



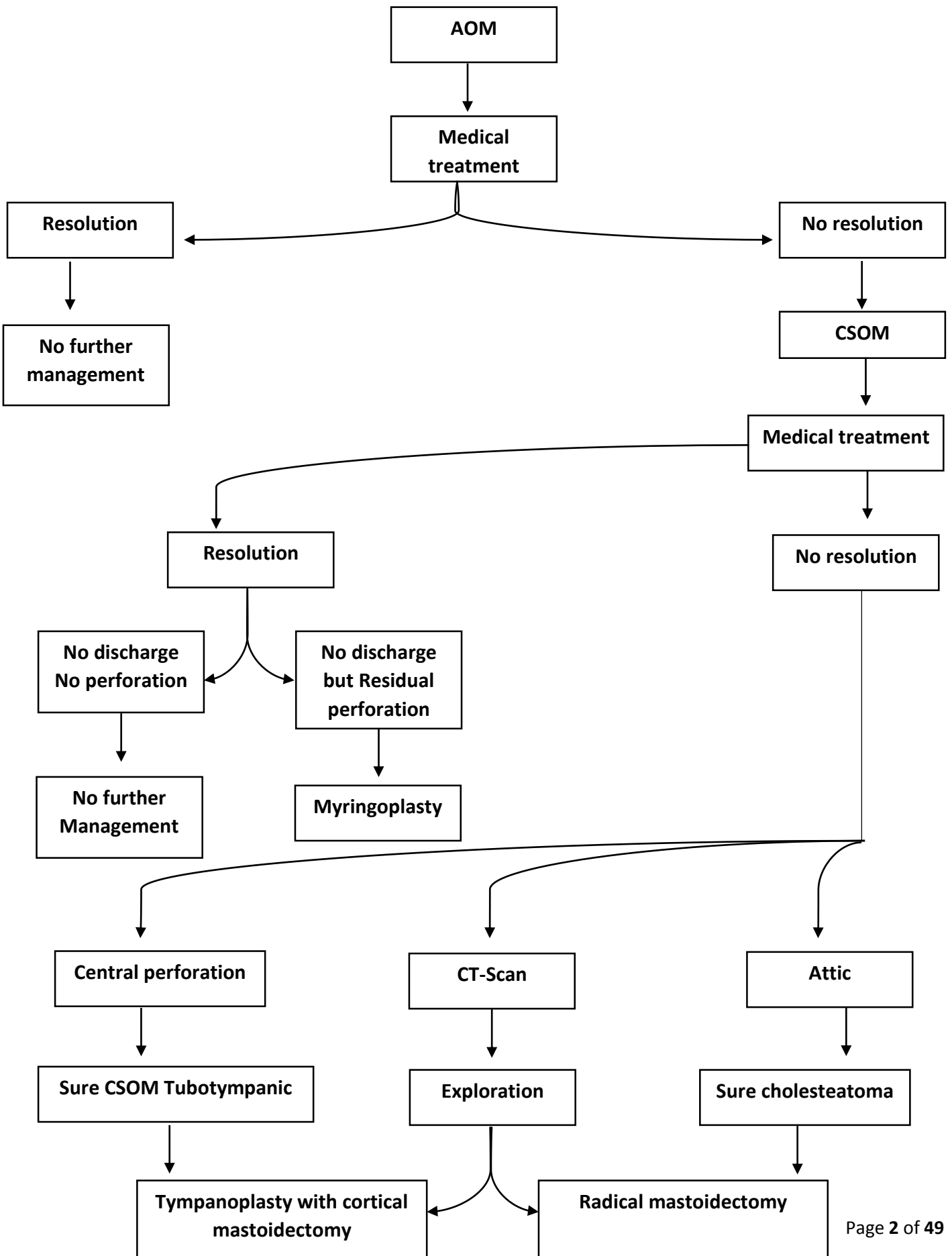
OTOLOGY

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Algorithm of Otitis Media



Barotraumatic otitis media or Aerotitis media

Definition:

It is non infective inflammatory condition of middle ear cleft produced when the air pressure within the middle ear is markedly less than that of surrounding atmosphere.

Causes:

- ⇒ Rapid descent in an aircraft
- ⇒ Rapid descent while underwater diving
- ⇒ Rapid descent in pressure chamber

Clinical features:

History:

- Pain in Ear
- Deafness
- Tinnitus
- Vertigo

Investigation:

PTA → conductive hearing loss

• Examination:

- Rinne is negative
- Weber is lateralized to the diseased ear
- Conductive hearing loss

❖ On otosonic examination:

- Drum is in drawn
- Pink in color
- There may be a fluid level
- If hemotympanum has occurred then it would be dusky blue in color

Treatment:

• Preventive

- Avoid travelling in non-pressurized aircrafts especially when one is suffering from upper respiratory tract infection
- Avoid sleeping during descent as Eustachian tube will not open by swallowing during sleep
- Vasoconstrictor drops, anti-inflammatory and anti-histaminic should use ½ hour before descent in persons with previous history of this episode
- Sweets and chewing gum should be used to encourage swallowing
- Auto inflation by Valsalva maneuver should be performed as the atmospheric pressure rises

• Curative

- URTI + Nasal congestion should be managed with vasoconstrictors nasal drops, systemic antibiotics and anti-inflammatory medicines
- Ask the patient to carry out Valsalva maneuver
- If fluid is present Myringotomy may be necessary and occasionally in resistant cases grommet insertion maybe required until the middle ear mucosa has returned to normal

Cholesteatoma

Definition:

Bad skin at a wrong place i.e. middle ear cleft or it is epidermal structure exhibiting independent growth, replacing middle ear mucosa, resorbing underlying bone and tendency to recur after removal

Classification:

- ❖ Congenital
- ❖ Acquired
 - Primary
 - Secondary
 - Tertiary

Congenital cholesteatoma:

It is the result of persistence of small nidus of epidermoid ectoderm which is normally resorbed. It manifest itself as an attic pearl behind an intact tympanic membrane.

Acquired Cholesteatoma:

- **Primary acquired** is associated with defect in pars flaccida
- **Secondary acquired** is associated with defect in pars tensa marginal perforation
- **Tertiary acquired** is associated with implantation of skin in middle ear cleft behind an intact tympanic membrane

Etiology: It is not known but there are different theories:

- ⇒ Theory of metaplasia
- ⇒ In growth of squamous epithelium (from external auditory meatus to middle ear perforation)
- ⇒ Persistence of congenital cell rest
- ⇒ Retraction pocket theory

Retraction pocket theory: It is most widely acceptable theory when Eustachian tube is blocked tympanic membrane is retracted in posterior superior segment and a retraction Pocket is formed in Attic region which is initially self-cleaning as dead epithelium and keratin readily passes into the meatus. If the retraction pocket becomes more marked, a sac is formed with the narrow neck. The epithelium eventually loses its capacity to migrate out of the pocket and is entrapped this from the **Cholesteatoma**.

Pathology:

- ⇒ **Macroscopic appearance:**
 - ↳ It is rounded
 - ↳ Pearly white cheesy mass of variable size
 - ↳ Surrounded by friable granulation tissue or polyp formation
- ⇒ **Microscopic appearance:**
 - ↳ Centre is having keratin squamous
 - ↳ Surrounded by a stratified squamous keratinized epithelium
 - ↳ Outer most layer of granulation tissue
 - ↳ Destruction of bone is by the release of lysosomes by granulation tissue which surrounds **Cholesteatoma**.

Clinical features:**Symptoms:** (same as Attic antral chronic suppurative otitis media)

- ↳ Purulent
- ↳ Bloodstained
- ↳ Foul smelly discharge
- ↳ Moderate to severe hearing loss.

Signs: There will be

- i) Attic posterior margined perforation
- ii) One may find Attic crust beyond which cholesteatoma may be visible
- iii) in some patients one may find granulation tissue or polyp

Investigations:

- i) Examination on under microscope (most important)
- ii) Pure tone audiometry
- iii) X-ray mastoid lateral view
- iv) CT scan/MRI (when there is suspicion of intracranial complications)

Treatment: No role of medical treatment

Mainstay of treatment is surgical excision (Mastoidectomy)

Regular suction clearance may control early disease

Chronic suppurative otitis media/Purulent otitis media/Chronic otitis media/Chronic middle ear disease

Definition: It is long standing infection or inflammation of a part of whole of the middle ear cleft, which is characterized by painless ear discharge and non-healing perforation

Classification:

⇒ **Old classification:**

- i) Tubotympanic or Safe disease
- ii) Tympanomastoid (Attico-antral) or unsafe disease

⇒ **New classification:**

- i) Chronic otitis media with cholesteatoma
- ii) Chronic otitis media without cholesteatoma

Incidence:

It is more prevalent in children

Predisposing factors:

- Focus of infection in upper airway
- Abnormal or horizontal Eustachian tube
- Allergy
- Autoimmune disease
- Previous otitis media
- Environmental factors such as poor socioeconomic class, overcrowding, poor diet and poor general health

Attico-antral or Unsafe CSOM or Tympanomastoid otitis media:

Definition:

This is the infection of the posterior superior part of the middle ear cleft i.e. atticoantral, Posterior tympanum and mastoid process & is linked with cholesteatoma its bone eroding properties cause risk of serious complications for this reason also known as Unsafe or Dangerous CSOM

Pathology:

The bony involvement may give rise to granulation or polyps. Polyp is red and fleshy. There are basic pathological process in tympano mastoid:

- 1) Perforation of pars flaccida of tympanic membrane
- 2) Cholesteatoma
- 3) Osteitis and granulation tissue
- 4) Ossicular necrosis (Common)
- 5) Cholesterol granuloma

Bacteriology: Both aerobes and anaerobes are seen

Clinical features:

