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

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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 × 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.

Keywords

- subaxial cervical spine
- synovial cyst
- spondylolisthesis
- fusion C4–C6
- laminectomy

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

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uncertain.⁴ It is thought that they start with facet joint degenerative change and erosion through the wall of the joint capsule, triggered by hypermobility^{5,6} or a traumatic event.^{5,7} 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.⁵ 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.⁵

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.⁸ 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.⁹ 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.^{5,10–13}

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,¹⁴ and an anterior corpectomy.⁹ 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 posterolateral 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

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 extradural, 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. 2 Anteroposterior and lateral postoperative X-rays. C4–C6 fusion with transpedicular screws and rods.

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–T1.⁵ 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 patient experiencing problems at the C5–C6 level.⁵ 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.³ 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 al ¹⁵	2013	Case series	12: C7–T1 (6), C4–C5 (2), C5–C6 (1), C6–C7 (3)	67	3	C5–C6 decompression	None
Lyons et al ⁵	2011	Case series	35: C7–T1 (17), C4–C5 (8), C3–C4 (5), C5–C6 (3), C2–C3 (2)	Mean 69	70 (C5–C6 case)	C5 and C6 hemilaminectomy	Mean age at presentation was 69 y (range, 33–82)
Moon et al ¹⁶	2010	Case report	1	74	4	C5 and C6 partial hemilaminectomy	20-month previously anterior cervical discectomy and fusion C4–C5
Chaoui et al ¹⁷	2000	Case report	1	74	None	C4 and C7 hemilaminectomy	None

Fig. 3 (A) Photomicrograph showing synovial cyst and adjacent structures ($\times 100$). (B) Photomicrograph showing synovial lining and fibrin compatible with synovial cyst ($\times 200$).

in the literature; all patients were over 65 years of age, with no gender predominance, and all were treated with posterior decompressive surgery alone ($\rightarrow$ **Table 1**).^{5,15–17}

Most cases described in the literature reported symptoms of radiculopathy, with myelopathic signs being quite rare. Our case presented with both radiculopathy and myelopathic signs in both the upper and lower limbs that developed over a period of 6 months. The MRI findings play a fundamental role for the establishment of both an accurate diagnosis and efficient treatment, and similar MRI findings have been described in other reports.^{5,15–17}

Surgical resections of both cervical and lumbar synovial cysts are an effective treatment for the cysts causing symptomatic compression of the adjacent neural structures. All reported cases of cysts at C5–C6 were treated with hemilaminectomy, excision, and removal of the synovium within the facet joint, which is mandatory. No complications were described and excellent results were achieved.^{5,15–17} In the report by Lyons et al,⁵ 21 patients were treated with hemilaminectomy and resection of the cyst, and 14 with laminectomy ($\rightarrow$ **Table 1**). In all 35 cases, the synovia of the facet joint was resected. Of the laminectomy patients, four had preoperatively identified spondylolisthesis with abnormal movement on flexion and extension views and therefore underwent a full decompressive laminectomy, synovial cyst resection, and posterior instrumented fusion. The C5–C6 cases underwent a hemilaminectomy; no fusion was performed. In our case, we decided to precede with C4–C6 instrumentation after decompression, due to the grade I spondylolisthesis at the C5–C6 level ($\rightarrow$ **Fig. 1a**) and because

we excised most of the C5 lateral mass to decompress and excise the C5–C6 facet joint cyst. Spondylolisthesis plus laminectomy are known to be risk factors for segmental instability.¹⁵

Synovial cysts can only be distinguished by their histologic findings and can often be confused with ganglion cysts.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.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 ($\rightarrow$ **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.⁵

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 spondylolisthesis, 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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Disclosures

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References

- 1 Cho BY, Zhang HY, Kim HS. Synovial cyst in the cervical region causing severe myelopathy. *Yonsei Med J* 2004;45(3):539–542
- 2 Khan AM, Girardi F. Spinal lumbar synovial cysts. Diagnosis and management challenge. *Eur Spine J* 2006;15(8):1176–1182
- 3 Shima Y, Rothman SL, Yasura K, Takahashi S. Degenerative intraspinal cyst of the cervical spine: case report and literature review. *Spine (Phila Pa 1976)* 2002;27(1):E18–E22
- 4 Kjerulf TD, Terry DW Jr, Boubelik RJ. Lumbar synovial or ganglion cysts. *Neurosurgery* 1986;19(3):415–420
- 5 Lyons MK, Birch BD, Krauss WE, Patel NP, Nottmeier EW, Boucher OK. Subaxial cervical synovial cysts: report of 35 histologically

- confirmed surgically treated cases and review of the literature. *Spine (Phila Pa 1976)* 2011;36(20):E1285–E1289
- 6 Holtzman RN, Dubin R, Yang WC, Rorat E, Liu HM, Leeds NE. Bilateral symptomatic intraspinal T12–L1 synovial cysts. *Surg Neurol* 1987;28(3):225–230
 - 7 McGuigan C, Stevens J, Gabriel CM. A synovial cyst in the cervical spine causing acute spinal cord compression. *Neurology* 2005; 65(8):1293
 - 8 Colen CB, Rengachary S. Spontaneous resolution of a cervical synovial cyst. Case illustration. *J Neurosurg Spine* 2006;4(2):186
 - 9 Jabre A, Shahbadian S, Keller JT. Synovial cyst of the cervical spine. *Neurosurgery* 1987;20(2):316–318
 - 10 Farrokh D. Lumbar intraspinal synovial cysts of different etiologies: diagnosis by CT and MR imaging. *J Belge Radiol* 1998;81(6): 275–278
 - 11 Davis R, Iliya A, Roque C, Pampati M. The advantage of magnetic resonance imaging in diagnosis of a lumbar synovial cyst. *Spine (Phila Pa 1976)* 1990;15(3):244–246
 - 12 Conrad MR, Pitkethly DT. Bilateral synovial cysts creating spinal stenosis: CT diagnosis. *J Comput Assist Tomogr* 1987;11(1): 196–197
 - 13 Apostolaki E, Davies AM, Evans N, Cassar-Pullicino VN. MR imaging of lumbar facet joint synovial cysts. *Eur Radiol* 2000;10(4): 615–623
 - 14 Kostanian VJ, Mathews MS. CT guided aspiration of a cervical synovial cyst. Case report and technical note. *Interv Neuroradiol* 2007;13(3):295–298
 - 15 Uschold T, Abl AA, Fusco D, Bristol RE, Nakaji P. Supracerebellar infratentorial endoscopically controlled resection of pineal lesions: case series and operative technique. *J Neurosurg Pediatr* 2011;8(6):554–564
 - 16 Moon HJ, Kim JH, Kim JH, Kwon TH, Chung HS, Park YK. Cervical juxtafacet cyst with myelopathy due to postoperative instability. Case report. *Neurol Med Chir (Tokyo)* 2010;50(12):1129–1131
 - 17 Chaoui FM, Njee-Bugha T, Figarella-Branger D, Peragut JC. [Synovial cyst of cervical spine]. *Neurochirurgie* 2000;46(4):391–394