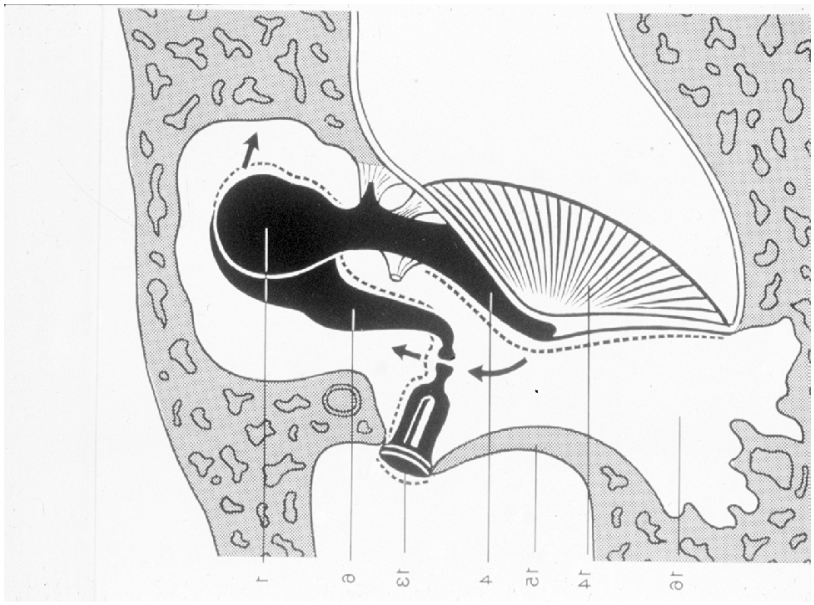
ENT III

Sources:
Lecture notes, Slides, 427 Team, Toronto's Notes



Normal Middle Ear Cavity

Chronic Otitis Media

- The middle ear cavity mainly contains air.
- The Eustachian tube connects the nasopharynx to the middle ear. Its function is to equalize the pressure between the middle ear and the atmospheric pressure.
- A disease is defined as a chronic disease if it lasts more than 4-6 weeks.

Classification of Chronic Otitis Media :

1. **Chronic non-suppurative otitis media:** (no pus coming through the external canal)

A. Otitis media with effusion "OME".

B. Adhesive otitis media.

2. **Chronic suppurative otitis media "CSOM":** (pus +perforation of drum)

A. Tubotympanic (Safe).

B. Atticoantral (Unsafe).

1. Chronic Non-suppurative Otitis Media

A. Otitis media with effusion "OME"

- **Definition:**

Presence of non-purulent fluid within the middle ear cleft (fluid is nearly sterile).

No perforation, Tympanic Membrane is Intact.

- **Synonyms (other names):**

1. Secretory otitis media.
2. Middle ear effusion.
3. Sero-mucinous otitis media.
4. Catarrhal otitis media.
5. Glue ear.
6. Serous otitis media.
7. Non-suppurative otitis media.

- **Prevalence:**

20% - 50% of **children** will have otitis media with effusion (OME) at some time between 3 and 10 years of age

Two peaks at 2 and 5 years of age.

Risk Factors:

- Race.
- Age: more in children because they are more prone to URTI and due to the anatomy of Eustachian tube in children (shorter, wider and more horizontal).
- Gender (female = male)
- Season: more in winter because of the common cold. Nasopharyngeal anatomical abnormalities (e.g. choanal atresia).
- Cleft palate.
- Smoking (whether passive or active, It causes irritation around the Eustachian tube)
- Allergy.

Histopathology:

Changes in the mucosa:

- Vasodilatation and mononuclear cell infiltration.
- Metaplasia of the epithelium to ciliated columnar epithelium.
- Mucus secreting gland formation.

Formation of fluid in the middle ear:

- Transudate.
- Exudate.
- Secretions.

Predisposing Factors:

Eustachian tube dysfunction --> <-- inflammation

Contraction of the Tensorpalati muscle causes opening of the Eustachian tube.

