Endoscopic versus open approach to the infratemporal fossa

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BOUNDARIES OF INFRATEMPORAL FOSSA

- Sphenoid bone: Greater wing
  Lateral plate of pterygoid process
- Pterygomaxillary fissure
- Inferior orbital fissure
- Infratemporal surface of maxilla
- Temporal bone: External acoustic meatus
  Mandibular fossa
  Styloid process
  Foramen spinosum
  Foramen ovale
  Pterygopalatine fossa
  Sphenopalatine foramen
- Petrous bone
Contents of Infratemporal Fossa:

Muscles:
MUSCLES OF MASTICATION
i.e TEMPORALIS, MASSETER,
LATERAL & MEDIAL PTERYGOID

Nerves:
- V3 & its branches
- Otic ganglion
- Chorda tympani

Artery:
- Maxillary artery

Veins:
- Pterygoid venous plexus

Open Surgical Approaches to the infratemporal fossa
WHICH LESIONS???

- **MAINLY NEOPLASMS**
  
  Either primary like schwannoma of Mandibular nerve or TG nerve and meningeoma extending from middle cranial fossa.

  **OR more common:**

  Extension of nasal or nasopharyngeal neoplasms like nasopharyngeal angiofibroma or malignancy of maxilla.

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Here we are not dealing with temporal bone lesions that extend to the infratemporal fossa......

Fisch B or C
ENDOSCOPIC APPROACHES FOR THE INFRATEMPORAL FOSSA

- Endoscopic Endonasal Transpterygoid Approach either: ipsilateral or contralateral with posterior septectomy

- Endoscopically Assisted Ipsilateral Caldwell-Luc Approach

Transpterygoid approach
Endoscopic Assisted Caldwell Luc approach:

**AIM OF THE WORK**

- The aim of this study is to compare the endoscopic transpterygoid and the preauricular subtemporal approaches to the infratemporal fossa to better elucidate their respective advantages and drawbacks. We will illustrate that using cadaveric dissections and clinical correlation.
CADAVERIC STUDY:

Figure: endoscopic view of the left infratemporal fossa, A: before, B: after removal of posterior wall of maxillary sinus.
Endoscopic dissection of infratemporal fossa.

Endoscopic view of infratemporal fossa.
Figure: dissection of left V2 and V3 after partial drilling of pterygoid plate and resection of lateral pterygoid muscle.
FO: foramen ovale, LPM: lateral pterygoid muscle, FR: foramen rotundum, TM: temporalis muscle
Exposure seen from above via preauricular subtemporal approach.
A: exposure of V2; maxillary nerve.
B: craniotomy for exposure of foramen rotundum and foramen ovale.

Exposure seen from above via preauricular subtemporal approach taken with the aid of 0° endoscope.
### TABLE: Critical differences in anatomical dissection of the infratemporal fossa between both endoscopic and open approach.

<table>
<thead>
<tr>
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<th><strong>Endoscopic Transpterygoid Approach</strong></th>
<th><strong>Preauricular Subtemporal Approach</strong></th>
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<tbody>
<tr>
<td><strong>Depth of dissection</strong></td>
<td>Less deep</td>
<td>Deep</td>
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<tr>
<td><strong>External skin incision</strong></td>
<td>No</td>
<td>Bicoronal or hemicoronial skin incision.</td>
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<td><strong>Risk of facial nerve injury</strong></td>
<td>No</td>
<td>Risk if dissection in superficial plane.</td>
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<tr>
<td><strong>Injury to temporalis muscle</strong></td>
<td>Minimal risk</td>
<td>Yes, postoperative pain and trismus are common.</td>
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<tr>
<td><strong>Injury to pterygoid muscles</strong></td>
<td>Lateral pterygoid is usually divided.</td>
<td>Sometimes divided.</td>
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<td><strong>Maxillary artery exposure</strong></td>
<td>Mainly for 3rd part with its terminal branches.</td>
<td>Mainly for the 2nd part with muscular and buccal branches.</td>
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<td><strong>Foramen rotundum &amp; V2</strong></td>
<td>Easily visualized and dissected.</td>
<td>Often requires removal of lateral orbital rim.</td>
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<tr>
<td><strong>Nerve of pterygoid canal</strong></td>
<td>Easily visualized.</td>
<td>Not visualized.</td>
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<tr>
<td><strong>Foramen ovale &amp; spinosum</strong></td>
<td>Can be approached after drilling out the lateral pterygoid plate.</td>
<td>Easily visualized.</td>
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<td><strong>Exposure of middle fossa dura</strong></td>
<td>Difficult except for medial aspect (Meckel’s cave).</td>
<td>Easy to perform complementary craniotomy.</td>
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<tr>
<td><strong>Risk of injury to Internal carotid artery</strong></td>
<td>Possible to injure the parapharyngeal part of internal carotid artery if the dissection continues deep and lateral or the petrous part of the internal carotid</td>
<td>Also possible according to the extent of dissection.</td>
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CLINICAL STUDY RESULTS:

