Adult Hearing Loss

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I have no conflict of interest to disclose
Outline

• Background and classification
• Evaluation of adult hearing loss
• Otoscopic findings and treatment
  – Conductive hearing loss
• Sensorineural hearing loss
  – Evaluation
  – Hearing aids, cochlear implants
• Recommendations
Hearing Loss

• 278 million worldwide with hearing loss
• 31 million Americans with hearing loss\(^2\)
  – 10.5% of population
  – 14% of baby boomers (46-65 yo)
  – 7% of Generation X (29-45 yo)
• Congenital deafness 1 in 500 newborns
  – Genetic cause in 50%
• UW Madison study (2003)\(^2\)
  – 9 million new cases HL in US in 5 years
  – 17 million cases will worsen over 5 years

Types of Hearing Loss

- Conductive
  - External, tympanic membrane, middle ear
  - Medically, surgically correctable
  - Hearing aids
Types of Hearing Loss

• Sensorineural
  – Cochlea, auditory nerve

www.hearingcarecenter.com
Types of Hearing Loss

- **Sensorineural**
  - Cochlea, auditory nerve
  - Hearing aids
  - Cochlear implants

- **Mixed**
  - CHL
  - SNHL
“I Have Hearing Loss”

- Unilateral vs. bilateral?
- Sudden vs. progressive?
- Complete vs. partial?
- Fluctuating vs. constant?
- More concerning
  - Unilateral
  - Sudden
  - Complete
Evaluation of Hearing Loss

- Associated symptoms
  - Otorrhea, otalgia, tinnitus, vertigo, facial palsy, fullness

- Relevant history –
  - Ototoxic medications
  - Otitis
  - Otologic surgery
  - Family history HL
  - Trauma
  - Meningitis

- More concerning
  - Unilateral
  - Sudden
  - Complete
  - Unilateral tinnitus
    - Pulsatile
    - Vertigo
Otological Examination

• Otoscopy
  – Removal of cerumen via irrigation, cautious curettage
  – Pneumatic otoscopy
• Tuning Forks
• Cranial nerve
• Head and neck exam
Tuning Fork Examination

- **Weber** –
  - Fork at midline
    - Lateralizes to CHL
    - Away from SNHL

- **Rinne** –
  - Air louder than bone
    - Normal in general
  - Bone louder than air
    - = CHL
CHL from Canal Disease

- Cerumen Impaction
- Osteoma, Exostoses
- Otitis Externa
  - Bacterial, fungal
- Carcinoma
Osteoma, Exostoses

- Benign bony outgrowths in EAC
- More common in cold water swimmers
- Surgery if large and CHL
Bacterial Otitis Externa

- **Symptoms**-
  - Pain, otorrhea, HL

- **Otoscopy**-
  - EAC/auricular edema/erythema, purulence, tenderness
  - TM mobile generally

- **Treatment**-
  - Ototopical abx/steroid
  - Wick if EAC occluded
Fungal Otitis Externa

- **Symptoms** -
  - Drainage, HL, itching
- **Otoscopy** -
  - EAC edema
  - Fungal elements
- **Treatment** -
  - Debridements- often
  - Topical antifungals
    - Lotrimin
    - Acetic Acid
  - Refer for mgmt
EAC Carcinoma

- Symptoms:
  - Pain, otorrhea, HL
  - Facial paralysis
  - Unresponsive

- Otoscopy:
  - Edema, erythema, mass, purulence

- Otitis externa unresponsive to treatment
  - Refer
Tympanosclerosis

- Can appear like cholesteatoma
- History of otitis
- Moves with pneumatic exam
Tympanic Membrane Perforation

- Trauma
  - Direct
  - Barotrauma
- Tympanostomy
- Otitis Media
  - Acute
  - Chronic
    - +/- Cholesteatoma
Acute Otitis Media

- HL, pain, fever
- Erythema, bulging of TM
- *S. Pneumoniae*, *M. Catarrhalis*, *H. Influenzae*
- PO abx if TM intact
- Otic abx, steroid if TM perforation
Otitis Media with Effusion

- Acute vs. chronic
- CHL, fullness
- TM retracted, clear effusion, amber hue to TM
- Waiting period
- Nasopharyngoscopy if unilateral
- Tympanostomy if persistent
Chronic Otitis Media

- Chronic Suppurative Otitis Media (CSOM)
- COM with Cholesteatoma
- Sx’s – HL, chronic otorrhea
- *S. Aureus, P. Aeruginosa, K. Pneumoniae*
- Frequently with perforation → Ototopicals
  - Higher tissue concentrations than PO
- Role for surgery → Referral
Chronic Suppurative Otitis Media

- Multifactorial-
  - Osteitis
  - Biofilm
  - Resistant organisms
- Ototopical treatment
- Debridement
- Treat systemic dz
  - DM, Immune-deficiency
- Culture for failures
- Surgery
Otological treatment

- **Ototoxic-**
  - Neomycin/Polymixin B/Hydrocortisone (Cortisporin)
  - Gentamycin
  - Tobramycin

- **Non-Ototoxic-**
  - Ciprofloxacin
    - CiproDex
    - Cipro HC
  - Ofloxin
    - Floxin Otic
  - Sulfacetamide
Otological Guidelines

• If TM intact (treating otitis externa)
  – Steroid, antibiotic combination as most efficacious

• If TM perforation or tympanostomy (treating OE or otitis media)
  – Ototopical therapy most effective
  – Nonototoxic gtt as safest choice
  – Systemic therapy if immunosuppressed
Cholesteatoma

- Skin cyst
- Pathophysiology
  - Eustachian tube dys.
  - Perforation
  - Congenital
- Erodes bone
  - Ossicles
  - Inner ear
  - Skull base
  - Fallopian canal
- *P. Aeruginosa* superinfection
Cholesteatoma

