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GRAND ROUNDS

Atypical presentation of a cervical synovial cyst

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Abstract

Introduction Synovial cysts of the cervical spine are rare. These lesions have been associated with other spinal conditions as osteoarthritis, spondylolisthesis, and disc degeneration, with authors postulating a possible link with segmental spinal instability. This study aims to describe an atypically presenting case of a cervical synovial cyst.
Case report A 65-year-old man presented with complaints of cervical radicular pain (VAS of 7) that evolved with development of paresthesia and muscular weakness, compatible with C8 right compression. This symptomatology had an odd pattern with total regression of symptoms when lying supine or upon extreme efforts, leading to a delayed referral to MRI. A C7–T1 synovial cyst was identified, compressing the C8 nerve root. The patient was submitted to decompression and instrumented fusion of the affected level and showed total regression of symptoms.
Conclusions Although rare, cervical synovial cysts are associated with a significant impairment in patients' daily activities. The atypical pattern of symptoms described in this case may be associated with the fluid content of the cyst, with postural changes causing different degrees of root compression. Most authors agree on a surgical option, but the need for associated fusion is still under debate.

Keywords Cervical spine · Synovial cyst · Radiculopathy · Spine surgery

Introduction

The first case of a spinal synovial cyst was reported more than a century ago [1]. Since then, many cases were reported at all spine levels [2], but mainly on the lumbar spine [3]. These are described as cystic dilatations of the synovial sheaths, lined by a synovial epithelium of pseudostratified columnar cells containing clear fluid [1, 2], which allows their differentiation from the ganglion cysts that have no mesothelium lining [2]. A recent review of the literature showed that their occurrence in the cervical spine is rare, with few cases reported [2]. These are more common at the C7–T1 level, and patients usually have clinical manifestations of myelopathy and/or radiculopathy with variable severity [1, 2, 4].

The purpose of this study is to describe an atypically presenting case of cervical synovial cyst.

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Case presentation

A 65-year-old highly active man presented to his assistant physician with a history of pain that started over his right scapula, and then migrated to the lateral side of his right arm and fingers. No trauma or predisposing event was identifiable. The pain disappeared when lying supine or upon extreme efforts, such as digging and riding karts, and slowly reappeared in the first 10 min of activity stop. Considering this odd symptomatology pattern, these complaints were underestimated, and general painkillers were prescribed. However, after 3 months of complaints, a new medical appointment revealed a progressive worsening, with development of paresthesia, weakness and numbness of his right hand and arm, and intense pain (VAS score of 7). His assistant physician performed a corticosteroid spinal infiltration, resulting in amelioration of symptoms (VAS score of 4). The patient was then referred to our spine group. Upon admission, a rigorous physical examination showed signs of an ataxia. No symptoms of sphincters or sympathetic dysfunction were present. The physical examination revealed hyperreflexia of his right upper limb, with hypesthesia, diminished muscular strength (3/5), and a positive Romberg's sign.

Diagnostic imaging section

The X-ray showed non-specific degenerative spine changes, including a subtle C7–T1 spondylolisthesis, with no visible lesions (Fig. 1). The MRI revealed what appeared to be a cystic mass at the C7–T1 level, hypointense on T1-weighted images, and hyperintense on T2-weighted images, located in the posterior-lateral right aspect of the extradural space, adjacent to the right C7–T1 facet joint, with marked compression of the spinal cord. This mass was apparently continuous with the facet joint, which was also hyperintense on T2-weighted images (Fig. 2).

Historical review of the condition, epidemiology, diagnosis, pathology, and differential diagnosis

The first case of a spinal synovial cyst was reported more than a century ago [1]. Although more frequent in the lumbar segment, these lesions can appear in any spine level. Only a few cases are reported on the cervical spine, more common at the C7–T1 level [1–4].

The pathophysiology of spinal cysts is still unknown. Traumatic, degenerative, congenital, and inflammatory causes have all been described [5]. Degeneration of the synovial facet joints, osteoarthritis, spondylolisthesis, and disc degeneration, associated over time with capsular defects, leads to segmental spinal instability, with formation of the cyst [3]. The mechanical stress posed on these joints leads to upregulation of multiple factors, as angiopoietin-1, basic fibroblastic growth factor, substance P, platelet-derived growth factor, and interleukin-1 and 6, with consequent synovial hyperplasia, neovascularization, and exudation of fluid, resulting in formation of the cyst [2, 4, 6]. The increased frequency of cyst formation on the

