Diseases of the inner ear

- Temporal bone fracture.
- Perilymph fistula.
- Otitic blast injury.
- Noise induced hearing loss.
- Presbycusis.
- Labyrinthitis.
- Meniere's disease.
- Acoustic neuroma (vestibular schwannoma)

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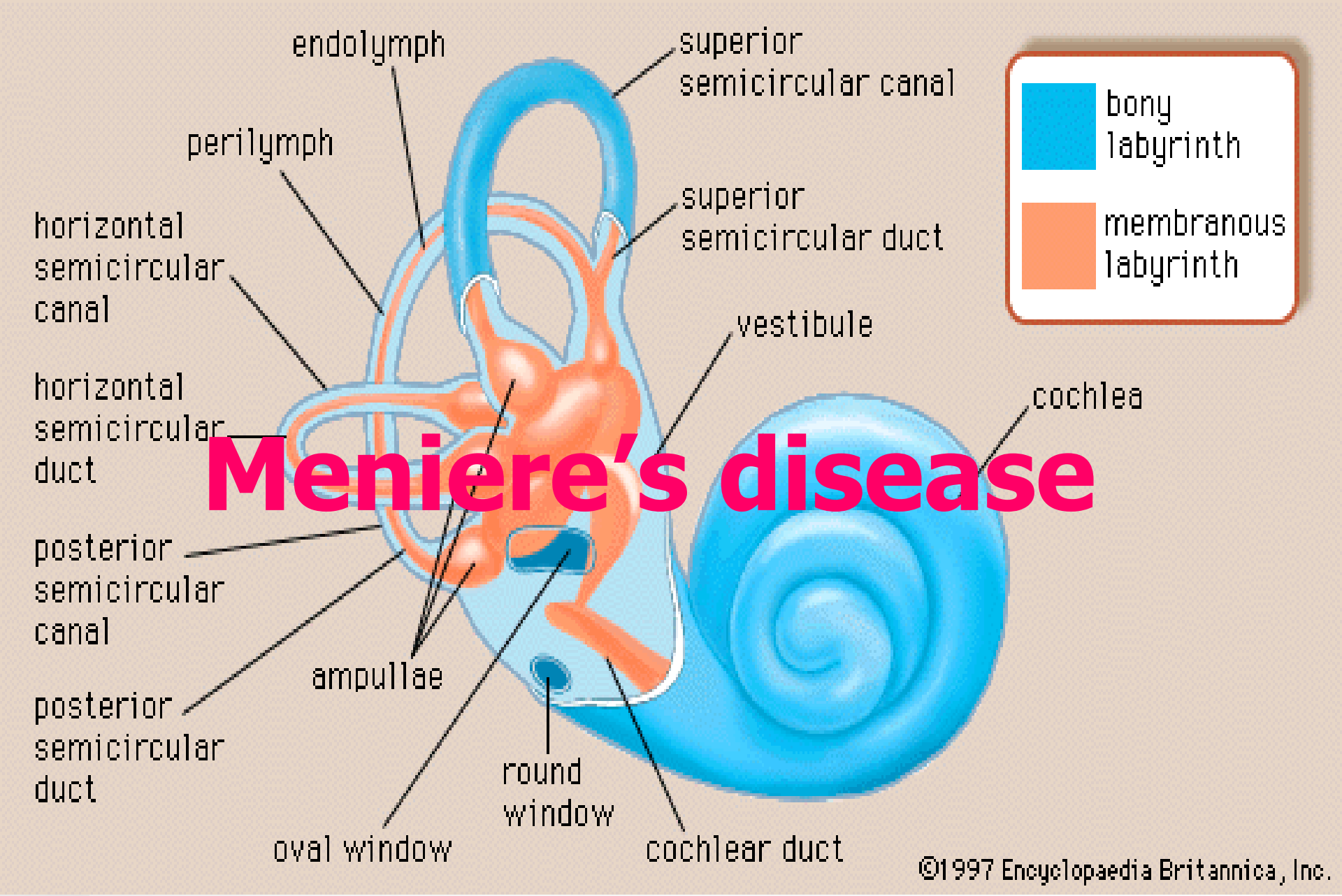

Meniere's disease

A 40 years Male Patient With vertigo, Unilateral Sensory neural deafness, tinnitus & fullness of ear.

