Waste not, want not: Report of a completely calcified C1-C2 juxtafacet cyst and literature review

Luca Ruggeri1, Lara Brunasso2, Giovanni Urrico3, Raffaele Alessandrello1, Giovanni Cinquemani1, Rita Lipani1, Jaime Mandelli1, Francesco Nobile3, Domenico Gerardo Iacopino2, Rosario Maugeri2

1Department of Neurosurgery, S. Elia Hospital, Caltanissetta, 2Department of Neurosurgery, Neurosurgical Clinic, AOUP “Paolo Giaccone,” Department of Experimental Biomedicine and Clinical Neurosciences, School of Medicine, University of Palermo, Palermo, 3Department of Pathology, S. Elia Hospital, Caltanissetta, Italy.

E-mail: Luca Ruggeri - luxrug130984@gmail.com; *Lara Brunasso - lara.brunasso@community.unipa.it; Giovanni Urrico - giovanni.urrico@tiscali.it; Raffaele Alessandrello - ales.lele@tiscali.it; Giovanni Cinquemani - giovannicinquemani@libero.it; Rita Lipani - rita.lipani@virgilio.it; Jaime Mandelli - aimogene@hotmail.it; Francesco Nobile - aimogene@hotmail.it; Domenico Gerardo Iacopino - gerardo.iacopino@gmail.com; Rosario Maugeri - rosario.maugeri1977@gmail.com

*Corresponding author: Lara Brunasso,
Department of Neurosurgery, Neurosurgical Clinic, AOUP “Paolo Giaccone,” Department of Experimental Biomedicine and Clinical Neurosciences, School of Medicine, University of Palermo, Palermo, Italy.
lara.brunasso@community.unipa.it

ABSTRACT

Background: Calcified juxtafacet cysts in the cervical spine are extremely rare. Such symptomatic cysts commonly cause neck pain, radiculopathy, or even myelopathy. MR and CT studies typically document cord/root compression. On occasion, some of these cysts will spontaneously regress, while many others may warrant surgical removal.

Case Description: A 70-year-old male presented with a 2-year history of a progressive tetraparesis. The preoperative MR/CT studies showed a C1-C2 left extradural mass occupying more than half of the spinal canal. On MR, it was homogeneously hypointense on both T1- and T2-weighted images, while the CT showed a calcified cyst. Intraoperative and histopathological findings documented a calcified cervical juxtafacet cyst (i.e. ganglion subtype) that was fully excised without sequelae.

Conclusion: C1-C2 juxtafacet cervical cyst should be considered when a patient presents with myelopathy due to a calcified MR/CT documented paraspinal lesion contributing to significant cervical cord/root compression.

Keywords: Calcified cyst, Cervical degenerative disease, Ganglion cyst, Juxtafacet cyst, Spinal cyst

INTRODUCTION

Cervical juxtafacet cysts are unilateral/dorsolateral intraspinal extradural lesions originating from the facet capsule of a cervical synovial joint[4,7,8] These patients are typically in their 60s–70s.[4,7,8,10] When symptomatic, the clinical presentation depends on size, location, and extent or cord/root compression.[8] Here, we report a 70-year-old patient whose C1-C2 juxtafacet cyst contributed to cervical myelopathy that resolved following surgical decompression/fusion.

CASE REPORT

A 70-year-old male presented with a 2-year history of a progressive tetraparesis that markedly worsened 2 weeks before presentation. On examination, he was severely myelopathic (i.e. with
diffuse hyperreflexia, and bilateral Babinski and Hoffman's signs).

**MR and CT studies**

MR and CT studies documented a large left-sided C1-C2 juxtafacet cyst that resulted in unilateral/dorsolateral extradural cord compression. It was homogeneously hypointense on both T2- and T1-weighted images; additionally, there was significant T2 hyperintensity in the medulla [Figure 1a-c]. The CT further documented a 1.2 cm ossified mass occupying more than half of the spinal canal without apparent connection to adjacent bony/articular structures [Figure 1d and e].

**Surgery**

The patient underwent a C1 and C2 left hemilaminectomy. At surgery, the C1-C2 cyst appeared as a yellow, round, well-defined and bone-like finding, easily separated from adjacent neural/dural and/or vascular structures [Figure 2a]. With a clean cleavage plane between the cyst and the dura, it was readily removed under the operating microscope. In addition, the left C1-C2 foraminal extension was also easily removed [Figure 2b and c]. The postoperative course was uneventful, and the patient was transferred to a rehabilitation hospital.

**Pathology**

The histopathology was consistent with a juxtafacet cervical ganglion cyst comprised a fibrocalcific capsule containing a moderately fibrous and sclerotic liquid matrix. No atypical cells were observed, and no synovial lining was found [Figure 3].

