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Intradural Lumbar Disk Fragment with Ring Enhancement on MR

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Summary: Intradural extension of a herniated intevertebral disk, an unusual complication of a common disease, may mimic an intradural tumor on MR. A case of a pathologically proved subdural disk fragment is presented; MR findings that suggested the correct diagnosis were: proximity of intervertebral disk disease; whorl-like mixed intensity on T2-weighted images; poor visualization of the mass on unenhanced T1-weighted images; and marked ring enhancement following administration of gadolinium.

Index terms: Spine, intervertebral disks; Spine, magnetic resonance

We recently encountered an unusual case of intervertebral disk disease mimicking an intradural tumor.

Case Report

A 45-year-old man presented with a 6-month history of back and right leg pain following a motor vehicle accident. He had undergone an L4-L5 diskectomy 2½ years previously, with relief of symptoms. A magnetic resonance (MR) scan obtained 3 months prior to the current evaluation at another facility failed to demonstrate a significant disk herniation.

Physical examination revealed decreased muscle strength of the right ankle and great toe dorsiflexors as well as decreased pinprick sensation over the right calf and dorsum of the right foot. An MR scan demonstrated a large intraspinal mass at L4-L5 adjacent to a diffusely bulging disk (Figs. 1 and 2). This lesion was slightly hyperintense to the surrounding cerebrospinal fluid (CSF) on the 600/25 (TR/TE) sagittal image and hypointense with heterogenous whorl-like mixed signal on 2500/90 image (Fig. 1A). After administration of gadolinium-DTPA there was ring enhancement of the periphery of the lesion (Figs. 1C and 2B). A large disk herniation was considered the most likely diagnosis based on the clinical history, although the large size, ring enhancement, and apparent intradural location suggested the possibility of a tumor such as ependymoma or meningioma.

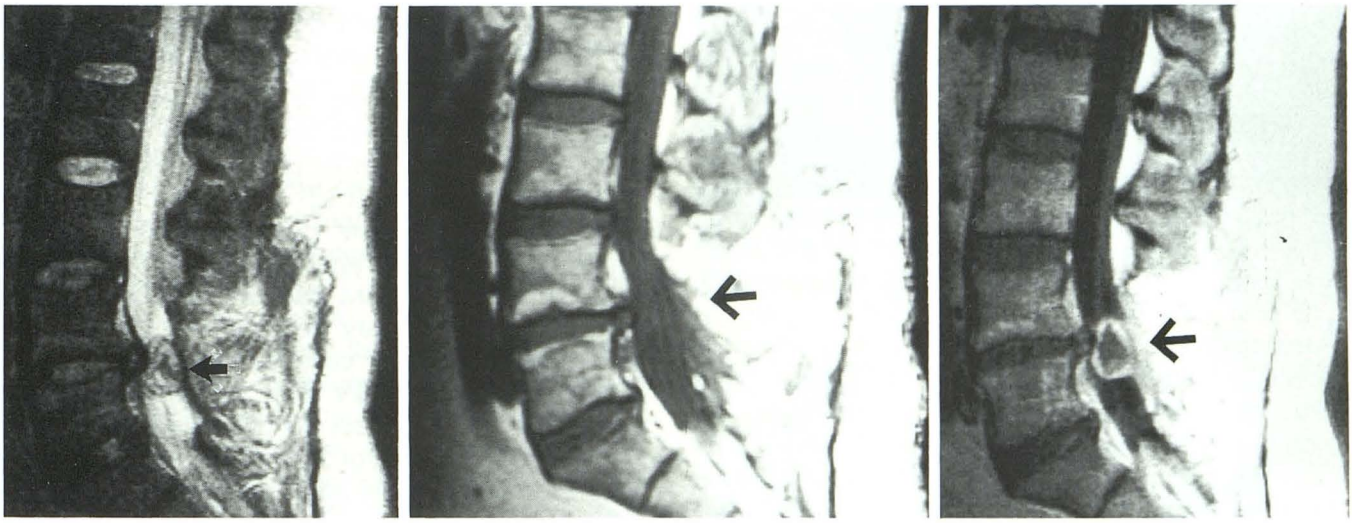

Fig. 1. This sagittal 2500/90 (TR/TE) image (*A*) demonstrates the hypointense intraspinal mass at L4-5 (*arrow*) adjacent to a diffusely bulging disk. There is CSF capping the mass reflecting the intradural location of the lesion. On the 600/20 image (*B*) it appears slightly hyperintense to the surrounding CSF (*arrow*). With administration of gadolinium-DTPA there is ring enhancement (*arrow*, *C*) which is felt to be due to granulation tissue.

