



Ear III-IV

Objectives:

- Chronic otitis media and middle ear operation.
- Classification of chronic otitis media.
- Otitis media effusion.
- Adhesive otitis media.
- Chronic suppurative otitis media – types and management.
- Ear operation in brief (myringotomy, tube, tympanoplasty and mastoidectomy).
- Predisposing factors for complications, and the complications of acute & chronic otitis media.
- The pathways for spreading the infections beyond the ear.
- To know the classifications of complications (extra cranial, cranial {temporal}, & intra cranial).
- To know presentations, clinical findings, investigations and management of each complication.
- In detail (acute mastoidectomy and management).

Resources: 435 team work, slides

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Quick middle ear anatomy

- **Eustachian** (Pharyngo-tympanic) Tube
- **Tympanum** (Middle Ear Cavity):
 - **Ossicles:** malleus, incus, and stapes.
 - **Muscles:** Stapedius muscle and Tensor tympani
 - **Nerves:** Facial nerve
- **Mastoid Antrum and Air Cells**

- **Stapedius muscle innervation:** stapedial nerve, from the facial nerve, what is the tiniest muscle in the body is? Stapedius muscle

- **Tensor tympani muscle innervation:** mandibular branch, of the trigeminal nerve

ACUTE VS CHRONIC Otitis Media

type	Acute Otitis Media	Sub-Acute Otitis Media	Chronic Otitis Media
duration	Less than 3 weeks	From 3 weeks-3 months	More than 3 months

Acute otitis media (AOM):

Stages:

- I: Tubal occlusion (to early)
- II: pre-suppurative (effusion not pus yet)
- III: Suppuration
- IV: Resolution/complications (to late)



Chronic otitis media (COM):

❖ Chronic Otitis Media is an infection involving a part of the middle ear cleft or all its components that is persistent for more than 3 months.

❖ The tympanic membrane is intact (not perforated) in Chronic non-suppurative otitis media, while in chronic suppurative otitis media it is not intact (perforated).

❖ To have a discharge coming through the external canal the membrane has to be perforated.

❖ Classification:

A. Chronic Non suppurative (discharge) otitis media:

● **Otitis media with effusion (OME)**. If not treated properly or not cured by itself, it could lead to adhesion in the tympanic membrane in middle ear (adhesive otitis media).

- **Adhesive otitis media**

B. Chronic suppurative otitis media (CSOM)

- **TuboTympanic** (As long as the annulus is intact, we consider it TT) , which is also known as the Safe type, has no risks of serious complications. the perforation is toward the Eustachian tube or in the middle of tympanic membrane.
- **AtticoAntral**, which is also known as the Unsafe type, has a high risk of developing complications.

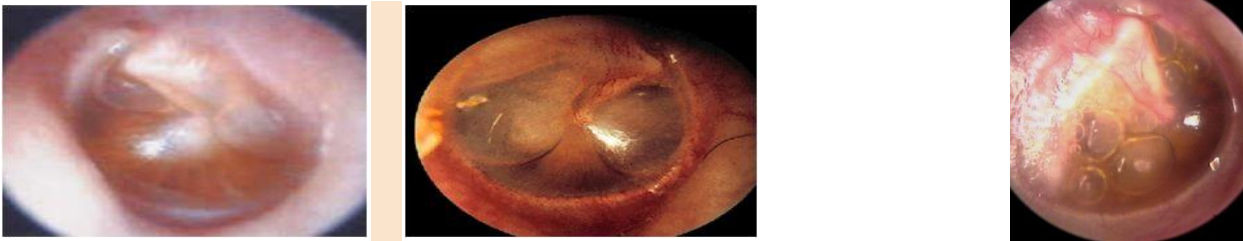
explanation of stage of Acute otitis media (AOM):

- **Stage I:** Eustachian tube is blocked that will lead to negative pressure forming in the middle ear cavity, and there will be more fluids and less air, that will result in the retraction of the tympanic membrane towards the middle ear cavity
 - **Stage II:** this happens approximately when the middle ear cavity is almost filled with fluids (no air), that will give you bacterial invasion but still no pus and suppuration (pre-suppurative), if treated at this stage it may prevent you from going to the next stage but if you didn't treat it the patient will go to stage three
 - **Stage III:** in addition to the complications in stage I&II the patient will have a lot of pus, more pain, fever, and the condition progressed to infection which you should handle it with antibiotics normally. If you didn't treat it at this stage the patient will go to the next stage
 - **Stage IV:** if you have a negative pressure in a tight area, most likely the pressure will try to break through the weakest point in that area, as we know the middle ear cavity is all bony EXCEPT the lateral side which has the tympanic membrane, so the TM will rupture to relieve the pressure inside the middle ear cavity.
 - When the TM is perforated/ruptured, there will be pus collection (discharge) in the external auditory meatus and there will be resolution of the symptoms (pain will decrease)
 - What are the complications of acute OM?
- In the above picture, what do you think is the stage of AOM?
Stage III, but if you waited longer the patient might go to stage IV

A. Chronic non suppurative otitis media

Otitis media with effusion:

- Glue ear or secretory otitis media (SOM):
- Glue ear or secretory OM are all synonyms for OM with effusion.
- Effusion means fluids in the middle ear cavity, you can see in the picture **there are air bubbles** and the tympanic membrane is red and bulging, this is an image of OM with effusion



● Dysfunction of the Eustachian tube:

○ If the patient had recurrent acute otitis media, and you keep giving him antibiotics and didn't improve you think of the cause that is blocking the eustachian tube, in children the main problem that is causing blockage if the Eustachian tube is adenoids so you need to remove the adenoids in order for the child to benefit from other procedures: like tube or drainage, in adults Eustachian tube dysfunction could happen post radiation.