- **What is your diagnosis ?**
- **What are the Investigations?**
- **What is the treatment?**

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Meniere's disease

- Definition

Disease of the inner ear of unknown aetiology characterized by vertigo, deafness, tinnitus & fullness of ear.

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Meniere's disease

- It is also known as the hydrops of endolymph as the endolymphatic system is dilated.
- Meniere, A physician of Paris described this disease on 1861 one year before his death.

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Pathology:

- **Main pathology is the distention of the endolymphatic system (scala media, saccule, utricle & semicircular canal) either due to increased secretion of endolymph or faulty absorption or both.**
- **The increased endolymphatic pressure may lead to rupture of Reissner's membrane, mixing of endolymph and perilymph, this causes an alteration in basilar membrane mobility, resulting in deafness and tinnitus.**
- **The same pressure increase leads to distortion of ampullae of the semicercular canals with subsequent vestibular dysfunction.**
- **Once the endolymphatic pressure has been released, Reissner's membrane heals and the fluid chemistries returns to normal leading to improvement of symptoms.**

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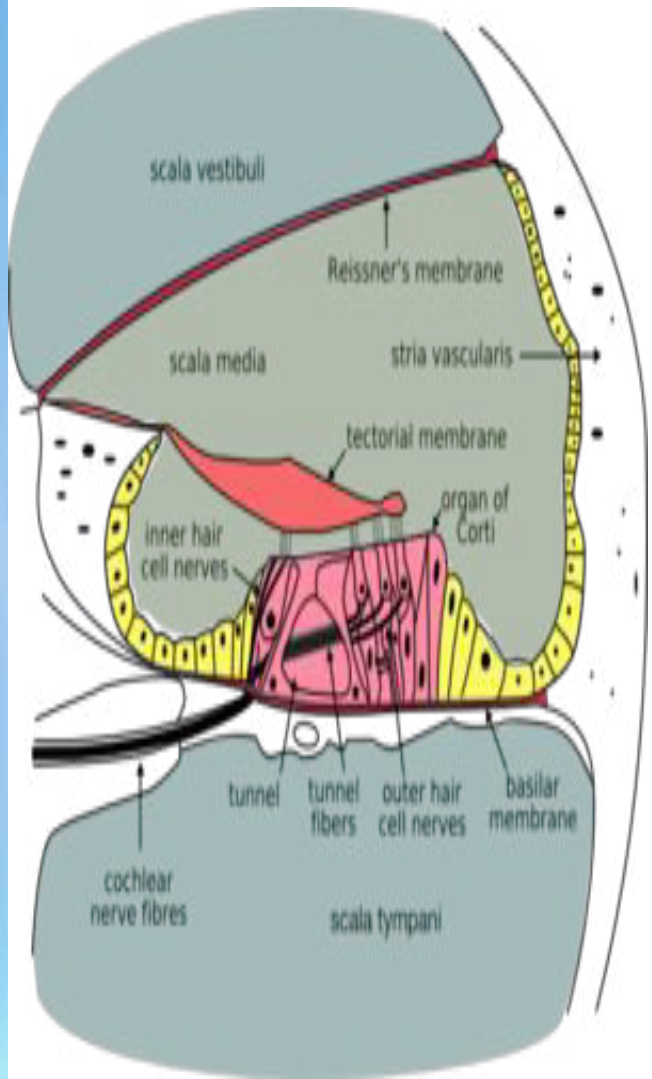
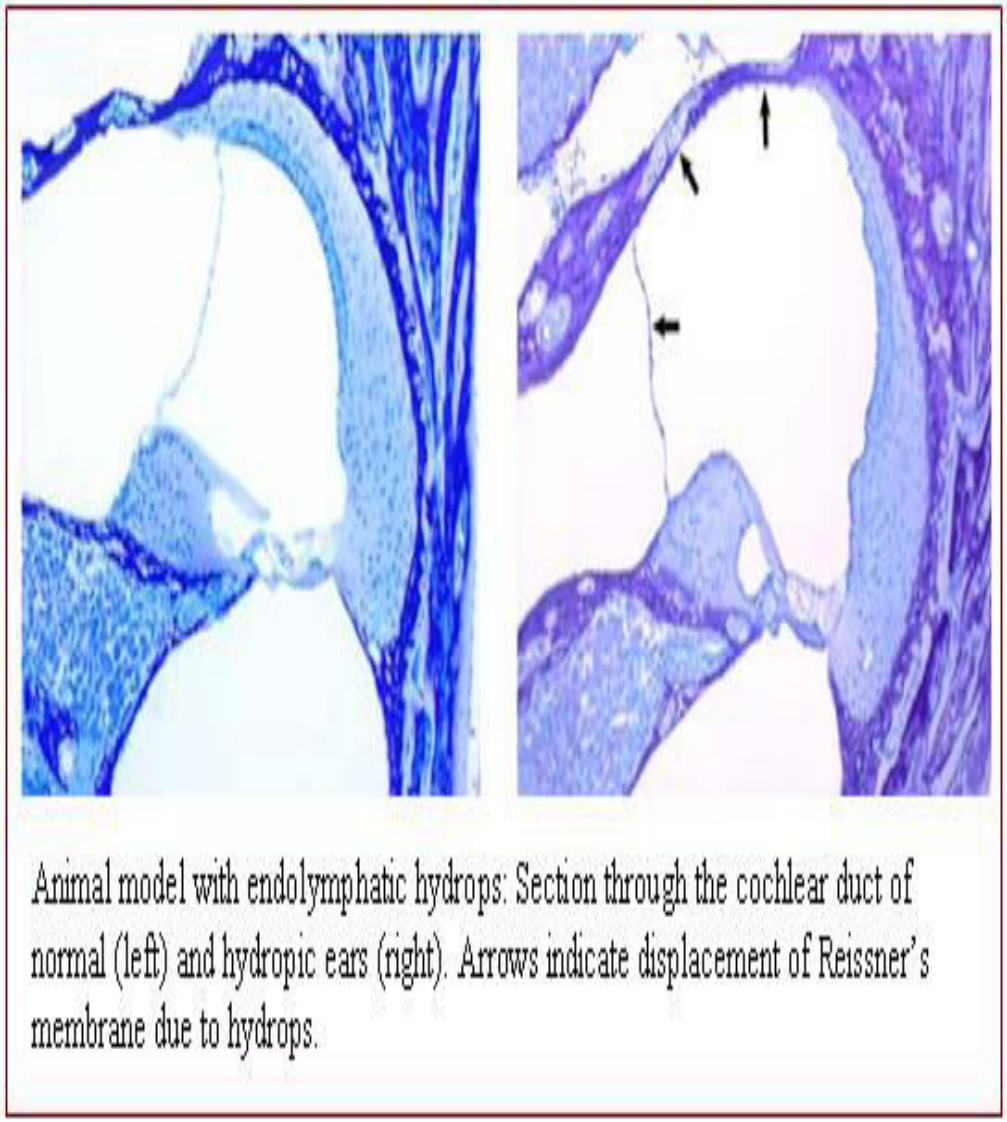
