

ENT QUICK REVISION

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- In a chronic eustachian tube dysfunction the first part to get retracted is the pars flaccida causing retraction because of negative pressure pocket which can enter the middle ear and cause acquired cholesteatoma
- Epitympanum is Most common site for acquired cholesteatoma , affect the head of malleus and incus
- Mesotympanum is Most common site for congenital cholesteatoma (not related to -ve pressure)
- Conduction hearing loss : tympanic membrane + bones.
- Sensorineural hearing loss: cochlea + nerves
- The first area to get eroded in acquired cholesteatoma is the attic and it's seen on CT.
- Vagus nerve (auricular or Arnold's), on irrigation , Suction and cold drop → stimulate vasovagal attack
- Stapedius muscle supplied by the stapedial branch of the facial nerve.
- Tensor tympani supplied by the mandibular division of the trigeminal nerve.
- The scala vestibuli and scala tympani are filled with perilymph and communicate with each other at the apex of cochlea through an opening called helicotrema.
- Scala vestibuli is closed by the footplate of stapes which separates it from the air-filled middle ear.
- The scala tympani is closed by secondary tympanic membrane; it is also connected with the subarachnoid space through the aqueduct of cochlea.
- The scala media is filled with endolymph.
- Normal hearing range is 20 - 20,000 Hz
- Vibrations lead to stimulation of a specific location on the basilar membrane, depending on the sound frequency (tonotopy).
 - High-frequency (20,000 Hz) 250-500 sounds stimulate hair cells at the base of the cochlea(basal turn)
 - Middle-frequency 1000-2000 sounds stimulate hair cells at middle turn
 - Low-frequency (20 Hz) 4000-5000 sounds stimulate hair cells at the apex of the cochlea (apical turn)
- lateral Semicircular canal is the most prominent one so it's the first can be affected by diseases
- Posterior semicircular canal BPPV is Most common type of BPPV (up to 95% of cases).
- Positive Dix-Hallpike test (diagnostic test) : positional vertigo and nystagmus triggered during the maneuver.
 - Posterior canal BPPV: upbeat nystagmus with ipsiversive torsional nystagmus component.
 - Anterior canal BPPV: downbeat nystagmus with ipsiversive torsional nystagmus.
- The principal human auditory cortex is located deep within the sylvian fissure on the superior surface of the temporal lobe. The primary auditory cortex is often referred to as Brodmann area 41.

- Incus erosion cause the most significant conductive loss (60dB).
- Bat ear - Antihelix is absent
- Complications of Perichondritis or Trauma - cauliflower ear; formation of hematoma
- Tenderness and swelling, absent in otitis media, while present in otitis externa.
- Otorrhea in otitis externa: Ear discharge (very little and scanty, not mucoid, however if it contains mucus it is originating from the middle ear).
- How to differentiate between aspergillus & candida?
Aspergillus has black heads (spores forming, hyphae)
candida is totally white (cheesy, cotton like)
- Fungal vs. Bacterial
Fungal: Less pain, more itching & NO fever.
- Bullous Myringitis - Bulla over TM and medial canal with serous or serosanguinous fluid. It typically occurs in association with upper respiratory (viral) infections and is more common in winter.
- Small vesicles + facial weakness + discharge = Ramsay Hunt syndrome or HSV
- Eczematous and seborrheic otitis externa - Swelling, redness, crust formation and oozing of discharge.
- Suction cleaning (Fungal infection = Suction)
- Necrotizing (Malignant) Otitis Externa
 - An acute Pseudomonas infection (most common cause in immunocompromised patient) of the skin of the external ear canal which has spread to the adjacent bone. (Deep seated pain for more than a month).
 - Immunocompromised patients: HIV, uncontrolled DM or elderly
 - Granulation tissue in EAC, sequestra and Foul-smelling discharge from the floor of the external Auditory canal.
- Keratosis obturans - Accumulation of desquamated epithelium (skin not wax) in the bony canal. (the difference b/w it and cholesteatoma that in the latter one we have normal skin in abnormal place).
- Stages of tympanic membrane retraction:
 - Stage 1: mild, you can see part of the ossicles
 - Stage 2: reaching stapes
 - Stage 3: reaching cochlea promontory (atelectasis), redraws with valsalva maneuver
 - Stage 4: reaching cochlea, immobile with valsalva maneuver
- TuboTympanic (safe type) (central perforation) Tubo = Eustachian tube \ Tympanic= problem in the middle ear
- AtticoAntral (unsafe type) (marginal perforation) attic & antrum of mastoid
- The tympanic membrane is intact (not perforated) in Chronic non- suppurative otitis media, while in chronic suppurative otitis media it is not intact (perforated).
- Otitis media with effusion / Chronic middle ear effusion
 - Also called Glue ear or secretory otitis media
 - persistence of serous or mucoid fluid in the middle ear space without evidence of infection.
- Pure tone audiogram :
 - Air conduction (abnormal) + Bone conduction (normal) = Conductive hearing loss

