# Lumbar Intraforaminal Synovial Cyst in Young Adulthood: Case Report and Review of the Literature

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## Abstract

**Study Design** Case report.

**Objective** Lumbar juxtafacet cysts (synovial and ganglion cysts) are a rare cause of low back and radicular leg pain. Most patients with lumbar cysts are in their sixth decade of life and have significant facet joint and disk degeneration. Lumbar synovial cysts (LSCs) are extremely rare in adolescence and young adulthood, and to our knowledge, only two pediatric cases of LSC have been reported in the literature. We aim to prove the existence of LSC in adolescent patients as a real entity that causes low back and radicular complaints and to discuss the possibility of traumatic injury as a pathogenic cause of LSC formation in adolescence. A case of an 18-year old patient with LSC is presented. We report the clinical presentation, management, outcome, and review of the literature, focusing on issues that remain debatable.

**Methods** The case is presented together with its clinical course, the diagnostic techniques, the surgical findings, histologic results, and the treatment outcome.

**Results** After surgical treatment, the patient's complaints were alleviated and almost no complaints were registered during the next 6 months' follow-up.

**Conclusions** LSCs are extremely rare in adolescence, but they could be considered in the differential diagnosis in adolescent patients with low back pain and radiculopathy. Surgical removal of LSC could be considered as a treatment option to provide immediate and safe symptomatic relief.

**Keywords**
- lumbar synovial cysts
- adolescents
- young adults
- lumbar spine
- juxtafacet cysts
- rare case
- radicular pain

## Introduction

The term *lumbar synovial cysts* (LSCs) refers to cysts that arise from the zygapophyseal joint capsule of the lumbar spine. Kao et al were the first to report symptomatic spinal nerve compression resulting from an LSC and renamed these synovial and ganglion cysts as "juxtafacet" cysts (JFC).[1,2] The etiology of JFCs is unknown; possibilities include synovial fluid extrusion from the joint capsule, latent growth of a developmental rest myxoid degeneration, and cyst formation in the connective tissue. Increased motion seems to have a role in many cysts, and the role of repetitive microtrauma is debated by many authors.[3–6] Both synovial and ganglion cyst have similar clinical and radiographic features and are considered as an extrusion of the synovium through a capsular defect from degenerative or unstable facet joint.[6–9] In the last decade, improved imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI) have resulted in increased reporting, diagnostic yield, and treatment options of spinal synovial cysts.[3,6,8,10–16] The prevalence of LSC is unknown, and it is highly possible that there is no uniform distribution in all populations (0.65 to

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2.3%) according to the diagnostic method.[16–18] They are ailments of the older population, with the highest prevalence being in the sixth decade of life, and females are more commonly affected.[3,9,14,17,19,20] The intraspinal cysts occur mainly in the lumbar region, and they mimic the symptoms of disk herniation, causing low back and radicular pain. Neurologic deficit is exceptional.[7,21,22]

Synovial cysts are extremely rare in adolescence and young adulthood, and to our knowledge, only two pediatric cases of LSC have been reported in the literature.

Gelabert-González et al reported the presentation and treatment of 14-year-old girl with a 9-month history of left radicular pain who was found to have an intraspinal cystic lesion causing radicular compression.[7] The patient underwent L4 hemilaminectomy and excision of a synovial cyst, and the radicular pain completely regressed.

Vasani et al reported a 14-year-old boy with 1-month history of severe left leg pain ascending from the dorsum of the foot to the posterolateral part of the hip.[23] The pain began suddenly after a tackle during a soccer match and remained constant. Examination revealed reduced power in both ankle plantar and dorsiflexion and reduced pinprick and light touch sensation in the left L5 (lumbar) dermatome. MRI revealed a 1.5-cm extradural cystic lesion lying in the spinal canal at the L5 vertebral body level. The patient underwent an L5 hemilaminectomy and excision of the extradural cystic lesion. The cyst was adherent to the dura and the L5 nerve root.

