



Disponible en ligne sur

ScienceDirect  
www.sciencedirect.com

Elsevier Masson France

EM|consulte  
www.em-consulte.com



Short clinical case

## Bilateral synovial cyst of the thoracic spine causing paraparesis

S.J.M. Giovannini\*, H. Pinto, P. Marino, A. Cervio

Department of Neurosurgery, FLENI, Montañeses 2325, CP1428 Buenos Aires, Argentina



### ARTICLE INFO

#### Article history:

Received 11 November 2018  
Received in revised form 24 January 2019  
Accepted 9 March 2019  
Available online 29 March 2019

#### Keywords:

Cervicothoracic synovial cyst  
Bilateral synovial cyst  
Instability  
Instrumented fusion  
Surgical excision

### ABSTRACT

Spinal synovial cysts are degenerative extradural lesions mostly found in the lumbar region, and more rarely at cervical or thoracic levels and in a bilateral presentation. We report a patient with a history of progressive paraparesis associated with bilateral cervicothoracic synovial cysts, causing spinal canal narrowing and cord compression, ultimately resulting in myelopathy. A review of the literature summarizes previous reports on this topic. Surgical excision of the extradural mass, decompression of the spinal canal and instrumented fusion were performed, improving lower limb deficit and gait. Post-surgical MRI showed evidence of complete cyst resection, and good arthrodesis consolidation with adequate sagittal balance. Surgical excision is indicated in case of medical treatment failure or increasing symptom severity. Given the strong pathophysiological link between synovial cysts and spinal instability, concomitant instrumented fusion may help improve outcome.

© 2019 Elsevier Masson SAS. All rights reserved.

### 1. Introduction

Spinal synovial cysts are degenerative extradural lesions mostly found in the lumbar region, and more rarely at cervical or thoracic levels [1,2]; even more uncommon is a bilateral presentation. We report a case of bilateral synovial cysts at cervicothoracic level. Surgical outcome is described, together with a review of the literature on this topic. Informed consent was obtained from all participants included in the study.

### 2. Case Report

A 56-year-old male presented with progressive motor weakness, sensory loss in the lower limbs for three months, and left subcostal pain with bilateral numbness along the C8 distribution. The patient was wheelchair-bound at the time, but without bowel or bladder incontinence. Physical examination revealed predominantly proximal paraparesis (MRC score: 3/5), impaired distal proprioception, and bilateral patellar and Achilles tendon hyperreflexia.

MRI of the cervical and dorsal spine with contrast enhancement showed narrowing of the spinal canal between C7 and D1. Spinal cord signal changes were caused by an extradural mass, posterior in relation to facet joints on each side, hyperintense on T2 with minimal peripheral enhancement by intravenous contrast,

and hypersignal in the posterior ligamentous complex on weighted short-tau inversion recovery (STIR) sequences (Fig. 1). Findings were interpreted as bilateral symptomatic joint facet synovial cysts.

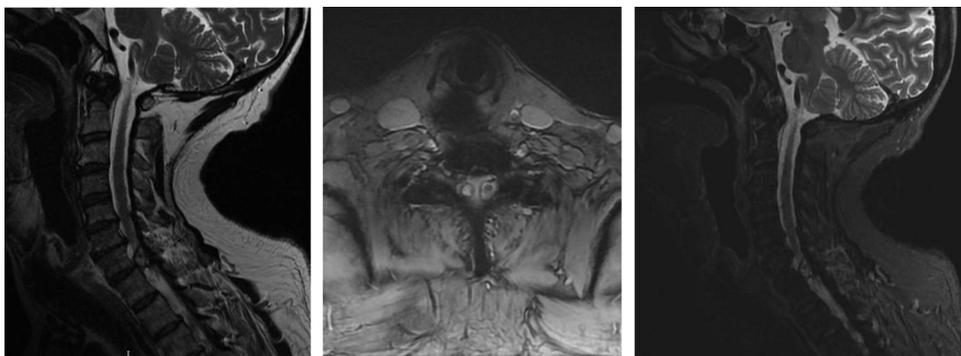
Wide decompression of the spinal cord canal between C7 and D2 was performed, followed by complete surgical excision of both lesions (Fig. 2). Pedicle screw instrumentation, with C6 to D3 “rod” fixation and “fusion using autogenous” bicortical “iliac crest” graft, was implemented. Postoperative course was uneventful and the patient showed immediate improvement of radicular pain, although neurological deficit persisted. Five days after the procedure, the patient was discharged and referred for outpatient physical therapy. Histological examination of the surgical specimen was compatible with juxtafacet synovial cyst (Fig. 3).

