HEARING LOSS
**Hearing loss**: Deviation from normal hearing in one or both ears.

**Hearing handicap**: This term refers to total or partial hearing loss that interferes with oral communication.

**Deafness**: This term is reserved for profound or total degrees of hearing loss.

**CLASSIFICATION OF HEARING LOSS**
1) Age of onset

- Prelingual
- Postlingual

Determines ability of the child to develop normal speech & language.

2) Speed of onset

- Gradual
- Sudden

Determines ability to use residual hearing in auditory communication.
3- Course

- Stationary
- Dynamic
  - Fluctuant
  - Progressive

Helps in taking decisions of treatment.

4- Pathology

- Organic
- Functional
  - Peripheral
  - Central
  - Hysterical
  - Malingering
  - Functional Overlay
5- Site of lesion

- Conductive
- Sensorineural
- Mixed
- Central

Causes of hearing loss
1) Conductive HL

1- Causes in external ear

- Congenital
  - atresia
- Acquired
  - wax / foreign body infection
  - tumor

- CHL
- Impacted Wax
- Canal Atresia
- Otitis Externa
- Ostema & Exostosis
- Carcinoma
2- Causes in the middle

1- Trauma
   TM perforation
2- Infection
   Otitis media (Acute & chronic, suppurative & non-suppurative)
3- Otosclerosis
4- Middle ear effusion
5- Ossicular discontinuity.
5- Tumor

1) Group where otoscopy show abnormality
2) Group where otoscopy is normal

- SNHL
  - Congenital
  - Acquired
**Congenital SNHL**

- Genetic
  - Syndromal: Waardenberg syndrome, Down syndrome
  - Non-Syndromal

- Non-genetic
  - intrauterine infection e.g. Rubella, toxoplasmosis

**Heredo-familial HL**
(commonest type)

**Acquired SNHL**

1. **Infectious:**
   - Meningitis
   - Mumps

2. **Traumatic:**
   - Physical trauma: Skull fracture (temporal bone)
   - Acoustic trauma: such as from explosions, fireworks, gunfires.
   - Barotrauma: differences in pressure during deep-sea diving.

3. **Toxic:**
   - Aminoglycoside antibiotics.

4. **Age-related hearing loss** (presbycusis), commonest cause of SNHL.

5. **Occupational (noise-induced HL):**
   Any occupation with exposure to loud noise on a continuous day-to-day basis can result in hearing loss due to nerve end damage.

6. **Others:**
   - Meniere’s disease
   - Acoustic neuroma
What happens in hearing loss

- In conductive hearing loss, sound energy is partially blocked before it reaches the inner ear. Examples of conductive hearing loss include earwax or a growth blocking sound, such as what occurs in otosclerosis.

- In sensorineural hearing loss, sound reaches the inner ear, but a problem in the inner ear or in the auditory nerve prevents further ascent of auditory stimulation to the CNS.

Early warning signs of hearing loss

- Muffled hearing.
- Difficulty understanding what people are saying, especially when there are competing voices or background noise.
- Listening to the television or radio at higher volumes than in the past.
- Avoiding conversation and social interaction.
- Depression. Many adults may be depressed because of how hearing loss is affecting their social life.
- Other symptoms that may occur with hearing loss include:
  - Tinnitus
  - Ear pain, itching, or irritation.
  - Pus or fluid leaking from the ear.
  - Vertigo, which can occur with hearing loss caused by Ménière's disease, acoustic neuroma, or labyrinthitis.
DIAGNOSIS OF HEARING LOSS

- HISTORY
- CLINICAL EXAMINATION
- AUDIOLOGICAL INVESTIGATIONS
- OTHER INVESTIGATIONS

CLINICAL EXAMINATION

1) OTOSCOPY
CLINICAL EXAMINATION

1) OTOSCOPY

2) Clinical tests

- **Whispered speech test** (Crude measure): The doctor may use this as a basic screening test by whispering words behind the patient and asking if he/she can hear anything.

- **Tuning fork test**. Different tuning forks can be used to test hearing at a variety of frequencies.
Rinne test:
Determines if ear is conductive or sensorineural

- Bone conduction (BC)
- Air conduction (AC)

AC > BC (Positive Rinne test) → Normal (or SNHL)
BC > AC (Negative Rinne test) → Conductive HL

Weber test:
Determines if unilateral or asymmetric loss is conductive or sensorineural

- Midline or not lateralized → No significance between ears
- Lateralized to better ear → Poorer ear is SNHL
- Lateralized to poorer ear → Poorer ear is conductive
3) Audiological investigations

1) Pure tone audiometry

It measures 1- air conduction thresholds,
2- bone conduction thresholds,
At six different frequencies at octave intervals from 250 Hz to 8000 Hz.
Analysis of these thresholds on the audiogram gives information about
1- type of hearing loss: differences between AC & BC thresholds.
2- degree of hearing loss: absolute AC thresholds.
3- causes of hearing loss: Configuration (Shape) of audiogram.
Conductive HL  
High Freq. sloping

Mixed HL  
Low freq. SNHL
Speech Audiometry

Helps to localize the site-of-lesion

- CHL  excellent discrimination scores (90-100%)
- Sensory  score 70-90%
- Neural  scores are very poor (0-50%)

(4) Other investigations

1- ABR
- Determination of hearing thresholds in infant, newborns & malingerers
- Detect acoustic neuroma: by studying time differences (interpeak latencies) between different ABR waves.

2- MRI
Detect acoustic neuroma
1- CHL

Most of CHL cases are treatable and treatment depends on the cause

e.g.

- Wax → ear wash
- SOM → medical treatment or grommet’s tube insertion
- Otosclerosis → stapedectomy
- Chronic Suppurative OM → Tympanoplasty or mastoidectomy
Most of SNHL cases are untreatable (except Meniere’s disease & sudden SNHL) and treatment depends on rehabilitation
e.g
Hearing aids, cochlear implant