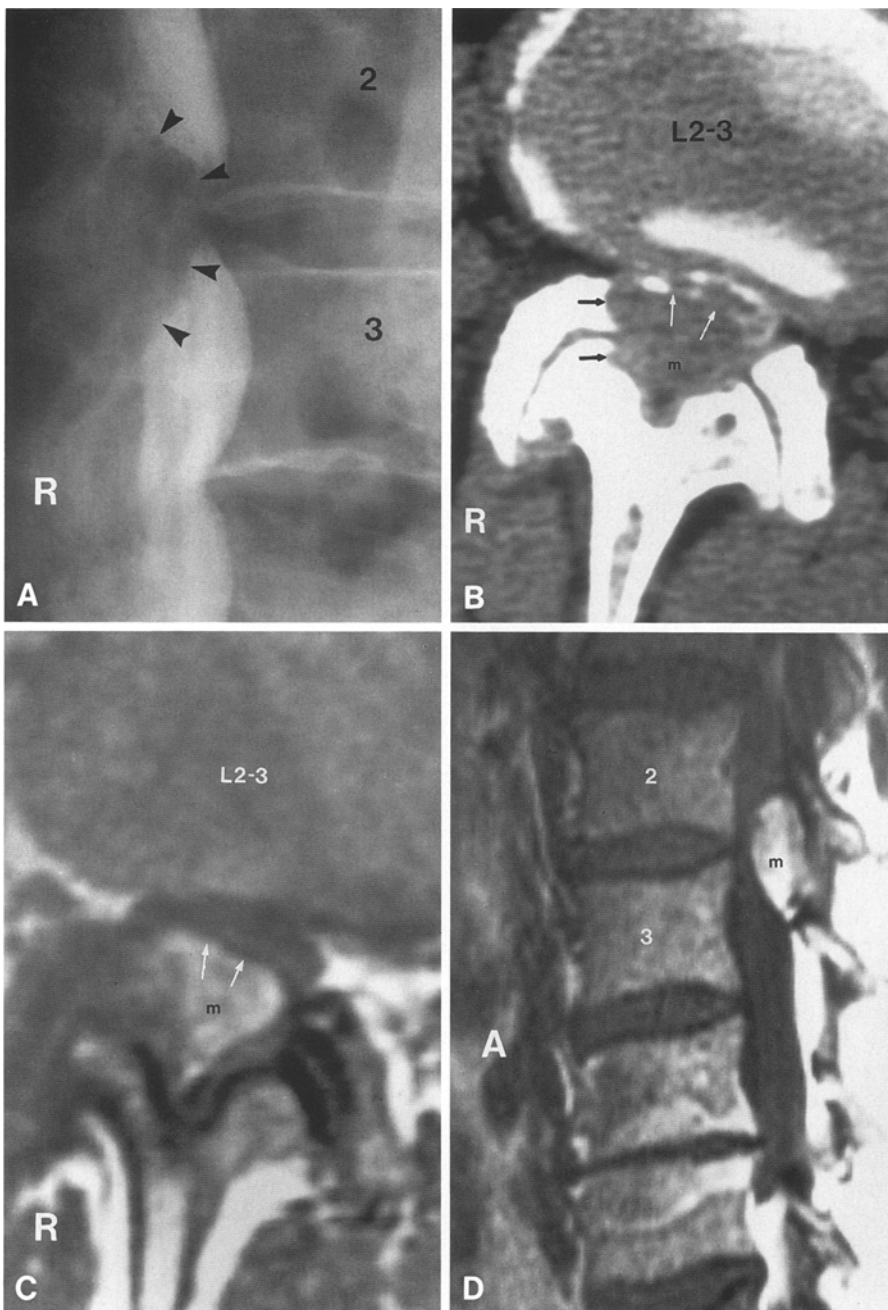


## Case report 712

Ronald M. Summers, M.D., Ph.D., and Douglas J. Quint, M.D.

Neuroradiology Division, Department of Radiology, University of Michigan Hospitals, Ann Arbor, Michigan, USA



**Fig. 1.** **A** Oblique film from a lumbar myelogram demonstrates an extradural mass (*arrowheads*) in the right posterolateral aspect of the spinal canal. **B** Post-myelography CT at soft-tissue window delineates the mass (*m*) arising from the medial aspect of the right L2-3 facet joint. The thecal sac (*white arrows*) is displaced ventrolaterally to the left. Degenerative changes of this joint (*black arrows*) were better seen on the bone windows (not shown). **C** Non-contrast axial and **D** sagittal T1-weighted MR scans demonstrate the heterogeneous increased signal intensity mass (*m*). The thecal sac is identified by *white arrows*. Post-contrast sagittal T1-weighted study (not shown) demonstrated minimal peripheral enhancement of the mass. **E** Sagittal T2-weighted study demonstrates increased signal centrally (old blood) and decreased signal peripherally (hemosiderin deposition) (*arrows*) from the mass. *A*, anterior; *R*, right; 2, L2 vertebral body; 3, L3 vertebral body

## Clinical information

The patient is a 60-year-old man who presented with a 6-month history of pain in the mid-portion of his back, radiating down both legs (greater on the right than on the left) and also extending into the right ankle. He also complained of a 6-month history of intermittent numbness and tingling in both of his legs. The pain was aggravated by prolonged sitting or standing. He denied bowel or bladder dysfunction. Past medical history was remarkable for excision of a fibrous mesothelioma (complicated by empyema) from his left chest 14 months prior to presentation.

