Symptomatic lumbar epidural varices

Report of two cases

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- Lumbar epidural varices have been infrequently described in the literature and rarely accepted as a primary pathophysiologica1 entity. The authors' total experience with symptomatic lumbar epidural varices over the last 15 years includes four cases (incidence 0.067% of all lumbar spine operations), two of which are described in detail in this paper. The mechanism for their formation is proposed: central disc herniations obstruct the anterior epidural venous flow leading to anterolateral caudal venous distention. Subsequent venous endothelial injury predisposes to varying degrees of phlebothrombosis. Decompression of partially thrombosed varices may occur during operative discectomy or spontaneously during regression of the nonoperated disc prolapse. Regression of the central disc herniation may also explain the "disappearing disc" phenomenon, in which patients with clinical and radiographic evidence of apparently large caudal disc herniations exhibit clinical and radiographic resolution. Magnetic resonance (MR) imaging characteristics of the epidural varix depend upon the degree of thrombosis within this anomaly. A thrombosed varix is hyperintense on T1-weighted, proton-density, and T2-weighted images, whereas flowing blood is hypointense. The variable hypo- and hyperintensity on the T2-weighted MR imaging sequences correlate with a partially patent lumen within the varix.

KEY WORDS - lumbar epidural varix - sciatica - lumbar disc herniation - disappearing disc phenomenon - magnetic resonance imaging

The differential diagnoses of lumbar epidural varices include herniated disc, abscess, tumor, hematoma, and synovial cyst. Impingement upon the nervous tissue by spinal epidural varices is a rarity seldom described in the literature as a primary pathophysiological entity. Two reports from the 1940's describe the first four published cases of lumbar epidural varices with symptoms approximating those of a herniated lumbar intervertebral disc.24 One additional report of myelopathy from dilated epidural veins at the cervicothoracic junction has been added recently.3 There are also a few contributions from the European literature rendering accounts of sciatica and cauda equina syndrome from similar lesions at the lumbar and sacral levels.6,11

Case Reports

The total experience at the New York Hospital-Cornell University Medical Center with symptomatic lumbar epidural varices constitutes four cases in approximately 6000 lumbar spine operations performed over the last 15 years, an incidence of 0.067% (Table 1). We discuss two recent cases in detail and render an opinion with regard to the pathophysiology of this rare entity.

Case 1

This 22-year-old man, a competitive swimmer, experienced the acute onset of lower-back pain radiating to both legs while swimming the butterfly stroke. This pain was accompanied by bilateral lower-extremity paresthesias and weakness lasting approximately 5 minutes. A few days later, he experienced intermittent pain and paresthesias in the right anterior aspect of the thigh and shin, exacerbated by prolonged sitting and relieved by recumbency.

Examination. Salient features on the physical examination 2 months after symptom onset included mild right quadriceps muscle weakness with atrophy of the medial two heads. Sensation was intact. The right patellar reflex was depressed. Straight-leg raising to 30° on the right increased the right thigh pain. Magnetic resonance (MR) imaging was performed 6 weeks after the onset of acute symptomatology (Fig. 1). The pulse sequences included T1-weighted, proton-density, and
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<th>Case No.</th>
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<th>Imaging Modality: Interpretation*</th>
<th>Operative Findings</th>
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<th>Symptoms &amp; Signs</th>
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<td>1 M. 22</td>
<td>MRI: central L3–4 HNP with caudal fragment</td>
<td>epidural varix anterolateral to thecal sac &amp; extending into axilla of rt L-4 nerve root</td>
<td>yes</td>
<td>rt sciatica, rt quadriceps weakness &amp; atrophy</td>
<td>improved</td>
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<td>2 M. 35</td>
<td>MRI: central L4–5 HNP with caudal fragment</td>
<td>isolated epidural varices anterolateral to thecal sac &amp; extending into axilla of lt L-5 nerve root</td>
<td>yes</td>
<td>lt sciatica, lt foot drop</td>
<td>improved</td>
<td></td>
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<td>3 M. 46</td>
<td>CT: central L5–S1 HNP with caudal fragment</td>
<td>epidural varix anterolateral to thecal sac &amp; extending into axilla of rt S-1 nerve root</td>
<td>no</td>
<td>rt sciatica</td>
<td>improved</td>
<td></td>
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<tr>
<td>4 M. 57</td>
<td>myelography: central L4–5 HNP with caudal fragment</td>
<td>epidural varix anterolateral to thecal sac &amp; extending into axilla of rt L-5 nerve root</td>
<td>no</td>
<td>rt sciatica, partial rt foot drop</td>
<td>improved</td>
<td></td>
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* MRI = magnetic resonance imaging; HNP = herniated nucleus pulposus; CT = computerized tomography.

**Fig. 1.** Case 1. Magnetic resonance images demonstrating degenerative disc disease at the L3–4 level with a central disc herniation (arrowheads). In addition, a ventral and right-sided epidural mass (arrows) is revealed, with an intensity different from that of the disc herniation. **Left:** Sagittal T₁-weighted image (TR 700 msec, TE 15 msec). **Center:** Axial proton-density image (TR 2168 msec, TE 15 msec). **Right:** Sagittal T₂-weighted image (TR 2168 msec, TE 90 msec).

