

A spiral-bound notebook with a light beige, textured cover. The word "vertigo" is written in a red, serif font in the center of the cover. The spiral binding is visible on the left side.

vertigo

## • Describe Dizziness:

**vertigo** (illusion of rotational, linear, or tilting movement such as “spinning,” “whirling,” or “turning” of the patient or the surroundings),

**disequilibrium** (sensation of instability of body positions, walking, or standing described as “off-balance” or “imbalanced”),

**oscillopsia** (inability to focus on objects with motion, such as reading a sign while walking, seen with bilateral or central vestibular loss),

**lightheadedness** (sense of impending faint, presyncope),  
physiologic dizziness (motion sickness, height vertigo),

**multisensorydizziness** (diabetes, aging resulting in partial loss of multisensory systems)

# Central and Systemic Vertigo

- Multiple Sclerosis
- Other Neurological Disorders (stroke, seizures, middle cerebellar lesions, parkinsonism, pseudobulbar palsy)
- Metabolic Disorders (hypo/hyperthyroidism, diabetes)
- Medications and Intoxicants (psychotropic drugs, alcohol, analgesics, anesthetics, antihypertensives, anti-arrhythmics, chemotherapeutics)
- Vascular Causes (vertebrobasilar insufficiency, basilar migraine syndrome, vascular loop compression syndrome)

# Common Causes of Peripheral, Central, and Systemic Vertigo

## Peripheral Vertigo

- Benign Paroxysmal Positional Vertigo
- Ménière's Disease
- Vestibular Neuronitis
- Perilymphatic Fistulas
- Cerebellopontine Angle Tumors
- Otitis Media
- Traumatic Vestibular Dysfunction



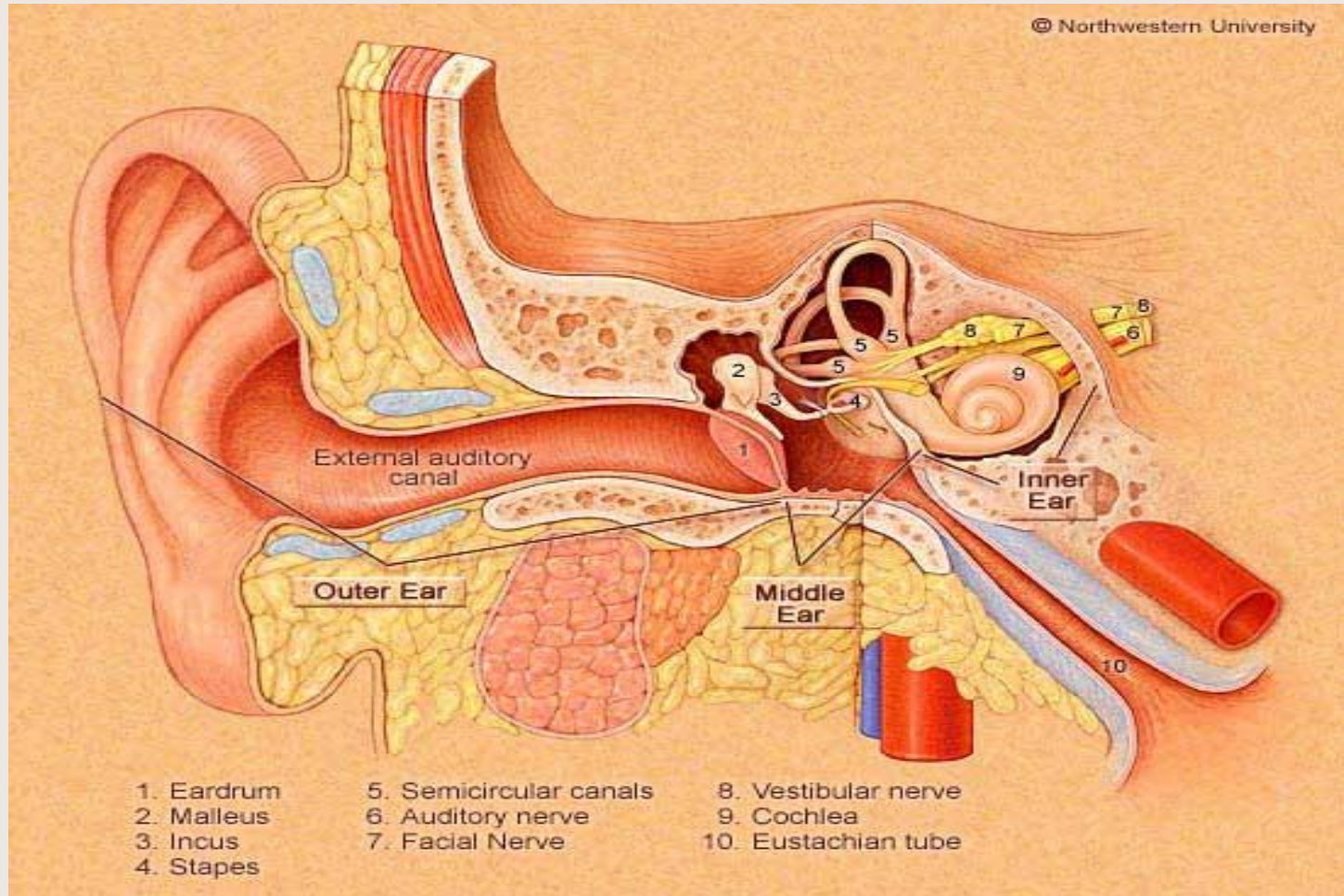
Dix Hallpike test for right side posterior canal BPPV. (A) First sitting position (inset shows debris near ampulla of posterior canal); (B) Second supine head hanging position (Inset shows debris moving away from the ampulla in the posterior canal)