On physical examination, the patient was tender to palpation at the L4-5 spinal level. The pain was aggravated by hyperextension of the lower back. Motor strength was 5 out of 5 in all muscle groups without

measurable atrophy. The patient demonstrated decreased sensation on the lateral aspect of his right leg and also on the medial and lateral aspects of his right foot. Ankle and knee reflexes were normal on the left, but absent on the right.

Plain radiographs of the lumbosacral spine showed marked disk space narrowing at L4-5 with adjacent vertebral endplate sclerotic changes. Also noted was mild osteoarthritis of a facet joint of the lower lumbar spine and a modest rotational scoliosis, concave to the right.

Computed tomography (CT) myelography (Fig. 1a, b) showed an extradural mass, located posterolaterally and to the right within the spinal canal at the L2-3 intervertebral disk level, causing marked narrowing of the thecal sac. The lesion appeared to arise from the medial aspect of the right L2-3 facet joint. Degenerative changes of this facet were noted. The mass was considered most suspicious for a primary synovial process.

Magnetic resonance (MR) imaging (Fig. 1C-E), both before and after contrast administration, better demonstrated the approximately  $1 \times 1 \times 2.5$  cm lesion located in the right posterolateral aspect of the spinal canal at the L2-3 level. It was again noted to fill most of the spinal canal and demonstrated heterogeneous increased signal intensity on the non-contrast T1-weighted study. Following contrast administration, only a small portion of the periphery of the mass appeared to enhance. On the more T2-weighted study, the lesion demonstrated heterogeneous signal intensity with a low signal intensity rim.

The patient underwent a complete laminectomy at L2. At surgery, the right L2-3 facet joint was extremely hypertrophic with what appeared to be a black tinge on the facet joints. A large extradural cyst was present, markedly compressing the thecal sac behind the arch of L2 and causing severe focal spinal stenosis. The cyst was removed.

---

*Address reprint requests to:* Douglas J. Quint, M.D., Neuroradiology Division, B1D530, Department of Radiology, University of Michigan Hospitals, 1500 E. Medical Center Drive, Ann Arbor, MI 48109-0030, USA

### Diagnosis: Hemorrhagic synovial cyst arising from right L2-3 facet joint

Microscopic examination of the tissues showed fragments of fibrocartilage and dense fibrous connective tissue which had recent and old organizing hemorrhages characterized by large collections of hemosiderin and hematoidin macrophages and granulation tissues. No neoplasm was identified. Within the fibrocartilage degenerative changes were noted. The findings were considered most consistent with recent and old organizing hemorrhage within a synovial cyst.

### Discussion

Extraarticular synovial cysts are commonly associated with arthropathy of a facet. Most reported cases are described in the lower lumbar region [5], but due to their relative rarity, they remain an unusual cause of lumbar radiculopathy. The etiology of these cysts is uncertain, but both degenerative change and trauma are thought to be factors [1, 4-6, 9]. It is important to suggest the possibility of the existence of these lesions preoperatively, because of the different surgical approach that may be required in comparison with routine disk surgery. For example, an increased risk of dural lacerations exists if an improper surgical approach is used [4]. Pathologically, the walls of synovial cysts are composed of multiple layers of fibrous connective tissue of variable thickness and cellularity [7, 9].

The most common clinical symptoms of an intraspinal synovial cyst include pain without motor, sensory, or deep tendon reflex changes [2]. Hemorrhage into the cyst may result in acute exacerbation of back or radicular pain. These clinical features may be simulated by other intraspinal processes. For example, the clinical presentation can be very similar to that of a herniated intervertebral disk [2, 4]. Less common lesions that may also present with similar symptoms include arachnoid cyst, neurofibroma, and, rarely, a cystic, malignant, spinal cord lesion.

The primary imaging features of synovial cysts include sclerosis and narrowing of the involved facet joint, posterolateral extradural filling defects at myelography at the level of the affected facet joint, and spondylolisthesis without spondylolysis [1, 5]. The L4-5 level is most often involved [1]. Gas within a synovial cyst has been reported on CT scans [8, 10]. In these studies, it was hypothesized that gas within the vacuum cleft of a degenerated facet joint dissected into the cyst, resulting in the low attenuation (air) appearance on the CT scan.