Etiology:

Eustachian tube dysfunction (failure of aeration and drainage):

- Poor muscular function (e.g. down syndrome)
- Adenoids (by hypertrophy of lymphoid tissue which can cause obstruction of the Eustachian tube)
- Barotrauma: trauma due to pressure (e.g. pilots and divers)
- Others (e.g. cleft palate, choanal atresia, rhinitis, sinusitis, tumors)

Infections:

- Unresolved acute otitis media (AOM).
- Adenoiditis and other URTIs (sinusitis, common cold). Increased secretory activity of the middle ear mucosa. Allergy.

So, The Air in Middle Cavity become absorbed:

There will be Metaplasia --> The Cell Lining Changes it character, become secretory in nature.

then, this fluid accumulate with no place to go (Blocked Eustachian Tube) as it stays longer, become thick (worsen the hearing loss)

Symptoms:

- Hearing impairment (**conductive hearing loss**, not sensory hearing loss).
- ± Otalgia (ear pain). Fluid sensation.

Diagnosis:

- Pneumatic otoscopy: dull, opaque, bulging and retracted membrane with yellow, gray or bluish color, and loss of light reflex.
- Tuning fork tests show conductive hearing loss.
- PTA (Pure tone audiometry).
- Impedance audiometry
- Audiogram: CHL, SNHL.
- Tympanometry and aucostic reflexes.
- Myringotomy (it is also part of the management).

Treatment:

- Treatment of the cause if feasible.
- Observation: If you think the disease is not active (most cases resolve spontaneously).

Medical treatment:

- Antibiotics.
- Decongestants, Anti-allergics.
- Steroids, middle ear aeration (e.g valsalva maneuver).

Surgical:

- Myringotomy (Repairs the Tympanic Membrane only) and aspiration (to equalize the pressure).
- Ventilation tubes (grommets).
- Surgical treatment of the causative factor (e.g. adenoidectomy, tonsillectomy)

Complications of ventilation tube insertion:

- Infection (use ear drops, if the infection persists the tube has to be removed).
- Blockage.
- Extrusion (come out very early).
- Tympanosclerosis: hyalinization of the fibrous tissue followed by calcium deposits. Perforation.

Factors affecting treatment:

- Age.
- Duration.
- Unilateral or bilateral (if it is unilateral in adult patient, you have to think about nasopharyngeal carcinoma).
- Degree of hearing impairment.
- Previous treatment.
- Associated conditions (e.g. cleft palate).
- Tympanic membrane changes.
- Other factors.

Sequelae:

- Spontaneous resolution: 50% resolve within 3 months. Only 5% persists for more than 12 months.
- Tympanosclerosis.
- Scarring, retraction, atelectasis of the middle ear and ossicular necrosis.
- Cholesteatoma and cholesterol granulomas.

Conclusion:

- **OME** is very common in children.
- Etiology is associated with Eustachian tube dysfunction and/or chronic infection.
- In adults, nasopharyngeal pathology should be considered.
- Most cases resolve spontaneously.
- Conservative treatment is of doubtful **value.**
- Ventilation tube insertion restores hearing in selected cases.

B. Chronic adhesive otitis media:

Definition:

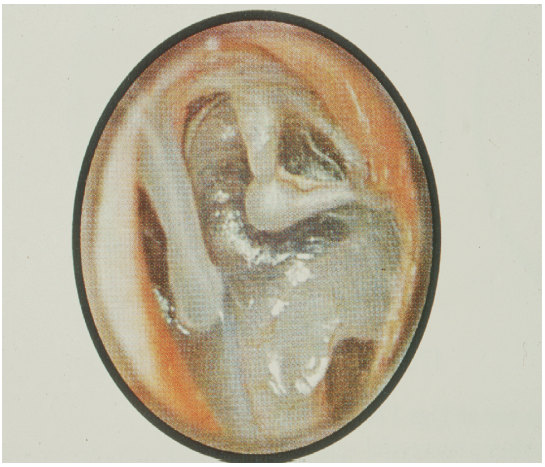
- Formation of adhesions in the middle ear (between middle ear wall and tympanic membrane itself) after reactivation and subsequent healing of either CSOM or OME.

