Synovial cysts of the lumbosacral spine: diagnosis by MR imaging.

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*AJNR Am J Neuroradiol* 1989, 10 (6) 1239-1242
http://www.ajnr.org/content/10/6/1239

This information is current as of October 22, 2023.
Synovial Cysts of the Lumbosacral Spine: Diagnosis by MR Imaging

Intraspinal synovial or ganglion cysts are uncommon lesions associated with degenerative lumbosacral spine disease. CT usually reveals cystic lesions adjacent to a facet joint, and they may show calcification. MR imaging of four surgically confirmed cases of intraspinal synovial cysts revealed subtle signal changes compared with CSF. Short TR/TE images showed the lesions to be slightly hyperintense in three cases and isointense in one case. Long TR/TE sequences revealed a hyperintense appearance in two cases and a hypointense appearance in the others. A peripheral rim of decreased signal on long TR/TE images probably reflects fine calcification or hemorrhage in the margins of the cysts.

The multiplanar and contrast characteristics of MR make this technique well suited to the diagnosis of herniated disk, degenerative facet disease, and synovial cyst.


Intraspinal synovial or ganglion cysts are associated with degenerative lumbosacral spine disease. The increasing number of recent reports [1–8] probably reflects the improved diagnostic accuracy afforded by CT. The characteristic CT appearance is usually a calcified, cystic lesion adjacent to a facet joint, as first reported by Hemminghytt et al. [9]. There are two reports of MR imaging in the diagnosis of synovial cysts. Granat et al. [10] first reported that MR was diagnostic in one case but noncontributory in a second. Azzam [11] has recently described the MR diagnosis of a midline lumbar ganglion/synovial cyst. We present four surgically treated cases of lumbar intraspinal synovial cysts that were diagnosed preoperatively by MR.

Case Reports

Case 1

A 57-year-old man presented with numbness of the left anterior thigh that he had experienced for 31 years. Intermittent pain in his left calf became persistent and severe about 7 weeks before hospitalization. He denied any trauma, although he had been involved in multiple sports injuries. On examination, his left thigh was atrophied but the calf muscles were normal. Patellar reflex was absent on the left and hypoactive on the right. Sensory examination revealed diminished sensation to light touch and pin prick on the anterior aspect of the left thigh.

The spine was examined with a 1.5-T MR imager. Short TR/TE (T1-weighted) axial images at L4–L5 (Fig. 1A) revealed bilateral severe facet joint degeneration with bony hypertrophy and large posterolateral extradural impressions upon the thecal sac, which was markedly narrowed. These extradural lesions were centered on the facet joints and were slightly hyperintense relative to CSF. A hypointense rim was best seen on a sagittal long TR/TE (T2-weighted) image (Fig. 1B). The synovial cyst was mildly hypointense relative to CSF on the long TR/TE image. The decreased signal intensity of the L3–L4 and L5–S1 intervertebral disks reflected disk desiccation resulting from degenerative disk disease. Signal hyperintensity
of the adjacent endplates of L5 and S1, due to increased marrow fat, was a consequence of degenerative disk disease. Lumbum myelography confirmed bilateral extradural masses compressing the thecal sac (Fig. 1C). The postmyelogram CT demonstrated arthropathy with vacuum phenomenon involving the left facet joint; the cysts were located laterally, adjacent to the facet joints (Fig. 1D).

Bilateral L4–L5 laminectomies were performed. Synovial cysts, arising bilaterally from the L4–L5 facet joints, were totally excised. Histologic examination revealed that the cyst wall was composed of reactive synovial membrane. The patient has done well 8 months postoperatively.

**Case 2**

A 67-year-old man presented with a history of chronic low back and right leg pain for 1 year. The pain radiated along the posterolateral aspect of the thigh to the midcalf. On examination he was tender over the right sciatic notch. The straight leg-raising test was positive at 20° on the right. His sensory examination was normal.

An MR axial image at L4–L5 showed a right posterolateral mass near the facet joint compressing the thecal sac. The mass had a greater signal intensity than adjacent CSF on a short TR/TE sequence (Fig. 2A). The peripheral hypointensity of the synovial cyst was accentuated on the long TR/TE sagittal image, while the more central portion of the cyst had greater signal intensity than CSF (Fig. 2B).

The patient had a right L4–L5 laminectomy with excision of the synovial cyst, which arose from the right L4–L5 facet joint. The cyst wall was composed of reactive fibrous connective tissue.

The patient did well for 8 months postoperatively. He returned with complaints of left-sided leg pain. Physical examination revealed weakness of plantar flexion on the left and decreased sensation to pin prick and light touch along the sacral one dermatome. He had an absent ankle jerk on the left. MR revealed lumbar stenosis at L4–L5. He underwent a lumbar laminectomy and fusion 20 months after his initial surgery. He is asymptomatic a month after his second surgery.

**Case 3**

A 58-year-old woman presented with right leg pain of 3 months duration, which radiated along the posterolateral aspect of the thigh to the calf. Examination revealed mild lumbosacral tenderness with a positive straight leg-raising maneuver on the right at 40°. She had no objective motor weakness or sensory deficits. The right Achilles reflex was absent.

