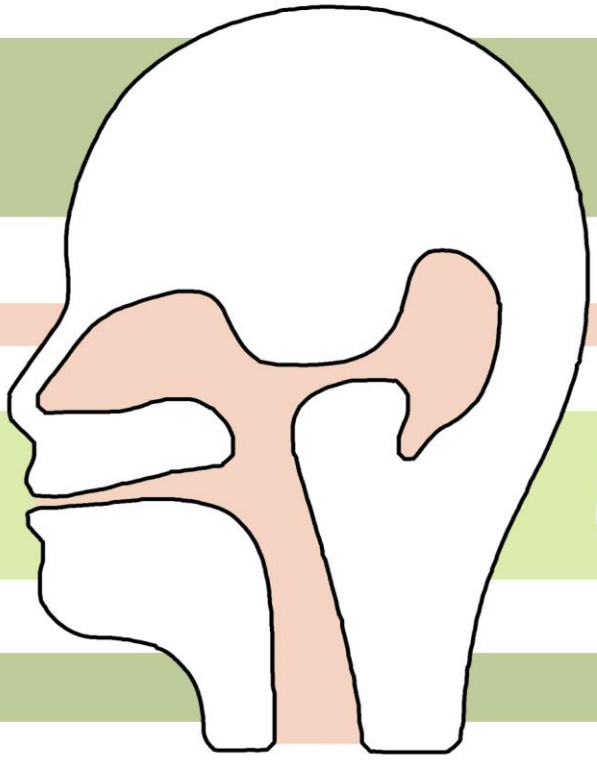


EAR, NOSE AND THROAT

(7) Deafness

Leader: Maha Alhaidan

Done by: Amal Alsinan

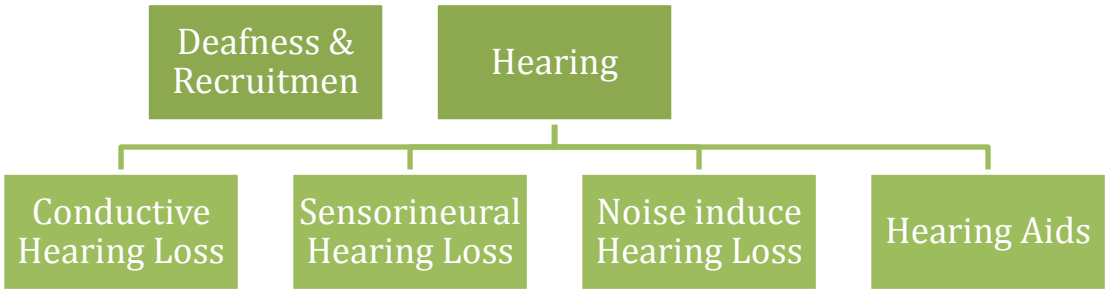
Revised by: Shaikha Aldossari

Doctor's note Team's note Not important Important 431 teamwork

(431 teamwork do not highlight it in yellow, but put it in a yellow "box")

Objectives:

were not given



Hearing loss:

How common is hearing loss?

- Overall about 1 in 10
- 1 in 3 adults 65 - 75
- 1 in 2 older than 75
- 1-2% school age children
- 4% children under 5

Very common and important

Signs of Hearing Loss:

- Talking louder than necessary
- Turning up volume on the TV or radio
- Complaints that other people "mumble"
- Confusion of similar sounding words نحلة/ نخلة
- Inappropriate responses in conversation
- Ringing or buzzing in the ears
- Lip Reading

– Watching a speaker's face intently
– Difficulty "hearing" someone behind
– Having difficulty on the telephone

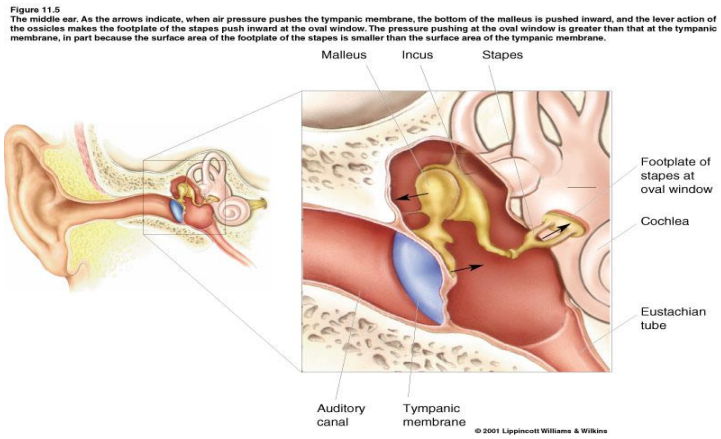
Effects of sensory loss:

- Don't enjoy conversations – too much work
- People think you are an idiot
- Scared to try new contacts
- Scared to take new jobs
- Limits your world
- limit activities
- Isolation
- Depression
- Anxiety
- Insecurity
- strain relationships
- Increases psychosocial difficulties

Deafness & Recruitment:

Recruitment:

Out of proportion of loudness. (Meaning the patient can't hear, but when he hear, he hear everything louder than it's normal range) The cochlea normally acts as a filter; it decreases loud voices and amplifies the low sounds, here the cochlea is not functioning well.



When the external and the middle ear are affected= conductive hearing loss.
Inner ear (cochlea) and the nerve= sensory hearing loss.
Cochlea's job is tuning of the sound.

Conductive Defects:

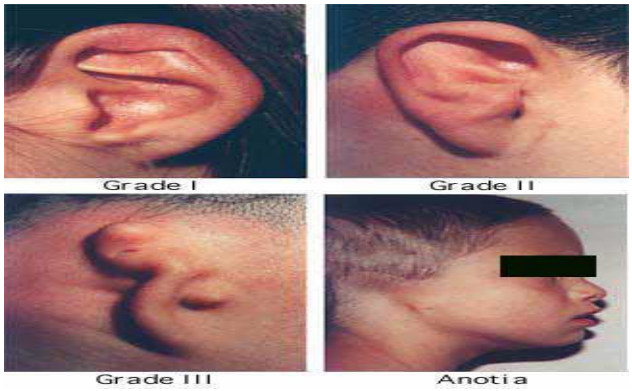
- Wax & foreign bodies
- Otitis externa
- Ear drum Scarring; perforation
- Otitis media
  – Acute suppurative (ASOM)
  – Otitis media with effusion (OME)
  – Chronic otitis media (CSOM)
- Otosclerosis
- Ossicular chain disruption

1. Wax:

Is the commonest cause of conductive hearing loss (CHL).

2. Microtia:

Deformity of the ear auricle.



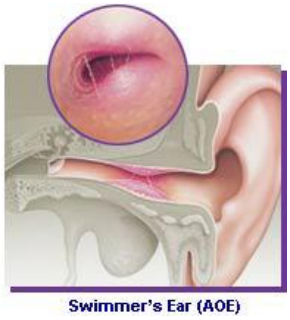
3. Atresia:

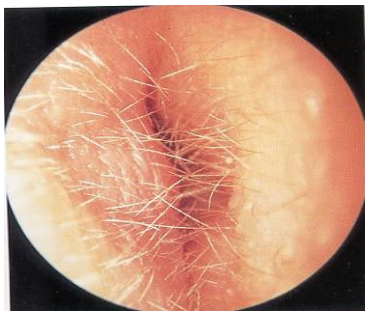
No ear canal.

4. AOE: (acute otitis externa):

It's a common condition involving inflammation of the ear canal. The **acute** form is caused primarily by bacterial infection, with Pseudomonas aeruginosa and Staphylococcus aureus the most common pathogens.

