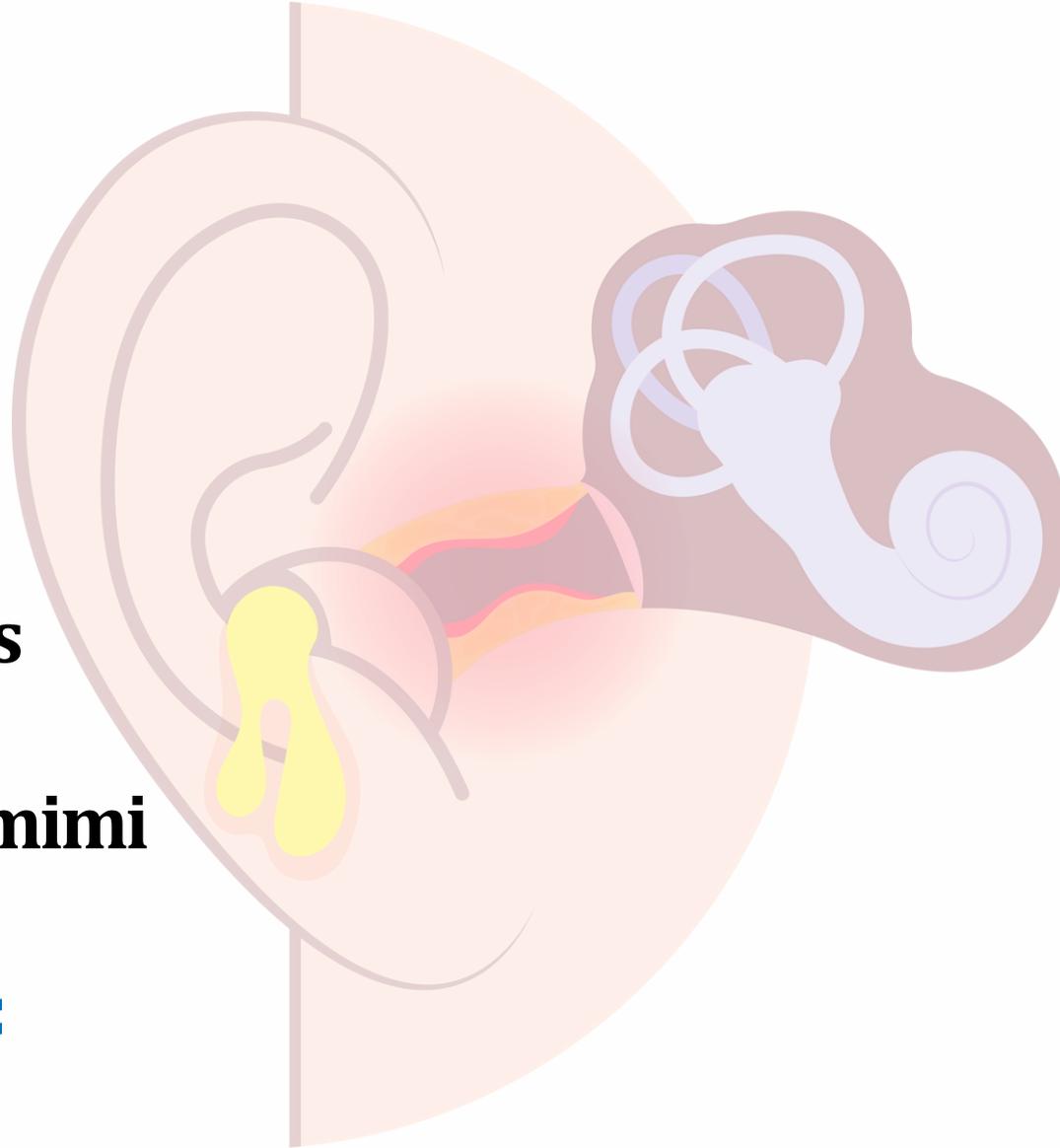


# Acute Otitis Media



**Done by :**

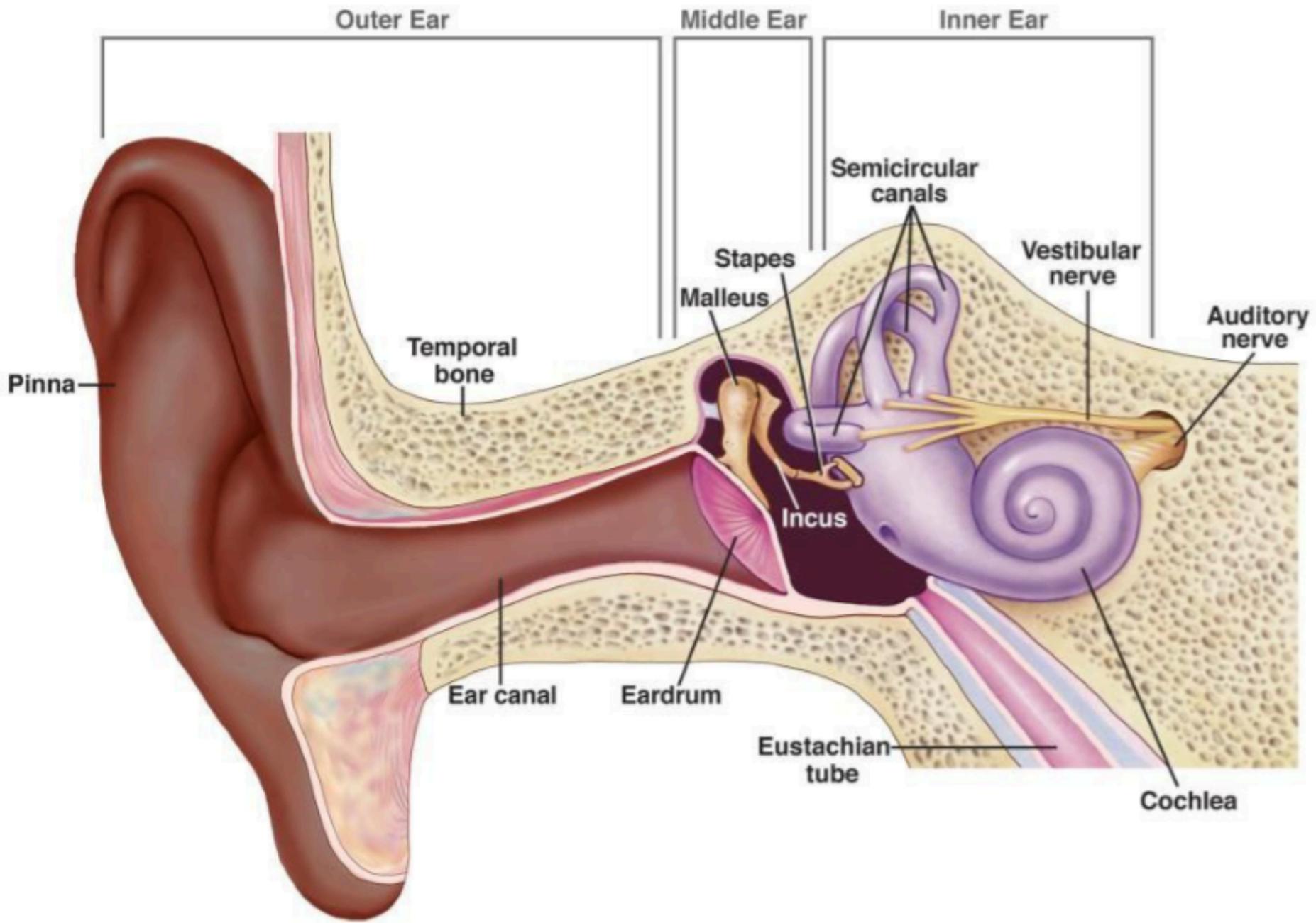
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**Supervised by :**

**Dr. Abdullah**



- The Ear consists of three major parts: the **outer ear**, the **middle ear**, and the **inner ear**.
- The **outer ear** includes the pinna—the visible part of the ear—and the ear canal.
- The outer ear extends to the tympanic membrane or eardrum, which separates the outer ear from the middle ear.
- The **middle ear** is an air-filled space that is located behind the eardrum. The middle ear contains three tiny bones, the malleus, incus, and stapes, which transmit sound from the eardrum to the inner ear.
- The **inner ear** contains the hearing and balance organs. The cochlea contains the hearing organ which converts sound into electric signals which are associated with the origin of impulses carried by nerves to the brain where their meaning appreciated .

- **Acute otitis media (AOM) :**

is a **short-lived (usually 3-7 days)** infection of the middle ear. If it is **viral** it may last as little as a day or so but it can persist, causing pus to accumulate under pressure behind the eardrum, which may perforate

\* Before the eardrum perforates, AOM is intensely **painful**. It mainly occurs in children. Recurrent otitis media (ROM) refers to repeated such episodes, typically more than three in a 6- month period.

