Acute Otitis Media
&
Otitis Media with effusion

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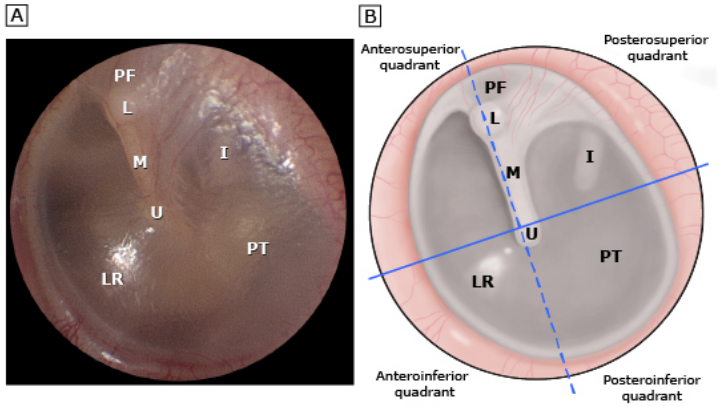
Middle Ear


A
PF
L
M
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B
Anterosuperior quadrant
Posterosuperior quadrant
PF
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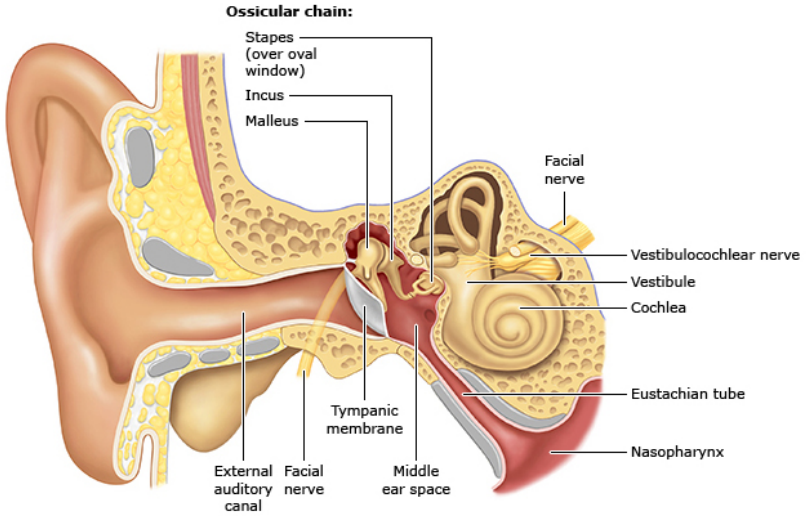
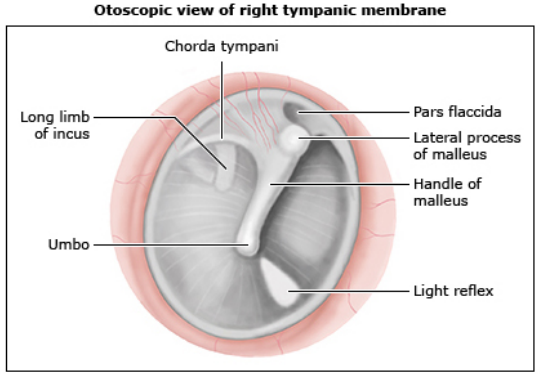
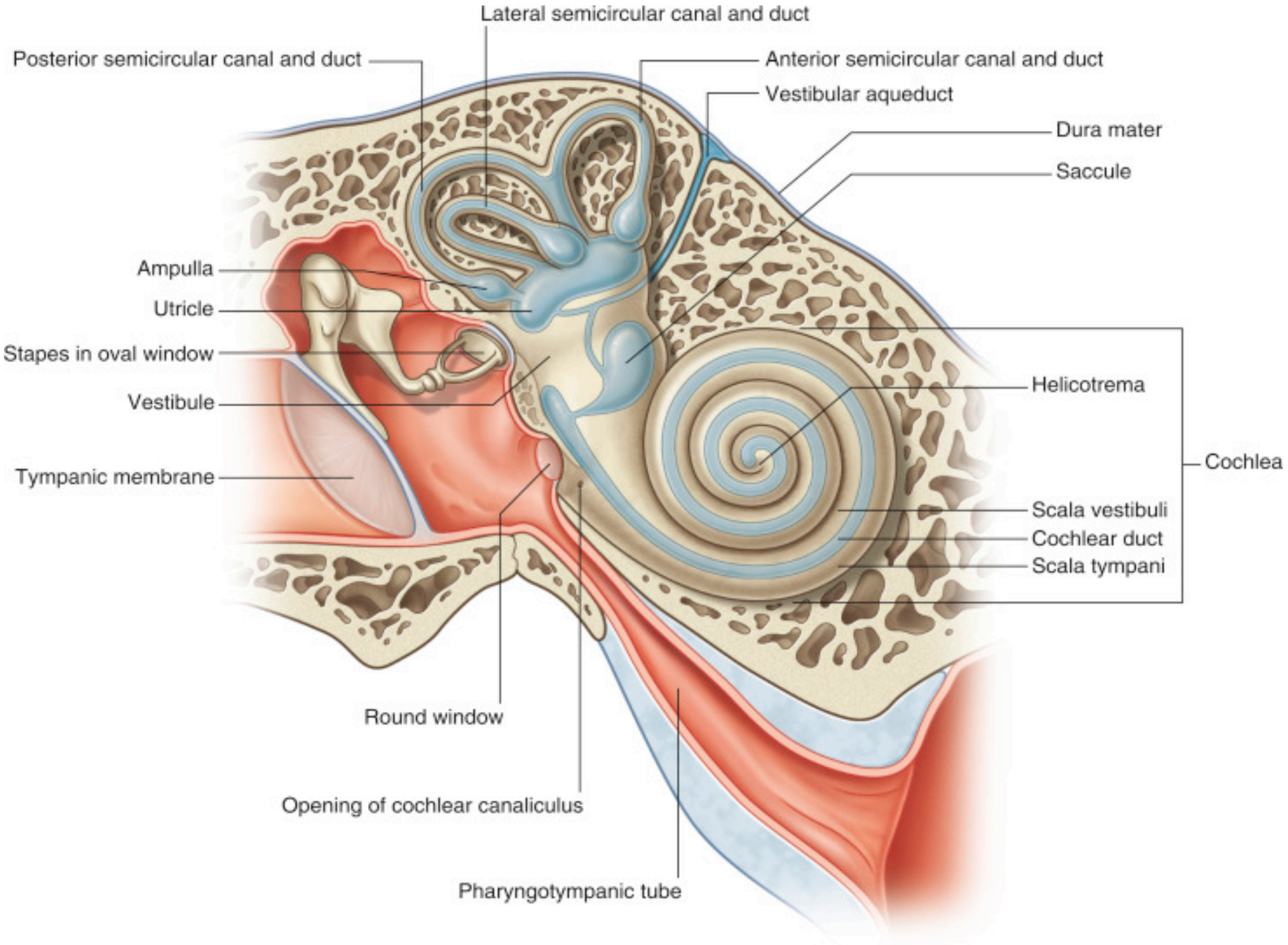
Anteroinferior quadrant
Posteroinferior quadrant


