

## Synovial cyst of dens causing spinal cord compression. Case report

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We report a rare case of synovial cyst of the dens (odontoid process) in a 61 year old women with no previous history of trauma. She had progressive symptoms of 1 year's duration due to spinal cord compression. Magnetic resonance imaging of cervical spine revealed a large mass posterior to the dens which was compressing the spinal cord near the cervicomedullary junction. This lesion was at first considered radiologically to represent an exuberant pannus formation or a meningioma of the foramen magnum, but subsequent surgical intervention and pathological examination revealed that it was a synovial cyst. Similar cases reported in the literature are reviewed and discussed.

*Keywords:* synovial cyst; spinal cord compression; dens; cervical spine.

### Introduction

Synovial cysts or ganglion cysts of the spine have been described as a rare entity. They are benign lesions adjacent to the facet joints.<sup>1</sup> Most cases reported in the literature were located in the lumbosacral spine, but those in the cervical spine, similar to our case, are more scarce. Only 10 such cases have been reported in the literature to the best of our knowledge.<sup>1-10</sup> Here we add another case with a detailed clinical history, radiological studies, and operative pathological findings. We also review the cases reported in the literature and discuss the pathogenesis of this entity.

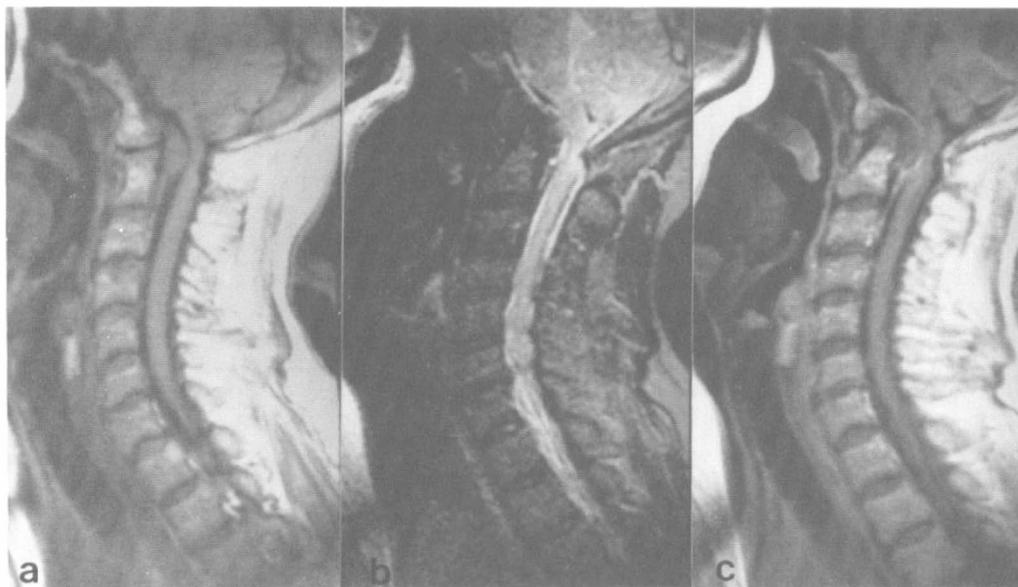
### Case report

The patient was a 61 year old saleswomen, who had a one year history of numbness of her hands and feet and weakness of the extremities. The left lower extremity was weaker than the right, and the right upper extremity was weaker than the left. She also had progressive difficulty in balancing and lower occipital headache. She denied any history of trauma. Her PPD test was positive and she had a 20-pack-year smok-

ing history. General physical examination was within normal limits and there were no stigmata of rheumatoid arthritis.