- Middle ear filled with serous or mucoid fluid
- No purulence
- Often present after acute otitis media is treated appropriately with antibiotics ● Most will clear within 3 months.
- Previously thought sterile
- 30-50% grow in culture
- over 75% PCR +
- Usual organisms

Etiology

- **Bacterial:** *Strep.pneumoniae* -*Moraxella cat* -*Haemophilus influ.*
- **Viral:** RSV - Rhinovirus -Parainfluenza virus - Influenza virus

Diagnosis

-History. - Clinical Examination. - Tuning fork tests (Weber and Rinne test)

mnemonic;

(Weber and Rinne test) Rinne= rinne under the pinne(pinne=pinna) normal of Air Conduction more than bone conduction. weber=weber it's right or left. tells u sensorineural hearing loss. example; if u hear it better in the left mean right sensorineural.

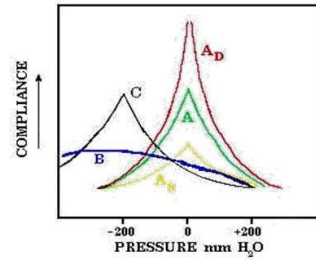
normally equal in weber but if i'm coming and having disease in the right ear and when i put weber i heard it in the same ear i'm complaining of this is CONDUCTIVE hearing loss. But if i heard it in the other ear this is sensorineural hearing loss. Rinne positive mean AC more than BC which is NORMAL or SENSORINEURAL. we do weber to differentiate, Rinne negative mean BC more than AC which is ONLY CONDUCTIVE.

Audiological assessment:

1-Tympanometry.

We apply pressure and look at cochlear movement zero is peak is normal. If flat as B this is no movement of TM like wax, foreign body, perforation, effusion. to differentiate between them we do External Ear Canal Volume, if there's foreign body it will be low, if effusion or tympanosclerosis normal, if perforation very high.

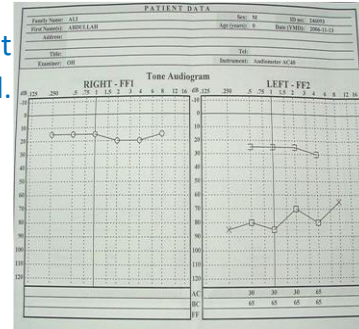
C is negative pressure ossicle tube dysfunction. If there's effusion it will go to B



2- Pure tone audiogram.

we give tone to patient in isolated room and specific frequency and he say yes i heard it or no. and the audiologist count the value. if 25 and more this is normal if less abnormal. we give two pure tone once with headphone=Air Conduction.

and the other bone if AC and BC in normal range this is normal if BC in normal but AC less. this is conductive hearing loss. if all not in normal range and no space between them this is sensorineural if all not in normal range and there is space between them this is mix



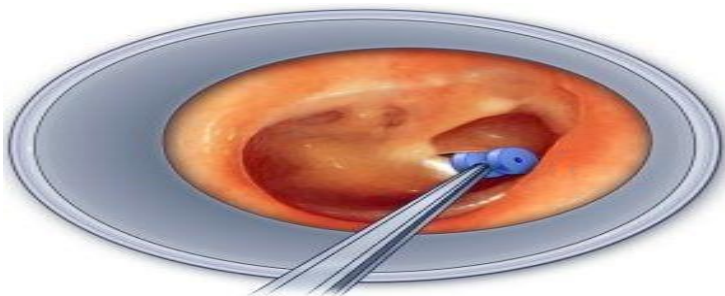
Management

A. medical

- **Observation** – many European countries wait 6-9 months prior to placement of ear tubes.
- **Antibiotics.** Meta-analysis shows beneficial short-term resolution of OME.
- **Audiogram at 3 months with persistent effusion to determine impact on hearing**
- **Decongestants, Nasal corticosteroid sprays, OTOVENT**
- Medical is the first step before surgical, nasal sprays, nasal drops, or for long term there are steroid sprays (not giving to children less than 2 years, and no longer than 3 months of use), OTOVENT: is a balloon that the patient inflates with one of the nostrils to open the blocked Eustachian tube

B. Surgery (Tympanostomy Tubes)

Bypass Eustachian tube to ventilate middle ear. indication : chronic OME >3mos with hearing loss and/or speech delay is an indication for tympanostomy tube placement.



-myringotomy +/- tube, balloon dilation of the Eustachian tube.

