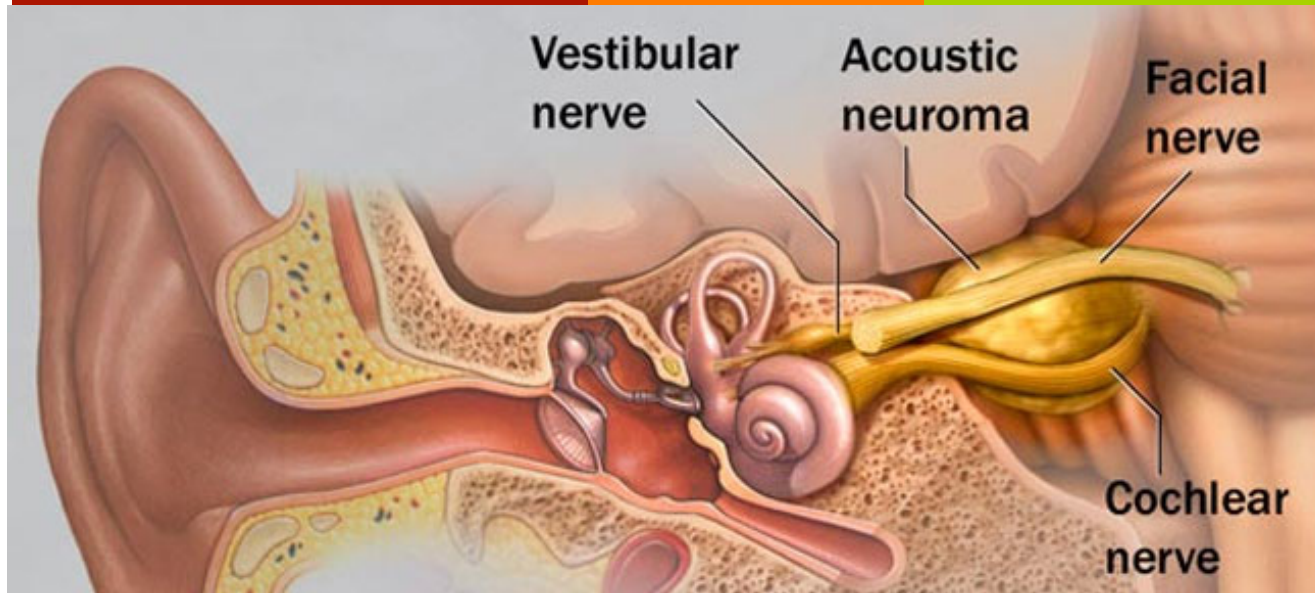


2nd PBL case

Vestibular Schwannoma (Acoustic Neuroma)



Done by:

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This work **DOES NOT** cover the materials discussed during previous lectures. So, please make sure that you go through the learning objectives and fulfill each.

Learning objectives:



1. Correlate the anatomical structures (inner ear, and vestibulocochlear nerve) with their functions in the hearing and body balance mechanisms.
2. Discuss the significance of the cerebellopontine angle area and anatomical structure related to it.
3. Understand the anatomy and function of the vestibulocochlear, trigeminal, and facial nerves.
4. Use basic sciences to interpret symptoms , signs and investigation results of a patient presenting with acoustic neuroma.
5. Briefly outline a management plan and manage options.
6. Discuss the impact of disease on patient, family and work.

What was wrong?

➔ **Patient's key information:**

- Male, 55 years old.
- Works in cargo section as airport navigator for over 12 years.
- Married and has 3 children.

