Endoscopic Endonasal Odontoidectomy for Ventral Retro-Odontoid Epidural Abscess

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Introduction

- Ventral CCJ epidural abscesses are complex and require urgent surgery.
- Posterior approaches are commonly used, though anterior options include transcervical, transoral, and endoscopic endonasal techniques,[1].
- The endonasal approach is usually best for lesions above the nasopalatine line, [2].
- Despite less favorable anatomy here, successful endonasal surgery highlights flexible, case-specific planning.

Case Description

A male in his 60s presented with a large retropharyngeal abscess with ventral cervical epidural extension. Initial management included transoral drainage performed by another surgeon; however, this approach failed to control the pathology adequately.

- Patient developed progressive quadriparesis with worsening craniovertebral junction stenosis and increasing edema involving the medulla and cervical spinal cord.
- Six days later, the clinical course was complicated by a PEA arrest requiring intubation.
- Post-arrest exam: Glasgow Coma Scale 11T.
- Neurologic findings included quadriplegia with anti-gravity strength and preserved brainstem reflexes.

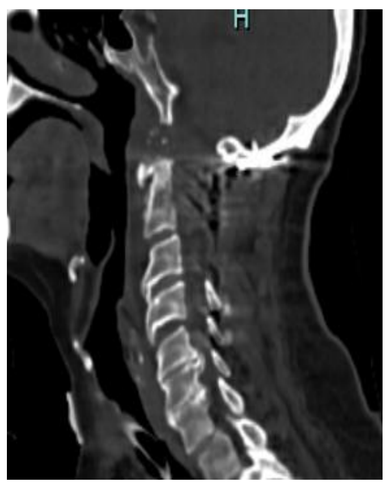

Figure 1. CT before Transoral Approach

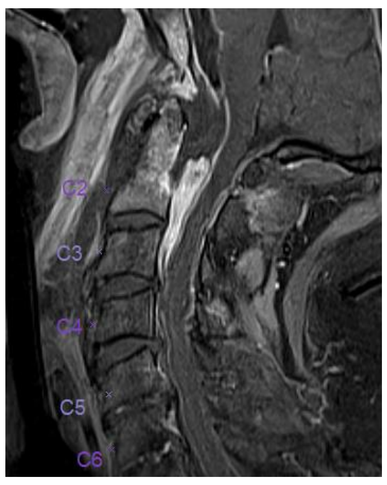

Figure 2. Sagittal view, T1 MRI

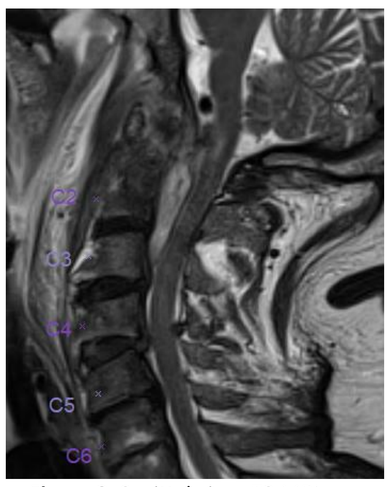

Figure 3. Sagittal view, T2 MRI

Figures 1–3 demonstrate early imaging obtained prior to the transoral drainage attempt. CT demonstrated erosive changes involving the odontoid process.
T1-weighted MRI demonstrated a large ventral retro-odontoid epidural abscess with central hypoenhancement and peripheral enhancement, causing significant compression at the cervicomedullary junction. T2-weighted sagittal imaging demonstrated early brainstem and cervicomedullary signal changes consistent with compressive injury.

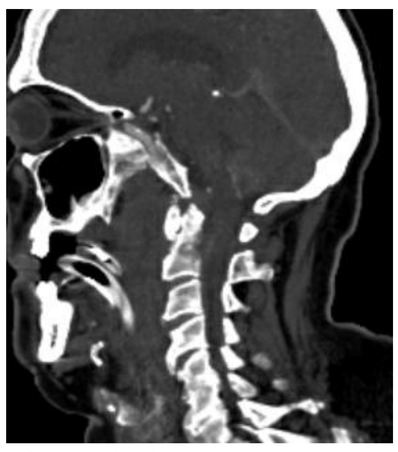

Figure 4. CT after Transoral approach

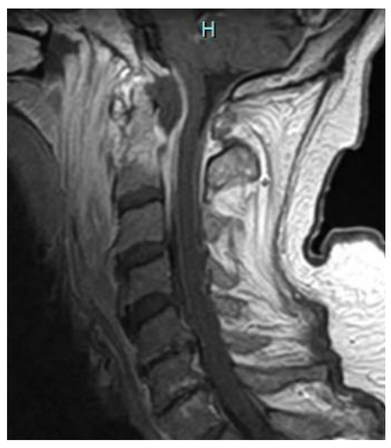

Figure 5. Sagittal view, T1 MRI

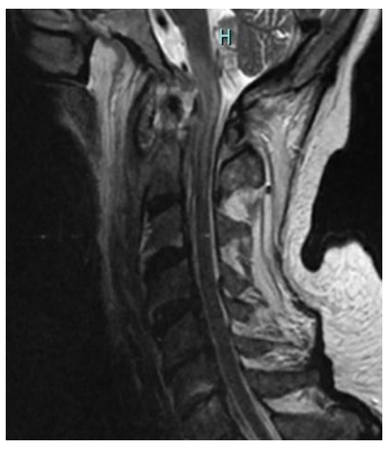

Figure 6. Sagittal view, T2 MRI.

Subsequent imaging (Figures 4-6) shows an epidural abscess and progression of edema extending rostrally and caudally, correlating with worsening quadriparesis.