Causes:

- Prolonged OM Or/and inappropriate treatment

Clinical Features:

- History of CSOM or OME.
- Deafness Conductive is usually the only symptom (the conductive deafness is usually more than OME). Tympanic membrane shows various structural changes



Treatment:

- Impossible to treat
- Observation (advise the patient to perform valsalva maneuver).
- Surgical treatment. (If it is large)
- Hearing aid.
- **Ventilation Tube is the treatment of choice in children**

Ventilation tube insertion
(surgical treatment of otitis media)

2. Chronic Suppurative Otitis Media "CSOM"

Definition:

- Chronic suppurative otitis media (CSOM) is a long-standing infection of a part or whole of the middle ear cleft, characterized by ear discharge and a permanent perforation. A perforation becomes permanent when its edges are covered by squamous epithelium and it does not heal spontaneously.
- Facial Nerve Runs In the middle ear Horizontally
- Conductive Deafness and/ or Mixed Hearing Loss are found in CSOM
- Infection may speared to the Inner Ear --> SNHL

Etiology:

- Environmental (hot and humid weather).
- Genetic
- Previous OM (either AOM or OME).
- Upper respiratory tract infections
- Eustachian tube dysfunction

Clinico-pathological types:

- Tubotympanic "TT" (safe type, anteroinferior). Perforation is central, Tympanic is surrounding it (not in the centre necessary) , Not associated with **Cholesteatoma**
- Atticoantral "AA" (unsafe type, posterosuperior). Perforation could be Atic, marginal ! Associated with **Cholesteatoma**

Pathology:

- Signs of suppurative infection:

Discharge (otorrhea) and perforation.

Chronic inflammatory reaction in the mucosa and the bone (osteitis).

- Signs of healing attempts (if there is damage to mucosa):

Granulation tissue and polyps.

Fibrosis and tympanosclerosis.

- Cholesteatoma (in atticoantral type).

Symptoms:

- **Otorrhea:**

Intermittent, profuse and odorless in TT type (mucopurulent discharge).
Persistent, scanty and odorous in AA type (the odor is due **to** involvement of the bone).

- **Deafness**: conductive (except in case of cholesteatoma where it can cause sensory hearing loss).
- **Tinnitus.**

N.B. **Any other symptom means complication**

Otoscopic examination:

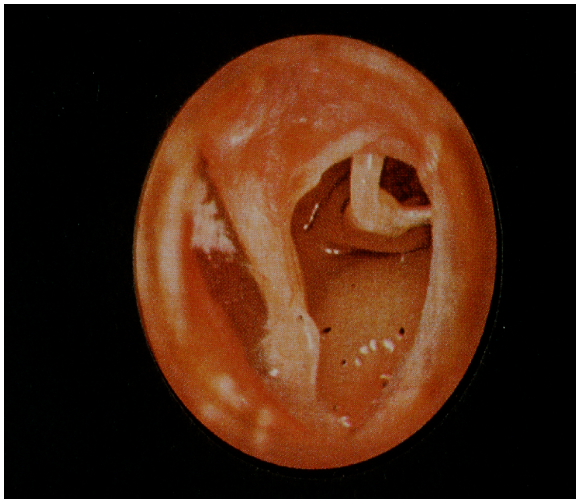
Discharge:

- Present in TT type if active, but may be absent if not active.
- Usually is present in AA type.

Perforation:

- Central perforation: in TT type (does not involve fibrous annulus).
- Marginal or attic perforation (in attic area): in AA type with cholesteatoma (cholesteatoma like wet paper).
- **Polyps, granulation tissue and tympanosclerosis.**

- You can see if there is a perforation: Handle of malleus, Long process of Incus, AS joint !



Total perforation in chronic suppurative otitis media

Healed Tympanic Membrane
with tympanosclerosis
Sometime a Perforation Could heal by it self .. called: tympanosclerosis

• Tympanosclerosis:

1. Harmless to the patient, Normal hearing.
2. Patient May have conductive Deafness --> No Need for surgery also !

Features indicating complications in CSOM:

1. Pain.
2. Vertigo.
3. Persistent headache (intracranial complication).
4. Facial weakness (facial canal erosion).
5. Child refusing feeds and easily sleeps (extradural abscess).
6. Fever, nausea, vomiting (intracranial infection).
7. Irritability and neck rigidity (meningitis).
8. Diplopia (Gradenigo's syndrome)
9. Ataxia (labyrinthitis or cerebellar abscess)
10. Abscess around the ear (mastoiditis).