Ossicular chain:
Stapes (over oval window)
Incus
Malleus
Facial nerve
Vestibulocochlear nerve
Vestibule
Cochlea
Eustachian tube
Nasopharynx
Tympanic membrane
External auditory canal
Facial nerve
Middle ear space


Otoscopic view of right tympanic membrane
Chorda tympani
Long limb of incus
Pars flaccida
Lateral process of malleus
Handle of malleus
Umbo
Light reflex

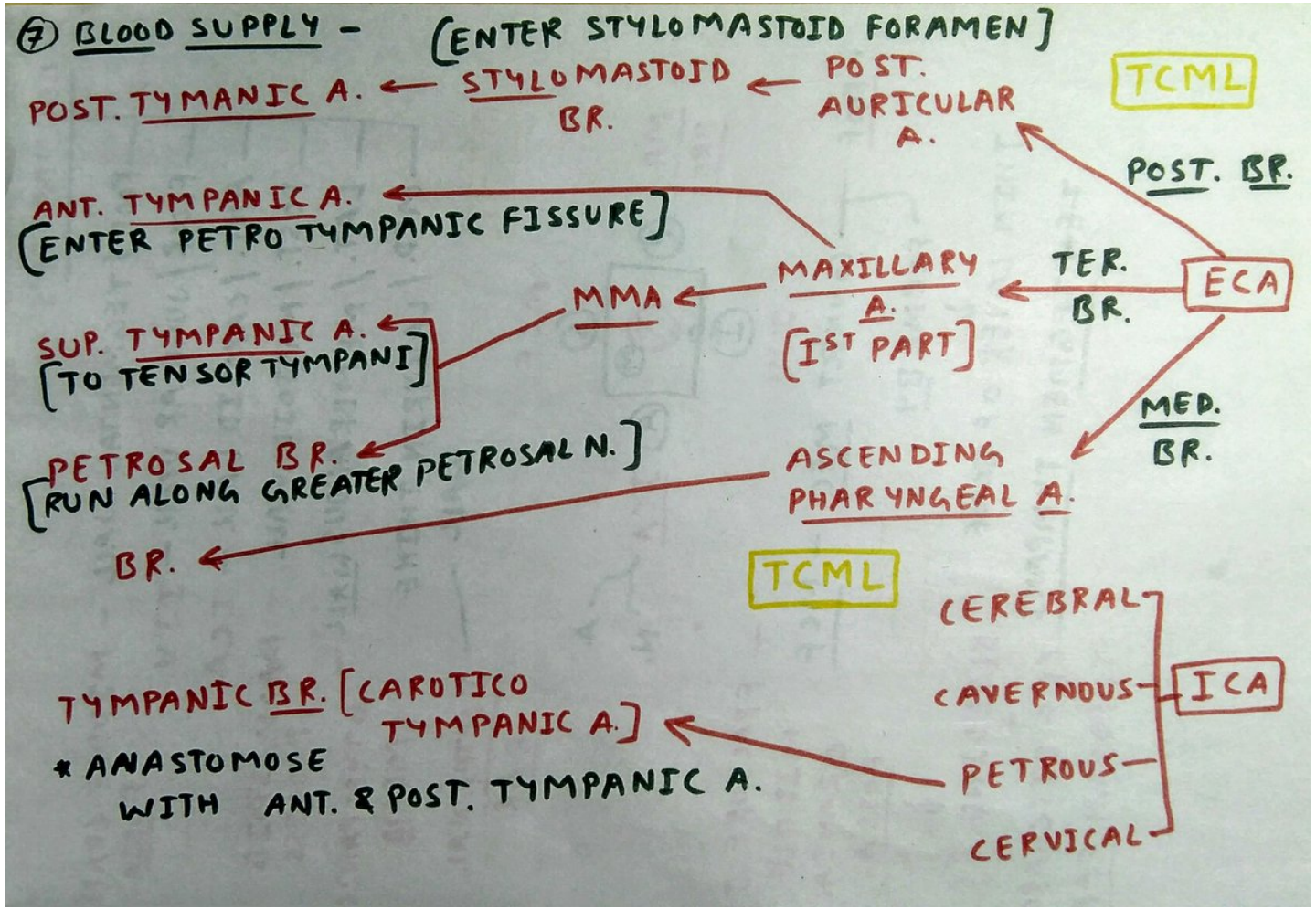

Lateral semicircular canal and duct
Posterior semicircular canal and duct
Anterior semicircular canal and duct
Vestibular aqueduct
Dura mater
Saccule
Ampulla
Utricle
Stapes in oval window
Vestibule
Helicotrema
Tympanic membrane
Cochlea
Scala vestibuli
Cochlear duct
Scala tympani
Round window
Opening of cochlear canaliculus
Pharyngotympanic tube

- Develpes from tubotympanic recess, an endodermal extension from 1st pharyngeal pouch
- Blood supply:

➢Arterial supply ⟶

➢Venous drainage is

Through IJV system



Nerve supply

Middle Ear

Tympanic cavity (Middle ear cavity)

Sensory nerve supply of the middle ear mucosa :

1. Tympanic branch of the glossopharyngeal nerve.
2. Auriculotemporal branch of the trigeminal nerve.

Motor nerve supply of the middle ear muscles :

1. Stapedius muscle supplied by the stapedial branch of the facial nerve.
2. Tensor tympani muscle supplied by the mandibular division of the trigeminal nerve.