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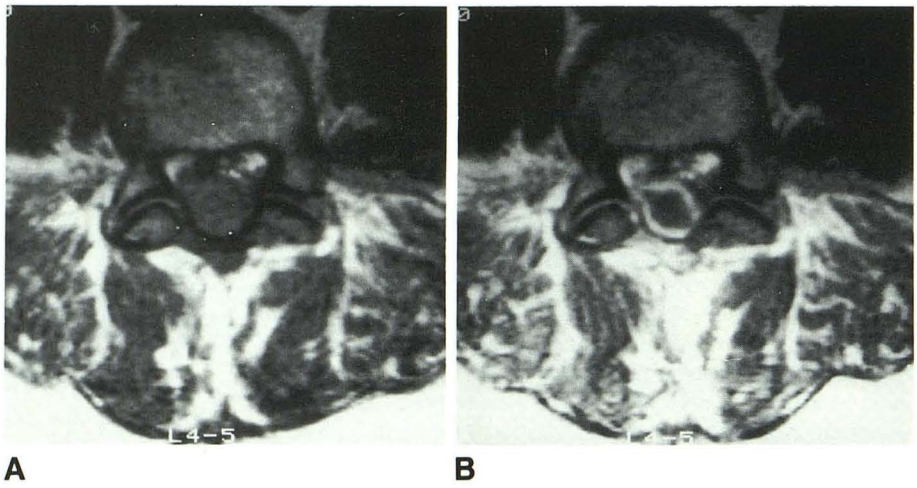

Fig. 2. The axial 750/24 image at the level of the disk fragment demonstrates the herniated nucleus pulposus ventral to the thecal sac. The intradural component cannot be visualized (*A*). After the administration of gadolinium-DTPA the margins of the intradural fragment are defined (*B*).

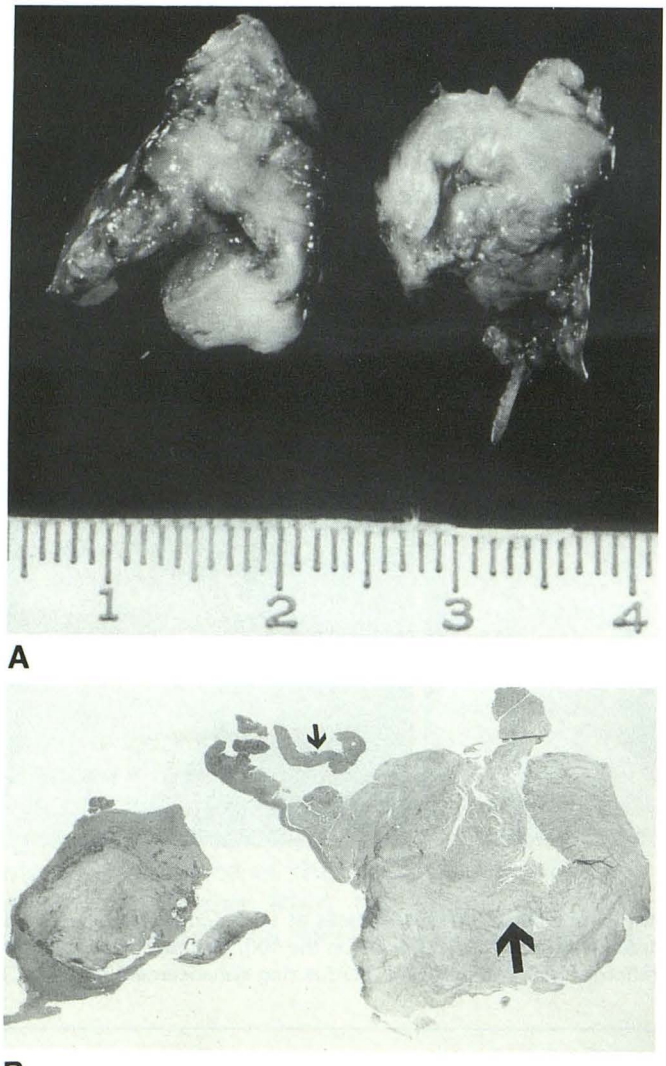

Fig. 3. Gross (*A*) and microscopic (*B*) sections of the surgical specimen demonstrate degenerated fibrocartilage (*large arrow*) surrounded by granulation tissue (*small arrow*).

At surgery, an intradural mass was found adherent to the nerve roots and dura. Surgical dissection localized the mass to the subdural space. The surface of the mass contained numerous very fine blood vessels. An area of dural penetration was present anterolaterally on the right. Frozen section of the mass revealed degenerated fibrocartilage and granulation tissue (Fig. 3) consistent with a herniated disk. The mass was removed and the patient had an uneventful postoperative course. He reported marked improvement of symptoms on follow-up examinations.

Discussion

Intradural penetration of a herniated intervertebral disk was reported by Dandy in 1942 (1). It is a rare complication of disk herniation with a reported incidence of 0.13% (2). It is thought that adhesions between the dura and the posterior longitudinal ligament enable the disk material to erode through the dura into the subdural space. The disk material may be confined to the subdural space, as in our case, or penetrate into the subarachnoid space (2). The adhesions may be congenital or secondary to disk disease or previous surgery (3). Typically patients will have a history of chronic low back pain or disk disease. Many will have had previous back surgery. Often an acute exacerbation of pain with radicular symptoms and multiple nerve root neurologic deficits will precede the diagnosis (2). In our case, there were both previous surgery and disk herniation. The most common level at which intradural disk herniation occurs is at L4-L5, as in our case, although cases involving the cervical or thoracic spine have been reported (4).

