

Case Report

Intradural Migration of a Sequestered Lumbar Disc Fragment Masquerading as a Spinal Intradural Tumor

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Intervertebral intradural lumbar disc herniation (ILDH) is a quite rare pathology, and isolated intradural lumbar disc herniation is even more rare. Magnetic resonance imaging (MRI) may not be able to reveal ILDHs, especially if MRI findings show an intact lumbar disc annulus and posterior longitudinal ligament. Here, we present an exceedingly rare case of an isolated IDLH that we initially misidentified as a spinal intradural tumor, in a 54-year-old man hospitalized with a 2-month history of back pain and right sciatica. Neurologic examination revealed a positive straight leg raise test on the right side, but he presented no other sensory, motor, or sphincter disturbances. A gadolinium-enhanced MRI revealed what we believed to be an intradural extramedullary tumor compressing the cauda equina leftward in the thecal sac, at the L2 vertebral level. The patient underwent total L2 laminectomy, and we extirpated the intradural mass under microscopic guidance. Histologic examination of the mass revealed a degenerated nucleus pulposus.

Key Words : Intradural disc herniation · Spinal intradural tumor · Magnetic resonance imaging.

INTRODUCTION

Intradural lumbar disc herniation (ILDH) is a rare condition, having a reported incidence of 0.04-0.33% of all lumbar disc herniations^{12,20}. Since Dandy first described it in 1942⁵, the occasional reports of ILDH have rarely described the condition at above the L2-3 level^{12,16,17}. Moreover, only one case of intradural cranial migration of disc materials has been described¹⁸.

Though ILDH can be diagnosed by means of magnetic resonance imaging (MRI), computed tomography (CT), and post-myelogram CT, such cases are rarely reported, due to physicians' limited experience with this condition and its nonspecific presentation¹⁶. In addition, in cases having either intradural disc fragments that migrated upward or downward or no direct connection between the protruded disc materials and intradural lesions, confusion with other spinal abnormalities, such as neurofibroma, lipoma, meningioma, epidermoid tumor, arachnoid cyst, or metastasis, may occur^{1,12}.

In this report, we present a case of a sequestered lumbar disc fragment which is upward migration in intradural space at the L2

vertebra level mimicking an intradural extramedullary (IDEM) spinal tumor.

CASE REPORT

A 54-year-old man was admitted to the hospital after experiencing pain in his lower back and right leg for the preceding 2 months. His symptoms included a sudden exacerbation of pain for the 2 days prior to his admission. Neurologic examination revealed a positive straight leg raise test on his right side, without sensory, motor, or sphincter disturbances. An MRI showed an intradural mass-like lesion at the L2 level vertebral body and extending to the L2-L3 disc space, 10×23 mm in size, with degenerative, diffuse disc bulging at all lumbar vertebral levels. This mass-like lesion had inhomogeneous signal intensity on a non-contrast MRI (Fig. 1). A gadolinium-enhanced MRI showed a partially-enhanced IDEM mass causing anterolateral compression of the nerve roots in the thecal sac (Fig. 2). The patient underwent surgical removal of the L2 and L3 laminae. Upon exploring carefully, we observed a swollen dural sheath, with

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dense external adhesions between the ventral dura and posterior longitudinal ligament (PLL). However, not only the dural sheath but also annulus of L2/3 intervertebral disc and PLL had no apparent defects or tearing.

Upon making a longitudinal incision in the dura, we detected a 1×2 cm, yellowish mass occupying the thecal sac, with peripheral displacement of the nerve roots (Fig. 3). Moreover, superior portion of the mass contacted the conus medullaris.

After carefully microdissecting the mass from the surrounding nerve roots and inner aspect of the ventral dura, the mass was totally removed. Although the ventral dura showed a dense adhesion to the PLL, no dural defects or tearing existed at the level of the mass. We sent a section of the mass for a frozen section biopsy, which ultimately confirmed it comprised degenerative nucleus pulposus, without any cellular elements. The surgery concluded upon primary closure of the durotomy site. The patient had no complication and his pain resolved significantly. He was discharged 1 week after the operation.

DISCUSSION

Intradural herniation of an intervertebral disc is a rare clinical entity, generally detected during surgery, and 92% of such intradural disc herniations (IDHs) are seen at the lumbar level^{9,17}. ILDH's reported incidence is 0.04-0.33% of all lumbar disc herniations^{9,12,16}. The most commonly affected site is L4-5 (55%), followed by L3-4 (16%) and then L5-S1 (10%)^{8,17}. Although some authors, including Han et al.⁹, have reported ILDHs at the L2-3 level, such are quite rare. Moreover, intradural migration of disc fragment, to the level of the vertebral body from the level of ruptured intervertebral disc space, is particularly rare.

