

Endoscopic-Assisted Surgery of the Middle ear and Petrous Apex

Douglas E. Mattox, M.D.

Professor and Chair

Department of Otolaryngology – Head & Neck Surgery
Emory University School of Medicine

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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)

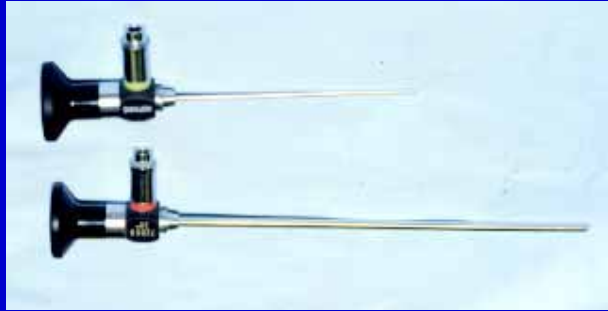
- Posterior fossa surgery (Wackym et al 1999)

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

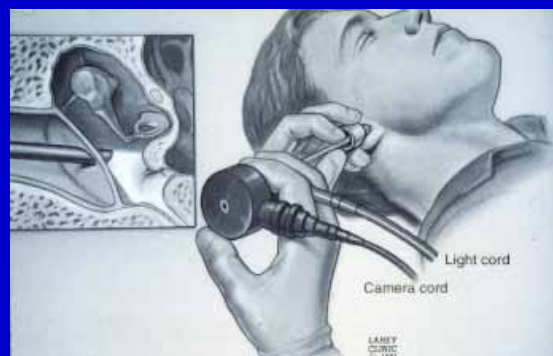
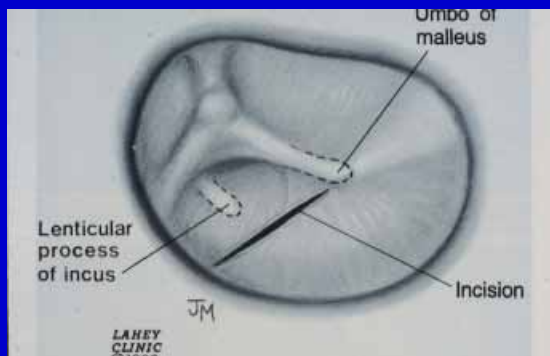
Topical
(iontophoresis)