- **Symptoms:**

- Scanty and purulent discharge from the ear
- Foul smell
- Blood stained
- Hearing loss

- **Signs:**

- Discharge in external auditory meatus
- Retraction pocket
- Polyp or granulation
- Perforation is of dangerous type i.e. attic or marginal
- Cholesteatoma

- **Investigations:**

- Pure tone audiometry
- Examination under microscope
- X-ray mastoid
- Pus for culture and sensitivity
- CT scan temporal bone
- Tuning fork test show conductive or mixed hearing loss

- **Treatment:**

- **Surgical treatment:**

- Radical mastoidectomy
- Modified radical mastoidectomy

- **Reconstructive surgery:**

- ↳ Tympanoplasty

- **Conservative treatment:**

- ↳ Repeated suction clearance and periodic evaluation

Comparison of Canal up and Canal down procedures

	Canal wall up procedure	Canal wall down procedure
Meatus	Normal appearance	Widely open meatus
Dependence	Does not require routine cleaning	Dependence on doctor for cleaning mastoid activity
Recurrence	High rate	Low rate
2nd look surgery	Required 2 nd look surgery after 6 months	Not required
Patients limitations	No limitations	Swimming is not allowed
Auditory rehabilitation	Easy to wear a hearing aid if needed	Problem in fitting a hearing aid

Tubotympanic CSOM:

It is much more common than Attic control type of COSM it usually starts in childhood it is called Tubotympanic because in many cases the persisting or recurring infection spreads via the Eustachian tube to the tympanic cavity. It really gives rise to serious complications

Pathology:

There are basic pathological process in tympano mastoid:

- 1) Perforation of pars flaccida of tympanic membrane
 - Central perforation
 - Marginal perforation
- 2) Middle ear mucosa
- 3) Polyp
- 4) Ossicular chain
- 5) Tympanosclerosis
- 6) Fibrosis and adhesions

Bacteriology: both aerobes anaerobes

Clinical features:

Symptoms:

- ⇒ Mucopurulent discharge from ear
- ⇒ Hearing loss: Conductive type; severity varies but rarely exceeds 50 dB.

Sign:

- ⇒ Mucopurulent discharge may be seen in the external auditory meatus
- ⇒ Perforation is seen
- ⇒ Middle ear mucosa: normally, it is Pale color; when inflamed it looks red and swollen.

Investigations:

- ⇒ Pure tone audiometry
- ⇒ Examination under microscope
- ⇒ Audiogram
- ⇒ Puss for culture sensitivity
- ⇒ X-ray PNS at 45 degree
- ⇒ X-ray mastoid (usually mastoids are cellular but if there has been a prolonged infection they may be sclerotic but there will be no evidence of bone destruction)

Treatment:

I. Elimination of upper respiratory tract infection:

- ⇒ Tonsillectomy
- ⇒ Adenoidectomy
- ⇒ Treatment of Sinusitis

II. Obtained a dry ear:

- ⇒ Frequent aural toilet
- ⇒ Application of topical antibiotics
- ⇒ Broads spectrum antibiotics
- ⇒ Prevent water entry into the ear canal during bathing or swimming

III. Surgical:

- ⇒ If medical treatment fails to dry the ear, cortical mastoidectomy may be done

IV. Minimize the disability of hearing loss:

- ⇒ Advise the patient hearing aid with or without ossicular reconstruction

Complications of CSOM

Routes of spread of infections:

1. Direct spread
2. Thrombophlebitis → Most common cause spread of infection in acute infections
3. Preformed pathways
 - Congenital dehiscence
 - Patent suture
 - Skull Fractures
 - Surgical defects
 - Oval and round windows

Classification of complications:

- 1) Extracranial/intratemporal
- 2) Intracranial

Extracranial/intratemporal Complications (FMPL)

Classification of Extracranial/intratemporal Complications:

- ⇒ Facial nerve paralysis
- ⇒ Mastoiditis
- ⇒ Petrositis
- ⇒ Labyrinthitis

1. Facial nerve paralysis:

Occur as a complication of both acute and chronic otitis media

Acute otitis media:

- ⇒ When the bony canal dehiscent the inflammation of middle ear spread and cause damage to nerve which leads to facial paralysis
- ⇒ Treatment:
 - **Medical:** Systemic antibiotics for acute otitis media
 - **Surgical:** Myringotomy

Chronic otitis media:

- ⇒ Cause by cholesteatoma or penetrating granulation tissue. Cholesteatoma destroy the bony canal and cause pressure on nerve
- ⇒ Facial paralysis slowly progressive
- ⇒ Treatment:
 - Urgent exploration of middle ear
 - Granulation tissue is removed if it don't invades the nerve sheath
 - If nerve is damage by granulation tissue then firstly to control the infection then grafting of nerve is done

2. Mastoiditis:

When infection spread from the mucosa, lining the mastoid air cells, to involve bony walls of the mastoid air cell system.

Classification:

i) Acute mastoiditis:

- Etiology:
 - ⇒ Due to the acute suppurative otitis media, the determining factors being high virulence of organisms or lowered resistance of the patient.
 - ⇒ Children are more effected
 - ⇒ Beta hemolytic streptococcus is the most common causative organism
- Pathology
 - ⇒ Production of pus under tension
 - ⇒ Hyperemic decalcification and osteolytic Resorption of bony walls
- Clinical features:

Symptoms:

 - ⇒ Pain behind ear
 - ⇒ Fever
 - ⇒ Ear discharge

Signs:

⇒ Mastoid tenderness	⇒ Perforation of tympanic membrane
⇒ Ear discharge	⇒ Swelling over the mastoid
⇒ Sagging of posterior superior meatal wall	⇒ Hearing loss
- Investigations
 - ⇒ Blood counts
 - ⇒ Erythrocyte sedimentation rate
 - ⇒ X-ray mastoid
 - ⇒ Ear swab
- Treatment:
 - ⇒ Hospitalization of the patient
 - ⇒ Antibiotics
 - ⇒ Myringotomy
 - ⇒ Cortical mastoidectomy

ii) Masked mastoiditis:

- Etiology:
 - ⇒ Due to inadequate antibiotic therapy
 - ⇒ Mostly due to oral penicillin given in cases of acute otitis media when acute symptoms subside but infection continues in mastoid
- Clinical features:
 - ⇒ Often in child
 - ⇒ Pain behind the ear
 - ⇒ Persistent hearing loss
 - ⇒ Tympanic membrane appears thick
- Treatment:
 - ⇒ Cortical mastoidectomy
 - ⇒ Full doses of antibiotics

3. Petrositis:

Spread of infection from middle ear and mastoid to the petrous part of temporal bone is Petrositis

- **Pathology:**
Infective process runs along the posteriosuperior and anterioinferior tract and reaches the petrous apex, forming epidural abscess damages the 6th Cranial Nerve and trigeminal ganglion
- **Clinical features:**
 - ⇒ Gradenigo's syndrome
 - ↗ External rectus palsy
 - ↗ Deep-seated palsy or retro orbital
 - ↗ Persistent ear discharge
 - ⇒ Fever
 - ⇒ Headache
 - ⇒ Vomiting
 - ⇒ Neck rigidity
 - ⇒ Vertigo
- **Diagnosis:**
 - ⇒ CT-scan
 - ⇒ MRI
- **Treatment:**
 - ⇒ Cortical mastoidectomy
 - ⇒ Radical mastoidectomy
 - ⇒ Modified radical mastoidectomy
 - ⇒ Antibacterial therapy of high doses

4. Labyrinthitis:

There are three types of labyrinthitis:

i. **Circumscribed labyrinthitis (FISTULA OF LABYRINTH)**

There is thinning or erosion of bone capsule of labyrinth usually of the horizontal semicircular canal.

Etiology: The causes are:

- ↗ Chronic suppurative otitis media with cholesteatoma is the most common cause.
- ↗ Neoplasms of middle ear, e.g. carcinoma
- ↗ Surgical or accidental trauma to labyrinth

Clinical features:

- ⇒ Sensitive to pressure changes.
- ⇒ Vertigo

Investigation:

It is diagnosed by "fistula test" which can be performed in two ways.

- ⇒ Pressure on tragus: Sudden inward pressure is applied on the tragus. It stimulates the labyrinth, Patient will complain of vertigo.
- ⇒ Siegel's speculum: When positive pressure is applied to ear canal, patient complains of vertigo

Treatment:

- ⇒ Mastoid exploration is often required to eliminate the cause
- ⇒ Systemic antibiotic therapy

ii. Diffuse serous labyrinthitis

It is diffuse intralabyrinthine inflammation without pus formation and is a reversible condition if treated early.

Etiology

- ⇒ Most often it arises from pre-existing circumscribed to pre-existing circumscribed labyrinthitis
- ⇒ In acute infections of middle ear cleft
- ⇒ It can follow Stapedectomy or fenestration operation

Clinical features:

- ⇒ Nausea
- ⇒ Vertigo
- ⇒ Vomiting
- ⇒ Sensorineural hearing loss

Treatment:

- ⇒ Medical
 - ↪ Patient is put to bed, his head immobilized with affected ear above.
 - ↪ Antibacterial therapy is given in full doses to control infection.
 - ↪ Labyrinthine sedatives, e.g. Prochlorperazine (Stemetil)
 - ↪ Myringotomy is done if labyrinthitis has followed acute otitis media
- ⇒ Surgical
 - ↪ Cortical mastoidectomy (in acute mastoiditis)
 - ↪ Modified radical mastoidectomy (in chronic middle ear infection or cholesteatoma)

iii. Diffuse suppurative labyrinthitis

This is diffuse pyogenic infection of the labyrinth with permanent loss of vestibular and cochlear functions.

Etiology: It usually follows serous labyrinthitis, pyogenic organisms entering through a pathological or surgical fistula.