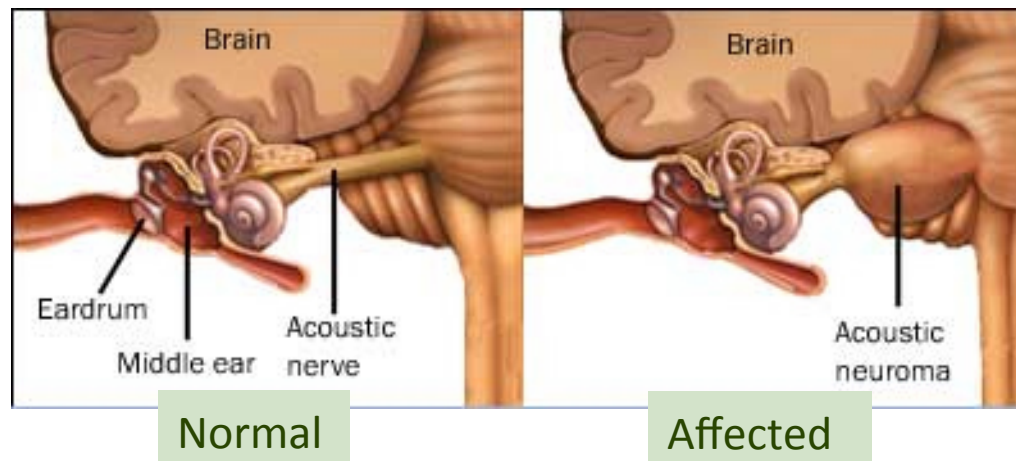
➔ **His complaints:**

- Decreasing in hearing in his right ear.
- Hearing ringing noises in his right ear.
- Numbness on the right side of his face.
- The surrounding is rotating and tilting when he changes the position of his head.

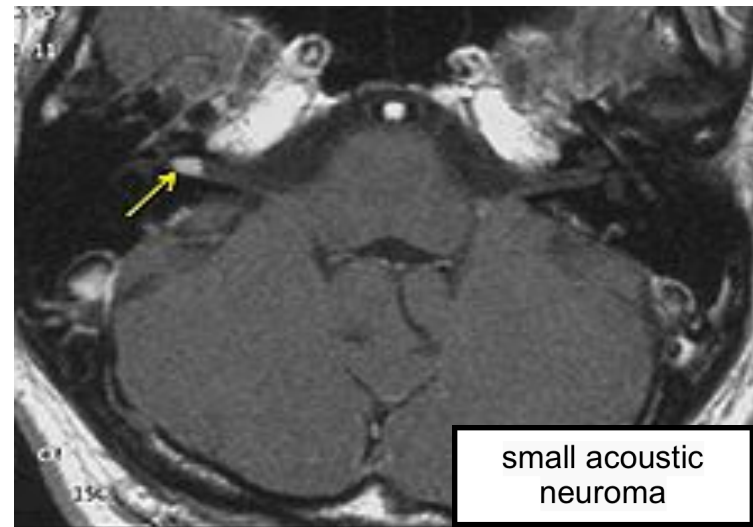
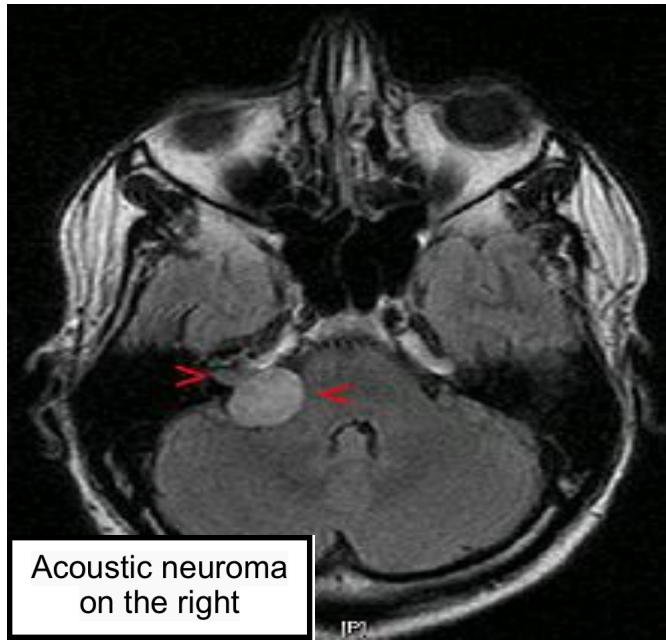


What's an Acoustic Neuroma?

- An acoustic neuroma is a **benign** tumor of the myelin-forming cells of the vestibulocochlear nerve (**8th cranial nerve**) that develops on the nerve that connects the ear to the brain. **A type of schwannoma**, this tumor arises from the Schwann cells responsible for the myelin sheath that helps keep peripheral nerves insulated.
- It comprises 5–10% of all intracranial neoplasms in adults. Incidence peaks in the fifth and sixth decades and both sexes are affected equally.
- The tumor **usually grows slowly**. As it grows, it presses against the hearing and balance nerves.



Acoustic Neuroma



- The earliest symptoms of acoustic neuromas include ipsilateral sensorineural hearing loss/deafness.
- **Large tumors** that compress the adjacent brainstem may affect other local cranial nerves. it may also compress the 5th, 7th, and less often, the 9th and 10th cranial nerves .
- It may lead to increased intracranial pressure, with its associated symptoms such as headache, vomiting, and altered consciousness.
- If it grows large enough, it can press against the brain, becoming life-threatening.
- Acoustic neuroma can be difficult to diagnose, because the symptoms are similar to those of middle ear problems. Ear exams, hearing tests, and scans can show if you have it.
- If the tumor stays small, you may only need to have it checked regularly. If you do need treatment, **surgery and radiation** are options.
- If the tumors **affect both hearing nerves**, it is often because of a genetic disorder called neurofibromatosis.

