A posttraumatic lumbar spinal synovial cyst

Case report

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A patient with posttraumatic lumbar radicular paresthesias is presented. The preoperative diagnosis of an epidural synovial cyst was considered. At surgery, an epidural synovial microcystic mass was found emanating from a distracted L4-5 facet joint and dissecting into the layers of the ligamentum flavum. A brief review of the condition is presented.

KEY WORDS • synovial cyst • lumbar spine • posttraumatic paresthesia • nerve root compression

The case of a patient with delayed posttraumatic lumbar radicular discomfort and paresthesias without objective neurological findings is presented. A preoperative diagnosis of a true synovial epidural lumbar cyst was considered based upon the unusual clinical history and the myelographic computerized tomography (CT) appearance. Several similar histologically verified cases have been reported previously.1,3,6,7,13,17,21-23

Case Report

This 62-year-old woman with an unremarkable medical history fell 4 feet onto cobblestones, landing on her left sacroiliac region. She immediately complained of low-back pain and stiffness in the lumbar spine. Most of these symptoms cleared within 3 days. One month later she noticed the onset of painless intermittent paresthesias in the anterolateral aspect of the left leg below the knee. After 4 days of bed rest and steroid administration, the symptoms subsided and she returned to vigorous activity. Seven months after the fall, she noted the onset of a nonradicular, deep dull ache in the left lower extremity which was aggravated by ambulation. She also noted a recurrence of the radicular paresthesias in the anterolateral aspect of the left leg below the knee. After 4 days of bed rest and steroid administration, the symptoms subsided and she returned to vigorous activity. Seven months after the fall, she noted the onset of a nonradicular, deep dull ache in the left lower extremity which was aggravated by ambulation. She also noted a recurrence of the radicular paresthesias which began distally in the foot and extended proximally in the distribution of L-4 up to the upper thigh. The paresthesias were intermittently severe, accentuated by ambulation and somewhat relieved during rest. These symptoms increased in severity over the next 2 months.

Physical Examination. No abnormal mechanical, motor, sensory, or reflex signs could be elicited. Indeed, the rate and range of motion in the lumbar spine were exceptional, even for a patient decades younger. The unusually severe and persistent paresthesias, which were aggravated by movement, and the absence of radicular pain or mechanical signs suggested possible root compression by a soft-tissue mass rather than a herniated disc or lumbar stenosis. A plain CT scan of the lumbar spine demonstrated abnormal soft-tissue density laterally within the spinal canal; the mass extended rostrally from the left L4-5 neural foramen along the lateral recess to the rostral margin of the L-4 pedicle. The density of the mass was less than that typically seen for herniated disc material. A metrizamide myelogram confirmed the prominent left lateral extradural defect extending rostrally from the lower aspect of the L4-5 disc space to the L-4 pedicle (Fig. 1). A postmyelography CT scan revealed the presence of the mass in continuity with a distracted left L4-5 facet joint (Fig. 2), and indicated that the mass was compressing the left L-4 nerve root (Fig. 3). The diagnosis of a synovial or arachnoid cyst was suggested. A delayed CT scan, performed 6 hours after the introduction of metrizamide, failed to demonstrate contrast material in the mass, further indicating the diagnosis of a synovial cyst.

Operation. The patient underwent a left L4-5 hemilaminectomy. When the lateral aspect of the L-4 lamina was being ronguered away, small amounts of
clear, viscous, slightly yellow fluid were expressed from a grayish mass emerging laterally from beneath the superficial layers of the ligamentum flavum, near its origin on the caudal portion of the L-4 lamina. Further dissection under the operating microscope revealed that the microcystic mass extended rostrally and caudally between the two layers of the ligamentum flavum from a rent in the distracted L4-5 facet joint capsule. It protruded ventrally and extended from the medial margin of the L-4 pedicle caudally to the level of the L4-5 disc space. The microcystic material was not adherent to the underlying deep layer of the ligamentum flavum or to the dura of the medially deviated root sleeve, and was completely removed. The medial aspect of the L-4 inferior facet was rongeured away and more extruded fragments of grayish soft tissue were extracted from the L4-5 facet joint and neural foramen. The L-4 nerve root was palpated rostrally, medially, and distally into the foramen and was seen taking a normal course without compression or tethering. The anulus fibrosus and posterior longitudinal ligament at the L4-5 interspace were palpated and found to be intact. Postoperatively, the patient had immediate and complete relief of her paresthesias and pain.

Pathological Examination. The material initially removed from beneath the superficial layers of the ligamentum flavum consisted of loose, highly vascular villous connective tissue, with occasional lining synovial cells, adherent to dense ligament (Fig. 4A). Areas of hemosiderin were also present, consistent with foci of old hemorrhage (Fig. 4B). The material removed from the vicinity of the joint capsule itself consisted of a hyperplastic villous nodular connective tissue lined by cuboidal synovial cells (Fig. 4C). Minimal inflammatory change was evident.