Clinical features:

- ⇒ Severe vertigo
- ⇒ Nausea
- ⇒ Vomiting
- ⇒ Nystagmus
- ⇒ Total loss of hearing

Treatment: It is same as for serous labyrinthitis

- ⇒ Medical
 - ↪ Patient is put to bed, his head immobilized with affected ear above.
 - ↪ Antibacterial therapy is given in full doses to control infection.
 - ↪ Labyrinthine sedatives, e.g. Prochlorperazine (Stemetil)
 - ↪ Myringotomy is done if labyrinthitis has followed acute otitis media
- ⇒ Surgical
 - ↪ Cortical mastoidectomy (in acute mastoiditis)
 - ↪ Modified radical mastoidectomy (in chronic middle ear infection or cholesteatoma)

Intracranial Complications (MOBiLES)

Classification of Intracranial Complications:

- ↳ Meningitis
- ↳ Otitic hydrocephalus
- ↳ Brain abscess
- ↳ Lateral sinus thrombophlebitis
- ↳ Extradural abscess
- ↳ Subdural abscess

1. MENINGITIS

It is inflammation of leptomeninges (pia and arachnoid) usually with bacterial invasion of CSF in subarachnoid space. It is the most common intracranial complication of otitis media

Mode of Infection:

Blood-borne infection is common in infants and children

CLINICAL FEATURES

⇒ **Symptoms:**

- ↳ There is rise in temperature (102-104 F) often with chills and rigors.
- ↳ Headache
- ↳ Neck rigidity
- ↳ Photophobia and mental irritability.
- ↳ Nausea
- ↳ Vomiting
- ↳ Drowsiness
- ↳ Cranial nerve palsies and hemiplegia.

⇒ **Signs:**

- ↳ Neck rigidity
- ↳ Positive Kernig's sign
- ↳ Positive Brudzinski's sign
- ↳ Tendon reflexes are exaggerated
- ↳ Papilloedema

DIAGNOSIS:

- ⇒ CT
- ⇒ MRI
- ⇒ Lumbar puncture
- ⇒ CSF examination

Treatment:

- ⇒ Medical:
 - ↳ Antimicrobial therapy
 - ↳ Corticosteroids combined with antibiotic therapy
- ⇒ Surgical:
 - ↳ Myringotomy
 - ↳ Cortical mastoidectomy

2. OTITIC HYDROCEPHALUS

It is characterized by raised intracranial pressure with normal CSF findings. It is seen in children and adolescents with acute or chronic middle ear infections.

Pathogenesis: Both these factors result in raised intracranial tension.

- ⇒ Lateral sinus thrombosis & middle ear infection causes obstruction to venous return
- ⇒ Obstruction of arachnoid villi to absorb CSF.

CLINICAL FEATURES

⇒ Symptoms

- ↗ Severe headache
- ↗ Nausea
- ↗ Vomiting.
- ↗ Diplopia due to paralysis of 6th cranial nerve.
- ↗ Blurring of vision due to papilloedema or optic atrophy.

⇒ Signs

- ↳ Papilloedema may be 5-6 diopters
- ↳ Nystagmus
- ↳ Lumbar puncture
- ↳ CSF pressure exceeds 300 mm H₂O (normal 70-120 mm H₂O)

Treatment:

⇒ Medical

- ↗ Acetazolamide
- ↗ Corticosteroids
- ↗ Repeated lumbar puncture
- ↗ Middle ear infection may require antibiotic therapy

3. OTOGENIC BRAIN ABSCESS

(Cause by both aerobes and anaerobes)

PATHOLOGY:

Brain abscess develops through four stages.

- ⇒ Stage of invasion (initial encephalitis)
- ⇒ Stage of localization (latent abscess)
- ⇒ Stage of enlargement (manifest abscess)
- ⇒ Stage of termination (rupture of abscess)

CLINICAL FEATURES

Clinical features can be divided into:

⇒ **Those due to raised intracranial tension**

- ↳ Headache
- ↳ Nausea
- ↳ Vomiting
- ↳ Level of consciousness: Lethargy which progresses to drowsiness, confusion, stupor and finally coma.
- ↳ Papilloedema
- ↳ Slow pulse and subnormal temperature.

⇒ **Those due to area of brain affected. They are the localizing features.**

➤ **Temporal lobe abscess:**

- ↳ Nominal aphasia
- ↳ Homonymous hemianopia
- ↳ Contralateral motor paralysis
- ↳ Epileptic fits
- ↳ Pupillary changes and oculomotor palsy

➤ **Cerebellar abscess:**

- ↳ Headache
- ↳ Spontaneous nystagmus is common
- ↳ Ipsilateral hypotonia
- ↳ Ipsilateral ataxia
- ↳ Past-pointing and intention tremor can be elicited by finger nose test.
- ↳ Dysdiadochokinesia

INVESTIGATIONS:

- ⇒ Skull X-rays
- ⇒ CT scan is the single most important means of investigation
- ⇒ X-ray mastoids or CT scan of the temporal bone for evaluation of associated ear disease.
- ⇒ Lumbar puncture

TREATMENT

⇒ **Medical:**

- ↳ High doses of antibiotics
- ↳ Raised intracranial tension can be lowered by dexamethasone
- ↳ Discharge from the ear should be treated by suction & use of topical ear drops.

⇒ **Neurosurgical:** Abscess is approached through a sterile field. Options include:

- ↳ Repeated aspiration through a burr hole
- ↳ Excision of abscess
- ↳ Open incision of the abscess and evacuation of pus

4. LATERAL SINUS THROMBOPHLEBITIS (SYN. SIGMOID SINUS THROMBOSIS)

It is an inflammation of inner wall of lateral venous sinus with formation of an intrasinus thrombus.

ETIOLOGY:

It occurs as a complication of acute coalescent mastoiditis, masked mastoiditis or chronic suppuration of middle ear and cholesteatoma

PATHOLOGY: The pathological process can be divided into the following stages:

- ⇒ Formation of perisinus abscess
- ⇒ Endophlebitis and mural thrombus formation
- ⇒ Obliteration of sinus lumen and intramural abscess
- ⇒ Extension of thrombus:

CLINICAL FEATURES

- ⇒ Hectic Picket-fence type of fever with rigors
- ⇒ Headache
- ⇒ Progressive anemia and emaciation.
- ⇒ Griesinger's sign
- ⇒ Papilloedema
- ⇒ Tobey-Ayer test
- ⇒ Crowe-Beck test
- ⇒ Tenderness along jugular vein

INVESTIGATIONS

- ⇒ Blood smear is done to rule out malaria.
- ⇒ Blood culture is done to find causative organisms
- ⇒ CSF examination
- ⇒ X-ray mastoids
- ⇒ Contrast-enhanced CT scan
- ⇒ MRI
- ⇒ Culture and sensitivity of ear swab.

TREATMENT

- ⇒ Intravenous antibacterial therapy
- ⇒ Mastoidectomy and exposure of sinus
- ⇒ Ligation of internal jugular vein
- ⇒ Anticoagulant therapy
- ⇒ Supportive treatment. Repeated blood transfusions may be required to combat anemia

5. EXTRADURAL ABSCESS

Collection of pus between the bone and dura

PATHOLOGY

- ⇒ In acute otitis media, bone over the dura is destroyed by hyperemic decalcification and the pus comes to lie directly in contact with dura.
- ⇒ In chronic otitis media it is destroyed by cholesteatoma and the pus comes to lie directly in contact with dura

CLINICAL FEATURES

- ⇒ Persistent headache on the side of otitis media.
- ⇒ Severe pain in the ear.
- ⇒ Fever
- ⇒ Purulent ear discharge.
- ⇒ Disappearance of headache with free flow of pus from the ear

Investigations:

- ⇒ contrast-enhanced CT
- ⇒ MRI.

TREATMENT

- ⇒ Cortical or modified radical or radical mastoidectomy
- ⇒ An antibiotic cover should be provided for a minimum of 5 days

6. SUBDURAL ABSCESS

This is collection of pus between dura and arachnoid

PATHOLOGY:

Infection spreads from the ear by erosion of bone and dura. Pus rapidly spreads in subdural space

CLINICAL FEATURES

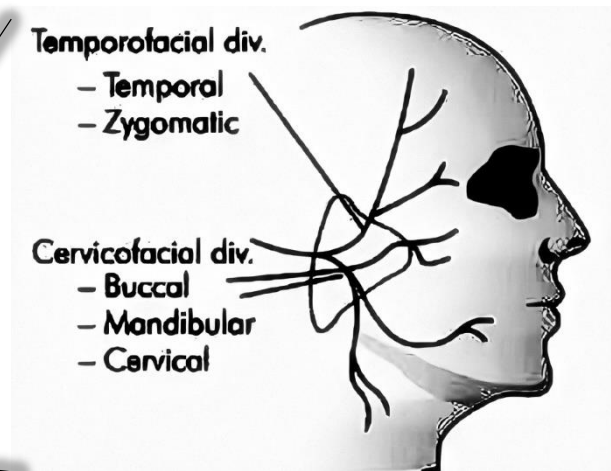
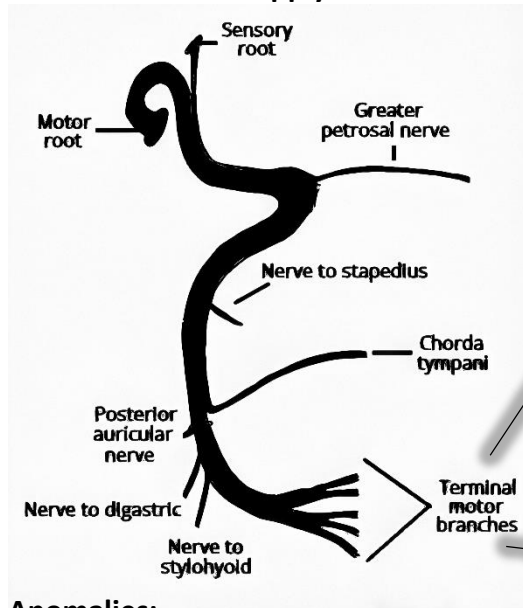
- ⇒ Meningeal irritation
 - ↳ Headache
 - ↳ Fever (102°F or more)
 - ↳ Increasing drowsiness
 - ↳ Neck rigidity
 - ↳ Positive Kernig's sign.
- ⇒ Cortical venous thrombophlebitis
 - ↳ Aphasia
 - ↳ Hemiplegia
 - ↳ Hemianopia
 - ↳ Jacksonian type of epileptic fits
- ⇒ Raised intracranial tension:
 - ↳ Papilloedema
 - ↳ Ptosis
 - ↳ Dilated pupil