- it is named myringotomy because you open the tympanic membrane, the tympanic membrane is rounded in shape. -Where is the best site in the TM to do an incision for myringotomy? Most likely and it is recommended to do it in the anterior inferior part of the membrane, sometimes you will find adhesions in

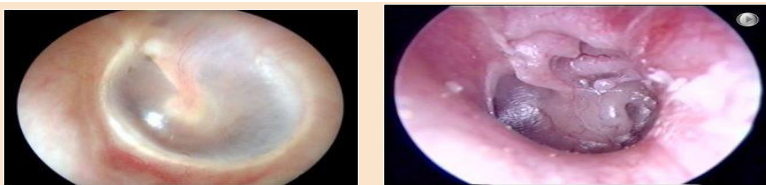
the anterior inferior site, so you do the incision the posterior inferior site. -Some of the schools will do adenoidectomy, myringotomy, (grommet) tube placement all at the same time, others will do for example only myringotomy ... etc. -Tube might have some complications like: permanent perforation, foreign body reaction...etc, it will stay in the ear for 6 months. -Myringotomy will heal after 48 to 72 hours. -One of the new methods of dealing with OM with effusion is balloon dilation of the Eustachian tube, promising results

Adhesive Otitis Media:

- Lack of middle ear ventilation results in negative pressure within the tympanic cavity.
- The ear drum retracts onto structures within the middle ear.
- The result of long-standing Eustachian tube dysfunction.
- the drum loses structural integrity and becomes flaccid.
- Contact between the drum and the incus or stapes can cause bone erosion at the IS joint.
- Can sometimes be treated with tympanostomy tubes

-Adhesive OM is other way of negative pressure in the middle ear cavity, in this case the negative pressure is without fluids, so it will create a tension pulling the tympanic membrane medially towards the ossicles and promontory (first turn of cochlea) and get adherent to them.

Middle ear atelectasis (TM retraction)



B. Chronic suppurative otitis media

Chronic suppurative otitis media is a long-standing infection of a part or whole of the middle ear cleft characterized by ear discharge (Otorrhea) and permanent perforation of tympanic membrane

❖ 3D

Duration > 3 months despite treatment

Discharge mucopurulent otorrhea

Deafness Perforation /Ossicular chains

❖ Epidemiology

More common

- Lower socioeconomic groups
- Children
- Otitis media
- Some children eventually outgrow.



❖ Etiology

Pseudomonas aeruginosa. Staphylococcus aureus. Proteus species. Anaerobes, Fungi (Aspergillus, Candida)
(usually caused by mixed organisms), if the patient came with ear discharge think of OM

❖ Classification

1-Tubo-tympanic. (safe)

2-Atticoantral. (un safe)

❖ Pathogenesis:

- ET dysfunction
- Poor aeration

- Mucosal edema and ulceration: - Capillary proliferation
- Osteitis

❖ Signs and symptoms

4D

- Deafness (Hearing loss)
- Discharge
- Defect TM (perforation)
- Duration

❖ Diagnosis:

- S/S
- Audiogram CHL
- -/+ CT scan
- Complication
- Revision
- Only hearing

Safe Vs. Unsafe (Cholesteatoma)

A-Tubotympanic type (Safe):

- Simple perforation.
- Intermittent non offensive(odorless) non bloody, Profuse ear discharge.
- On examination (central perforation).



B- Attico-antral (unsafe):

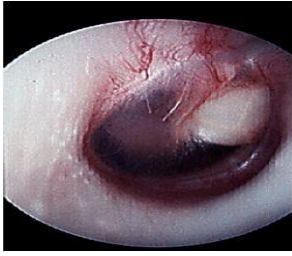
- Chronic(persist), Scanty, offensive and bloody ear discharge.
- On examination marginal perforation.

- You may see cholesteatoma. (Cholesteatomas are epidermal inclusion cysts of the middle ear and/or mastoid with a squamous epithelial lining.)

- Contain keratin and desquamated epithelium.



- Can be congenital (with intact TM)



- or acquired.(discharge)



❖ Pathogenesis of cholesteatoma

Natural history is progressive growth with erosion of surrounding bone due:

- Pressure effects.
- Osteoclast activation.

- some protease and collagenase secretion leading to bone and tissue erosion.

Primary acquired cholesteatomas pocket

- Invagination
- Basal cell hyperplasia
- Otitis media with effusion
- Epithelial invasion

Secondary acquired cholesteatomas

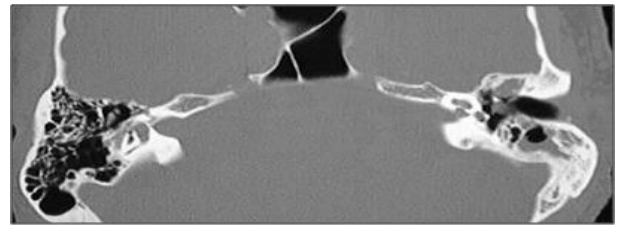
- Implantation theory
- Metaplasia theory
- Epithelial invasion theory

❖ Diagnosis:

-History

-Examination: -Otosopic, Microscopic, Tuning fork test.