Acute otitis media

- **DEFINITION:** Acute otitis media (AOM) is an acute, suppurative infectious process of middle ear space lasting ≤ 3 wks
- **Epidemeology:**

- Much more common in children than in adults because their eustachian tubes are shorter, narrower and horizontal. This makes it easier for bacteria to get in and more difficult for fluid to drain. Also, young children have weaker immune systems
- Peak incidence in children ages 6 to 24 months
- Incidence declines significantly after age 5 (45 – 60% before age 5)
- Pneumococcal vaccine role in incidence decline (42% decline in children under age 5)

Most common causative organisms:

- ***Streptococcus pneumoniae***
- ***Haemophilus influenzae***
- ***Moraxella catarrhalis***
- ***Staphylococcus aureus***
- **Group A streptococcus**
- ***Mycoplasma pneumoniae***
- ***Viruses:*** rhinovirus and respiratory syncytial virus were most commonly identified, although parainfluenza, coronavirus, and adenovirus were also occasionally detected
- Rare causes include diphtheritic otitis, tuberculous otitis, and otogenous tetanus, and otitis media due to *Chlamydia trachomatis*.

PATIENT FACTORS CONTRIBUTING TO THE DEVELOPMENT OF AOM

- **Eustachian tube dysfunction**
- **Eustachian tube obstruction**
- **Immune dysfunction**
- **Ineffective muco-ciliary clearance due to ciliary dyskinesia**

PRESENTATION AND DIAGNOSIS

- **Clinical manifestations:**

❖Otalgia and ear rubbing

❖decreased or muffled hearing

❖Frequently TM rupture with sudden relief of pain, accompanied by purulent otorrhea

❖Fever (one to two thirds of children)

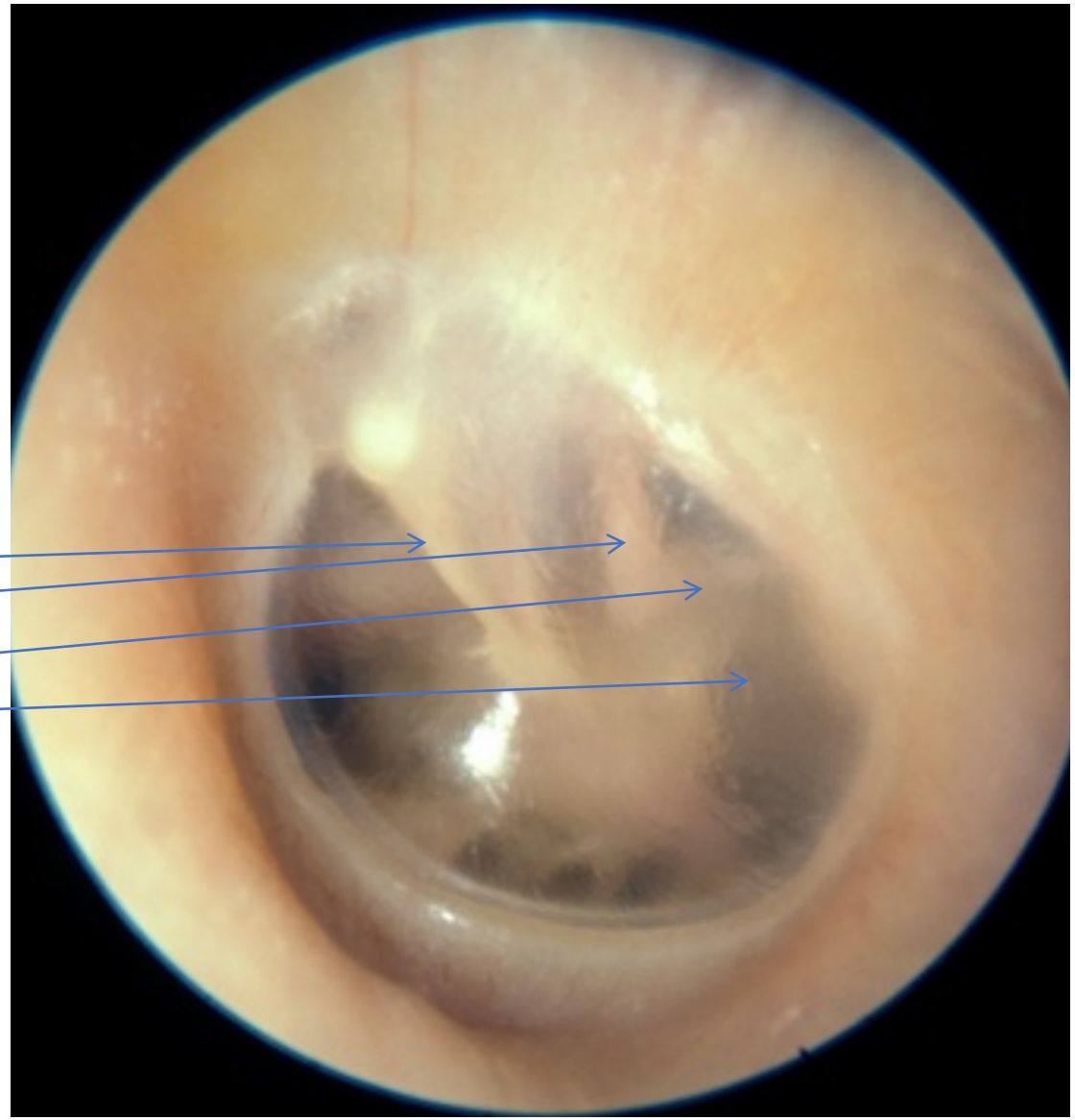
❖Infrequently disequilibrium

❖Other symptoms, such as high fever, severe pain behind the ear, or facial paralysis, suggest complications

Normal TM

Translucent
(can see through it)

- Handle of the malleus
- Incus
- Stapedius tendon
- Round window niche



Diagnosis with otoscopy

- Key features:

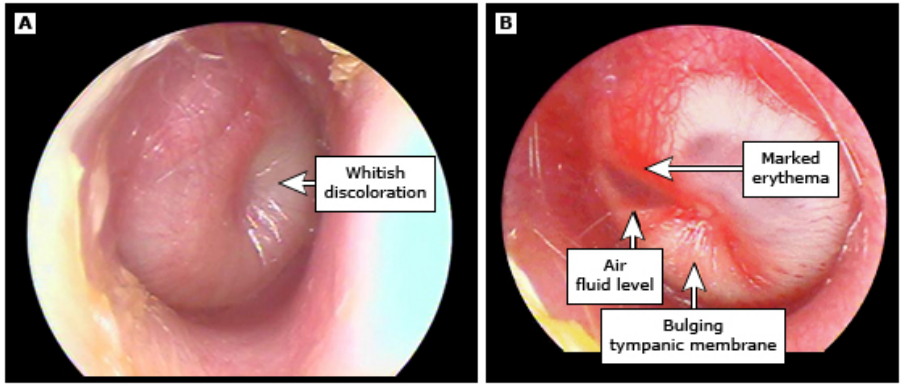
❖ Bulging tympanic membrane

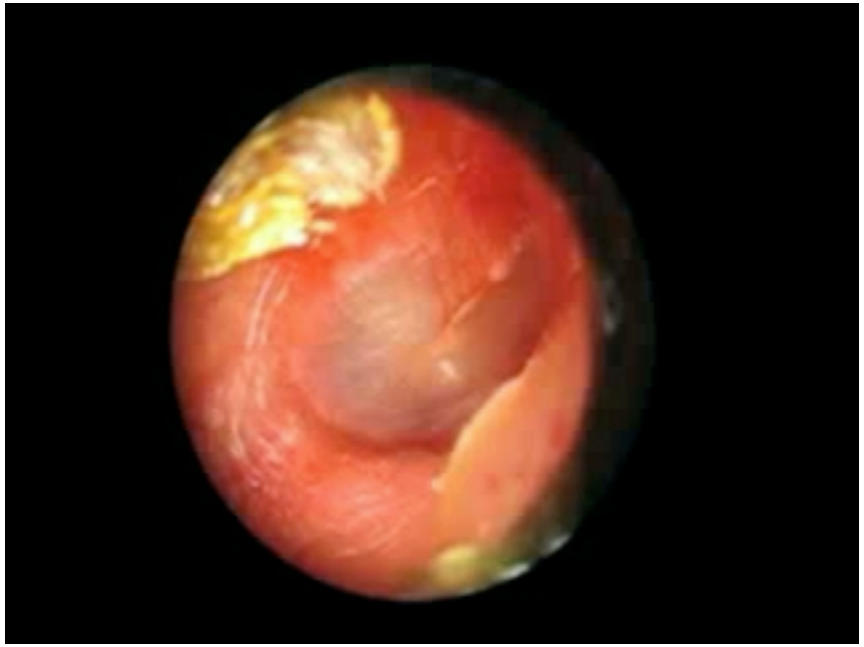
❖ Reduced mobility of the tympanic membrane when pneumatic otoscopy is applied

❖ Partial or complete opacification of the tympanic membrane

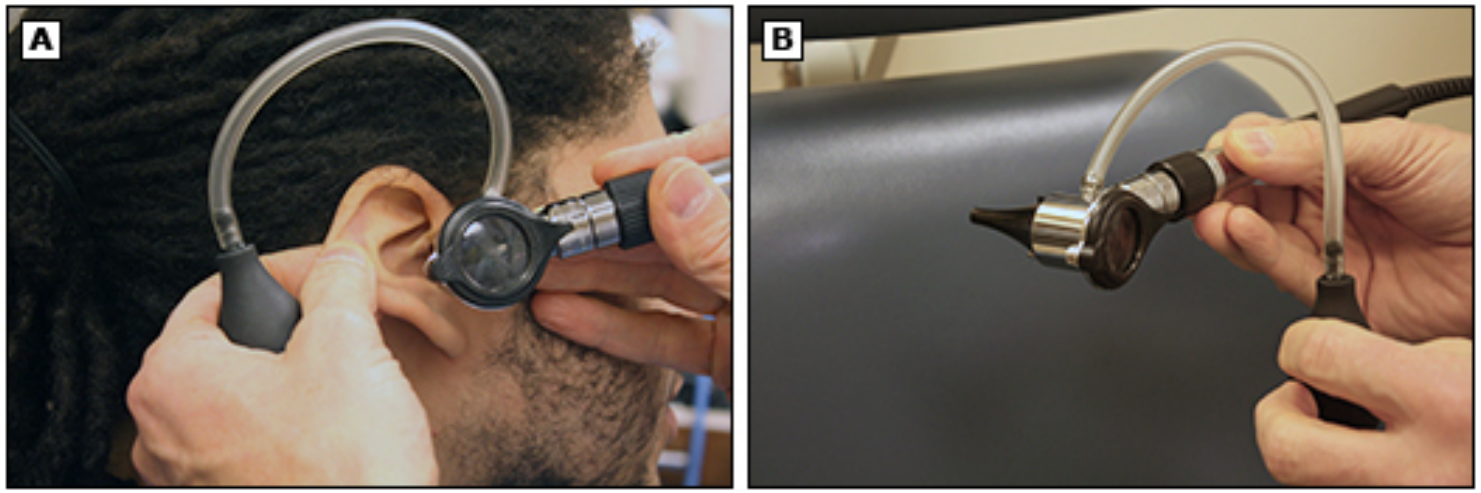
❖ Acute perforation with purulent otorrhea

