Cervical Synovial Cyst Causing Cervical Radiculomyelopathy: Case Report and Review of the Literature

José A. Corredor¹ Gerald Quan²

¹Department of Orthopaedic and Traumatology Surgery, Fundación Santa Fe de Bogotá, Our Lady of the Rosary University, Bogotá D.C., Colombia
²Department of Spinal Surgery, University of Melbourne, Austin Health, Victoria, Australia

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Abstract

Study Design Case report.

Objective Synovial cysts in the subaxial cervical spine are rare and are most commonly reported at the cervicothoracic junction. Only six cases of symptomatic C5–C6 synovial cysts have been reported in the literature; the condition is usually treated with decompressive laminectomy. We present a patient with a synovial cyst arising from the C5–C6 facet joint, associated with spondylolisthesis, and causing radiculomyelopathy. The patient was treated with a posterior excision of the cyst, decompressive laminectomy, and fusion.

Methods A 67-year-old man had vertebral canal stenosis at C5–C6 secondary to a synovial cyst and spondylolisthesis with symptoms and signs of radiculopathy and myelopathy. Surgical management involved C5–C6 posterior decompressive laminectomy and excision of the cyst and C4–C6 instrumented fusion with lateral mass screws and rods. A literature review of symptomatic cervical synovial cysts is presented.

Results The imaging studies identified grade I spondylolisthesis and a 3.3 x 4.3-mm extradural lentiform-like mass associated with focal compression of the spinal cord and exiting the C6 nerve root. After the surgery, the patient had an immediate full recovery and was asymptomatic by the 6-month examination. No operative complications were reported. The histologic report confirmed the presence of a synovial cyst.

Conclusions C5–C6 is an unusual localization for symptomatic synovial cysts. Similar cases reported in the literature achieved excellent results after cyst excision and decompressive laminectomy. Because spondylolisthesis plus laminectomy are risk factors for segmental instability in the cervical spine, we report a case of a C5–C6 facet synovial cyst successfully treated with posterior laminectomy and C4–C6 fusion.

Introduction

A synovial cyst is defined as an intraspinal, extradural extrusion of the synovium through a capsular defect from a degenerate or unstable facet joint.¹ It is internally lined with a pseudostratified columnar cell layer and contains clear fluid based on histologic analysis.² Symptomatic synovial cysts are much more commonly located in the lumbar spine compared with the cervical spine.³ The etiology of synovial cysts in the cervical spine is multifactorial and remains...
uncertain. It is thought that they start with facet joint degenerative change and erosion through the wall of the joint capsule, triggered by hypermobility or a traumatic event. Inflammatory factors may also play an important role in the development, with upregulation of angiopoietin-1, basic fibroblastic growth factor, substance P, platelet-derived growth factor, and interleukins at the site of the mechanically stressed facet joints contributing to the synovial hyperplasia and leading to cyst formation. Furthermore, cervical synovial cysts have most commonly been reported at the cervicothoracic junction (C7–T1), suggesting a predilection for cyst development at a transitional junction between the mobile and fixed segments of the spine.

The natural history of symptomatic cervical spine synovial cysts is generally assumed to be associated with slow, stepwise progression of symptoms and signs once there is compression of the spinal cord and/or exiting cervical nerve roots. Indeed, only one case report of spontaneous resolution of a cervical synovial cyst has been described in the literature. The rapid deterioration of symptoms is thought to be due to hemorrhage into the synovial cysts, where trauma may play a role in the acute expansion. Computed tomography (CT) myelography and magnetic resonance imaging (MRI) are the most useful diagnostic investigations, delineating the synovial cyst arising extradurally next to degenerated facet joints, the presence of fluid within the cyst, and the extent of cyst compression of the spinal cord and/or exiting the cervical nerve roots.

Surgery is indicated in the presence of severe pain and neurologic compromise and involves decompression of the cyst and the associated neural elements. Hemilaminectomy is the surgical treatment most commonly reported in the literature; however, other procedures have been described such as a full laminectomy, CT aspiration, and an anterior corpectomy. We describe the clinical presentation, radiologic findings, and surgical treatment of a C5–C6 facet joint synovial cyst associated with spondylolisthesis and the symptoms of cervical radiculomyelopathy treated by posterior excision of the cyst, decompressive laminectomy, and posterior lateral instrumented fusion from C4 to C6.

**Case Report**

A 67-year-old man presented with a 6-month history of pain that started in his right lower limb and developed into progressive ataxia, pins and needles in the fingers, and numbness of both hands not linked to any known traumatic episode. Over several weeks, his pain and ataxia worsened, and he developed decreased sensation and weakness of his lower limbs and occasional urinary incontinence.

The physical examination revealed loss of straight leg raise, hyperreflexia of his right upper limb, decreased sensation of his right lower limb, and a positive Romberg’s sign. The patient underwent MRI of his lumbar and cervical spines as well as CT of his brain. MRI of his cervical spine identified vertebral canal and bilateral neuroforaminal stenosis at C5–C6 secondary to degenerative subluxation of C5–C6 facet joints and a 3.3 × 4.3-mm extradural heterogeneous T1-weighted hypointense and T2-weighted hyperintense mass. Vertebral canal stenosis at C5–C6 secondary to: (1) degenerative subluxation with grade I anterolisthesis of C5 on C6; (2) a 4-mm extramedullary, probably intradural mass protruding into the vertebral canal from the C5 lamina/ligamentum flavum/dura. The cord demonstrates abnormal high T2-weighted signal at the level of compression. (b) Axial T2-weighted MRI of C5–C6. Bilateral facet joint degenerative changes, cord compression, and severe bilateral neural exit foraminal stenosis with associated neural compression. Contributing to the canal stenosis there is a 3.3 × 4.3-mm extradural mass. (c) Postcontrast axial fat-suppressed images suggest homogeneous enhancement of the mass.