Three months after surgery, the patient presented full recovery of lower limb motor function, gait and balance, and was able to perform daily life activities independently. MR images of the cervical and thoracic spine showed complete spinal cord release, and no residual cyst (Fig. 4). Postoperative control was completed with cervicothoracic spine CT and X-ray, to check pedicle screw position and screen for radiological signs of arthrodesis consolidation and adequate balance.

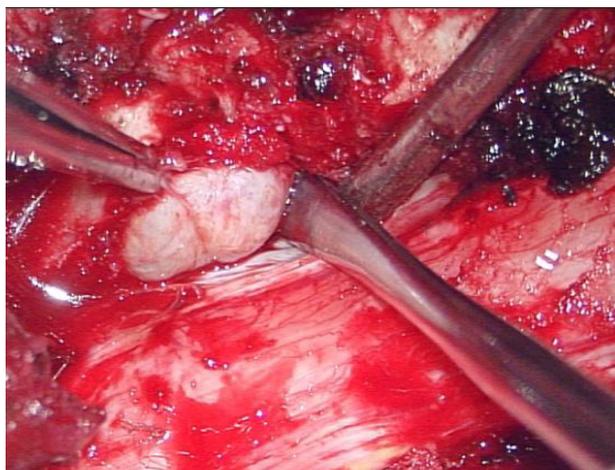
### 3. Discussion

Juxtafacet synovial cysts are extradural lesions located on the medial aspect of the joint facet, projecting into the spinal canal [3–6]. The most frequent symptoms are low-back pain and symptoms related to radicular involvement, although signs of myelopathy may also be present [1,4–10].

\* Corresponding author at: ÔHiggins 2470, CP1428, Buenos Aires, Argentina.  
E-mail address: sgiovannini@fleni.org.ar (S.J.M. Giovannini).



**Fig. 1.** MRI of the cervical spine showing severe spinal cord compression at C7-D1 level caused by two extradural lesions hyperintense on T2-weighted images, in contact with the joint facet. Signs of myelopathy can be observed. The STIR sequence presents hypersignal of the posterior longitudinal ligament complex.

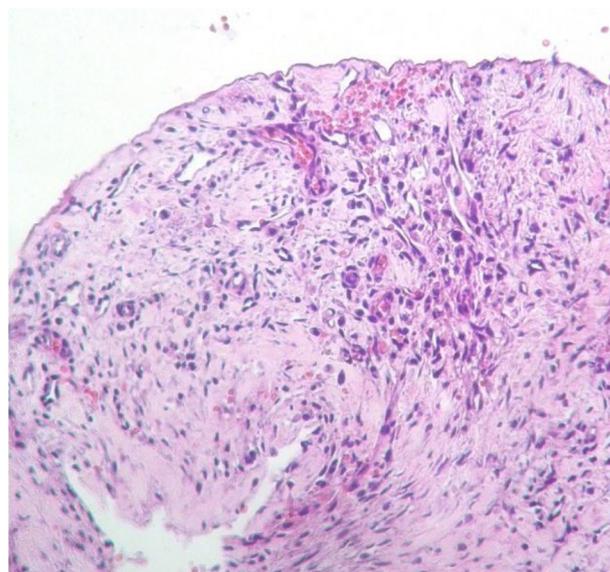


**Fig. 2.** Intraoperative findings showing C7-D2 laminectomy and exposure of the right synovial cyst in contact with the joint facet.

Differential diagnoses include disc herniation, meningioma, neuroma, and arachnoid cyst [11–13].