## Case Report

We report a case with a similar presentation to the two previously reported cases. Our patient was an 18-year-old sportsman, actively practicing freestyle wrestling, with low back pain for a period of 1 year. He also was unable to maintain an upright position for a long time and needed to rest after standing for a short while due to the axial lumbar pain. After lumbar X-rays in lying and sitting position and a CT scan demonstrated no remarkable pathologic changes, conservative treatment was attempted by his family doctor, but with no significant improvement. The month before the hospitalization, the intensity of the low back pain increased and also spread to his left leg with typical L5 dermatome distribution. Because of the new symptoms, the patient was referred to a neurologist for evaluation. Physical examination revealed hypesthesia on the left L5 dermatome and pain on L4–L5 vertebrae on palpation. Straight leg-raising test was positive for the left leg. MRI revealed a 1.5-cm intraspinal synovial cyst originating from the left L4–L5 facet joint with low intensity on T1-weighted images and hyperintensity on T2-weighted images in the spinal canal at the L5 vertebral body level and extending into the neural foramen (►**Fig. 1**). After extensive discussions of the treatment options with the patient and the relatives, including further conservative treatment based on the MRI findings, the patient consulted with a neurosurgeon.

We further discussed with the patient and the relatives the variety of the treatment options, including conservative management, but the patient was adamant that he wanted fast and definitive treatment in the view of possible continuation of his sport activities.

The patient underwent microscope-assisted partial hemilaminectomy, flavectomy, and foraminotomy under general anesthesia in the prone position. The cyst contained 2 mL of clear gelatinous fluid, and a well-vascularized capsule compressed the L5 nerve root. To avoid the interapophyseal joint and cyst recurrence, piecemeal excision of the cyst wall was performed, followed by bipolar coagulation of the synovial membrane. Following excision of the mass, decompression of the nerve root was performed. There was no evidence of a herniated intervertebral disk or degenerative changes.

The patient was mobilized on the first postoperative day. His low back pain, left leg pain, and sensory deficit improved markedly. On the second postoperative day, the patient was discharged. Postoperative follow-ups at 1 and 6 months confirmed complete neurologic recovery and restoration of the common sport activities usually practiced from the patient. A year after the surgery, while practicing his usual daily activities, he had a regular follow-up with dynamic X-rays showing no signs of instability at the operated L4–L5 level.

Histopathology demonstrated cyst wall with synovial lining with compressed single layer of epithelial cells. The synovial membrane was found to be highly vascularized (►**Fig. 2**).

## Discussion

Intraspinal synovial cysts are reported with increasing frequency in the literature but continue to be an uncommon cause of radicular pain.[3–5,24] The term *lumbar intraspinal synovial cysts* refers to cysts that arise from the zygapophyseal joint capsule of the lumbar spine. They are included in the term *juxtafacet cyst*, which also encompasses ganglion cysts and was introduced by Kao et al in 1974.[1] Synovial and ganglion cysts have some histopathologic divergences but no significant clinical differences, because their treatment and prognosis are the same.[6,10,12] Newer imaging modalities such as CT and MRI have allowed an accurate preoperative diagnosis of this entity that previously could be identified only during surgery.[2,11,16,19,25] The exact etiology of spinal synovial cyst is still unclear. The proposed mechanism of formation of these cysts includes repetitive microtrauma in association with abnormal spinal motion and degenerative joint changes, which leads to rupture of the synovial membrane, herniation of the synovial fluid and cells, proliferation of mesenchymal cells, and myxoid degeneration.[4,5,10,13,14,18,19,26] Most JFCs (51 to 82%) are detected at the L4–L5 level, which generally has the greatest degree of motion within the lumbar spine and where spondylolisthesis is also most prevalent.[3,5,6,10,13,14,17,19,20,24,27,28] This suggests that underlying microinstability of the motion segment and chronic hypermobility are in part related to facet joint synovial cyst formation.[6,19] The role of trauma or repeated microtrauma has been frequently stated.[2,13,20] The presence of hemosiderin in many pathologic specimens is one of the strongest arguments for this. On the other hand, lumbar