- **Otitis media with effusion (OME) :**

is also common in children. **Fluid – often thick sticky ‘glue’** accumulates in the middle ear behind an **intact drum**. Because some fluid in the middle ear is normal for up to several weeks after an episode of AOM, **the term OME requires that the fluid be persistent for at least 3 months.**

- **Chronic otitis media :**

**This implies that the eardrum has perforated**, the perforation has failed to heal and there is ongoing infection. The term chronic suppurative otitis media (CSOM) is often used to emphasize the Tendency for ears with longstanding perforation to become infected and discharge .

# Classification of otitis media according to:

1. Duration
2. Nature of fluid/discharge : suppurative and non-suppurative
3. Otitis media with effusion and Aero-otitis media
4. Causative organism –viral /bacterial

# Classification of OM according to the duration of illness:

- Acute otitis media (AOM):

Rapid onset of symptoms < 3 weeks

- Subacute otitis media :

Symptoms lasting for 3 weeks to 3 months

- Chronic otitis media :

Symptoms lasting for 3 months or longer

# Epidemiology

- **Otitis media** (OM) is the second **most common** disease of childhood.
- Most **children** will experience some form of acute otitis media during their lifetime , 3 out of 4 kids have had at least one ear infection by the time they reach 3 years of age .
- The peak age of incidence **is 6 months to 3 years** old and it is rarely seen above 5 years of age.
- Otitis media occurs more in the **winter** than summer months as it is usually associated with a cold.
- It can occur in **adults** but this is unusual.

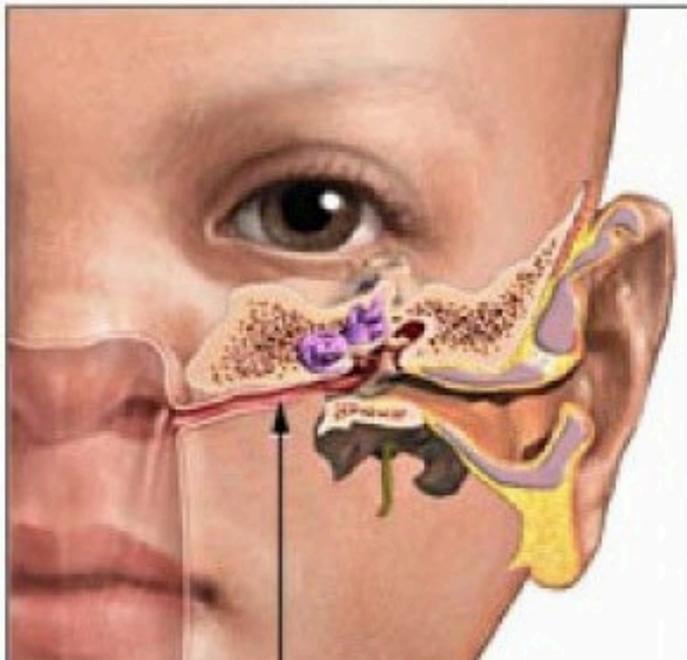
# Risk factor of otitis media :

- **Boys** are more likely than girls to develop **otitis media**.
- **Children with older siblings** at school or nursery are exposed to infections that may be brought home.
- Children who suffer with many colds or respiratory infections are more likely to develop **OME**.
- Parent's smoking is thought to be associated with an increase in both acute and chronic otitis media as it is believed to increase Strep. pneumoniae colonization.

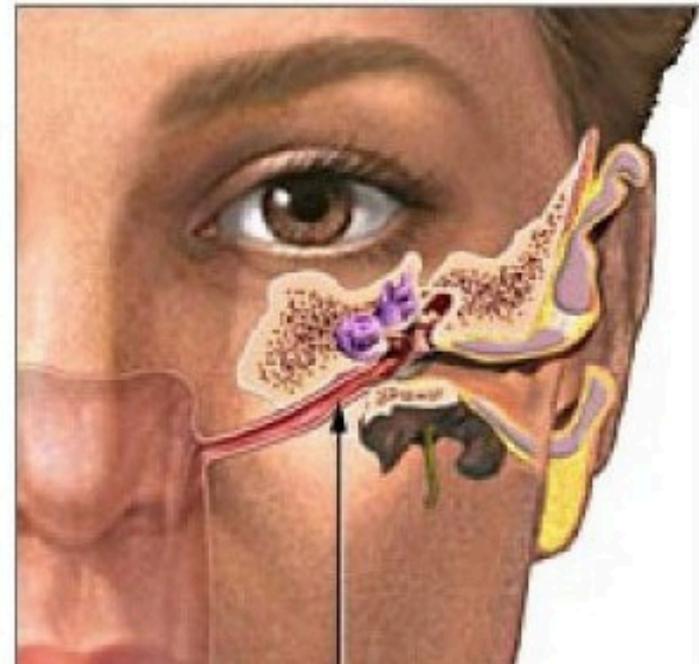
# Why OM more common in childhood?