TREATMENT:

- ⇒ Craniotomy
- ⇒ Intravenous antibiotics are administered to control infection
- ⇒ Mastoidectomy

Facial Nerve paralysis (7th nerve):

Branches of nerve supply:



Anomalies:

1. Bony dehiscence
2. Prolapse of nerve
3. Hump
4. Bifurcation
5. Trifurcation

Blood supply:

1. Cerebellar artery
2. Labyrinthine artery
3. Superficial petrosal
4. Stylomastoid artery

Diagnostic test:

- ⇒ Minimal nerve excitability
- ⇒ Maximal stimulation test (**MST**)
- ⇒ Electroneuronography (**ENoG**)
- ⇒ Electromyography (**EMG**)

Causes:

- ⇒ **Central**
 - ↳ Brain abscess
 - ↳ Poliomyelitis
- ⇒ **Intracranial**
 - ↳ Congenital cholesteatoma
 - ↳ Meningitis
- ⇒ **Intratemporal part**
 - **Idiopathic:**
 - ↳ Bell's palsy
 - **Infections:**
 - ↳ CSOM
 - ↳ ASOM
 - **Trauma:**
 - ↳ Accidental
 - Fractures of temporal bone
 - ↳ Surgical
 - Mastoidectomy
 - **Neoplasm**
 - ↳ Facial nerve neuroma
- ⇒ **Extracranial**
 - ↳ Malignancy of parotid
 - ↳ Surgery of parotid
 - ↳ Accidental injury to parotid
- ⇒ **Systemic disease**
 - ↳ Diabetes mellitus
 - ↳ Hypothyroidism
 - ↳ Leprosy
 - ↳ Leukemia

Bell's palsy

Definition:

It is an acute lower motor neuron facial palsy unknown etiology and therefore it is a diagnosis of exclusion. It is probably a viral infection which induces immune response that led to inflammatory swelling and consequently impaired function of facial nerve.

Epidemiology: Both sexes equally involved

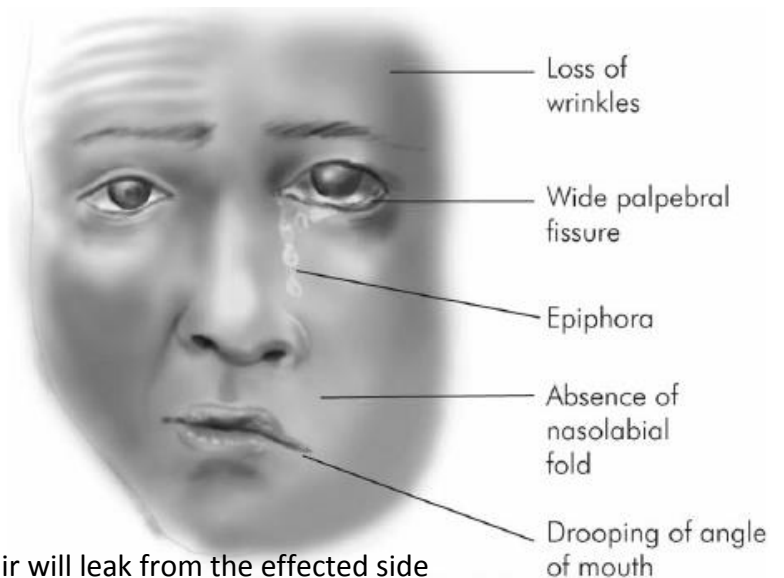
Clinical features:

Symptoms:

- ↪ Unable to close eyes
- ↪ Dribbling of saliva
- ↪ Facial symmetry
- ↪ Tearing of eyes

Signs:

- ↪ Ask the patient to show teeth
- ↪ Ask the patient to blow the mouth and air will leak from the affected side
- ↪ Ask the patient to forcefully close the eyes; patient will not be able to close eyes
- ↪ Ask the patient to do frowning of the forehead; patient will be unable to perform



Investigation:

1. CT scan
2. MRI
3. EEMG (evoked electromyography)

Treatment:

General treatment: It includes reassurance of the patient, care of the eye (artificial tears), physiotherapy and massage of facial muscles

Medical: It includes steroids e.g. prednisolone

Surgical treatment: It includes facial nerve decompression

Foreign Bodies in the Ear

Most common age group is school children than by toddlers

Classification of foreign bodies:

1. **Organic** (piece of paper, rubber, seeds, peas and beans)

Organic foreign body may be symptomatic by causing otitis externa due to local irritation of meatal wall epithelium e.g. cotton wool is most commonly seen in adult patients. Other common foreign body in adults is insects.

2. **Inorganic** (beads, cotton, crayons and stones)

Inorganic foreign body Asymptomatic

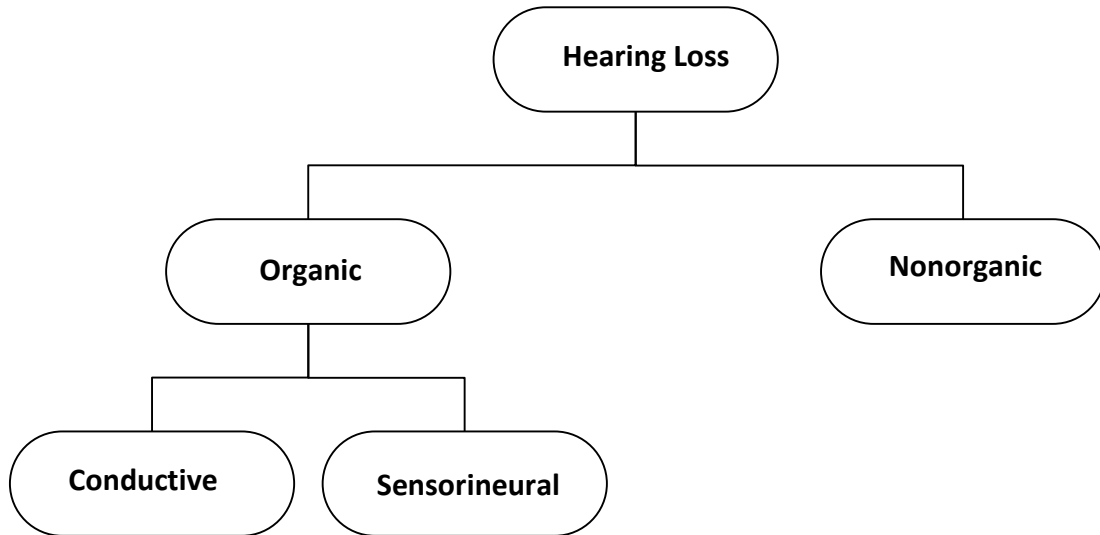
Management:

1. **History:** Take history of foreign body. Ask patient to show the sample of that foreign body or ask patient if symptoms of otitis externa are present.
2. **Examination:** On examination it is easy to see foreign body in external ear with the help of speculum but if it is hidden in anterior recess one should do otoscopy or examination
3. **Treatment:** Removal may appear to be easy but it usually requires the skills and facilities of a specialist. Direct attempts for their removal by the untrained may lead to complications. It is sometimes possible to remove the foreign body in clinic but general anesthesia may be required for children and sensitive adults.

As a general rule most foreign body can be removed by Syringing. Objects of vegetable origin such as peas, beans and nuts are hygroscopic and should not be syringed. Large objects lying superficial to the external auditory canal isthmus should not be syringed as there is danger of wedging them in that area.

- ⇒ **Suction or a fine hook** maybe used to remove material of vegetable origin and large objects which lie superficial to isthmus.
- ⇒ **Forceps (crocodile forceps)** are useful for soft material such as paper, cotton wool or sponge. These should never be used to remove smooth spherical objects such as beads as they will be pushed further down to the ear canal
- ⇒ **Removal of living foreign body** Insects should be killed before syringing by instilling spirit drops or oil or even water into the ear canal. Maggots grip on the ear canal skin. So, they must be killed or anesthetized with chloroform water and turpentine oil (maggot oil) before removed with forceps
- ⇒ **Removal of foreign body by incision** rarely foreign body removal through the posterior canal wall after postural incision is to be done. This approach is called **post-aural approach**. It is helpful if perimeatal extraction is not possible because of swelling of the canal wall from irritation or if the large object has lodged medial isthmus. Once the object is out the ear should be examined to ensure if tympanic membrane has not been damaged. If there is otitis externa ear should be treated by local and systemic antibiotics.