❖ Erythema of tympanic membrane



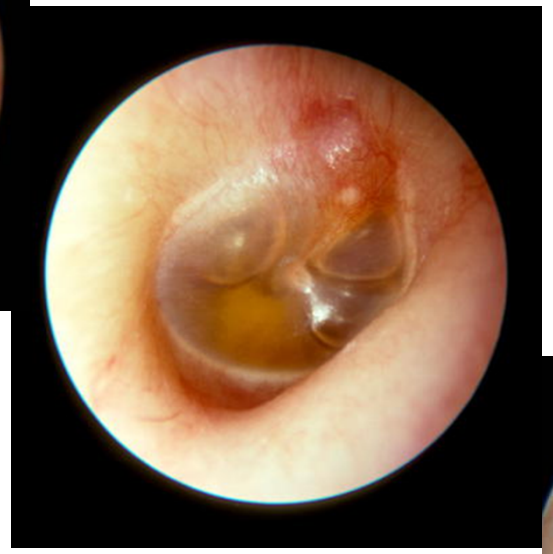


Pneumatic otoscope



Usual sequence after **AOM**

Acute otitis media



Otitis media with effusion

Normal

Acute otitis media

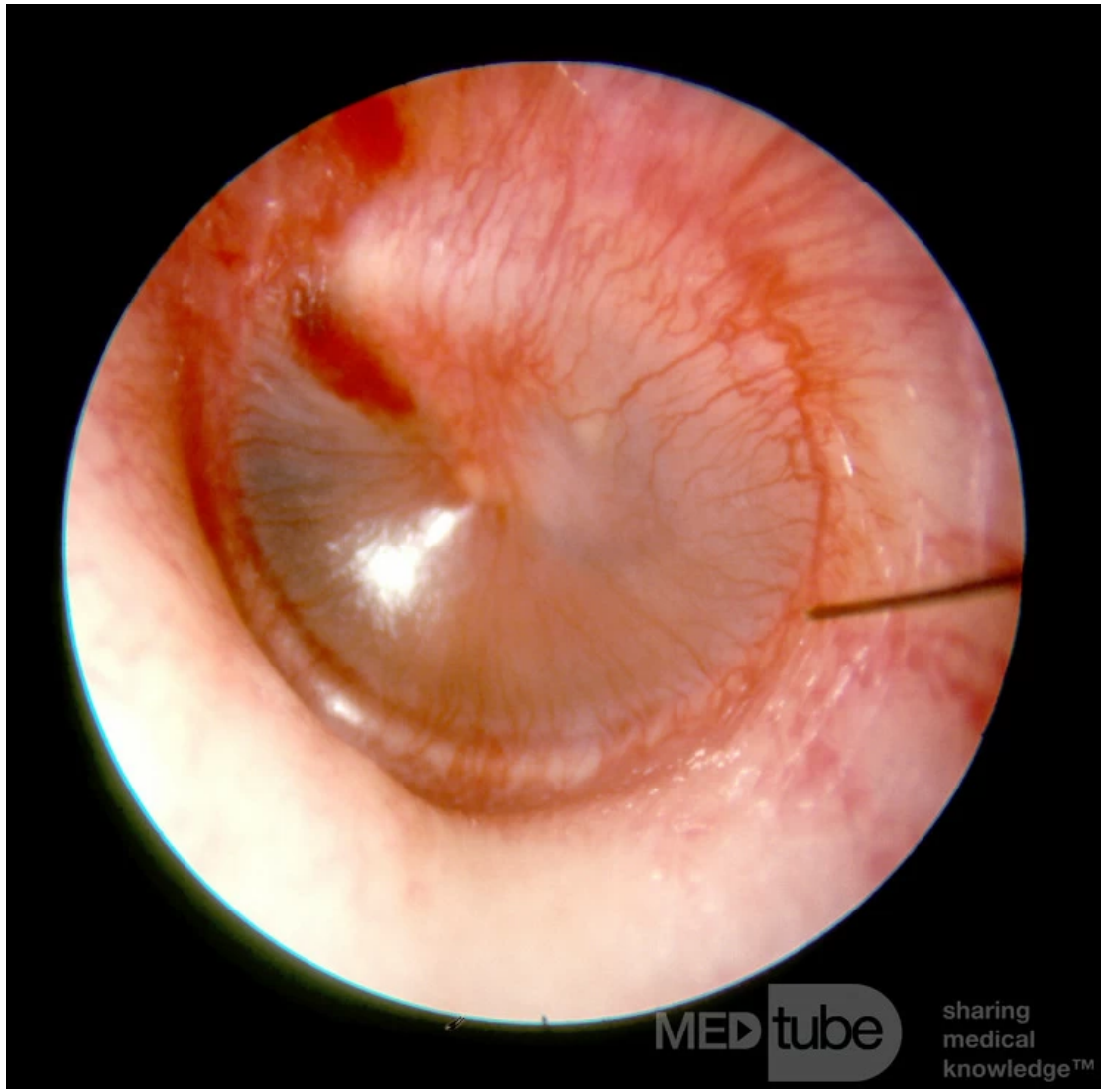
Perforation with otorrhoea

Normal (perforation heals)

Persistent perforation

Stages

- **Stage of Hyperaemia**
  - Mild earache
  - Congested TM



STAGES CONTINUED

- **Stage of exudation**
  - Fever
  - Earache
  - Deafness
  - Congestion and bulging of TM
  - Mastoid tenderness

STAGES CONTINUED

- Stage of suppuration
- Purulent ear discharge
- Increased deafness
- Decreased pain
- Decreased fever

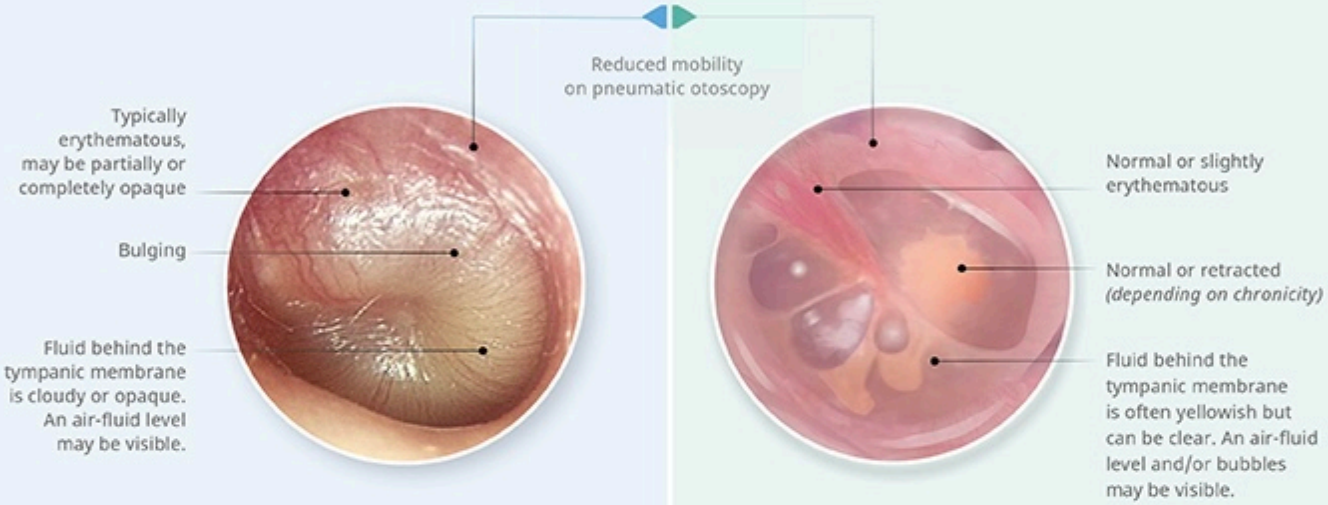
STAGES CONTINUED

- **Stage of resolution**
  - Otorhea stops
  - Normal hearing
  - Healed perforation

DIFFERENTIAL DIAGNOSIS

- Otitis media with effusion
- Chronic otitis media
- Bullous myringitis
- External otitis
- Herpes zoster
- Deep space head and neck infections (referred pain)

TYMPANIC MEMBRANE



SYMPTOMS - Acute Otitis Media

- Aural fullness typically with acute pain *(mild, moderate, or severe)*
- Sudden pain relief and/or otorrhea with mucopurulent discharge if tympanic membrane ruptures
- Decreased or muffled hearing

SYMPTOMS - Otitis Media with Effusion

- Aural fullness typically without pain
- Decreased or muffled hearing

KEY CONCEPTS

Otitis media with effusion (OME) is commonly misidentified as acute otitis media (AOM). Otoscopic examination is essential for distinguishing between these conditions. The characteristic otoscopic finding in AOM is a bulging, often opaque and erythematous tympanic membrane with reduced motility. In contrast, OME is characterized by yellow or clear fluid behind the tympanic membrane with or without viscous bubbles and/or retraction of the tympanic membrane.

