Endoscopic-Assisted Surgery of the Middle ear and Petrous Apex

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Rationale of Endoscopic Otologic Approaches

Operating Microscope
- Excellent illumination and magnification
- Vision limited to line-of-site

Endoscopes
- Angled vision at tip allowing off line-of-site visualization
Off Line-of-Sight Structures

Middle ear
   Epitympanic recess
   Facial recess
   Sinus tympani
   Eustachian tube
   Hypotympanum
Posterior fossa
   Fundus of internal auditory canal

Endoscopy of the Middle Ear

Tympanoplasty and ossicular reconstruction (Bottrill & Poe 1995, Tarabichi 1999)
Second look for cholesteatoma (Youssef & Poe 1997, Yung 2001)
Posterior fossa surgery (Wackym et al 1999)
Otologic Endoscopes

Rigid
1.7 mm and 4 mm sinus scopes
0, 30 and 70 degree lenses

Fiberoptic

Middle Ear Endoscopy – Potential Indications

Unexplained conductive hearing loss
Trauma
Cholesteatoma, infection
Perilymph fistula
Follow-up (second look) cholesteatoma
Outpatient Middle Endoscopy Technique

Co-operative patient

Anesthesia
  Topical
    (iontophoresis)
  Local (phenol)

Accurate placement of myringotomy

Middle Ear Endoscopy
Setup for Middle Ear Endoscopy

Endoscopic Middle Ear Endoscopy – Problems

Bleeding

Middle ear adhesions

Improper placement of myringotomy
Endoscopic Middle Ear Surgery

Advantages
- Clear view of anterior sulcus
- Reduce need for anterior canalplasty

Disadvantages
- One handed manipulation
- Manipulation vs. suction

View of Middle Ear

Microscopic View

Endoscopic View
Endoscopic-Assisted Temporal Bone Surgery

Epitympanum
Facial Recess
Sinus tympani
Petrous apex

Residual Cholesteatoma in Anterior Epitympanum
Antrum

Ossicular Abnormality – Fractured Stapes
Sinus Tympani

Disadvantage - One Handed Dissection
Endoscopic Middle Ear Surgery – Disadvantages

One handed surgery
Bleeding harder to manage
Passing instruments past endoscopes
Fogging

Endoscopic-Assisted Neurotology
Endoscopic vestibular nerve section
Acoustic neuroma
  Identification of the facial nerve
  Completeness of the resection
  Pneumatization of the petrous apex
  Prevention of CSF leak
Petrous apex cholesterol cyst
Operative Technique

Initial dissection and exposure with the operating microscope
Examination and dissection of the interior of the lesion with rigid endoscopes
Otologic Endoscopes
  1.7 mm o.d.
Rhinologic Endoscopes
  4.0 mm o.d
  0, 30 and 70 degree lenses

Case I: Petrous Apex Cholesterol Granuloma

64 yr old male right sided headaches and hearing loss
Case I: Microscopic View: Transcanal Infracochlear Approach

CASE I: Endoscopic View
CASE I: Limits of Cavity

48 year old male with multiply recurrent cholesterol granuloma

Imaging demonstrated multiloculated cyst of mastoid and petrous apex

Retrofacial approach

CASE II: Petrous Apex
Cholesterol Granuloma

48 year old male with multiply recurrent cholesterol granuloma

Imaging demonstrated multiloculated cyst of mastoid and petrous apex

Retrofacial approach
Case II: Exploration of Interior of Cyst Demonstrates Secondary Cyst

Case II: Opening of Secondary Cyst
Case II: Dissection of Septum within Cyst

76 year old woman with long history of chronic draining left ear
Presented after acute onset of mental status deterioration
Meningitis and temporal lobe abscess
Imaging demonstrated massive cholesteatoma with complete destruction of the mastoid and petrous apex to the anterior foramen lacerum
VII nerve and cochlear function intact

Case III: Petrous Apex Cholesteatoma
Case III: Imaging

Case III: Microscopic View
Case III: Microscopic View of Petrous Apex

Case III: Surgical Dilemma

Radical resection with
- Mobilization of the facial nerve
- Mobilization of the carotid artery
- Resection of the otic capsule

Endoscopic removal with *in situ* preservation of
- VII
- Carotid
- Otic capsule
- Avoid CSF leak
Case III: Endoscopic View

Case III: Initial Dissection
Case III: Final Cavity

Results

All cases still under active follow up

No surgical complications including

Facial paralysis
CSF leak
Perioperative infection
Oto-Endoscopic Surgery: Advantages

Off line-of-site visualization

Exposure beyond lateral constrictions

Examination of interior of lesions for septae and loculations not possible to see with operating microscope

Oto-Endoscopic Surgery – Disadvantages

One handed surgery
Bleeding may be difficult to manage
Passing instruments past endoscopes through narrow apertures
Can often see areas that are very hard to reach with
Fogging of lense
Endoscopic-Assisted Surgery of the Petrous Apex

“For the man with a hammer, All world is a nail.”

Haskins Kashima, M.D.