1. ET : shorter ,wider ,more horizontal making it easier for the bacteria to travel from throat and upper RT
2. Upper Resp. tract infection is more in children
3. Adenoid obstruction of Eustachian tube
4. Regurgitation of milk (breast feeding)+ vomitus

Infant

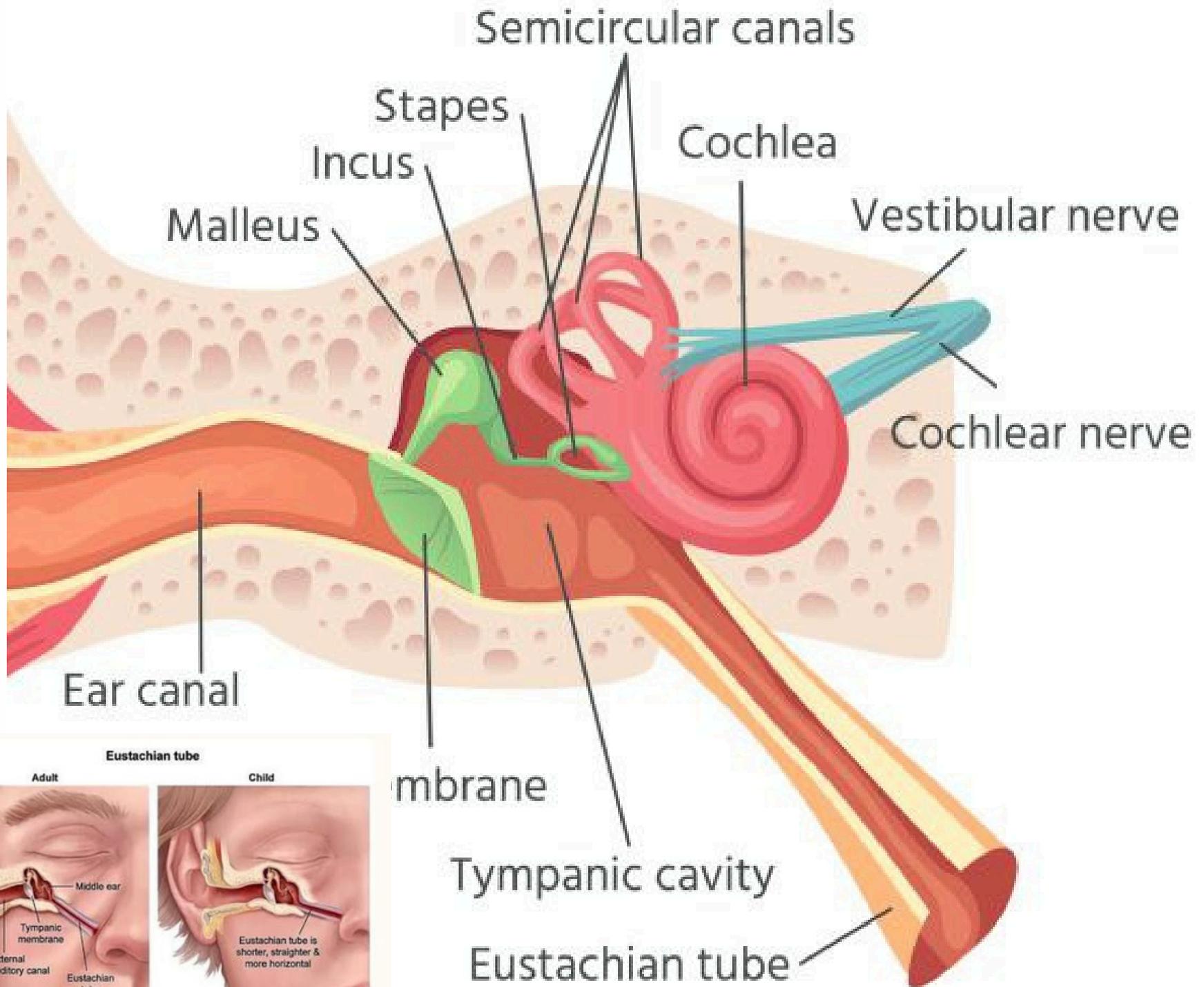


Adult



# Acute otitis media (AOM)

- Acute otitis media is **common** and frequently **bilateral**.
- Most children will develop one or more episodes typically before they are 2 years old.
- It can follow an acute upper respiratory tract infection and may be viral or bacterial.
- A viral infection is short-lived (1 or 2 days) and often accompanied by some general features of an upper respiratory infection, e.g. pharyngitis and a runny nose.