Investigation: Audiological assessment, Radiological assessment Cholesteatoma image



❖ Treatment

A. Chronic suppurative otitis media without cholesteatoma (safe)

- Cleaning
- Water protection
- Acetic acid: a) used for cleansing debris b) inhibits Pseudomonas

❖ Otological Medications:

- **Antibiotic only otic drops** - Floxin (ofloxacin) • Ciprofloxacin (100% dry @ 21 days) • Neomycin
- Polymyxin B • Gentamicin • Tobramycin

• **Antibiotic with steroid otic drops** - Ciprodex (ciprofloxacin and dexamethasone Cipro HC ciprofloxacin and hydrocortisone)

❖ **Systemic:** • Antistaphylococcal • AntiPseudo • Quinolones

❖ **Surgical:** repair of the TM perforation: - **Myringoplasty - Tympanoplasty**

- Ossicular Chain Reconstruction if needed

B. Chronic suppurative otitis media with cholesteatoma (Unsafe)

Skin growing in the wrong place

• Middle ear cleft • Mastoid • Petrous apex.

- Granulation tissue in contact with bone enzymes "collagenase" bone destruction.

Congenital cholesteatomas:

1. Normal TM 2. No history of otorrhea 3. No history of otologic Sx

• Prior OM without otorrhea are not excluding

-Cholesteatoma Surgery:

Canal wall up (CWU)

• **Complete mastoidectomy**

Canal wall down (CWD)

-**Radical Mastoidectomy or modified radical mastoidectomy** (= Bondy's procedure).

Surgical goals for cholesteatoma

1. Treat complications 2. Remove diseased tissue 3. Obtain a dry ear 4. Preserve normal anatomy

5. Improve hearing

Determinants of operative technique for cholesteatoma

Local factors:

• Presence of a fistula • Extent of disease • Eustachian tube function • Mastoid pneumatization • SNHL

General factors:

• General medical condition • Reliability • Skill of the surgeon

Radical Mastoidectomy: remove malleus, incus, mastoid (so we make the middle ear and the attic one cavity). Modified Radical Mastoidectomy: spares the ossicles (so we only clean the epitympanum)

-**Cholesteatoma: keratin in the middle ear cavity, it is the unsafe type of CSOM, it has more complications and may need major surgeries.**

■ **What are the causes and why it happens? There are only theories about this subject, not well known.**

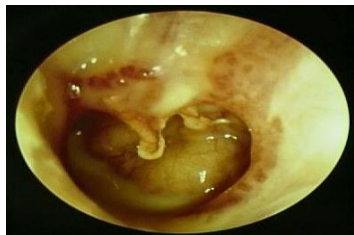
• **Suppurative means you have discharge**, so if you have discharge and perforation, the treatment is surgery. • **In the picture (right down) we don't depend on the size of the perforation we depend on the annulus (tympanic membrane rim) if the annulus is intact most likely it is safe COM, also if there is no keratin (the whitish material).**

• **In the other picture (right up) we have subtotal or total perforation, but the annulus is still intact, and no keratin, so it is safe.**

- In the other picture (left down) we have middle ear polyp, it is a reaction by the body if there was a long term suppuration(pus), that will lead to bulging of the middle ear mucosa, and that polyp will continue to discharge until it is cleared by an operation, so we can't judge because it is obscuring the TM but it seems within the safe.



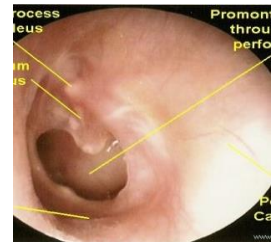
Unsafe



safe



safe



safe

Management is Surgery in form of:

a. Tympanoplasty: ○ Tympanoplasty is closure of the perforation in the TM, with or without ossiculoplasty (reconstruction of the ossicles).

b. Mastoidectomy:

○ Mastoidectomy: is cleaning of the air cells in the mastoid, we need it in case if the Chronic suppurative OM extended to mastoiditis, every patient should be CT scanned prior to surgery to plan and judge before deciding whether to perform tympanoplasty or mastoidectomy with tympanoplasty.

CSOM –biofilms

• What is a biofilm?

- Polysaccharide matrix surrounding bacteria,
- Spore-like
- Communication network for the bacteria

• Failure of anti-microbials (hypothesis)

- Direct barrier effect
- Biofilms antagonize abx through gene expression
- Negative charged surface

c. Tympanomastoidectomy:

• Notes:

○ Different types of tympanoplasty:

○ Wullstien classification of tympanoplasty

➤ Type I: called simple tympanoplasty or myringoplasty.

■ why? (because you are reconstructing the tympanic membrane without touching any ossicles), you do that if you have a tympanic perforation and you gave it time to heal but it didn't, so you go and reconstruct as a simple myringoplasty.

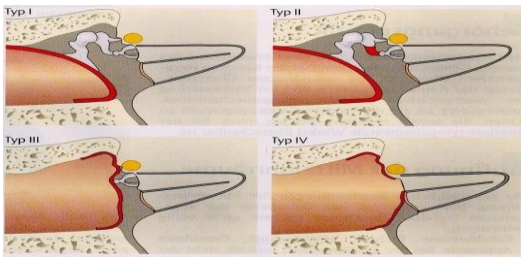
➤ Type II: TM reconstruction + the Pt will need partial ossicular reconstruction prosthesis (PORP) or total ossicular reconstruction prosthesis (TORP) because of the erosion mainly to the incus.