# **Benign Positional Vertigo**

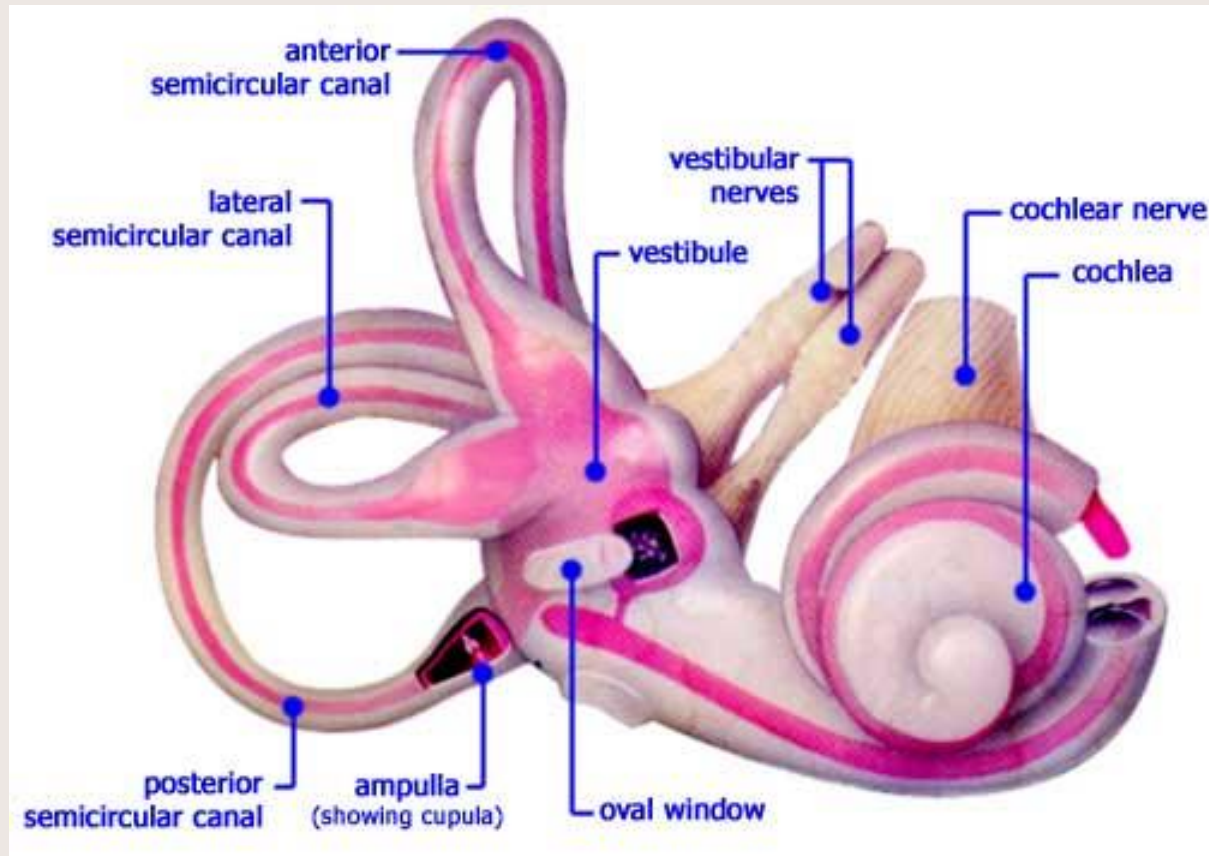
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# The Ear