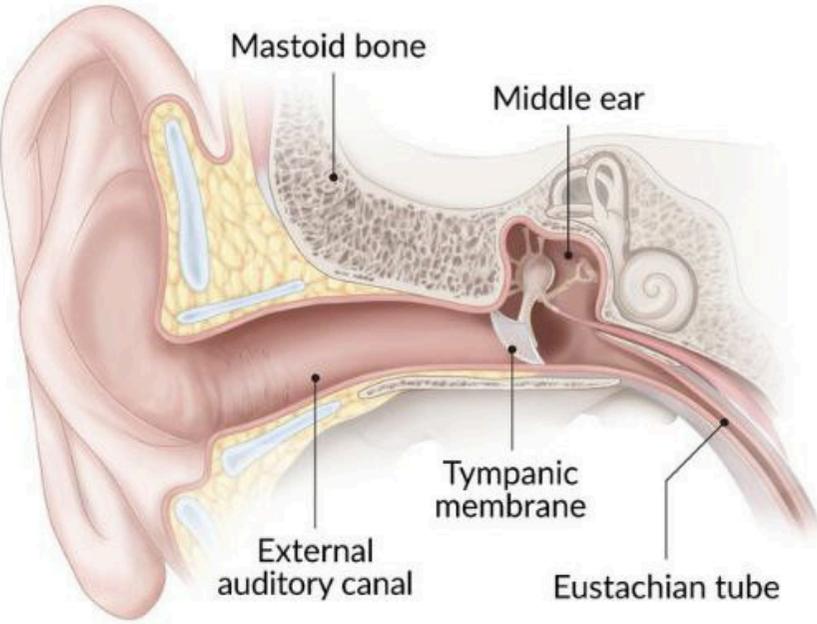
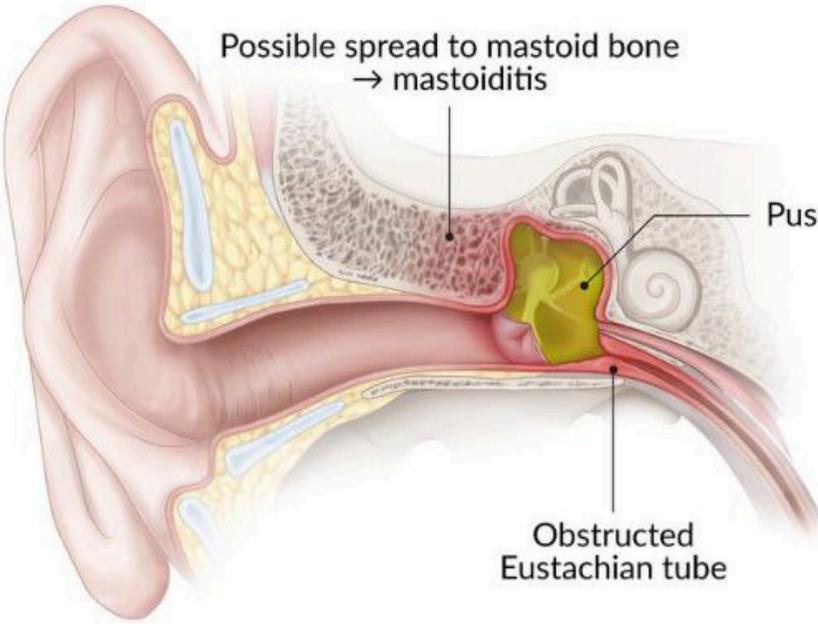
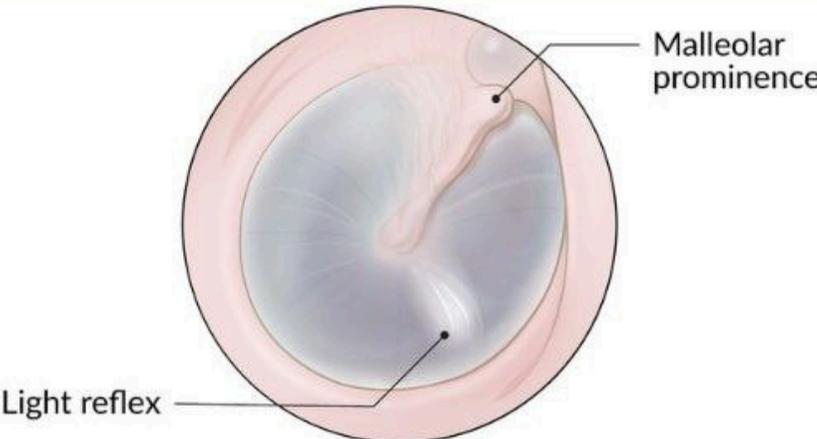
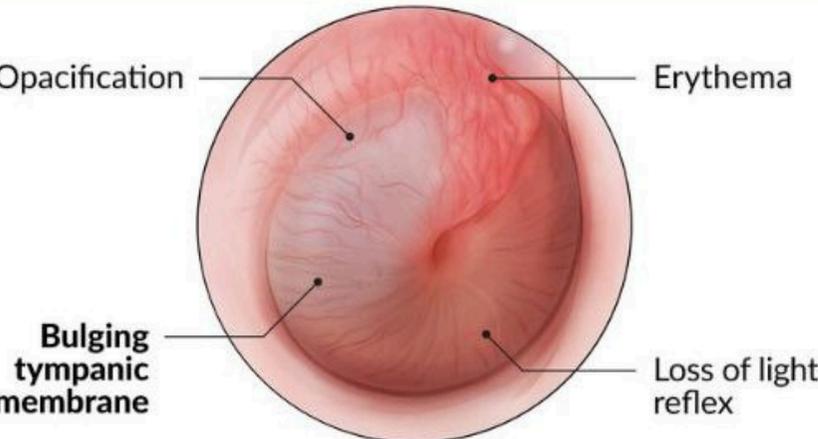