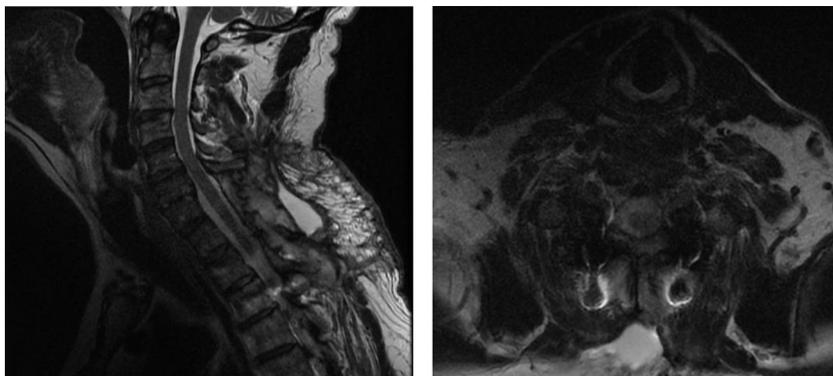
Synovial cysts communicate with the joint facet, are lined by pseudo-stratified columnar epithelium, and contain clear serous fluid [8,13–15].

Magnetic resonance is the best imaging method for diagnosis, showing the extradural lesions in contact with the medial aspect of the joint facet, with high intensity on T2 sequences similar to CSF, with a hypointense halo corresponding to the fibrous capsule. On T1-weighted images, signal is hypointense, showing contrast enhancement in 50% of cases [1,3,6,9,11,12,14–16].



**Fig. 3.** Histology, showing fibrous capsule with chronic inflammatory process and erosion of epithelium.

The main pathophysiological hypothesis of synovial cyst formation is that they result from joint facet degeneration, causing weakness in the joint capsule. This leads to herniation of the synovial capsule with its liquid content, forming a cyst in communication with the facet. The degenerative process generally occurs in areas of excessive movement, such as in spondylolisthesis and trauma among other causes [1,3,6,11,13,15,17], making spinal



**Fig. 4.** MRI of the cervical spine 3 months after surgery. Absence of both juxtafacet cysts and appropriate spinal cord release can be observed, as well as artifacts generated by the pedicle screws.

instability the main risk factor in spinal synovial cyst pathogenesis [5–9,17,18].

In our case, the patient presented several signs of osteodegenerative disease, suggesting instability as the main factor in the development of the synovial cysts. CT showed grade I anterolisthesis of C7-D1 and rectification of the cervical spine with incipient progressive kyphosis. In the dorsal column there was an increase in dorsal kyphosis, with anterior wedging of the vertebral bodies between D7 and D12 (Fig. 5). MRI showed damage to the C5-C6 and C6-C7 intervertebral spaces, associated with Modic II signal changes at the same levels and hypersignal in the posterior ligamentous complex on STIR sequence.

All these findings explain the increased moment arm in the cervicothoracic junction, which is just above the dorsal segment, with much less movement, and the resulting development of synovial cysts.

A great majority of cysts develop in the lumbar spine (97%), and are rarely found at cervical or thoracic levels [1,2,19]. The cervicothoracic junction (C7-D1 segment) is the most frequent site, probably as a result of the greater mobility of this segment of the spine [14].

Due to its anatomical characteristics, the thoracic spine displays less mobility and therefore a lower rate of synovial cysts (<1%). To date, only 43 cases of thoracic synovial cysts have been reported, including those at the cervicothoracic and the thoracolumbar junction. Bilateral synovial cysts are even more rare, with only 11 cases reported in the literature (Fig. 6).

Conservative management is the most common treatment for spinal cysts, comprising analgesics, immobilization and CT-guided fine-needle aspiration biopsy. Aspiration with or without injection of steroids generally relieves pain [6,9,19].

In case of medical treatment failure, or in patients who develop neurological deficit, surgical removal of the lesion may result in remarkable symptom improvement [6,9,19].

Surgical treatment involves complete synovial cyst resection through a hemilaminectomy or laminectomy approach, with or without facetectomy [5–7,9,10,18]. Concomitant instrumented fusion may be indicated [6,17,18]. In the vast majority of patients reported in the literature, decompression and resection of the cyst without instrumentation was the choice [1,11,17,20]. However, in the present case we decided to take a more aggressive attitude. The patient presented severe progressive neurological disease and multiple signs of spinal instability, which led to the genesis of the lesions. For this reason, we decided to perform wide



Fig. 5. CT scan showing grade I anterolisthesis of C7-D1 and rectification of the cervical spine. The dorsal column presents an increase in dorsal kyphosis with anterior wedging of the vertebral bodies between D7 and D12.

