

Disclosures

The authors report no relevant financial relationships or conflicts of interest.

Introduction

Penetrating nasal foreign bodies with intracranial extension are rare but potentially life-threatening injuries, with risks including cerebrospinal fluid (CSF) leak, vascular injury, and intracranial infection. Endoscopic endonasal approaches provide excellent visualization of the skull base and allow for controlled foreign body removal with immediate reconstruction. We present a case of penetrating nail gun injury involving the anterior skull base managed via a contralateral endoscopic transsphenoidal approach

Case Presentation

A 39-year-old male presented as a transfer from an outside hospital following an accidental nail gun injury to the left nasal cavity. The patient denied vision changes, loss of consciousness, clear rhinorrhea, post-nasal drip, or metallic taste. Past medical history was unremarkable. Social history was notable for prior intranasal cocaine use

Physical examination demonstrated a metallic foreign body lodged within the left nasal cavity as well as a chronic-appearing anterior septal perforation. Cranial nerve examination was intact. No clear rhinorrhea was elicited with forward flexion.

Pre-operative Images



Image 1: Sagittal noncontrast CT sinus revealed a 3-inch metallic foreign body traversing the left nasal cavity with intracranial extension through a defect in the planum sphenoidale, projecting approximately 1-2 mm into the anterior cranial fossa. Trace pneumocephalus was present without intracranial hemorrhage



Image 2: Foreign body entering left nasal cavity

Surgical Planning

The patient was taken to the OR the following morning for endoscopic sinus surgery with foreign body removal and skull base repair. This was performed in conjunction with Neurosurgery. A contralateral endoscopic transsphenoidal approach was selected to optimize visualization of the skull base defect and permit controlled foreign body removal with immediate skull base repair.

Surgical Technique



Image 3: Initial endoscopic view showing foreign body in left nasal cavity



Image 4: The Right inferior turbinate was outfractured



Image 5: Middle turbinate resection for access and free mucosal graft harvest



Image 6: Middle turbinate stump was cauterized using suction bovie



Image 7: View of right sphenoid os after partial ethmoidectomy and partial resection of superior turbinate



Image 8: Right nasoseptal rescue flap was raised



Image 9: Sphenoid os widened and posterior septectomy performed

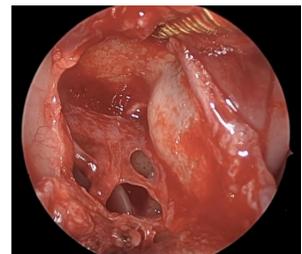


Image 10: Foreign body visualized violating skull base



Image 11: Foreign body was carefully removed. A small dural defect was identified without active CSF leak



Image 12: Skull base repair with Duragen inlay and middle turbinate free mucosal graft inlay



Image 13: Multilayer skull base reconstruction performed using:
- Duragen inlay graft
- Middle turbinate free mucosal graft
- Surgical for graft stabilization
- Fibrin sealant
- Nasopore bolster



Image 14: Foreign body

Discussion

This case is a successful demonstration of an endoscopic transsphenoidal approach for the removal of a penetrating foreign body that violates the skull base. This technique offers a distinct advantage over traditional open craniotomy approaches for select anterior skull base injuries. The patient did well postoperatively and was sent home on postoperative day 2. There was no evidence of CSF leak postoperatively.

Historically speaking, foreign bodies causing penetrating skull base injuries are generally managed with an open craniotomy, typically through a bifrontal approach^{[2][8]}. Open approaches have higher complication rates and are associated with significant morbidity secondary to prolonged operative times and the need for brain retraction. It was found in a systematic review of 888 patients with traumatic anterior skull base CSF leaks that open surgical repair was associated with an 11.1% complication rate compared to the 0.7% rate when providers opted for endoscopic approaches, with higher rates of CSF leak recurrence^[9]. The endoscopic endonasal approach provides a more optimal visualization of the defect in the skull base, avoids brain retraction, eliminates facial incisions, and allows the surgeon to perform immediate skull base reconstruction^{[3][6][10]}.

The endoscopic transsphenoidal approach is typically employed for excision of sellar and parasellar lesions^{[4][5]}. Its use in this case provided a more favorable trajectory for instrumentation and allowed binasal access for foreign body removal. Complications that can arise from using this approach include postoperative CSF leak, meningitis, vascular injury, and visual impairment^[3]. The Brain Trauma Foundation recommends broad-spectrum antibiotics for up to 5 days, depending on contamination^[2].

Multidisciplinary collaboration between Otolaryngology and Neurosurgery is essential for optimal outcomes. CT angiography is critical to assess for injury to nearby vasculature. Surgeons should plan for multilayer skull base reconstruction, which is easily achieved using intranasal free mucosal grafts or vascularized pedicled flaps.

The endoscopic transsphenoidal approach used in this case illustrates a minimally invasive, effective, and safe technique for select penetrating nasal foreign bodies with skull base extension. This approach allows excellent visualization, avoids increased morbidity as with craniotomy, and allows immediate multilayer skull base reconstruction, which allows favorable outcomes when applied appropriately.

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