Meniere's disease : **Pathology**:





Animal model with endolymphatic hydrops: Section through the cochlear duct of normal (left) and hydropic ears (right). Arrows indicate displacement of Reissner's membrane due to hydrops.

Aetiology:

- The exact cause is not known.
- Various theories have been postulated.
  - Defective absorption by endolymphatic sac.
  - Vasomotor disturbance.
  - Allergy.
  - Sodium and water retention.
  - Hypothyroidism.
  - Autoimmune and viral cause.

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Clinical Features :

- Male >female.
- Unilateral-50%. May be bilateral
- Age: 30-55 years.
- Symptoms are due to mixing of endolymph and perilymph by rupture of Reissner's membrane forming fistula.
- Cardinal symptoms are:

1. Episodic vertigo.
2. Fluctuating hearing loss.
3. Tinnitus
4. Sense of fullness or pressure in the affected ear.

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Clinical Features :

- **Vertigo-**

- Sudden onset, Paroxysmal, Comes in attack. Lasts for 10 minute to 20 hours.
- A feeling of rotation of himself on his environment, sometimes there is feeling of "to and fro" or "up and down" movement.
- Usually, an attack is accompanied by nausea & vomiting with ataxia and nystagmus.
- Usually, there is no warning symptoms of an on coming attack of vertigo but there may be a sense of fullness in the ear.
- Spontaneous remission may be hours to year,
- Not associated with unconsciousness.

