The View through the Nose: ENT considerations for Pituitary/Skull Base Surgery

Edsel Kim, M.D.
Otolaryngology-Head and Neck Surgery
The Oregon Clinic
Providence Brain and Spine Institute
Pituitary, Thyroid and Parathyroid Update
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Endonasal Pituitary/Skull Base Surgery

- Overview
- Anatomy
- History
- Case studies
- Video
Endoscopic Pituitary Surgery

- Natural extension of sinus surgery
- 1997 – Jho and Carrau
Endonasal Endoscopic Skull Base Surgery

**Why?**
- Visualization
  - Endoscopes vs. Headlight/Microscope
- Access
- Decreased Patient Morbidity
- Improved Outcomes

**Why Not?**
- Very Steep (and long) Learning Curve
- Need willing partner (Neurosurgeon and ENT)
- Volume to gain greater proficiency can be difficult to get to next level
Endonasal Skull Base Surgery

- Addressing those areas outside of the sella/pituitary
- Natural progression beyond pituitary and sinus surgery
Endonasal Skull Base Surgery
Endonasal Skull Base Surgery

ENT

- Provide exposure to structures beyond the sinuses using endoscopes
- Assist in visualization and tumor removal with neurosurgery
- Reconstruct skull base defect and repair CSF leak
  - Fat graft
  - Vascularized tissue
# Endonasal Skull Base Surgery

Table 1: Training Levels for Endonasal Skull Base Surgery

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>Level I</td>
<td>Sinus Surgery</td>
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</table>
| Level II | Advanced sinus surgery  
Cerebrospinal fluid leak  
Intrasellar — sella, pituitary |
| Level III | Extrasellar — sella, pituitary  
Optic nerve decompression  
Intraorbital surgery  
Extradural skull base surgery |
| Level IV | Intradural skull base surgery  
A. With cortical cuff  
Transplanum  
Transcribiform  
Type I Craniopharyngioma  
Intradural skull base surgery  
B. Without cortical cuff  
Type II/III Craniopharyngioma  
Transclival, intradural |
| Level V | Coronal plane, carotid dissection  
Vascular surgery |

Univ. Pittsburgh Training Levels for Endonasal Skull Base Surgery
Anatomy

Paranasal Sinuses

- Frontal sinus
- Ethmoid sinus
- Nasal cavity
- Maxillary sinus
- Sphenoid sinus
- Pharynx (throat)
3D Considerations

- Sinuses are a 6 sided box
  - 4 sides of the box lead to blindness and/or death
- Axial, Sagittal and Coronal Planes
Axial Plane

- Nasal Airway
  - Nostril to the sphenoid sinus
- Allergies, Chronic sinusitis, polyps
- Deviated septum, nasal trauma
- Previous nasal surgery with/without persistently deviated septum
Sagittal Plane

- Cribiform plate - Olfactory groove lesions
  - Meningioma
  - Esthesioneuroblastoma

- Planum sphenoidale
  - Meningioma

- Sella
  - Pituitary Adenoma
  - Rathke’s Cleft Cyst
  - Craniopharyngioma

- Clival lesions
Coronal Plane

- Cavernous Sinus
- Pterygopalatine Fossa
- Petrous Apex
- Meckel’s Cave
- Jugular Foramen
Endoscopic Skull Base Surgery – Immediate Risks

- **Bleeding** – 2.5%
  - Cavernous Sinus
  - Carotid Artery

- **Neurologic deficits** – 2.5%
  - Cavernous Sinus – ophthalmoplegia
  - Optic nerve – Blindness

- **Infection** – 1%
  - Meningitis

- **CSF Leak** – 5%

- **Death** - 0.9%

Endoscopic Skull Base Surgery – Delayed Risks

- CSF Leak – 5%
- Altered/Diminished sense of smell – 2%
- Scarring/Chronic Sinusitis – 5%
- Delayed Neurologic deficits – 1.9%

Endoscopic Pituitary Surgery
Endoscopic Pituitary Surgery
Cavernous Sinus Meningioma

- 75 yo female with 3 day history of temporal HA, nausea and vomiting
- Left sided ptosis, complete ophthalmoplegia and proptosis
Cavernous Sinus Meningioma
Rathke’s Cleft Cyst
Endoscopic Skull Base Surgery

- Ideal time for everything to come together
  - Improved Optics/Visualization
  - Computer Navigation (CT and/or MRI)
  - Development of low profile high speed drills
  - Injectable hemostatic agents to aid with visualization

- Synergistic effort
  - Combination of ENT/Neurosurgery
  - True multidisciplinary collaboration
Future

• Articulating Instruments
  • Ability to look and manipulate tissue around corners as easily as rigid instruments

• 3-Dimensional Optics
  • Aid in depth perception (optic versus haptic)
  • Potentially speed the learning curve for newer surgeons

• Robotic Skull base surgery
  • Allow suturing at the skull base
The past 10-15 years have had a rapid growth of improved techniques, approaches and understanding of skull base anatomy from an endoscopic perspective.

Newer treatments allow for lower morbidity with equal if not improved outcomes.

Endonasal skull base surgery can have significant advantages over traditional open skull base/pituitary surgery.