- Air conduction (abnormal) + Bone conduction (abnormal) + NO GAP = Sensorineural hearing loss
- Air conduction (abnormal) + Bone conduction (abnormal) + air-bone GAP = Mixed hearing loss
- < 25 normal, >=25 abnormal
- Adhesive otitis media
 - Lack of middle ear ventilation, results in negative pressure within the tympanic cavity.
 - negative pressure from eustachian tube pull the TM inside
 - The TM retracts onto structures within the middle ear and can't plug out by valsalva.
 - Contact between the drum and the incus or stapes can cause bone erosion at "incudostapedial joint"
- Otorrhea in CSOM
 1. TT type: Intermittent non offensive (odorless) non bloody, Profuse ear discharge. (When water enter the middle ear)
 2. AA type: Chronic (persist), Scanty, offensive (malodorous) and bloody ear discharge.
- Cholesteatoma: in AA type
- Cholesteatomas are basically normal skin inside the middle ear, if it gets inside the middle ear it starts working as a tumor and start eating the bones leading to bony erosion and can cause facial paralysis. It releases enzymes each time it gets infected thus leading to destruction of the middle ear content
- Congenital cholesteatoma: Epitympanic + intact TM
 - Untreated ectoderm → epidermal lesion (white keratin in intact TM)
 - More aggressive than acquired
- Acquired cholesteatoma: Mesotympanic + perforated membrane
- The natural barrier between the brain and the temporal bone is :
 1. Bone tegmen 2. Meninges dura.
 it prevent the infection in the middle ear from going to brain
- Bezold abscess (extension of infection from mastoid to SCM)
- In Meningitis and labyrinthitis the cochlea will be fibrosed and appear white in CT scan and it loses its structure causing SN hearing loss and these patients are not candidates for cochlear implants (no place for the implantation)
- Labyrinthine fistula
 - communication between middle and inner ear, mostly affects the lateral semicircular canal
 - It is caused by erosion of bone by cholesteatoma.
 - imbalances with valsalva - Attack of instability (vertigo) mostly during straining, sneezing and lifting heavy object
 - Diagnosis - CT scan of temporal bone, fistula test
- Ramsay Hunt syndrome (herpes zoster oticus) occurs when a shingles outbreak affects the facial nerve near one of the ears.
- LMNL: upper and lower parts of the face are affected.