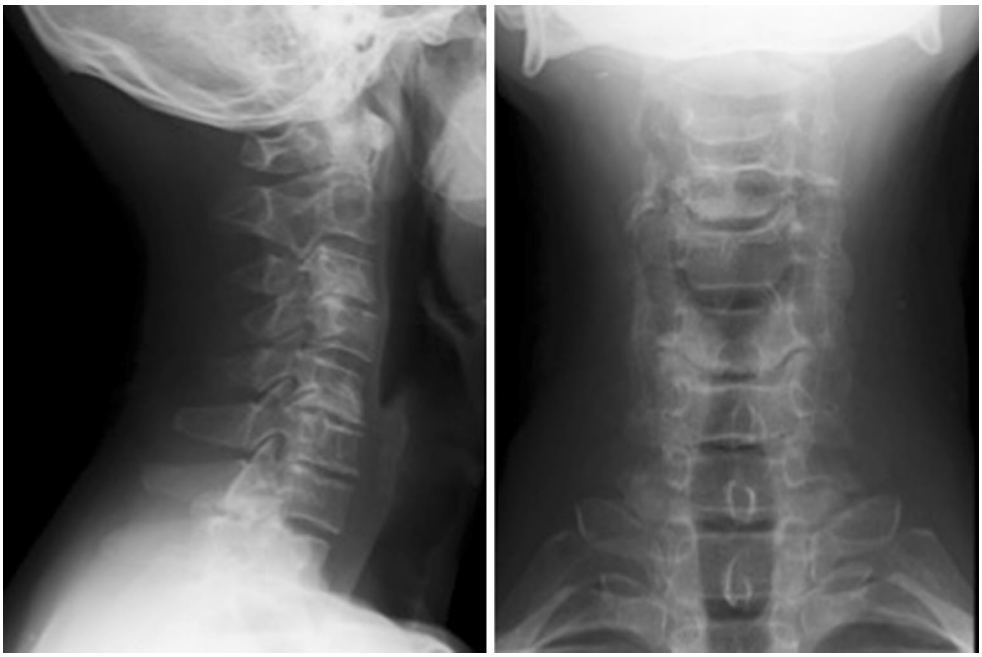

Fig. 1 Lateral and antero-posterior X-ray views of the cervical spine. A grade I spondylolisthesis on C7–T1 level can be visualized

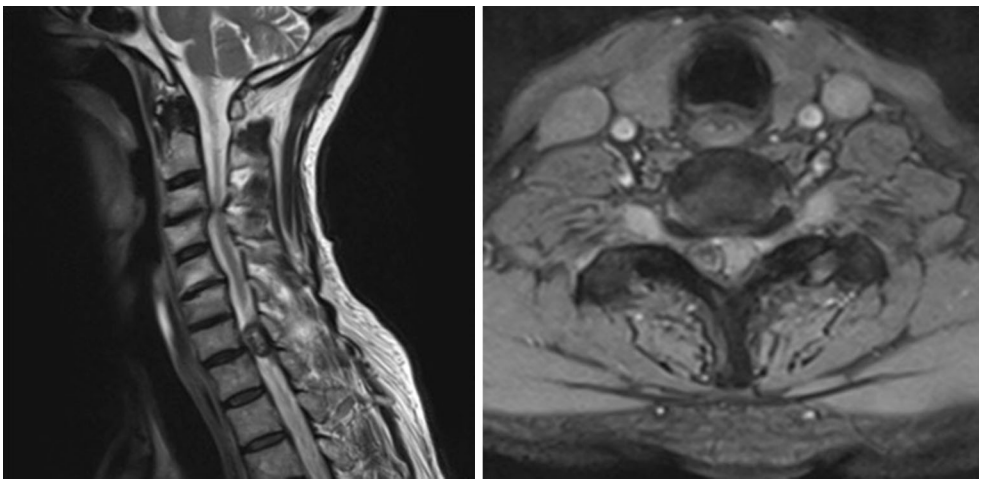

Fig. 2 Parasagittal and axial MRI showing the cyst and its relationship with the spinal cord

C7–T1 joint may be explained by a transitional facet joint that is subjected to biomechanical forces inexistent at higher spinal levels, resulting in local hypermobility.

These lesions may be clinically silent or present with clinical manifestations of myelopathy and/or radiculopathy with variable severity, depending on their size, site, and relationships [1, 2, 4]. Although big cysts can cause bilateral compression, radicular symptoms are usually ipsilateral to the lesion [7]. Patients can also present with aggravating symptoms or with variable complaints, due to changes in the content of this mass [7].