T₂-weighted sequences in the axial plane. Degenerative disc disease was present at the L3–4 level, with disc space narrowing, loss of intradiscal signal, and a central disc herniation which was compressing the anterior aspect of the thecal sac. In addition, a right-sided ventral epidural mass was noted to extend from the L3–4 intervertebral disc space inferiorly along the superior one-half of the posterior aspect of the L-4 vertebral body and laterally into the right L3–4 neural foramen. The mass was distinct and different in MR imaging signal intensity from the L3–4 disc; compared to the L3–4 disc, the lesion was mildly hyperintense on the proton-density images and dramatically hyperintense on the T₂-weighted images. The lesion caused a moderate degree of mass effect on the thecal sac. Differential diagnosis of this lesion included sequestered disc fragment, nerve sheath tumor, proteinaceous fluid collection, and a hematoma.

**Operation.** With the aid of the operating microscope, L3–4 laminotomies were performed. The thecal sac was small and the ventral epidural space quite large.
A central L3-4 disc herniation was seen, as was a discrete bluish mass approximately 2 cm in length, causing ventral compression of the dural sac and right L-4 nerve root (Fig. 2). The mass was densely adherent to the dura and in continuity with the anterior internal vertebral venous plexus. The varix was aspirated, excised, and found to contain yellow proteinaceous fluid. Back bleeding from the epidural veins in continuity with the varix was noted, confirming the venous nature of the lesion. The central L3-4 disc herniation was removed in the standard fashion.

Pathological Examination. Pathological examination of the aspirate revealed hemosiderin-laden macrophages in a background of lysed blood. The varix wall consisted of highly vascular fibrous tissue with perivascular lymphocytes indicative of recent injury to the vessel wall. The endothelium was associated with fresh red blood cells and thrombosis, consistent with the diagnosis of the thrombosed epidural vein.

Case 2

This 35-year-old man slipped on a tile floor while exercising at home and fell on his back. He experienced immediate lower-back pain, left-sided sciatica, and paresthesias on the dorsum of his left foot. These intractable symptoms occurred intermittently and were exacerbated by exercise over the next 6 weeks.

Examination. Physical examination revealed mild weakness in the left extensor hallucis longus and tibialis anterior muscles. Sensation was intact. The left ankle jerk reflex was depressed. Straight-leg raising to 30° on the left increased the pain in that leg. Pain upon crossed straight-leg raising to 60° was present on the right. Magnetic resonance imaging was performed using T1-weighted, proton-density, and T2-weighted sequences in the sagittal plane and a T1-weighted sequence in the axial plane (Fig. 3). Degenerative disc disease was noted at the L3-4, L4-5, and L5-S1 levels, with disc space narrowing and loss of intradiscal signal. At the L4–5 level, a central disc herniation was present. In addition, a ventral epidural mass at the level of the L-5 vertebral body was demonstrated. This mass was isointense to the L4–5 intervertebral disc on the T1-weighted images. On the T2-weighted images, the mass was hypointense, suggesting a hemorrhagic or calcified lesion. Differential diagnoses included an epidural hematoma, hemorrhage associated with a disc herniation, or a calcified disc herniation.

Operation. With the aid of the operating microscope, left L-4 and L-5 laminotomies were performed, revealing an L4–5 disc herniation with a large central extrusion. The ventral epidural space, as in Case 1, was capacious. The caudal abnormality, which was expected to be a sequestered disc fragment with hemorrhage based on the MR image was, in fact, a collection of dilated, partially thrombosed epidural veins anterior and lateral to the thecal sac around the left L-5 root that extended down the spinal canal to a point opposite the L-5 vertebral body. The veins were not disturbed as they became spontaneously decompressed after the disc extrusion was removed.

Cases 3 and 4

These two patients (Cases 3 and 4) underwent computerized tomography and myelography, respectively. Imaging studies in both cases were suggestive of disc herniation with caudal extension. Although the operation revealed no disc herniation, each patient had a large epidural varix, as in Case 1, causing significant nerve root compression.
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Anatomical and Radiological Correlations

The vertebral venous system consists of internal and external networks that communicate with each other. The ascending lumbar and lateral sacral veins, part of the external vertebral venous network, arise from the common iliac veins, ascend along the lateral aspect of the vertebral body, and drain into the azygous vein on the right and the hemiazygous vein on the left. A single lateral sacral vein traverses each anterior sacral foramen and connects the internal vertebral venous plexus with the internal iliac vein.