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

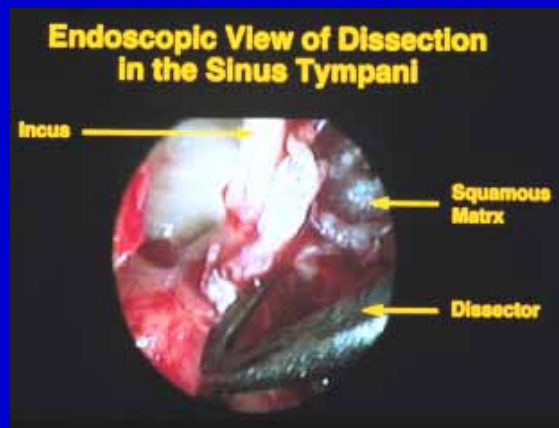
Manipulation vs. suction

View of Middle Ear

Microscopic
View

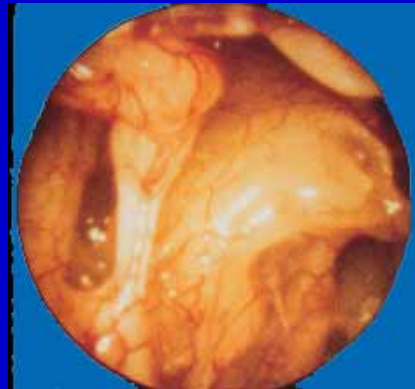


Endoscopic
view

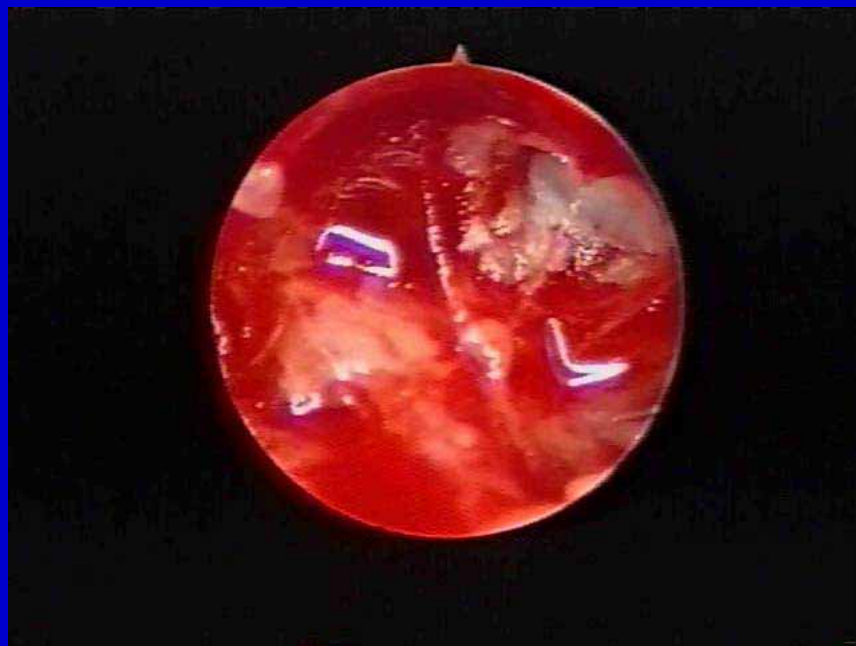


Endoscopic-Assisted Temporal Bone Surgery

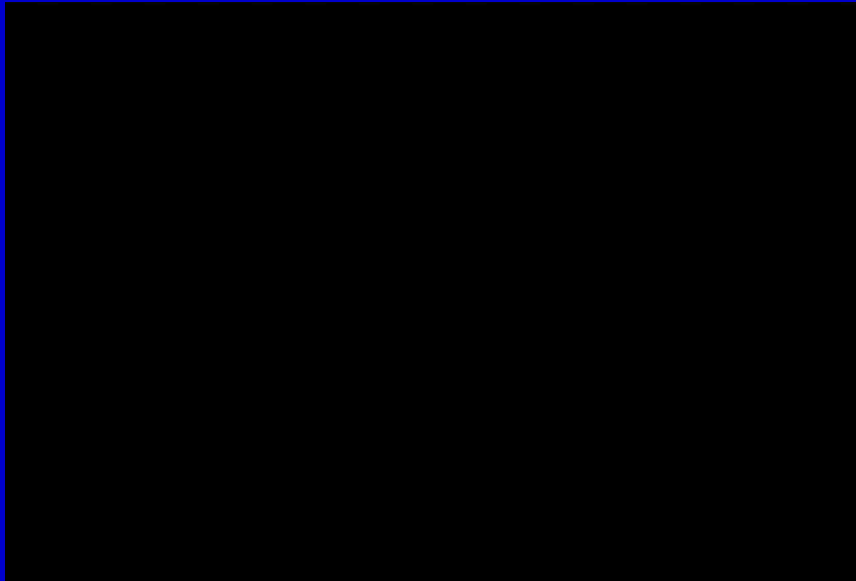
Epitympanum
Facial Recess
Sinus tympani
Petrous apex