(Source: http://www.aafp.org/afp/2012/1201/p1055.html)



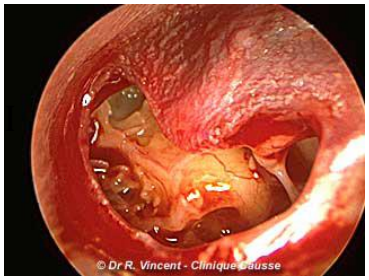


Raccoon eyes sign:

(Skull base fracture blood goes to the external auditory canal> tympanic membrane perforation> blood in the middle ear)

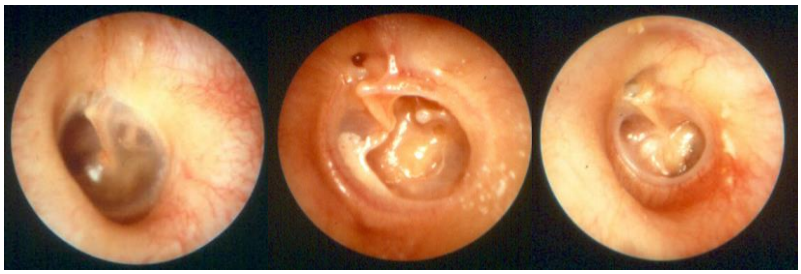
battle's sign:

Perforated drum:



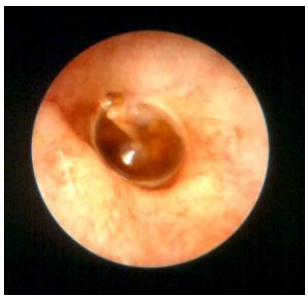
Fresh blood indicates a recent injury (acute injury).

5. Drum Retraction (Adhesive OM): It's also called Atresia, Atelectasis ear.



The tympanic membrane gets sucked in because of Eustachian Tube Dysfunction and negative pressure, which will suck the eardrum inside. We treat it by ventilation tube, which prevents the ear from getting sucked inside by preventing the negative pressure. So perforation and retraction both of them are causes conductive hearing loss

Treatment of adhesive OM is attachment of tube.

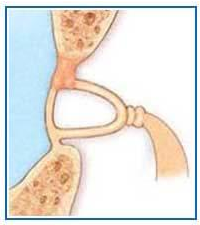


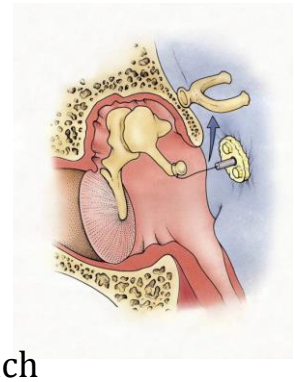
6. Tympanosclerosis:

Calcification of an old inflamed tissue. (usually it's asymptomatic, but when it's symptomatic it causes CHL) (ask about previous infection in the ear while taking the history because it comes from recurrent infections)

It's a condition characterized by the presence of masses of hard, dense connective tissue around the auditory ossicles in the middle ear, also know as myringosclerosis.(source: medical dictionary)

7. Otosclerosis:





Fixation of the stapes by new bone formation.

- 10% otosclerotic lesions (10% symptomatic)
- Females: Male 2: 1
- Middle-age
- Worse during pregnancy (due to hormonal changes)
- treatment: Stapedectomy

(it's an excessive growth in the bones of the middle ear, which interferes with the transmission of sound, source medical dictionary)

Stapedectomy: is a surgical procedure in which the inner most bone (stapes) of the middle ear is replaced with a small plastic tube of stainless-steel wire to improve the movement of sound to the inner ear.

Sensory neural hearing loss (SNHL):

- Congenital
- Trauma
- Infection
- Noise
- Ototoxic
- Presbycusis
- Acoustic neuroma

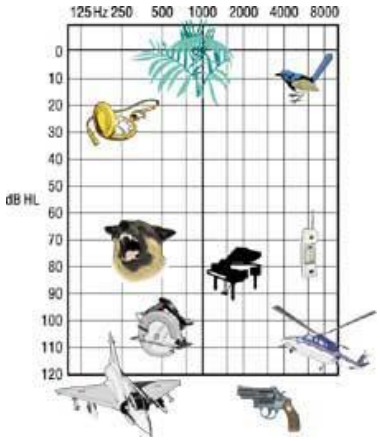
1. Congenital hearing loss:

- Deafness affects 0.2%
- SNHL attributed to
  – 50% genetic factors
  – 20-25% environmental
  – 25-30% sporadic
- Genetic (due to consanguinity marriages)
  – 75% AR (autosomal recessive)
  – 20% to AD (autosomal dominant)
  – 5 % X-linked
- Over 400 syndromes

