Hemorrhage into a lumbar synovial cyst causing an acute cauda equina syndrome

Case report

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Juxtafacet cysts of the lumbar spine have been reported with increasing frequency but their pathogenesis remains obscure. These cysts most frequently present with back pain, followed by chronic progressive radiculopathy or gradual onset of symptoms of spinal canal compromise. The authors report an unusual case of hemorrhage into a right L3–4 synovial cyst causing an acute cauda equina syndrome and describe its successful surgical treatment. The clinical, radiographic, and pathological features are discussed.

KEY WORDS • synovial cyst • juxtafacet cyst • zygapophyseal joint • spinal canal • cauda equina syndrome • lumbar spine • epidural space

Juxtafacet cysts of the lumbar spine have been reported with increasing frequency, presumably due in part to the availability of sensitive imaging studies such as computerized tomography (CT)-myelography and magnetic resonance (MR) imaging. They commonly present with chronic radicular symptoms or neurogenic claudication, or less often with a spinal cord compression syndrome. Back pain alone generally precedes the radicular or spinal cord compression syndrome by an average of 9 years. Pathologically, these lesions may be divided into synovial cysts and ganglion cysts based on the presence or absence, respectively, of a true synovial lining. Hemorrhage into a juxtafacet cyst is not uncommon, but clinical evidence of acute hemorrhage has been described only in the cervical region. We report a case in which hemorrhage into an L3–4 juxtafacet synovial cyst causing an acute cauda equina syndrome and describe its successful surgical treatment.

Case Report

This 59-year-old man noted the sudden onset of low-back pain radiating to both calves while bending to lift a heavy suitcase. He had experienced an exacerbation of ulcerative colitis several months previously and was being treated with a prednisone taper (20 mg/day alternating with 25 mg/day) and sulfasalazine. The pain was accompanied by altered sensation in the plantar aspects of both feet and the anterior right thigh, as well as by lower-extremity weakness. A CT scan of the L4–S1 region obtained at another hospital was unremarkable. Conservative treatment was prescribed but, when 5 days of bed rest provided no benefit, he presented to our institution.

Examination. Neurological examination revealed 2/5 strength in the iliopsoas muscle and 3/5 strength in the hip adductor, quadriceps, hamstring, ankle dorsiflexor, plantar flexor, and plantar everters muscles on the right. There was 4/5 strength in the hip adductor, ankle everters, and dorsiflexor muscles on the left. The ankle jerk was absent on the right and trace on the left. There was decreased pinprick sensation in the right L-3 and bilateral S-1 distributions. There were no bowel or bladder symptoms or findings.

Routine biochemical and hematological tests were normal. An MR image revealed an extradural mass posterolateral to the right L-3 nerve root and adjacent to the facet. There was minimal enhancement after gadolinium-diethylenetriamine penta-acetic acid infusion (Fig. 1). The mass was bright on a T1-weighted image and heterogeneous on T2-weighted images, with a large region of darkness consistent with blood products greater than 7 days in age (Fig. 2).

Operation. One week after onset of symptoms, a right L3–4 hemilaminotomy was performed with the patient under general anesthesia in the prone position. The ligamentum flavum was opened sharply and a clot-filled mass was encountered within the ligamentum and
iliopsoas, hemosiderin-laden lately. (Fig. 2) Decompression stained in cyst with herniated Postoperative Pathological F~G. the superior aspect in facetectomy fragments of spinal areas. Which was close to the synovial superior face of L3-4 level, axial gadolinium projection, evidence that the variable cyst contents including hemorrhage of different ages. Radiographically, juxtafacet cysts may be recognized by their characteristic location posterior and lateral to the thecal sac on CT-myelography and MR imaging. They may have a variety of MR imaging signal intensities, presumably due, at least in part, to the variable cyst contents including hemorrhage of different ages. Spontaneously occurring air or injected contrast material may be diagnostically useful when observed within the cyst.