Short TR/TE axial MR images at 1.5 T demonstrated a right posterolateral mass compressing the thecal sac and encroaching upon the right intervertebral foramen at L5–S1 (Fig. 3). This synovial cyst was slightly hyperintense relative to CSF and was approximately centered at the right facet joint. A sagittal long TR/TE sequence (not shown) revealed hypointensity of the cyst relative to CSF, with a more subtly hypointense peripheral margin.

Right L5 and S1 hemilaminectomies with decompression of the right S1 nerve root were performed. A cyst with 1 ml of xanthochromic fluid arose from the facet joint, adhering to the hypertrophic ligamentum flavum and compressing the S1 nerve root. The cyst was totally excised. Histologic examination showed a cyst wall of dense fibrous connective tissue with multiple foci of dystrophic calcification. The patient has no complaints 11 months postoperatively.
Case 4
A 63-year-old woman presented with a 2-year history of progressive right leg pain in the distribution of the L4 nerve root. No history of trauma was obtained.

Although sensory examination was normal, the right quadriceps and hamstrings were weak, with absent right patellar and Achilles reflexes.

Spinal MR at 1.5 T disclosed, in the right lateral recess at the L4–L5 level, a lesion that extended into the intervertebral foramen (Fig. 4A). The epidural fat ventrolateral to the thecal sac was observed, and the right lateral aspect of the thecal sac was compressed. The mass effect was centered on the facet joint and appeared contiguous with the joint space. A subtle hypointensity, best seen on the long TRfTE sequence, demarcated the borders of this cyst, which was isointense with CSF on the short TR/TE sequence and slightly hyperintense relative to CSF on the long TR/TE sagittal image (Fig. 4B). The sagittal image assisted in clarifying that the lesion was not a herniated nucleus pulposus, as it showed no continuity with the normal-appearing L4–L5 intervertebral disk.

The patient underwent a partial right L4–L5 hemilaminectomy with total excision of a 1 × 1-cm cyst arising from the right L4–L5 facet joint. Histologic examination revealed that the cyst wall was composed of hyperplastic synovial membrane. The patient has no complaints 9 months postoperatively.

Discussion
Intraspinal synovial or ganglion cysts are uncommon. A review of 54 reported cases (including the present four cases) reveals a female predominance (38 females, 16 males) [1–10, 12–23]. Their ages range from 33 to 76 years, with a mean of 58 years. Most patients are symptomatic at the time of diagnosis. Incidental synovial cysts have been described [9, 21]. Motor deficits were observed in 44.2%, sensory deficits in 28%, reflex changes in 31%, and no neurologic deficits in 38.5%.

In these 54 cases, 61% (33 cases) were located at the L4–L5 interspace, 17% (nine cases) at the L3–L4 interspace, 13% (seven cases) at the L5–S1 interspace, and 9% (five cases) in the cervical region. Bilateral synovial cysts have been reported in three cases (Mercader et al. [6], Bhushan et al. [22], and case 1 in the series reported here).

The origin of synovial cysts remains controversial. Most develop as a consequence of degenerative joint disease or trauma [17–19]. This is further supported by the frequency of these cysts at the L4–L5 and L5–S1 levels, which represent the most mobile segments of the lumbar spine and are the most common locations for degenerative disease.

Myelography is usually inconclusive, revealing an extradural defect not immediately adjacent to the disk space. CT shows a cystic lesion with or without calcification located laterally adjacent to the facet joint. In 11 of 23 cases, calcification has been identified on CT [1–4, 6–10, 14, 23]. These cysts may be difficult to differentiate from other intraspinal cysts or from cystic neurofibroma and large herniated disks with free fragments.

MR in our four cases revealed minimal signal intensity difference between the cyst and CSF on either short or long TR/TE sequences. In three cases the lesions were slightly hyperintense relative to CSF on the short TR/TE images; in the fourth case, the cyst was isointense with CSF. In two cases the cysts were slightly hyperintense relative to CSF on the long TR/TE sequences and in two cases they were
hypointense. These signal intensity changes may require careful manipulation of width and level of the image display window to avoid overlooking the lesion. All of our cases had a peripheral hypointensity accentuated on the long TR/TE images. This finding most likely represents fine calcification or hemorrhage in the margins of the cyst [7]. Joint capsule ligaments and dura are also of low signal intensity and may contribute to this appearance. The lateral location of the mass effect and its relationship to the facet joint is helpful in suggesting the diagnosis of a synovial cyst. Careful interpretation of both the axial and sagittal images is necessary to distinguish clearly a synovial cyst from a herniated nucleus pulposus. Facet joint degeneration, an associated finding, may be seen with MR.

We conclude that a lateral location adjacent to a degenerated facet joint will assist in differentiating synovial cysts from other extradural disorders. The multiplanar and contrast characteristics of MR make this technique well suited to the diagnosis of herniated disk as well as to the diagnosis of degenerative facet disease and synovial cyst.

REFERENCES