# The Inner Ear





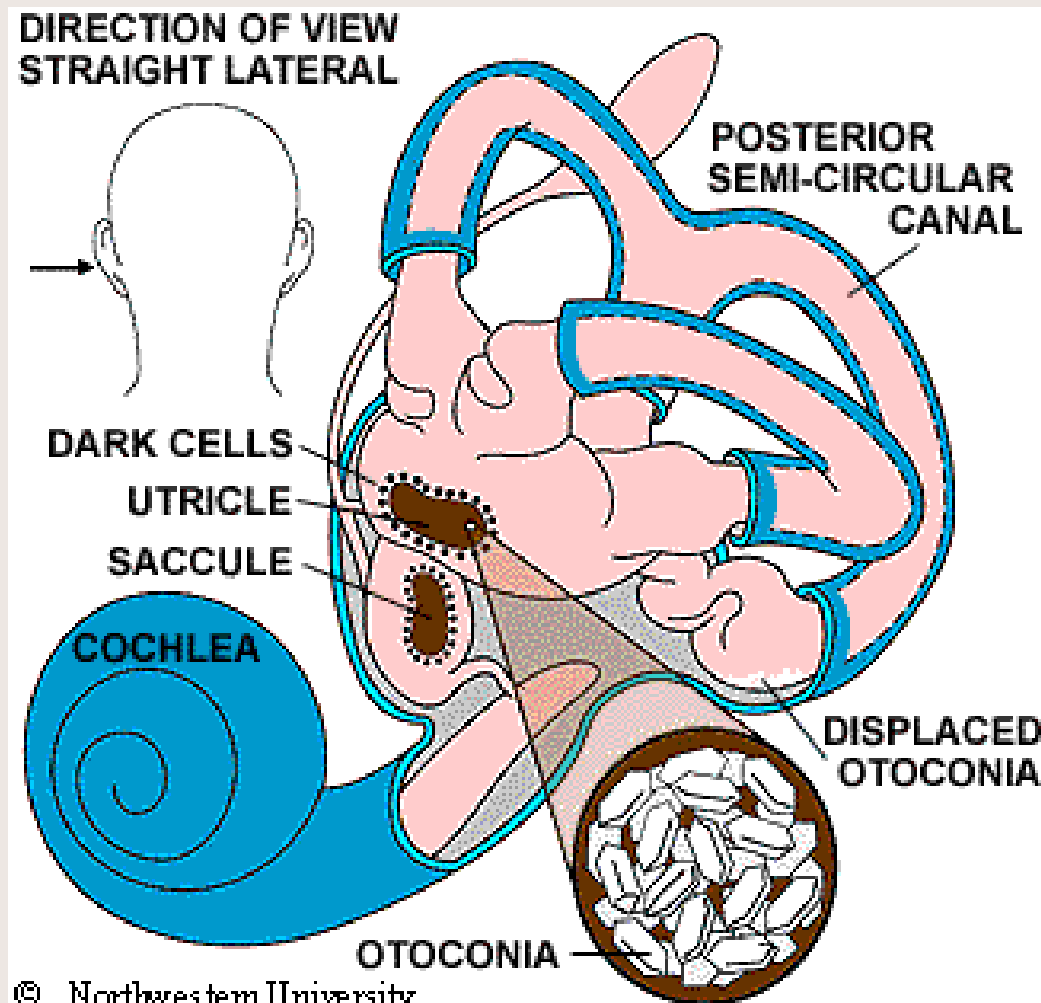
# Benign Paroxysmal Positional Vertigo (BPPV)

