

Extreme lateral disc herniation manifesting as nerve sheath tumor

Case report

MICHAEL D. CUSIMANO, M.D., F.R.C.S.(C), BERNARD P. BUKALA,
AND JUAN BILBAO, M.D., F.R.C.P.(C)

Division of Neurosurgery and Department of Pathology, St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada

✓ This report discusses the clinical features of a patient who presented with an L-3 radiculopathy in whom magnetic resonance imaging demonstrated what appeared to be a nerve sheath tumor in an extraforaminal location on the L-3 nerve root. A lateral intermuscular approach to excise the lesion was used to preserve the facet joint. Histological examination of the intraneural lesion revealed degenerative disc fragments. The authors hypothesize that the structure of the annulus fibrosus in the upper lumbar region predisposes these regions to lateral herniation. Furthermore, it is proposed that the lateral disc herniation allowed the disc fragments to erode through the epineurium of the neural sheath. This case expands the differential diagnosis of fusiform enlargement of nerves to include disc herniation.

KEY WORDS • lateral disc herniation • nerve sheath tumor • extreme lateral approach

PRIOR to the advent of computerized tomography (CT) scanning, extreme lateral disc herniations were rarely diagnosed. In contrast to classic intracanal disc herniation, extreme lateral disc herniations usually present at the upper lumbar levels. This rarity means that few surgeons have had extensive experience with the exploration of the extraforaminal area and removal of the disc. Several cases have been documented^{3,10,12} in which a foraminal or extraforaminal lesion was diagnosed as a retroperitoneal neoplasm, intradural tumor, and benign tumor, respectively, but a herniated intervertebral disc was found. We present the first case of an extreme lateral disc herniation that manifested as an L-3 nerve sheath tumor, and in which herniated disc fragments penetrating the epineurium of the nerve sheath were found in the nerve root. We hypothesize that the herniated disc damaged the neural epineurium and allowed the disc fragments to enter the nerve root.

Case Report

A 42-year-old movie technician developed a sudden onset of back pain, which was partially relieved by lying supine. He developed sciatic-type left leg pain that awakened him at night. He also had paresthesia along the medial aspect of the left knee.

On examination, he had difficulty standing upright from a flexed position on his left leg, and there was decreased bulk of the left thigh by 2 cm as compared to the right. Decreased sensation to pinprick was found in the L-3 dermatome. Lumbar myelogram showed small extradural defects of L4-5 and L5-S1. A CT scan performed by the referring center did not image the L3-4 disc space. Because the clinical findings did not correspond with the radiological ones, a magnetic resonance (MR) image was ordered. While awaiting MR imaging, the pain decreased, but the left leg numbness and weakness increased, and his left knee tendon reflex was lost. The MR image showed a 1 × 0.6-cm fusiform lesion lateral to the intervertebral foramen of the L3-4 disc, on the left side, which enhanced with gadolinium (Fig. 1). The lesion was suspected to be a small schwannoma.

A lateral approach was used to explore the region. The L-3 nerve root was enlarged in a fusiform shape by the lesion. A minimal amount of the most lateral part of the facet joint was removed to allow a better view of the tumor. The capsule of the lesion was opened and the inner part was taken out; it was soft, crumbly, greyish material. The frozen section diagnosis was schwannoma. The inner aspect of the capsule was also taken out, but the whole lesion was not resected because the L-3 nerve root was incorporated into a large part of the capsule of the lesion.