Neurologically, she was alert and oriented and she had intact cranial nerves and normal extraocular muscle movements. Motor strength of the left lower and right upper extremities was weaker than the corresponding contralateral sides. Sensation was intact to pin prick throughout, but there was a decrease of light touch sensation on the right upper extremity compared with the left. The lower extremities had decreased but equal light touch sensation. The knee jerks were 3+ and the ankle jerks were 2+. Toes were downgoing bilaterally. Finger-to-nose testing was impaired bilaterally with mild dysmetria. Horizontal tremor was observed, the left being more prominent than the right. Rapid alternating movement and heel-to-shin testings were also impaired bilaterally. Romberg sign was positive with falling to the left. Her gait was moderately ataxic. Nerve conduction velocity tests and an electromyogram were normal. A magnetic resonance (MR) examination of the cervical spine was performed on a 1.5 Tesla imaging system (Fig 1). T1-weighted sagittal images revealed a well circumscribed, extra-axial, homogeneous mass posterior to the dens (odontoid process). The mass was causing marked cervical canal stenosis, and deformed and compressed the spinal cord. On T1-weighted images, the mass was of intermediate signal intensity (hyperintense with respect to cerebrospinal fluid). On T2-weighted images, the mass was of homogeneously low signal intensity (hypointense with respect to

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**Figure 1** MR examination of the cervical spine. (a) T1-weighted sagittal image showing intermediate signal intensity mass posterior to the dens. (b) T2-weighted sagittal image shows mass to be of low signal intensity. (c) Postgadolinium-DTPA image. Mass shows rim enhancement.

CSF). Postcontrast (Gadolinium-DTPA) T1-weighted sagittal images showed a thin rim of enhancement, but no internal enhancement. Questionable erosive changes were noted in the superior aspect of the dens, but the marrow signal within the dens was normal. In addition, a prominent disk bulge at the C4–5 level deformed the thecal sac and caused effacement of the CSF spaces anterior and posterior to the spinal cord. The spinal cord was not deformed. Spondylotic changes and neuroforaminal encroachment were also noted at other levels of the cervical spine. An exploratory surgical operation by a transoral approach was performed. At surgery, the arch of C1 was removed. After section of the apical and alar ligaments, the dens, which was intact, was also removed. A yellowish, amorphous, avascular mass-like lesion came into view. The mass was removed in a piecemeal fashion until the tectorial membrane was visualized. Multiple fragments of soft tissue obtained from the operative site consisted of fibroconnective, ligamentous, and cartilagenous tissue, and fragments of bone and skeletal muscle. Histologically, the most remarkable finding was the presence of multicystic structure that was lined by synovial cells. This cystic structure was situated among the loose connective tissue and adjacent to the degenerative cartilagenous tissue. There was no

evidence of inflammation, granuloma, or remote hemorrhage. Although the fusion of the vertebrae was inevitable to stabilize the craniovertebral junction and the upper cervical spines, the strength and sensation in her arms and legs returned soon after surgery.

## Discussion

A synovial cyst differs from a ganglion cyst. The former has synovial lining cells and contains clear fluid, whereas the latter is lined by fibrous connective tissue and contains gelatinous and highly viscous fluid.<sup>1</sup> However, these two terms have been used interchangeably when referring to a benign cystic lesion adjacent to the facet joints of the spine.<sup>2</sup> Hence, some authors<sup>1</sup> preferred to use the term 'juxtafacet cyst'. Other benign cystic lesions in this region, quoted from Sybert *et al*,<sup>11</sup> include arachnoid cysts, acquired and congenital fibrous cysts, ependymal cysts, teratomatous cysts, and perineural cysts.

The pathogenesis of the ganglion/synovial cysts of the spine has been debated. While some authors<sup>3,11–13</sup> seemed to imply that trauma was the cause, others had different

opinions. Other theories pertaining to the pathogenesis, reviewed by Miller *et al.*,<sup>6</sup> include metaplasia, the presence of developmental rests, excess stress at the facet joints with herniation of synovial tissue, and mucinous degeneration of connective tissue.

Rousseaux *et al.*<sup>14</sup> reviewed 73 cases from the literature and eight of their own cases. They opined that although these were variously described in the literature as the synovial cyst, ganglion cyst, benign synovialoma, and pigmented villonodular synovitis, they actually represented a spectrum of benign degeneration of soft articular tissues. Indeed, our case, radiographically, presented as a rather solid-appearing mass without significant evidence of cystic nature. At surgery, however, some amorphous material was seen that might represent the cystic content. In addition, the surgical specimen contained a large amount of degenerative cartilagenous tissue. Moreover,

our patient did not have a history of trauma, and the MR of the cervical spine revealed that there were other areas of spinal stenosis, possibly degenerative in nature. Another interesting observation was that, in the cases without a history of trauma, the occupations of the patients might involve considerable neck movement: eg factory assembly line worker, dentist, and saleswoman (Table I).