Although researchers are not certain of IDH's disease mechanism, the most widely accepted hypothesis states that adhesion between the ventral dura and PLL leads to the subsequent perforation of these firmly adhesive tissues, including the annulus fibrosus, due to the increased intradiscal pressure^{5,10,11,13}. Floeth and Herdmann⁷ have reported that the herniated fragments work like a fingertip and the relative movements of the lumbar spine lead to a repetitive impression of the fixed dural sac and subsequent to a chronic inflammation and erosion process with thinning of the dura. Finally, the ligament and the adherent dura sheets are perforated and free disc material can herniate into the dural sac. Furthermore, some studies suggest that dense adhesions, whether congenitally formed or caused by trauma, previous surgery, inflammation, or osteophyte or disc protrusion, fixate the dural sac^{3,6,15}. Many previous studies report seeing ILDH most frequently at the L4-5 level; the fact that the L4-5 level shows the densest adhesions between the PLL and ventral dura supports the hypothesis^{8,14,17}.

ILDH's clinical symptoms generally include long-lasting low back pain and signs of cauda equina syndrome^{12,17}. ILDH above the conus medullaris seems to lead to neurological dysfunction more rapidly than does ILDH below the conus medullaris. How-

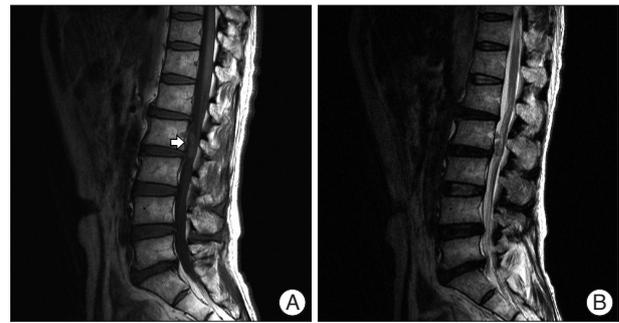


Fig. 1. Preoperative MRI. A : A 10×23 mm sized isointense mass-like lesion on sagittal T1-weighted image (arrow) B : Inhomogenous signal intensity on T2-weighted image.

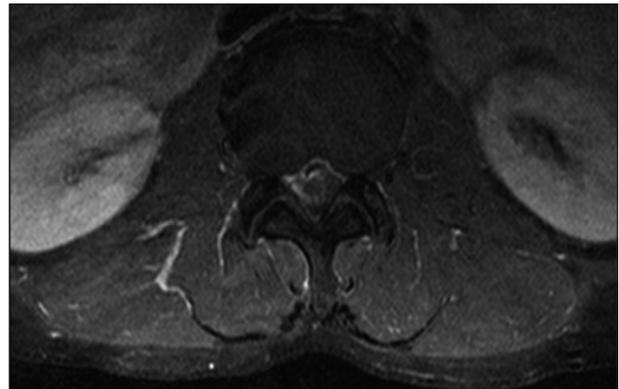


Fig. 2. Gadolinium-enhanced axial image shows peripherally enhanced of the lesion.



Fig. 3. Intraoperative photograph. Yellowish mass occupying the thecal sac (white arrow) and peripheral displacement of the adherent cauda equine nerve roots (black arrow).

ever, cases may present solely with signs of root compression¹⁷.

Myelography and myelo-computed tomography can accurately reveal this pathology, typically showing a complete blockage of the contrast medium, but these imaging methods do not allow the physician to characterize the compression's nature^{18,19}. Although CT can provide valuable information, it cannot reliably identify intradural disc ruptures⁴. Benyamin et al.² report an incidental diagnosis of ILDH that occurred during a discography. In that case, the physicians saw the annular fissure and extrusion of the injected contrast medium into the intrathecal space on the discography.

MRI is regarded as the most reliable method for diagnosing ILDH, and indeed for diagnosing any IDH. A study by Choi et al.⁴⁾ presented a T2-weighted image showing the PLL's loss of continuity and its sharp, beak-like appearance, which presages an IDH. Wassestrom et al.²¹⁾ reported an IDH with a rim enhancement pattern visible on a gadolinium-enhanced MRI. In spite of these diagnostic modalities for ILDH, the preoperative diagnosis of ILDH is difficult due to gadolinium-enhanced MRI being in limited use and to ILDH's rarity and nonspecific presentation^{9,16)}. In our case, we also observed a peripheral rim enhancement pattern on the gadolinium-enhanced MRI, but it depicted only a small, inferior portion of the mass.

Mut et al.¹⁵⁾ classified IDH into types A and B. Type A is disc herniation into the dural sac, while type B is disc herniation into the dural sheath, in the preganglionic region of the nerve root. However, classifying IDHs into type A or B presents difficulties, not only because ILDH detection most often occurs incidental to other surgery, but also because Mut et al.¹⁵⁾ based their classification on operative field findings^{2,17)}.

In our case, we located an intradural mass-like lesion at the level of the L2 vertebral body and extending into the L2-L3 disc space. Because most of the mass was at the level of the L2 vertebral body and totally within the thecal sac, we thought the mass might be an intradural extramedullary spinal tumor, such as a neurinoma, meningioma, ependymoma, or dermoid. Interestingly, however, biopsy revealed the mass to be an ILDH.