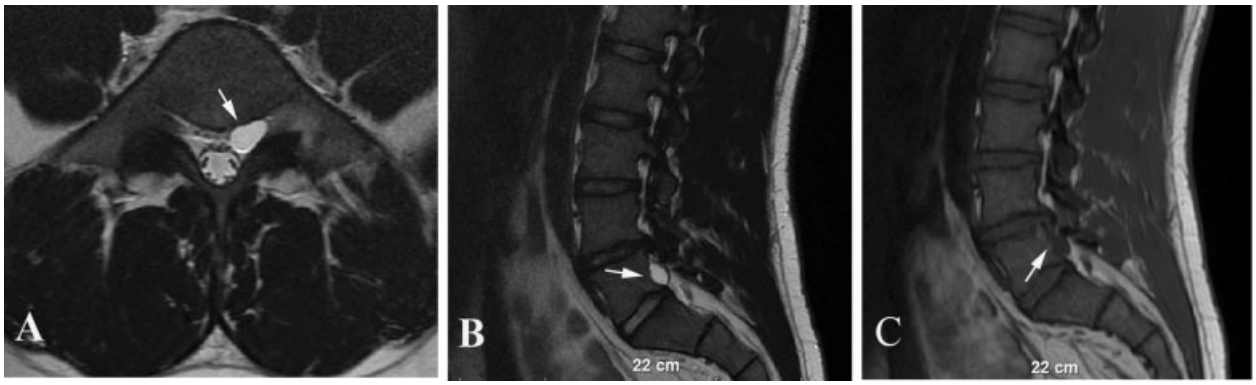


**Fig. 1** Magnetic resonance imaging revealed a 1.5-cm intraspinal synovial cyst originating from the left L4–L5 facet joint with low intensity on T1-weighted images (C) and hyperintensity on T2-weighted images (B), lying in the spinal canal at the L5 vertebral body level and extending into the neural foramen (A).

intraspinal synovial cysts are ailments of the older population, with a higher prevalence in the seventh decade of life.[3,19] Lyons et al reported 194 cases with an average age of 66 years (range 28 to 94),[20] Deinsberger et al reported 31 cases with an average age of 67.1 years (range 31 to 83),[10] Acharya et al reported 26 patients with a mean age of 55.9 years (range 27 to 80),[9] and Trummer et al reported 19 cases with a mean age of 65 years (range 48 to 81).[19] These facts further highlight the role of a degenerative process. Hsu et al reported that 75% of their patients had degenerative arthropathy on radiologic imaging.[22] Deinsberger et al and Boviatsis et al reported osteoarthritic changes in the facet joints in all patients and degenerative disk disease in two.[3,10] The youngest patients in the published series are 27 to 30 years old. After an extensive literature search, we have found only two cases reporting on lumbar intraspinal synovial cyst in adolescents. The two cases reported have had similar clinical presentation and CT/MRI scan findings.

Our case also suggests that the rules have exceptions. In our study, the synovial cyst was seen on the left L4–L5 facet joint without degenerative arthropathic changes. The possible cause for LSC formation probably is the repetitive facet microtrauma as a result of the patient's sport activities.

The clinical presentation of any LSC depends on its size, site, and relationship with the adjacent structures. The patients usually present with back pain and radicular pain.[20] The pain is frequently intermittent and is often posture-related as well. It is usually persistent and does not respond to conservative management.[21,22,24] Symptoms may simulate a herniated nucleus pulposus, lumbar stenosis, or facet joint syndrome, all of which are common.[3] Apart from lumbar disk herniations, spontaneous regressions are very rarely seen.[12] Back pain usually precedes radicular pain (range 50 to 93%),[19,26] whereas the duration from onset of symptoms to diagnosis is usually longer than in patients with disk herniation.[3,10] In the last decade, this period has been shortened because of the availability of MRI.[13] Though radicular pain is the most common clinical symptom, neurologic deficit is rarely encountered.[12] Painful radiculopathy, which may be unilateral or bilateral, is reported in 57 to 100% of the cases.[3,5,19,20,22,26] Other symptoms like neurogenic claudication, sensory loss, motor weakness, and cauda equina