Surgical Approach

Stage 1: Endoscopic Endonasal Odontoidectomy
Patient Positioning: Supine, neutral head alignment; left shoulder bump for rightward ergonomic tilt.

Surgical steps:
1. Bilateral inferior turbinate lateralization.
2. Posterior septectomy.
3. Drilling the maxillary crest flush with the hard/soft palate.
4. Elevation of reverse U-shaped rhinopharyngeal flap.
5. Removal of the superior anterior arch of C1 and odontoid (rostral to caudal).
6. Drainage and resection of epidural abscess; care to avoid CSF leak.
7. Flap replacement with sealant.

Surgical Approach

Stage 2: Occiput-to-C5 Posterior Fixation
Patient Positioning: Prone with Mayfield fixation and careful occipitocervical alignment.

Surgical Steps:
1. Posterior subperiosteal cervical dissection.
2. C2 dorsal nerve root sacrifice.
3. C1 lateral mass and C2 pars screw placement under fluoroscopy.
4. Freehand C3–C5 screw placement.
5. Occipital plate fixation.
6. C1–C3 laminectomies.
7. Rod placement to complete stabilization.

Result

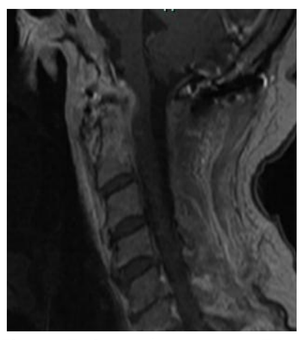

Figure 7. 2-weeks post-op, T1

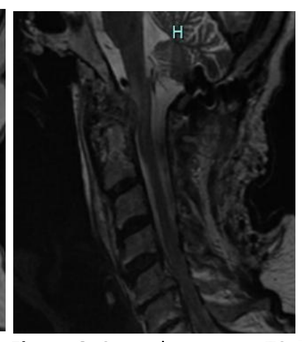

Figure 8. 2-weeks post-op,T2

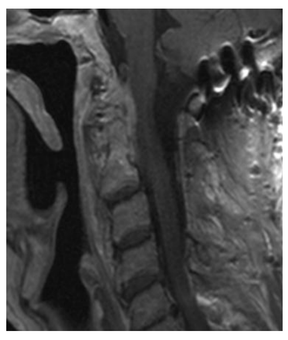

Figure 9. 3-months post-op,T1

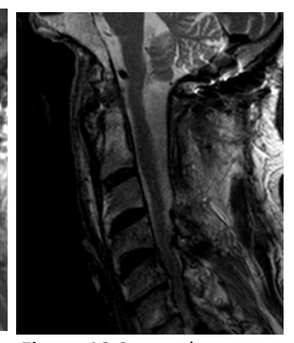

Figure 10.3-months post-op,T2

Serial imaging (Figure 7-10) at two weeks and three months post-op demonstrated complete resolution of the epidural abscess with improvement of brainstem and cervicomedullary junction edema.

- Early neurological improvement without new deficits.
- Required tracheostomy (POD 7) and gastrostomy due to edema.
- Polymicrobial infection treated; discharged to rehab.

At 3 months: decannulated, full strength, ambulatory.

Discussion

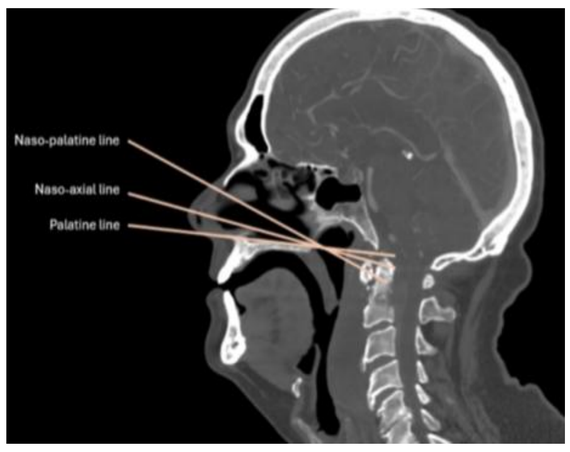

Figure 11: Demonstration of Naso-palatine line, Naso-axial line, and palatine line

Due to progressive neurological decline with brainstem and cervical cord edema, a staged approach was performed consisting of endoscopic endonasal odontoidectomy with abscess evacuation followed by occiput-to-C5 posterior fixation for ventral decompression and stabilization.

Rationale for Ventral (Endonasal) Approach
1. Ventral compression favored direct anterior decompression rather than a posterior-only approach.
2. Provided improved source control and drainage of the epidural abscess alongside antibiotic therapy.
3. Prior transoral drainage had failed.
4. Posterior stabilization was required following ventral decompression.

Benefit–Risk Assessment
Anticipated benefits, including definitive decompression, infection control, and prevention of further neurological decline, were considered to outweigh procedural risks, such as CSF leak and spinal cord injury.

Conclusion

This case highlights that carefully selected surgical intervention can achieve good neurological and functional recovery in complex craniovertebral junction infections.

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Surgery video link:

Reference:
1.Liu JK, Patel, J., Goldstein, I. M., Eloy, J. A. Endoscopic Endonasal Transclival Transodontoid Approach for Ventral Decompression of the Craniovertebral Junction: Operative Technique and Nuances. Neurosurgical Focus. 2015;38(4):E17. doi:10.3171/2015.1.focus14813
2. de Almeida JR, Zanation AM, Snyderman CH, et al. Defining the nasopalatine line: the limit for endonasal surgery of the spine. Laryngoscope. Feb 2009;119(2):239-44. doi:10.1002/lary.20108