- UMNL: lower part of the face is affected
- Mastoid tenderness: middle ear pathology
- Tragus tenderness: external ear pathology
- Mastoiditis - inflammation of mucosal lining of antrum and mastoid air cells system
 - Symptoms - ear ache, high fever, ear discharge
 - Signs - Mastoid tenderness, Swelling over mastoid, Hearing loss, Auricular protrusion
 - Investigation - CT scan of temporal bone, Ear swab for culture and sensitivity
- Positive Greissinger's sign which is edema and tenderness over the area of the mastoid emissary Vein
- Brain abscess - most lethal complication of CSOM
- Extradural (Epidural) abscess - Most common intracranial complication of CSOM
- Hearing loss : is define by WHO as a hearing loss with thresholds ≥ 25 dB on one or both ear.
- Wax: the most common cause of conductive hearing loss (CHL)
- Otosclerosis
 - Progressive bilateral hearing loss
 - it Worsen during pregnancy and improve after delivery (due to hormonal changes)
- Glomus tympanicum tumors are the most common vascular tumors of the middle ear.
- Temporal bone fracture (common in RTA)
 - Longitudinal fracture (hearing is preserved) or Transverse fracture (ear will be dead)
 - The cochlear will be affected when the temporal fracture is transverse this is due to the anatomical position of it
- Weber test
 - Unilateral conductive hearing loss (middle ear hearing loss), deviated to affected ear.
 - Unilateral sensorineural hearing loss (inner ear hearing loss), deviated to better ear.
- Tympanogram - It's not a test of hearing , it is a test of mobility of tympanic membrane and it will tell us about the status of the tympanic membrane and middle ear status
 - It's a graphic representation of the relationship between the air pressure in the ear canal and the movement of the tympanic membrane.
 - Type A: normal
 - Type Ad: ossicular disruption with normal TM
 - Type As: ossicular fixation
 - Type B: fluid (effusion) or perforated tympanic membrane.
 - Type C: peak at the negative side (normally at 0 mm H₂O) = negative pressure in the middle ear (dysfunction).
- Tympanic membrane amplify sound 17 times , It should be tense.
- Tympanosclerosis: Calcification of an old inflamed tissue, whitish, sclerotic plaques.
- Drum Retraction (Adhesive OM) - also called Atelectasis ear

- Noise Exposure Induced SNHL - Patients will present with Tinnitus only sign, earliest sign
- Presbycusis = Deafness + Tinnitus “buzzing” + Recruitment “out of proportion loudness”
- Bone Anchored Hearing Aids (B.A.H.A):
 - Titanium implants, used in CHL (they use titanium because it doesn’t react with the body)
 - skips the external and middle ear and goes straight to the cochlear and stimulates the bone directly.
- Cochlear implant:
 - Audiogram shows bilateral profound sensorineural hearing loss can be an indication
 - Putting tiny electrode in the cochlea.
 - Prelingual children and postlingual adult (ex; due to trauma)
 - It bypass the external, middle and inner ear to stimulate the auditory nerve directly.
 - It’s a device consisting of a microphone, signal processor, external transmitter, and implanted receiver
- Peripheral Nystagmus - Meniere's, BPPV, vestibular neuritis
- Duration of dizziness:
 - Seconds to minutes: BPPV (position related, repeated episodes, without hearing loss).
 - Minutes to hours: Meniere’s, Recurrent vestibulopathy, Migraine associated vertigo.
 - Days: Vestibular neuritis, sudden sensorineural hearing loss with vertigo (labyrinthitis).
 - Constant, no improvement: never vestibular.
- Peripheral Nystagmus
 - Spontaneous horizontal nystagmus (typical) (BPPV has vertical)
 - The direction of nystagmus does not change with gaze change (unidirectional nystagmus).
 - The fast phase beats away from the side of the lesion.
 - Gaze fixation suppresses nystagmus.
- Meniere's disease - 20 min to 4 hr of vertigo associated with Tinnitus, Ear(Aural) fullness, Hearing loss
 - Idiopathic endolymphatic hydrops
 - Can occur at any age but its onset is common between 40-60 years
 - Triggers - High salt intake, caffeine, stress, nicotine and alcohol
 - Overproduction or retention of endolymph (Unknown, autoimmune, ischemia, mumps, syphilis, hypothyroidism, head trauma, previous infection, hormonal (pregnant females are more prone).
 - PTA (pure tone audiometry) - low frequency sensorineural hearing loss
 - Confirmatory test - electrocochleography
- Vestibular neuritis
 - 12h to 24h of vertigo, vomiting