➤ Type III: the most common, and usually the Pt come at II or III, we are reconstructing the TM but the ossicles are already eroded, and the only intact ossicle is the stapes, so you will attach the TM membrane on the head of the stapes and you may use some prosthesis as will.

■ We have in Stapes a foot plate, and crura (suprastructure)

➤ Type IV: rarely used.

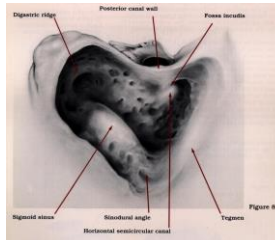
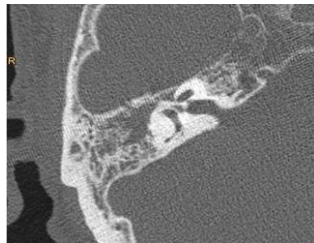
■ In the picture we see the TM membrane, there is Partial Ossicular Replacement Prosthesis (PORP) because the stapes is intact, but if the stapes' supra structure is not there, we do Total Ossicular Replacement Prosthesis (TORP).



★ Notes:

★ Where is the mastoid?

○ This picture is an Axial cut of CT showing the mastoid. There are a lot of normal variations in mastoid in adults, so you may notice that both sides aren't symmetrical, if the mastoid is filled with air it will appear black, but when it is filled with either edematous mucosa or pus or discharge it will appear like it is totally opacified and you can't see air, in this case you should go forward for mastoidectomy, tympanoplasty alone will not help and won't be successful, because if we did a tympanoplasty and cleaned the pus and/or discharge from the middle ear cavity, the pus and/or discharge will recur again because you didn't treat the cause of the infection.



★ In MASTOIDECTOMY, we go to the area of the mastoid if the underlying mucosa in COM and chronic mastoiditis is inflamed and producing pus, we drill and clean all the whole area.

★ The doctor mentioned the anatomical structures of the external and middle and inner ear with the mastoid air cells in the CT axial cut

Investigations in Chronic Otitis Media

1. **Audiology:** PTA, tympanogram, acoustic reflex.

2. **Radiology:** CT, MRI. We care more about CT than MRI in case of COM. When do we care more about MRI for COM? If you are dealing with or expecting complications.

Complications of Otitis Media (Acute & Chronic):

❖ **Predisposing factors:**

- Virulent organisms. ○ the most common organism causing COM? pseudomonas and the most dangerous one, very resistance to antibiotics.
- Chronicity of disease ○ the more chronic the most likely to get complications, less successful the surgery to treat the disease
- Presence of Cholesteatoma and bone erosion. ○ cholesteatoma: the presence of skin "white keratin material" in abnormal location that secretes enzymes and eat up the bone, causing a pathway for disease to spread specially

behind the mastoid going to the brain and meninges. Anatomically there is no skin in the middle ear.

- Obstruction of natural drainage e.g. by a polyp. (Natural drainage eustachian tube).

- Low resistance of the patient. ○ e.g. immunocompromised pts. Most of the times otitis media is cured without any complications

◆ Pathways of infection:

- Extension of infection is by bone erosion due to a cholesteatoma. **The most common pathway.**
- Vascular extension (retrograde thrombophlebitis) **from the mastoid area going most likely to the brain.**
- Congenital dehiscence.
- Fracture lines.
- Round or oval window membrane to the labyrinth.
- Dehiscence due to previous surgery.

Complications of Otitis Media (Acute & Chronic):

A. Intra-cranial:

1. Lateral sinus thrombosis
2. Epidural abscess
3. Subdural abscess
4. Meningitis
5. Brain abscess
6. Otitic hydrocephalus

B. Intra-temporal complication:

1. Hearing loss (SNHL/CHL)
2. Facial paralysis
3. Mastoiditis
4. Petrositis
5. Inner ear Fistula
6. Labyrinthitis
7. Tympanosclerosis
8. Ossicular discontinuity and fixation

A. Intra-cranial complication :

1-Epidural abscess

- b/w the bony part of the mastoid and the dura, there will be abscess
- Collection of pus against the dura.
- Middle or posterior cranial fossa.

Why not the anterior? Because the mastoid is related to middle and posterior cranial fossa, but the anterior one is far away

- Sharply defined dural adherence to bone at suture lines
- epidural abscess is the commonest Intracranial complication of otitis media.
- Intracranial complication of otitis media
- Outside the dura of the lateral venous sinus is called perisinus abscess.
- Associated with subdural empyema, management and etiology same as subdural empyema
- can lead to focal osteomyelitis

❖ Clinical picture:

- **Persistent headache** on the side of otitis media.
- **Pulsating discharge.**
- Fever
- Asymptomatic (discovered during surgery) **especially in immunocompromised**

❖ **Diagnosis:** CT scans reveal the abscess as well as the middle ear pathology.