Bacteriology:

1. Aerobes:

- Pseudomonas aeruginosa (gram negative).
- Proteus (gram negative).
- Escherichia coli (gram negative).
- Staphylococcus aureus (gram positive).
- Klebsiella (gram negative).

2. Anaerobes:

- Bacteroides fragilis.
- Peptostreptococcus.

Investigations:

- Audiometry and tuning fork tests.
- Microscopy.
- Bacteriology.
- Imaging (e.g. CT, mastoid X-rays).

Treatment:

- Depends on the type and presentation (either simple or not):
- Medical Treatment is preparing the to surgery; If the patient has discharge you can not preform surgery on him !

1. Treatment of TT CSOM:

- Conservative treatment (active TT type --> conservative treatment --> inactive TT type)
- Ear toilet (we have to clean the ear every now and then to get rid of pus, so the ear drop can touch the mucosa).
- Ear drops.

- Reconstructive surgery: myringoplasty with or without ossicular reconstruction. Treat any predisposing or contributory factors (e.g. infected tonsils, nasal allergy)
- Keep the ear dry and avoid hard nose-blowing.
- Antibiotics: according to culture (e.g. clindamycin or second generation cephalosporins) Removal of polyps and granulations.

Myringoplasty:

An operation performed to repair the tympanic membrane.

Tympanoplasty:

An operation performed to eradicate disease in the middle ear cavity and to reconstruct the hearing mechanism (commonly, we use the temporalis fascia as a graft).

It is done by closing the the perforation and Inspect The Ossicles (Making sure that they are Intact, Mobile)

Types:

Type 1: Means closing of the Perforation, Inspect the ossicles and they were fine.

Types 2: Means closing of the perforation, and there is Ossicles distraction and the surgeon repaired it

-> Specially between the Incus and stapes

Type 3: Means closing of the perforation, and there doesn't have ossicles (Distracted)

Type 4 and Type 5: for congenital anomalies only !

Mastoidectomy:

Removing the Mastoid Content

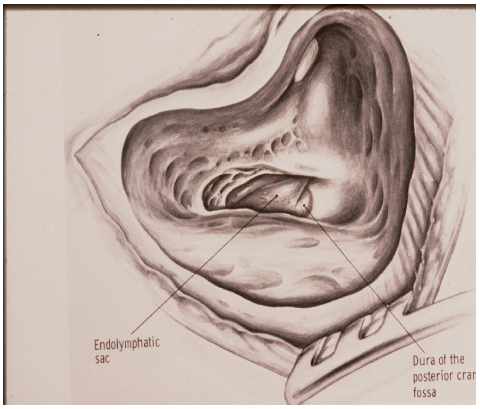
Two Types:

Cortical Mstoidectomy: Mastoid Process is cleared

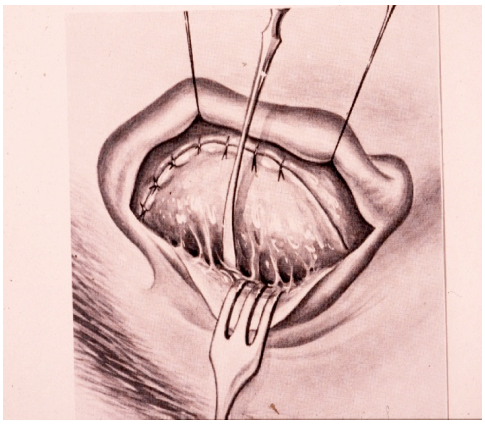
Radical Mastoidectomy: Clear MAstoid Process, Removal of the Posterior Wall

TympanoMastoidectomy: (Combine approach TympanoMastoidectomy)

Means: we have cleared the mastoid from the disease + the perforation is closed in tympanic



Mastoidectomy operation as the possible operation in chronic suppurative otitis media



Post auricular incision approach to middle ear and mastoid

Aims of tympanoplasty:

- To close the perforation.
- To prevent re-infection.
- To improve hearing.

