



## The Saccular Chine - Vertebral Synovial Cyst

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### Preface

Synovial cyst arises as a consequence of herniation of synovial lining through the joint capsule. Generally, joints of proximal and distal extremities are incriminated. Haemorrhage within the synovial cyst may engender a mass-like lesion.

Synovial cyst arising within the popliteal fossa is additionally denominated as popliteal cyst or Baker's cyst. Cutaneous metaplastic synovial cyst commonly arises due to localized trauma to abutting soft tissue and is layered by metaplastic cuboidal or pseudostratified columnar synovial epithelium.

Spinal extradural synovial cyst arises within vertebral joints, is layered with cuboidal or pseudostratified columnar epithelium and is imbued with synovial fluid. Spinal synovial cyst with a cystic configuration is interconnected to adjoining facet joint and frequently demonstrates degenerative spondylosis of the facet joint.

Synovial cysts appearing within the vertebral column predominantly emerge within lumbar region, especially adjoining lumbar vertebrae 4 and 5 (L4-L5), in contrast to thoracic or cervical vertebrae [1,2].

### Disease characteristics

Spinal extradural synovial cyst abutting a facet joint is commonly discerned in the elderly population. Average age of disease emergence is 66 years and disease frequency varies from 0.6% to 7.3% although bilateral synovial cysts emerging adjacent to lumbar facet joints are infrequent [1,2].

Spinal extradural synovial cyst is commonly situated along the medial border of degenerated facet joint [1,2].

Spinal synovial cysts are common at lumbar vertebrae 4 and 5 (L4/L5) as the aforesaid vertebral position demonstrates significant mobility along with a predilection for synovial cysts or osteoarthritis of adjoining facet joint. Spinal synovial cyst is also discerned upon vertebrae 5 or sacral vertebrae 1 (L5/S1) position [1,2].

Of obscure aetiology, spinal synovial cyst is associated with degenerative facet disorder, spondylolisthesis and spinal trauma [2,3].

### Clinical elucidation

Synovial cyst within the popliteal space occurs due to herniation of synovial membrane through posterior joint capsule and may be accompanied by effusion of joint fluid from adjoining bursae. The cyst may be associated with degenerative joint disease, neuropathic arthropathy or rheumatoid arthritis [2,3].

Spinal synovial cyst may be asymptomatic and discovered incidentally. Spinal synovial cysts infrequently represent with pain of significant duration within the lower back, radiculopathy or symptoms associated with neurogenic claudication. Cauda equina syndrome or myelopathy may be exceptionally enunciated [3,4].

Typically, the cyst is associated with arthropathy of the adjacent facet joint and may engender lumbar radiculopathy in significant proportion. Synovial cyst can compress the adjacent nerve root

with consequent appearance of radicular pain. Pain associated with radiculopathy is contingent to proportionate physical activity wherein the severity may increase with enhancing mobility. Motor deficits, sensory loss and altered reflexes are discerned [3,4].

Enlarged cysts may generate stenosis of the vertebral canal and compression of adjoining neural structures with emergence of cogent neurological symptoms [3,4].

**Histological elucidation**

Grossly, ruptured cyst cavity is permeated with clear or straw coloured synovial fluid or mucoid substance.

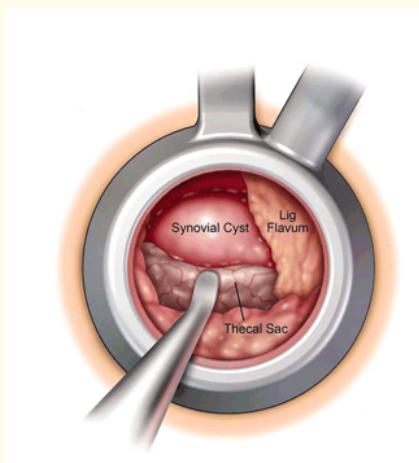
Upon microscopy, synovial cyst arising within the popliteal fossa is layered with cuboidal or pseudostratified columnar synovial epithelium. The cyst wall may demonstrate accumulation of mature cartilage. Cyst wall depicts a palisading of histiocytes and foci of fibrinoid necrosis.

Cutaneous metaplastic synovial cyst is a cystic structure layered with synovial epithelium and endowed with papillary projections [5,6].

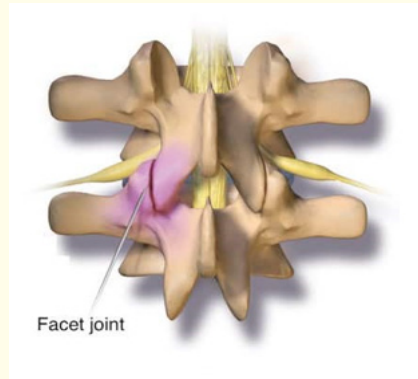
The cyst wall is composed of fibro-collagenous tissue or dense granulation tissue. Synovial cyst is intrinsically layered with cuboidal or pseudostratified columnar epithelium [5,6].