- Inner ear problem that results in short lasting, but severe, room-spinning vertigo.
- ***Benign***: not a very serious or progressive condition
- ***Paroxysmal***: sudden and unpredictable in onset
- ***Positional***: comes with a change in head position
- ***Vertigo***: causing a sense of dizziness.

# Canalolithiasis Theory

- The most widely accepted theory of the pathophysiology of BPV
- Otoliths (calcium carbonate particles) are normally attached to a membrane inside the utricle and saccule
- The utricle is connected to the semicircular ducts
- These otoliths may become displaced from the utricle to enter the posterior semicircular duct since this is the most dependent of the 3 ducts
- Changing head position relative to gravity causes the free otoliths to gravitate longitudinally through the canal.
- The concurrent flow of endolymph stimulates the hair cells of the affected semicircular canal, causing vertigo.

# Canalolithiasis Theory



# Causes

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- Idiopathic
- Infection (viral neuronitis)
- Head trauma
- Degeneration of the peripheral end organ
- Surgical damage to the labyrinth

# Symptoms

- Starts suddenly
- first noticed in bed, when waking from sleep.
- Any turn of the head bring on dizziness.
- Patients often describe the occurrence of vertigo with
  - tilting of the head,
  - looking up or down (top-shelf vertigo)
  - rolling over in bed.
- nausea and vomiting.
- There is no new hearing loss or tinnitus.

# Diagnosis

- **Lab Studies:**
  - No pathognomonic laboratory test for BPV exists. Laboratory tests may be ordered to rule out other pathology.
- **Imaging Studies:**
  - Head CT scan or MRI.
- **Procedures:**
  - The Dix-Hallpike test, along with the patient's history, aids in the diagnosis of BPV.

# The Dix-Hallpike test



Figure 1. To perform Dix-Hallpike testing, the examiner stands to the side of the patient, who sits upright with head turned to the examiner (left). The patient is positioned so that when the body is supine, the head will extend beyond the end of the table. The examiner holds the patient's head and moves the patient rapidly from the sitting to the head-hanging position, first with the head turned to one side (right) and then to the other. Once in the head-hanging position, patients with benign positional vertigo will show a burst of nystagmus after a delay of five to 10 seconds.

# Treatment

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- Medications
- The Canalith Repositioning Procedure (CRP)
- Surgery



# Medications

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- Antiemetic
- Antihistaminic
- Anticholinergic

# Canalith Repositioning Procedure ( CRP )

- The treatment of choice for BPPV.
- Also known as the Epley maneuver,
- The patient is positioned in a series of steps so as to slowly move the otoconia particles from the posterior semicircular canal back into the utricle.
- Takes approximately 5 minutes.
- The patient is instructed to wear a neck brace for 24 hours and to not bend down or lay flat for 24 hours after the procedure.
- One week after the CRP, the Dix-Hallpike test is repeated.
- If the patient does experience vertigo and nystagmus, then the CRP is repeated with a vibrator placed on the skull in order to better dislodge the otoconia.

