Intradural disc rupture

Report of two cases

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Two cases of intradural disc rupture are presented, and 43 cases found in the literature are reviewed. Dandy's original observations concerning this lesion correlate well with contemporary experience. Characteristics of the history and physical findings are uniform enough to suggest a clinically identifiable syndrome. Microscopic examination of the Cytospin cerebrospinal fluid specimen and the use of computerized tomography with metrizamide may suggest the diagnosis preoperatively. Despite significant neurological deficits associated with lumbar lesions, the prognosis following surgery is good.

KEY WORDS intervertebral disc displacement • intradural disc rupture • lumbar disc

In 1942, Walter Dandy reported serious complications of intervertebral disc ruptures. Of the lumbar disc ruptures he reported, one resulted in an intradural L4-5 lesion associated with cauda equina dysfunction. Dandy's original report has proven to be fairly characteristic of the history, neurological findings, and postoperative course in lumbar intradural disc rupture.

The following two case reports describe an uncommon L1-2 lesion and a more common L4-5 intradural disc rupture. These cases correlate well with Dandy's original description.

Case Reports

Case 1

This 66-year-old retired farmer presented with a 9-month history of fluctuating low-back pain. Five days before admission, he experienced acute lumbar and bilateral radicular pain after rising from a reclining chair. Progressive neurological deficit ensued characterized by paraparesis and urinary and fecal retention. Lumbar and high cervical Pantopaque myelography revealed a total block across the L1-2 interspace. Protein levels in the cerebrospinal fluid (CSF) taken below the block were 670 mg%. Cytospin* examination of the CSF revealed macrophages containing fibrocartilaginous debris (Fig. 1).

An exploratory laminectomy at L1-2 revealed an intradural mass of disc material measuring 5 x 1 cm, which compressed the conus medullaris to the left of the spinal canal and was surrounded by the cauda equina roots emerging from the conus. After removal of the disc mass, a 2 x 1-cm rent communicating with the L1-2 interspace was found in the anterior dura, but could not be closed. Epidural scar tissue was

* Cytospin II manufactured by Shandon Southern Instruments, Inc., 515 Broad Street, Sewickley, Pennsylvania.
Case 2

This 66-year-old retired nurse was seen with a historical sequence very similar to that outlined in Case 1. Her neurological deficit was less severe, however. On examination, she had cauda equina dysfunction characterized by left S1-5 hypalgesia, left leg weakness, and bilateral radicular pain. There was no sphincter disturbance. Pantopaque lumbar myelography revealed a total block across the L4-5 interspace (Fig. 2).

An exploratory L-4 laminectomy revealed a 2.5 × 2-cm intradural disc rupture surrounded by cauda equina roots (Fig. 3). An anterior dural rent was found communicating with the L4-5 interspace, but could not be closed. Dense epidural scar tissue lay across the interspace, extending along the L-5 roots bilaterally. The patient’s postoperative convalescence was uneventful. The radicular pain resolved, and the sensory deficit and left leg weakness improved markedly.

Discussion

A search of the world literature revealed 43 cases of intradural disc rupture, reported in groups of one to three cases. Of the 43 cases, the specific level of involvement could not be verified in four, as these cases were reported by personal communication with various authors. Of the remaining verifiable cases, 16 intradural disc ruptures (41%) were found at L4-5, 10 (26%) were found at L3-4, five (13%) at L2-3, four (10%) at L1-2, and one (3%) at L5-S1. Two (5%) intradural thoracic disc ruptures were reported at T-9 and T-10, and one (3%) C5-6 intradural rupture was reported.13

In the lumbar cases reviewed in the literature and the present cases, the histories were chronic relative to back pain, and acute relative to severe radicular pain and progressive neurological deficit. When considering all of the cases, the more profound deficits were associated with conus or cord lesions. Lumbar lesions were characterized by a greater neurological deficit than one would associate with the usual extradural disc rupture. Despite relatively severe radicular pain and neurological deficit, intradural disc rupture at L-1 and below carried a good prognosis, with excellent functional recovery being the rule. Patients with thoracic and cervical lesions fared much worse, with little or no postoperative improvement.

Most authors imply that the tethering effect of
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adherent epidural scar tissue appears to be a significant underlying factor associated with intradural disc rupture. Dandy's original theory as to the etiology of the lesion corresponds well with contemporary observations. He stated that "the acute pressure of the protruded disc eroded the overlying dura and permitted its penetration into the spinal canal." He did not allude to the tethering role of the epidural scar per se, yet he did state that "the scar throughout the interior of the spinal canal was the end product of the rupture of a disc into the spinal canal."2

The greatest incidence of intradural disc rupture at L4–5 was well explained by Blikra1 in his autopsy study of the spinal canal in 40 cadavers. His study revealed that the L4–5 ventral dura was firmly or inseparably adherent to the posterior longitudinal ligament, so as to tether the dura which allowed herniated disc material to pass through the annulus, posterior ligament, and dura as one structure. Separable adhesions were found at L3–4 and at L5–S1 in his study. However, this theory does not explain why intradural disc ruptures occur relatively frequently at L3–4 and occasionally at other levels throughout the spinal canal.

In the L1–2 lesion reported in Case 1, an additional observation was made that may provide a preoperative laboratory diagnostic clue as to the presence of an intradural disc rupture. On the routine Cytospin CSF specimen obtained at myelography, hematoxylin and eosin staining revealed macrophages with ingested fibrocartilaginous material. The presence of these macrophages led to the preoperative consideration of the intradural disc rupture diagnosis. Unfortunately, the myelography for Case 2 was performed elsewhere, and the CSF specimen was not examined for the macrophage phenomenon. Hodge, et al.,7 demonstrated preoperative diagnosis of an intradural disc rupture also by utilizing metrizamide enhancement of spinal computerized tomography (CT).

Considering the large number of patients undergoing intervertebral disc surgery, the frequency of intradural disc rupture is very low. Dandy's experience was one in 300.2 Peyser and Harari11 reported two in 753 cases. Undoubtedly, there are many more unreported cases that occur in the normal course of clinical neurosurgery, so that the diagnosis of an intradural disc rupture should be entertained when the appropriate history and findings occur.

Summary

Two cases of intradural disc rupture are reported, illustrating an uncommon L1–2 lesion and a more common L4–5 lesion. Forty-three cases were found in the world literature, with a majority occurring at L3–4 and L4–5. Two thoracic and one cervical intradural disc ruptures were found. Dandy's original observation concerning the etiology, incidence, clinical presentation, operative findings, and prognosis correlate well with contemporary experience. Despite its infrequent occurrence, preoperative diagnosis of an intradural disc rupture should be entertained when there is a history of significant chronic low-back pain followed by an acute episode of bilateral radicular symptoms, unexpectedly severe neurological deficit, and the presence of a complete or nearly complete block with myelography. The presence of CSF macrophages containing fibrocartilaginous material and the use of spinal CT with metrizamide enhancement should suggest the diagnosis preoperatively.

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