**Differential diagnosis**

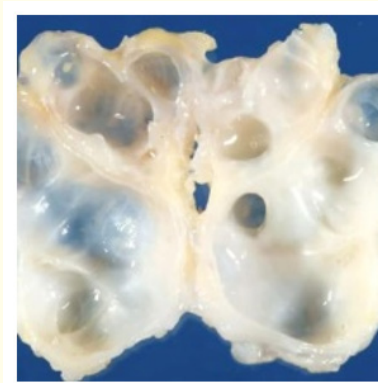
Spinal extradural synovial cyst requires a segregation from diseases engendering non-discogenic sciatica such as lumbar ra-



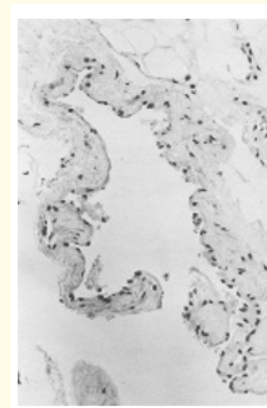
**Figure 1:** Synovial cyst layered with synovial epithelium abutting ligaments and joint structures [10].



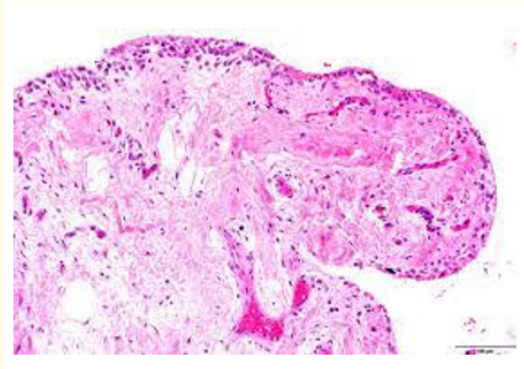
**Figure 2:** Synovial cyst arising within the joint space adjoining a facet joint [11].



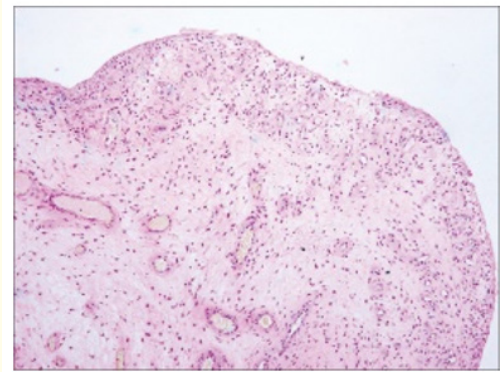
**Figure 3:** Synovial cyst imbued with thick, mucoid synovial fluid surrounded by a layer of fibro-collagenous tissue [12].



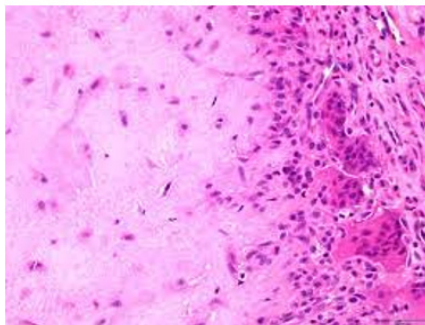
**Figure 4:** Synovial cyst layered by multiple layers of pseudo-stratified columnar epithelium and circumscribing granulation tissue [10].



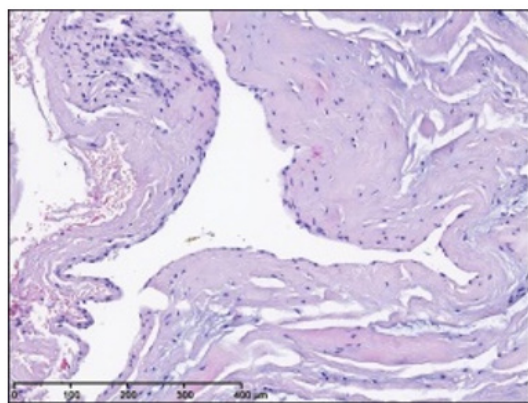
**Figure 5:** Synovial cyst exhibiting papillary structures lined by columnar epithelium and encompassing granulation tissue [13].



**Figure 8:** Synovial cyst enunciating a cystic lining of pseudo-stratified columnar epithelium and enveloping fibro-collagenous synovial tissue [15].



**Figure 6:** Synovial cyst exemplifying histiocytes, lymphocytes and multinucleated giant cells enmeshed within the cyst wall [13].



**Figure 7:** Synovial cyst layered by pseudostratified columnar epithelium and enveloping fibro-collagenous tissue [14].

dicular herpes zoster, lumbar instability, nerve root schwannoma, sacroiliitis, sciatic neuritis, piriformis syndrome, intra-pelvic mass, coxarthrosis along with facet joint cyst and hypertrophy [5,6].

Soft tissue mass appearing within the intra-spinal lumbar epidural space requires a segregation from facet cyst, extruded or sequestered disc fragment, metastatic neoplasms, meningioma, schwannoma, neurofibroma with cystic degeneration, arachnoid cyst, perineural cyst or dermoid cyst [5,6].