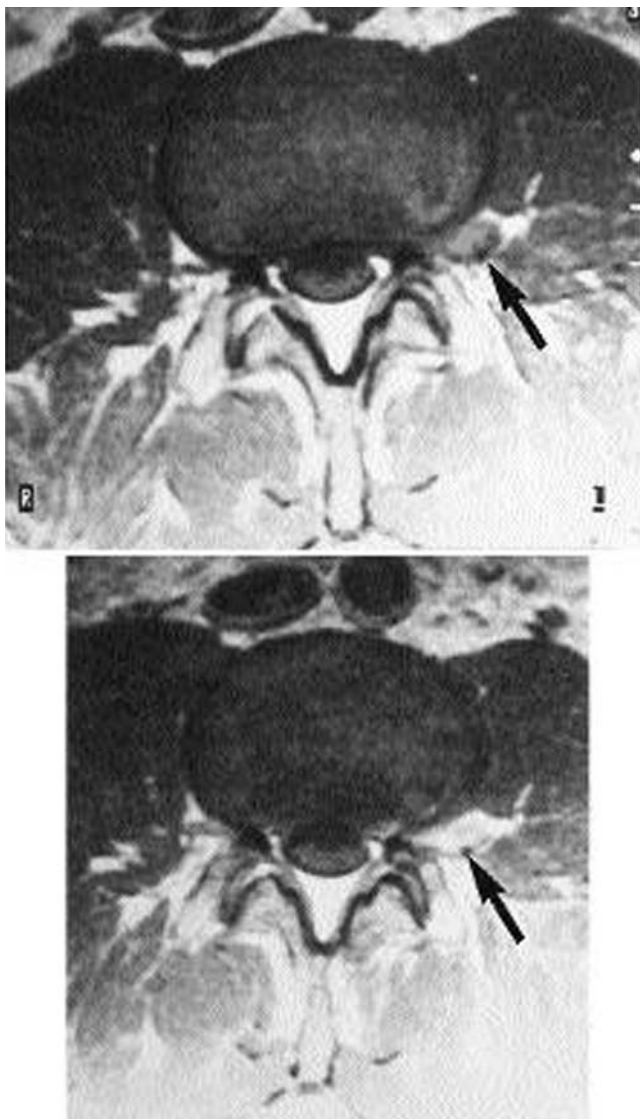


FIG. 1. Magnetic resonance imaging of the lumbar spine demonstrating a 1 × 1.5-cm soft-tissue mass within the nerve root just lateral to the intervertebral foramen at the L3-4 level that enhances following the administration of gadolinium. *Upper:* Plain T₂-weighted sequence. *Lower:* Gadolinium-enhanced T₁-weighted sequence.

A piece of fat was used to cover the nerve root and the fascia was closed.

Paraffin-embedded hematoxylin-eosin stained sections demonstrated that the bulk of the lesion was degenerated intervertebral disc with fibroblasts on the periphery that represented reactive change. There was no evidence of neoplasia (Fig. 2). The patient has remained free of any pain; he recovered partial neurological function and has returned to work.

Discussion

Extreme lateral disc herniation was described by Abdullah and coworkers,^{1,2} and others.^{6,8,9,11} Abdullah, *et al.*,¹

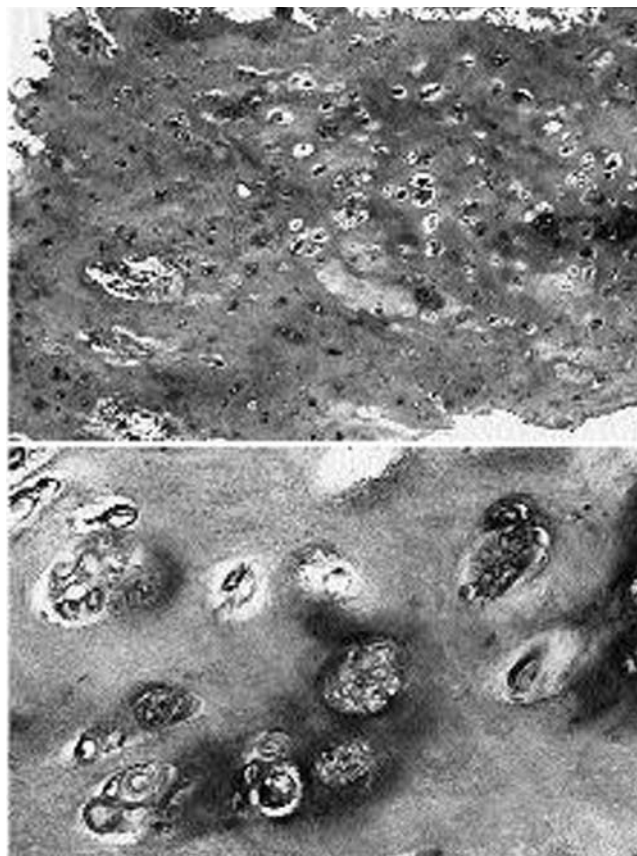


FIG. 2. Photomicrographs of the specimens removed at surgery demonstrating hyaline cartilage with reactive change and degeneration. H & E. *Upper:* Original magnification × 10. *Lower:* Original magnification × 40.

described the clinical syndrome of far lateral disc herniation, and in a later paper he advocated the surgical procedure which is known as the “classic” interlaminar approach.² The classic approach is related to a significant rate of instability, most likely because of the sacrifice of the facet joint required.^{4,9,11} A far lateral intermuscular approach^{6,9,11} to the lesion was used in this case to avoid the late complication of instability in this man.

Ten percent of upper-lumbar root compression syndromes are caused by far lateral disc herniation, in contrast to 2.5% by herniation of discs below the L4-5 level.⁶ Abdullah, *et al.*,¹ suggested that this might occur because the upper lumbar region takes most of the strain on the spine during lateral bending. This proposal was questioned by Postacchini, *et al.*,⁸ who found no correlation between lateral bending and lateral disc herniation in a series of patients with acute onset of pain due to lateral disc herniation. We hypothesize that this part of the lumbar region has a different structure of the annulus fibrosus that predisposes it to lateral herniation.

