Synovial Cysts of the Upper Cervical Spine

Christian Theodotou MD; Timur Urakov MD; Steven Vanni DO

Department of Neurosurgery
University of Miami Miller School of Medicine

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Learning Objectives

By the conclusion of this session, participants should be able to:

1.Understand the different surgical approaches of atlantoaxial synovial cysts

2.Make informed decisions in choosing anterior versus posterior resection based on anticipated morbidity

Introduction

Degenerative cystic lesions of the upper cervical spine are rare and are believed to be due to joint instability. There is no consensus on the management of these lesions in either symptomatic or asymptomatic cases. Surgical and non-surgical strategies have been attempted. Among surgical approaches, both anterior and posterior surgical approaches, with and without decompression, and with and without instrumentation have been described

Methods

The PubMed database was searched for all relevant cases describing non-rheumatoid atlantoaxial joint cysts. The following search phrases were used: "cervical AND synovial cyst", "atlantoaxial AND synovial cyst", "c1-2 AND synovial cyst", "c1-c2 AND synovial cyst", "cervical AND "juxtafacet cyst", "atlantoaxial AND juxtafacet cyst", "c1-2 AND juxtafacet cyst", "c1-c2 AND juxtafacet cyst." Results were filtered for human subjects only and available in english. Cases with cysts at other levels, including atlantooccipital cysts, were excluded. Cases with non-cystic lesions were excluded as well.

Results

Seventy cases were included from a total of 41 studies. The posterior approach was used in 26 patients, the anterior approach in 29, and a lateral approach in 3. Percutaneous needle aspiration if the cyst was reported in 2 cases while non-operative management was reported for 3 cases. Unspecified surgical techniques were used in 5 cases. Surigcal technique if any was not reported in 2 cases. Fusion was reported in 35 of the cases.

Cyst resection was attempted in 46 patients (32 complete, 14 subtotal). Complete cyst resection was possible in 25 of 29 anterior surgeries whereas only 7 of 21 posterior approaches were able to completely resect the cyst. No resection was performed in six surgical cases. Posterior instrumentation was performed in 8 of 26 posterior decompressions versus 27 of 29 anterior decompressions.

