ENDONASAL REPAIR OF SPHENOID SINUS FRACTURE AND ENCEPHALOCELE CAUSED BY A LATERAL SKULL BASE PENETRATING INJURY
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Introduction
Penetrating trauma to the lateral skull base with a knife that resulted in direct injury to the lateral sphenoid sinus wall and associated structures in an adolescent has not been reported. Endonasal approaches to repairing the skull base can be applied in the acute traumatic period to prevent further sequelae.

Case Presentation
An 18-year-old female sustained multiple stab wounds to the head, neck, torso, and extremities during an assault. A stab wound to the left temporo-parietal region caused multiple hematomas in the left temporal lobe and extended through the cavernous sinus and into the sphenoid sinus. The patient was noted preoperatively to have a CN III palsy, but was otherwise neurologically intact. Cavernous sinus thrombosis was present on MRA and the ICA was unaffected.

Imaging

Table of imaging figures:

- Figure 1. CT Axial
- Figure 2. CT Coronal
- Figure 3. CT Angiography

Surgical Approach
We performed an endonasal repair of the sphenoid sinus fracture and encephalocele with abdominal fat graft and nasoseptal flap. She was managed postoperatively with a lumbar drain and close monitoring, and discharged home on post-operative day #10 without evidence of CSF rhinorrhea.

Intraoperative Photos

Table of intraoperative photos:

- Figure 4. Intraoperative photo demonstrating bone fragment in sphenoid sinus in close proximity to the internal carotid artery.
- Figure 5. Intraoperative photo demonstrating appearance status post endoscopic repair of sphenoid sinus injury with abdominal fat graft and Duraseal in place.
- Figure 6. Intraoperative photo demonstrating appearance status post endoscopic repair of sphenoid sinus injury with nasoseptal flap overlying defect.

Discussion
Sphenoid sinus fractures are associated with damage to the internal carotid artery, CSF leak, optic nerve damage, superior orbital fissure syndrome, and post-traumatic DI1. The vulnerability of the ICA in the setting of sphenoidal trauma has been demonstrated through case series reporting post-traumatic carotid-cavernous fistulae after sphenoidal fracture2 Non-penetrating head injury has also been associated with traumatic ICA aneurysm rupture into the sphenoid sinus3. We present the first case of a penetrating stab injury to the skull base in a pediatric patient. The patient's ICA was noted to be intact on thorough preoperative imaging evaluation despite the concerning preoperative finding of a CN III palsy. Pedicled nasoseptal flaps with or without free grafts have been demonstrated to be efficacious in the reconstruction of skull base defects4-5. We employed this endoscopic skull base technique to repair the defect in this high-risk and fragile region of the skull base.

Conclusions
Penetrating trauma to the temporo-parietal region of the skull may result in injury to the skull base and, in this case, an associated encephalocele at the level of the sphenoid sinus. Careful assessment should be performed to assess the intracranial carotid artery, cavernous sinus, and relevant cranial nerves prior to operative intervention. Surgical management can be successfully performed using an entirely endonasal approach.

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References