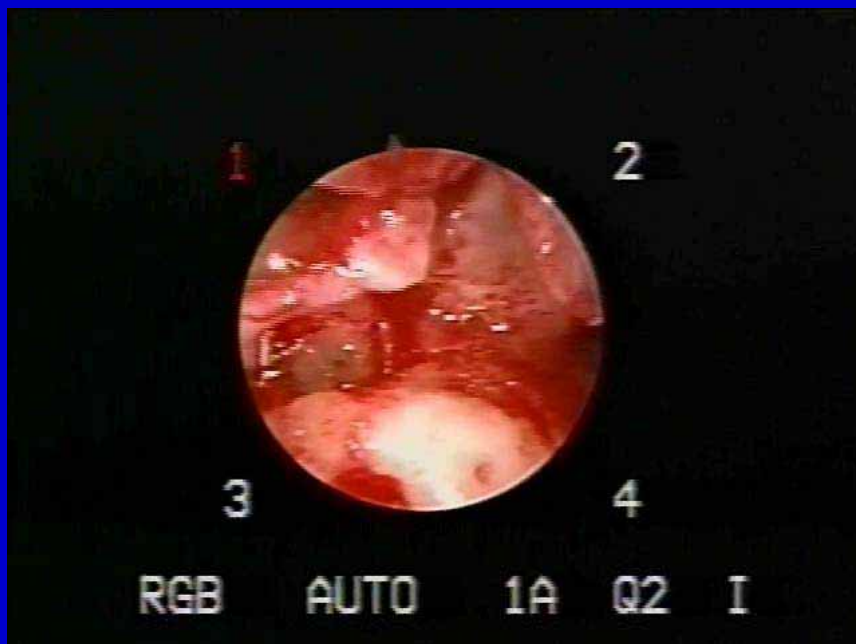
Residual Cholesteatoma in Anterior Epitympanum



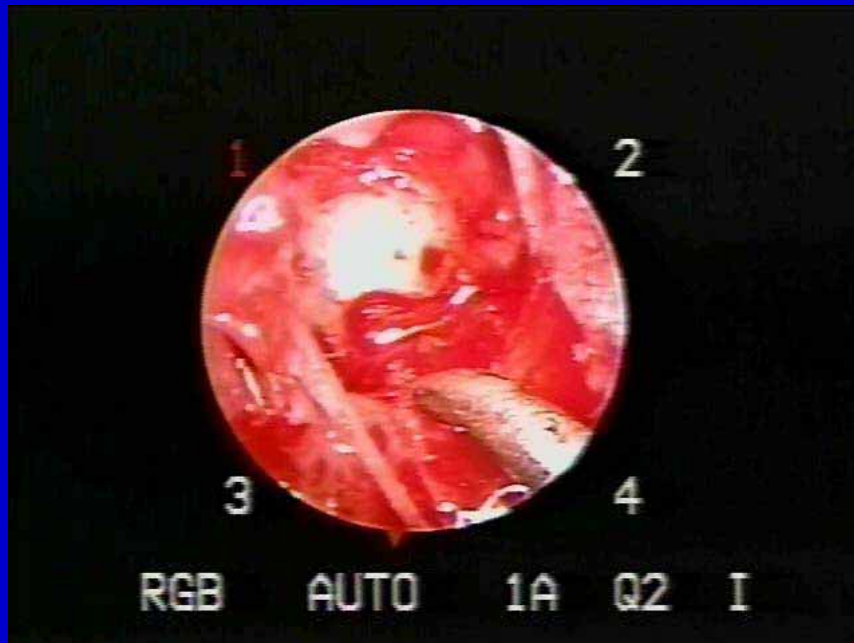
Antrum



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.

