Extraforaminal Lumbar Synovial Cyst
Causing Sudden Foot Drop
—Case Report—

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Abstract
A 52-year-old female presented with extraforaminal lumbar synovial cyst at the L4-5 level causing sudden foot drop on the right. Computed tomography, magnetic resonance (MR) imaging, and coronal MR myelography source images identified the cystic mass in the extraforaminal zone. The patient underwent microdecompression via a lateral transmuscular route, and the extraforaminal cyst compressing L4 ganglion was successfully removed. The histological diagnosis was synovial cyst. This unique case of surgically proven extraforaminal lumbar synovial cyst causing sudden foot drop indicates that extraforaminal synovial cyst should be included in the differential diagnosis of patients presenting with sudden foot drop.

Key words: extraforaminal synovial cyst, lumbar spine, foot drop

Introduction
Symptomatic synovial cysts occur within the spinal canal or neural foramen and cause radiculopathy. Synovial cysts originate from the facet joint arthrosis, and present as intra- or extraspinal extradural masses. The cysts tend to be connected to the facet joint, but continuity between the cyst and the origin may not be observed. Most lumbar synovial cysts are confined to the spinal canal. Only 7 cases of symptomatic extraforaminal lumbar synovial cysts have been described, all of which manifested as radiating leg pain.

We present a case of extraforaminal lumbar synovial cyst causing sudden foot drop, which was successfully treated by the microdecompression technique via a lateral transmuscular approach.

Case Report
A 52-year-old female presented with sudden foot drop on the right, which had happened 7 days ago while the patient was asleep. She did not have any history of trauma or excessive activity. The patient had a history of mild low back pain persisting for 30 years, and had been treated conservatively by acupuncture and physical therapy. She also complained of dull aching pain over the bilateral buttocks and intermittent radiating pain along the right L4 sensory dermatome. Physical examination demonstrated complete foot drop on the right (motor power grade 1) and decreased sensation over the right L4 sensory dermatome.

Radiography showed facet joint arthritic change and spondylolisthesis (Meyerding grade I) at the L4-5 level. Lumbar magnetic resonance (MR) imaging showed a cystic lesion compressing the L4 ganglion in the extraforaminal zone on the right at the L4-5 level, appearing as hyperintense on T2-weighted images and hypointense on T1-weighted images (Fig. 1A, B). Computed tomography (CT) showed the cyst as slightly hyperdense (Fig. 1C). Coronal MR myelography source images also clearly demonstrated the extraforaminal cystic lesion compressing the right L4 ganglion (Fig. 1D).

The cyst was removed by the microdecompression technique via a lateral transmuscular approach. During the surgery, a well-demarcated oval-shaped cyst, which originated from the lateral L4-5 facet joint and compressed the L4 ganglion, was identified in the extraforaminal zone, and was removed completely. The cyst was filled with relatively thick, mixed with yellow and black fluid, suggesting intracystic hemorrhage. Histological examination was...
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Fig. 1  A, B: Magnetic resonance (MR) images showing an extraforaminal cyst (arrow) as hyperintense on the sagittal T2-weighted image (A), and hypointense on the axial T1-weighted image (B).  C: Computed tomography scan showing the cyst (arrow) as slightly hypodense.  D: Coronal MR myelography source image clearly demonstrating severe compression of the L4 ganglion by the cyst in the extraforaminal zone (arrow).

Fig. 2  Photomicrograph of the surgical specimen showing synovial membrane and fibroconnective tissue consistent with synovial cyst.  Hematoxylin and eosin stain, original magnification ×20.

compatible with synovial cyst (Fig. 2).

The patient showed improvement of motor power (power grade IV) with gradual recovery of preoperative sensory deficit at 6 months after surgery. Follow-up radiography did not demonstrate any new instability.

Discussion

Lumbar synovial cysts most commonly occur at the L4-5 level, possibly due to the greater range of movement at this level.5,12,13,28,29,32) The etiology of lumbar synovial cysts are still unclear, but various proposed mechanisms include: osteoarthritic changes that cause prolapse from the synovial joint; developmental arrests of synovial tissue; mucinous degeneration of periarticular fibrous tissue; and proliferation of pluripotential mesenchymal cells.24) Acute onset of symptoms with synovial cyst tends to be associated with intracystic hemorrhage, and occurred in 9% of patients.23) In our case, minor hemorrhage in the cyst was identified during surgery, and was considered to be the cause of the symptoms. Spontaneous bleeding of the synovial membrane and fibroconnective tissue had apparently caused sudden enlargement of the asymptomatic extraforaminal synovial cyst, which resulted in abrupt compression of the L4 ganglion and resulted in sudden foot drop.

The neuroimaging differential diagnosis of extraforaminal synovial cyst includes herniated disk, schwannoma, cystic neurofibroma, extradural arachnoid cyst, perineural cyst, meningioma, etc.7,10,18,22,30) Synovial cyst usually appears as isointense or hypointense on T1-weighted images, and hyperintense on T2-weighted images, as in our case. Recent advances and refinements in diagnostic imaging modalities have markedly improved the accuracy of preoperative diagnosis of cystic lesion in the extraforaminal zone. However, the correct diagnosis of pathological lesions located in the extraforaminal zone is sometimes difficult even with CT and/or MR imaging, and frequently results in persistent symptoms despite surgery.4,15) In this
regard, coronal MR imaging may be useful in the assessment of extraforaminal pathologies in the lumbar sacral spine, if sagittal and axial MR imaging cannot clearly define the lesions.\textsuperscript{31)}

In the present case, we could not definitely confirm that the extraforaminal cyst was the causative pathology based on the findings of CT and MR imaging. However, coronal MR myelography source images clearly demonstrated severe compression of the L4 ganglion by the cystic lesion in the extraforaminal zone. Coronal source images are used to extract conventional MR myelography images, and can clearly demonstrate the anatomical structures of the foraminal and extraforaminal areas, such as pedicle, ganglion, and foraminal/extraforaminal disk, in the whole lumbar spine, so are very helpful to identify pathological lesions in these areas in combination with CT and MR imaging.\textsuperscript{21)}

Nonsurgical management or percutaneous aspiration of synovial cyst has been recommended,\textsuperscript{1-3,8,14) but the definitive treatment for symptomatic lumbar synovial cyst is generally considered to be complete surgical excision.\textsuperscript{13,20,26,32,34) Higher mobility may be one of the predisposing factors for synovial cyst,\textsuperscript{23)} but the benefits of concomitant fusion surgery over simple cyst excision have not been clearly demonstrated. Surgical removal of the juxtapaacet cyst was sufficient for immediate symptomatic relief.\textsuperscript{35)} Whether to perform concomitant fusion or not should depend on the individual patient characteristics, especially the degree of instability.\textsuperscript{35)} Therefore, minimally invasive or less invasive surgical techniques are preferred unless fusion is planned to prevent postoperative joint instability.\textsuperscript{6)}

In the present case, cyst excision was successfully performed using the microdecompression technique via a lateral transmuscular route. This procedure is an effective surgical option for pathologies in the extraforaminal zone, and enables direct decompression with minimal damage to the surrounding anatomical structures.\textsuperscript{31,36,37)}

This unique case of surgically proven extraforaminal lumbar synovial cyst causing sudden foot drop indicates that extraforaminal synovial cyst should be included in the differential diagnosis of patients presenting with sudden foot drop.

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