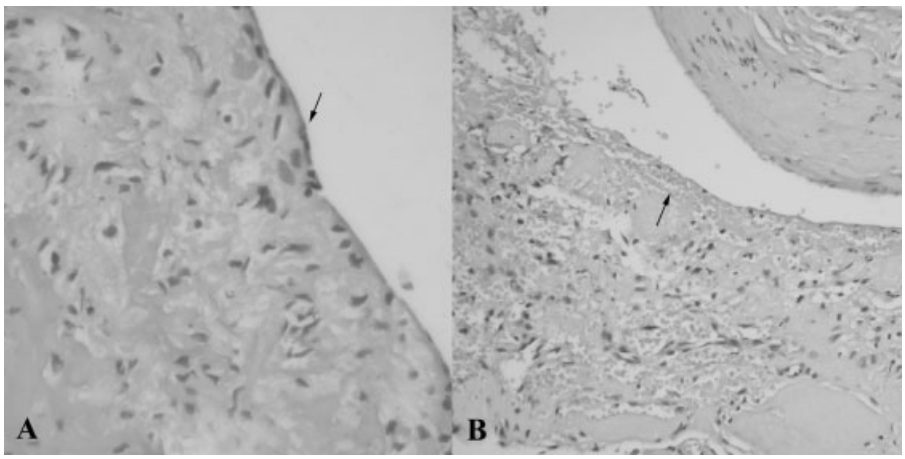


**Fig. 2** Histopathology demonstrating cyst wall with synovial lining with compressed single layer of epithelial cells (arrow on A). Synovial membrane is highly vascularized (arrow on B).

syndrome have also been reported, ranging from 10 to 44%.[19,20,22,26,29] In our case with a young 18-year-old patient, the history of low back pain preceded the radicular pain and perhaps this had been the time of the formation of LSC. When the cyst grew after the initial formation, it compressed the nerve root, which resulted in radicular pain.

CT and MRI are the two neurodiagnostic imaging modalities recommended for characterization of synovial cysts and preoperative planning.[3,11,13,17,19,21,24,26] Spinal CT may detect the cyst when its wall is calcified or when its cavity contains gas or blood due to hemorrhage.[12,24] CT and myelo-CT examinations reveal hypodense to isodense cystic centers with hyperdense rims reflecting calcification of the capsule.[17] MRI is the modality of choice for the diagnosis of JFCs.[9,11–13,20,21,24] Salmon et al determined that MRI is more sensitive than CT in documenting the presence of synovial cyst and that the diagnostic accuracy of the MRI is 77% compared with 56% for CT.[30] The majority of authors report 90% sensitivity compared with 70% for CT. Trummer et al noted that synovial cysts can be best shown by MRI, which also gives accurate three-dimensional information about the connective tissues and their relation to the facet joints.[19] The typical synovial cyst appears with low-intensity signal in T1-weighted images and a high-intensity signal in T2-weighted sequences.[4,8,15,18,24,26,29] In the case that we report, the CT scan was also negative, and we also believe that MRI is the gold standard in diagnosing LSCs. In our case, the diagnosis was achieved preoperatively by lumbar spine MRI (►**Fig. 1**).

Histopathologically, LSC and ganglion cysts arise from periarticular tissues. A true synovial cyst is lined with synovium-like epithelial cells, whereas the ganglion cysts have collagenous capsule, which surrounds myxoid material in the absence of epithelial cells.[22] They contain serous or gelatinous fluid and measure up to 2 cm in diameter.[22,24] The distinction between true synovial and ganglion cysts is purely pathologic; however, no difference is noted with respect to surgical treatment or prognosis.[20,26] Hsu et al and Howington et al explain that synovial and ganglion cysts are stages in a cycle of cyst formation and degeneration.[22,26] We agree with this opinion, as the histologic analysis of the cyst showed a true synovial cyst wall with the typical synovial lining with compressed single layer of epithelial cells and gelatinous fluid filling. Moreover, we found no degenerative changes in the adjacent structures. The differential diagnosis includes posterior longitudinal ligament cysts and ligamentum flavum cysts; however, these cysts do not communicate with the facet joint and are not lined with epithelium.[6]

Conservative treatment and several surgical methods are treatment alternatives for the LSC. Conservative options includes bed rest, analgesics, corset, physical therapy, and CT-guided cyst aspiration with or without injection of steroids into the facet joint.[3,19,20,22] Hsu et al compared conservative and surgical treatment and reported that in six patients, symptoms improved with rest, medication, and bracing; epidural corticosteroid injections provided short-term relief in three of four patients; and facet corticosteroid injections provided good to partial relief in two of three patients.[22] Follow-up data were available for 5 months only, and these treatments often showed short-term or no improvement at all.