- Through the clinical study done in both Alexandria university Hospital and Ohio State University Wexner Medical center….. We tried to answer the following Questions:
  - indications of each approach???
  - Exposure and limitations???
  - Complications if any???
  - Reconstruction methods???

Indications???

Most benign tumors like juvenile angiofibroma and schwannoma can be resected completely using an endoscopic approach. Some malignant tumors, especially those displacing than invading important neurovascular structures in the ITF, can be removed safely through the endoscopic approach like low-grade adenocarcinomas and adenoid cystic carcinomas.
Whereas other invasive malignant tumors extending to the ITF like maxillary sinus cancer or mandibular cancer, as seen, most often mandate a traditional open surgical approach as extended preauricular subtemporal approach combined with anterior approach that enables proximal internal carotid artery (ICA) control, resection of primary tumor and exenteration of the soft tissues of the infratemporal fossa.

An important drawback of the endoscopic endonasal transpterygoid approaches is the limited exposure of the parapharyngeal ICA. We need to mobilize the medial pterygoid muscle and Eustachian tube to identify the ICA in the medial wall of infratemporal fossa. Sometimes, we need to expose the ICA proximally in the neck to gain adequate control.
Exposure and limitations???

- The exposure offered by the endoscopic endonasal transpterygoid approach to the infratemporal fossa is equal to exposure of preauricular subtemporal approach and more extensive than that of microscopic sublabial transmaxillary approach, providing improved access to treat larger, more extensive lesions.

COMPLICATIONS:

- endoscopic endonasal transpterygoid approaches avoids morbidities that are inherent to lateral and non-endoscopic anterior approaches such as cosmetic issues related to skin incision, need for bony osteotomies, or temporalis muscle manipulation, TMJ pain and dysfunction, paralysis of facial nerve branches, craniotomy, and brain retraction. However, trismus can result from scarring of the pterygoid muscles.
RESIDUAL TUMOR????

- Residual tumor remained in some cases after an endoscopic transpterygoid approach. Tumor remnants were intentionally left in critical regions such as the cavernous sinus, petrous apex or jugular foramen. This responds more to the need to preserve important neurovascular structures rather than a limitation of the endoscopic transpterygoid approach.

So, it is not the approach issue!!!!!!

CSF LEAK AND RECONSTRUCTION

- Nasoseptal flap in the endoscopic cases and no postoperative CSF leak was encountered following this method of reconstruction.

- Open combined approaches are associated with large defects that frequently require either regional flap as temporalis muscle or microvascular free flap reconstructive method such as anterolateral thigh (ALT) free flap. **This markedly increases the time of surgery and may cause morbidity for the patients.**
CONCLUSIONS

Endoscopic transpterygoid approaches have become very standard to resect most of benign and select malignant tumors that involve the infratemporal fossa and middle cranial fossa. Open approaches play an important role, especially in resection of large malignant tumors of maxilla and mandible, and combined with other craniofacial approaches for tumors resection.

Thank you