# The Epley Maneuver

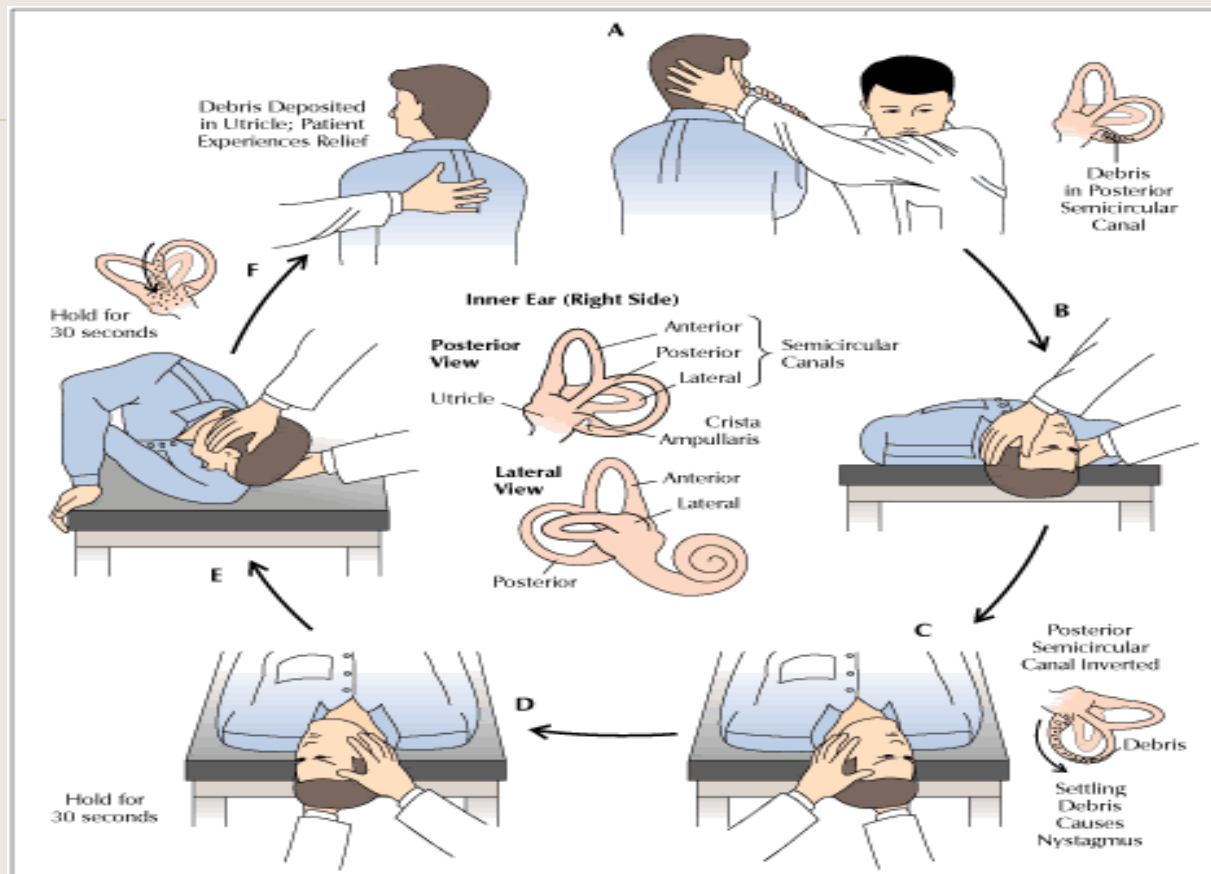


Figure 2. In the modified Epley maneuver, the patient's head is systematically rotated so that the loose particles slide out of the posterior semicircular canal and back into the utricle. The first step in the maneuver is the Dix-Hallpike test. If the vertigo affects the right ear, the patient is brought to the head-hanging position with the right ear turned downward (A-C). The physician then moves to the end of the table and rotates the patient's head to the left, with the right ear turned upward (D). The head is held in that position for 30 seconds. The patient then rolls onto the left side (E). Meanwhile, the examiner rotates the patient's head leftward until the nose points toward the floor. That position is also held for 30 seconds. Finally, the patient is lifted into the sitting position with the head facing left (F).