Discussion

The differential diagnosis that may be entertained in a case of non-neoplastic epidural cyst includes spinal perineurial, arachnoid, ganglionic, and true synovial cysts. Perineurial cysts have been described as originating in the space between the perineurium (in continuity with the arachnoid) and endoneurium (in continuity with the pia). They are small, often multiple cysts, located in the vicinity of the dorsal root ganglia, and have a fibrous cyst wall containing nerve fibers, cell bodies, and occasionally old hemorrhage. A few are multiloculated. They are usually located on sacral roots and, when symptomatic, cause pain and paresthesias in the sacral root distribution. Antecedent trauma has sometimes been noted. On myelography they rarely
Posttraumatic lumbar spinal synovial cyst

fill with contrast material immediately, but occasionally demonstrate delayed filling. These cysts are distinct from the asymptomatic dural subarachnoid root sleeve dilatations seen incidentally on myelograms. Extramedullary arachnoid cysts derive from arachnoid herniation through dural defects. They are most often located near the origin of a root sleeve or in the midline. They are thought to be due to a congenital dural weakness and, in midline cases, are an expression of an incomplete dysraphic state. Arachnoid cysts are usually located in the thoracic region, although cervical and lumbosacral cases have been reported. They are often large, and on x-ray films have demonstrated pedicle and vertebral body compression and erosion, not uncommonly causing kyphosis. On myelography they usually fill with contrast agent upon manipulation of the patient. Clinically, patients often present with significant symptoms of cord compression.

Juxta-facet ganglionic cysts are composed of a loose or tight vascular collagenous wall containing a highly viscous gelatinous material and are devoid of synovial lining. They are thought to arise from myxoid degeneration and cyst formation in connective tissue, excess production of hyaluronic acid and resultant cyst formation by fibroblasts, synovial fluid (not lining) extrusion from an injured facet joint, or proliferation of pluripotential mesenchymal cells. Clinically, the reported cases presented with low-back and lumbar radicular pain and had mild to moderate motor, sensory, mechanical, and/or reflex signs. Ganglionic cysts appear on myelography as nonfilling L4–5 extradural defects. At surgery, they are often adherent to an otherwise intact joint capsule although they contain no synovium.

True synovial cysts, as described here, have been reported with histological verification in the past. Histologically, they are composed of multiple layers of villous nodular hyperplastic vascular connective tissue with minimal inflammatory change, lined by low cuboidal synovial cells. Occasionally, hemosiderin has been found in the cyst. As Chen pointed out, the photomicrograph that purported to be of a synovial cyst in one case was more consistent with a cyst of leptomeningeal than synovial origin. True synovial cysts have usually originated from a synovial herniation through the facet joint capsule. Indeed at surgery, in

FIG. 3. Artist’s drawing, transverse view, of the synovial cyst at the level of the L4–5 disc space. The mass emanated from the distracted L4–5 left facet joint, dissecting into the layers of the ligamentum flavum and impinging on the L-4 nerve root.

FIG. 4. Photomicrographs of the pathological material. H & E. A: The material removed initially demonstrated loose, vascular villous connective tissue with occasional lining synovial cells connected to dense fibrous avascular ligamentum flavum. × 10. B: A focal collection of hemosiderin-laden macrophages is illustrated. × 40. C: Hyperplastic synovium removed from the vicinity of the joint capsule. × 25.
most cases the cyst has been demonstrated to be adjacent to, if not in continuity with, a lumbar facet joint; they have been found at the L3–4, L4–5, or L5–S1 levels. The rare occurrence of a lumbar facet-joint synovial cyst of rheumatoid arthritic origin with neurological manifestations has been reported. A synovial cyst of a cervical facet joint causing myelopathy has recently been described. Only three of the previously reported true synovial cysts were associated with trauma, 16 years, 6 years, and 3 months prior to clinical presentation. Myelographically, lumbosacral synovial cysts have produced complete blocks or posterolateral or anterolateral extradural defects, and have not filled with contrast material. The CT appearance has been reported as an epidural mass adjacent to a facet joint. One case had a calcified rim and another contained gas from degeneration in the facet and cyst.

Separation of the facet joint at L4–5 and a low-density mass in continuity with the radiographically widened synovial cavity was demonstrated in our case (Fig. 2). The cyst did not fill with contrast material on immediate or delayed post myelographic CT and thus a preoperative diagnosis of a synovial cyst was made. The cyst was seen to be irregular although generally spherical in shape, and clearly impinging on the L-4 nerve root consistent with the patient’s radicular paresthesias. This case was unusual in that the clinical history and radiographic, operative, and histological findings led us to hypothesize that the patient’s initial fall caused partial distraction of the L4-5 left facet joint, herniation of the synovial lining into the adjacent ligamentum flavum, and gradual proliferation and expansion of the cystic element by accumulation of viscous synovial fluid, resulting in increasing neurological symptoms. The presence of some hemosiderin in the pathological specimen was consistent with the proposed traumatic origin of the cyst. A unique aspect of this case was the dissection of the synovial cyst between the layers of the ligamentum flavum. This unusual circumstance may have contributed to the persistence of severe intermittent radicular paresthesias without pain by superimposing the cushioning effect of the inner layer of the ligamentum flavum between the lesion and the compressed L-4 nerve root. Ganglionic cysts of the ligamentum have been previously described. Recently, four cases have been reported of synovial cysts of the ligamentum flavum, separate from the facet joint capsule and causing a typical lumbosacral radiculopathy. The clinical result of surgical decompression was excellent in this case, as has been previously reported.

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References


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