

Review Article

Spinal case of the month with short perspective: How would you treat this L3-L4 synovial cyst?

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Abstract

Background: In this new section, Case of the Month with Short Perspective from Surgical Neurology International, we want to see how various spine surgeons would approach different spinal pathologies. In this first case, an elderly male presented with 3 years of lower back pain and progressive neurogenic claudication with bilateral radiculopathy that had exacerbated over the prior 6 months. An outside physician performed a magnetic resonance (MR) study of the lumbar spine that showed a massive synovial cyst filling the spinal canal (e.g., large bilateral cysts) at the L3-L4 level with grade I spondylolisthesis. The MR and CT studies also both demonstrated moderate L2-L3, and severe L3-L4 stenosis.

Methods: Despite the massive synovial cyst filling the spinal canal at the L3-L4 level, pain management (anesthesia training) spent 3 months performing three successive epidural steroid injections accompanied by attempts at percutaneous synovial cyst aspiration/rupture.

Results: By the time the patient presented to neurosurgery, he had developed severe neurogenic claudication, radiculopathy, myelopathy, and a cauda equina syndrome. Dynamic X-rays revealed a mild grade I degenerative spondylolisthesis at the L3-L4 level without active motion, while both computed tomography (CT) and MR studies confirmed moderate stenosis stenosis/ossification of the yellow ligament at the L2-L3 level, severe stenosis at L3-L4 level with spondylolisthesis, and massive bilateral synovial cysts at the L3-L4 level filling the spinal canal.

Conclusions: Following an L2-L4 decompressive laminectomy without fusion (note the absence of motion intraoperatively at the L3-L4 level), the patient's symptoms resolved, and he regained normal function. How would you have managed this patient?

Key Words: Decompression, fusion, lumbar case study, perspective, synovial cyst

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INTRODUCTION

In the new Case of the Month with Short Perspective section from Surgical Neurology International, we ask how various spine surgeons would approach different spinal pathologies. In this first case study, an elderly male presented with 3 years of lower back pain and 6 months of progressive neurogenic claudication with myelopathy and bilateral radiculopathy. An outside physician performed a magnetic resonance (MR) study of the lumbar spine that showed moderate stenosis/ossification of the yellow ligament (OYL) at the L2-L3 level with severe stenosis/OYL at the L3-L4 level accompanied by massive bilateral synovial cysts filling the spinal canal and grade I L3-L4 spondylolisthesis. How would you have managed this patient?

CASE STUDY

An elderly male presented with 3 years of lower back pain accompanied by 6 months of progressive neurogenic claudication, myelopathy, and bilateral radiculopathy. An outside physician ordered a lumbar MR scan that demonstrated moderate stenosis/OYL at the L2-L3 level, and marked stenosis/OYL with degenerative spondylolisthesis and massive bilateral synovial cysts filling the canal at the L3-L4 level (note the synovial cysts extended all the way to the L2-L3 level). Despite the marked thecal sac/cauda equina compression, over the next 3 months, anesthesia/pain management performed three epidural steroid injections with attempted cyst aspirations/ruptures. When the patient's symptoms worsened, characterized now by a severe cauda equina syndrome, he was finally seen by neurosurgery; the straight leg raising examination (SLR) was limited bilaterally to 30 degrees, iliopsoas/

quadriceps/extensor hallucis longus/dorsiflexors weakness was present bilaterally at the 3/5 level, Patellar and Achilles reflexes were absent, and there was a marked decrease in pin appreciation in the L3, L4, and L5 distributions. Dynamic X-rays showed a mild grade I degenerative spondylolisthesis at the L3-L4 level without active motion. The CT and the new MR scans confirmed moderate L2-L3 and severe L3-L4 stenosis/OYL with massive bilateral L3-L4 synovial cysts filling the spinal canal and the previously noted grade I L3-L4 spondylolisthesis [Figures 1-4]. Following an L2-L4 laminectomy for decompression/excision of stenosis/OYL and the massive bilateral synovial cysts without fusion (e.g. no motion documented intraoperatively at the L3-L4 level), the patient was asymptomatic. How would other spine surgeons have managed this patient?

Short perspective reviewing lumbar synovial cyst diagnosis and treatment

Symptoms and signs of synovial cysts

Patients with synovial cysts typically present in their mid 60s with a 2:1 or 1:1 male: female ratio.^[2] They may exhibit unilateral or bilateral radiculopathy, neurogenic claudication, and occasionally develop cauda equina syndromes. Notably, 40% will have accompanying degenerative spondylolisthesis. The levels involved typically include in descending order; L4-L5 followed by L5-S1, L3-L4, and L2-L3.

