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Introduction

Although nasogastric (NG) tube placement is routinely performed, rare but serious adverse events can occur, including intracranial perforation.¹ Intracranial trauma with cerebrospinal fluid (CSF) leak through the cribriform plate is uncommon, particularly in awake patients; however, the resulting neurologic sequelae may be clinically significant.

Anterior Skull Base Vulnerability

- The cribriform plate and its dural lining represent some of the thinnest structures of the anterior skull base, making them particularly susceptible to iatrogenic injury.²
- Trauma to this region may result in:
 - CSF leak and pneumocephalus, intracranial hemorrhage, and increased risk of meningitis and anosmia²
- Breach of dural integrity permits intracranial air entry during pressure changes such as coughing or sneezing, leading to pneumocephalus and mass effect on central nervous structures.³
- Characteristic imaging findings may include the “Mount Fuji sign,” in which subdural air separates the frontal lobes.³

Neurologic Sequelae

- This case describes a rare NG tube-associated anterior skull base injury resulting in cribriform plate perforation with cerebrospinal fluid leak, pneumocephalus, intracranial hemorrhage, and subsequent cranial nerve III and IV palsy.
- Pneumocephalus and intracranial hemorrhage can produce compressive and pressure-related injury to neural structures, including, but not limited to, cranial nerves traversing the tentorial edge.³
- The case highlights the mechanism of neurologic injury, importance of early recognition and interdisciplinary management, and the potential for spontaneous neurologic recovery with appropriate follow-up.

Case Presentation

A 66-year-old male (history of diabetes, hypertension, hyperlipidemia, and diverticulitis) with prior bowel obstruction presented with one week of nausea, vomiting, and lower abdominal pain. Abdominal CT demonstrated colonic air-fluid levels and diverticulosis, prompting bedside nasogastric tube placement for bowel decompression while the patient was awake and alert.

Acute Neurologic Deterioration:

- Altered mental status and incoherent speech, left eyelid ptosis, and facial asymmetry.

Emergent Head CT Findings:

- Acute subdural hemorrhage along the left tentorium cerebelli, acute subarachnoid hemorrhage in the left temporal and occipital lobes, and extensive bilateral subdural pneumocephalus most prominent over the frontal lobes. Prompting transfer to a tertiary care center.

Skull Base Evaluation and Management

- Endoscopic endonasal evaluation identified a 3 x 5 mm cribriform plate defect with active CSF leak.
- Initial conservative management was attempted but due to persistent pneumocephalus, surgical repair was scheduled for four days post-injury.
- Prior to repair, lumbar drain was attempted for diagnostic purposes and to reduce pressure on the repair site, but unsuccessful due to spinal stenosis.

Surgical Repair

- Approach: Image-guided extradural endoscopic endonasal repair
- Procedures performed: Left maxillary antrostomy, left total sphenoidectomy, left front sinusotomy, and left middle turbinectomy.
- Technique: 1 x 1 cm free mucosal graft harvested from the left middle turbinate; bipolar cautery of the anterior ethmoidal artery; defect sealed with Surgicel®, mucosal graft, and DuraSeal®; Gelfoam® and Merocel® nasal packing used for stenting.

Postoperative Course and Follow-Up

- Imaging demonstrated complete resolution of pneumocephalus with significant improvement in mental status.
- Day 16: resolution of ptosis and anisocoria, but persistent diplopia prompted neuro-ophthalmology follow-up.

Neuro-Ophthalmologic Course

- 2 months: horizontal and vertical diplopia, 12 LHT on downgaze
- 4 months: Worsening hypertropia (8 LHT in primary gaze, 5 LHT on downgaze), inconsistent with isolated CN III palsy (consistent with CN IV)
- 5 months: Spontaneous resolution of diplopia, residual 2 LHT primary gaze
- 8 months: Orthotropic in all gazes, complete resolution of CN III and IV

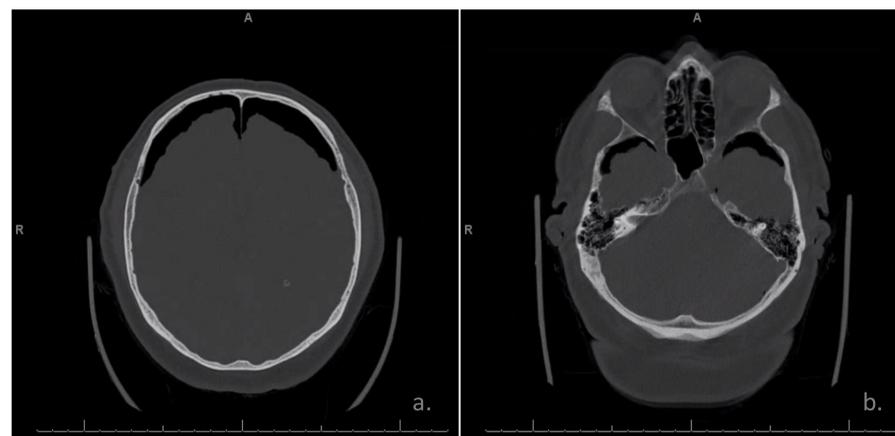


Figure 1a. Initial CT Head without contrast demonstrating pneumocephalus most pronounced overlying both frontal cerebral convexities with tenting of the anterior aspects of the frontal lobes. **1b.** Initial CT Head without contrast demonstrating pneumocephalus overlying the anterior aspects of both middle cranial fossae.