2. Treatment of AA CSOM:

Removal of cholesteatoma by mastoid operation (mastoidectomy`) either radical or modified radical. Canal wall up procedures are done in selected cases.

Canal wall down procedures:

- They leave the mastoid cavity open into the external auditory canal so that the diseased area is fully exteriorised. The commonly performed operations for atticoantral disease are atticotomy, modified radical mastoidectomy and rarely, the radical mastoidectomy.

i) Modified radical mastoidectomy:

An operation in which the mastoid antrum and air cells, attic and middle ear are converted into a common cavity, exteriorized to the external canal. The tympanic membrane and ossicles remnants are retained.

ii) Radical mastoidectomy:

An operation in which the mastoid antrum and air cells, attic and middle ear are converted into a common cavity, exteriorized to the external canal.

The tympanic membrane, malleus and incus are removed, leaving only the stapes in situ.

There are 3 types of Incisions is surgery (approach to the middle ear):

1- Behind the Auricle (post)

2- Endo-oral: Used with type two Tympanoplasty

3- Transcanal: Through the canal, only used if the patient is having central Perforation (Not used anymore)

Complication of Surgery:

Facial Nerve Paralysis: because it has 2 pathways in the Middle ear:

1- Horizontal: 55% of patients are uncovered by bone in this area so, it might be injured during surgery

2- Vertical: goes in the mastoid

Facial paralysis as a complication of middle ear and mastoid surgery

Aims of radical and modified radical mastoidectomy:

- Safety.
- Dry ear.
- Preserve hearing.
- Mastoidectomy is an unsafe and risky procedure so hearing might be impaired as a complication of it.

Conclusion:

- **TT type**: The discharge is usually copious, intermittent and odorless. The perforation is central. Treatment is conservative (if there is active infection) followed by tympanoplasty to prevent re-infection and improve hearing.

- **AA type:** The discharge is usually scanty, persistent and of bad odor. The perforation is attic or marginal with cholesteatoma. Treatment is by mastoidectomy to provide safety and dry ear.

Cholesteatoma

Definition:

The presence of a desquamating stratified squamous epithelium (skin) in the middle ear. The middle ear is no where lined by keratinising squamous epithelium. It is the presence of this type of epithelium in the middle ear or mastoid that constitutes a cholesteatoma. In other words, cholesteatoma is a "skin in the wrong place". The term cholesteatoma is a misnomer, because it neither contains cholesterol crystals nor is it a tumor to merit the suffix "oma" However, the term has been retained because of its wider usage.

Classification of cholesteatoma:

- **Congenital**: It arises from the embryonic epidermal cell and rests in the middle ear cleft or temporal bone. Congenital cholesteatoma occurs at three important sites: middle ear, petrous apex and the cerebellopontine angle, and produces symptomatology depending on its location.

- **Acquired**:

1. Primary: It is called primary as there is no history of previous otitis media or a pre -existing perforation.

2. Secondary: In these cases, there is already a pre-existing perforation in pars tensa. This is often associated with posterosuperior marginal perforation or sometimes large central perforation.

Effects of cholesteatoma:

- Keratin encourages persistence of the infection.
- Matrix causes bone erosion (bone destruction).

Cholesteatoma expansion and bone destruction:

- Once cholesteatoma enters the middle ear cleft, it invades the surrounding structures, first by following the path of least resistance, and then by enzymatic bone destruction. An attic cholesteatoma may extend backwards into the aditus, antrum and mastoid; downwards into the mesotYmpanum; medially, it may surround the incus and/or head of malleus.

- Cholesteatoma has the property to destroy bone. It may cause destruction of ear ossicles, erosion of bony labyrinth, canal of facial nerve, sinus plate or "gmen tympani and thus cause several complications. Bone destruction by lolesteatoma has been attributed to various enzymes such as collager phosphatase and proteolytic enzymes, liberated by osteoclasts anc ononuclear inflammatory cells, seen in association with cholesteatorr

Done !