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CASE REPORT

Intradural disc herniation at L5 level mimicking an intradural spinal tumor

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Abstract Intradural lumbar disc herniation is a rare complication of disc disease. The reason for the tearing of the dura matter by a herniated disc is not clearly known. Intradural disc herniations usually occur at the disc levels and are often seen at L4–L5 level but have also been reported at other intervertebral disc levels. However, intradural disc herniation at mid-vertebral levels is rare in the literature and mimics an intradural extramedullary spinal tumor lesion in radiological evaluation. Although magnetic resonance imaging (MRI) with gadolinium is useful in the diagnosis of this condition, preoperative correct diagnosis is usually difficult and the definitive diagnosis must be made during surgery. We describe here a 50-year-old female patient who presented with pain in the lower back for 6 months and a sudden exacerbation of the pain that spread to the left leg as well as numbness in both legs for 2 weeks. MRI demonstrated an intradural mass at the level of L5. Laminectomy was performed, and subsequently durotomy was also performed. An intradural disc fragment was found and completely removed. The patient recovered fully in 3 months. Intradural lumbar disc herniation must be considered in the differential diagnosis of mass lesions in the spinal canal.

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Introduction

Herniation of an extruded intervertebral disc through the dural matter and into the subarachnoid space is a rare event in lumbar disc disease. The first report of an intradural herniation was presented by Dandy in 1942 [1]. The pathogenesis of intradural disc herniation is not clear. Preoperative diagnosis is difficult despite the availability of newer neuroradiologic investigative tools, such as computed tomography (CT) and MRI. In neuroradiological evaluation, confusion with other spinal abnormalities, such as neurofibroma, lipoma, meningioma, epidermoid tumor, arachnoid cyst, arachnoiditis or metastasis may occur.

In this report, we present a case of intradural disc herniation at the L5 level diagnosed during surgery. The condition mimicked an intradural extramedullary spinal tumor lesion.

Case report

A 50-year-old female patient was admitted to the hospital having experienced pain in the lower back and both hips for 6 months, and intermittent claudication for 2 months. She sought treatment at many clinics, with no remission of symptoms. She reported a sudden exacerbation of lower back pain that spread to the left leg and numbness in both legs for 2 weeks before admission. She had no history of trauma, concomitant infection or previous lower back surgery. Neurological examination revealed weakness of the left extensor hallucis longus and decreased ankle reflex in both lower extremities. The leg pain involved the posterior of the left thigh. Straight leg (Lasègue's sign) raise was positive at 30° bilaterally. A sensory deficit (numbness) involved the posterior of both thighs, but bladder and bowel function were normal. MRI showed a mass-like lesion, measuring about 2 × 1.5 × 1 cm, at the level of L5 (Figs. 1, 2). The left of the center lesion was isointense on T1-weighted and T2-weighted images in non-contrast MRI (Fig. 1). In the Gadolinium-enhanced MRI, T1-weighted images showed no homogeneous contrast enhancement of the mass, but the surroundings were contrast-enhanced to a characteristic peripheral ring enhancement; T2-weighted images revealed no peripheral or homogeneous contrast enhancement of the mass (Fig. 2). A stalk connecting the intervertebral disc to the mass did not appear, but a beak-like appearance was seen in the axial T2-weighted image (Fig. 1). A herniated intradural disc was suspected, but intraspinal tumor could not be ruled out. She underwent a total laminectomy at the level of L4, L5 and S1 in the prone position. There was no significant extradural lesion after laminectomy. A hard mass could be felt along palpation of the dural sac. The dura was swollen and immobile. Subsequent durotomy demonstrated a nearly 2 × 1 cm ruptured intradural disc remarkably close to the nerve roots and the ventral dura. The disc was carefully dissected and then completely removed under the surgical microscope (Fig. 3). The ventral dura was a fibrotic change without perforation, so that the intradural mass was not communicating with the disc material in the intervertebral space. It was adherent to the PLL of the L5–S1 interspace and L5 body. Pathologic examination confirmed that the lesion was disc material. The patient was discharged 5 days after the operation and the postoperative period was uneventful. She gained full recovery after 3 months.

Discussion

Intradural disc herniations are rare, accounting for 0.27–0.33% of all herniated disc [2, 3]. So far, more than 151 cases of intradural disc herniations have been reported since 1942 [1]. About 3% occur in the cervical region, 5% in thoracic region and 92% in the lumbar region [2]. The average age of onset of intradural disc herniations is