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Clinical Features :

- **Hearing loss-**

  - Sensory neural loss.
  - Fluctuating
  - Progressive
  - Low frequency loss first
  - Later high frequency loss

❖ **Hearing improves after the attack and may be normal during the periods of remission.**

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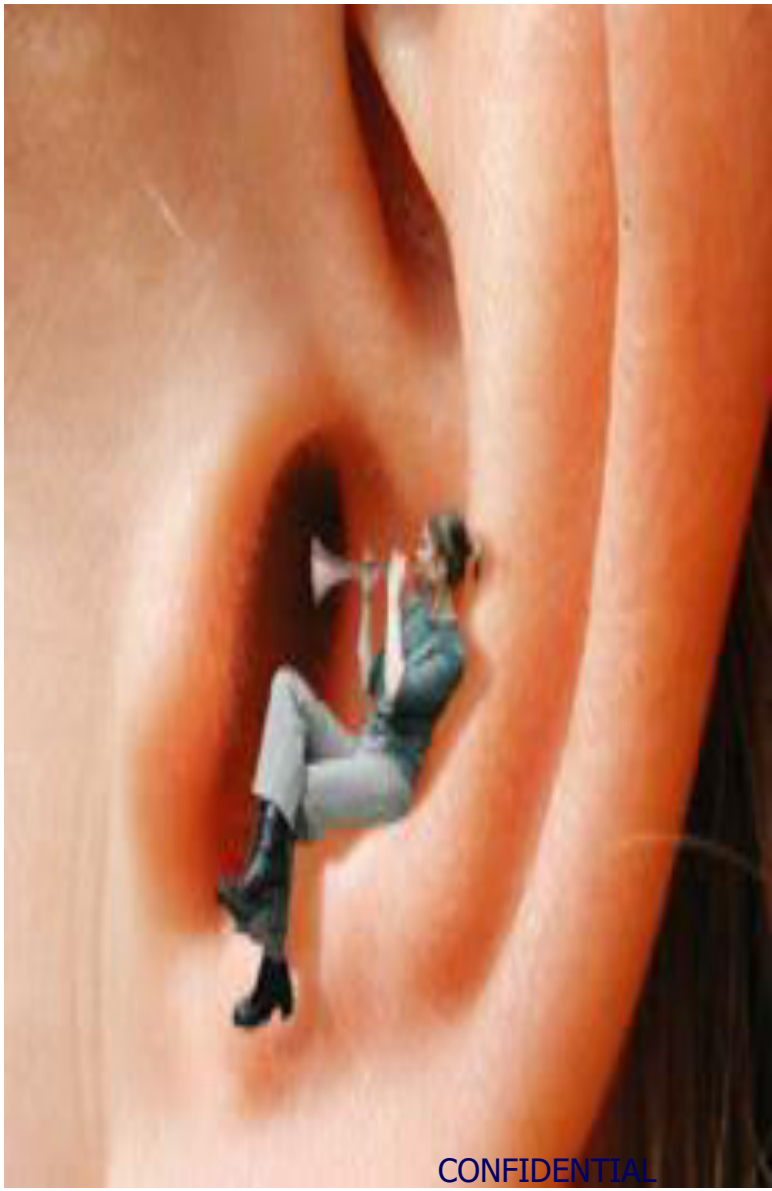
Clinical Features :

- **Tinnitus:**

- ❑ Is low-pitched roaring type, is aggravated during acute attacks.
- ❑ Sometimes, it has a hissing character.
- ❑ May persist during periods of remission.



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Examination

- Otoscopy – no abnormality is seen in TM.
- Nystagmus – is seen only during acute attack. The quick component of nystagmus is towards the unaffected ear.
- Tuning fork tests- indicates SNHL.

  Rinne test- is positive.

  weber test- is lateralised to the better ear.

  ABC test- is reduced in the affected ear.

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Investigations.