Hearing Loss:



	Conductive Hearing Loss	Sensorineural Hearing Loss
Site of Lesion	External ear and tympanic membrane, Middle ear	Cochlea, 8 th Nerve or central auditory pathway
Sound perception	Quieter but not distorted	Quieter but distorted
Bone conduction	Normal absolute bone conduction	Bone conduction is reduced on Schwabach and absolute bone conduction tests
Frequency	Low frequency affected more	High frequency
Loss of dB	Loss is not more than 60 dB	Loss may exceed 60db
Speech discrimination	Good	Poor
Speech quality	Well maintained	Indistinct and expressionless
Rinne test	Negative	Positive
Weber test	Weber lateralized to poorer ear	Weber lateralized to good ear
Audiogram	Air-bone gap	Poor Air-bone gap
Hearing aid	Tolerated by the patient	Not tolerated

Conductive Hearing Loss:

Causes:

- ❖ **Congenital:**
 - Meatal atresia
 - Fixation of foot plate of stapes
 - Congenital cholesteatoma
- ❖ **Acquired:**
 - Diseases of external ear:
 - Wax
 - Foreign body
 - Fungus
 - Neoplasm
 - Furunculosis
 - Diseases of tympanic membrane:
 - Retraction
 - Rupture
 - Diseases of middle ear:
 - OME
 - ASOM
 - CSOM
 - Tumors
 - Otosclerosis
 - Acute mastoiditis

Management:

- ⇒ **Removal of canal obstructions:** e.g. impacted wax, foreign body, osteoma, benign or malignant tumors
- ⇒ **Removal of fluid:** Myringotomy
- ⇒ **Removal of mass from middle ear:** Tympanotomy and Cholesteatoma
- ⇒ **Stapedectomy**
- ⇒ **Tympanoplasty**
- ⇒ **Hearing aid**

Sensorineural Hearing Loss:

Causes:

- ❖ **Congenital:**
 - Pendred's syndrome
- ❖ **Acquired:**
 - Labyrinths
 - 8th nerve palsy
 - Labyrinthine surgery
 - Noise induced hearing loss
 - Acoustic neuroma
 - Meniere's disease
 - Brain tumor
 - CVA
 - Presbycusis
 - Fevers
 - Typhoid fever
 - Meningitis
 - Measles
 - Mumps
 - Ototoxic drugs
 - Quinine
 - Diuretics
 - Salicylates

Management:

- i. **Syphilis** of the inner ear is treatable with high doses of penicillin and steroids with improvement in hearing.
- ii. **Hearing loss of hypothyroidism** can be reversed with replacement therapy.
- iii. **Serous labyrinthitis** can be reversed by attention to middle ear infection.
- iv. **Ménière's disease** can prevent further episodes of vertigo and hearing loss.
- v. **SNHL due to perilymph fistula** can be corrected surgically by sealing the fistula in the oval or round window with fat.
- vi. **Ototoxic drugs** should be used with care and discontinued if causing hearing loss.
- vii. **Noise induced hearing loss** can be prevented from further deterioration if the person is removed from the noisy surroundings.

Hematoma Auris

Definition:

It is a condition caused by Extravasation of blood between cartilage and perichondrium of the pinna.

Etiology:

The result of closed trauma in sports such as boxing, rugby and football

Pathology:

Trauma → Blood vessels bleed → Extravasation of blood between cartilage and perichondrium. If untreated leads to suppuration → Destruction of cartilage → Cauliflower deformity of the pinna.

Clinical Findings:

Symptoms

- ⇒ History of trauma
- ⇒ Swelling of pinna
- ⇒ Pain in the ear
- ⇒ If late presentation disfigurement of pinna

Signs

- ⇒ Doughy swelling of pinna and may give bluish color
- ⇒ Tenderness (if suppuration)

Treatment:

- ⇒ **Cases seen shortly after injury:** Aspiration using a wide bore needle.
- ⇒ **Long standing cases:** Under strict aseptic measures incision and evacuation of the clot. Incision is given along the margin of helix.

Following aspiration or incision a firm dressing can be applied to the pinna to prevent recurrence of hematoma.

MALIGNANT OTITIS EXTERNA

Definition:

It is defined as an otitis externa which progresses to an osteomyelitis initially of tympanic plate which then may spread to involve the skull base and petrous part of the temporal bone

Epidemiology: It is most common after manage and in diabetics

Microbiology: causative agents Pseudomonas Aeruginosa

Clinical Findings:

- ⇒ Constant deep Otolgia and blood stained ear discharge
- ⇒ On examination granulation tissue and blood stained mucopurulent discharge is present in deep portion of the EAM
- ⇒ 7-12 cranial nerves palsies

Differential Diagnosis:

- ⇒ Acute suppurative otitis media
- ⇒ Chronic suppurative otitis media
- ⇒ Malignancy of EAM or middle ear

Investigations:

- ⇒ Histological and microbiological exam of the granulation tissue
- ⇒ CT scan MRI of petrous part of the temporal bone

Treatment:

- ⇒ Surgical removal of the granulation and the necrotic tissue
- ⇒ I/V antibiotics i.e. ciprofloxacin six weeks
- ⇒ Opiate analgesic to control deep otalgia

Mortality rate: It has very high mortality rate

Complications: Widespread osteomyelitis

Intracranial complications:

- ⇒ Brain abscess
- ⇒ Subdural abscess
- ⇒ Brain abscess
- ⇒ Meningitis
- ⇒ Cranial nerves paralysis
- ⇒ Death

Mastoidectomies

Definition:

Mastoidectomy is an operation undertaken to remove the disease from one or more parts of the middle ear cleft

Classification:

a) Canal wall up procedures

- ⇒ Cortical mastoidectomy (Schwartz operation)
- ⇒ Combines approach Tympanoplasty

b) Canal wall down procedures

- ⇒ Atticotomy
- ⇒ Radical mastoidectomy
- ⇒ Modified radical mastoidectomy

Anesthesia: General anesthesia

Position of the patient: Supine position with diseased ear in upmost position

Incision/Approach: Post-aural incision

1) RADICAL MASTOIDECTOMY

Principle: It is an operation performed to eradicate all middle ear, aditus, mastoid antrum and mastoid air cells disease so that these unsafe cavities are converted into a common cavity which is exteriorized through external auditory meatus.

In this procedure we remove the remnants of tympanic membrane and ossicles except foot plate of stapes

Indications of Radial Mastoidectomy:

- ⇒ Chronic Suppurative Otitis Media with moderate to severe hearing loss
- ⇒ Chronic Suppurative Otitis Media with intracranial complications
- ⇒ Extensive cholesteatoma

2) MODIFIED RADICAL MASTOIDECTOMY

Definition: It is an operation performed to eradicate all middle ear, aditus, mastoid antrum and mastoid air cells disease. It is same as radical mastoidectomy, except that tympanic membrane and ossicles are retained to reconstruct the hearing mechanism.

Indications of Modified Radical Mastoidectomy

- ⇒ Chronic Suppurative Otitis Media with mild degree hearing loss especially in young patients
- ⇒ Cholesteatoma limited to antrum and attic

3) CORTICAL MASTOIDECTOMY/SIMPLE MASTOIDECTOMY/SCHWARTZ OPERATION

Definition: It is an operation performed to remove the disease from mastoid antrum, mastoid air cell system and aditus without disturbing the middle ear contents. In this operation we do not remove the bony meatal wall. That is why it is called "canal wall up procedure'.

Indications of Cortical Mastoidectomy

- ⇒ Acute mastoiditis not responding to medical treatment
- ⇒ For severe case of glue ear or Otitis Media Externa

Complications of mastoidectomy:

1) Pre-operative

Complication due to anesthesia → Cardio-pulmonary arrest

2) Operative

- ⇒ **Facial nerve paralysis** (common)
- ⇒ Damage to dura mater
- ⇒ Damage to sigmoid sinus.
- ⇒ Damage to jugular bulb
- ⇒ Damage to the ossicles
- ⇒ Damage to the labyrinth
- ⇒ Damage to lateral/Horizontal semicircular canal

3) Post-operative

- ⇒ Wound infection
- ⇒ Labyrinthitis

Meniere's disease or Endolymphatic Hydrops

Definition:

It is a disease of inner ear which involve both cochlea and vestibule and is characterized by episodic vertigo, deafness and tinnitus. Tinnitus occurs because of the involvement of cochlea i.e. inner ear.

Etiology: Etiology is unclear but there is etiological factors-

- ⇒ Genetic factor
- ⇒ Anatomical anomalies e.g. small vestibular aqueduct
- ⇒ Traumatic
- ⇒ Allergic
- ⇒ Viral infections
- ⇒ Autoimmune diseases
- ⇒ Psychosomatic

Epidemiology: It is common in 5th decade (50 years) with no gender bias

Pathology:

Whatever is the pathology there is constant feature i.e. either increased production of endolymph or decreased absorption of endolymph. This lead to dilatation of endolymphatic compartment inner ear

Clinical Features:

Symptoms:

- ⇒ Episodic vertigo
- ⇒ Hearing loss (in early stage it is reversible and if condition progresses it becomes irreversible)
- ⇒ Tinnitus
- ⇒ Sense of fullness in the affected ear

Signs

- ⇒ Nystagmus is positive
- ⇒ Tuning fork test (Rinne's positive. Weber's will be lateralized to the normal ear)

Investigations:

- ⇒ **PTA:** shows sensorineural hearing loss
- ⇒ **Speech audiometry:** shows recruitment phenomenon i.e. high frequency sounds are increased and are uncomfortable to the patient
- ⇒ **Electrocochleography:** shows cochlear dysfunction
- ⇒ **Caloric test:** shows Vestibular dysfunction
- ⇒ **Glycerol dehydration test:** glycerol when given orally, it reduces endolymphatic pressure → improvement in hearing.
- ⇒ **MRI:** to rule out other causes of vertigo

Differential Diagnosis:

- ⇒ Acoustic neuroma (8th nerve tumor)
- ⇒ Otosclerosis
- ⇒ Labyrinthitis
- ⇒ Intracranial diseases

Treatment:

1. **Reassurance:** Bed rest, salt and water restriction
2. **Medical treatment:** It provides adequate control in 80% of the patients
 - ⇒ Labyrinthine vasodilators i.e. Beta-histine (SERC) 16mg TDS
 - ⇒ Prochlorperazine (Stemetil): It is a labyrinthine sedative
 - ⇒ Cinnarizine: It is also a labyrinthine sedative
3. **Surgical treatment:**
 - Decompression of endolymphatic sac
 - Vestibular Neuroectomy
 - Labyrinthectomy

Otalgia

Nerve supply of the ear:

- i) Auriculo temporal branch of trigeminal nerve
- ii) Vagus nerve
- iii) Greater auricular nerve
- iv) Lesser occipital nerve
- v) Glossopharyngeal nerve

Definition: Pain in the ear is called Otalgia.