**Eustachian tube**

Adult

Child



	Normal	Acute otitis media
Anatomy	 <p>Mastoid bone</p> <p>Middle ear</p> <p>External auditory canal</p> <p>Tympanic membrane</p> <p>Eustachian tube</p>	 <p>Possible spread to mastoid bone → mastoiditis</p> <p>Pus</p> <p>Obstructed Eustachian tube</p>
Otoscopic examination	 <p>Malleolar prominence</p> <p>Light reflex</p>	 <p>Opacification</p> <p>Erythema</p> <p>Bulging tympanic membrane</p> <p>Loss of light reflex</p>

- Serous exudate (Catarhal OM),
- Mucopurulent exudate (Suppuration).
- Bulging of T.M
- Rupture of T.M.

**Clinical picture:**

**Stage I: Acute salpingitis :**

Symptoms : • Deafness and autophony (may be tinnitus).

- Fullness sensation (may be pain).

Signs :

- Retraction of the TM
- Deafness: CHL (conductive H loss).

**Stage II: - Stage of catarrhal otitis media :**

Symptoms : • Pain: Dull ear ache,

- $\uparrow$  deafness and autophony. Tinnitus

Signs :

- Retraction + congestion around handle of malleus and periphery of TM
- Deafness:  $\uparrow$  CHL.

**Stage III: Stage of suppuration:**

**A- Before rupture of the tympanic membrane :**

Symptoms General symptoms (Fever Anorexia Headache Malaise).

- Pain: Earache (throbbing)
- Deafness - Tinnitus.

Signs

- The whole TM becomes red and lusterless  
 $\rightarrow$  Bulging  $\rightarrow$  impending rupture.
- Deafness  $\uparrow$  CHL

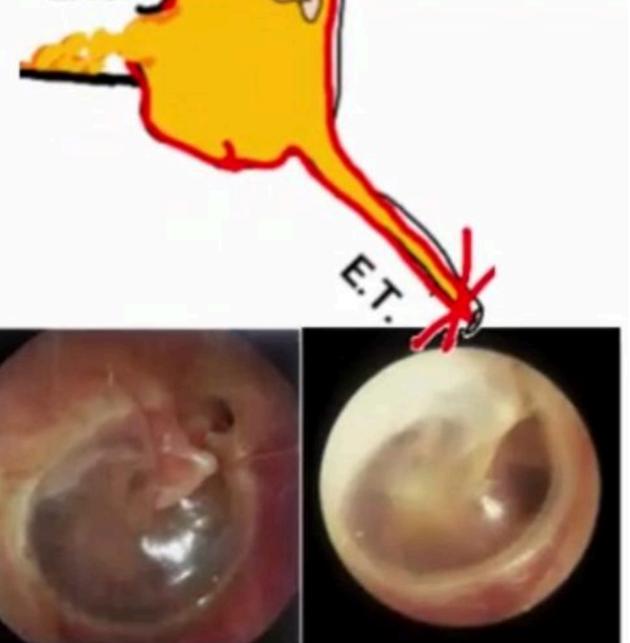
**B- After rupture of the tympanic membrane :**

Symptoms Discharge  $\rightarrow$  Otorrhea,

- Relief of pain, deafness, Tinnitus & fever.

Signs

- Discharge  $\rightarrow$  Mucopurulent
- Perforated drum
- Deafness: CHL.



