



Difficulties in Diagnosis and Operation Associated With Lumbar Intradural Disc Herniation: A Case Report

Hieu T. Le^{ID}, Hoai T.P. Dinh^{ID}, Quynh H.T. Pham, Hoang D. Tran, Minh T. Nguyen

Department of Neurology, Hue University Hospital, Hue city, Thua Thien Hue province, Viet Nam

Abstract

Intradural disk herniation (IDH) represents an uncommon instance of disk degeneration. The surgical treatment of IDH, preoperative, and intraoperative diagnosis are difficult. The present case report highlights difficult parts of diagnosis and surgery. A 44-year-old man presented with lower back pain radiating to his right leg. A disk protruding into the ventral dural sac and exhibiting the hawk-beak sign was discovered by MRI. The dorsal side was exposed and incised during L3/4 laminectomy, a puncture on the ventral side was detected, and subsequently, three fragments extending into the dura sac were discovered. The defect was corrected and completed internal fixing was done. Pathology identified it as nucleus pulposus tissue. At one-month follow-up, he was able to walk normally. An incredibly uncommon form of disc degeneration is lumbar IDH. MRI can assist in the diagnosis, however, surgical investigation and pathology are necessary for an accurate diagnosis.

Keywords: Intradural; Disk herniation; Lower back pain; Radiating pain; Laminectomy.

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Introduction

Lumbar disk herniation is one of the most prevalent causes of sudden or ongoing lower back discomfort. The disease known as lumbar intradural disk herniation (IDH), can cause the nucleus pulposus of the intervertebral disc to extend into the dural sac which accounts for 0.04-0.33% of all disc herniations.¹ Dandy and colleagues, reported the first case in 1942, and more than 160 instances have since been recorded globally.²⁻⁴ IDH often affects the L1/2, L2/3, and L3/4 less frequently than the L4/5 and L5/S1.^{3,5} Despite improvements in neuroimaging methods, identifying an IDH is still difficult for physicians. This challenging diagnosis may result in an erroneous procedure or insufficient decompression.⁶ Most patients need surgery for a final diagnosis, but IDH operative management is challenging and fraught with the risk of nerve injury, especially in the lumbar region.⁷ This case report presents the clinical diagnosis, operative management, and potential pathogenic pathways of a patient with L3/4 IDH.

Case Presentation

A 44-year-old man who had previously experienced back and leg discomfort arrived at emergency room with an acute lumbar pain that had happened a week earlier. There was no family history and no bladder or bowel symptoms. Towards the back of the right thigh, a

neurological examination revealed diminished pinprick sensation. Stretching the right side's femoral nerve was positive. His right lower extremity has a reduced knee jerk reflex. Physical therapy and epidural steroid injections did not alleviate the pain (Visual analog scale of 8-9 on a scale of 0 to 10).

The posterior disc fibrous annulus ruptured, posterior longitudinal ligament (PLL) lost continuity, a large disc protruded into the ventral-dural sac measuring 6 × 7 × 18 mm in size, according to magnetic resonance imaging (MRI) results (Figure 1A, 1B). It was quite likely that the patient had IDH, but it was also possible that they had a tumor or cyst, thus laminectomy and posterior lumbar interbody fusion at L3/4 level were indicated immediately. The L3/4 level had a full decompressive laminectomy. The dura was stiff, bulging, and immovable. We saw a smooth surface from the right dorsolateral view with hard shards adhered in the ventral dura's interior wall. The dura mater loosened and the cauda equina nerves released after expelling three free pieces. We discovered a thinning circular defect with a width of around 7 mm (Figure 2A), that was adherent to the PLL and was immobile. Then, we close the ventral defect, and continuous sutures were used to close the dorsal dura, and internal fixation was performed.

Histopathological examination of disk herniation with hyperplastic inflammatory granulation tissue,



*Correspondence to: Hoai T.P. Dinh, Email: phuonghoai1412.md@gmail.com

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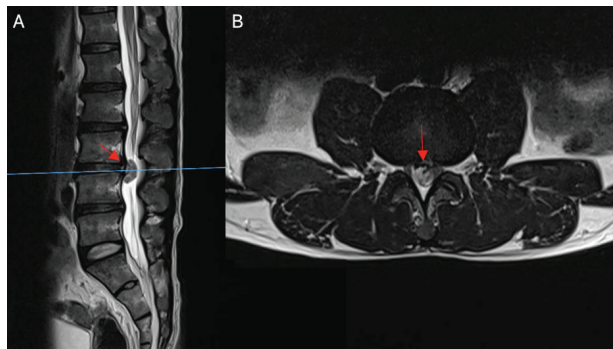


Figure 1. A Herniated Disc Located L3/4 on Lumbar MRI (red arrow). A heterogenous hypointense mass measuring 6x7x18mm is observed on T2-weighted image in sagittal section (A), and the central hernia is slightly displaced towards the right side in axial section (B), leading to spinal stenosis that compresses the cauda equina nerve root