# Surgery

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- Singular neurectomy
- Vestibular Nerve Section
- Posterior Canal Plugging Procedure

# Singular neurectomy

- Old procedure
- Section the nerve that transmits information from the posterior semicircular canal ampulla toward the brain.
- Can cause hearing loss in 7-17% of patients and fails in 8-12%.

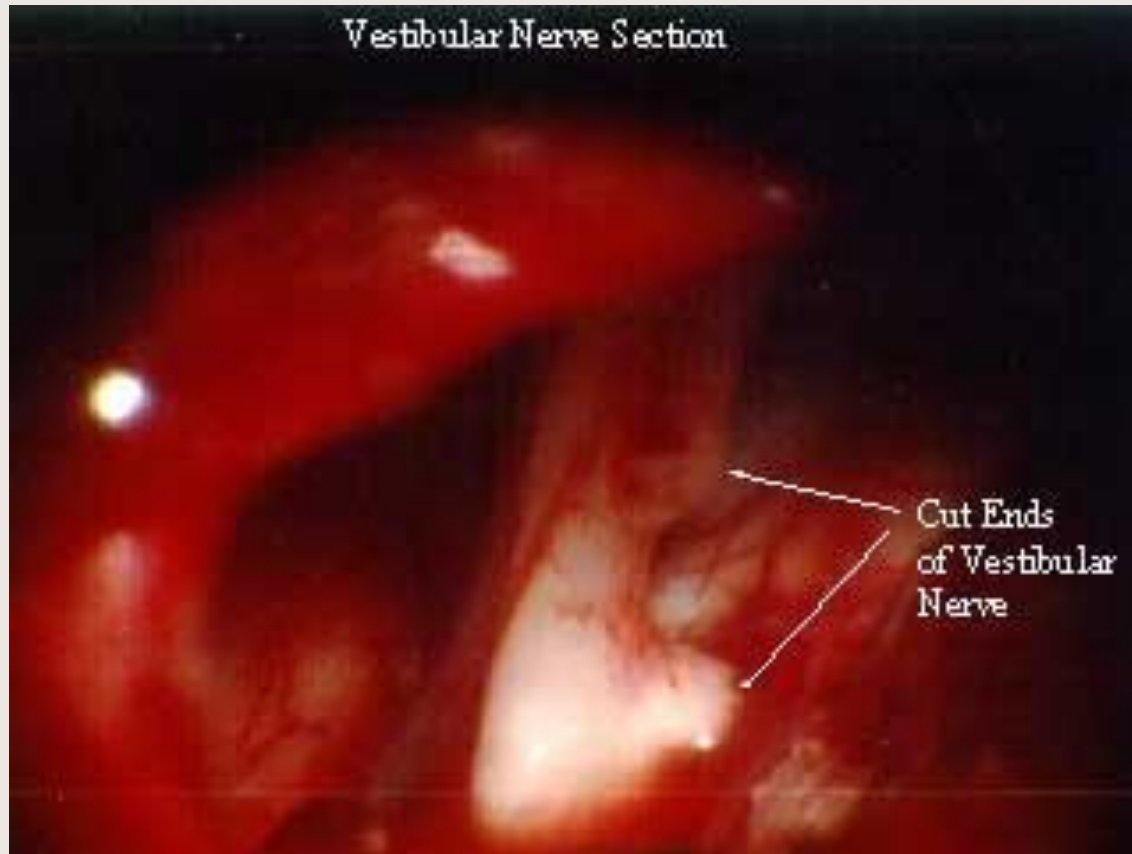
# Posterior Canal Plugging Procedure

- Recently developed procedure
- Replaced the singular neurectomy.
- A mastoidectomy is performed through an incision made behind the ear.
- The balance center is then uncovered and
- The posterior semicircular canal is opened, exposing the delicate membranous channel in which the crystalline debris is floating.
- The canal is then gently, but firmly packed off with tissue so the debris can no longer move within the canal and strike against the nerve endings.
- The canal is then sealed and the incision closed.
- One-night hospital stay is advised.
- The patient returns in one week for suture removal.
- less than 20% hearing loss.