Case Reports

Atlantoaxial synovial cyst case reports

First author	Year	Location	Neurologic Deficit	Surgery	Resection	Complications
Alguacil[11]	1987	L retropharyngeal, C2 Anterior longitudinal ligament	Dysphagia, odynophagia	NS	Complete	None
Onofrio[21]	1988	Peri-odontoid/cruciate ligament	BUE distal weakness, numbness, paresthesias	Laminectomy, suboccipital craniectomy	Yes	None
Miller[10]	1989	Retro-odontoid	Weakness, Spastic quadripareis, C5/6 sensory levels	Laminectomy, foramen magnum craniectomy	Yes	None
Goffin[24]	1992	Retro-odontoid; quadrate ligament	Quadriparesis R>L, Right hyperreflexia.	Laminectomy, suboccipital craniectomy	STR	None
Quaghebeur[4]	1992	R facet joint	BUE weakness, BLE weakness, spastic gait	Laminectomy	STR	None
Choe[33]	1993	Retro-odontoid	Weakness LLE>RLE, RUE>LLE, distal numbness, ataxia	Transoral, C1 arch removed, odontoid resection. Fusion not specified?	Yes	None
Weymann[23]	1993	Posterior to cord	Unsteady gait, weakness x4, increased reflexes x4	Laminectomy	Yes	None
Kaufmann[20]	1996	Retro-odontoid	Paresthesias, ataxia,, hyper-reflexia, +Hoffman, +babinski	CT guided needle biopsy, Transoral odontoidectomy and decompression	Complete	None
Vergne[33]	1996	Retro-odontoid	Neck pain, right hand weakness	C1 Laminectomy	Biopsy	None
Fransen[19]	1997	Retro-odontoid	Spastic tetraparesis, hyperreflexia x4, gait difficulty	L hemilaminotomy, suboccipital craniectomy, transcondylar resection.	Complete	None
Pizzolato[36]	1997	Retro-odontoid, transverse ligament	Tetraparesia.	NS	NS	None
Akiyama[18]	1999	Retro-odontoid	Left weakness, numbness, hyperreflexia	Laminectomy, transcondylar resection, lateral suboccipital craniotomy, posterior instrumented fusion	Complete	None
Aksoy[17]	2000	Retro-odontoid, Os odontoideum	Leg stiffness, loss of hand coordination	Laminectomy, anterior fusion	No	None
Chang[49]	2000	Retro-odontoid (transverse ligament)	L hand weakness and parestehsias	Posterior fusion with wires.	No	None
Eustachio[42]	2003	Retro-odontoid, Atlantoaxial joint	Mild tetraparesis, ataxia, hyperreflexia	C1 hemilaminectomy, suboccipital craniotomy	STR	None
Morio[24]	2003	Anterior to odontoid, facet joints	BUE/BLE dysesthesia, tone increased x4, L hyperreflexia	Posterior instrumented fusion	No	None, shrinkage of cyst
Okamoto[26]	2004	Retro-odontoid, R Joint	RUE/RLE weakness, hyperreflexia on R.	Right hemilaminectomy, posterior fusion	STR	None
Sagiuchi[30]	2006	Retro-odontoid	Spastic tetraparesis, hyperreflexia, BL Babinski	Philadelphia collar; C1-2 posterior fusion	No	Cyst resolved with collar, fusion for subluxation
Cecchi[13]	2008	Retro-odontoid, median atlantoaxial joint, transverse ligament	Postural instability, ataxia, mild spastic tetraparesis, voiding difficulty, BL Achilles clonus	None; Philadelphia collar	No	None, shrinkage of cyst
Kirk[47]	2008	Retro-odontoid	L hand paresthesia, hyperreflexive on left	1.Transoral decompression 2. posterior instrumented fusion	Yes	None
Velan[31]	2008	Retro-odontoid	Neck pain, spastic quadriparesis	Percutaneous cyst aspiration; repeat percutaneous cyst aspiration.	STR/aspiration	Cyst recurrence at 1.5 years, moderate improvement after second aspiration
Elhammady[37]	2009	Atlanto-occipital joint	Ataxia, L facial pain, swallowing impaired. L tongue atrophy	Lateral suboccipital craniotomy, C1 hemilaminectomy	Complete	Worsening dysphagia
Marbacher[44]	2009	Retro-odontoid, s/p fracture	BUE distal numbness, ataxia	1.Transoral 2. Fusion with transarticular screws	Complete	Atlantoaxial instability, see #2
Aizawa[16]	2010	Retro-odontoid/ L facet joint	LUE/LLE weakness, hyperreflexia, mild bladder dysfunction	Hemilaminectomy, foramen magnum craniectomy	STR	None, no recurrence
Harries[34]	2010		BUE parastehesias, ataxia, BUE weakness, hyperreflexia	Far-lateral excision	STR	None
Weng[5]	2010	Retro-odontoid	Quadriparesis, paresthesia, bladder dysfunction.	Posterior decompression, posterior instrumented fusion (craniocervical)	No	None, complete cyst resolution
Henaux[29]	2011	Atlanto-occipital joint	R hypoglossal palsy, dysphagia	None	No	Developed contralateral asymptomatic cyst.
Parks[15]	2011	Retro-odontoid	BUE/BLE numbness, bladder and bowel incontinence, wide based gait, +BL Romberg	Posterior decompression, posterior instrumented fusion with transarticular screws	NS	None
Sameshima[14]	2013	Retro-odontoid, transverse ligament	RU/RLE paralysis and sensory loss	Hemilaminotomy, transcondylar resection	Yes	None
Ohnishi[27]	2015	Retro-odontoid	R hyperreflexia, RUE myelopathy	Anterolateral approach with C1 posterior arch and C1 lateral mass resection	Yes	None
Ikegami[32]	2015	Retro-odontoid	Neck pain, BL hand hypesthesia	Lateral atlantoaxial joint puncture, arthrography	No	None, complete resolution

Table 1. Case reports of atlantoaxial synovial cysts

Case series

Case Series of atlantoaxial synovial cysts.

First Author	Year	Pts	Location	Neuro Deficit	Surgery	Resection	Complications
Bydon[9]	2014	3/17	Atlantoaxial	Various		Yes(16), No(1); NS	NS
Birch[39]	1996	5/5	Retro-odontoid	Various	Transoral decompression+ fusion (2), Laminectomy (2), observation (1)	Yes	None
Cai[40]	2001	2	Retro-odontoid, transverse ligament (2)	RUE spasticity, BL Hoffman, BLE weakness; spastic generalized weakness.	Transoral decompression, C1-2 posterior fusion (2)	STR	1 improved, 1 stabilized
Van Gompel[50]	2011	10	Atlantoaxial	Various	Transoral decompression + posterior craniocervical fusion (9). Posterior decompression (6)	Complete	Wound infection (1), all improved
Lee[12]	2013	3	Atlantoaxial	Varous	Anterior decompression and resection, posterior fusion (3)	Yes	All improved
Lyons[22]	2011	11			Transoral decompression + posterior fusion (11)	Complete	10 improved, 1 stabilized.
Puffer[50]	2013	3	Retro-odontoid(3)	BLE weakness, parasthesias; neck pain; LUE pain	C1 laminectomy (1)Posterior occipito-cervical instrumented fusion (2), Transoral decompression then instrumented occipitocervical fusion (1)	STR (transoral; 1); none (2)	None
Zorzon[28]	2001	2	Retro-odontoid (2)	Ataxia, R distal weakness, hyperreflexive; R hemiparesis, hyperreflexia	Hemilaminectomy, subtotal resection (2)	STR	None; no recurrence

Table 2. Case series of atlantoaxial synovial cysts

Conclusions

Atlantoaxial synovial cysts are rare and an optimal surgical approach is still elusive. We conducted our literature review and found a total of 70 other cases of atlantoaxial synovial cysts reported to date in the literature. We attempt to analyze available data and evaluate the numbers of anterior versus posterior approaches and the choice of decompression, amount of cyst resection, and instrumentation.

References

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