. An adequate election of the surgical approach may minimize neurologic injuries. Thoracic disc herniation may be observed in imaging studies but the need of surgical treatment is unusual. The presence of neurological symptoms related to the injury may require surgical treatment although its complications are not infrequent.

CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

PATIENTS INFORMED CONSENT:

The patient and their families were informed that data from the case would be submitted for publication, and gave their consent.

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