Overview

- Improved Understanding of Anatomy
  - Temporal Bone
  - Ossicles
  - Tympanic Membrane
  - Pathologic Exams
- Vertigo as a Presenting Symptom
  - Causes and Treatment
- Hearing Loss
  - Conductive vs Sensorineural
  - Sudden Sensorineural Hearing Loss

Ear Anatomy

External Ear:
Pinna and ear canal

Middle Ear:
TM, malleus, incus, stapes, and eustachian tube

Inner Ear:
Semicircular canals and cochlea
Stapes
Facial nerve
Incus
Malleus
Promontory of cochlea
Myringo-sclerosis

Causes
- Breakdown of protective factors
- Excessive cerumen removal
- Trauma to canal
- Chronic skin conditions (eczema, psoriasis, seborrhea)
- Prolonged water in the ear canal

Common Pathogens of bacterial OE
- Sterile – 10%
- Pseudomonas aeruginosa – 50%
- Staph aureus/strep pneumo – 40%
Otitis Externa

Treatment of bacterial OE
- Clean out the canal
- Do not irrigate the canal to cleanse
- Can place an otowick
- Spongy tube that wicks the drops coating the entire canal
- Patient or practitioner should remove after 48-72 hours
- Topical analgesics
- Topical antibiotic otic drops:
  - Ciprofloxin with dexamethasone (Ciprodex)
  - Ofloxacin (Floxin)
  - Ciloxan, Gentamicin, and Tobramycin (eye drops)
- **Do not use Gentamicin or Tobramycin with perforated ear drums
- Systemic antibiotics if cellulitis has developed
  - Cephalexin or Bactrim work well for Staph aureus infections
  - Cipro or Levaquin work well for pseudomonas if the cartilage is involved

Systemic antigens:
- Itraconazole
- Amphotericin B
- Fluconazole
- Ketoconazole
- Voriconazole
- Caspofungin

Topical analgesics:
- Lidocaine
- Ibuprofen ear drops
- Non-sedating antihistamines
- Hydrocortisone

Topical antibiotics:
- Ciprofloxin
- Tobramycin
- Neomycin
- Gentamicin
- Polymyxin B

Otomycosis

Treatment
- Clean out the ear canal completely
- Topically apply antifungal powder
- Follow up with antifungal otic drops
  - Acetic acid otic, Vosol (white vinegar)
  - Compounded clotrimazole and hydrocortisone powder

Prevention
- Use equal parts rubbing alcohol and white vinegar in each ear canal after showering. Fill up each ear canal and let it sit for about 3-5 seconds. Do at least 2 times a week.
Serous Otitis Media

Exam
- Retracted TM (tenting over the malleous)
- Dull
- Amber colored fluid or "coca-cola" appearance
- Air bubbles (can look like fine hairs behind the TM)
- Pneumatic otoscopy may reveal decreased movement of the TM, BC>AC
- Not infected, No indication for Abx
Incorrect!

- Use Fifth Finger for Bracing
- Hold Otoscope with Fingertips for Better Control
Middle Ear Pathology

Glomus Tumor

Facial Nerve Schwannoma

Hemotympanum
Cerebrospinal Fluid Effusion

More Anatomy….

Nasopharynx and Eustachian Tube Relationship

Unilateral Effusion in Adult Must Raise Suspicion of Nasopharyngeal Mass
Dizzy Patients

- Important to get good history
- Vertigo is virtually diagnostic of inner ear pathology
- Common Primary Care Patients
  - Acute Labyrinthitis
  - BPPV
  - Meniere’s
- If Patient Gives a History of True Vertigo, Referral Is Reasonable
**Acute Labyrinthitis**
- Acute onset Vertigo
  - Can be associated with URI
  - Can be very frightening to patient
  - Hearing loss is unusual
  - Usually Viral Etiology
  - Exam Normal with the Exception of Nystagmus
- Supportive Therapy
  - Fluids
  - Rest
  - Steroids
- Presentation can be significant
  - Often sent to ER for CT to rule out stroke

**BPPV**
- Benign Paroxysmal Positional Vertigo
- Acute onset Vertigo when head placed in dependent (Dix-Hallpike) position
- Vertigo last seconds and is fatigable
- Rotatory Nystagmus Seen
- Dx Confirmed with Dix-Hallpike Maneuver
- Pathology is thought to be related to crystals floating in the SCC
- Rx with Canal Repositioning Maneuver