Notes:

- **Trigeminal neuromas** are the second most common form of schwannomas involving cranial nerves. Schwannomas of other cranial nerves are very rare.
- Acoustic neuromas may occur **idiopathically**, or in some cases occur as part of von Recklinghausen neurofibromatosis, in which case the neuroma may take on one of two forms:



Neurofibromatosis type I	Neurofibromatosis type II
A schwannoma may sporadically involve the 8th nerve, usually in adult life, but may involve any other cranial nerve or the spinal root. Bilateral acoustic neuromas are <u>rare</u> in this type.	A bilateral acoustic neuromas are the hallmark and typically present before the age of 21. These tumors tend to involve the entire extent of the nerve and show a strong <u>autosomal dominant inheritance</u> . Incidence is about 5 to 10%.

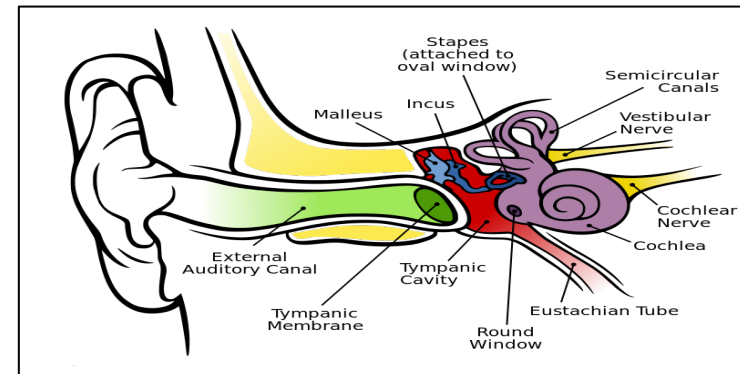


Von Recklinghausen's neurofibromatosis is also called **von Recklinghausen disease** or simply **neurofibromatosis (NF)**. It is an autosomal dominant hereditary disorder. NF is the most common neurological disorder caused by a **single gene**. Patients develop multiple soft tumors (neurofibromas) and very often skin spots. The tumors occur under the skin and throughout the nervous system.

What structures do we need for hearing?

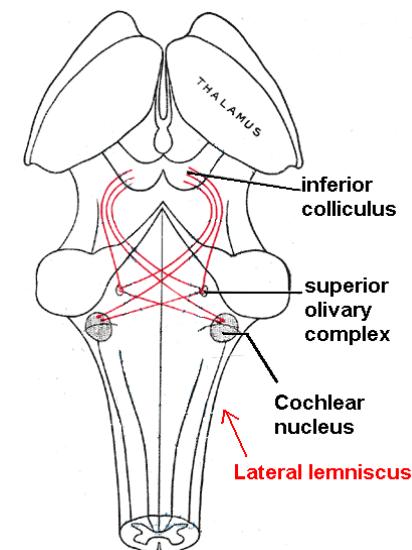
➔ Peripheral Auditory system:

- Outer ear, middle ear, inner ear.
- Organ of Corti.
- Hair cell.
- Neurons.



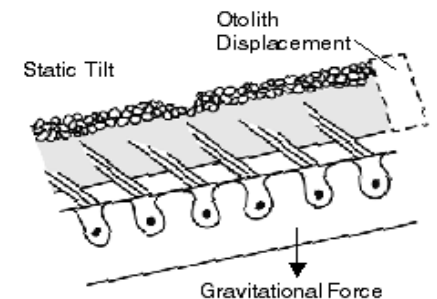
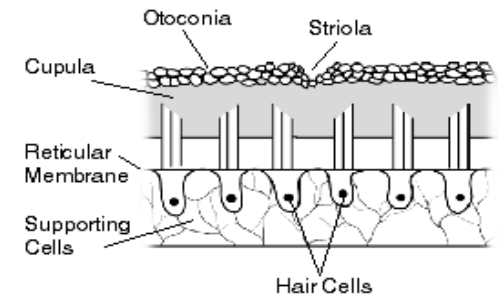
➔ Central Auditory system:

- Cochlear nucleus.
- Trapezoid body.
- Superior olivary complex.
- Lateral lemniscus.
- Inferior colliculi.
- Medial geniculate nucleus.
- Primary auditory cortex.



