

Intradural Lumbar Disc Herniation

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Intradural lumbar disc herniation(ILDH) is a rare pathology. The pathogenesis of ILDH is not known with certainty. Adhesions between the ventral wall of the dura and the posterior longitudinal ligament(PLL) could act as a preconditioning factor. Diagnosis of ILDH is difficult and seldom suspected preoperatively. Prompt surgery is necessary because the neurologic prognosis appears to be closely related to preoperative duration of neurologic symptoms. Despite preoperatively significant neurological deficits, the prognosis following surgery is relatively good. We report on case of ILDH at L3/4 with differential diagnoses, and the possible pathogenic factors are discussed.

KEY WORDS : Intradural disc rupture · Lumbar disc · Spine.

Introduction

Intradural lumbar disc herniation(ILDH), one of the serious complications of intervertebral disc herniation, is an uncommon occurrence in the natural course and clinical spectrum of lumbar disc disease^{7,11,16,31}. The incidence of ILDH was reported to be 0.04~0.33% of lumbar disc protrusion. The preoperative diagnosis of this condition is still difficult, despite new neuroradiologic investigation possibilities including computerized tomography(CT) and magnetic resonance imaging (MRI). The purpose of this study is to report our experience of a case of L3/4 intradural disc herniation review the relevant literature, and discuss its pathogenesis, diagnosis, and treatment.

Case Report

A previously healthy 40-year-old woman was hospitalized due to lower back pain and both leg weakness that had developed gradually over a period of 4 months. On admission, decreased motor function of both lower extremities was fourth-fifths, and loss of patella as well as Achilles deep tendon reflex in the both lower extremities was noted. Sensory function was intact. Plain radiographs of lumbosacral spine revealed normal curvature. Magnetic resonance imaging showed disc herniation with somewhat downward migration at the L3-L4 level on sagittal sections. T1-weighted axial images at the level of L3-L4

demonstrated disc protrusion with compressed cauda equina (Fig. 1). After diagnosis of lumbar disc herniation, the patient underwent partial hemilaminectomy on L3 with foraminotomy. During the procedure, a small amount of cerebrospinal fluid leakage was seen. After close examination, tearing was seen on the ventral wall of the dura. Disc material was found in the intradural space which seemed to compress the cauda equina at the right spinal canal. The disc material was removed with careful microdissection and primary closure of the dural defect was done using fibrin glue. The postoperative course was uneventful with complete relief of lower back pain. She was discharged on the 17th day after surgery with normal muscle strength and gross normal patella and Achilles tendon reflex.

Discussion

Migration of the disc material in the intradural site requires perforation of the annulus fibrosus, posterior longitudinal ligament and dura mater. The tearing of the ventral wall of dura by a herniated lumbar disc with intradural disc herniation is a rare pathologic entity^{6,12-14,31}. The incidence of this condition in the lumbar region was 0.04~0.33% of lumbar disc protrusions⁹. Dandy⁷ in 1942, reported the first case among 300 patients who underwent surgery for lumbar disc herniation. Although the pathogenesis of intradural disc herniation is not known with certainty, several mechanisms have been

• Received : July 12, 2005 • Accepted : August 25, 2005

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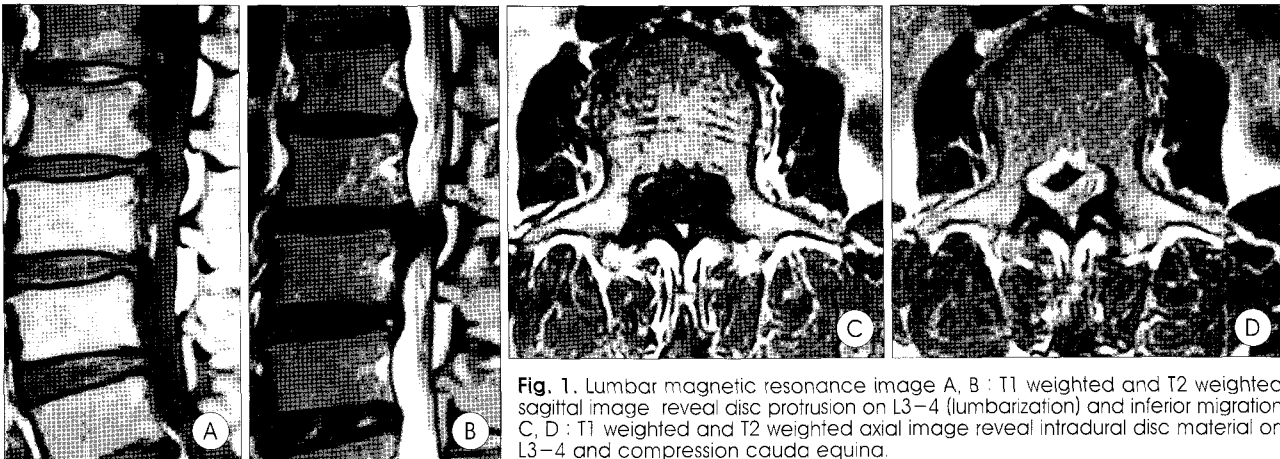


