Surgical Management of Hearing Loss

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Disclosures

• None

Learning Objectives

• Describe the pathophysiology of common and uncommon otologic conditions causing hearing loss that may be amendable to surgical intervention.
• Identify indications and contraindications for surgical management of hearing loss.
• Discuss surgical technique for procedures such as tympanoplasty (with and without ossicular chain reconstruction), tympanomastoidectomy, bone anchored hearing aid devices, and cochlear implantation.
Outline

- Hearing loss classification and impact
- Management strategies for hearing loss
- Surgical treatment for otologic conditions

Hearing disorders are common

- 16.1% of US adults aged 20-69 have been found to have hearing loss
- The prevalence is even higher in the older adult population, estimated at 33% in people over 60, and 50% in people over 85

Classification of hearing loss

- Conductive hearing loss
- Sensorineural hearing loss
- Mixed hearing loss
Conductive hearing loss

- Cerumen impaction
- Tympanic membrane perforation
- Ossicular erosion/discontinuity
- Middle ear effusion

Sensorineural hearing loss

- Presbycusis
- Noise induced
- Congenital
- Genetic
- Ototoxic exposure

Mixed hearing loss
Options for management of hearing loss

- Observation
- Amplification/adjunctive listening devices
- Surgery

Surgical procedures for treatment of hearing loss

- Myringotomy with/without tubes
- Tympanoplasty
- Stapedectomy
- BAHA
- Cochlear implantation

Conductive or Mixed HL
Sensorineural HL

Myringotomy with tube

- Indications:
  - Chronic otitis media with effusion
  - Recurrent acute otitis media
  - Complicated acute otitis media
  - Eustachian tube dysfunction
  - Barotrauma (e.g. HBO therapy)

- Risks:
  - Persistent perforation
  - Otorrhea
Chronic otitis media with effusion
Postoperative care

• Dry ear precautions (no longer recommended in pediatric population)
• +/- ototopical drops
• Tubes usually extrude in 6 – 12 months

Tympanoplasty

• Indications:
  – Tympanic membrane perforation
  – Ossicular pathology
    • Erosion of ossicles from cholesteatoma
    • Trauma
• Two general techniques
  – Medial graft
  – Lateral graft
Medial vs. lateral graft tympanoplasty

<table>
<thead>
<tr>
<th>Indications (size, location, other considerations)</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medial: Smaller and posteriorly located perforations</td>
<td>Quicker surgery, Easier to accomplish</td>
<td>Less anterior exposure</td>
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<tr>
<td>Lateral: Larger and/or anteriorly located perforations, Revisions</td>
<td>Excellent exposure to defect for reconstruction, Versatile</td>
<td>Possibility of blunting and canal stenosis, Technically more challenging</td>
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Ossiculoplasty

- Subtypes of tympanoplasty
  - Type 1: Reconstruction of the TM
  - Type 2: TM graft onto incus (rare)
  - Type 3: Reconstruction connects TM to stapes capitulum
  - Type 4: Reconstruction connects TM to stapes footplate
  - Type 5: Reconstruction connects TM to vestibule (uncommon)
Type 3 tympanoplasty (incus interposition)

Type 3 tympanoplasty (Prosthetic)

PORP

TORP
Postoperative Care

- First visit usually ~ 1 week postop
  - Wound check
  - Remove lateral packing if present
- If medial non-absorbable (rosebud) packing used, removed ~ 2 weeks postop
- If absorbable packing used, typically remove residual ~ 1 month postop
Stapedectomy

- Indications:
  - Otosclerosis
  - Fixed stapes due to tympanosclerosis
  - Osteogenesis imperfecta

- Risks:
  - Sensorineural hearing loss
  - Taste disturbance
  - Dysequilibrium
  - Facial paresis/paralysis

Preoperative considerations

- Stapedectomy will generally not be performed on an only hearing ear
  - Caveat: if the patient has such severe hearing loss (mixed) that they are no longer benefitting from amplification, stapedectomy will be considered
- The conductive hearing loss due to otosclerosis should be differentiated from that due to superior canal dehiscence
  - Acoustic reflexes are present in SCD and absent in otosclerosis
Intraoperative issues: facial nerve dehiscence

Intraoperative issues: facial nerve prolapse

Postoperative care

• Packing generally removed one week after surgery
• Usually the Rinne will be flipped (AC>BC) at that point
  — May not be the case if hemotympanum or edema of the TM is present
  — Sometimes tuning fork exam is equivocal early on
• Often patients will notice that sounds are quite loud and may sound “hollow,” akin to being at the end of a tunnel
Postoperative care

- Things to watch out for:
  - Vertigo
  - Severe dizziness
  - Perception of severe tinnitus or hearing loss

Reparative granuloma

- Indications:
  - Mixed/conductive hearing loss
    - Bone conduction PTA < 65dB
    - ≥ 5 years old
  - Single sided deafness
    - ≥ 5 years old

- Risks:
  - Soft tissue reaction (granulation, skin overgrowth)
  - Infection
  - Numbness around implant or into scalp

BAHA
see if you can crop and enlarge the photo

andy, 6/24/2012
BAHA

Postoperative Care

• Healing cap should stay in position for at least 2 weeks postoperatively
  – If the cap falls off before 2 weeks, it needs to be replaced
  – The cap simply snaps onto the abutment
    • Gauze (xeroform or otherwise) should be placed under the cap to put downward pressure on the skin around the abutment
• After the wound has healed, patients should clean the abutment site daily
  – Non-alcoholic wipes or gentle bristled brush

Postoperative Care

• Device is loaded around 3 months after surgery

• Things to watch out for:
  – Soft tissue overgrowth
Cochlear Implantation

• Indications:
  – Adults:
    • Bilateral moderate to profound SNHL
    • Sentence scores of <50% in operative ear and <60% in best aided condition
  – Children:
    • Bilateral severe to profound SNHL (infants: bilateral profound SNHL)
    • No progress in language development with amplification

• Risks
  – Loss of residual hearing
  – Facial nerve paralysis
  – Dizziness
  – Meningitis
  – Failure of device
Postoperative Care

- Seen ~ 1 week postoperatively for wound check
- Implant activation at 3 months postop
- Things to watch out for:
  - Wound breakdown/irritation over the device
  - Ensure vaccinations were received
    • For adults this is Prevnar (PCV13) followed by Pneumovax (PPSV23) at least 8 weeks later

Conclusions

- Surgery can restore hearing for individuals with conductive, sensorineural, or mixed hearing loss
- In properly selected patients, surgical outcomes are expected to be excellent
- No procedure is without risk. Early recognition of potential adverse outcomes and intervening is crucial.