**Dix-Hallpike maneuver**
- Pt subjective to head turn to 45 degrees, laid supine, and head hanging
- Characteristics of BPPV
  - Delayed onset (2 to 20 s)
  - Transient Vertigo
  - Rotatory Nystagmus
  - Fatigable
Repositioning maneuver PSC/ASC

Meniere’s Disease

- Clinical Tetrad of Symptoms
  - Episodic Vertigo
  - Fluctuating Hearing Loss
  - Tinnitus
  - Fullness and Pressure in Affected Ear
- Physical Exam Essentially Normal
- Treatment Ranges from Dietary Modifications to Surgical Intervention

Acoustic Neuroma

- Unilateral Hearing Loss or Tinnitus
- MRI with Gad
- Treatment
  - Observation
  - Gamma Knife
  - Surgery
Hearing Loss

Conductive Hearing Loss

Sensorineural Hearing Loss

Causes
- Very loud noise exposure
- Trauma
- Ischemic attack to the auditory nerve or cochlea
- Viral infection
- Tumor (Acoustic neuroma)
- Idiopathic

Clinical Presentation
- Sudden muffling of hearing in one or both ears
- Loud tinnitus that can be low or high pitched
- Aural fullness
- Associated dizziness
- May follow an upper respiratory illness

OTOLOGIC EMERGENCY!
Sudden Sensorineural Hearing Loss

**Exam**
- Usually normal ear exam
- Hearing test reveals a low or high frequency loss that is asymmetrical to the other ear
- Middle ear pressure is usually normal
- If the patient is dizzy, do a neurological exam and vestibular exam
- Tuning fork test will reveal AC>BC and Weber should lateralize to the better hearing ear

**Treatment**
- Patients have a 3 day window to fully recover their hearing. After this window, the chance of recovery decreases by 30% per week.
- High dose steroids (60mg prednisone for the first week) then taper down if hearing is improving
- Intratympanic Steroid Injection
- Usually start the patient on Valtrex 1g tid for 5 days
- Blood work to look for Syphilis, Herpes, autoimmune disorders (lupus, rheumatoid), thyroid disorders, and a lipid panel
- Weekly hearing tests
- Will order an MRI of the Internal Auditory Canals (IACs) with Gad enhancement to rule out a Schwannoma

**Tuning Fork Exams**

**Weber**
- Vibrating Fork is placed on patients forehead or upper incisors
- Ask patient if one ear is louder than the other
- In patient with SENSORINEURAL loss, the sound will lateralize to the GOOD ear
- In patient with CONDUCTIVE loss, the sound will lateralize to the BAD ear
- Must be used in conjunction with Rinne Test
Rinne Test
Tests conductive system
- TM, Ossicles, Middle Ear Space
- Vibrating Fork is first placed behind the test ear on the mastoid tip
  - Bone Conduction
  - Confirm that the patient can hear the tone
  - Bring the fork forward and just lateral to the EAC
  - Air Conduction
  - Ask if tone is louder, softer or the same

Normal or Positive Test is Air Conduction (Fork in Forward Position) is louder than Bone Conduction
Abnormal test is Bone Conduction louder than Air Conduction
- Signifies at least 35 db conductive hearing loss
  - Fluid
  - OM
  - TM perforation
  - Otosclerosis
**Rinne Test**

- Normal Test: AC>BC
- Abnormal: BC>AC
- Abnormal Test = Conductive Loss

**Bone Conduction - Mastoid Tip**
Air Conduction - 5 cm Lateral to EAC

**65 yo female calls in noting sudden decrease in hearing in RIGHT ear after getting of shower**
- Hx of HTN and Hyperlipidemia
- Left ear exam normal
- Right ear with Cerumen Obstruction
- Weber to Left
- Rinne
  - Left: AC>BC
  - Right: AC>BC
- What to do?

**Final Exam...**

- Sudden SNHL: Right Ear
  - Weber to Left: Good Ear
  - Start Oral Steroids
  - Refer

**Summary**

- **Otologic Anatomy**
  - Key to understanding and treating pathology

- **Vertigo/Dizzy Patients**
  - History is Key
  - Vertigo is good indication for referral

- **Sudden Sensorineural Hearing Loss**
  - Otologic Emergency
  - Identify with Tuning Forks
  - Start Steroids and Refer