**Literature review**

Here, we reviewed multiple studies involving cervical juxtafacet cysts. Criteria for literature review search strategy included "spinal cyst" or "ganglion cyst" or "facet cyst" or "juxtafacet cyst" or "cervical" or "calcified" in appropriate combination, in the main databases (PubMed, Google Scholar, MEDLINE, and Scopus). We identified 169 patients with these lesions; patients averaged 65.2 years of age and included 96 men, 66 women and unknown 5 cases. Cysts were located predominantly at the following levels: odontoid process in 17 cases (10.06%), C1-C2 facet joint in 25 (14.8%), and C7-T1 facet joint in 57 cases (33.73%). Most of the patients typically underwent laminectomy/hemilaminectomy for the excision of these cysts; 3 had laminoplasty. Posterior

Figure 1: T2-weighted coronal (a), sagittal (b), and axial (c) MRI images show an extradural mass homogeneously hypointense at the C1-C2 level on the left with the characteristic total signal loss. The mass causes severe compression and dislocation of the dural sac with prominent area of T2 hyperintensity involving enterally the medulla at the same level. Axial bone window CT image (d) shows a completely bone density mass occupying more than half spinal canal, with no apparent connections with adjacent bony articular structures. In (e), a three-dimensional CT reconstruction.
cervical fusion was also performed in 22 cases (i.e. two were occipitocervical fusions). Fifteen cases were approached utilizing a transoral route (i.e. most of were C1-C2 facet joint cysts). The histopathological examination, when accessible, documented 103 synovial cyst, 27 ganglion cyst, and 37 were not specified. No completely calcified cysts were found [Table 1]

DISCUSSION

Juxtafacet cysts are likely due to “degenerative joint disease” and facet joint degeneration.[4,8] Degenerative changes lead to myxoid degeneration of collagen connective tissue, joint capsule weakness, and potential herniation of synovial tissue (i.e. synovial fluid fills the newly formed cavity and becomes a cyst).[2,4,8] Cervical localization is less common and the most cases occur at the cervicothoracic junction-C7/T1.[2,4,7,8,10]

Histopathological types

Two histopathological types of degenerative spinal cyst are describe The synovial cyst is considered as an extrusion of the synovial membrane through a capsular defect from a degenerated facet joint; here, there is direct communication with the synovial cavity of the facet joint. The ganglion cyst shows no synovial cavity but has a fibrous connective tissue wall with no direct communication with the facet joint.[1,4] Therefore, synovial cysts are usually known as “true cysts” and ganglion cysts as “pseudocysts.”[3,8,10]

Imaging of juxtafacet cysts

MRI is the modality of choice to differentiate juxtafacet cysts from other extradural or even intradural compressive lesions.[8] MR images typically show a well-circumscribed, extradural lesion located adjacent to the facet joint with low/intermediate T1-weighted intensity (hypointensity) and high T2-weighted intensity (hyperintensity).[4,8] Erosion of adjacent bone and progressive enlargement might mimic malignancy.[4] With gadolinium, there is usually peripheral rim enhancement of the cyst wall (i.e. reflecting the relative increased vascularity of the capsule).[1,8]

Calcification of juxtafacet cyst

Calcification in the cyst walls is commonly reported and characterized by low signal intensity (hypodensity) on T1-weighted and T2-weighted images.[3,9] Note, completely calcified cysts are extremely rare and are better appreciated on CT scans [Figure 1].[3,5]

Surgery for juxtafacet cysts

Only a subset of juxtafacet cysts is symptomatic.[6,8] Posterior decompression surgery through laminectomy typically addresses the resultant cervical spinal stenosis, in some instances, also warranting fusion.[7,10,12] Laminoplasty is another alternative surgical approach. Due to occasional
dense dural adhesions, some resections require leaving a small segment of the adherent capsule behind to avoid a cerebrospinal fluid leak (CSF).[^11] Notably, CT-guided needle aspiration is rarely safe or effective and can result in significant CSF leaks and/or direct cord damage.[^7,^9]

**CONCLUSION**

Juxtafacet cysts should be considered among the differential diagnostic consideration for symptomatic intraspinal-extradural or paraspinal space-occupying lesions of the cervical spine, even when completely calcified radiological findings are documented.