What structures do we need for balance?

- Equilibrioception is mainly sensed by the detection of acceleration, which occurs in the **vestibular system**. Other senses play roles as well, e.g. the **visual system** and **proprioception**. The importance of visual input for balance is illustrated by its being harder to stand on one foot with eyes closed than with eyes open.
- it is determined by the level of fluid properly called **endolymph** in the labyrinth.
- The sense of balance, usually, deteriorates in the process of **aging** of a person. However, it can be improved considerably with the help of special training.



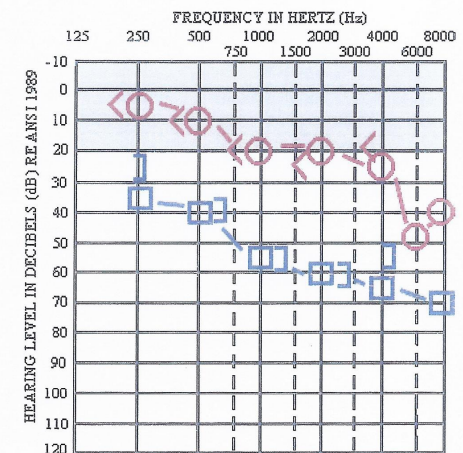
➔ On examination, the following was found:

- ★ *The 5th cranial nerve (trigeminal nerve)*: loss corneal reflex on the right side and loss of sensation on the skin over the right maxilla and forehead.
- ★ *The 7th cranial nerve (facial nerve)*: weakness on right side of the face.
- ★ *The 8th cranial nerve (vestibulocochlear)*: evidence of sensory neural hearing loss on the right ear.

➔ On investigation, the following was found:

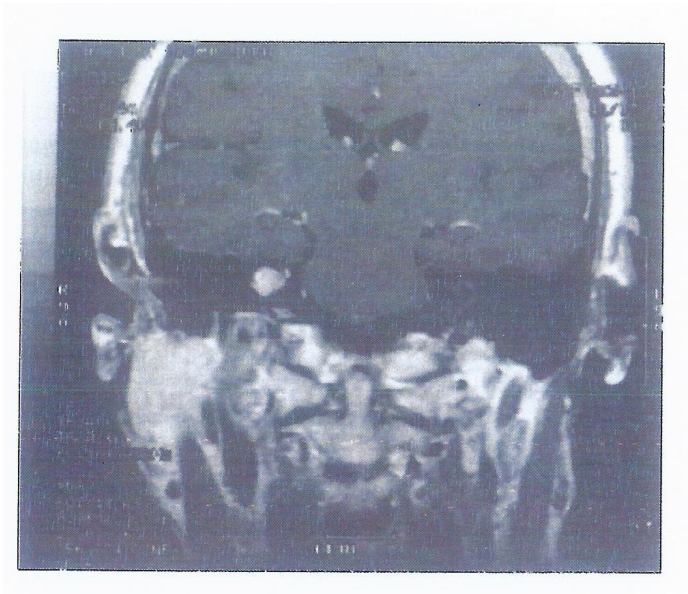
1. Audiometer: There is evidence of high frequency of sensory neural hearing loss (lower curve). Bone conduction is normal (upper curve) on the right ear. These changes are consistent with acoustic neuroma on the right side.

Audiometer (PTA) is the key hearing test used to identify hearing threshold levels of an individual, enabling determination of the degree, type and configuration of a hearing loss. Thus, providing the basis for diagnosis and management.



2. **MRI** (*Magnetic resonance imaging*): (with gadolinium) shows acoustic neuroma on the right side.

MRI is a medical imaging technique used in radiology to visualize internal structures of the body in detail. MRI makes use of the property of nuclear magnetic resonance (NMR) to image nuclei of atoms inside the body. MRI can create more detailed images of the human body than are possible with X-rays.



Management:

➤ **Stereotactic Radiation Therapy:**

Stereotactic radiation therapy is a type of external radiation therapy that uses special equipment to position the patient and precisely deliver radiation to a tumor. The total dose of radiation is divided into several smaller doses given over several days. Stereotactic radiation therapy is used to treat brain tumors and other brain disorders. It is also being studied in the treatment of other types of cancer, such as lung cancer. Also called stereotactic external-beam radiation therapy and stereotaxic radiation therapy. What differentiates Stereotactic from conventional radiotherapy is the precision with which it is delivered.

Impact of disease on patient, family and work:

Depression, anxiety, anger, hopelessness.

Good Luck