Causes:

Primary:

- i) **Diseases of pinna** e.g. perichondritis, Trauma to the pinna
- ii) **Diseases of meatus and drum** e.g. wax, boil, trauma, carcinoma of external ear, malignant otitis externa, otomycosis, perforation of tympanic membrane, myringitis
- iii) **Diseases of middle ear** e.g. barotrauma, otitis media, carcinoma of middle ear

Secondary:

- i) **Diseases of cervical plexus:** (C2 and C3)
Cervical spondylosis
Cervical arthritis
Soft tissue injury to the neck
- ii) **Diseases of trigeminal nerve:**
 - ⇒ Dental abscess, Dental caries and unerrupted teeth
 - ⇒ Temporomandibular joint disease e.g. capsular stress
 - ⇒ Nasopharyngeal diseases e.g. tumors of nasopharynx, adenoiditis, post-adenoidectomy
 - ⇒ Sino-nasal and Salivary gland diseases e.g. sinusitis
- iii) **Diseases of glossopharyngeal nerve** e.g. glossopharyngeal neuralgia, Tumors of base of tongue, Acute tonsillitis, Acute pharyngitis, Post-tonsillectomy, Peritonsillar abscess
- iv) **Diseases of vagus nerve** e.g. tumors of hypopharynx and larynx.

Management:

History:

- ⇒ Take full history regarding all structures of head and neck

Examination:

- ⇒ Examination of the ear, throat, TM joint, Oral cavity, Oropharynx, Nasopharynx, Hypopharynx, Larynx and Cervical spine

Investigation:

- ⇒ According to cause

Treatment:

- ⇒ According to cause

Otitis Externa

Definition:

Inflammation of the skin of External Auditory Meatus.

Pathogenesis:

Sweat gland secretions keep the pH 3-5 which is lethal for most pathogens. Usually the External Auditory Meatus is sterile and contains Staphylococcus albus as commensals.

In acute phase of otitis Externa there are dilated dermal blood vessels of increased permeability which cause cardinal signs of inflammation i.e. red, hot tender, and edematous ear canal

Etiology/Predisposing factors

- ⇒ **Environmental:** heat, humidity, bathing, swimming
- ⇒ **Traumatic:** Especially from dirty fingernails, cotton buds and hairpins
- ⇒ **Inherited:** Narrow ear canal, excessive wax production and inherited tendency towards development of Eczema

Classification:

Infective

- ⇒ **Bacterial:**
 - Diffuse Otitis Externa caused by Pseudomonas aeruginosa, Staphylococcus aureus and Proteus
 - Localized Otitis Externa or Furunculosis caused Staphylococcus aureus
 - Malignant Otitis Externa caused by Pseudomonas aeruginosa
- ⇒ **Fungal:**
 - Aspergillus niger
 - Aspergillus fumigatus
 - Candida albicans
- ⇒ **Viral:**
 - Herpes simplex
 - Herpes zoster

Reactive

- ⇒ Eczema
- ⇒ Seborrhoeic Dermatitis
- ⇒ Keratitis Obturans
- ⇒ Psoriasis

Clinical Findings:

Acute phase:

- ⇒ Hot burning sensation in the ear
- ⇒ Pain aggravated by movements of jaw
- ⇒ Ear starts oozing thin serous discharge
- ⇒ Meatal lining becomes inflamed and swollen
- ⇒ Regional lymph nodes become enlarged and tender

Chronic phase:

- ⇒ Irritation and desire to itch
- ⇒ Discharge is scanty
- ⇒ Meatal skin which is thick and swollen
- ⇒ Hypertrophic skin
- ⇒ Meatal stenosis

Treatment:

Acute phase:

- i) **Ear toilet:** It is most important in treatment of single diffuse otitis externa. Ear toilet can be done by dry mopping, suction clearance or irrigating the canal with warm sterile normal saline
- ii) **Medicated wicks:** A gauze wick soaked in antibiotic steroid preparation is inserted in the ear canal
- iii) **Antibiotics**
- iv) **Analgesics**

Chronic phase:

- i) Gauze wick soaked in 10% ichthammol glycerine and inserted into the ear canal to reduce swelling
- ii) Itching can be controlled by topical application antibiotic steroid cream
- iii) Chronic stenotic otitis externa it is surgically excised

Otitis Media

Definition: Otitis media is an inflammation of part or all of the mucosa of middle ear cleft

Classification:

1. Acute
2. Chronic
3. Specific e.g. tuberculosis or syphilis otitis media
4. Adhesive otitis media

Suffix: Suppurative or non suppurative

Acute Suppurative Otitis Media

Definition: This is a bacterial disease middle ear cleft caused by pus forming organisms

Causative Organisms:

Streptococcus Pneumoniae (40%)

Haemophilus Influenzae (30%)

Moraxella Catarrhalis (10%)

Epidemiology:

It is the commonest disease of children age group ranging from 3-7 years infants have shorter, wider and a more horizontally placed Eustachian tube as compared to adults. so they are more vulnerable to ASOM as compared to adults

Predisposing Factors:

Poor sanitation, overcrowding and malnutrition

Etiology:

It may occur as a primary or a secondary infection after a viral acute non suppurative otitis media. Bacteria enter the middle ear cleft via Eustachian tube or perforated tympanic membrane or blood borne

- 1) Direct extension from a bacteria or a secondary to a viral upper respiratory tract infection. This is the common etiological factor.
- 2) Recurrent or chronic rhinosinusitis
- 3) Adenoiditis
- 4) Any disease like measles, diphtheria and whooping cough.
- 5) Eustachian tube dysfunction → causes of which are → tumors of nasopharynx, adenoid hypertrophy, abnormal Eustachian tube patency and sub mucosal cleft-plate.

Pathology and clinical features:

1. Stage of tubal occlusion

- **Pathogenesis:** Edema and hyperemia of nasopharynx end of the Eustachian tube blocks the tube → blocks the tube → absorption of air → negative intra-tympanic pressure → retraction of tympanic membrane and some degree of effusion in middle ear.
- **Symptoms:** The commonest symptom of acute suppurative otitis media is Earache. Earache and deafness are not marked in this stage
- **Signs:** There are 4 signs of tympanic membrane retraction
 - 1) Handle malleus assuming a more horizontal position i.e. Foreshortening of the handle of malleus
 - 2) Distortion Of the cone of light
 - 3) Prominence of the lateral process of Malleus
 - 4) Prominence of anterior posterior labial folds
- **Investigation:** Tuning Fork test shows Conductive deafness.

2. Stage of pre-suppurative

- **Pathogenesis:** If tubal occlusion is prolonged → pyogenic organisms invade tympanic membrane cavity causing hyperemia of its lining Inflammatory exudate appears in the middle ear cavity Tympanic membrane becomes congested
- **Symptoms:** Marked throbbing earache, deafness, tinnitus and high grade fever
- **Signs:**
 - ⇒ Congestion of pars tensa
 - ⇒ Leash of blood vessel appear along the handle of malleus
 - ⇒ Leash of blood vessel at the periphery of tympanic membrane
 - ⇒ Cart-wheel appearance
 - ⇒ Tympanic membrane becomes uniformly red
- **Investigation:** Tuning fork test shows Conductive hearing

1. Stage of suppuration

- **Pathogenesis:** This is marked by formation of pus in the middle ear and to some extent in mastoid air cells Tympanic membrane starts bulging to the point of rupture
- **Symptoms:** Excruciating pain, Deafness increases High grade fever up to 102-103F°. In some cases there may be vomiting and even convulsions
- **Signs:** Tympanic membrane landmarks. Tenderness is over mastoid antrum → red, angry looking and bulging with loss its landmarks. Tenderness is over mastoid antrum.

2. Stage of Resolution:

- **Pathogenesis:** Tympanic membrane ruptures and release of pus and subsidence of Symptoms inflammatory process begins to resolve.
- **Symptoms:** With evacuation of pus earache is relieved Fever settles down & patient feels better
- **Signs:**
 - ⇒ External auditory meatus → containing blood mucopurulent discharge
 - ⇒ Small perforation is seen in anterior inferior quadrant of pars tensa
 - ⇒ Hyperemia of tympanic membrane

3. Stage of complications:

If the violence of organism is high resistance of patient is poor resolution may not take place and disease spreads beyond the confines of middle ear.

Complications may be:

- ⇒ Acute mastoiditis
- ⇒ Sub-periosteal abscess
- ⇒ Facial paralysis
- ⇒ Labyrinthitis
- ⇒ Petrositis
- ⇒ Extradural abscess
- ⇒ Subdural abscess
- ⇒ Meningitis
- ⇒ Brain abscess
- ⇒ Lateral sinus thrombophlebitis
- ⇒ Otitis hydrocephalus

Investigations:

Pus for microbiology and culture and sensitivity

CT scan/MRI (if there is suspicion of complications)

Treatment:

➤ **Medical:**

- ⇒ Bed rest
- ⇒ Systemic and topical decongestants (for stage 1, 2 & 3)
- ⇒ Analgesics and antipyretics (for stage 1, 2 & 3)
- ⇒ Systemic antibiotics i.e. penicillin group (for stage 2, 3 & 4)
- ⇒ Local antibiotics (for stage 4)
- ⇒ Ear toilet (for stage 4)

➤ **Surgical:** Surgical treatment is by a procedure called Myringotomy for stage 3 of acute suppurative otitis media.