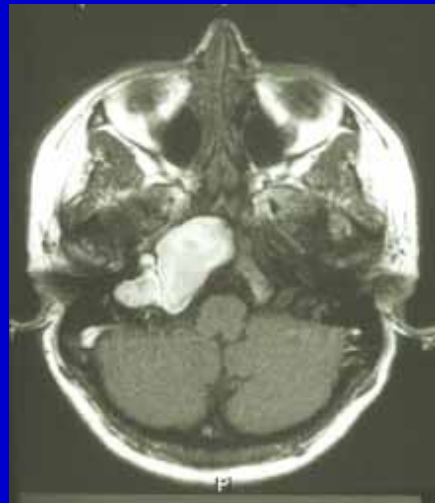
Rhinologic Endoscopes

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



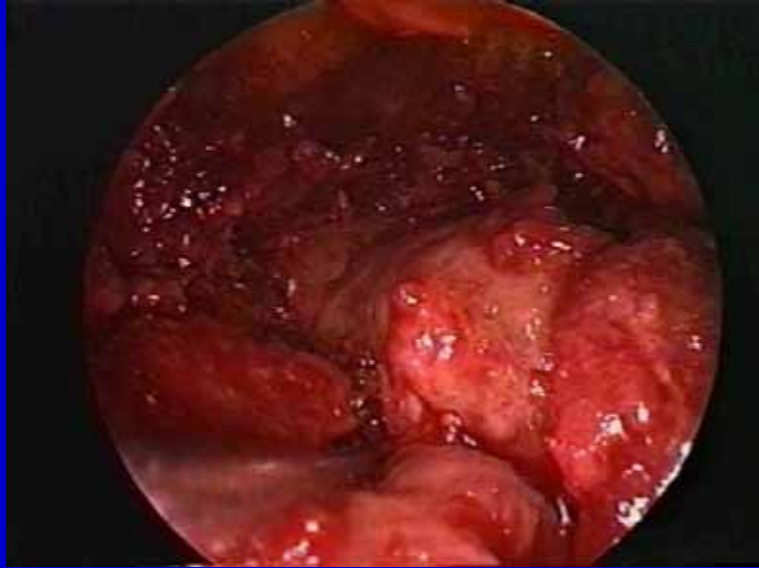
Case I: Microscopic View: Transcanal Infracochlear Approach



CASE I: Endoscopic View



CASE I: Limits of Cavity



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



Case III: Petrous Apex Cholesteatoma

76 year old woman with long history of chronic draining left ear

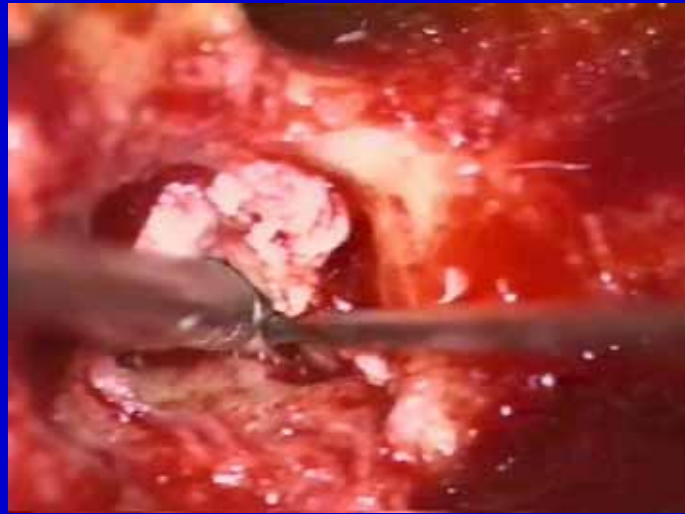
Presented after acute onset of mental status deterioration

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: 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

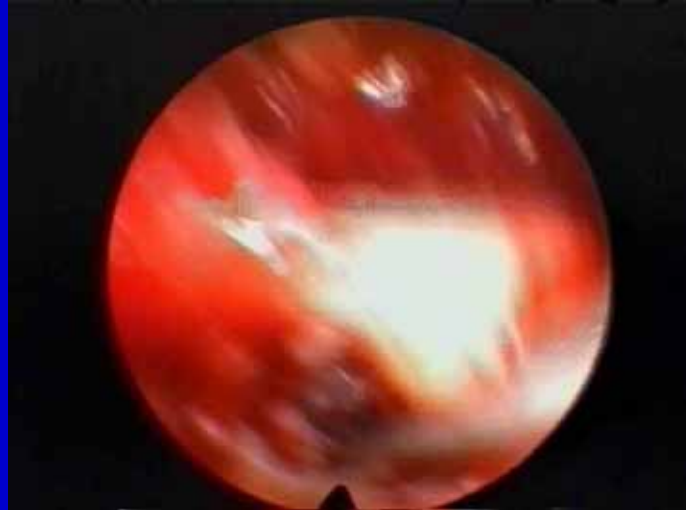
Case III: Endoscopic View



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.