

THORACOLUMBAR JUNCTION INTRADURAL DISC HERNIATION: REPORT OF A CASE AND LITERATURE REVIEW

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Abstract

Intradural disc herniation is a rare disease that most commonly occurs in the lumbar region. Less than 5% occur in the thoracic and cervical regions. We report a patient with thoracic intradural disc herniation at T12-L1 who was presented with sudden onset paraparesis due to myelopathy symptoms. The intradural nature of disk herniation was not clearly diagnosed on preoperative MRI, due to poor MRI quality, and it was identified intraoperatively by inspection of the thecal sac. The patient underwent surgery with transdural disk removal and posterolateral interbody fusion with transpedicular T12-L1 fixation and experienced total neurological recovery. The patient gave explicit authorization for the use of photographic material obtained during surgery and medical imaging.

Keywords: Intradural Disc Herniation, Dura

INTRODUCTION

Intradural disc herniation (IDH) is a condition when the nucleus pulposus penetrates the posterior longitudinal ligament (PLL) and the anterior wall of the dura and migrates intrathecally [1] and it is very uncommon and accounts for only 0.04-0.33% of all lumbar disc herniations [2,3]. IDH is a rear pathology and was first reported in 1942 by Dandy [4]. IDH occurs more commonly in elderly patients [5] with an incidence in men in more than 70% of cases [6]. 92% of cases of IDH occur in the lumbar spine, 5% in the thoracic spine and only 3% in the cervical spine [7]. The L4-L5 intervertebral disc is the most affected segment in lumbar IDH [8] which could be attributed to the following three reasons:

1. Anatomically, the dura mater of the L4-L5 levels is the closest to the PLL [2];
2. L4-L5 intervertebral discs are under the greatest biomechanical pressure [9];
3. As it is the most common segment of lumbar disc herniation, the L4-L5 levels are often associated with annulus rupture [10].

A relationship was found between the anterior dura mater and the posterior longitudinal ligament in the formation of dense adhesions in the lumbar spine [22]. They concluded that adhesions between these structures may be an underlying factor in the pathology of intradural disc herniation. Chronic inflammation at the disc herniation site can cause adhesions, thinning and even discontinuity of the dura, thereby causing a disc herniation to enter the dural sac. The preoperative diagnosis of IDH is challenging and the clinical manifestations of patients and preoperative imaging, including radiographs and computed tomography, often lack specificity. Patients often present with local back and radiating leg pain, similar to lumbar degenerative disease in the elderly population and the syndrome of cauda equina. Preoperative imaging often shows lumbar disc herniation or lumbar spinal stenosis.

It is difficult to make an exact diagnosis of IDH preoperatively by relying only on the imaging examination [11,12]. Some authors reported that IDH may mimic an intradural tumor [13, 14]. However, some findings are able to distinguish it: location close to intervertebral disc disease, whorl-like mixed intensity on T2-weighted MRI, poor visualization on T1-weighted MRI and marked ring enhancement following the administration of gadolinium [10]. IDH could enhance MRI because it is surrounded by vascular tissue rich in blood vessels, which some authors consider to be the most specific imaging finding [13] and there is little opportunity to observe this specific imaging finding preoperatively, as enhanced MRI is not performed routinely for lumbar degenerative disease. Preoperative diagnosis of IDH is rare, but MRI with gadolinium enhancement can be helpful when it reveals the 'hawk-beak' sign [15], which is a beak-like mass that experiences ring enhancement at the intervertebral space. An abrupt loss of continuity of the posterior longitudinal ligament in MRI is also suggestive of lumbar IDH, and thought to indicate the portion of the ligament that was transversed by the disc fragment. Contrast enhancement will usually not be present [16] because the granulation tissue that forms around the disc fragment only happens in the chronic process. Some IDH demonstrate peripheral disc enhancement [17]. The rim enhancement is attributed to granulation tissue around the avascular disc fragment, which is normally confirmed on histopathology. Many authors have demonstrated ring enhancement of intradural disc fragments, differentiating it from a variety of intradural tumors [17] with similar symptoms like progressive leg pain, back pain or neurological deficits. In acute disc herniation. Some authors state that the presence of air within the spinal canal and an intradural mass-like lesion on the CT scans and MRI, respectively, were almost certainly evidence of a herniation rather than a tumor. It is believed that the gas is trapped by the herniated disc material and this might be an important indication of herniated disc fragments [18]. The physiologic and pathological features that cause IDH are unclear, even though several reasons are known that may contribute to the formation of intradural herniation:

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1. Congenital narrowing of the spinal canal with less epidural space;
2. Adhesion between the annulus fibrosus, posterior longitudinal ligament, and dura;
3. Congenital and iatrogenic fineness of the dura [19,20,21].

Case presentation: A 74-year-old woman was brought to the Emergency Room due to sudden and increasing muscular weakness for 2 weeks. No prior history of similar symptoms, pain or paraesthesia. On admission, the patient was not able to walk or stand, suffering from paraparesis with motor force (MF) 1/5 left knee flexion, 2/5 right knee flexion and 2/5 bilateral foot flexion and extension. Lasègue and Bragard signs were negative. Dorsal and lumbar MRIs showed a large T12-L1 herniation, occupying about 75% of the vertebral canal, cranially migrated and the patient was selected for surgery (Figure 1).