The internal vertebral venous system consists of anterior and posterior divisions. The anterior division is important in epidural venography because it is in contact with the posterior margins of the vertebral bodies and the intervertebral discs. Epidural venography is a radiographic technique used for visualizing the vertebral venous system and thereby diagnosing lumbar disc herniations. It is done by percutaneous puncture of the femoral vein, usually the right femoral vein, followed by selective catheterization of ipsilateral or contralateral ascending lumbar or lateral sacral veins. Following intravenous contrast medium administration, the anterior internal vertebral veins appear as two longitudinal channels on either side of the vertebral body or as a racemose network.

The radicular veins are one of several transverse vascular channels connecting the internal and external vertebral venous systems. At each level, radicular veins traverse the intervertebral foramen above and below the pedicle. The vein below the pedicle is important in epidural venography because this vein is associated with the exiting nerve root.

The most reliable sign of a lumbar disc herniation on epidural venography is compression or complete occlusion of the anterior internal vertebral and radicular veins, with normal filling cephalad and caudad to the level in question. Ancillary signs of a disc herniation include the presence of collateral flow, caudal flow of contrast material, or focal dilatation of the anterior internal vertebral veins. Venous displacement in the absence of compression is consistent with a bulging annulus rather than a disc herniation.

Magnetic resonance imaging is a noninvasive technique that provides multiplanar evaluation of the spinal canal. The MR images of our two patients demonstrated an epidural lesion distinct from the adjoining intervertebral disc, both anatomically and based on MR imaging signal intensities. The different signal intensities of the varices in the two cases were well correlated with the operative findings. On MR images, thrombus is hyperintense on T2-weighted sequences, whereas flowing blood is hypointense. Hence, the hyperintensity in the varix on the T2-weighted sequences in Case 1 correlates with the thrombus found at surgery, whereas the hypointensity on the T2-weighted sequences in Case 2 correlates with the operative finding of a partially patent lumen in the varices.

Pathophysiology

Based on a review of the limited literature on this subject, patients presenting with symptomatic lumbar epidural varices can be divided into two distinct categories: those with a single dilated varix or localized collection of varices causing nerve root compression, and those with extensive distended venous channels. The four cases in this series fall into the first category as does the first published account of this entity. All patients presented with a large blue varix or focal collection of varices anterolateral to the thecal sac and extending into the axilla of the affected nerve root. The pathophysiologic basis for this phenomenon is not known, but we offer some speculation based upon our observations. A herniated disc produces an effect sufficient to occlude an epidural (anterior internal vertebral) vein; subsequent venous dilatation occurs as a consequence of the valveless nature of the epidural venous plexus. Venous dilatation develops distal to the site of occlusion as a result of the rostral flow of blood through the venous sinuses, serving as a collateral route for the caval and azygous systems. Prior reports of symptomatic epidural varices make no mention of associated disc herniations. Two of the four patients in our series had large central disc herniations (with or without extrusion of disc material) in concert with a large ventral epidural space or, alternatively, a small thecal sac, which predisposed to the focal epidural venous distention and phlebothrombosis, compromising the thecal sac and exiting nerve root. Campbell, et al., described a case of inferior vena cava thrombosis believed to be caused by endothelial injury of the vena...
cava wall from compressive or shearing forces. We postulate this same mechanism for the formation of thrombosed epidural varices. An acute disc herniation is responsible for the initial endothelial injury, resulting in thrombotic venous occlusion. The thrombosed epidural vein may remain distended and simulate a disc sequestrum, thus accounting for the intractable sciatica. More importantly, as in our Case 2, a partially thrombosed varix will collapse during the lumbar discectomy, rendering the lesion less apparent to the surgeon than suggested by the preoperative radiographic studies. This latter occurrence suggests that these lesions are more common than the literature and our own experience would indicate. This process of varix regression may explain the curious “disappearing disc” phenomenon that we have observed in a few patients who presented with an apparent caudal disc “sequestrum” on MR imaging, which at a later date had resolved both clinically and radiographically. Two of our patients had large thrombosed epidural varices without an apparent disc fragment, and we suspect that the central protrusion in both of these cases resolved with time, although the varices persisted. Both of these patients were surgically treated many months after the onset of symptoms, which we hypothesize would allow for the central disc herniation to resolve.

None of the patients in this series fell into the second pathophysiological category: multiple distended venous channels. Two reports from the European literature describe patients with multiple lumbar epidural varices causing nerve root and thecal sac compression.\textsuperscript{4,11} In these cases, the majority of patients suffered from spinal dysraphism and obesity. Congenital venous anomalies in association with obesity, pregnancy, or portal venous hypertension are believed to be responsible for the multiple distended epidural veins in these patients.\textsuperscript{6,8,9}

Conclusions

Lumbar epidural varices are a distinct and extremely rare pathophysiological entity resulting in nerve root compression clinically indistinguishable from a sequestrated disc fragment. The MR imaging findings, however, are more consistent with thrombus and/or slow blood flow within the epidural varices than a sequestrated disc fragment caudal to a central disc protrusion or extrusion. Either spontaneous regression or surgical excision of the central disc herniation may allow for decompression of partially thrombosed caudal epidural varices, which could account for the surgical or radiographic phenomenon known as the disappearing disc fragment.

References


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