Several imaging techniques have been used in the workup of these cases. Contrast myelography

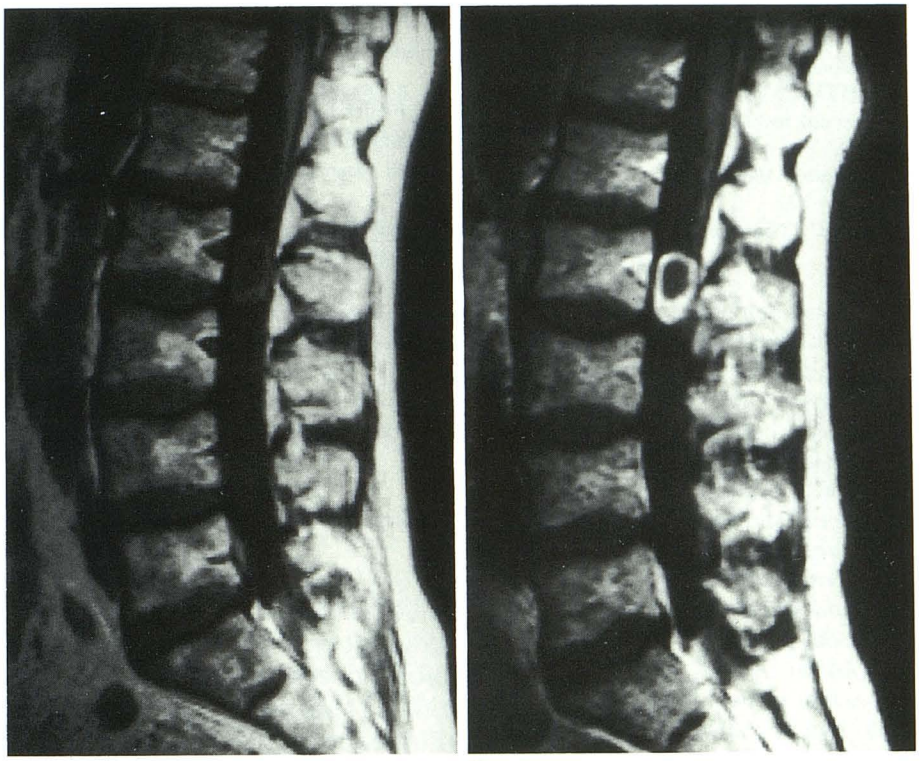

Fig. 4. This 500/25 sagittal image (*A*) reveals an intermediate intensity ring within the spinal canal at L2. After the administration of gadolinium-DTPA (*B*) this ependymoma also takes on a ring enhancement pattern.

may demonstrate an intradural mass lesion or occasionally a complete block (4, 5). Hodge et al showed the utility of combining the myelogram with computed tomography (6) to demonstrate the intra- and extradural components of the mass and show their relationship to surrounding vertebral structures. Holtas et al utilized the multiplanar capabilities of MR to trace the connection between the intradural mass and the intervertebral disk space (5). The images obtained on a low field strength system (0.3 T) demonstrated similar characteristics to our case.

Localization of a mass to the intradural compartment is based on the appearance of a widened subarachnoid space on the side of the lesion and displacement of roots or cord away from the lesion. Large masses may be difficult to localize in this fashion (7). On MR, similar imaging features may be applied and in our case there appeared to be CSF capping the mass (Fig. 1A) suggesting the intradural location.

The differential diagnosis of intradural mass lesions in the lumbar region includes nerve sheath tumor, meningioma, ependymoma, epidermoid/dermoid, intradural metastasis, and free disk fragment as in our case. Nerve sheath tumors are the most common intraspinal neoplasms (35%), followed by meningiomas (25%) (7). While both of these tumors may enhance homogeneously, they may be differentiated by their signal characteristics on T2-weighted images. Meningiomas usually remain isointense with the spinal cord whereas nerve sheath tumors are usually hyperintense (8). Both of these tumors would be expected to enhance. Ependymomas are the most common type of glioma found in the adult spinal cord and filum terminale. The lumbar and sacral spinal canal are common sites for this tumor. While enhancement is typical for these tumors, we recently encountered such a case with ring enhancement that bore a remarkable resemblance to our case (Fig. 4). In contrast to the disk, which was hypointense on the T2-weighted scan, the ependymoma was hyperintense. Epidermoid and dermoid tumors do not usually enhance.

The pathologic material clearly demonstrated granulation tissue around the disk material (Fig. 3), possibly accounting for the pattern of ring enhancement seen in this case.

Although disk herniations are commonly seen, they may still confound the radiologist in cases in which they take on unusual imaging features. It is important to be aware of the potential for free disk fragments to reside in the intradural space and to mimic the enhancement patterns of tumors.

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