Distinguishing these disorders is important because management strategies differ. AOM in adults requires oral antibiotic therapy. OME is a noninfectious disorder that may occur in association with conditions such as recent viral upper respiratory infection or AOM, barotrauma, allergic rhinitis, or obstruction of the Eustachian tube; it generally resolves within 12 weeks without treatment. Interventions to reduce symptoms of OME may be helpful for symptomatic patients. Persistent or recurrent, unilateral OME is an indication for otolaryngology referral and an assessment for obstructive pathology.

TREATMENT OF ACUTE OTITIS MEDIA

- ❑Observation (viral causes with mild symptoms)
- ❑Antibiotics
  - First-line therapy is amoxicillin-clavulanate (for adults amoxicillin 875 mg with clavulanate 125 mg orally twice daily. For children Amoxicillin 45-90 mg/kg per day, clavulanate 6.4 mg/kg per day in 2 doses)
- **Duration of treatment** –
- Ten days for children <2 years of age and children (of any age) with tympanic membrane perforation or history of recurrent AOM.
- Five to seven days for children ≥2 years with intact tympanic membrane and no history of recurrent AOM

Treatment continued

- Alternatives in penicillin allergy:

❖Cephalosporins in **Mild non-IgE-mediated reaction**

❖Macrolides in **IgE-mediated or serious delayed reaction**

- Second-line therapy: Floroquinolones

❑Analgesics

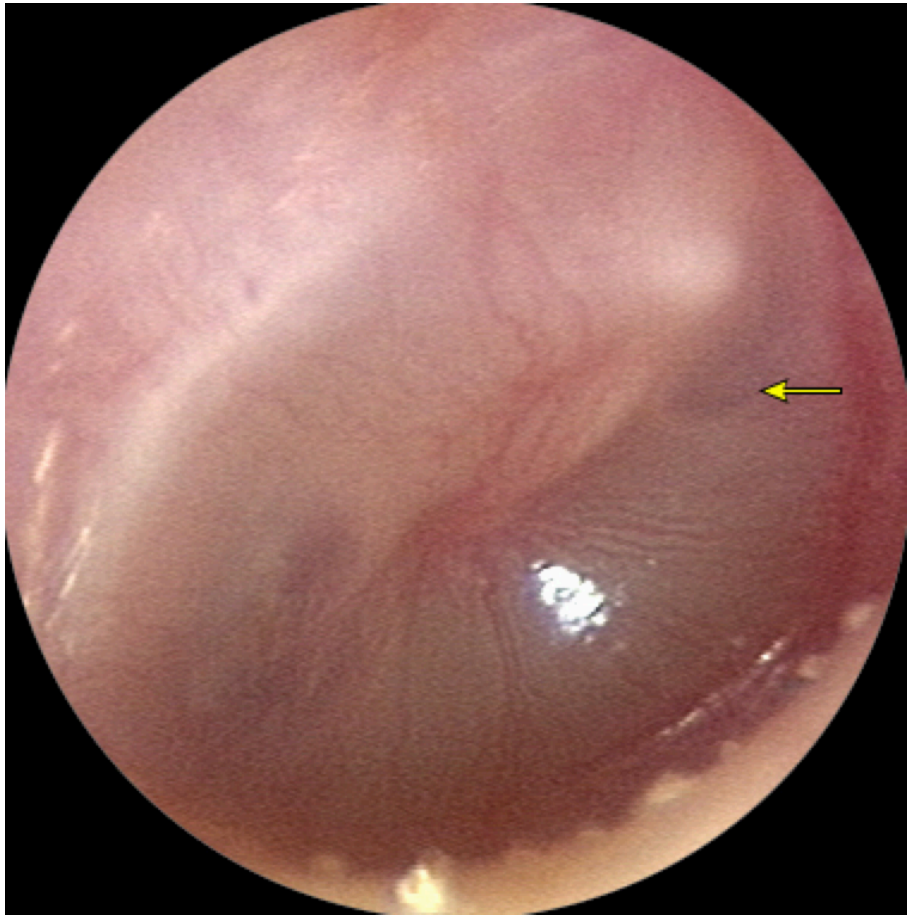
❑Therapeutic tympanocentesis

Complications

- **Chronic tympanic membrane perforation** (rare)
- **Mastoiditis** (20%)
- **Labyrinthitis** (rare)
- **Facial paralysis** (rare)
- **Persistent hearing loss** (rare)
- **Petrositis (petrous apicitis)** (rare)
- **Otitic meningitis** (rare)
- **Epidural, subdural, and brain abscess** (rare)
- **Otitic hydrocephalus** (rare)
- **Septic lateral sinus thrombosis** (rare)

Otitis media with effusion

- Otitis media with effusion (OME), also called serous otitis media or "glue ear", is defined as middle ear effusion without signs of acute infection.
- OME often occurs after acute otitis media (AOM), but it also may occur with Eustachian tube dysfunction, in the absence of a preceding AOM.



EPIDEMIOLOGY

• common among asymptomatic young children, with 90% having at least one episode by four years of age.

• The prevalence ranges from 10 - 17 % among children 2 - 4 years, and decreases to 3 - 4 % between 6 and 8 years.

• The Danish longitudinal birth cohort reported a cumulative "otitis media" incidence of 61% at seven years.

• OME is more common in winter and has declined dramatically during the COVID-19 pandemic.

