

Paarth Patel, BSA; Jonathan Espinosa, MD; Erin Lopez, MD; Cristian Gragnaniello, MD, PhD

Introduction

Background

Atlantoaxial joint (AAJ) synovial cysts are rare causes of cervical myelopathy and pose significant surgical challenges due to their proximity to critical neurovascular structures. Traditional transoral and posterior transdural approaches are associated with substantial morbidity. The endoscopic endonasal approach (EEA) offers a minimally invasive anterior corridor to the retro-odontoid space while avoiding oropharyngeal disruption.

Objective

To describe a novel application of expanded endoscopic endonasal odontoidectomy for resection of an isolated AAJ synovial cyst, highlighting operative refinements that improve angulation and surgical access.

Surgical Technique

A staged posterior occipitocervical fusion was performed first to address anticipated instability following resection of the C1 anterior arch and odontoid process. An expanded endoscopic endonasal approach was then used, incorporating posterior septectomy and limited midline hard-palate drilling to optimize inferior angulation toward the dens. Inferior exposure was further enhanced using dynamic soft-palate retraction achieved with a double-looped uvular suture, allowing adjustable intraoperative control without nasogastric tubing. Endoscopic resection of the C1 anterior arch was followed by cranial-to-caudal drilling of the odontoid process, permitting controlled entry into the retro-odontoid space. The synovial cyst was identified and excised in its entirety, resulting in adequate ventral spinal cord decompression without cerebrospinal fluid leak.

Case Description

A 48-year-old female with prior C4 corpectomy and C3–C7 anterior fusion presented with progressive neck pain, upper-extremity radiculopathy, gait instability, and cervical myelopathy. MRI demonstrated a retro-odontoid cystic lesion causing spinal cord compression with associated T2 signal change. Given interval lesion enlargement and worsening neurologic symptoms, the patient underwent staged posterior occipitocervical fusion followed by expanded endoscopic endonasal odontoidectomy and cyst excision. Histopathology confirmed a synovial cyst.



Figure 2. Intraoperative sagittal (A) and axial (B) neuronavigation images depicting the endonasal surgical pathway extending from the nasal cavity through the nasopharynx to the odontoid process.

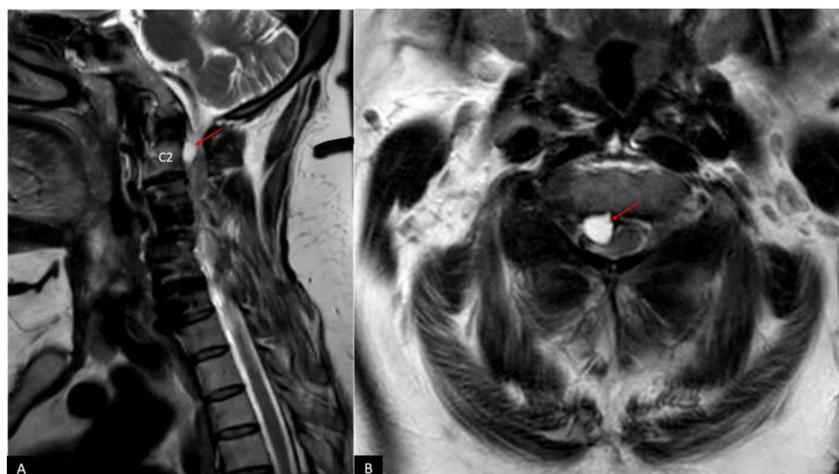


Figure 1. Preoperative sagittal (A) and axial (B) T2-weighted MRI depicting a retro-odontoid synovial cyst (red arrow) compressing the cervical spinal cord.

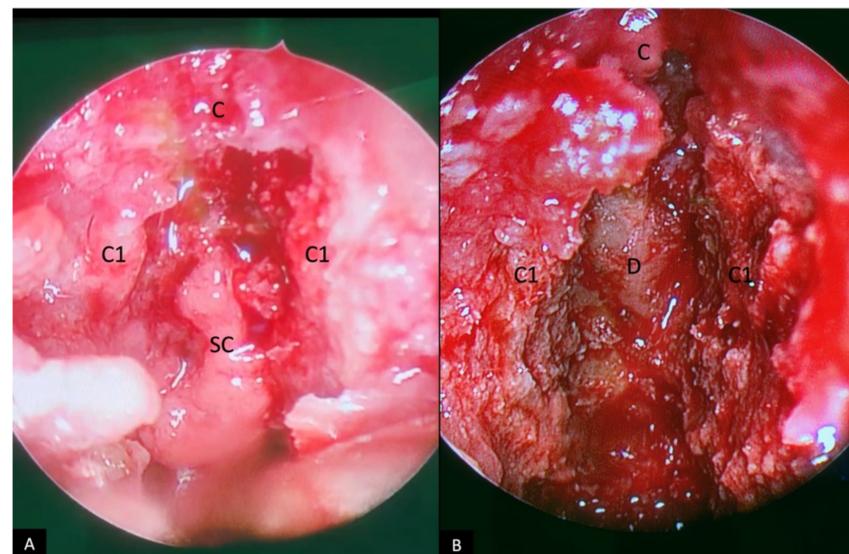


Figure 3. Preoperative sagittal (A) and axial (B) T2-weighted MRI depicting a retro-odontoid synovial cyst (red arrow) compressing the cervical spinal cord.