❖ **Treatment:** Mastoidectomy and drainage of the abscess + IV ABx for prevention

3-Subdural abscess

● **b/w dura and arachnoid space**

- Collection of pus between the dura and the arachnoid. It's a rare pathology.
- Potential space
- Lack of anatomical boundaries

❖ Clinical picture:

- Headache without signs of meningeal irritation.
- Convulsions.
- spread rapidly
- Fever & Vomiting
- Focal neurological deficit (paralysis, loss of sensation, visual field defects)
- Ear 14% (paranasal sinusitis 75%)
- Forehead or eye swelling from emissary vein thrombosis
- Nuchal rigidity (doctor mentioned it in the slides but we don't know how is that matching with the previous statement of not having any signs of meningeal irritation)

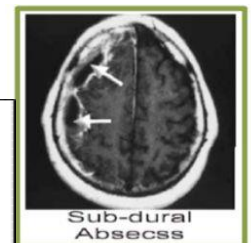
❖ **Investigations:** CT scan of head both with and without contrast, MRI

LP is hazardous - risk of transtentorial herniation

❖ Treatment:

- Antibiotics – initially (systematic)
 - Vancomycin
 - Chloramphenicol
 - Flagyl
 - Modify based on culture results
- Drainage (neurosurgeons).
- Mastoidectomy.
- Craniotomy: – relatively emergency – Wide craniotomy because of septations / loculations

Axial cut, CT, Bone window
The subdural abscess is within the dura (a white thin line).
It's a landmark to distinguish between extra and subdural abscess



Why we do mastoidectomy if the abscess is subdural?

b/c the source of the disease is there, so if you drained the abscess and didn't treat the source it will happen again and again.

Lumbar puncture should not be done as it can cause herniation of the cerebellar tonsils. It is a neurological emergency. A series of burr holes or a craniotomy is done to drain subdural empyema. Intravenous antibiotics are administered to control infection. Once infection is under control, attention is paid to causative ear disease which may require mastoidectomy.

2-Meningitis

- meningitis and VST, serious complications, very rare, but they could happen
- Inflammation of meninges (pia & arachinoid)
- ❖ **Pathology:** Occurs during acute exacerbation of chronic unsafe middle ear infection.
- ❖ **Clinical picture:**
 - General symptoms and signs: High fever, restlessness, irritability, photophobia and delirium, and rarely rash
 - Signs of meningeal irritation: Kernig's sign and Brudzinski's sign (click on the sign there is a video).
- ❖ **Diagnosis:** Lumbar puncture is diagnostic. to detect the organism and to assess the severity of the disease.
- ❖ **Treatment:** treatment of the complication itself and control of ear infection:
 - Specific antibiotics. you start empirically with broad spectrum, and you wait for the results of the sensitivity.
 - Antipyretics and supportive measures
 - Mastoidectomy to control the ear infection. A must.
- ❖ **CSF Microbiology:**
 - Gram stain: – Sensitivity 60-90% – Specificity nearly 100% – In pts who received an antibiotic: 40-60% (+)
 - Culture (+) in 70-85% – <50% (+) in those partially treated
 - False-negatives may occur in patients who are partially treated

4-Venous Sinus Thrombosis

- Thrombophlebitis of the venous sinus (usually lateral sinus venous thrombosis) .
- ❖ **Etiology:** It usually develops secondary to direct extension.
 First irritation of the wall then progresses to thrombus then either it will regress or causes symptoms of obstruction (increase ICP, central nerve palsy).
 Spread of infection by direct extension or via mastoid emissary vein>Pus and granulation adjacent to sigmoid Sinus>Reactive thrombophlebitis>intraluminal thrombus >CSF obstruction
- ❖ **Clinical picture:**
 - Headache, vomiting, and papilledema (increase intracranial pressure). 6th cranial nerve might be affected because it is the longest cranial nerve passing through the cavernous sinus
 - Signs of blood invasion:
 - (spiking) fever with rigors and chills.
 - Jugular Foramen syndrome
 - Torticollis
 - Positive Greissinger's sign (Pressing on the mastoid process will cause tenderness and edema because of small vessel blockage) which is edema and tenderness over the area of the mastoid emissary vein.

❖ Diagnosis:

- **Clinical** “history of AOM”
- CT scan with contrast.
- MRI, MRA, MRV
- Angiography, venography.
- Blood cultures is positive during the febrile phase.

❖ Treatment:

● Medical

- Antibiotics and supportive treatment,
- **Anticoagulants**. in 12 hours window most imp

● Surgical

- Mastoidectomy with exposure of the affected sinus and the intra-sinus abscess is drained.
- Decompression
- Thrombus evacuation

5-Brain Abscess

- inside the brain parenchyma
- Localized suppuration in the brain substance.
- It is **the most lethal complication** of suppurative otitis media.

Stages of brain abscess:

1. Encephalitis (Poorly localized area of discoloration and softening.)
2. Latency (Early Abscess Stage increasing necrosis of center with beginnings of capsule formation)
3. Expanding (Late Stage, dense fibro- gliotic capsular wall and purulent center)
4. Rupture

❖ **Incidence:** 50% is Orogenic brain abscess.

❖ **Pathology Site:** Temporal lobe or Less frequently, in the cerebellum. (more dangerous).