Boviatsis et al and Chang recommended percutaneous interventions in the elderly or in patients at high risk.[3,27] Many authors suggest initial conservative treatment using all the above modalities for a period of 6 months before surgical treatment is considered.[3,6,11,20] Despite the rupture of the cyst, percutaneous treatment does little to eliminate stenosis resulting from hypertrophied ligamentum flavum and facet arthropathy, which usually accompanies the cyst.[10] Therefore, surgical treatment could be recommended when simple conservative methods fail to control the symptoms or when neurologic deficits develops.

Surgical treatment with complete cyst excision is the gold standard for this kind of patient and is very effective for pain relief.[3,6,10,30] The applied surgical technique remains a matter of debate and varies depending on the cyst size, its adhesion to the dura, and the presence of concomitant local pathologies. Métellus et al advocated performing medial facetectomy together with hemilaminectomy, suggesting that this technique helps prevent recurrence.[29] Not all authors agree with this technique, due to increased chance of producing spinal instability, but in a large retrospective analysis by Lyons et al,[20] no correlation between the extent of laminectomy and/or facetectomy and the development of symptomatic spondylolisthesis was identified.[3] Our experience shows that the surgical technique should be tailored to the individual patient and that partial hemilaminectomy with medial facetectomy is usually sufficient. The need for spinal fusion relates to the concomitant segmental instability or with extensive bone resection with the decompression, but not to LSC excision. Attempts to decrease bone removal and ligamentous disruption of the spine might reduce the need for initial as well as delayed spinal fusion.[10] In the series of Lyons et al,[20] 9% of 194 patients required spinal fusion at the time of initial therapy. The outcome was good to excellent in 91%, with 82% showing improvement in motor deficits and 79%, improvement in sensory deficits. In the series of 13 cases of El Shazly et al with long-term follow-up, concomitant spinal fusion was not performed in any of the patients.[5] They reported excellent to good results in 92% of the patients with a satisfaction rate of 80%. None of 31 patients of the series of Deinsberger et al required spinal fusion, either at the time of surgery or at follow-up.[10] Good to excellent results at a follow-up period of 12 to 30 months was achieved in 80.7% (25/31 patients). Similar postoperative results were reported in the series of Trummer et al,[19] Terao et al,[14] Boviatsis et al,[3] Acharya et al,[9] Ayberk et al,[6] and Salmon et al.[30]

Development of a new synovial cyst after surgical removal is reported in the literature but is rare and due to incomplete removal of the cyst wall during the initial operation.[10,19,26,30]

Postoperative complications reported in the literature are equally rare. Lyons et al reported a 4% complication rate in a series of 194 patients including cerebrospinal fluid leak (three patients) and one patient each with diskitis, epidural hematoma, seroma, deep vein thrombosis, and death.[20] Deinsberger et al had one asymptomatic dural tear after surgery.[10] Acharya et al reported one cerebrospinal fluid wound leak and one superficial

wound infection.[9] Trummer et al noted no postoperative complications in their series of patients.[19]

## Conclusion

LSC is a rare but well-documented pathology that causes low back pain and radicular symptoms especially in elderly patients. LSCs are likely degenerative lesions with juxtafacet location. Extremely rarely, they can be encountered in adolescents and young adults and should be considered in the differential diagnosis in young patients with low back and radicular pain. MRI is the tool of choice for diagnosis. Surgical removal of LSC should be considered as a treatment option to provide immediate and safe symptomatic relief.

Irrespective of the cyst origin and nature, all the patients present in a similar manner—most of all with radiculopathy. The case that we present follows a presentation pattern similar to the other two cases with intraspinal cyst in the adolescent and young adult population, namely predominantly radicular pain, clearly selecting a lumbar dermatome.

Disclosures
None

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