Discussion

- Although intracranial perforation during NG tube placement is rare, this case demonstrates that clinically significant anterior skull base injury can occur even in awake, alert patients, highlighting that intact protective reflexes do not eliminate risk.
- In this case, immediate recognition of neurologic changes allowed prompt diagnosis; however, similar injuries may be overlooked when findings are subtle or delayed, especially when CSF rhinorrhea is misattributed to benign sinonasal symptoms, increasing the risk of complications such as meningitis.⁴
- Proper NG tube placement technique, including inferior and posterior advancement along the nasal floor, is critical to minimizing the risk of anterior skull base injury.⁵
- Pneumocephalus and intracranial hemorrhage likely produced localized mass effect and pressure-related injury at the tentorial edge, an anatomically vulnerable region where cranial nerves III and IV are susceptible to compressive and shear forces.⁶
- The evolving ophthalmologic findings suggest partial recovery of cranial nerve III function which unmasked a concurrent cranial nerve IV palsy, emphasizing that early neurologic examinations may underestimate the full extent of injury.
- This sequential pattern of recovery underscores the importance of longitudinal neuro-ophthalmologic follow-up, as delayed or evolving deficits may only become apparent over time.
- In cases of limited anterior skull base trauma, endoscopic endonasal repair provides effective closure of cribriform plate defects with high success rates and reduced morbidity, making it the preferred approach in appropriately selected patients.⁷
- The patient’s gradual spontaneous recovery aligns with existing literature demonstrating that traumatic cranial nerve III and IV palsies often improve over 6-12 months, supporting an initial period of conservative management prior to surgical intervention.⁸

Conclusions

- NG tube placement can rarely result in anterior skull base injury with significant neurologic sequelae, even in awake patients.
- Early recognition of neurologic changes and prompt imaging are essential for accurate diagnosis and timely management.
- Endoscopic repair is an effective and minimally invasive option for select cribriform plate defects.
- In traumatic cranial nerve III and IV palsy, extended observation with close neuro-ophthalmologic follow-up is warranted, as spontaneous recovery is common and may prevent unnecessary surgical intervention.

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References

1. Motta APG, Rigobello MCG, Silveira R, Gimenes FRE. Nasogastric/nasoenteric tube-related adverse events: an integrative review. *Rev Lat Am Enfermagem.* 2021;29:e3400. doi:10.1590/1518-8345.3355.3400
2. Kühnel TS, Reichert TE. Trauma of the midface. *GMS Curr Top Otorhinolaryngol Head Neck Surg.* 2015;14:Doc06. doi:10.3205/cto000121
3. Das JM, Munakomi S, Bajaj J. Pneumocephalus. In: *StatPearls [Internet]*. Treasure Island, FL: StatPearls Publishing; 2025. Updated December 11, 2024. Accessed June 21, 2024. <https://www.ncbi.nlm.nih.gov/books/NBK535412/>
4. Liu MY, Gardner JR, Woodworth BA, et al. Individual SNOT-22 items aid in differentiating between spontaneous cerebrospinal fluid rhinorrhea and chronic rhinosinusitis without nasal polyps. *Ann Otol Rhinol Laryngol.* 2023;132(6):698-704. doi:10.1177/00034894221111256
5. Young RF. Cerebrospinal fluid rhinorrhea following nasogastric intubation. *J Trauma.* 1979;19(10):789-791. doi:10.1097/00005373-197910000-00014
6. Cui V, Kouliev T. Isolated oculomotor nerve palsy resulting from acute traumatic tentorial subdural hematoma. *Open Access Emerg Med.* 2016;8:97-101. doi:10.2147/OAEM.S117687
7. Yadav YR, Parihar V, Janakiram N, Pande S, Bajaj J, Nameev H. Endoscopic management of cerebrospinal fluid rhinorrhea. *Asian J Neurosurg.* 2016;11(3):183-193. doi:10.4103/1793-5482.145101
8. Sriraman W, Panyakorn S. Retrospective analysis of factors related to the long-term recovery of third, fourth, and sixth cranial nerve palsy with etiologies and clinical course in a tertiary hospital. *Clin Ophthalmol.* 2024;18:441-450. doi:10.2147/OPHT.5449127