❖ Clinical picture:

- non-specific Symptoms for abscess
- increased intracranial pressure—Headache, Nausea/Vomiting, Lethargy, Seizures.

❖ **Diagnosis:** – CT scans. – MRI

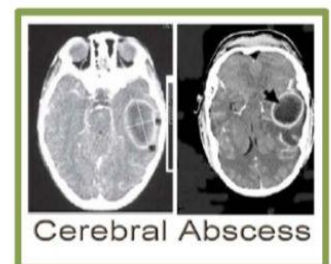
❖ Treatment:

● Medical

- Systemic antibiotics.
- Measure to decrease intracranial pressure. **do not do LP, contraindicated**

● Surgical

- Neurosurgical drainage of the abscess.
- mastoidectomy operation after subsidence of the acute stage



- Clinical manifestations**
- General manifestations: fever, lethargy, headache **sever generalized worse in the morning** .
 - Manifestation of raised IC pressure (**headach , N&V**) the latter usually projectile seen more often in cerebellar lesions.
 - Focal manifestations
 - **Temporal: Aphasia, hemianopia, paralysis**
 - **Cerebellar: ataxia, vertigo, nystagmus, muscle incoordination**

6-otitic hydrocephalus

- Misnomer (no ventricular dilatation)
- Many terms used including
 - pseudotumour cerebri
 - Benign intracranial hypertension
 - idiopathic intracranial hypertension
 - serous meningitis
 - angioneurotic hydrocephalus
 - meningeal hypertension

❖ Clinical picture:

- Non-specific
- Headache(Frontal worse on lying down, Raised intracranial pressure, Papilloedema, \pm VI n. palsy)
- Tinnitus • Nausea / vomiting • Visual disturbance
- Others – lethargy, dizziness, mood change

❖ Treatment:

- Goals of treatment are
 - Treat underlying disease
 - symptom relief
 - preservation of vision
- Various treatment modalities including
 - medication (Oral corticosteroid)
 - repeated lumbar punctures
 - surgery
 - Lumboperitoneal shunting

❖ prognosis:

- High variable course
- 10% recur (weeks to years)
- May resolve within months to years
- 10 % serious visual loss

Relationship

❖ barriers penetration:

1. Bone:

Epidural Abscess

LST

3. Arachnoid:

Meningitis

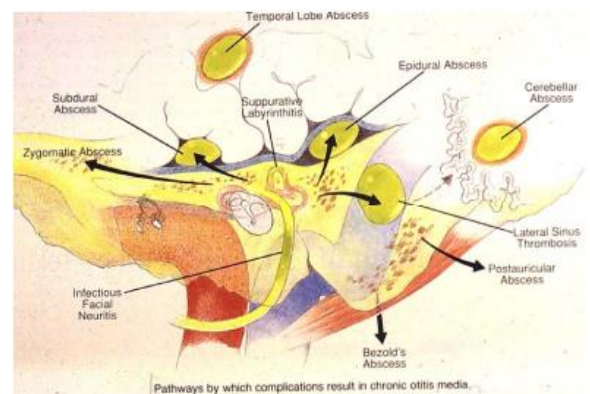
2. Dura Mater:

Subdural Abscess

4. Pia Mater:

Brain Abscess

Ventricles OHC



B.intra-temporal complication

1-Facial nerve paralysis

- The facial nerve exits through the stylomastoid foramen.
- 70% of the cases are Bell's palsy
- Congenital or acquired (surgery, inflammation, erosion) dehiscence of nerve canal.
- It is possibly a result of the inflammatory response within the fallopian canal to the acute or chronic otitis media.
- Tympanic segment is the most common site to be involved.
- Slow – chronic expansion of disease
- Rapid – infected cholesteatoma
- With cholesteatoma requires immediate surgery
- CT localizes involved portion



❖ Diagnosis:

- Clinically
- May occur in acute or chronic otitis media.
- CT scan.

Grades:

1-normal

2- at rest we can't see the weakness, need more effort to push mean muscle better.

3-at rest we can't see the weakness, less effort needed to push the muscle means muscle weaker.

4- at rest we can see weakness, more effort

5- at rest we can see weakness, less effort needed.

6-flat.

in otitis media it is peripherally injured so the affected nerve side of the face will be completely paralyzed LMNL vs UMNL? Lower: upper and lower parts of the face are affected Upper: lower part of the face is affected (upper part has bilateral supply from both hemisphere)

❖ **Treatment:** • Acute otitis media and acute mastoiditis: (cortical mastoidectomy +ventilation tube).

• Chronic otitis media with cholesteatoma: (mastoidectomy ± facial nerve decompression).

– Remove cholesteatoma and infected debris

if Acute OM? Tube, IV antibiotics and +/- steroids +/- mastoidectomy

- Do not open the nerve sheath

2-Labyrinthine fistula

- Communication between middle and inner ear

❖ **Etiology:** It is caused by erosion of bony labyrinth due cholesteatoma.