PREDISPOSING FACTORS

- Family history of otitis media (otitis-prone parents)
- bottle feeding (as opposed to breastfeeding)
- male sex
- daycare center or in-person school attendance
- adenoidal hypertrophy
- exposure to tobacco smoke
- low socioeconomic status
- cleft palate and other midface facial anomalies, such as Down syndrome
- Obesity

PATHOGENESIS

- Incompletely understood
- results from inflammation in response to persistent bacterial components following acute otitis media (AOM)
- Eustachian tube dysfunction is also a major factor
- bacterial biofilms also have a major role in the pathogenesis (immunofluorescence studies and sensitive PCR assays demonstrate bacterial DNA (most commonly nontypeable Haemophilus influenzae) present in the middle ear
- Poor clearance of middle ear biofilms, genetic predisposition, allergies, ciliary dyskinesia, gastroesophageal reflux, and obesity also may contribute

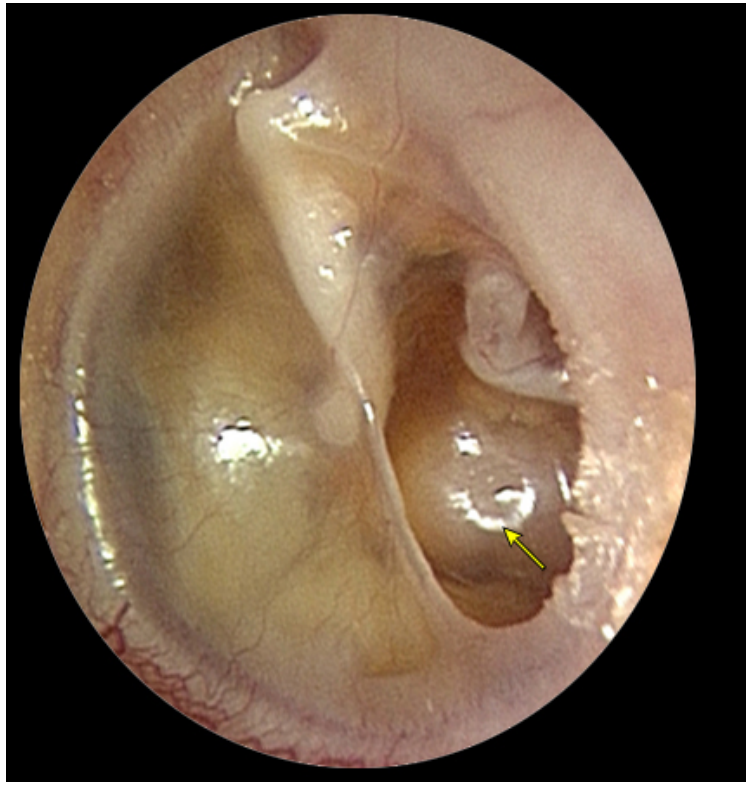
CLINICAL FEATURES

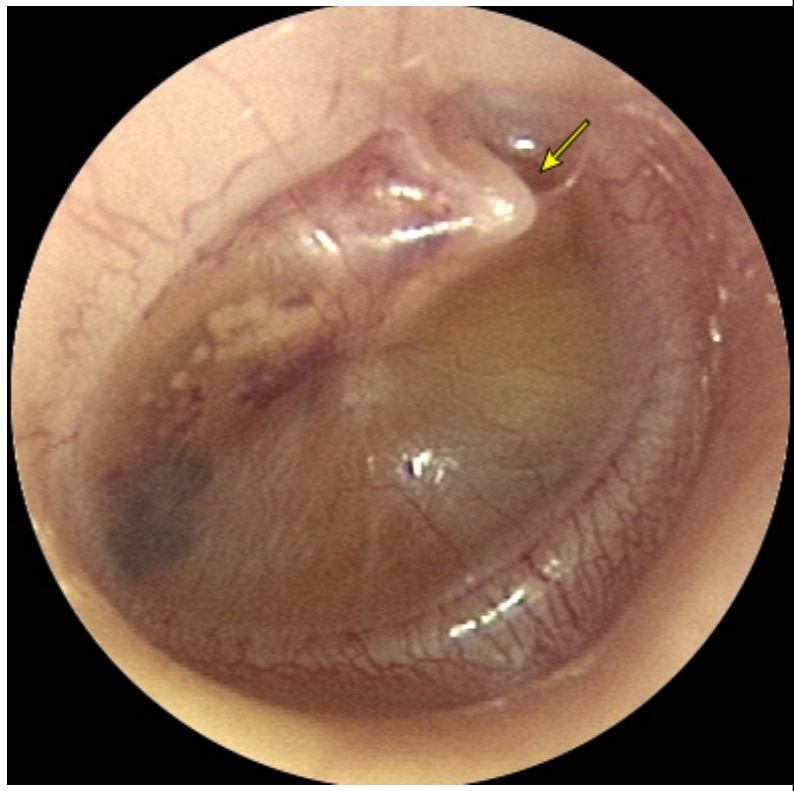
- Presentation:
  - Caregiver concern about poor hearing and speech and language delays
  - Failed hearing screening

- Symptoms:
  - Hearing loss
  - feeling of fullness in the ear
  - Tinnitus
  - balance problems

Clinical and otoscopic findings

- Impaired mobility of the tympanic membrane during pneumatic otoscopy.
- Type B tympanometry (flat curve).
- An air-fluid level, sometimes with bubbles,
- Amber-colored middle ear fluid is common
- Tympanic membrane in a retracted position but sometimes will seem normal to the eye
- Opacification of the tympanic membrane