## ◆ Tympanic Membrane Changes in AOM Stages

Stage of AOM	TM Appearance
1. Tubal Occlusion (Eustachian tube dysfunction)	Retracted TM, dull/gray, reduced cone of light
2. Hyperemia / Pre-suppurative Stage	Red, congested, opaque TM, loss of landmarks, reduced mobility
3. Suppurative Stage	Bulging TM (due to pus in middle ear), intensely red, opaque, absent light reflex, no landmarks
4. Perforation Stage	TM ruptures → visible perforation with purulent discharge, pain decreases
5. Resolution / Healing Stage	Perforation closes, TM regains translucency, may show scarring (tympanosclerosis) or atrophic areas

## ◆ Mnemonic to recall TM changes

👉 “Retracted → Red → Bulging → Burst → Back”

Retracted (early) •

Red (hyperemia) •

Bulging (suppuration) •



# Pathogenesis

- Acute otitis media is an infection of the **mucous membrane** of the whole middle-ear Eustachian tube, tympanic cavity, attic, aditus, mastoid antrum and air cells.
- The bacteria responsible for acute otitis media are: Streptococcus pneumoniae 35%
- Haemophilus influenzae 25%
- Moraxella catarrhalis 15%
- Group A streptococci and Staphylococcus aureus may also be responsible.

- The sequence of events in acute otitis media is as follows:

1. Organisms invade the mucous membrane causing inflammation, oedema, exudate and later pus.

2. Oedema closes the Eustachian tube, preventing aeration and drainage.

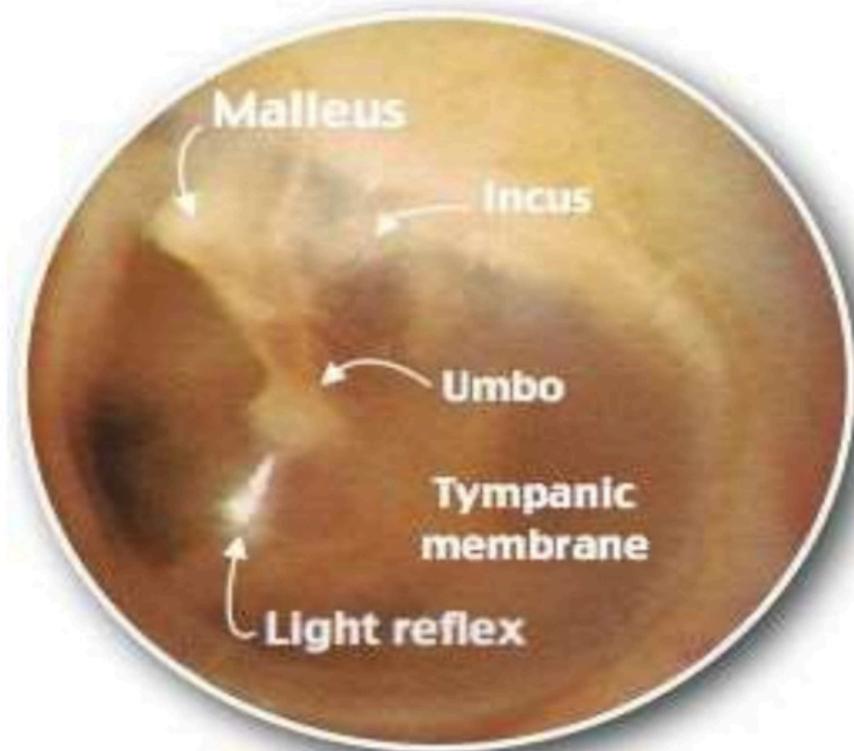
3. Pressure from the pus rises, causing the drum to bulge and perforate.