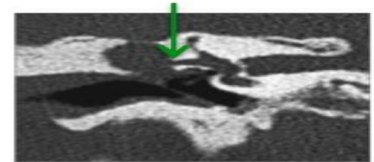
❖ **Clinical picture:**

- Hearing loss. Sensory neural hearing loss
- Attack of vertigo mostly during straining, sneezing, and lifting heavy object. (pressure induce fistula)
- Positive fistula test.

EXTRA → the idea that you will create more pressure in the EAC and that will reflect on the middle ear and TM, normal people won't be affected, in abnormal Pts with + fistula test the pressure will extend to the inner ear causing vertigo, tinnitus in the same time when you're doing the test, fistula isn't commonly seen, it is seen clearly in CT

❖ **Diagnosis:**

- High index of suspicion.
- Longstanding disease.
- Fistula test.
- CT scan of temporal bone.



❖ **Treatment:** CWD Mastoidectomy.

treatment of fistula: explore the area and see which area is affected by cholesteatoma and close it, you can close it with fascia (most likely from temporalis muscle) or by a rib cartilage, or by using synthetic materials and others.

3-Mastoiditis

- this complication is seen more in children + may give an appearance of a **unilateral bat ear**.
- It is the inflammation of mucosal lining of antrum and mastoid air cells system.
- Acute Mastoiditis: **fast progression (2weeks after OM)**

❖ **Pathology:**

- Production of pus under tension.
- Hyperaemic decalcification.
- Osteoclastic resorption of bony walls. (causes bone fracture pus excrete outside "subperiosteal abscess").

❖ **Symptoms:** • Earache. • Fever. • Ear discharge.

• **There will be +Reservoir** (the ability of a patient to produce cerebrospinal fluid rhinorrhea at will by moving the head, indicating presence of a fistula with pooling in a paranasal sinus). **Sign in acute mastoiditis.**

❖ **Signs:**

- Mastoid tenderness.
- Sagging of posterosuperior meatal wall.
- TM perforation.
- Swelling over mastoid.
- Hearing loss.



❖ Investigation:

- CT scan temporal bones.
- Ear swab for culture and sensitivity

❖ Treatment

Medical treatment (no abscess) : Hospitalize, IV antibiotics, Analgesics.

Surgical treatment (there is an abscess) : Myringotomy, Cortical mastoidectomy.

3-Petrositis

Petrositis is an important complication of infected petrous cells, but it is rarely seen in a non-pneumatized apex “petrous pyramids (30 %normal subjects).”

- Poor drainage
- Bony coalescence

Next to it lies the ganglion of CN5 and the abducent nerve (CN6).

❖ Symptoms

- **Gradinigo Syndrome (IMPORTANT)** à Triad of: trigeminal neuralgia (CN5), **A**bducent diplopia OR retroorbital pain OR squint (CN6), increased ear **d**ischarge.

4- Labyrinthitis

if the infection spread from the middle ear to the inner ear

- It's seen more with CSOM with cholesteatoma It involves ALL the inner ear.

❖ Symptoms:

vertigo and sensory neuron loss, nausea and vomiting

❖ Treatment

IV Antibiotics and antiemetics.

Complications include: permanent imbalance, SNHL, chronic labyrinthitis.

5- Tympanosclerosis

- Asymptomatic
- Indicator of OM
- Ear drum stiffness
- Ossicular fixation

6-Other intra-temporal complication

1-Hearing loss

- SNHL
- Conductive hearing loss common
- Ossicular chain erosion
- Severity of loss varies despite extent of disease
- Silent cholesteatoma?

2- Ossicular fixation or erosions.

- What are the vascular structures that pass through temporal bone? Carotid and internal jugular vein more common than artery) may get affected from thrombophlebitis (inflammation of the lining wall of the vessels

C. Extracranial complication

- Extension of infection to the neck.
- Bezold abscess (extension of infection from mastoid to SCM). [management: drain the abscess](#)
- Subperiosteal abscess -Septicemia

Cases

1) COM

- 45 Y
- Rt Ear Hearing loss
- Discharge



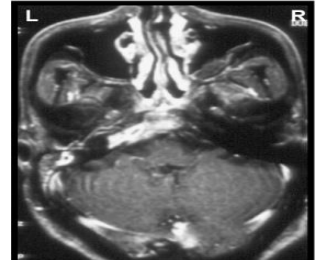
2) Cholesteatoma

- 35 Y • Left ear • Discharge • Deafness
- Diagnosis?
Cholesteatoma
- Treatment?
See above



3) Petrositis

- 50 Y
- Headache
- Persistent ear discharge
- Diplopia



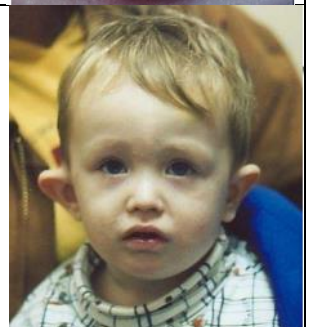
4) Congenital cholesteatoma

- 3 Y
- Healthy
- Incidental finding



5) Mastoiditis

- 3.5 Y
- 2 weeks ago, OM
- Fever
- Earache
- Exam



6) Brain abscess

- 35 Years
- PMHx Rt CSOM
- Fever
- Headache