- ⇒ **Myringotomy:** Ear drum is incised at anterior inferior compartment to evacuate the pus. It is indicated when ear drum is bulging, there is acute pain and there is persistent effusion beyond 12 weeks in spite of medical treatment.

Glue Ear/Secretory Otitis Media/Mucoid Otitis Media/Serous Otitis Media/Exudative Otitis Media

Definition:

It is non suppurative and non-purulent otitis media. A condition of middle ear cavity in which there is accumulation of sterile fluid in the middle ear cleft.

Epidemiology: Incidence is highest in young children of 4-6 years. Incidence decreases with age. It is uncommon in teenagers. Prevalence increases in winters

Etiology:

1. Malfunctioning of Eustachian tube. The causes are:

- ⇒ Adenoid hyperplasia
- ⇒ Chronic rhinitis and sinusitis
- ⇒ Chronic tonsillitis
- ⇒ Benign and malignant tumors of nasopharynx
- ⇒ Palatal defects e.g. cleft palate, palatal paralysis

2. Allergy: Seasonal or perennial allergy to inhalants or foodstuff is common in children.

3. Unresolved otitis media:

4. Viral infections: Various adenovirus and rhinovirus of upper respiratory tract may invade middle ear mucosa

CLINICAL FEATURES:

Symptoms: The disease affects children of 5-8 year age. The symptoms include:

- ⇒ **Hearing loss:** This is the presenting and sometime the only symptom.
- ⇒ **Delayed speech:** Because of hearing loss development of speech is delayed.
- ⇒ **Defective speech:** Because of hearing loss development of speech is defective.
- ⇒ **Mild earaches:**
- ⇒ **Recurrent infections**
- ⇒ **Otalgia**

Otosopic findings:

- ⇒ Tympanic membrane is often dull and opaque with loss of light reflex.
- ⇒ Tympanic membrane may appear yellow, grey or bluish in color.
- ⇒ Tympanic membrane may show varying degree of retraction
- ⇒ Fluid level and air bubbles may be seen.
- ⇒ Mobility of the tympanic membrane is restricted.

HEARING TESTS

- ⇒ Tuning fork tests show conductive hearing loss.
- ⇒ Audiometry: There is conductive hearing loss of 20-40 dB
- ⇒ Impedance audiometry. It is an objective test useful in infants and children.
- ⇒ X-ray mastoids. There is clouding of air cells due to fluid.

TREATMENT

The aim of treatment is removal of fluid and prevention of its recurrence.

4. MEDICAL

⇒ **Decongestants:**

- **Topical decongestants** in the form of nasal drops
- **Systemic decongestants** help to relieve oedema of Eustachian tube

⇒ **Anti-allergic measures:** Antihistamines or sometimes steroids may be used in cases of allergy. If possible, allergen should be found and desensitization done

⇒ **Antibiotics:** They are useful in cases of upper respiratory tract infections

⇒ **Middle ear aeration:** Patient should repeatedly perform Valsalva manoeuvre.

5. SURGICAL

When fluid is thick and medical treatment alone does not help, fluid must be surgically removed.

⇒ **Myringotomy and aspiration of fluid:**

- An incision is made in tympanic membrane and fluid aspirated with suction.
- Sometimes two incisions are made in the tympanic membrane, one in the anteroinferior and the other in the anterosuperior quadrant to aspirate thick, glue like secretions on "beer-can" principle".

⇒ **Grommet insertion:**

⇒ **Tympanotomy or cortical mastoidectomy:**

⇒ **Surgical treatment of causative factor:**

- Adenoidectomy
- Tonsillectomy
- Wash-out of maxillary antral

Complications:

- ⇒ Atrophic tympanic membrane
- ⇒ Ossicular necrosis
- ⇒ Tympanosclerosis
- ⇒ Retraction pockets
- ⇒ Cholesteatoma

Otosclerosis or Otospongiosis

Definition:

A hereditary disease of bony labyrinth in which one or more foci of irregularly laid spongy bone places bony otic capsule. Most of Otosclerotic foci involves stapes region, leading to foot plate of stapes fixation.

Most common area:

Area of the promontory in the anterior part of the foot plate of stapes i.e. fissula antefenestrum

Etiology:

It is unknown but there's some evidence of hereditary involvement in 50% of the patients

Epidemiology:

Most common age group is 18-30years

Male to female ratio is 1:2

Pregnancy and menopause may affect the disease

Pathology:

Otosclerotic lesion appears chalky white or greyish in color but when it is in active stage it appears red due to increased vascularity.

Clinical features:

⇒ **Symptoms:**

- Deafness, which is bilateral (70-80% of patients)
- Paracusis willisii: patient hears better in noisy surrounding
- Tinnitus

⇒ **Signs:**

- Tympanic membrane is normal
- Schwartz sign: flamingo pink appearance of the tympanic membrane
- Tuning fork test will show conductive hearing loss

Investigation:

- i) **Pure Tone Audiometry:** Shows conductive hearing loss and a dip in bone conduction at 2,000 Hz frequency which is called "Cohort's notch"
- ii) Stapedial reflex is absent
- iii) CT Scan

Treatment:

- i. **Medical treatment: Sodium fluoride** → decreases the vascularity. It is effective phase. It doesn't allow the patch to expand
- ii. **Surgical treatment: Stapedectomy**
Stapes is removed and replace by prosthesis
Supra structure of stapes is removed
Limit opening is made through foot plate of stapes
Teflon piston is inserted around long incus and free end inserted into the opening through stapes foot plate
Opening in foot plate sealed by vein graft, Gelfoam or Fat
- iii. **Hearing aid:** Stapedectomy cause loss of sensorineural hearing loss.

Differential diagnosis:

ASOM

OME

Tympanosclerosis

Attic fixation of malleus

Ossicular discontinuity

Perichondritis

DEFINITION:

Infection of Perichondrium of auricle which occurs most commonly when the cartilage exposed either by laceration or surgery

DEFINITION OF SUB PERICHONDRIAL ABSCESS: Collection of pus underneath the Perichondrium

ETIOLOGY:

- ⇒ This may follow Aspiration or Incision of Hematoma auris.
- ⇒ Following superficial Infection of Pinna or meatus.
- ⇒ Following Injury as a result of Surgery.
- ⇒ Frostbite or burn
- ⇒ Insertion of earrings into the pinna
- ⇒ Iatrogenic

MICROBIOLOGY:

The organism involved is *Pseudomonas aeruginosa* most commonly seen in diabetics and immunocompromised persons

CLINICAL FEATURES:

SYMPTOMS

- ⇒ Severe pain of the pinna
- ⇒ Fever
- ⇒ Swelling of Pinna

SIGNS:

In early stage: Pinna is red and tender. This is followed by generalized swelling of pinna and eventually the formation of "subperichondrial abscess" with pus between Perichondrium and Cartilage. The cartilage is deprived of its blood supply and may undergo necrosis resulting in marked deformity of Pinna,

TREATMENT:

- ⇒ Hospitalize the patient
- ⇒ Broad spectrum parenteral Antibiotics
- ⇒ Drug of choice being ciprofloxacin. Alternatively, 3rd generation Cephalosporin may be used
- ⇒ In case of a subperichondrial abscess, Incision and Drainage (I/D) is done along with parenteral antibiotic

Tinnitus

Definition:

It is an abnormal perception of sound unrelated to an external source of sound. It is distinguished from hallucinations which are meaningful sounds.

Tinnitus may be described as hissing, buzzing, rushing, hammering, Sound of sea or bells. This tinnitus is more annoying in quiet environment.

Pathology: exact cause is unknown maybe regarded as irritation of cochlea or upper auditory pathway.

Types:

1. Subjective: When the patient alone hears it.
2. Objective: This is heard by the patient and the doctor

Etiology:

Divided into two types:

1. Otological
2. Non-Otological

Otological:

1) Diseases of external ear:

- Impacted wax
- Foreign body
- Otitis externa

2) Diseases of middle ear:

- Glomus tumor
- Aneurysms of internal carotid artery
- Otitis media
- Widened

3) Diseases of the inner ear:

- NIHL (Noise Induced Hearing Loss)
- Vestibular schwannoma
- Presbycusis
- Meniere's disease
- Drugs e.g. NSAIDS, Caffeine

Non-Otological:

- ⇒ Anemia
- ⇒ Hypertension
- ⇒ Hyperthyroidism
- ⇒ Psychogenic
- ⇒ Migraine

Management:

History:

1. Onset
2. Pattern (Clicking, Blowing)
3. Pitch (high or low)
4. Location (Unilateral or Bilateral)
5. Intensity (Loud or Slow)
6. Time of max sound
7. Ask about the profession
8. Detailed drug history
9. History of trauma or surgery

Examination:

Full ENT and CVS examination

Investigation:

1. PTA
2. MRI
3. Tinnitus pitch
4. Loudness matching
5. Hematological test
 - ⇒ Hemoglobin
 - ⇒ TFT (Thyroid Function Test)
 - ⇒ Lipid profile
 - ⇒ BSR (Blood sugar random)
 - ⇒ Angiography for objective pulsatile tinnitus

Treatment:

1. Treat the underlying cause
2. Involve the psychologist and reassure the patient
3. Noise making/ sound therapy
 - ⇒ Hearing aid
 - ⇒ Pillow radio/Pillow speaker
4. Drugs
 - ⇒ Lidocaine
 - ⇒ Fluoride
 - ⇒ Antidepressants

TYMPANIC MEMBRANE PERFORATION

DEFINITION: A ruptured eardrum is an opening or hole in the thin layer issue (eardrum) that separates the outer and middle ear