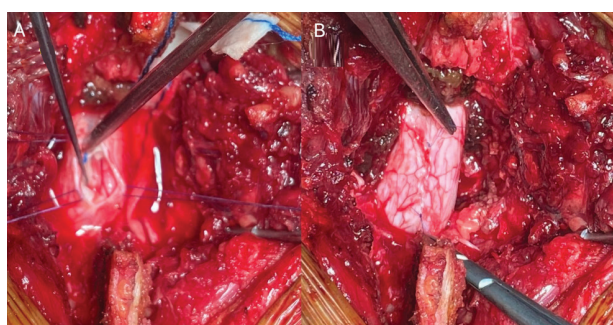


Figure 2. Depicting the Removal of the Disc Hernia Mass and Epidural Suturing in an Intraoperative Image. An examination reveals the presence of a 7mm perforation in the ventral dural with three herniated disc fragments found within the epidural sac (A). The epidural wall is closed using continuous suturing through a microsurgical technique (B)

nucleus pulposus tissue, and degraded fibrocartilage (Figure 3). The postoperative period of the patient noted no complications or adverse occurrences. The patient had no symptoms during follow-up.

Discussion

IDH, rather uncommon at the L3/4 level, with PLL and ventral dural sac have strong adhesions, whether congenital or acquired, are believed to play a role in the pathophysiologic process.^{8,9} According to our understanding, the primary impacts on IDH include acquired predisposing conditions such as ongoing inflammation, degenerative illness, iatrogenic illnesses, trauma, regional infection, and bleeding.^{10,11}

Patients with an intraoperative diagnosis of lumbar IDH often experience a sudden onset of back pain with or without neurological impairments, neurogenic symptoms for months or years, and get admitted to the hospital.¹² Local adhesions are stimulated and eroded by the release of inflammatory substances by a ruptured disc.¹³ The adhered local dural sac thins due to this erosion and the mechanical pressure exerted by herniated disc fragments, and eventually ruptures as a result, permitting loose disc pieces to reach the subdural region where they push



Figure 3. Extracting Three Herniated Disc Fragments During the Surgical Procedure. These fragments are characterized by hard, irregular white mass specimen, hyperplastic inflammatory granulation tissue, nucleus pulposus tissue, and degraded fibrocartilage, as identified during the histopathologic investigation

against and activate the cauda equina nerve.¹³ Acute and more severe neurological symptoms may now appear in people with chronic intermittent pain.¹²

Preoperative diagnosis of IDH requires thorough review of the patient's medical history, physical exam, and imaging. Nevertheless, it is challenging to provide a precise diagnosis based on imaging evidence.^{6,14} First of all, not every case will exhibit the typical findings that have been described in the literature. However, the "hawk beak" sign, ring enhancement or "crumble disc" sign, Y sign are shown on a preoperative radiologic images.¹³ In this report, axial T1- and T2-weighted MRI at the L3/4 level showed rupture of the posterior disk fibrous annulus and loss of PLL integrity. Second, despite advancements in neuroimaging, it is still challenging to distinguish IDH from meningeal cyst, benign tumor, arachnoiditis, hematoma, and metastases, among other spinal disorders.^{6,13}

Immediate surgery should be thought of as the first-line therapy when patients have significant neurologic symptoms and radiologic data strongly suggests IDH.⁸ To prevent neurological damage, the surgical method entails thorough dissection and cautious investigation.⁷ Based on preoperative imaging results, either a partial or complete laminectomy for decompression. To reduce the possibility of postoperative CSF leaking, correctly repairing the dorsal and ventral dura problems is essential. Hemostatic material, autologous fascial, or fat grafts have been used by certain surgeons in place of continuous sutures to close the ventral defect.^{7,8,13} The local intervertebral space should be stabilized, and internal fixation and spinal fusion are advised to prevent secondary disc herniation.^{7,15}

Our case study provides strategies for preoperative imaging diagnosis of IDH, a framework for the surgical diagnosis of this illness, including selection of the procedure and intraoperative assessment, as well as aspects of the surgery that need special attention. This information gives surgeons essential data for IDH patient management and operative strategy.

Firm adhesions between the PLL, posterior disc fibrous annulus, and ventral dural sac that can be inherited or acquired are among the pathophysiologic reasons and potential causes of the highly uncommon disc degeneration known as lumbar IDH. Specific imaging characteristics can be revealed by MRI to assist in diagnosis. If radiologic data strongly suggests IDH, immediate surgical surgery should be the first line of therapy to assure a speedy recovery.

Authors' Contribution

Conception and design: Hoai T.P. Dinh. Acquisition of data: Hieu T. Le. Analysis and interpretation of data: Hieu T. Le. Drafting the article: Hoai T.P. Dinh. Critically revising the article: Hoai T.P. Dinh. Reviewed submitted version of manuscript: Hieu T. Le, Hoai T.P. Dinh, Quynh H.T. Pham, Hoang D. Chan, Minh T. Nguyen. Statistical analysis: Quynh H.T. Pham. Study supervision: Minh T. Nguyen.

Competing Interests

None to be declared.

Consent for Publication

Informed consent was obtained from the patient for publication of this report.

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