Case report

Intradural disk herniation at L1–L2: report of two cases

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Context: Lumbar intradural disk herniation (IDH) is a rare but serious complication of spinal disk protrusions. Although the pathogenesis of lumbar IDH is still vague, it is believed to be associated with the adhesion of the posterior longitudinal ligament with the ventral wall of the dura. Diagnosis is still difficult despite current neuroradiologic imaging techniques.

Findings: Two women, ages 63 and 69 years, presented with recent exacerbation of back pain. In each case, imaging studies revealed a ventral herniated disk at L1–L2. Both patients underwent surgery and in both cases a hard mass was palpated through the dura. Both patients experienced immediate postoperative relief of back pain following surgery. One patient required fusion and postoperative rehabilitation; her neurologic deficit returned to baseline.

Conclusion/clinical relevance: Prompt surgical intervention is indicated for IDH; disk removal allows for symptomatic relief and minimization of neurologic deficit.

Keywords: Herniated disk, Intradural, Lumbar vertebrae, Discectomy, Neurologic deficits, Spinal surgery

Introduction

Intradural disk herniation (IDH) was first reported by Dandy¹ in 1942. Intradural herniation of intervertebral disk comprises 0.26–0.30% of all disk herniations.^{2–4} Ninety-two percent of all IDH occur in the lumbar region, with only 5% occurring in the thoracic region followed by 3% in the cervical region.⁴ Lumbar IDH is most prevalent in the fifth decade of life, and the overwhelming majority of cases, 76%, occur in males.⁵ Fifty-five percent of lumbar IDH occur at L4–L5, compared to 16% at L3–L4 and 10% at L5–S1; far fewer occur at L2–L3 and L1–L2.^{4,6} Patients typically present with an acute-on-chronic exacerbation of back pain, and may also exhibit symptoms of cauda equina syndrome. Preoperative diagnosis is difficult due to the variable clinical and radiological presentation. We report our experience with two cases of lumbar IDH occurring at the L1–L2 intervertebral disk level.

Case discussion: representative case

A 69-year-old woman presented with acute onset low back pain and left anterior thigh pain of 1-week duration. Neurological examination showed normal strength in her lower extremities with diminished knee and absent ankle reflexes with downgoing toes bilaterally. Examination also revealed decreased pinprick sensation in the L1–L2 dermatomes of the lower left extremity. No bladder or bowel deficits were noted. Lasègue's sign was negative bilaterally. The rest of her examination was unremarkable.

MRI revealed an extradural mass at L1–L2 (Fig. 1). Myelogram and CT showed a partial block of contrast flow at L1, as well as an anterior extradural defect and a mass behind the L1 vertebral body (Fig. 2). This mass was thought to represent an extruded disk, most likely from the L1–L2 disk.

The patient underwent an L1–L2 discectomy. Removal of the L1 lamina bilaterally showed an underlying tense and bulging thecal sac. No disk fragments were visualized at the level predicted by both CT and MRI. The L1 pedicle was removed, which yielded a bulge in the annulus in the vertebral disk space of L1–L2. A small amount of disk material was discovered

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Figure 1 Patient 1. Sagittal T2-weighted MRI shows extradural lesion at L1–L2. (Note the ‘hawk-beak’ sign behind body of L1.)

but not a sufficient amount to represent the larger fragment seen on CT and MRI. Exploration of the space anterior to the spinal cord revealed attachment of the thecal sac to the underlying tissue, but the thecal sac was not scarred. An intraoperative ultrasound was performed and showed an intradural mass. The disk was removed in a piecemeal fashion from the ventral dural defect with a pituitary rongeur. The defect on the anterior aspect of the dural sac was repaired; this most

Figure 2 Patient 1. Post-myelogram CT shows thecal sac compression behind the body of L1.

likely represents where the disk had ruptured through the sac. Final pathologic diagnosis was hyaline and fibrocartilage consistent with a nucleus pulposus. There were no operative complications, and the patient’s symptoms resolved by postoperative day three. She remains neurologically normal 3 years after surgery.

The second patient presented with lower extremity weakness. MRI revealed an L1–L2 herniated disk, which was resected in a similar manner as described above. A fusion was performed due to the excessive bone removal required to remove the disk. The patient’s postoperative pain resolved and she was neurologically normal 4 years after surgery.

Discussion

IDH is a rare complication of disk protrusion.⁷ Only 0.04–0.33% of disk herniations in the lumbar region are intradural.^{2–4} Within the lumbar region, L4–L5 represents 55% of IDH cases, followed by L3–L4 (16%) and L5–S1 (10%); far fewer occur at L2–L3 and L1–L2.^{4,6,8} Patients often experience an acute exacerbation of their chronic back pain by an incident such as lifting or falling.⁵

Although an exact pathogenesis for lumbar IDH has not been determined, it is generally accepted that adhesions between the annulus fibrosus, posterior longitudinal ligament (PLL), and ventral aspect of the dura represent a predisposing factor.^{2,4,6} Penetration of a midline adhesion allows for direct passage from the epidural space into the thecal sac. Evidence supporting the adhesion hypothesis can be seen in the frequency of the

location of IDHs. Lumbar IDH is most common between L4 and L5 disk space, constituting about 55% of lumbar intradural herniations.⁴ Yildizhan *et al.*⁸ performed 40 autopsies and discovered intimate connections between the dura, PLL, and annulus; these adhesions occurred most frequently in the L4–L5 interspace. Out of 40 autopsies, seven adults and three late abortions were noted as having adhesions. This finding that adhesions and lumbar IDH occur at their highest frequency in the same location bodes for a correlation between them.

Diagnosis from imaging represents a difficult task, as lumbar IDH can have various clinical and radiological presentations and mimics more common pathologies. The most common myelographic finding is a complete block, occurring in 71%, followed by an incomplete block occurring in 15% of patients.⁵ However, since myelography only details the architecture of structures within the thecal sac, it fails to show any anomalies in the epidural space. The most common intradural masses causing a complete block are neuromas and meningiomas, and thus these lesions are frequently misdiagnosed as neoplasms.⁹ Although post-myelogram CT can provide useful information, they are not able to reliably diagnose IDH.^{2,4} MRI, however, can provide several clues that suggest lumbar IDH. When coupled with gadolinium-diethylenetriaminepentaacetic acid (DTPA), MRI reveals the ‘hawk-beak’ sign, which is composed of a beak-like mass that experiences ring enhancement at the intervertebral space.^{10–12} An abrupt loss of continuity of the PLL on MRI is also suggestive of lumbar IDH, and thought to indicate the portion of the ligament that was transversed by the disk fragments.¹⁰

Treatment for lumbar IDH is surgical removal of the disk material with closure of the dural defect.² Preoperative diagnosis is important for proper surgical approach, which will decrease manipulation of the spinal cord and postoperative neurologic deficits.¹⁰ Factors in prognosis include presence of cauda equina syndrome, duration of symptoms, and complete

resection of the protruded material.⁴ A tense dura is often noted along with a ventral rupture in the wall of the dura.

Conclusion

The goal of surgery is to remove the ruptured disk material from the thecal sac and repair ruptured dura.² If extensive bony resection is required to adequately expose the pathology, fusion should be considered to prevent the sequelae of instability, including kyphosis and chronic pain.

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