ETIOLOGY

- ⇒ **INFECTION OF THE MIDDLE EAR:** It is the most common cause of tympanic membrane perforation. Infections can be caused by viruses, bacteria, or fungi.
- ⇒ **TRAUMA:** can also cause perforation. Blunt or penetrating trauma: such as from a fall on the side of your head or a stick that goes deep in your ear
- ⇒ **RAPID CHANGES IN PRESSURE:** for example, scuba diving (barotrauma. Changes in pressure during air travel
- ⇒ **OTHER CAUSES:**
 - Unskilled instrumentation & syringing of the ear
 - Temporal bone fracture
 - Forceful inflation of middle ear by Valsalva's maneuver
 - Slaps to the ear
 - Lightning blasts
 - Blast waves from gunshots, fireworks, and other loud noises

SYMPTOMS:

- ⇒ Vertigo (spinning sensation)
- ⇒ Hearing change or loss often with ringing, buzzing, or clicking,
- ⇒ Ear discharge or blood draining from the ear
- ⇒ Earache or discomfort of the eat

SIGNS:

- ⇒ **OTOSCOPY:** Shows ruptured tympanic membrane with congestion and regular margins. Fresh blood or clots may be seen in meatus. Bigger perforations can be seen easily, but smaller perforations are usually hidden
- ⇒ **EXAMINATION UNDER MICROSCOPE (EUM):** By microscopy one can easily detect smaller perforations.
- ⇒ **TUNING FORK TESTS:** Will show Rinne's negative and Weber will be lateralized to diseased ear i.e. conductive hearing loss

INVESTIGATIONS:

- ⇒ **TYMPANOMETRY:** showing increased volume, indicating tympanic membrane perforation
- ⇒ **AUDIOMETRY:** Confirms conductive hearing loss and intensity of hearing loss

TREATMENT:

- ⇒ **CONSERVATIVE TREATMENT:** Most patients with a traumatic tympanic membrane perforation do not require any specific treatment, as they have an excellent chance of healing spontaneously within two months. If patient has pain, pain killers are given to relieve pain
- ⇒ **Strict dry ear precautions** are best followed to prevent water from getting into the ear. Instructions to the patient include no swimming and the use of a Vaseline-soaked cotton ball in the affected ear during bathing.
- ⇒ **Treat infection** if present by local and oral antibiotics
- ⇒ A hearing test should be performed after 2-3 months to verify that hearing has returned to normal

SURGICAL TREATMENT

- ⇒ **Myringoplasty:** Post-aural approach under general anesthesia.
- ⇒ **Tympanoplasty:** In this operation reconstruction of tympanic membrane and ossicles is done. It is indicated when ossicles are disrupted along with tympanic membrane

Vertigo

Definition:

Vertigo is the hallucination of movement or sensation of rotation. It is cardinal symptom of vestibular system and its central connection.

Etiology:

We divide into 2 according to etiology

- 1) Non-vestibular diseases (Metabolic, Muscular and Skeletal)
- 2) Vestibular diseases (Central and Peripheral)

Central causes:

- Cerebrovascular diseases
- Migraine
- Multiple sclerosis
- Brain tumors
- Vertigo due to drugs (Diuretics, Metronidazole)
- Iatrogenic vertigo

Peripheral causes:

- BPPV (Benign Paroxysmal Positional Vertigo)
- Meniere's disease
- Vestibular schwannoma
- Vestibular neuronitis
- Middle ear diseases e.g. cholesteatoma
- Inner ear infection e.g. Labyrinthitis
- Cervical vertigo

Management:

i) History:

- ⇒ Ask about precipitating factors of vertigo e.g. Neck movements (BPPV)
- ⇒ Ask about associated symptoms e.g. deafness
- ⇒ Ask about frequency of attack
- ⇒ Ask about the past history of trauma
- ⇒ Ask about the drug history

ii) Examination:

- ⇒ ENT, CVS and Neurological examination is mandatory
- ⇒ Do *HALL PIKE TEST*
- ⇒ Do *Romberg's test*

iii) Investigations:

- ⇒ *PTA (for hearing loss)*
- ⇒ *ERA (Evoked Response Audiometry)*
- ⇒ *ENG (Electro Nystagmography)*
- ⇒ *Posturography*
- ⇒ *MRI*
- ⇒ *CBC*
- ⇒ *Test for Syphilis*

Treatment:

- Vestibular rehabilitation: it is the main stay of treatment in many vestibular disorders. This includes reassurance (80%) followed by habituating exercises.

Medical treatment:

- ⇒ Change the lifestyle
- ⇒ Labyrinthine sedatives e.g. Cinnarazine
- ⇒ Labyrinthine vasodilators
- ⇒ Anti-depressants

Surgical treatment:

- ⇒ It will be according to the cause e.g. for treatment of BPPV
- ⇒ Surgical options is:
 - Posterior semicircular canal obliteration
 - Singular neurectomy

Vestibular Schwannoma/Acoustic Neuroma

Definition:

It is a benign, encapsulated slowly growing tumor which originates from Schwann cells of 8th cranial nerve

The most commonly involved nerve is Superior Vestibular Nerve and then the Inferior vestibular nerve and rarely the cochlear nerve

Pathology

Microscopic appearance:

- ⇒ Appears as a firm, well circumscribed, encapsulated mass, which arises from neurilemmal sheath
- ⇒ Two histological patterns can be seen
 - Fasciculated type
 - Reticular type
 - Hemorrhage can occur leading to sudden onset of symptoms in reticular type

Epidemiology:

- ⇒ Female to male ratios 3:2. Common age presentation is 4th decade and onwards. It is 80% of all cerebellopontine angle tumors and 8% of all intracranial tumors.
- ⇒ 90% are unilateral

Clinical Features:

Symptoms

- ⇒ **Otological symptoms:**
 - Unilateral hearing loss 90%
 - Tinnitus
 - Vertigo is rare due to central compensation by the brain

Neurological symptoms:

Early symptoms: These are due to involvement of the 5th, 6th, 7th, 9th and 10th cranial nerves

- ⇒ 5th nerve involvement: Facial pain and Numbness
- ⇒ 6th nerve involvement: Diplopia and double vision
- ⇒ 7th nerve involvement: Facial weakness, Loss of lacrimation and loss of taste sensation from anterior 2/3 of tongue
- ⇒ 9th and 10th nerve involvement: Dysphagia and Hoarseness of voice

Late symptoms: These are due to the involvement of cerebellum

- ⇒ Ataxia
- ⇒ Unsteadiness/ Vertigo

Terminal symptoms: These are due to the raised intracranial pressure and include

- ⇒ Headache
- ⇒ Decreased vision (due to papillary edema)
- ⇒ Altered state of consciousness
- ⇒ Coma

Signs:

- ⇒ Otoloscopic examination is unremarkable Le no finding
- ⇒ Tuning fork test will show sensorineural hearing loss!
- ⇒ Check for 5th, 6th, 7th, 9th, 10th nerve involvement.
- ⇒ Check for cerebellar involvement by different tests e.g. Gait

Investigations:

- ⇒ MRI is the investigation of choice
- ⇒ PTA
- ⇒ Brainstem Evoked Response Audiometry (BERA)
- ⇒ Electrogustometry
- ⇒ Schirmer's test (lacrimation)

Treatment:

1. No treatment required in majority of the cases as it is very slow growing tumor
2. Surgical excision of the tumor if the patient has symptoms
 - Surgical excision** is done by one of the 3 approaches
 - ⇒ Translabyrinthine approach
 - ⇒ Middle cranial fossa approach
 - ⇒ Suboccipital approach
3. If the patient is unfit for surgery then option is Radiotherapy

WAX or CERUMEN

INTRODUCTION

Wax is a mixture of secretions from ceruminous and pilosebaceous glands together with squamous of epithelium dust and other foreign debris

LOCATION OF CERUMINOUS GLANDS:

Ceruminous glands are found deep within the skin of the outer 2/3 of the external auditory meatus

FUNCTION OF WAX:

- ⇒ Secretions of cerumen into lumen are both by eccrine and apocrine function.
- ⇒ This special odour is repellent to insects
- ⇒ Irritation of overlying skin causes the surrounding myoepithelial cells to contract expelling the liquid contents into the external auditory meatus once secreted evaporation occurs allowing the now sticky substances and the squamous epithelium to **entrap**
 - Dust
 - Bacteria
 - Fungi

SYMPTOMS

- ⇒ Deafness
- ⇒ Tinnitus
- ⇒ Reflex cough (which occurs due to stimulation of the auricular branch of the vagus nerve also known as the Arnold s nerve)
- ⇒ Earache or fullness in ear → when wax swells up by the entry of water into the ear after swimming or by the moisture in the atmosphere
- ⇒ Vertigo

SIGNS

Ear is having black

Dark brown or yellowish material looking waxy in appearance. It may be hard or soft in consistency.

TREATMENT

- ⇒ Removal by ceruminolytics e.g. oils (olive oil or almond oil) and soda glycerin eardrops. Small amount of wax can be removed but if wax deep within the meatus then it is first softened by instilling ceruminolytics then suction or syringing is done
- ⇒ Syringing
- ⇒ Suction under direct vision: to remove art wax
- ⇒ Instrumentation to remove hard wax
- ⇒ The best method for removal of wax is suction under direct vision

SYRINGING

Normal saline at 37° is used as irrigating solution.

For syringing pinna should be pulled

Adult → upward + backward

Children → directly backward

Stream should be directed onto the roof or posterior wall of the external auditory meatus so that it passes around the wax plug forcing it outwards by pressure from behind. Press directly onto a mass of wax will only tend to impact it more deeply.

Contraindications of syringing:

- ⇒ Perforation of the tympanic membrane
- ⇒ Previous ear surgery
- ⇒ Presence of middle ear diseases
- ⇒ Otomycosis
- ⇒ Otitis externa