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Snapshots in Ear, Nose & Throat



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CHAPTER

16

Sensorineural Hearing Loss

Lesions in the cochlea, VIIIth nerve or central auditory pathways leads to sensorineural hearing loss. Sensorineural hearing loss (SNHL) can be divided into:

- Sensory or cochlear hearing loss.
- Nerve or retrocochlear hearing loss.
- Central hearing loss.

Causes of Sensorineural Hearing Loss

- Cochlear causes.
- Retrocochlear causes.
- Central causes.

Cochlear Causes (Table 16.1)

- Congenital—aplasia and hypoplasia of inner ear.
- Infective:
  - Viral measles, mumps, chickenpox, rubella.
  - Bacterial—syphilis, pyemia.

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Table 16.1 Differences between cochlear and retrocochlear sensorineural hearing loss

Cochlear SNHL	*Retrocochlear SNHL*
• Hair cells are damaged mainly	Lesion is of VIIth nerve or its central connections
• Recruitment is present	Recruitment is absent
• No significant tone decay	Tone decay is significant
• SISI is positive	SISI is negative
• Bekesy shows type II tracing	Bekesy shows type III tracing
• Speech discrimination is not highly impaired	Speech discrimination is highly impaired (SDS is very poor) and roll over phenomenon is present
• Subjective feeling of diplacusis, hyperacusis or fullness in the ear	No such sensation or feeling

- Traumatic:
  - Temporal bone fractures
  - Noise-induced deafness
  - Traumatic perilymph fistula
  - Blast injuries.
- Ototoxicity.
- *Vascular causes:* Old age, atherosclerosis, embolism, thrombosis.
- Meniere's disease
- Presbycusis.
- *Metabolic causes:* Diabetes mellitus, renal failure, hypothyroidism.

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Retrocochlear Causes (Table 16.1)

- Tumors in internal auditory canal and cerebellopontine angle tumor.
- Congenital cholesteatoma at cerebellopontine angle.
- Meningitis.

Central Causes

- Multiple sclerosis
- Meningitis
- Brain tumor
- Idiopathic.

Presbycusis

It is also called as senile deafness. It is the deterioration of hearing that occurs with increasing age particularly after 60 years.

It is the most common cause of sensorineural deafness. It is a degenerative process.

It is bilateral, symmetrical high tone sensorineural deafness with slow progression.

Affected persons talk loudly. Discrimination of speech is poor. Recruitment is present. Tinnitus is often present and may be the initial symptom.

Aggravating Factors

- Smoking
- Noise

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- Diabetes.
- Hypertension.

Types of Presbycusis

- *Sensory:* Degeneration of organ of Corti.
- *Neural:* Degeneration of neural elements (poor speech discrimination).
- *Strial or metabolic:* Atrophy of stria vascularis in all turns of cochlea.
- *Cochlear conductive:* Stiffening of the basilar membrane thus affecting its movement.

Treatment

- Hearing aid is often helpful.
- Avoidance of loud noise.
- Avoidance of ototoxic drugs.
- General nutrition should be improved including administration of vitamin B_1, B_6, B_{12}.
- If diabetes control blood sugar and control BP, if hypertensive.

Ototoxicity

Certain drugs or chemicals can damage the inner ear and cause sensorineural hearing loss, tinnitus and vertigo. This is called ototoxicity.

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Table 16.2 The site of action of ototoxic agents

Ototoxic drugs	*Site of action*
• Aminoglycosides	Damage type 1 hair cells of the crista ampullaris; destruction of outer hair cells
• Loop diuretics	Edema and cystic changes in the stria vascularis
• Salicylates	Probably interfere at enzymatic level
• Chloroquine and quinine	Vasoconstriction in the small vessels of the cochlea and stria vascularis
• Cytotoxic drugs	Affect the outer hair cells
• Vancomycin	Damage to cochlear hair cells initially of basal turn (high frequency)

Note: The patients taking ototoxic drugs must be instructed to report development of tinnitus, hearing loss, imbalance and vertigo.

- Aminoglycoside antibiotics:
  - Streptomycin, gentamycin and tobramycin are primarily vestibulotoxic. They selectively damage type I hair cells of the crista ampularis (Table 16.2)
  - Neomycin, kanamycin, amikacin, sisomicin and dihydrostreptomycin are cochleotoxic. They selectively damage outer hair cells, starting at basal coil and then progress to apex of cochlea.
  - Incidence of ototoxicity is highest with neomycin. Netilmicin is the weakest ototoxic.
  - Patients at risk are those:
    a. Impaired renal function
    b. Age above 65 years

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c. Concomitantly taking other ototoxic drugs
d. Already received aminoglycoside antibiotics
e. Who genetically susceptibility to aminoglycosides.