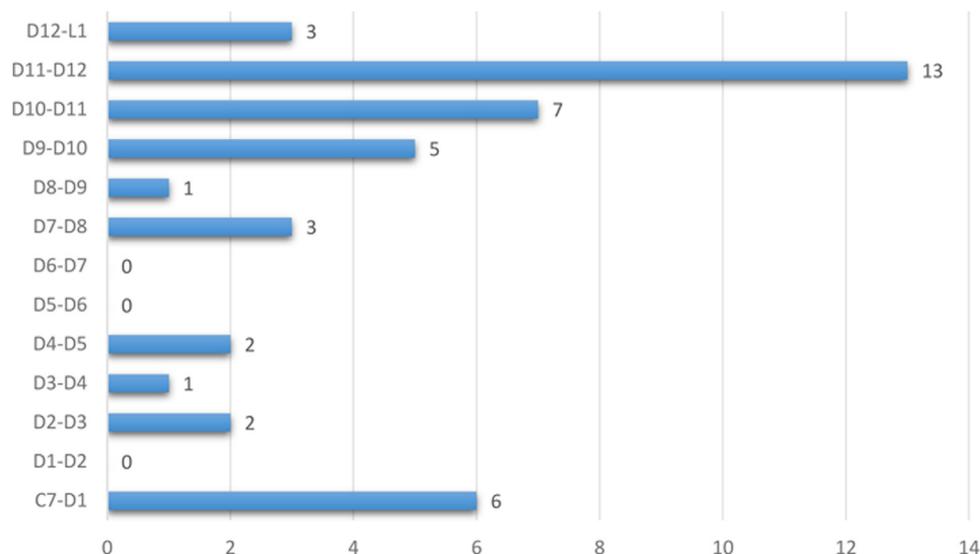


Fig. 6. Levels of the 43 cases of thoracic juxtafacet cysts reported in literature.

decompression combined with transpedicular screws, to treat not only the myelopathy induced by the cysts but also the spinal instability, thus preventing relapse of the lesion and postoperative kyphosis.

#### 4. Conclusion

Juxtafacet synovial cyst diagnosis has been increasing with the advent of MRI. This pathology is extremely rare at cervical and thoracic levels, and bilateral presentation is even more infrequent.

Surgical excision of the cyst is recommended in cases of failure of conservative management or in patients with symptoms of spinal cord compression. Given their close link to spinal instability, concomitant instrumented fusion should be considered in bilateral injuries in the cervicothoracic region or when wide facetectomy is performed for removal.

#### Disclosure of interest

The authors declare that they have no competing interest.