Discussion

The transoral approach has historically been considered the standard anterior route for retro-odontoid pathology due to its wide exposure of the dens; however, it is associated with substantial morbidity related to oropharyngeal disruption, including dysphagia, speech disturbance, respiratory complications, and prolonged recovery. Posterior transdural approaches avoid oropharyngeal injury but require dural violation, exposing intradural structures and increasing the risk of cerebrospinal fluid-related complications, while lateral approaches may necessitate C2 nerve root sacrifice and carry increased risk of vertebral artery injury.

The endoscopic endonasal approach provides a minimally invasive anterior corridor that preserves oropharyngeal integrity and avoids intradural manipulation. Prior studies have demonstrated faster extubation, earlier return to oral intake, and reduced hospital length of stay following endonasal odontoidectomy compared with transoral approaches. Although limited inferior angulation has traditionally constrained the use of EEA for lower craniovertebral pathology, targeted modification of the endonasal corridor can overcome these limitations and allow direct access to the retro-odontoid space.

In the present case, posterior septectomy, limited midline palatal drilling, and dynamic soft-palate retraction using a double-loop uvular suture improved inferior access, enabling complete excision of an isolated atlantoaxial joint synovial cyst. Staged posterior occipitocervical fusion addressed anticipated instability following resection of the C1 anterior arch and odontoid process. Complete ventral spinal cord decompression was achieved without cerebrospinal fluid leak or velopharyngeal dysfunction, with postoperative imaging confirming cyst excision and stable fusion. This case supports the expanded endoscopic endonasal approach as a safe and effective anterior option for select isolated atlantoaxial synovial cysts while minimizing approach-related morbidity.

Contact

Paarth Patel
 UT Health San Antonio
 Paarth.patel02@gmail.com
 2148465359

References

- Kassam AB, Snyderman C, Gardner P, Carrau R, Spiro R. The expanded endonasal approach: a fully endoscopic transnasal approach and resection of the odontoid process. *Neurosurgery* 2005;57(Suppl 1):E213
- Goldschlager T, Hirtl R, Greenfield JP, Anand VK, Schwartz TH. The endoscopic endonasal approach to the odontoid and its impact on early extubation and feeding. *J Neurosurg* 2015;122(3):511–518
- Shriver MF, Kshetry VR, Sindwani R, Woodard T, Benzel EC, Reinos PF. Transoral and transnasal odontoidectomy complications: a systematic review and meta-analysis. *Clin Neurol Neurosurg* 2016;148:121–129
- Komisar RJ, Starke RM, Raper DMS, Anand VK, Schwartz TH. Endonasal endoscopic versus transoral microscopic odontoid resection. *Innov Neurosurg* 2013;1(1):37–47
- Ponce-Gomez JA, Ortega-Porco LA, Soriano-Baron HE, et al. Evolution from microscopic transoral to endoscopic endonasal odontoidectomy. *Neurosurg Focus* 2014;37(4):E15
- Zoli M, Mazzatenta D, Valluzzi A, Mascari C, Pasquini E, Frank G. Endoscopic endonasal odontoidectomy. *Neurosurg Clin N Am* 2015;26(3):427–436
- Fujiwara Y, Manabe H, Sumida T, Tanaka N, Hamasaki T. Microscopic posterior transdural resection of cervical retro-odontoid pseudotumors. *J Spinal Disord Tech* 2015;28(10):363–369
- Jamshidi AM, Govindarajan V, Levi AD. Transdural approach for resection of craniovertebral junction cysts: case series. *Neurosurgery* 2023;92(3):615–622
- Naito K, Yamagata T, Kawahara S, Ohata K, Takami T. High cervical lateral approach to safely remove the cystic retro-odontoid pseudotumor: technical note. *Neural Med Chir (Tokyo)* 2019;59(10):392–397
- Bruder M, Cattani A, Gessler F, et al. Synovial cysts of the spine: long-term follow-up after surgical treatment and comprehensive literature review. *J Neurosurg Spine* 2017;27(3):256–267