Open transpedicular fixation was performed on T12 and L1. After a partial T12 and complete L1 laminectomy, the dura mater was found to be very thin, reddish, tense and impossible to be mobilized. A midline posterior durotomy was performed and a voluminous intradural disc herniation was noticed. The disc material was removed, the dura mater was tightly closed and a posterolateral interbody fusion was performed (Figure 2). Just after surgery, neurological improvement was noticeable with motor strength improvement. The postoperative period was uneventful and the patient was discharged on day 4, referred to physical therapy for rehabilitation. On the 6th month follow-up the patient had total neurological recovery, which was able to stand, walk and perform its daily activities. One year after surgery, MRI showed no recurrence and the patient had no residual symptoms (Figure 3).



Figure 1. T2 sagittal and axial, STIR thoracolumbar MRI revealing large Th12-L1 intradural hernia

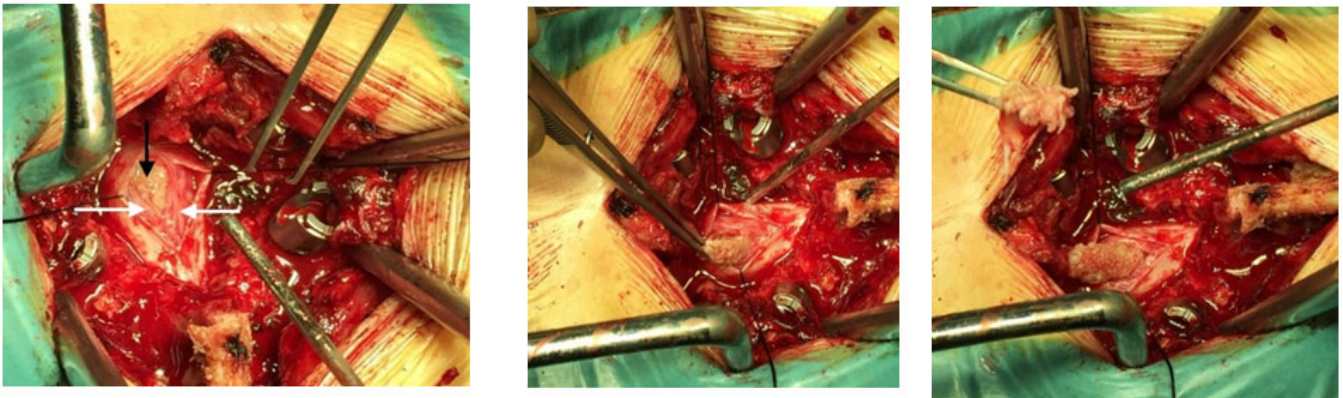


Figure 2. Intradural herniation after midline posterior durotomy, roots: white arrows, intradural hernia: black arrow, the dura is suspended with silk strings. Intraoperative picture of disc herniation removal

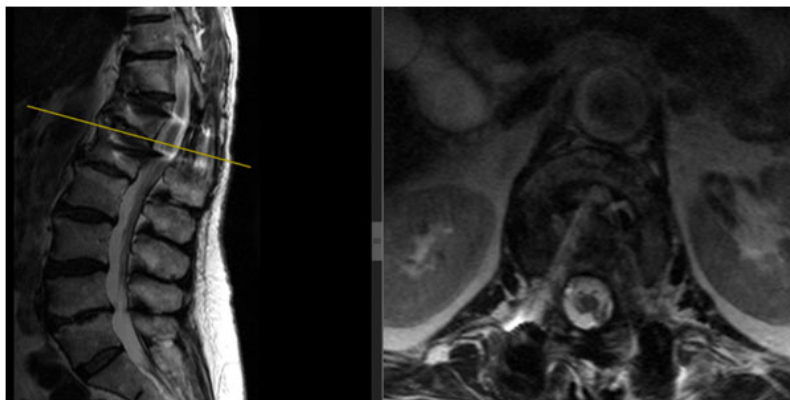


Figure 3. One-year postoperative MRI showing no compression, no residual disc fragments

Conclusion

Intra-dural herniation is a rare disease. Its pathophysiology is not well known but several predisposing anatomic factors have been mentioned in the literature, which seem to favor dural sheath tears and following intrusion of herniated disc material. IDH is considered a degenerative disease and affects patients of an older age range with the type and onset of symptoms varying according to location. MRI and other imaging techniques may at times fail to accurately establish the diagnosis of IDH prior to surgery and the index of suspicion raised by the lack of clinical correlation with initial surgical findings justifies an intradural exploration. IDH should be suspected when intraoperative findings are incompatible with findings from the preoperative imaging examination, and it could be confirmed by pathological examination of the resected tissue from the dural space. Urgent surgery is almost always recommended, and surgical results are usually favorable.