2. Noise induced SNHL:

- Boilermaker's deafness

• One of the most common occupationally induced disabilities
• **Tinnitus** (only sign)
– Commonly accompanied NISNHL
– Warning sign
(one gunshot could cause SNHL, and in KSA fireworks)



- 90 db for 8 hours
- 95 db for 4 hours
- 100 db for 2 hours
- 105 db for 1 hours

3. Ototoxicity:

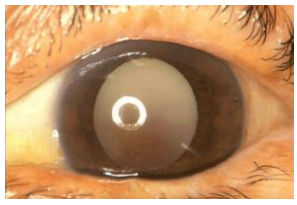
• Antibiotics (aminoglycosides)
• Diuretics
• Antineoplastics
• Antinflammatories
• Antimalarial agents
• Ototopic agents
• Others

Higher risk:

1. Renal failure (Elevated peak and trough levels)
2. Liver failure
3. Immunocompromise
4. Collagen-vascular disorders
5. Advanced age (> 65 years)
6. Prior ototoxicity
7. Concurrent use of known ototoxic agents
8. Preexisting HL or Vestibular
9. Bacteremia (fever)
10. Treatment course longer than 14 days
11. + ve FHx of AG ototoxicity

4. Presbycusis:

Aging process of human beings, it's associated with grey hair, cataract and SNHL.
Presbycusis = Deafness + Tinnitus + Recruitment



Overview of Hearing Loss:

- #1 Handicapping disorder
- 60% of Americans > 65 HL
- 90% of > 75 Y have HL
- HL + degenerative processes of aging.
- ½ Vestibular symptoms

Problems With Diagnosis:

- Shame or embarrassment.
- HA social stigma
- Embarrassment prevents 15 million elderly people from getting help.

Hearing Aids

History: 1550 by Girolamo Cardano when he saw that sound could be transmitted through the teeth.

Cochlear implant:

Putting tiny electrode in the cochlea.

In congenital HL the cochlear implant is ineffective after 5 years, due to the disappearance of auditory segment from the brain. But in people who used to hear and then lost their hearing there is no time limit for the usage of cochlear implant.

It's a device consisting of a microphone, signal processor, external transmitter, and implanted receiver; the receiver is surgically implanted under the skin near the mastoid process above and behind the ear.(source: medical dictionary)

So in the exam if they gave you a cochlear implant picture you should know it, it looks like a regular hearing aid but with a magnet from outside.

Classical indication of cochlear implant:

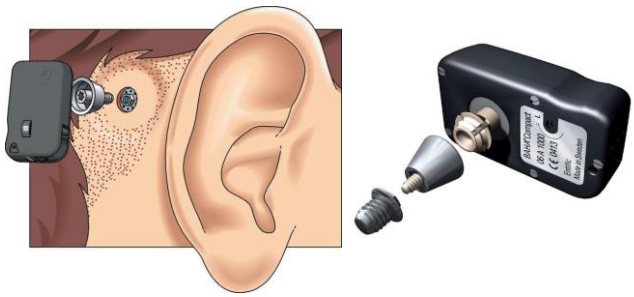
Bilateral sensory-neural hearing loss not benefiting from hearing aids and less than 5 years of age if congenital hearing loss.

Bone Anchored Hearing Aids (B.A.H.A):

Titanium implants, used in CHL (they use titanium because it doesn't react with the body)

BAHA stimulates the cochlea by transmitting the sound waves through the bones in our skull, or bone conduction, thereby bypassing the outer and the middle ear.

(source: http://www.earassociates.com/services-bone-anchored-hearing- aids-san-jose-ca.html)



Auditory brainstem implant (A.B.I):

Implant in the brainstem.

Summary from TORONTO

(Otosclerosis):

Fusion of stapes footplate to oval window so that it cannot vibrate.

Etiology:

1. Autosomal dominant, variable penetrance approximately 40%
2. Female > male, progresses during pregnancy (hormone responsive)

Clinical Features:

1. Progressive conductive hearing loss first noticed in teens and 20s (may progress to sensorineural hearing loss if cochlea involved)
2. ± pulsatile tinnitus
3. tympanic membrane normal ± pink blush (Schwartz's sign) associated with the neovascularization of otosclerotic bone.
4. characteristic dip at 2000 Hz (Carhart's notch) on audiogram.