Reported failure rates of percutaneous radiographically-directed cyst rupture/ aspiration

Synovial cysts typically have tough, firm, thick, and often ossified/calcified capsules containing gelatinous/crank case fluid or fibrous material (e.g. rather than fluid) that can be readily aspirated.^[2-4] In a review by Epstein

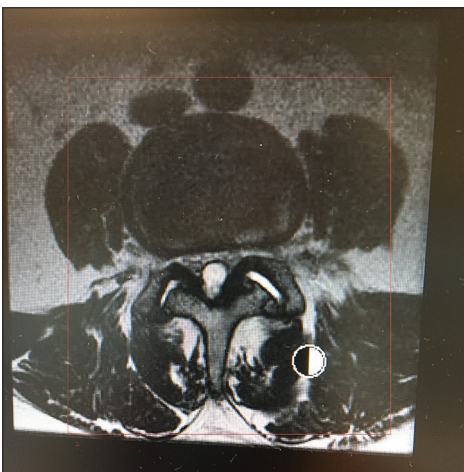


Figure 1: This axial T2-weighted MR at the L3-L4 level demonstrated a large central hyperintense mass (bilateral synovial cysts/capsules) and ossification of the yellow ligament (OYL) filling the dorsal spinal canal at the L3-L4 level. Fluid was also noted in bilateral L3-L4 facet joints



Figure 2: The midline sagittal T2-weighted MR demonstrated a hyperintense/somewhat heterogeneous mass consistent with coalescence of bilateral synovial cysts filling the dorsal spinal canal at the L3-L4 level. Note that at surgery, the coalesced synovial cysts extended all the way to the L2-L3 level

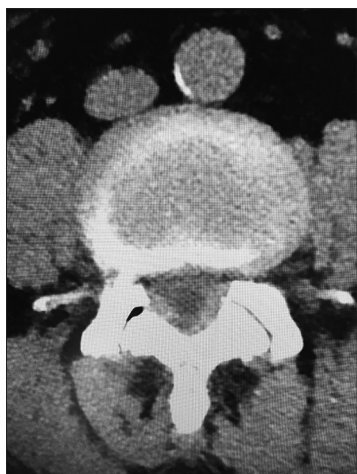


Figure 3:The axial soft tissue CT showed marked stenosis attributed to bilateral OYL and massive calcified capsules of the bilateral synovial cysts at the L3-L4 level. Note the air within the right L3-L4 facet joint

et al., attempts at aspiration reportedly fail in 50–100% of the cases.^[2,3] In 2017, when Lutz *et al.* attempted 35 lumbar synovial cyst ruptures, 40% required repeated cyst rupture, and 31% needed surgery.^[5]

Success of decompressive surgery for lumbar synovial cysts

Synovial cysts, whether unilateral or bilateral, include foraminal and cephalad components that impinge not only on the thecal sac and the inferiorly exiting nerve root, but also compress the superior, foraminal, and far laterally exiting root.^[2,3] For example, as in this case, for a synovial cyst at the L3-L4 level, the decompression should start at the next cephalad level of L2-L3 to pick up the L3 foraminal/far laterally exiting nerve root so the cyst capsule that is often densely adherent to this root (e.g. in its axillary portion) may be safely removed. If the decompression is confined just to the level of the synovial cyst extrusion, there is an increased risk that the foraminal/far laterally exiting cephalad root will be damaged. Also, of note, these cysts may be densely adherent to the underlying dura as ossification of the cyst capsule may extend to/through the thecal sac. It is, therefore, important to recognize when to decompress the synovial cyst without necessarily attempting to remove its entire adherent capsule from the underlying dura.

Low secondary reoperation/fusion rates after decompressions for lumbar synovial cysts

With surgical decompression, the reoperation rates for synovial cysts is low. In a study by Bruder *et al.* out of 141 synovial cysts, 70% underwent initial decompression (typically hemilaminectomies).^[1] Patients were followed for an average of 9.3 years, and the reoperation rate for recurrent cysts was 7%, while 9% warranted secondary surgery to address resultant instability requiring fusions. For Scholz *et al.*, there was

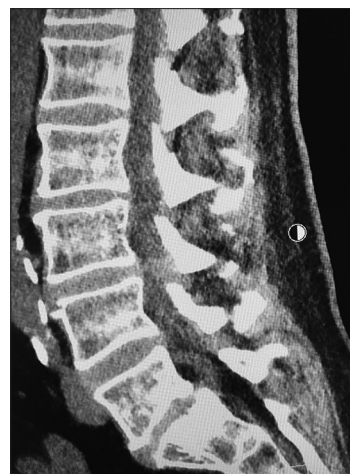


Figure 4: This slightly parasagittal soft tissue CT demonstrated hyperdensity dorsolaterally consistent with OYL and ossification/calcification of the synovial cyst capsules at the L3-L4. Note L3-L4 degenerative spondylolisthesis was not apparent on this study

also a low frequency of postoperative instability following 74 decompressions alone for excision of lumbar synovial cysts.^[6] For patients averaging 69 years of age, only 3 required secondary surgery for recurrent synovial cysts, and just 4 developed instability warranting fusions.

Invitation for comments

This is the first in a series of monthly case studies with Short Perspectives for Surgical Neurology International. We invite your responses. Would you have originally ordered epidural injections in this patient? What surgical approach would you have performed – a laminectomy and/or other decompression alone, and/or decompression with a fusion?

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Conflicts of interest

There are no conflicts of interest.

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