**Fig. 1** (a) Sagittal T2-weighted magnetic resonance imaging (MRI). Vertebral canal stenosis at C5–C6 secondary to: (1) degenerative subluxation with grade I anterolisthesis of C5 on C6; (2) a 4-mm extramedullary, probably intradural mass protruding into the vertebral canal from the C5 lamina/ligamentum flavum/dura. The cord demonstrates abnormal high T2-weighted signal at the level of compression. (b) Axial T2-weighted MRI of C5–C6. Bilateral facet joint degenerative changes, cord compression, and severe bilateral neural exit foraminal stenosis with associated neural compression. Contributing to the canal stenosis there is a 3.3 × 4.3-mm extradural mass. (c) Postcontrast axial fat-suppressed images suggest homogeneous enhancement of the mass.
lentiform mass. It was inseparable from the left C5 lamina and ligamentum flavum and was compressing the left posterolateral aspect of the spinal cord and exiting the left C6 nerve root. The cervical spinal cord demonstrated an abnormally high intramedullary T2 signal at the level of the compression (►Fig. 1). The lumbar spine MRI and brain CT were normal.

The patient subsequently underwent uncomplicated posterior cervical surgery that involved C5–C6 posterior decompressive laminectomy, excision of the left C5–C6 facet joint cyst and the undersurface of that facet joint, wide decompression of the exiting left C nerve root, and C4–C6 posterolateral instrumented fusion with lateral mass screws and rods (►Fig. 2). Intraoperative findings included a large extradural cyst adjacent at C5–C6 left facet adhering to both dura and flavum ligament causing left posterolateral cord compression and exiting the left C6 nerve root, causing compression. The cyst contained mixed tissue and the wall continued until the left C5–C6 facet joint capsule.

After the surgery, the patient experienced an uneventful recovery with immediate relief of radicular and myelopathic symptoms. He was discharged 4 days postoperatively with a soft collar. At the 3-month postoperative clinical review, he described complete resolution of his preoperative symptoms, regaining full motor power and sensation in his upper and lower limbs. At the 6-month clinical review, the patient remained asymptomatic.

**Discussion**

Synovial cysts in the subaxial cervical spine are rare, but when they occur, they are most commonly described at the level of C7–T1. Lyons et al reported 35 cases of cervical synovial cysts where the most common level of synovial cyst removal was C7–T1 in 17 patients, compared with only three patients experiencing problems at the C5–C6 level. It is uncertain why this level is most commonly affected, as the same physiologic mechanisms occur along the entirety of the subaxial spine and despite increased degeneration occurring at the higher subaxial cervical levels. There are only six cases of symptomatic synovial cysts at the level of C5–C6 described.

**Table 1** C5–C6 synovial cyst: literature review

| Author         | Year | Study design   | No. of patients | Age (y) | Follow-up (mo) | Procedure                  | Comments                                      |
|----------------|------|----------------|-----------------|---------|----------------|----------------------------|-----------------------------------------------|
| Uschold et al15 | 2013 | Case series    | 12: C7–T1 (6),  | 67      | 3              | C5–C6 decompression        | None                                          |
|                |      |                | C4–C5 (2), C5–C6|         |                |                            |                                               |
|                |      |                | (1), C6–C7 (3)  |         |                |                            |                                               |
| Lyons et al5   | 2011 | Case series    | 35: C7–T1 (17), | Mean 69 | 70 (C5–C6 case)| C5 and C6 hemilaminectomy | Mean age at presentation was 69 y (range, 33–82) |
|                |      |                | C4–C5 (8), C3–C4|         |                |                            |                                               |
|                |      |                | (5), C5–C6 (3), |         |                |                            |                                               |
|                |      |                | C2–C3 (2)       |         |                |                            |                                               |
| Moon et al16   | 2010 | Case report    | 1               | 74      | 4              | C5 and C6 partial hemilaminectomy | 20-month previously anterior cervical discectomy and fusion C4–C5 |
| Chaoui et al17 | 2000 | Case report    | 1               | 74      | None           | C4 and C7 hemilaminectomy  | None                                          |
we excised most of the C5 lateral mass to decompress and excise the C5–C6 facet joint cyst. Spondylololysis plus laminectomy are known to be risk factors for segmental instability.\textsuperscript{15}

Synovial cysts can only be distinguished by their histologic findings and can often be confused with ganglion cysts.\textsuperscript{1} Synovial cysts are lined with pseudostratified columnar cells containing clear fluid compared with ganglionic cysts, which have a connective tissue capsule without a mesothelial lining.\textsuperscript{5} Cysts composed of nonspecific degenerative fibrous granulation tissue are possibly of synovial origin. The histologic examination of the resected cyst in our patient revealed a cystic cavity with a partial synovial lining and nonspecific degenerative fibrous tissue. The cyst wall had an irregular contour and areas of adherent fibrin features, which were compatible with histologic findings in synovial cysts (\textit{\small Fig. 3}).

Our patient had an uneventful recovery without recurrence of any symptoms at 6 months postsurgery. No case of recurrence has been described so far in the literature. If the cyst has been properly excised, the chance of recurrence remains low.\textsuperscript{5}

\section*{Conclusion}

The relative rarity of these lesions and the limited number of cervical synovial cysts has led to few case reports. Hemilaminectomy with synovial resection has excellent results after follow-up with good recovery. In the presence of additional spondylolysis, we recommend supplementary instrumented fusion to eliminate the risk of secondary instability and reoperation. Good results can be obtained after surgery.

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\section*{Disclosures}

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