There are a few cases reported in which patients presented clinically with radiculopathies and were suspected of neoplasms, but herniated discs were found (Table 1).^{3,10,12} As in our case, the cases by Eckardt³ and Witzmann¹² demonstrated a mass that did not appear to origi-

TABLE 1

Summary of case reports of lateral disc herniation in the literature

Authors	Year	Clinical Findings	Radiological Technique	Preliminary Diagnosis
Savitz, <i>et al.</i>	1982	bilateral L-5, S-1 radiculopathy	lumbar myelogram	intradural neoplasm L-4
Eckardt, <i>et al.</i>	1985	L-4 radicular pain	CT scan	retroperitoneal neoplasm
Witzmann, <i>et al.</i>	1991	left-sided sciatica	CT scan	intracanal and S-2 nerve root neuroma
Cusimano, <i>et al.</i>	1995	left-sided sciatica	MR imaging and CT scans	schwannoma of L-3 root

nate from the intervertebral disc space, thus leading the authors to make a preoperative diagnosis of neoplasm. Because the case by Eckardt and colleagues showed a soft-tissue mass just lateral to the foramen with no decrease in the height of any of the lumbar intervertebral disc spaces, they believed it was a retroperitoneal tumor. Witzmann's case appeared as a left-sided mediolateral disc herniation at L5-S1 associated with a sacral canal mass that was suspected to be a neuroma of the left S-2 root. In Witzmann's case there was enhancement of the capsule around the mass but not of the mass itself on CT. In contrast, our case manifested clinically and radiologically (that is, fusiform appearance and enhancement on MR imaging) as a nerve sheath tumor. To our knowledge, lateral disc herniation into a nerve root has not been documented in the literature.

A hypothesis was put forward for the erosion of disc fragments into vascular structures by Naiman, *et al.*⁷ They suggested that a lateral rupture of the disc could damage a radicular artery and nucleus pulposus fragments would enter the artery. Kestle, *et al.*,⁵ suggested that it was unlikely to be a common mechanism due to the absence of hematomas in the reported cases.

We propose a similar hypothesis for the entrance of disc fragments into the nerve root. We suggest that the lateral herniation of the intervertebral disc damaged the neural sheath, and this allowed the sequestered disc fragments to enter the nerve root. This case expands the differential diagnosis of fusiform enlargement of nerves to include disc herniation.

References

1. Abdullah AF, Ditto EW III, Byrd EB, et al: Extreme-lateral lumbar disc herniations: clinical syndrome and special problems of diagnosis. **J Neurosurg** 41:229-234, 1974
2. Abdullah AF, Wolber PGH, Warfield JR, et al: Surgical management of extreme lateral lumbar disc herniations: review of 138 cases. **Neurosurgery** 22:648-653, 1988
3. Eckardt JJ, Kaplan DD, Batzdorf U, et al: Extraforaminal disc herniation simulating a retroperitoneal neoplasm. **J Bone Joint Surg (Am)** 67:1275-1277, 1985
4. Grob D, Scheier H: Reintervention bei postoperativer Instabilität an der Lendenwirbelsäule. **Orthopaedics** 16:348-356, 1987
5. Kestle JRW, Resch L, Tator CH, et al: Intervertebral disc embolization resulting in spinal cord infarction. **J Neurosurg** 71:938-941, 1989
6. Maroon JC, Kopitnik TA, Schulhof LA, et al: Diagnosis and microsurgical approach to far-lateral disc herniation in the lumbar spine. **J Neurosurg** 72:378-382, 1990
7. Naiman JL, Donohue WL, Prichard JS: Fatal nucleus pulposus embolism of spinal cord after trauma. **Neurology** 11:83-87, 1961
8. Postacchini F, Montanaro A: Extreme lateral herniations of lumbar disks. **Clin Orthop** 138:222-227, 1979
9. Reulen HJ, Pfaundler S, Ebeling U: The lateral microsurgical approach to the "extracanalicular" lumbar disc herniation. I: a technical note. **Acta Neurochir** 84:64-67, 1987
10. Savitz MH, Katz SS, Lestch SD, et al: Unusual presentation of herniated intervertebral disc: report of two cases. **Mt Sinai J Med** 49:150-153, 1982
11. Siebner HR, Faulhauer K: Frequency and specific surgical management of far lateral lumbar disc herniations. **Acta Neurochir** 105:124-131, 1990
12. Witzmann A, Hammer B, Fischer J: Free sequestered disc herniation at the S2 level misdiagnosed as neuroma. **Neuroradiology** 33:92-93, 1991

Manuscript received January 11, 1994.

Accepted in final form July 13, 1994.

Address reprint requests to: Michael D. Cusimano, M.D., M.H.P.E., F.R.C.S.(C), 38 Shuter Street, Toronto, Ontario, Canada, M5B 1A6.