**Investigative assay**

Appropriate assessment of spinal extradural synovial cyst is obtained by myelography, computerized tomography (CT), facet arthrogram and magnetic resonance imaging (MRI).

Upon plain radiography, synovial cyst typically manifests as a calcified, cystic lesion appearing adjacent to a facet joint with accompanying mild degenerative alterations [7,8].

Computerized tomography (CT) demonstrates arthropathy within adjoining facet joint along with presence or absence of gas within the cyst [7,8].

Magnetic resonance imaging (MRI) with contrast administration is an optimal and recommended modality for aptly visualizing and categorizing synovial cyst. Upon magnetic resonance imaging, spinal extradural synovial cyst adjoining a facet joint typically exemplifies minimal signal intensity upon T1 weighted imaging and enhanced signal intensity upon T2 weighted imaging [7,8].

Magnetic resonance imaging (MRI) is inadequate in differentiating synovial cyst from ganglion cyst. However, aforesaid cysts can be suitably demarcated following intra-articular injection of contrast medium as a synovial cyst communicates with abutting joint space. Occurrence of gas within the cyst is pathognomonic of synovial cyst. Cysts abutting a facet joint may be permeated with heterogeneous fluid composed of intrinsic haemorrhage or accumulated debris [7,8].

Calcification within cyst wall is associated with minimal signal intensity upon T1 weighted imaging and T2 weighted imaging. Cysts demonstrating extravasation of red blood cells are associated with enhanced signal intensity [7,8].

Contrast administration is required for segregating synovial cyst in pertinent instances as signal characteristics may be dubious. Synovial cyst may emerge as a tumefaction within spinal extrathecal space and delineates peripheral image enhancement [8,9].

Synovial cysts arising in concurrence with peripheral nerves can be aptly discerned by cogent imaging techniques as the cysts are intimately connected with adjoining nerve. Compression of associated nerve root may be discerned [8,9].

### Therapeutic options

Synovial cyst occurring within the popliteal fossa necessitates extradition of excess fluid, treatment of underlying factors and sclerotherapy [8,9].

Cutaneous metaplastic synovial cyst can be appropriately treated with pertinent surgical extermination. Reoccurrence of the cyst is exceptional.

Spontaneous regression of spinal extradural or facet synovial cyst is documented [8,9].

Preferred preliminary therapy of a synovial cyst is adoption of extensive nonsurgical manoeuvres, especially in subjects lacking neurological deficits. Nonsurgical, conservative therapeutic strategies are comprised of analgesics, physiotherapy, bracing, injection into adjacent facet joint and aspiration of the cyst. Comprehensive retrogression of clinical and radiological features with adoption of conservative strategies is discerned [8,9].

Fluoroscopic or computerized tomography (CT) guided direct aspiration of lumbar synovial cyst adjoining a facet joint is a mini-

mally invasive, safe procedure. Besides, pain associated with the cyst is alleviated for a brief duration. However, proportion of cyst reappearance is significant on account of incomplete aspiration of thick, gelatinous, non-absorbable cystic contents, synovial epithelial layer and retention of cyst capsule. Incompletely aspirated cyst manifests persistent pain due to compression of abutting neurological structures [8,9].

Image guided percutaneous injection of steroids into synovial cyst adjoining the facet joint is accompanied by retrogression of clinical and radiographic symptoms or resolution of the cyst [8,9].

Targeted percutaneous radiofrequency ablation is utilized to evacuate the cyst followed by cauterization of cyst, associated facet capsule and facet joint. The technique exhibits proportionate reduction of cyst reoccurrence, in contrast to employment of manoeuvres such as cyst rupture, cyst aspiration or steroid injection [8,9].

Surgical intervention is optimal and recommended due to significant proportion of cyst reoccurrence and inferior results obtained with conservative therapy. Surgical resection of synovial cyst is indicated in instances with intractable pain, neurological deficits, cysts unamenable to conservative therapy or repetitive appearance of cysts. Synovial cyst can be subjected to surgical extermination or rupture and evacuation with a percutaneous approach [8,9].

Instrumented spinal fusion surgery is advantageous in subjects demonstrating spinal instability [8,9].

Facet cysts can be efficaciously excised with minimally invasive surgical procedures which decimate surgical haemorrhage, accompanying soft tissue injury and demonstrate reduced disruption of ligamentous or bony structures along with possible progressive vertebral instability requiring fusion surgery, particularly in instances with pre-existing spondylolisthesis [8,9].

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10. Image 1 and 4 Courtesy: Journal of Neurosurgery.
11. Image 2 Courtesy: Columbia spine.org.
12. Image 3 Courtesy: Humpath.com.
13. Image 5 and 6 Courtesy: Wiley online library.
14. Image 7 Courtesy: Europe PMC.org.
15. Image 8 Courtesy: Journal of Medical Society.

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