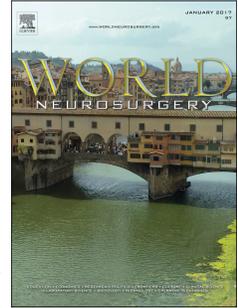


# Accepted Manuscript

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PII: S1878-8750(17)31168-3

DOI: [10.1016/j.wneu.2017.07.068](https://doi.org/10.1016/j.wneu.2017.07.068)

Reference: WNEU 6130

To appear in: *World Neurosurgery*

Received Date: 29 May 2017

Revised Date: 11 July 2017

Accepted Date: 12 July 2017

Please cite this article as: Shtaya A, Sadek A-R, Walker M, Nader-Sepahi A, Ventral lumbar synovial cyst causing cauda equina compression: case report and literature review, *World Neurosurgery* (2017), doi: 10.1016/j.wneu.2017.07.068.

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**Ventral lumbar synovial cyst causing cauda equina compression: case report and literature review**

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Title word count: 13

Number of figures: 2

Number of references: 10

Manuscript word count: 981

Conflict of interest

All authors have none to declare.

Funding

This paper was completed with no dedicated funding.

**Abstract:**

**Background:** Juxtafacet spinal cysts are cystic synovial lesions that are often indistinguishable clinically or radiologically and require histopathology analysis to confirm the diagnosis. Lumbar synovial cysts usually arising from the synovium of the facet joints. They have been described posterolateral or rarely in the posterior midline. However, we describe the first synovial cyst ventral to the dural sac.

**Case description:** We report a lumbar 3-4 lesion causing cauda equina compression in a 57-year-old man who presented with 3 months history of low back pain and bilateral sciatica, intermittent urinary incontinence and erectile dysfunction. Pre-operative magnetic resonance imaging (MRI) suggested prolapsed disc, following decompression, histological analysis of the fragment confirmed a synovial cyst.

**Conclusion:** Hitherto synovial cysts have not been reported anterior to the dural sac. We describe a lumbar ventral cystic mass with cauda equina compression that mimicked a disc prolapse due to synovial metaplasia. The patient had urgent decompression with subsequent resolution of the symptoms.

**Keywords:** Synovial cyst, lumbar spine, cauda equina.

**Introduction:**

Synovial cysts, also known as intraspinal facet cysts, are pathologically encapsulated masses as a result of breakdown of the epithelial articular lining. They usually reside adjacent to the facet joints; typically occur in the lower lumbar region and often in sites of degenerative changes and spinal dynamic instability<sup>1,2</sup>. Damage to the articular lining of a zygapophyseal joint or accumulation of fluid outside the facet joint may cause abnormal cyst formation. In this context, they are usually described as being in the postero-lateral area of the lumbar canal<sup>2</sup>. They are rarely observed in the midline under the lamina<sup>1</sup>. Some studies described degenerative cysts without synovial lining that can occur in the ligamentum flavum, the intervertebral discs, or other parts of the vertebral column<sup>3-5</sup>. Patients with these cysts may present with radicular symptoms due to foraminal stenosis and nerve root compromise<sup>6</sup>. However, they rarely develop cauda equina nerve root compression.

Herein, we report a unique case of midline ventral synovial cyst in a patient presented with cauda equina syndrome. We discuss the clinical presentation, imaging, intraoperative findings and pathological reports. We have also reviewed the literature for spinal synovial cysts.

**Case Report:**

A 57-year-old man presented with 3 months history of low back pain and bilateral sciatica radiating down to his calves. He had unremitting progressively worsening pain that did not respond to maximal analgesic therapy. No past medical history of rheumatoid arthritis or chronic inflammatory disease. On admission to hospital, he described reduced mobility due to pain, intermittent urinary incontinence for 1 month and erectile dysfunction for 2 weeks. Despite subjective leg weakness, on examination he had normal power in all compartments of his lower limbs but an absent left ankle jerk. MRI demonstrated a lumbar 3-4 disc prolapse with cauda equina compression (Figure 1 A-B). An emergency L3-4 inter-segmental decompression was performed and a cystic lesion containing viscous xanthochromic substance was excised. Inspection of the disc did not demonstrate a bulge and an intact annulus fibrosus with no communication between the intervertebral disc and the cyst. Frozen section histopathology was inconclusive. However, histopathology revealed a collapsed cystic structure lined by a discontinuous layer of cells with synovial type morphology. These lining cells showed positive immunoreactivity for CD68 and vimentin (Figure 2 A-B). Patient has made good recovery after the operation and discharged home after 2 days. All presenting symptoms and signs resolved and patient remained well more than 2 years down the line.

**Discussion:**

Patients with degenerative changes in the lumbar facet joints are often present with low back pain. However, lumbar intraspinal facet or juxtafacet cysts are commonly present with radicular pain due to their proximity to the exiting and crossing nerve roots<sup>6, 7</sup>. Rarely synovial cysts may cause cauda equina compression<sup>8</sup>. This has been described in elderly patients with degenerative changes<sup>9</sup> and in association with haemorrhage into the cyst<sup>10</sup>. However, none of the previous cases was reported ventral to the dural sac<sup>8-10</sup>. Synovial cysts are extradural in location mostly reported at the L4-5 level, which are thought to be due to the

increased mobility at this level, and to a lesser degree at the L5-S1 and L3-4 levels<sup>1, 11</sup>. They are typically found postero-lateral to the dural sac, resulting in posterior compression of the nerve roots, which contrasts with the typical location of a herniated disc, which may be found ventral or ventro-lateral to the dural sac and/or nerve root<sup>1, 7, 11</sup>. Intra-operatively the synovial cysts are usually noted to be in proximity to their facet joints<sup>11</sup>. Generally, these cysts are proposed as a regenerative change that is associated with hypermobility and instability of a motion segment as seen with spondylolisthesis and facet joint instability with incompetent capsule<sup>3, 6, 11</sup>. Another rare differential that mimics disc prolapse is a discal cyst. These cysts are extremely rare pathologies and only a few have been reported in literature<sup>12</sup>. They are intraspinal extradural cysts that communicate with the corresponding intervertebral discs<sup>12</sup>.