#### References

- [1] Almefty R, Arnautović KI, Webber BL. Multilevel bilateral calcified thoracic spinal synovial cysts. *J Neurosurg Spine* 2008;8:473–7, <http://dx.doi.org/10.3171/SPI/2008/8/5/473>.
- [2] Holtzman RN, Dubin R, Yang WC, Rorat E, Liu HM, Leeds NE. Bilateral symptomatic intraspinal T2–L1 synovial cysts. *Surg Neurol* 1987;28(3):225–30, [http://dx.doi.org/10.1016/0090-3019\(87\)90139-X](http://dx.doi.org/10.1016/0090-3019(87)90139-X).
- [3] Cohen-Gadol AA, White JB, Lynch JJ, Miller GM, Krauss WE. Synovial cysts of the thoracic spine. *J Neurosurg Spine* 2004;1(1):52–7, <http://dx.doi.org/10.3171/spi.2004.1.1.0052>.
- [4] Merkle M, Psaras T, Tatagiba M, Danz S, Schmidt F. Synovial cyst of the thoracic spine causing myelopathy. *Spine* 2009;34(5):E199–201, <http://dx.doi.org/10.1097/BRS.0b013e318198c64d>.
- [5] Scholz C, Hubbe U, Kogias E, Roelz R, Klingler JH. Microsurgical resection of juxtafacet cysts without concomitant fusion—Long-term follow-up of 74 patients. *Clin Neurol Neurosurg* 2017;153:35–40, <http://dx.doi.org/10.1016/j.clineuro.2016.12.008>.
- [6] Boviatsis EJ, Staurinou LC, Kouyialis AT, Gavra MM, Stavrinou PC, Themistokleous M, et al. Spinal synovial cysts: pathogenesis, diagnosis and surgical treatment in a series of seven cases and literature review. *Eur Spine J* 2008;17(6):831–7, <http://dx.doi.org/10.1007/s00586-007-0563-z>.
- [7] Denis DR, Hirt D, Shah S, Lu DC, Holly LT. Minimally invasive surgery for lumbar synovial cysts with coexisting degenerative spondylolisthesis. *Int J Spine Surg* 2016;10, <http://dx.doi.org/10.14444/3037>.
- [8] Shah RV, Lutz GE. Lumbar intraspinal synovial cysts: conservative management and review of the world's literature. *Spine J* 2003;3(6):479–88, [http://dx.doi.org/10.1016/S1529-9430\(03\)00148-7](http://dx.doi.org/10.1016/S1529-9430(03)00148-7).
- [9] Huang AJ, Bos SA, Torriani M, Simeone FJ, Chang CY, Pomerantz SR, et al. Long-term outcomes of percutaneous lumbar facet synovial cyst rupture. *Skeletal Radiol* 2017;46(1):75–80, <http://dx.doi.org/10.1007/s00256-016-2513-5>.
- [10] Zhenbo Z, Huaning L, Jin W, Haifeng G, Yuan F, Ming L. Hemilaminoplasty for the treatment of lumbar intraspinal synovial cysts (LISCs) and literature review. *Eur Spine J* 2016;25(11):3393–402, <http://dx.doi.org/10.1007/s00586-014-3570-x>.
- [11] Diamantopoulos J, Diez R, Jerez P, Sanmillan J, Choudri H, Cordoba A. Bilateral ganglion cysts: case report and review of the literature. *Acta Neurochirurgica* 1999;141(7):783–4.
- [12] Akhaddar A, Qamouss O, Belhachmi A, Elasri A, Okacha N, Elmostarchid B, et al. Cervico-thoracic juxtafacet cyst causing spinal foraminal widening. *Joint Bone Spine* 2008;75(6):747–9, <http://dx.doi.org/10.1016/j.jbspin.2008.04.009>.
- [13] Yurt A, Seçer M, Aydın M, Akçay E, Ertürk AR, Akkol İ, et al. Surgical management of juxtafacet cysts in the lumbar spine. *Int J Surg* 2016;29:9–11, <http://dx.doi.org/10.1016/j.ijssu.2016.03.003>.
- [14] Gazzeri R, Galarza M, Gorgoglione L, Bisceglia M, D'Angelo V. Cervical cyst of the ligamentum flavum and C7–T1 subluxation: case report. *Eur Spine J* 2005;14(8):807–9, <http://dx.doi.org/10.1007/s00586-005-0913-7>.
- [15] Bashir EF, Ajani O. Management of lumbar spine juxtafacet cysts. *World Neurosurg* 2012;77(1):141–6, <http://dx.doi.org/10.1016/j.wneu.2011.06.034>.
- [16] Doherty PF, Stein SC, White R. Bilateral synovial cysts of the thoracic spine: a case report. *World Neurosurg* 1993;39(4):279–81, [http://dx.doi.org/10.1016/0090-3019\(93\)90005-L](http://dx.doi.org/10.1016/0090-3019(93)90005-L).
- [17] Daentzer D, Stüder D. Thoracic juxtafacet cyst (JFC) as a rare cause of myelopathy—an additional reference to support the instability theory. *Joint Bone Spine* 2010;77(2):178–80, <http://dx.doi.org/10.1016/j.jbspin.2009.06.004>.
- [18] Arthur B, Lewkonia P, Quon JA, Street J, Bishop PB. Acute sciatica and progressive neurological deficit secondary to facet synovial cysts: A report of two cases. *J Can Chiropr Assoc* 2012;56(3):17.
- [19] El-Kader A, El-Beltagy H. Juxtafacet Spinal Synovial Cysts. *Asian Spine J* 2016;10(1):46–51, <http://dx.doi.org/10.4184/asj.2016.10.1.46>.
- [20] Graham E, Lenke LG, Hannallah D, Lauryssen C. Myelopathy induced by a thoracic intraspinal synovial cyst: case report and review of the literature. *Spine* 2001;26(17):E392–4.