**Declaration of patient consent**

Patient’s consent not required as patients identity is not disclosed or compromised.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Bisson EF, Sauri-Barraza JC, Niazi T, Schmidt MH. Synovial cysts of the cervicothoracic junction causing myelopathy: Report of 3 cases and review of the literature. Neurosurg Focus 2013;35:E3.
2. Corredor JA, Quan G. Cervical synovial cyst causing cervical radiculomyelopathy: Case report and review of the literature. Global Spine J 2015;5:e34-8.
3. Huang KT, Owens TR, Wang TS, Moreno JR, Bagley JH, Bagley CA. Giant, completely calcified lumbar juxtafacet cyst: Report of an unusual case. Global Spine J 2014;4:175-8.
4. Jitpun E, Narischat P. Hemorrhagic cervical synovial cyst presented with acute Brown-Sequard syndrome: A case report and review of literature. Clin Neurol Neurosurg 2020;195:106055.
5. Kasliwal MK, Deutsch H. Completely calcified lumbar synovial cyst. Neurol India 2011;59:315-6.
6. Kim J, Choi JG, Son BC. Bilateral ganglion cysts of the ligamentum flavum in the cervical spine causing a progressive cervical radiculomyelopathy and literature review. Case Rep Neurol Med 2017;2017:3953641.
7. Machino M, Yukawa Y, Ito K, Kato F. Cervical degenerative intraspinal cyst: Case report and literature review involving 132 cases. BMJ Case Rep 2012;2012:bcr2012007126. Available from: https://www.casereports.bmj.com/content/2012/bcr-2012-007126.citation-tools.
8. Mak D, Vidoni A, James S, Choksey M, Beale D, Botchu R. Magnetic resonance imaging features of cervical spine intraspinal extradural synovial cysts. Can Assoc Radiol J 2019;70:403-7.
9. Pikis S, Cohen JE, Barzilay Y, Hasharoni A, Kaplan L, Itshayek E. Symptomatic facet cysts of the subaxial cervical spine. J Clin Neurosci 2013;20:928-32.
10. 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:E18-22.
11. Stoodley MA, Jones NR, Scott G. Cervical and thoracic juxtafacet cysts causing neurologic deficits. Spine (Phila Pa 1976) 2000;25:970-3.

---

**Table 1: Summary of case report and case series of the literature review on juxtafacet cyst at the cervical level.**

| Criterion                  | Detail                                |
|----------------------------|---------------------------------------|
| Timeframe                  | 1974–2021                             |
| Number of journal articles | 78                                    |
| Number of patients         | 169                                   |
| M                          | 96                                    |
| F                          | 66                                    |
| Age of patients            | Mean age 65.2 yo (range 8–86)         |
| Location of cyst           |                                       |
| Odontoid process           | 17 (10.06%)                           |
| Atlantoaxial junction      | 6 (3.55%)                             |
| C1-C2 transverse ligament  | 2 (1.18%)                             |
| C2 quadrat ligament        | 1 (0.6%)                              |
| C2-C3 facet joint          | 3 (1.78%)                             |
| C3-C4 ligamentum flavum   | 4 (2.57%)                             |
| C3-C4 facet joint          | 9 (5.33%)                             |
| C4-C5 facet joint          | 10 (7.5%)                             |
| C4-C5 ligamentum flavum   | 3 (1.78%)                             |
| C5-C6 facet joint          | 12 (7.10%)                            |
| C6-C7 facet joint          | 19 (7.69%)                            |
| C7-T1 facet joint          | 57 (33.73%)                           |
| C7-T1 ligamentum flavum   | 5 (2.96%)                             |
| Anterior longitudinal ligament | 2 (1.18%)                      |
| Bilateral cysts            | 5 (2.96%)                             |
| Type of cyst               |                                       |
| Synovial cyst              | 103                                   |
| Ganglion cyst              | 27                                    |
| Not specified              | 37                                    |
| Treatment                  | Laminectomy/hemilaminectomy           |
| Most of cases              |                                       |
| Laminoplasty               | 3                                     |
| Posterior cervical fusion  | 22                                    |
| Transoral approach         | 15                                    |
| Transnasal and transoral   | 2                                     |
| odontoidecomy              |                                       |
| Anterior approach          | 1                                     |
| Spontaneous resolution     | 1                                     |
| CT-guided aspiration       | 1                                     |
| Just observation           | 1                                     |
| No treatment               | 1                                     |

[^11]: Ruggeri, et al.: Rare finding of a calcified C1-C2 juxtafacet cyst.
12. Uschold T, Panchmatia J, Fusco DJ, Abla AA, Porter RW, Theodore N. Subaxial cervical juxtafacet cysts: Single institution surgical experience and literature review. Acta Neurochir (Wien) 2013;155:299-308.

How to cite this article: Ruggeri L, Brunasso L, Urrico G, Alessandrello R, Cinquemani G, Lipani R, et al. Waste not, want not: Report of a completely calcified C1-C2 juxtafacet cyst and literature review. Surg Neurol Int 2021;12:369.