We report the first case, to our knowledge, of a lumbar synovial cyst that on imaging and at surgery did not appear in juxtaposition or continuous with the L3-4 facet joints. The lesion was found ventral to the dural sac in a central location with no communication with the facet joint, which was initially thought to be an L3-4 disc prolapse with compression on adjacent nerve roots. Importantly, the cyst did not communicate with the intervertebral disc that was intact. This is extremely rare, as these cysts are often found to be continuous with the facet joint of origin or in communication with an intervertebral disc and have been reported in other uncommon locations<sup>13</sup>. In our case, the cyst did not come from the facet joint, was not in communication with the intervertebral disc and resulted in adjacent cauda equina compression. Symptomatic lumbosacral synovial cysts in non-ventral locations have been described<sup>1, 11, 13, 14</sup>. However, to date a ventrally located synovial cyst causing cauda equina syndrome has not been reported. In contrast, the extremely rare discal cysts may present in this location but they usually communicate with the intervertebral disc, have no synovial cell lining and do not cause cauda equina nerve root compression<sup>12</sup>.

Interestingly, Pytel et al proposed synovial proliferation found in some intervertebral disc tissue studied and that represented reactive synovial metaplasia<sup>13</sup>. They also suggested that such type of synovial metaplasia develops secondary to abnormal friction or movement between crystal deposits or tissue fragments of a degenerative disc. In our case, the cystic lesion is located in a degenerative area of the lumbar spine (L3-4), not in communication with the disc and the histopathology characteristics revealed synovial proliferation and are suggestive of synovial metaplasia (Figure 2 A-B). Therefore, this is a new unusual location of a synovial cyst that has not been described before.

In conclusion, this case illustrates a new presentation and add an important treatable finding to the differential diagnosis of the ventral cystic lesions in the lumbosacral spine that may mimic a disc prolapse, which possibly cause cauda equina compression. Microsurgical resection utilising inter-segmental decompression approach would offer a straightforward desirable treatment option with preferable outcome and reduced risks including spinal instability.

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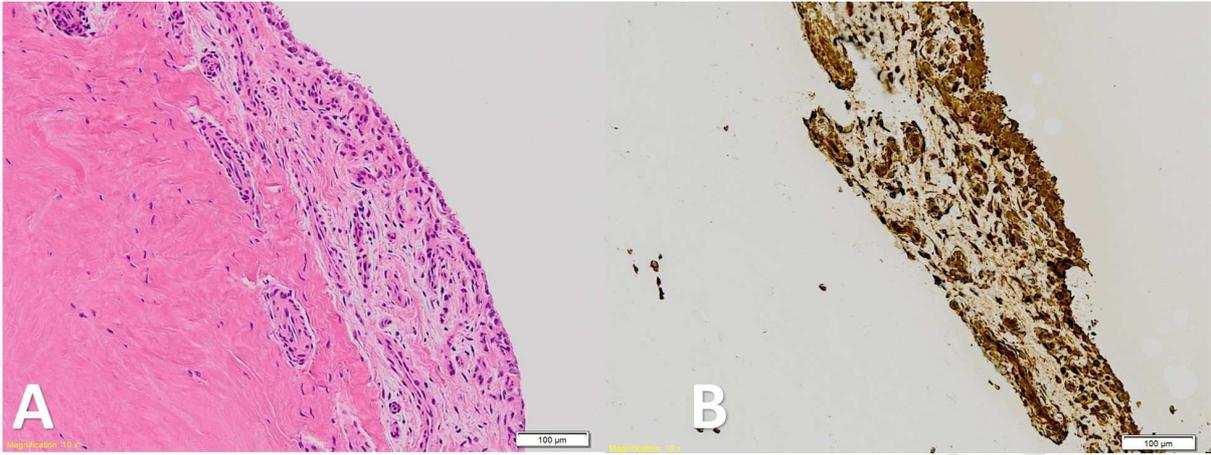
### Figure legends

**Figure 1** Pre-operative images. A T2W sagittal MRI image reveals hyper-intense lesion at L3-4 intervertebral disc with mass effect (arrow). B An axial T2W image at L3-4 intervertebral disc space showing the cystic lesion (arrow).

**Figure 2** A Haematoxylin and eosin stained section showing a cystic structure focally lined by cells with synovial type morphology. B These synovial cells show positive immunostaining for vimentin. Objective lens magnification 10x, scale bar = 100 microns



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**Highlights:**

Manuscript title: Ventral lumbar synovial cyst causing cauda equina compression: case report and literature review

Manuscript type: Case report and Literature Review

- Ventral lumbar synovial cyst that mimics prolapsed disc.
- Confirmed histopathology (synovial lining cells and positive vimentin).
- Synovial cyst in this location is extremely rare and to our knowledge has not be described before.
- Microsurgery is curative (benign rare treatable pathology).

Abbreviation in this article:

Magnetic resonance imaging: MRI

T2 weighted imaging: T2WI

Lumbar: L

Sacral: S

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