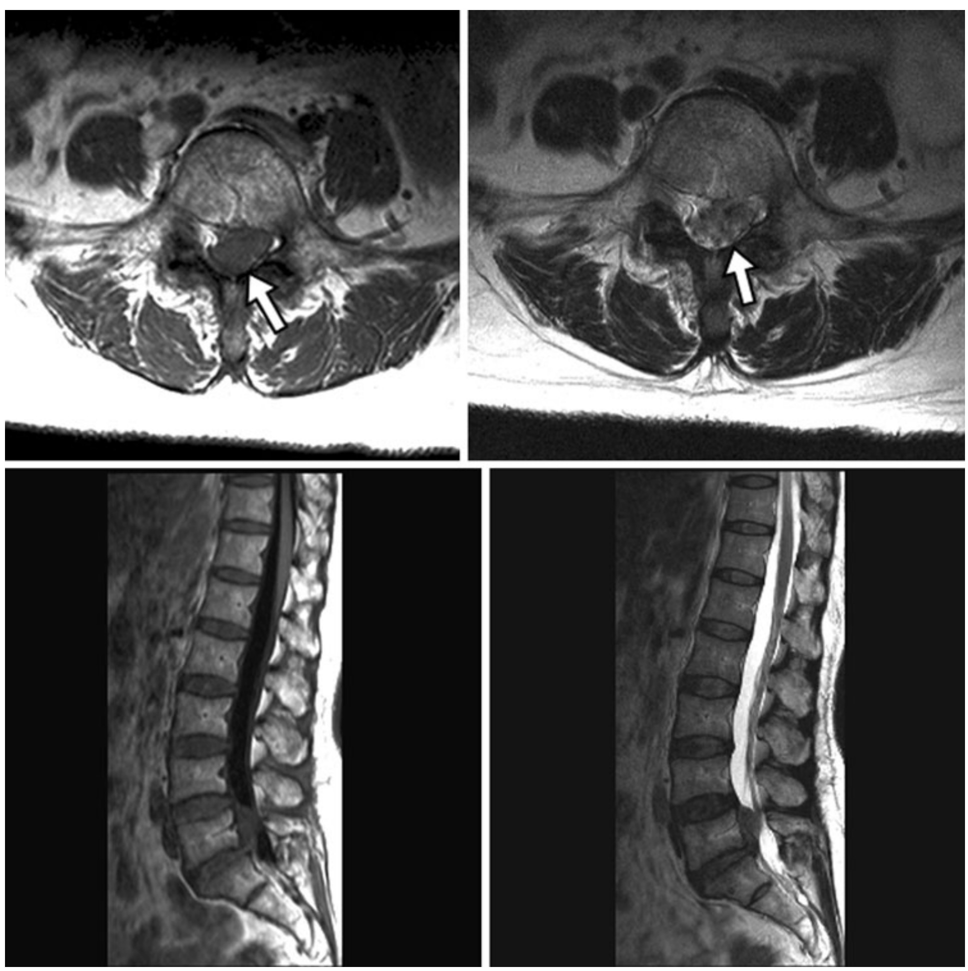

Fig. 1 T1- and T2-weighted images in non-contrast saggital and axial MRI demonstrating a huge isointense mass-like lesion, located centrally to the left at L5 level, which nearly compresses the entire spinal canal and a beak-like appearance in the axial T1- and T2-weighted images (*arrow*)

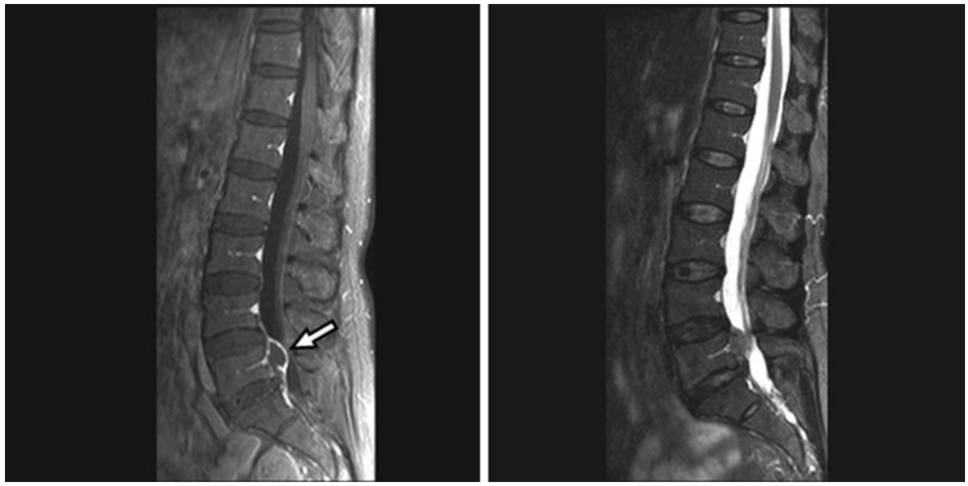

Fig. 2 Gadolinium-enhanced MRI, T1-weighted image showing ring enhancement (*arrow*) of the mass; T2-weighted image revealing no peripheral or homogeneous enhancement of the mass