# Vestibular Nerve Section

- done when the attacks of vertigo cannot be controlled with medication.
- An incision is made behind the ear and balance-hearing nerve is located.
- The balance part of the nerve is cut.
- The operation is done with a neurosurgeon and takes two hours.
- The success rate (no vertigo attacks) is over 90%.
- The hearing is usually not affected.

# Vestibular Nerve Section





# TINNITUS

Tinnitus is ringing sound or noise in the ear. The characteristic feature is that the origin of this sound is within the patient. Usually, it is unilateral but may also affect both ears. It may vary in pitch and loudness and has been variously described by the patient as roaring, hissing, swishing, rustling or clicking type of noise. Tinnitus is more in quiet surroundings, particularly at night, when the masking effect of ambient noise from the environment is lost.

# Types of Tinnitus

Two types of tinnitus are described:

(a) Subjective, which can only be heard by the patient.

(b) Objective, which can even be heard by the examiner with the use of a stethoscope

## Causes of Tinnitus :

**Subjective tinnitus** may have its origin in the external ear, middle ear, inner ear, VIIIth nerve or the central nervous system. Systemic disorders like anaemia, arteriosclerosis, hypertension and certain drugs may act through the inner ear or central auditory pathways. In the presence of conductive deafness, the patient may hear abnormal noises in the head during eating, speaking or even respiration.

**Objective tinnitus** is seen less frequent. Vascular lesions, e.g. glomus tumour or carotid artery aneurysm cause swishing tinnitus synchronous with pulse. It can be temporarily abolished by pressure on the common carotid artery. Venous hum can sometimes be stopped by pressure on the neck veins

Tinnitus synchronous with respiration may occur due to abnormally patent eustachian tube. Palatal myoclonus produces clicking sound due to clonic contraction of the muscles of soft palate and can be easily diagnosed. Clonic contraction of muscles of middle ear (stapedius and tensor tympani) may cause tinnitus which is often difficult to diagnose.

Sometimes, **tinnitus is psychogenic** and no cause can be found in the ear or central nervous system.

Tinnitus should be differentiated from auditory hallucinations in which a person hears voices or other organised sounds like that of music. It is seen in psychiatric disorders.

# Causes of tinnitus

## I. Otologic

### A Subjective

- Impacted wax
- Fluid in the middle ear
- Acute and chronic otitis media
- Abnormally potent eustachian tube
- Meniere's disease
- Otosclerosis
- Presbycusis
- Noise trauma
- Ototoxic drugs
- Tumours of Viliith nerve

### B. Objective

- Vascular tumours of middle ear (glomus tumour)
- Aneurysm of carotid artery
- Palatal myoclonus

## II. Non-otologic

- Diseases of CNS
- Anaemia
- Arteriosclerosis
- Hypertension
- Hypotension
- Hypoglycaemia
- Epilepsy
- Migraine

## III. Psychogenic

## Treatment

Tinnitus is a symptom and not a disease. Where possible, management of tinnitus includes.:

**1. Reassurance and psychotherapy.** Many times the patient has to learn to live with tinnitus.

**2. Techniques of relaxation and biofeedback.**

**3. Sedation and tranquilizers.** They may be needed in initial stages till patient has adjusted to the symptom.

Masking of tinnitus. Tinnitus is more annoying at bed time when the surroundings are quite. Use of a loudly clicking clock or a similar device may mask the tinnitus and help the patient to go to sleep.

Use of a hearing aid, in persons with hearing loss, not only improves hearing but also provides a masking effect. Tinnitus maskers can be used in patients who have no hearing loss.