Treatment:

monitor with serial audiograms if coping with loss.
hearing aid (air conduction, bone conduction, BAHA).
stapedectomy or stapedotomy (with laser or drill) with prosthesis is definitive treatment.

(Presbycusis): is the most common cause of SNHL.

Sensorineural hearing loss associated with aging (starting in 5th and 6th decades)

Etiology:

• hair cell degeneration.
• age related degeneration of basilar membrane, possibly genetic etiology.
• cochlear neuron damage.
• ischemia of inner ear.

Clinical Features:

• progressive, bilateral hearing loss initially at high frequencies, then middle frequencies
• loss of discrimination of speech especially with background noise present – patients describe people as mumbling
• recruitment phenomenon: inability to tolerate loud sounds
• tinnitus

Treatment:

• hearing aid if patient has difficulty functioning, hearing loss >30-35 dB, and good speech discrimination
• ± lip reading, auditory training, auditory aids (doorbell and phone lights)

Congenital Sensorineural Hearing Loss:

Hereditary defects:
• non-syndrome associated (70%)
• syndrome associated (30%)
Prenatal TORCH Infections:
• toxoplasmosis, rubella, CMV, herpes simplex, others (e.g. HIV, syphilis)
Perinatal:
• Rh incompatibility
• anoxia
• hyperbilirubinemia
• birth trauma (hemorrhage into inner ear)
Postnatal:
• meningitis, mumps, measles

High Risk Factors (for Hearing Loss in Newborns)
• low birth weight/prematurity
• perinatal anoxia (low APGARs)
• family history of deafness in childhood
• 1st trimester illness: TORCH infections
• neonatal sepsis
• ototoxic drugs
• perinatal infection, including post-natal meningitis
• consanguinity

Drug Ototoxicity:

Aminoglycosides:

• streptomycin and gentamicin (vestibulotoxic), kanamycin and tobramycin (cochleotoxic)
• toxic to hair cells by any route: oral, IV, and topical (if the TM is perforated)
• destroys sensory hair cells: outer first, inner second (therefore otoacoustic emissions are lost first)
• ototoxicity occurs days to weeks post-treatment
• must monitor with peak and trough levels when prescribed, especially if patient has neutropenia and/or history of ear or renal problems
• duration of treatment is the most important predictor of ototoxicity
• treatment: immediately stop aminoglycosides

Salicylates:

• hearing loss with tinnitus, reversible if discontinued

Antimalarials (Quinines)

• hearing loss with tinnitus
• reversible if discontinued but can lead to permanent loss

Others

• many antineoplastic agents are ototoxic (weigh risks vs. benefits)
• loop diuretics

Noise-Induced Sensorineural Hearing Loss:

• 85 to 90 dB over months or years or single sound impulses >135 dB can cause cochlear damage
• bilateral SNHL initially and most prominently at 4000 Hz (resonant frequency of the temporal bone), known as "boilermaker's notch" on audiogram, extends to higher and lower frequencies with time.

Phases of Hearing Loss:

• **dependent** on: intensity of sound and duration of exposure
• **temporary** threshold shift:

f.when exposed to loud sound, decreased sensitivity or increased threshold for sound

f.may have associated aural fullness and tinnitus

f.with removal of noise, hearing returns to normal

• **permanent** threshold shift:

f.hearing does not return to previous state

Treatment:
• hearing aid
• prevention:

f. ear protectors: muffs, plugs

f. limit exposure to noise with frequent rest periods

f. regular audiologic follow-up

MCQs:

Q1: Patients with sensorineural hearing loss will have:

A. normal air conduction and abnormal air conduction

B. normal bone conduction and abnormal air conduction

C. both air and bone conductions are abnormal

D. air bone gap

E. non of the above

Q2: Presbycusis is:
A. SNHL
B. Mixed hearing loss
C. Conductive hearing loss

Q3: All cause conductive hearing loss except:
A. Tympanoscelrosis
B. COM
C. Labrinthititis
D. Wax

Answers:

C, A, C.

For mistakes or feedback

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