- **PTA-will show low frequency SNHL in 33% cases and flat loss in 66% cases. A fluctuating SNHL on repeated audiogram is good evidence for the diagnosis.**
- **Speech audiometry- Discrimination score is usually 55-85% between the attacks but discrimination ability is much impaired during and immediately following an attack.**
- **Caloric test- may show canal paresis (Impaired vestibular function)**
- **Glycerol test- glycerol is a dehydrating agent. When given orally, it reduces endolymphatic pressure and thus causes an improvement in hearing.**
- **Electrocochleography (ECochG)- it shows changes diagnostic of Meniere's disease. Normally, ratio of summating potential (SP) to actional potential (AP) is 30%. In Meniere's disease, SP/AP ratio is greater than 30%.**

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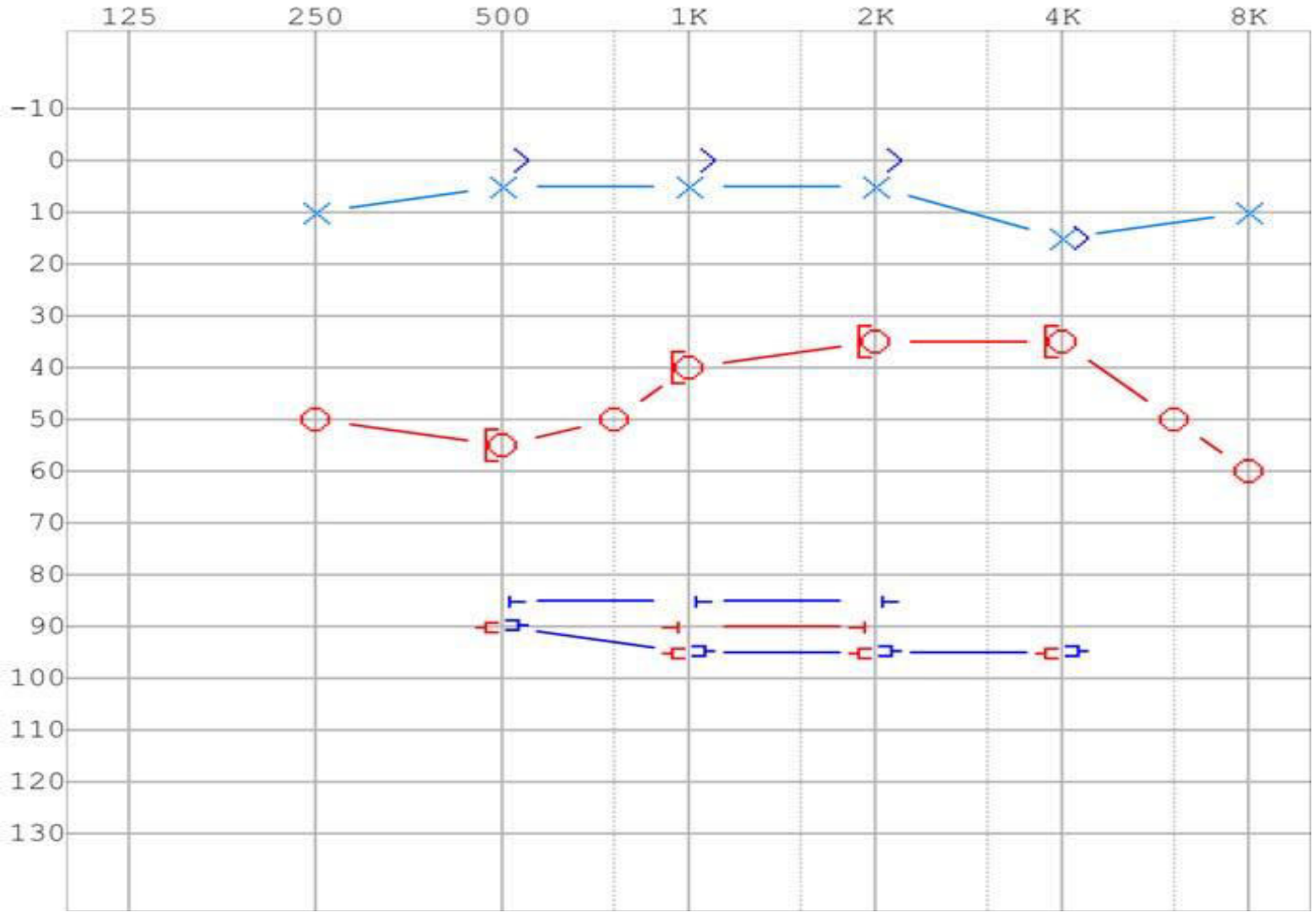
PTA