A number of theories have been proposed to explain the pathogenesis of juxtafacet cysts. These include: myxoid degeneration and cyst formation in collagenous connective tissue, increased production of hyaluronic acid by fibroblasts, and proliferation of mesenchymal or synovial cell rests. The most commonly accepted cause is a protrusion of synovial lining through a defect or rupture in the joint capsule. This hypothesis is supported by evidence that many juxtafacet cysts remain in continuity with the facet joint as evidenced by arthrography or by the presence of air within both the cyst and joint. Further support is found in the observation that the majority of juxtafacet cysts occur at L4–5, the level with the greatest facet mobility.

Once a protrusion of synovium occurs as the result of degenerative changes in the joint, hemorrhage may account for the expansion of some juxtafacet cysts. The observation of hemorrhage in the present case correlating with the onset of clinical symptoms strongly supports this hypothesis. Other authors have also observed blood products or hemosiderin in juxtafacet cysts. In a single published case in the cervical spine, the presence of hemorrhage was temporally correlated with the onset of a spinal cord compression syndrome. The present case is the first report of an acute cauda equina syndrome secondary to hemorrhage into a juxtafacet cyst.

The cause of hemorrhage into a juxtafacet cyst is unknown. Synovium is known to be richly vascularized, with venules being the predominant vessel type. There is an increase in the number and volume of vessels in degenerative synovium. This increase is likely mediated by the secretion of angiogenic factors by synovial cells. Furthermore, it has recently been demonstrated that damaged endothelial cells produce growth factors capable of stimulating synovial proliferation, which could in turn facilitate juxtafacet cyst.

### Discussion

Both synovial and ganglion cysts may arise from spinal facet joints and must be differentiated on pathological grounds. Synovial cysts are lined by a true synovium and contain synovial fluid, whereas ganglion cysts lack a true synovial lining and often contain a more viscous fluid. Clinically, they are indistinguishable and therefore it has been proposed that the term “juxtafacet cyst” is preferable. Juxtafacet synovial and ganglion cysts must also be differentiated from other spinal epidural cysts that have been described, including ligamentum flavum cysts, arachnoid cysts, perineural or Tarlov’s cysts, interspinous ligament ganglion/synovial cysts, and pigmented villonodular synovitis. Radiographically, juxtafacet cysts may be recognized by their characteristic location posterior and lateral to the thecal sac on CT-myelography and MR imaging. They may have a variety of MR imaging signal intensities, presumably due, at least in part, to the variable cyst contents including hemorrhage of different ages. Spontaneously occurring air or injected contrast material may be diagnostically useful when observed within the cyst.

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### Pathological Examination

Pathological analysis revealed synovium covering fibrous connective tissue (Fig. 3). There were regions of focal inflammation and hemosiderin-laden macrophages.

### Postoperative Course

The patient’s back pain and lower-extremity sensory deficits improved immediately. He also experienced a marked increase in right iliopsoas, quadriceps, hamstring, and dorsiflexor muscle strength. His gait remained moderately unstable secondary to persistent weakness in the hip adductor muscle, which nonetheless improved to 4/5 strength. This resolved gradually over the next 2 months.

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FIG. 2. Magnetic resonance images of the lumbar spine, sagittal projection, demonstrating the cyst location and the spinal canal compromise. Left: T1-weighted image (TR 600 msec, TE 11 msec). Center and Right: The dark regions on the T2-weighted first echo (center) and T2-weighted (right) images are consistent with blood products.

formation. Rapid development of a synovial cyst at L4–5 without evidence of hemorrhage has also been documented.6

Excision is generally reported to be the definitive treatment of symptomatic juxtapacet cysts. Percutaneous injection,3,4 aspiration,1 and conservative treatment with spontaneous remission20 have also been described. In the case of an acute spinal cord compression syndrome, the risk of progressive deficit with injection leads us to strongly recommend surgical treatment of these lesions.

The present case describes the unique acute onset of a cauda equina syndrome from hemorrhage into a synovial cyst. Characteristic MR imaging findings and the location posterolateral to the thecal sac but adjacent to the facet joint should allow accurate preoperative diagnosis of a synovial cyst. Prompt recognition of this condition may allow definitive surgical treatment in time to prevent irreversible neurological deficits.

References

FIG. 3. Photomicrograph of a paraffin-embedded section of the surgical specimen demonstrating cuboidal synovial epithelium. Other regions of the specimen revealed hemosiderin-laden macrophages. H & E, × 84.

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