While Sarliève et al.¹⁷⁾ reported the first case of an intradural cranial migration of disc material, the patient in their case had undergone previous spinal surgery. Therefore, that patient had fibrosis and cicatricial arachnoiditis around the dura mater. In our case, the patient peculiarly had no history of trauma, previous surgery, or inflammation in the area. Moreover, he lacked any dural defect comprised of a dense adhesion between the ventral dura and PLL. Therefore, until biopsy revealed the mass was an ILDH, we could not have imagined that the mass was an intradural migration of sequestered disc material.

CONCLUSION

We report a rare case of an ILDH that migrated upwardly from the level of the disc space to the level of vertebral body. In the treatment of a spinal intradural mass lesion, physicians should keep in mind the possibility of not only spinal tumors but also intradural disc herniation, to insure a correct diagnosis and proper management.

References

1. Aydin MV, Ozel S, Sen O, Erdogan B, Yildirim T : Intradural disc mimicking : a spinal tumor lesion. *Spinal Cord* 42 : 52-54, 2004
2. Benyamin R, Vallejo R, Yousuf N, Tamrazi A, Kramer J : Incidental di-

- agnosis of intradural lumbar disc herniation during discography : a case report. *Pain Pract* 7 : 332-336, 2007
3. Blikra G : Intradural herniated lumbar disc. *J Neurosurg* 31 : 676-679, 1969
4. Choi JY, Lee WS, Sung KH : Intradural lumbar disc herniation--is it predictable preoperatively? A report of two cases. *Spine J* 7 : 111-117, 2007
5. Dandy WE : Serious complications of ruptured intervertebral disks. *JAMA* 119 : 474-477, 1942
6. Fardon DE, Milette PC : Nomenclature and classification of lumbar disc pathology. Recommendations of the Combined task Forces of the North American Spine Society, American Society of Spine Radiology, and American Society of Neuroradiology. *Spine (Phila Pa 1976)* 26 : E93-E113, 2001
7. Floeth F, Herdmann J : Chronic dura erosion and intradural lumbar disc herniation : CT and MR imaging and intraoperative photographs of a transdural sequestrectomy. *Eur Spine J* 21 Suppl 4 : S453-S457, 2012
8. Görgülü A, Karaaslan T, Tural O : Intradural and intradiscal lumbar disc herniations : case report and review of the literature. *Norol Bil D* 21 : 4, 2004
9. Han IH, Kim KS, Jin BH : Intradural lumbar disc herniations associated with epidural adhesion : report of two cases. *J Korean Neurosurg Soc* 46 : 168-171, 2009
10. Hidalgo-Ovejero AM, García-Mata S, Gozzi-Vallejo S, Izco-Cabezón T, Martínez-Morentín J, Martínez-Grande M : Intradural disc herniation and epidural gas : something more than a casual association? *Spine (Phila Pa 1976)* 29 : E463-E467, 2004
11. Kataoka O, Nishibayashi Y, Sho T : Intradural lumbar disc herniation. Report of three cases with a review of the literature. *Spine (Phila Pa 1976)* 14 : 529-533, 1989
12. Koç RK, Akdemir H, Oktem IS, Menkü A : Intradural lumbar disc herniation : report of two cases. *Neurosurg Rev* 24 : 44-47, 2001
13. Lyons AE, Wise BL : Subarachnoid rupture of intervertebral disc fragments. *J Neurosurg* 18 : 242-244, 1961
14. McCormick PC, Stein BM : Functional anatomy of the spinal cord and related structures. *Neurosurg Clin N Am* 1 : 469-489, 1990
15. Mut M, Berker M, Palaoglu S : Intradiscal disc herniations in the lumbar spine and a new classification of intradural disc herniations. *Spinal Cord* 39 : 545-548, 2001
16. Ozdemir N, Yilmaz HS, Acar UD, Tektas S : Intradiscal lumbar disc herniation : report of two cases and review of the literature. *Br J Neurosurg* 18 : 637-643, 2004
17. Oztürk A, Avci E, Yazgan P, Torun F, Yücetaş S, Karabağ H : Intradural herniation of intervertebral disc at the level of Lumbar 1-Lumbar 2. *Turk Neurosurg* 17 : 134-137, 2007
18. Sarliève P, Delabrousse E, Clair C, Hussein HH, Schmitt C, Kastler B : Intradural disc herniation with cranial migration of an excluded fragment. *Clin Imaging* 28 : 170-172, 2004
19. Schisano G, Franco A, Nina P : Intradiscal and intradural lumbar disc herniation : experiences with nine cases. *Surg Neurol* 44 : 536-543, 1995
20. Schisano G, Nina P : Intradiscal lumbar disc herniation : case report and review of the literature. *Neurosurgery* 43 : 400, 1998
21. Wasserstrom R, Mamourian AC, Black JF, Lehman RA : Intradural lumbar disk fragment with ring enhancement on MR. *AJNR Am J Neuroradiol* 14 : 401-404, 1993