Fig. 1. Lumbar magnetic resonance image A, B : T1 weighted and T2 weighted sagittal image reveal disc protrusion on L3-4 (lumbarization) and inferior migration C, D : T1 weighted and T2 weighted axial image reveal intradural disc material on L3-4 and compression cauda equina.

suggested. Dandy⁷⁾ stated that the acute pressure of the protruded disc may erode and then penetrate the overlying dura. Lyons and Wise¹⁷⁾ also supported the idea of dural penetration by sustained pressure.

The summary of predisposing anatomic factors are as follows :

1. Adhesions between the annulus fibrosus, posterior longitudinal ligament, and dura mater, particularly when these are associated with postoperative adhesions caused by chronic fibrosis^{11,19-21,27)} or previous surgery^{1,2,4,8,16,18,19,26,27,29)}.
2. Congenital narrowing of the spinal canal with less epidural space, which, together with the favored condition (such as coughing, sneezing, and sudden effort), can more easily lead to compression of the spinal structures and perforation of the dura mater^{3,24)}.
3. Congenital or iatrogenic thinning of the dura mater.

The mean age of onset of this pathology is between 50 and 60 years. There is a preponderance of the male gender, with an incidence of 72%, as for the extradural pathology. The site most frequently affected is L4-5 (55%)^{5,15)}, followed by L3-4¹⁵⁾ (16%), L5-S1 (10%)^{5,15)}, and L2-3 and L1-2. Therefore it seems clear that the prevalent sites differ from those of extradural lumbar herniation^{5,15,23,27)}. The case history is not specific, but the presence of cauda equina syndrome associated with a several-year history of uni- or bilateral lumbar pain, can suggest the existence of intradural lumbar disc herniation^{4,9,11,20-22,24,25,29)}.

The diagnosis of intradural disc herniation can be made with difficulty using several neuroradiological techniques. Wasserstrom et al.³⁰⁾ reported an intradural disc herniation with a ring enhancement pattern on MRI with gadolinium study. Snow et al.²⁸⁾ agreed with considering ring enhancement as an expression of vascular granulation tissue around the herniation. The development of reactive chronic fibrosis and the disc fragment's vascularization is indicative of the typical enhancement picture with contrast medium in intradural herniations³⁰⁾. The MRI finding of an intradural lesion raises several diagnostic doubts that must be considered and resolved with differential diagnosis,

which includes neurinoma, meningioma, ependymoma, epidermoid, and dermoid. Both neurinoma and meningioma have homogeneous enhancement clearly different from the ring enhancement of intradural herniations. Ependymoma, which in some cases can cause difficulties in differential diagnosis, is markedly enhanced but, unlike intradural herniations, is hyperdense on T2-weighted images. Epidermoid and/or dermoid, on the other hand, does not reveal contrast^{28,30)}.

The treatment of intradural disc herniations basically involves surgical removal of ruptured disc material. Closure of the ventrally located dural tear is necessary because of the risk of CSF leakage. As pointed out by Kataoka et al.¹⁵⁾, since the neurological prognosis appears to be closely related to preoperative duration of neurologic symptoms, an indication for prompt surgical intervention must be a primary consideration for good recovery. At surgery, the dura and roots must be carefully explored in every case.

The prognosis of disc herniations complicated by penetration of the dural sac by the nucleus pulposus is not as easy as with noncomplicated disc herniations^{15,18,25)}. Prognosis is probably related to the degree of removed herniated disc, and three additional factors :

1. Duration of the symptomatology. Long duration can be a negative prognostic factor and is often linked to an unsatisfactory result²⁵⁾, causing worse outcome than with noncomplicated lumbar disc herniations.
2. Symptomatology characterized only by radicular disease or associated with cauda equina syndrome. Cauda equina syndrome is reported in 29% of cases described in the literature. In 62%, it was associated with slow but full recovery from deficits taking a minimum of 3 weeks to a maximum of 32 months^{7,10,18, 24,26,29)}.
3. Previous surgery^{24,29)} of the lumbar spinal column. In 81% of cases with clinical histories of lumbar surgery, there was excellent outcome^{4,25,30)}. In 19% of cases with less satisfactory result^{24,29)}, a decreased postoperative persistence of pain was noted.

Conclusion

We report a case of severe back pain with both leg weakness which was suspected as intradural lumbar disc herniation on lumbar spine magnetic resonance imaging and it was confirmed and removed through surgery with successful symptom relief.

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