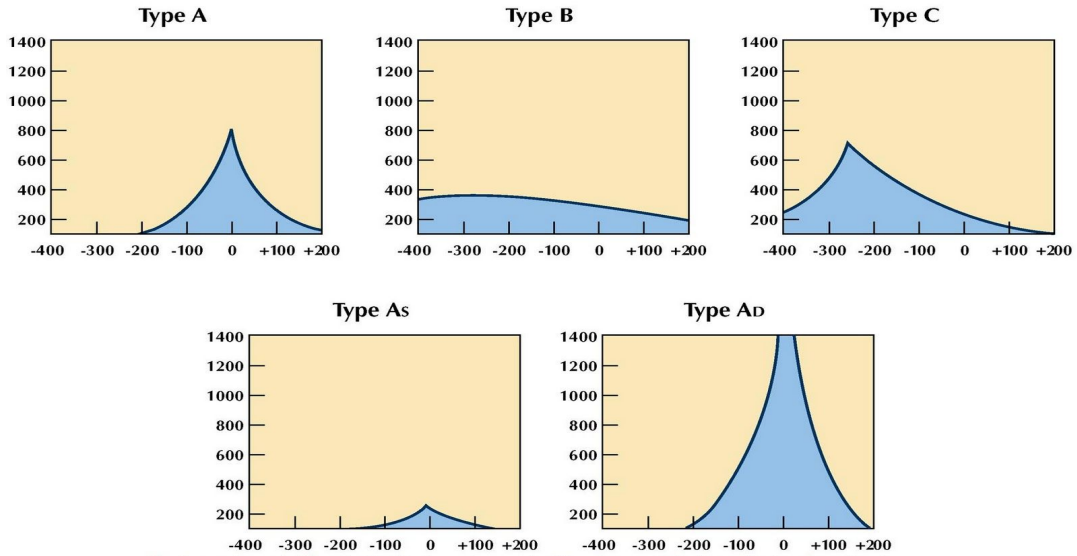


Complications and sequelae

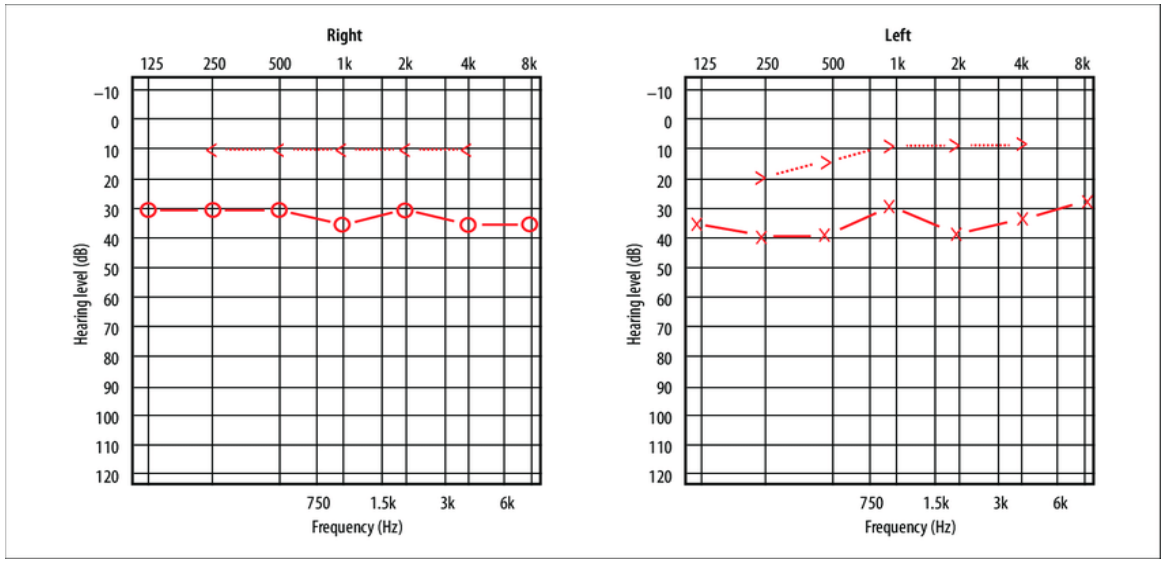
- Conductive hearing loss
- Myringosclerosis
- Retraction pocket
- Cholesteatoma

DIAGNOSIS

- Pneumatic otoscopy
- Audiology
- Tympanometry and acoustic reflectometry



Type A represents normal middle ear function. Type A curves have normal mobility and pressures and typify normal hearing and sensorineural hearing loss with normally functioning middle ear systems.
Type B represents restricted tympanic membrane mobility. Type B curves have little or no point of maximum mobility and reduced compliance. This curve is very typical of a stiff middle ear system as is seen in otitis media.
Type C represents significant negative pressure in the middle ear cavity.
Type C curves have normal mobility and negative pressure at the point of maximum mobility, (negative pressure is considered significant for treatment when more negative than -200 mm H2O).
Type As represents normal middle ear pressure but reduced mobility suggesting limited mobility of the tympanic membrane and middle ear structure, commonly seen in fixation of the ossicular chain.
Type Ad represents normal middle ear pressure but hypermobility. This pattern is indicative of a flaccid tympanic membrane due to disarticulation of the ossicular chain or partial atrophy of the eardrum.



DIFFERENTIAL DIAGNOSIS

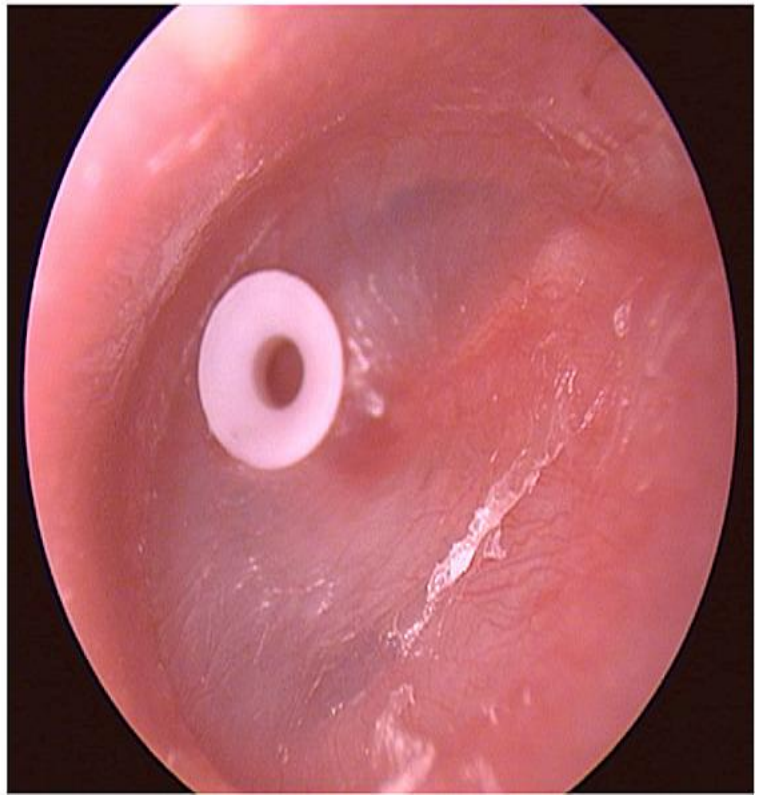
- The major consideration in the differential diagnosis of OME is acute otitis media (AOM)
- AOM is characterized by bulging of the tympanic membrane, ear pain, and/or fever
- OME is mostly asymptomatic apart from hearing loss

Management

- **PRIMARY INTERVENTIONS**
  - **Watchful waiting with follow-up for 3 months in children not at risk for speech, language, or learning problems**
  - **Tympanostomy tubes**

- **OTHER INTERVENTIONS**
  - **Balloon dilation of the Eustachian tube**
  - **Adenoidectomy**
  - **Hearing aids**

Tympanostomy tube inserted in eardrum.



Management continued

- **UNPROVEN OR INEFFECTIVE INTERVENTIONS**

- **Antibiotics:** biofilm-associated pathogens generally are unresponsive to antibiotic therapy
- **Oral glucocorticoids**
- **Intranasal glucocorticoids**
- **Autoinflation**
- **Antihistamines and decongestants**
- **Myringotomy without tympanostomy tubes**

Thank you