X-ray of these patients may reveal segmental instability, commonly associated with these lesions. Computed Tomography (CT) identifies the majority of spinal cysts, especially when associated with calcification or when air content is present [1, 8]. Nevertheless, Magnetic Resonance Imaging (MRI) is the most accurate image modality. It has a higher sensitivity, and allows a better characterization of the lesion, its extent, as well as compression of nearby structures and possible adhesions, helping in the planning of a possible surgical management [3, 8]. Usually, they present as iso or hypointense on T1- and hyperintense masses on T2-weighted images, enhanced peripherally after administration of gadolinium [1, 8, 9]. Occasionally, the synovial cysts may appear hypointense on both T1- and T2-weighted images, probably associated with solid consolidation of its content. Continuity with the facet joint may also be visible [7]. Although not always identified in the MRI, this communication is present and enables the filling and emptying of the cyst, explaining floating symptoms with different mechanical stresses and postural changes of the spine [7, 10].

A definitive diagnosis is only possible upon histological analysis. Synovial cysts are dilatations lined with synovial epithelium of pseudostratified columnar cells, opposing ganglion cysts that have no mesothelium lining [1, 2]. However, this distinction has no therapeutic or prognostic value [1]. Other possible differential diagnoses include disc herniation, metastatic disease, meningioma, schwannoma, cystic neurofibroma, dermoid cyst, parasitary cyst, perineural cyst, extradural arachnoid cyst, hypertrophic synovitis and hypertrophic-pigmented villonodular synovitis, and other less common conditions [1].

In the case presented, the patient showed progressively worsening symptoms that can be explained by a possible expansion of the cyst already described by previous authors that documented this occurrence with serial MRI [11]. One may speculate that fluctuating symptoms and the odd pattern described in the early follow-up period may be due to postural changes, associated with different fluid distributions in the cyst, leading to odd complaints [7] that may obscure the presence of an actual spinal lesion and postpone an adequate and timely diagnosis.

Rationale for treatment and evidence-based literature

Management of patients with cervical synovial cysts is dictated by associated clinical manifestations. Silent lesions can be managed with close follow-up, since spontaneous cyst regressions are well documented in the literature, mainly associated with withdrawal of the mechanical stresses [6, 8].

Upon compressive symptoms that warrant a more aggressive approach, many treatment options have been described.

Steroid injection in spinal cysts is nowadays a matter of debate. Although its use is increasing, many authors defend that it is associated with high failure rates [8].

Percutaneous aspiration was proposed as a less invasive approach. Cyst content may influence the possibility of

aspiration. The most common gelatinous type is not easily aspirated, and even after fluid removal, the fibrous capsule that remains may contribute to clinical compressive symptoms [12]. In most cases, aspiration only delivers temporary improvement, and is accompanied by risks of neurologic complications, even if performed under CT or MRI guidance. Therefore, it is only recommended when surgery is contra-indicated due to associated comorbid conditions [13].

Many surgical options were described for patients with spinal cysts. Decompression of the spinal cord and the root raises the odds of a good neurological recovery after surgery, and excellent results after follow-up were reported [9, 13]. Recurrence is unlikely if the excision is adequate and any surgical option must evolve total excision of the lesion [2, 9, 13]. Cysts are usually attached to the adjacent dura mater, but their removal can usually be performed without difficulty [9].

Minimally invasive surgery and open decompressions with and without instrumented fusion are possible options. Decompression can be achieved with an open door laminoplasty or with a total or partial laminectomy on the affected side. Nevertheless, removal of the synovium within the facet joint is mandatory to prevent recurrence [2, 13]. In the presence of instability, as pre-operative spondylolisthesis or after wide resection of posterior elements, a supplementary instrumented fusion is recommended [2].

Since these lesions are extremely rare, no strict guidelines are available on their therapeutic management. However, authors seem to agree that surgical excision associated with an appropriate decompression delivers the best outcome [8], and is nowadays considered the standard treatment, especially in patients with neurologic complaints [9]. Nevertheless, a plethora of surgical techniques is available and the ideal option remains a matter of debate and varies depending on the cyst size, its adhesion to the dura, the presence of concomitant local pathologies, and the type of resection or decompression performed [3, 6, 8].

In the case presented, a big cystic lesion was found adjacent and anterior to the right C7–T1 facet joint, compressing both the spinal cord and the C8 nerve root. Right-side hemilaminectomy and partial facetectomy were needed for adequate decompression and complete removal of the synovium. Both the spondylolisthesis at the affected level and the extensive removal of posterior elements contribute for an increased instability at the C7–T1 level. Accordingly, the need for an instrumented fusion can be anticipated, being the most consensual approach to this case.

Procedure (surgery/intervention)

The patient underwent surgical treatment, with a standard posterior approach. After right-side hemilaminectomy and partial facetectomy, the cyst was identified, adjacent to the facet joint, compressing the spinal cord and the exiting C8 nerve root (Fig. 3). The lesion and the remaining synovium were totally resected, allowing a full decompression. A C7–T1 pedicle screws instrumented fusion was then performed, to avoid further instability (Fig. 4).