Radiologically, the postgadolinium images are important for the presurgical differential diagnosis of this lesion. Meningiomas, which can occur in this location, may have a similar precontrast appearance, but most often exhibit uniform contrast enhancement. The lack of internal enhancement in this case made meningioma unlikely. The normal marrow signal within the dens also made primary bone pathology unlikely. Given the possible erosive changes in the dens and the well circumscribed

**Table I** Cases of synovial cysts of the cervical spine reported in the literature

Reference	Age. Sex	Symptoms	Occupation	Trauma	Site
Kao <i>et al</i> (1974) <sup>1</sup>	52M	Neck pain	Factory assembly line worker	No	C5-7
Cartwright <i>et al</i> (1985) <sup>3</sup>	41M	Spastic paraparesis	Unknown	Old fixation (C5-6)	C7-T1
Jabre <i>et al</i> (1987) <sup>5</sup>	60M	Weakness of legs	Unknown	Yes	C6-7
Alguacil-Garcia (1987) <sup>2</sup>	64F	Retropharyngeal mass	Unknown	Unknown	C2, adjacent to anterior ligament
Onifrio & Mih (1988) <sup>8</sup>	73M	Paresthesia of both upper extremities	Dentist	Unknown	Quadrangle ligament of dens
Patel & Sanders (1988) <sup>9</sup>	42F	R neck pain	Unknown	No	C4-5
Miller <i>et al</i> (1989) <sup>6</sup>	67F	Neck pain, decrease of ambulation	Unknown	Unknown	C1-2
Nijensohn <i>et al</i> (1990) <sup>7</sup>	58M	Weakness of RUE and both LE's	Unknown	Unknown	C5-6
Quaghebeur & Jeffrey (1992) <sup>10</sup>	82F	Leg weakness	Unknown	Unknown	C1-2
Goffin <i>et al</i> (1992) <sup>4</sup>	65M	Paresthesia of upper limbs	Unknown	Unknown	C1-2
Choe <i>et al</i> (1993) (this paper)	61F	Weakness, numbness of extremities	Saleswoman	No	Dens

benign appearance of the lesion, pannus formation was thought to be a possible etiology. The acute accumulation of synovial fluid associated with rheumatoid arthritis shows a similar appearance. The appearance of 1a and 1b in Figure 1 suggests a pseudotumour, and a review of the literature of masses in this region was given by Crockard *et al.*<sup>15</sup>

In recent years, a number of papers have commented on the MR appearance of synovial cysts of the lumbar,<sup>16–21</sup> thoracic,<sup>22</sup> and cervical spine.<sup>6,9</sup> Synovial cysts are generally reported to have signal characteristics of typical 'cysts', that is, low to intermediate signal intensity on T1-weighted images and high signal intensity on T2-weighted images. However, there are other reports of synovial cysts which are of low signal intensity on T2-weighted images.<sup>17</sup> This is usually attributed to hemorrhage and blood products within the cyst contents. However, it may not be necessary to postulate previous hemorrhage as the aetiology of this lesion's appearance on the T2-weighted sequence. The lesion itself is a simple cyst in name

only, that is, it consists of multiple small infolded cystic spaces. Mucoïd material can also have variable T2 signal characteristics; for instance, it is reported in MR imaging of the paranasal sinuses. The postgadolinium appearance of synovial cysts has also been reported to be variable, with rim enhancement reported as one of the patterns.<sup>14</sup> There is another report of a synovial cyst with a similar appearance (T1-weighted images only) at the craniocervical junction, and George *et al* recently discussed synovial cysts of the lateral mass in the craniocervical junction in their monograph on tumours of the foramen magnum.<sup>23</sup>

As far as management is concerned, we should be aware that this is a benign lesion that only requires surgical intervention with excellent prognosis.

Sypert *et al*<sup>11</sup> expressed their surprise that this type of cyst was not seen more commonly, considering the relatively high incidence of injury to the facet joint. With the advent of new diagnostic modalities such as CT and MR imaging, more cases could be encountered in the future.

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