Hearing loss

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Also known as hearing impairment, is a partial or total inability to hear

Normal human being can hears sounds of intensity lower than 15 dB

Disabling hearing loss refers to hearing loss greater than 40 dB in the better hearing ear in adults (15 years or older) and greater than 30 dB in the better hearing ear in children (0 to 14 years).

Types of hearing Loss

1. Conductive hearing loss : defect In the external ear , tympanic membrane or the middle ear
2. Sensori-neural hearing loss : defect in the cochlea or its neural connection
   Sensori – related to the cochlea
   Neural – related to the cochlear nerve or its neural connections
3. Mixed hearing loss : both conductive and sensori-neural elements are present

Degree of hearing loss

Hearing loss classified according to the severity to

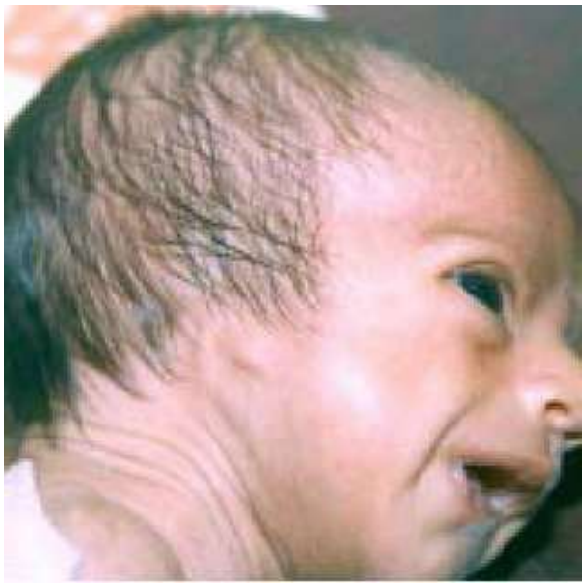
Slight, mild moderate, moderately severe, severe and profound hearing loss, below table showing thresholds of hearing of each class of hearing loss and its impact on the children

class	Hearing threshold	impact
Normal hearing	-10 to 15 dB	Child can hear sounds and speech even if they are very soft
Slight hearing loss	16 to 25 dB	Child may have trouble hearing soft speech, soft sounds, or speech spoken from a distance
Mild hearing loss	26 to 40 dB	Child will consistently miss some speech sounds.
Moderate hearing loss	41 to 55 dB	Child just barely hears speech at a conversational level in a quiet environment and may or may not be able to understand what is being said.
Moderately severe hearing loss	56 to 70 dB	Child may hear some speech sounds, but will be unable to understand speech without hearing aids.
Severe hearing loss	71 to 90 dB	Child may detect loud sounds in the environment, but will not hear normal conversational speech
Profound hearing loss	> 91 dB	Child likely responds more to vibrations than to sounds.

Causes of conductive hearing loss:

- Malformation of outer ear, ear canal, or middle ear structure
- Fluid in the middle ear (middle ear effusion)
- Ear infection (otitis media – otitis media with effusion)
- Poor Eustachian tube function
- Perforated eardrum
- Impacted earwax
- Infection in the ear canal (Otitis externa)
- Foreign object in the ear
- Otosclerosis (a hereditary disorder in which a bony growth forms around a small bone in the middle ear, preventing it from vibrating when stimulated by sound)

Anotia: congenital absence of the external ear



Microtia: congenital small auricle with no external canal

Causes of sensori-neural hearing loss:

- Heredity
- Malformation of the inner ear (Mondini malformation, Michel malformation)
- Exposure to loud noise (noise induced hearing loss)
- Aging (presbycusis)
- Drug induced hearing loss
- Head trauma
- Virus or disease
- Autoimmune inner ear disease
- Meniere's disease
- Tumors (cerebellopontine angle tumor)

Common drugs that lead to hearing loss

- Aspirin, when large doses taken.
- Non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen and naproxen.
- Certain antibiotics, especially aminoglycosides (such as gentamicin, streptomycin, and neomycin).
- Loop diuretics , such as furosemide or bumetanide.
- Medicines used to treat cancer, including cyclophosphamide, cisplatin, and bleomycin.

Mixed Hearing Loss

Pathology affecting the middle and the inner ear, a typical example is cholesteatoma, advanced stage of otosclerosis also leads to mixed hearing loss

Presbycusis

Some deterioration in hearing is almost inevitable as patients get older (presbycusis). This starts in early adult life and affects first the high tones. As many as 70% of patients in their seventies could benefit from the use of a hearing aid, and many patients from their forties onward will have marked age-related hearing loss. This is caused mainly by loss of sensitivity of the delicate hair cells in the cochlea. It is usually bilateral but the pattern is very variable.

Otosclerosis

Autosomal dominant disease causes abnormal bone to be formed around the stapes footplate, preventing its normal movement. Conductive deafness results. It is commoner in women, typically presents in early

adult life and often progresses during pregnancy. There may be a family history. Apart from conductive deafness, Otosclerosis can be treated by surgical removal of the stapes and replacement with a prosthesis (stapedectomy). This is a highly specialized procedure with a risk of complete hearing loss in the operated ear' otherwise hearing aids can also be used. sodium fluoride is useful to decrease bone formation over the cochlea (cochlear otosclerosis).

Sudden sensorineural deafness

Sudden deafness may be unilateral or bilateral and most cases are regarded as being viral or vascular. Sudden sensorineural deafness is an emergency and should be treated seriously. Bilateral profound deafness, especially if sudden, is a devastating event. Arrange admission to hospital as delay may mean permanent deafness.

Investigation may show no cause and treatment is usually with low-molecular-weight dextran, steroids and inhaled carbon dioxide in an attempt to improve blood flow to the inner ear.

Meniere's disease

Is a disease characterized by recurrent attacks of episodic vertigo, fluctuating hearing loss, tinnitus, aural fullness. Possible etiologies/triggers: viral, autoimmune, allergy, genetic.pathophysiology of theis disease that it caused by endolympatic hydrops. Typically vertigo attack duration is around one hour associated with nausea and vomiting.patient may be presented with Drops attacks (Tumarkin crisis): loss of lower extremity muscle tone, no loss of consciousness (6–7 %), thought to be caused by sudden stimulation of vestibular end organ.

Investigation: Audiogram: sensorineural hearing loss, classically low-frequency. Electrocochleography: test compares summating potential to action potential of auditory nerve; Ménière's disease patients have

increased summating potential/action potential ratio from altered basilar membrane function due to endolymphatic hydrops.

Treatment:

Medical treatment:

• Acute symptoms

– Vestibular suppressants—diazepam for vertigo, promethazine or meclizine for nausea/vomiting

– Oral steroids can be used for acute episode, especially if drop in hearing

– Allergy management may help symptoms

• Prophylaxis

_ Sodium restriction: counseled as initial first step, but little data to support

_ Dyazide shown to reduce vertigo episodes in randomized controlled trial, can also use acetazolamide

_ Betahistine: vasodilator, shown to decrease dizziness/vertigo in two randomized controlled trials

_ Intratympanic steroids: showed 70 % improvement at 18 months (but no difference from intratympanic gentamicin or endolymphatic sac decompression

_ Intratympanic gentamicin (selectively vestibulotoxic) has been used to decrease vestibular symptoms; may give repeat doses if vestibular symptoms are present, but should stop if patient develops symptoms suggestive of cochlear injury (worsening tinnitus/hearing loss)

Surgical treatment (rarely used):

_ Endolymphatic sac decompression / stenting

_ Vestibular nerve suctioning

_ Transmastoid labyrinthectomy