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D/D

- **Labyrinthitis.**
- **Congenital Syphilis.**
- **Cogan's Syndrome.**
- **Vestibular neuronitis.**
- **Benign paroxysmal Positional Vertigo (BPPV).**
- **Epilepsy.**

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Treatment

A. General measures.
B. Management of acute attack.
C. Managament of chronic attack.
D. Surgical treatment.

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Treatmemt

A. General measures:

1. Reassurance- pts anxiety can be relived by reassurance and by explaining the nature of disease.
2. Cessation of smoking- nicotine causes vasospasm. Smoking should be completely stopped.
3. Low salt diet- pts should take salt-free diet as far as possible. Salt intake should not exceed 1.5-2.0 g/day.
4. Avoid excessive intake of water. Should also avoid coffee, tea and alcohol.
5. Avoid stress- bring a change in life-style.
6. Avoid activities requiring good body balance- professions such as flying, under-water diving or working at great heights should be avoided.

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Treatment (cont.)

B. Management of acute attack.

1. **Reassurance and psychological support.**
2. **Bed rest with head supported on pillows to prevent excessive movement.**
3. **Vestibular sedatives –to relive vertigo.**

- **Prochlorperazine (Stemetil) – 15 to 75mg/day**
- **Cinnarizine- 15 mg 12 hourly**
- **Diazepam – 5 to 10 mg/day given I/V.**
- **Chlorpromazine- 25mg 8 hourly**

4. Vasodilators-Inhalation of carbogen (5% CO_2 with 95% O_2).
   Histamine drip-

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C. Management of Chronic attack

1. Vestibular sedatives-

- Prochlorperazine (Stemetil) -10mg 3 times daily orally for 2 months then reduced to 5mg 3 times daily for another month.

2. Vasodilators-

- Nicotinic acid, 50mg 3 times/day one hour before meals for 6 months.
- Betahistidine HCl- 8 to 16mg, 3 times/day, orally –6 months.

3. Diuretics – frusemide , 40 mg tab, taken alternate days with potassium supplement.
4. Propantheline bromide (probanthine)- 15 mg, thrice a day.
5. Hormones – if hypothyroidism then appopriate replacement therapy given.
6. Gentamicine therapy- Gentamicine is vestibulotoxic. Intratympanic gentamicine causes destruction of the vestibular labyrinth.

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D. Surgical treatment

1. Conservative-

- Decompression of endolymphatic sac.
- Endolymphatic shunt operation.
- Section of vestibular nerve.
- Ultrasound destruction of vestibular labyrinth.
- Sacculotomy.

2. Destructive - Labyrinthectomy.

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Prognosis :

- 75% cases managed by non surgical treatment.

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Presbycusis

- Definition:

  Reduction of hearing acquity in old age due to progressive degeneration in the auditory system.

Pathology :

- ✓ Both the peripheral (cochlear) and central (neural) components of the auditory system are affected.
- ✓ Reduction in the numbers of outer and inner hair cells.
- ✓ Atrophy of stria vascularis, microangiopathy leading to more cell death.

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Presbycusis

- Clinical features:
- Deafness- difficulties in understanding speech in presence background noise.
- Tinnitus-
- Normal ear canal and ear drum.
- Tuning fork tests- Rinne's test- +ve
  weber test- normal.
  ABC test- Reduced.

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Presbycusis

- Investigations :
- PTA shows- bilateral symmetrical SNHL with a slopping high frequency loss.
- Speech audiogram- will show type C graph with 60-80 percent speech discrimination.

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Presbycusis

- Treatment :
- Hearing aids- helpful in 70-80% cases.
- Hearing aids with tinnitus masker.
- Auditory rehabilitation.

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Questions and answers

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