Pathological examination of cyst fragments showed fibrous connective tissue with a synovial cell lining, compatible with a synovial cyst.

Procedure imaging section

Figures 3 and 4.

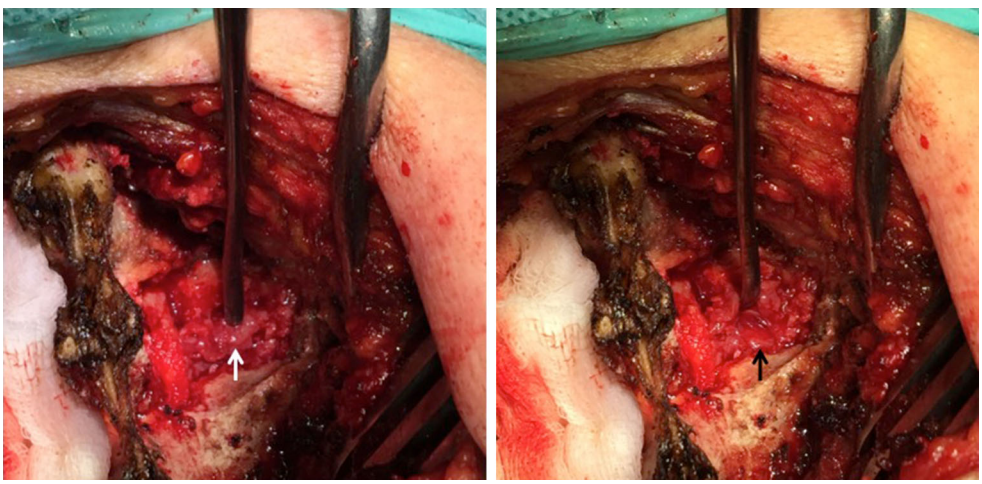

Fig. 3 Intraoperative images, showing the cyst (*white arrow*) and its relationship to the C8 nerve root (*black arrow*)

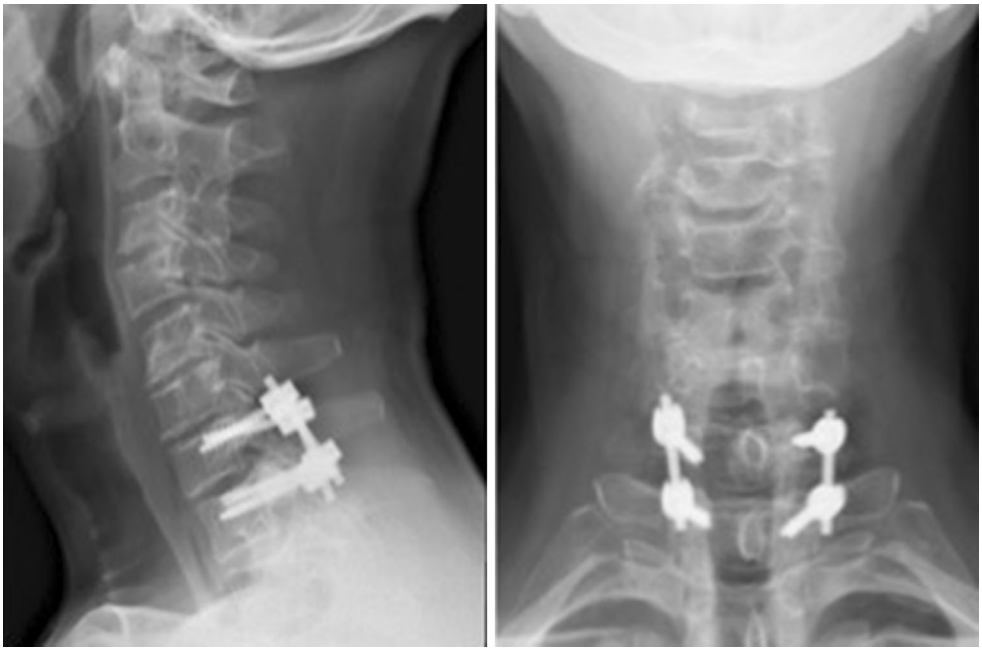

Fig. 4 Lateral and antero-posterior X-ray views of the cervical spine at 1-year follow-up

Outcome, follow-up

A full neurological recovery was achieved, and at 3-month follow-up, the patient was pain free (VAS score of 0) and even proudly reported having a tractor rollover a week before appointment with no symptomatic repercussions. X-ray showed evidences of a solid fusion. The patient then resumed his usual daily activities with no restrictions, and no symptomatic changes were noted in the following evaluations.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest. No author received any funding or compensation related to the development of this paper.

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