• HL, Otorrhea
• Painless
• Otoscopy
  – Squamous debris
  – Purulent material
  – Granulation
  – Crusting at TM
• Clinical diagnosis
• Surgical disease
  – Ototopical therapy
Complications of Cholesteatoma

- Facial paralysis
- Labyrinthitis
- Mastoiditis
- Brain abscess
- Meningitis
- Sigmoid sinus thrombosis
Granulation Tissue

- Bloody otorrhea
- ‘Proud flesh’
- Associations:
  - Tymp. Tube
  - Cholesteatoma
  - Malignant Otitis Ext.
- Topical steroids +/- abx
- Cholesteatoma until proven otherwise
Conductive Hearing Loss

- Otoscopy abnormal
  - EAC
  - TM
  - Middle Ear

- Otoscopy normal
  - Ossicular problem
    - Otosclerosis
    - Discontinuity
      - Trauma
    - Fixation
      - Congenital
      - Tympanosclerosis
  - Surgically correctable
Otosclerosis

- Abnormal bone turnover
- Fixation of stapes
- Progressive
- Unilateral > bilateral
- Hearing aids
- Surgery
Sensorineural Hearing Loss

- Aging (presbycusis)
- Noise induced
- Congenital
  - Hereditary
- Medications
  - Platinum containing
  - Aminoglycosides
  - Loop diuretics
- Acoustic Neuroma
- Meniere’s disease
- Autoimmune
- Idiopathic
- Trauma
- Infectious
  - Bacterial
  - Viral
  - Meningitis
Evaluation of SNHL

- Generally exam is unremarkable
- Audiogram as first step
- Unilateral loss or asymmetry on audio
  - MRI scan
  - Acoustic neuroma
    - Unilateral SNHL, tinnitus
    - Vertigo, dysequilibrium
Treatment of SNHL

• Address underlying cause if possible
  – Meniere’s, medication related, autoimmune, acoustic neuroma

• Prevention of further loss
  – Ototoxic medication awareness
  – Hearing protection

• Hearing amplification
• Cochlear implantation
Cochlear Implantation

• Candidacy
  – Profound bilateral SNHL
  – Little or no benefit from hearing aid
  – Suitable cochlea on imaging
  – 12 months or older
When to Implant

- As soon as hearing loss is identified and found to be a candidate
- 12 mos with congenital deafness
- Below 12 mos if post meningitis
- Best outcomes
  - Early implantation
  - Shorter duration of deafness
HL - Recommendations

- Normal otoscopy $\rightarrow$ Audiogram
  - Bilateral or unilateral
- Abnormal otoscopy $\rightarrow$ Treat cause
  - Referral if unresponsive
- Challenging, inconclusive exam $\rightarrow$ Refer
- Sudden hearing loss
  - Low threshold for audiogram unless clearly abnormal exam
Thank you

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Tympanic Membrane

- Normal TM –
  - Translucent
  - Intact
  - Mobile
  - Neutral in position
  - Light reflex
Sudden SNHL

- Partial or complete loss (>30dB X 3 freq)
  - Less than 3 days
- R=L, M=F
- 46 yo average
- 5-10% bilateral
- 50% with vertigo
- Otoscopy generally negative

Causes
- Idiopathic
- Autoimmune
- Thromboembolic
- Infectious
- Ototoxic
- Neoplastic
- Traumatic
Sudden SNHL

- **Workup**-
  - Audiogram same day
  - Laboratory
    - Controversial
  - MRI (non-urgent)

- **Treatment**-
  - Highly controversial
  - Steroids
    - PO
    - Intratympanic
  - Antivirals?
Bell’s Palsy

• Idiopathic facial paralysis
• Rule out other causes
  – Neoplasia
  – Infection
  – Cholesteatoma
  – Trauma
  – Congenital
  – CVA
Bell’s Palsy - Incomplete

• Excellent prognosis
  – 95-100% recovery

• Treatment controversial
  – Steroids
  – Antivirals

• Eye care
  – Daytime – Saline gtt
  – Nighttime – Lacrilube
Bell’s Palsy - Complete

- Paralysis –
  - 53% Complete recovery
  - 44% Partial recovery
  - 3% No recovery
- Medical treatment
- Surgical decompression
  - Beneficial in selected patients
  - Must be within first 2 wks
- Refer complete paralysis
  - As early as possible
Cochlear Implantation

- Electrical stimulation of auditory nerve
  - Not a hearing aid
- Internal / external components
- Outpatient surgery
  - Mastoidectomy
  - Cochleostomy
  - Microscope, facial nerve monitor
Cochlear Implantation

• 1985 -
  – <1000 CI recipients
  – Profound SNHL, ≤10% sentence recognition
  – Device performance assessed in quiet

• 2005 –
  – Over 60,000 implant recipients
  – Estimated 250,000 candidates
  – Mild to profound SNHL, ≤ 50% word recognition
  – Device performance assessed in noise & music appreciation
Future of Cochlear Implantation

- Partial hearing impairment
  - Electric-acoustic stimulation
- Younger children
- Improved technology
  - Hardware
  - Coding strategies
Approach to Hearing Loss

- Detailed otologic history and PE
- Identify causes of CHL and initiate treatment
  - Oto referral with audiogram often indicated
- If no cause identified on H & P (CHL/SNHL)
  - Audiogram possibly hearing aid evaluation
- If hearing aids not helping pt with SNHL
  - Cochlear implant evaluation
Conclusions

• CHL treated medically possibly surgically
• SNHL treated with hearing aid possibly CI
  – After ruling out directly treatable causes
• Sudden hearing loss
  – Early treatment and referral
• Complete Bell’s or facial paralysis
  – Urgent referral