Only a few examples of synovial cysts have been described on MR scans [3, 9]. Such descriptions include images from only a single case of a pathologically proven hemorrhagic cyst [3]. The remainder of the reported cases describe nonhemorrhagic cysts.

Silbergleit et al. [9] showed MR scans of three pathologically proved lumbar synovial cysts. These cysts had low to moderate MR intensity on both short and long TR (T1-weighted and T2-weighted, respectively) sequences and, in one case, demonstrated an enhancing rim following gadopentetate dimeglumine (MR scanning contrast agent) administration. Jackson et al. [3] studied six synovial cysts of the lumbar spine using MR imaging. They found the cysts to be smooth, well-circumscribed, extradural, cystic masses arising adjacent to degenerated facet joints. These nonhemorrhagic synovial cysts were isointense or slightly hyperintense to adjacent cerebrospinal fluid (CSF) on T1-weighted and mixed T1/T2-weighted ("spin-density") spin echo MR scans. In these cases, the slight hyperintensity relative to subarachnoid CSF was thought to be due to a combination of many factors, including (a) high-protein content, (b) lack of motion-induced signal loss in the isolated cyst fluid as compared with the moving CSF in the adjacent, narrowed, subarachnoid space, and/or (c) the presence of small amounts of paramagnetic blood breakdown products which may have been present in the cyst fluid.

As mentioned above, we could

find only one other reported case [3] of pathologically proven hemorrhage into a synovial cyst imaged with MR. In that case, a cyst with a fibrous capsule and a hemosiderin rim with lamellated, subacute hemorrhage at the center was identified on histologic sections. This cyst demonstrated only slight hyperintensity relative to CSF on the short TR, short TE (T1-weighted) scan. On the long TR, long TE (T2-weighted) scan, the cyst remained hyperintense, also identified on the T2-weighted scans was a well-defined, low signal intensity rim. The authors hypothesized that methemoglobin, present in subacute hemorrhage, probably accounted for the higher signal intensity on the T1-weighted scans from within the cyst, compared with images of nonhemorrhagic cysts.

In our patient, the synovial cyst was located at the L2-3 level, just medial to and contiguous with an osteoarthritic facet joint. It demonstrated dramatic increased signal intensity on the T1-weighted study with only minimal peripheral enhancement following contrast administration. Peripherally, decreased signal intensity on the T2-weighted study was consistent with the hemosiderin seen on pathologic section. The location and imaging characteristics of the lesion suggested a synovial cyst, filled with old hemorrhage. These imaging findings were confirmed at surgery.

Although intraspinal synovial cysts are a rare cause of radiculopathy and myelopathy, they can be reliably diagnosed by CT or MR. With timely recognition, a high likelihood of a good outcome exists [4].

In *summary*, synovial cysts are a common complication of osteoarthritis in the lumbar spine, causing pain and neurological symptoms. However with early diagnosis a good clinical result can be expected. This report describes a documented case of hemorrhage into a synovial cyst demonstrated on both MR and CT imaging and summarizes the relevant diagnostic features. The sites of origin of such a synovial hemorrhagic cyst are described and its relationship to an arthritic facet joint is stressed.

**References**

1. Bhushan C, Hodges FJ, Wityk JJ (1979) Synovial cyst (ganglion) of the lumbar spine simulating extradural mass. *Neuroradiology* 18:263
2. Hemminghytt S, Daniels D, Williams AL, et al (1982) Intraspinial synovial cysts: natural history and diagnosis by CT. *Radiology* 145:375
3. Jackson DE, Atlas SW, Mani JR, et al (1989) Intraspinial synovial cysts: MR imaging. *Radiology* 170:527
4. Onofrio BM, Mih AD (1988) Synovial cysts of the spine. *Neurosurgery* 22:642–647
5. Patel SC, Sanders WP (1988) Synovial cyst of the cervical spine: case report and review of the literature. *Am J Neuroradiol* 9:602
6. Pendelton B, Carl B, Pollay M (1983) Spinal extradural benign synovial or ganglion cyst: case report and review of the literature. *Neurosurgery* 13:322
7. Savitz MH, Katz SS, Goldstein HB, et al (1987) Hypertrophic synovitis of the facet joint forming a para-articular mass in cases of herniated intervertebral disc. *Spine* 12:509–510
8. Schulz EE, West WL, Hinshaw DB, et al (1984) Gas in a lumbar extradural juxta-articular cyst: sign of synovial origin. *Am J Radiol* 143:875
9. Silbergleit R, Gebarski SS, Brunberg JA, et al (1990) Lumbar synovial cysts: correlation of myelographic, CT, MR and pathologic findings. *Am J Neuroradiol* 11:777
10. Spencer RR, Jahnke RW, Hardy TL (1983) Dissection of gas into an intraspinal synovial cyst from contiguous vacuum facet. *J Comput Assist Tomogr* 7(5):886