Abbreviations: IDH, Intradural disc herniation; PLL, posterior longitudinal ligament; MRI, magnetic resonance imaging.

Informed Consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

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REFERENCES

- Sharma A, Singh V, Sangondimath G, Kamble P. Intradural disc diagnostic dilemma: case series and review of literature. *Asian J Neurosurg.* 2018;13(4):1033–1036. doi:10.4103/ajns.AJNS_55_17
- Kataoka O, Nishibayashi Y, Sho T. Intradural lumbar disc herniation. Report of three cases with a review of the literature. *Spine.* 1989;14 (5):529–533. doi:10.1097/00007632-198905000-00011
- Schisano G, Franco A, Nina P. Intradural and intradural lumbar disc herniation: experiences with nine cases. *Surg Neurol.* 1995;44 (6):536–543. doi:10.1016/0090-3019(95)00248-0
- Dandy WE. Recent advances in the diagnosis and treatment of ruptured intervertebral disks. *Ann Surg.* 1942; 115(4):514–520. doi:10.1097/0000658-194204000-00004
- Orakcioglu B, Dao Trong HP, Jungk C, Unterberg A. Against the odds: massive lumbar intradural disk herniation in the elderly. *Global Spine J.* 2015;5(5):e84–e87. doi:10.1055/s-0035-1546952
- Koc RK, Akdemir H, Oktem IS, Menku A. Intradural lumbar disc herniation: report of two cases. *Neurosurg Rev.* 2001;24(1):44–47. doi:10.1007/PL00011967
- Epstein NE, Syrquin MS, Epstein JA, Decker RE. Intradural disc herniations in the cervical, thoracic, and lumbar spine: report of three cases and review of the literature. *J Spinal Disord.* 1990;3 (4):396–403.
- Arnold PM, Wakwaya YT. Intradural disk herniation at L1–L2: report of two cases. *J Spinal Cord Med.* 2011; 34(3):312–314. doi:10.1179/2045772311Y.0000000007
- Yildizhan A, Pasaoglu A, Okten T, Ekinci N, Aycan K, Aral O. Intradural disc herniation pathogenesis, clinical picture, diagnosis and treatment. *Acta Neurochir (Wien).* 1991;110(3–4):160–165. doi:10.1007/BF01400685
- Kobayashi K, Imagama S, Matsubara Y, et al. Intradural disc herniation: radiographic findings and surgical results with a literature review. *Clin Neurol Neurosurg.* 2014;125:47–51. doi:10.1016/j.clineuro.2014.06.033
- Choi JY, Lee WS, Sung KH. Intradural lumbar disc herniation—is it predictable preoperatively? A report of two cases. *Spine J.* 2007;7 (1):111–117. doi:10.1016/j.spinee.2006.02.025
- Montalvo Afonso A, Mateo Sierra O, Gil de Sagredo Del Corral OL et al. Misdiagnosis of posterior sequestered lumbar disc herniation: report of three cases and review of the literature. *Spinal Cord Ser Cases.* 2018;4:61. doi:10.1038/s41394-018-0100-9
- Wasserstrom R, Mamourian AC, Black JF, Lehman RA. Intradural lumbar disc fragment with ring enhancement on MR. *AJNR Am J Neuroradiol.* 1993;14(2):401–404.
- MV Aydin1, S Ozel 2, O Sen1, B Erdogan1 and T Yildirim, Intradural disc mimicking: a spinal tumor lesion, *Spinal Cord* (2004) 42, 52–54
- Paul, MA and Yosafe, TW. Intradural disk herniation at L1–L2: report of two cases. *The Journal of Spinal Cord Medicine.* 2011; 34: 312–314.
- Mailleux P, Redant C and Milbouw G. MR diagnosis of transdural disc herniation causing cauda equine syndrome. *JBR-BTR.* 2006; 303–305. PMID: 17274584.
- Reema, CC, Prabodhan, P, Kshitij, C and Mihir, B. MRI Diagnosis of Intradural Lumbar Disc Herniation. Report of Three Cases with Review of Literature. *The Internet Journal of Orthopedic Surgery.* 2010; 18(2).
- Hidalgo-Ovejero AM, Garcia-Mata S, Gozzi-Vallejo S, IzcoCabezon T, Martinez-Morentin J, Martinez-Grande M. Intradural disc herniation and Epidural Gas: something more than a casual association? *Spine* 2004;29:E463-E467
- D’Andrea G, Trillo G, Roperto R et al. intradural disc herniations. The role of MRI in preoperative diagnosis and review of the literature. *Neurosurgical Review* 2003;27:75–80
- Sarliève P, Delabrousse E, Lair C et al., Intradural disc herniation migration of an excluded fragment. *Journal of clinical imaging* 2004;28:170-72
- Aydin MV, Ozel S, Erdogan B, Yildirim T. Intradural disc mimicking: a spinal tumor lesion. *Spinal Cord* 2004;42:52-4 Blikra, G. Intradural Herniated Lumbar Disc. *J. Neurosurg.* 1969, 31, 676–679.