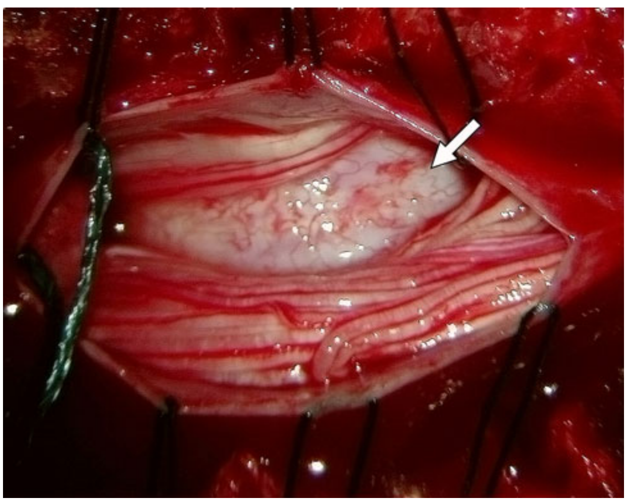

Fig. 3 Intraoperative image demonstrating the peripheral displacement of the adherent cauda equine nerve roots by intradural disc fragment (*arrow*)

between 50 and 60 years [4, 5]. Clinical features in the cervical spine present a severe neurologic deficit such as Brown Sequard syndrome, incomplete or transient quadriparesis [5, 6]. In the lumbar spine, it will present with cauda equina syndrome found in two-thirds of the patients [3, 7] or nerve root syndrome mimicking a spinal cord tumor [4]. Clinical history includes chronic lower back pain, acute radicular pain and progressive neurologic deficit [8]. The timing of the chronic symptoms led to the theory that interdural sequestration may simply be an intermediate stage in the process of complete transdural migration of a disc fragment and granulation tissue formation around the fragment. Mut et al. [9] suggested the following classification for intradural disc herniations. Type A: herniation of a disc into the dural sac. Type B: herniation of a disc into the dural sheath in the preganglionic region of the nerve root.

The site most frequently affected by intradural lumbar disc herniations is L4–L5 (55%), followed by L3–L4 (16%), L5–S1 (10%), L2–L3, and L1–L2 [3, 10]. The location of intradural disc herniations were reported at the intervertebral disc levels and above or under the levels connected with a stalk of disc. Disc fragments at mid-vertebral levels are rare; only one case reported that an intradural disc fragment with cranial migration was located among the cauda equina nerve roots at the L3 level [11]. In our case, the lesion was at the L5 level. Therefore, it is hypothesized that the disc fragment was migrating upward from the L5-S1 level.

The pathophysiological feature that causes intradural disc herniations is not clearly understood; however, it is postulated that a preexisting abnormality is present, predisposing a lesion formation. Theories have been proposed as follows [3, 12, 13]: (1) adhesion between the posterior longitudinal ligament (PLL) and the ventral wall of dura mater due to some local inflammatory processes may lead to spontaneous perforation or rupture; (2) congenital union between the PLL and dura mater; (3) the PLL and the ventral dura mater are usually loosely apposed [14, 15], so perforation of the dura may follow a sudden force. Adhesion between the PLL and dura was prominent in our case. We believe that the most likely conjecture for intradural disc protrusion is erosion and rupture of the PLL and the ventral dura caused by chronic mechanical irritation of the preexisting herniated disc in the intervertebral space.

Gadolinium-enhanced MRI scan is useful to differentiate a herniated disc from a disc space infection or tumor. The herniated discs appear as homogeneously isointense lesions on T1- and T2-weighted images. Hidalgo-Ovejero et al. [16] pointed out the significance of gas within the spinal canal, which was associated with intradural disc herniations. Hida et al. [17] stressed the usefulness of gadolinium-enhanced MRIs in making an accurate diagnosis preoperatively by showing a beak-like mass with ring enhancement at the level of the intervertebral space, which pointed to the abrupt loss of continuity of the PLL. Holtas et al. [18] reported that T2-weighted images showed an increased signal intensity area surrounding the herniated disc, which pointed a sharp beak-like appearance. They interpreted the ring enhancement to be a result of granulated tissue infiltrating the disc fragment over a long period. However, cases of acute herniation may fail to show ring enhancement because the granulated tissue has not yet developed. In the axial MRI, a tear can be found in the posterior annulus fibrosus with a stalk connecting the intervertebral disc and the intradural ruptured disc. Although MRI with gadolinium is useful, misdiagnosis is common. In our case, MRIs of the mass on T1- and T2-weighted images were homogeneously isointense. The beak-like appearance was seen at L5 level. However, the mass with ring enhancement on the T2-weighted image was not observed and a connecting stalk could not be found in the MRI. This led us to consider intradural extramedullary lesions such as neurofibroma or meningioma.

Treatment requires laminectomy and subsequent durotomy, followed by careful dissection of nerve roots under the microscope and removal of all intradural ruptured disc material. Repair of the dural defect must be as complete as possible to prevent cerebrospinal fluid leakage [19].

Preoperative diagnosis is thought to be very significant in the prevention of postoperative neurologic deficits, but correct preoperative diagnosis is usually difficult. Although MRI findings can be helpful for the preoperative diagnosis of intradural lumbar lesions, palpation of the dural sac and consideration to intradural disc herniation in the preoperative differential diagnosis for the intradural spinal tumors are most important when intraoperative findings are different from preoperative MRI findings. Surgery should be performed as soon as possible to provide the best opportunity for full neurological recovery.

Conflict of interest None of the authors has any potential conflict of interest.

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