- 50% may have upper respiratory tract infections
- Single, severe, prolonged, spontaneous vertigo, nausea, vomiting and Nystagmus.
- No neurological signs/symptoms
- Acoustic Neuroma
 - Benign tumor, arise from vestibular division of VIII.
 - Starts in the internal auditory canal and expands into cerebellopontine angle (CPA), compressing cerebellum and brainstem
 - When associated with type 2 neurofibromatosis (NF2): bilateral acoustic neuromas, café-au-lait skin lesions, and multiple intracranial lesions
 - Acoustic neuroma mimics Meniere's disease in presentation and imaging is the only way to differentiate between them.
- Bezold abscess - along sternocleidomastoid
- Luc's abscess - inside EAC
- Citelli's abscess - along digastric
- Central perforation of tympanic membrane - safe CSOM
- Marginal perforation of tympanic membrane - Unsafe CSOM (chronic suppurative otitis media)
- * Cyma concha is anatomical (surface) landmark of mastoid antrum
- * Surgical landmark of mastoid antrum is suprameatal triangle
- * Micro suction - best way to remove impacted foreign body
- * Cough reflex during ear syringing is due to Arnold branch of vagus nerve
- * Normal cough reflex is due to internal laryngeal nerve in larynx
- * Tegmen has a bulge which can be seen from cranial side. It is known as arcuate eminence. It is due to push by superior semi circular canal. It is the important surgical landmark for facial nerve surgery in the middle cranial fossa approach.
- * Facial recess - most common site for posterior tympanotomy
- * Carotico jugular crest present between jugular bulb and internal carotid artery.
- * Phelp sign - seen in CECT scan of glomus tumor - inability to distinguish between ICA and jugular bulb due to erosion of Carotico jugular crest
- * Sinus tympani - most common site for recurrent residual cholesteatoma
- * Trautman's triangle - the place where cholesteatoma erodes the bone and goes into posterior cranial fossa
- * Donaldson's line is surgical landmark for Endolymphatic sac
- * tip of handle of malleus is called umbo which is most visible and anatomical landmark of TM.
- * umbo divides the pars tensa into 4 quadrants
- * Lateral process of malleus is the most reliable landmark of TM
- * Ampula in semi circular canals - angular acceleration
- * macula in utricle and saccule - linear acceleration
- * otoconia in macula (otoconia are calcium carbonate crystals)
- * crista ampularis in ampula
- * Endolymph is secreted by stria vascularis and absorbed by endolymphatic sac
- * semi circular canals - detect angular acceleration or rotational motion

- * utricle - horizontal linear acceleration
- * saccule - vertical linear acceleration
- * BPPV - displacement of otoconia to posterior SCC
- * Weber goes towards CHL
- * Weber goes away from SNHL
- * unilateral RLN palsy - paramedian position
- * unilateral vagus nerve palsy - cadaveric/ neutral position
- * Bilateral RLN palsy - both vocal folds in paramedian position

Muscles that control the opening of eustachian tube:

1. Tensor veli palatini
2. Levator veli palatini
3. Salpingopharyngeus muscle

Chronic non suppurative otitis media

1. Otitis media with effusion/ chronic middle ear effusion
2. Adhesive otitis media

Chronic suppurative otitis media

1. Tubotympanic (safe)
2. Attico antral (unsafe)

Infection might spread to parotid gland through

1. Fissure of Santorini in cartilaginous part of EAC
2. Foramen of Huschke in bony part of EAC

Structures passing through sinus of Morgagni

Mnemonic: PLEA

- * palatine artery (ascending)
- * Levator veli palatini
- * eustachian tube
- * Ascending pharyngeal artery

Otosclerosis

- * Enchondral bone change to spongy bone
- * Autosomal dominant
- * Bilateral
- * CHL upto 60 dB
- * Tympanic membrane normal
- * Carhart's notch
- * As curve seen on impedance audiometry
- * Galle's test

- * Schwartz sign sometimes seen
- * Paracusis

Meniere's disease

- * Endolymphatic hydrops
- * Vertigo
- * SNHL
- * Tinnitus
- * Aural fullness
- * Tullio's phenomenon - loud noise precipitate vertigo
- * Tumarkin crisis - sudden fall attack
- * Hennebert sign - false positive fistula test
- * Early meniere's - rising curve audiogram
- * Late meniere's - sloping curve
- * Electrocochleography - confirmatory diagnosis