- *Diuretics:* Furosemide and ethacrynic acid.
- *Analgesics*: Salicylates, indomethacin, phenylbutazone, ibuprofen.
- *Antimalarials:* Quinine, chloroquine.
- *Cytotoxic drugs:* Nitrogen mustard, cisplatin and carboplatin.
- *Chemicals:* Alcohol, tobacco, marijuana, carbon monoxide poisoning.
- *Miscellaneous:* Erythromycin, ampicillin, propranolol, propylthiouracil, deferoxamine.

Sudden Deafness

It is defined as sensorineural hearing loss that occurs instantaneously. Hearing loss may be partial or complete (Table 16.3). Mostly, it is unilateral. It may be associated with tinnitus or temporary spell of vertigo. It may be due to:

- Vascular causes—vasospam, thromboembolism of the end arteries.
- Viral infections.
- Ototoxic drugs.
- Oval or round window rupture.
- Acoustic neuroma.
- Idiopathic.

Treatment

- It consists of early administration of steroids and vasodilators.

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Table 16.3 Differences between conductive deafness and sensorineural deafness

	Conductive deafness	*Sensorineural deafness*
• Voice	Low tone	High tone
• Noise intolerance	Absent	Present
• Rinne's test	Negative	Positive
• Weber's test	Lateralized to diseased ear	Lateralized to better ear
• Absolute bone conduction (ABC)	Not reduced	Reduced
• Pure tone audiometry	Good air-bone gap	No air-bone gap
• Speech discrimination	Absent	Present
• Recruitment	Absent	Present
• Speech audiometry	Good discrimination	Poor discrimination

- Earlier the treatment is started the better prognosis.
- If viral etiology is suspected, antiviral drugs are indicated.
- In most of cases, prognosis is poor.

Acoustic Trauma/Noise-induced Deafness

- Hearing loss occurs due to excessive noise exposure.
- *Acoustic trauma:* Permanent damage to hearing can be caused by a single brief exposure to very intense sound.
- *Noise induced hearing loss*: Hearing loss occurs following chronic exposure to less intense sounds. It is mainly a hazard of noisy occupation.

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- The audiogram in noise induced hearing loss shows a typical notch at 4 kHz both for air and bone conduction.
- It is usually symmetrical in both ears.
- Noise induced hearing loss is preventable.

Preventive Measures

- Exposure to noise should not be greater than 90 decibel for 8 hours/day/5 days week.
- Periodic audiometric screening and ergonomics.
- Use of ear protectors like plugs and muffs should be made mandatory
- Public awareness by education against noise pollution.

Perilymph Fistula

- There is sudden gushing or seepage of perilymph from the labyrinth to the middle ear through a fistulous opening, which is called perilymph fistula.
- It usually presents sudden or intermittent progressive sensorineural hearing loss with vertigo
- The usual cause is direct or pressure trauma to the ear
- Urgent tympanotomy and plugging of the leak with fascia is necessary.

Viral Causes for Hearing Loss

- Upper respiratory tract viruses, mumps, measles, herpes zoster, infectious mononucleosis and cytomegalovirus can cause inflammation of the labyrinth and deafness.

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- Mumps causes unilateral deafness.
- They cause degeneration of the organ of Corti, tectorial membrane and stria vascularis.

Psychogenic Deafness

- It is also called as nonorganic hearing loss (NOHL). Deafness without any organic causes.
- *There are two types:* Functional (Hysterical) and malingering.
- *Functional (Hysterical):* More common among females. It may be due to stress. The deafness is subconsciousness and the patient ceases to listen.
- *Malingering (Feigned deafness):* In this condition, the malingerer listens, but pretends not to hear.

Different Tests for Malingering

- *General tests:* The patient is examined repeatedly and his behavior is watched carefully. The response to tuning fork tests and pure tone audiometry will be inconsistent.
- *Stenger's test:* It is based on the principle that two tones of equal frequency and quality cannot be heard simultaneously if one is louder, i.e. only louder sound will be heard. This can be done using two tuning forks or a two channel audiometer or two audiometers.
- *Lombard's test:* A Barany noise box is placed over the normal ear and the patient is asked to count or read in his normal voice. If the deafness is true the voice is markedly raised, but in malingering the voice will remain the same.

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- *Double speaking tubes*: When two persons speak in each tube fitted to the ear of deaf patient he will hear in the good ear, but the malingerer will be confused. So he will give inconsistent responses.

Other Tests

These are:

- Chimani-Moos test
- Evoked response audiometry
- Acoustic reflex
- Psychogalvanic skin resistance test
- Delayed auditory feedback, etc.

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