4. Most cases resolve completely. A small number cause complications or persistent perforation.

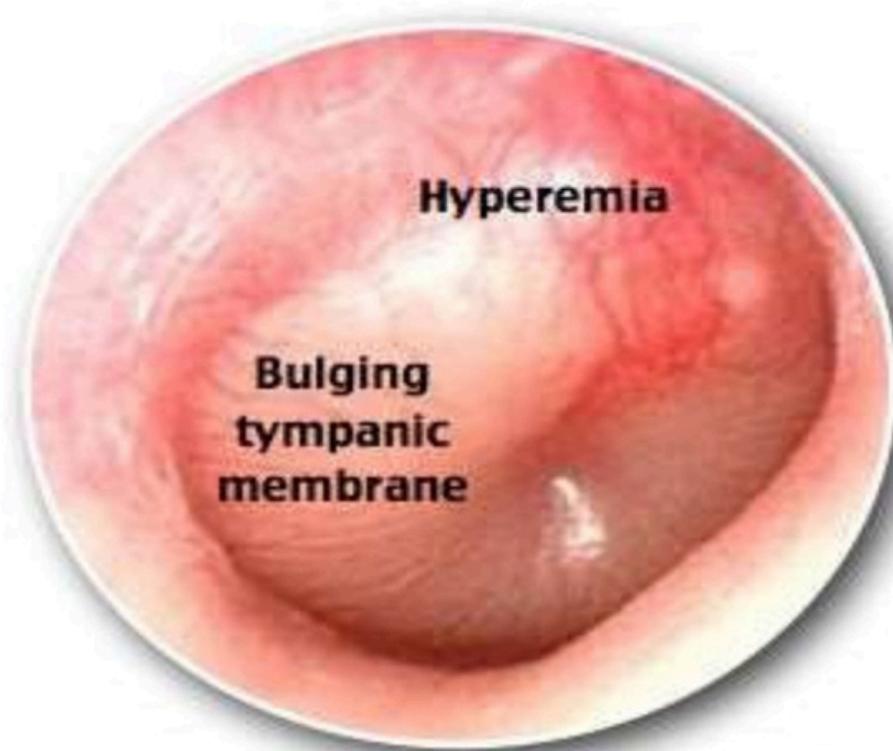
- Sequences of acute otitis media

1. Perforation >>> rupture of tympanic membrane >> scar.
2. Inflammation and discharge >>> Spontaneous resolution ( common and usually in children).
3. Transform into chronic form.
4. Transform into otitis media with effusion.
5. Resolves with antibiotics before discharge.
6. Pus and discharge

# Acute Otitis Media



**Normal**



**Acute Otitis Media**

## **Most common bacterial causes**

- *Streptococcus pneumoniae*
- *Haemophilus influenzae* (non-typeable)
- *Moraxella catarrhalis*

# Causes of AOM :

## ● More common

1. Common cold
2. Acute tonsillitis
3. Influenza
4. Coryza of measles, scarlet fever, whooping cough

## Less common

- 1. Sinusitis
- 2. Haemotympanum
- 3. Trauma to the tympanic membrane
- 4. Barotrauma (air flight)
- 5. Diving
- 6. Temporal bone fracture

## Symptoms :

- **Earache (otalgia)** : may be slight in a mild case, but more usually it is **throbbing** and **severe**. The child may cry and scream inconsolably until the ear perforates, the pain is relieved and peace is restored.
- **Deafness** : is **always present in acute otitis media** but if the infection is unilateral this can go unnoticed. **It is conductive in nature and may be accompanied by tinnitus**. In an adult deafness or tinnitus may be the first complaint.
- **Discharge** : Pressure builds up in the middle ear and the drum ruptures. **The child gets immediate pain relief** but the parents notice a sticky discharge, **often purulent**. The perforation formed in this way usually heals.

- **Signs**

1. **Pyrexia :**

The child is flushed and ill.

The temperature may be as high as 40 °C.

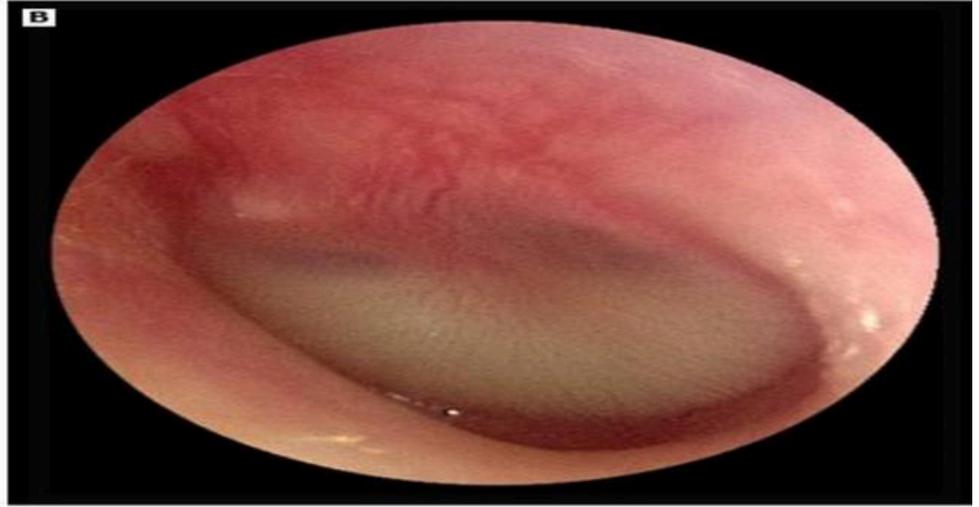
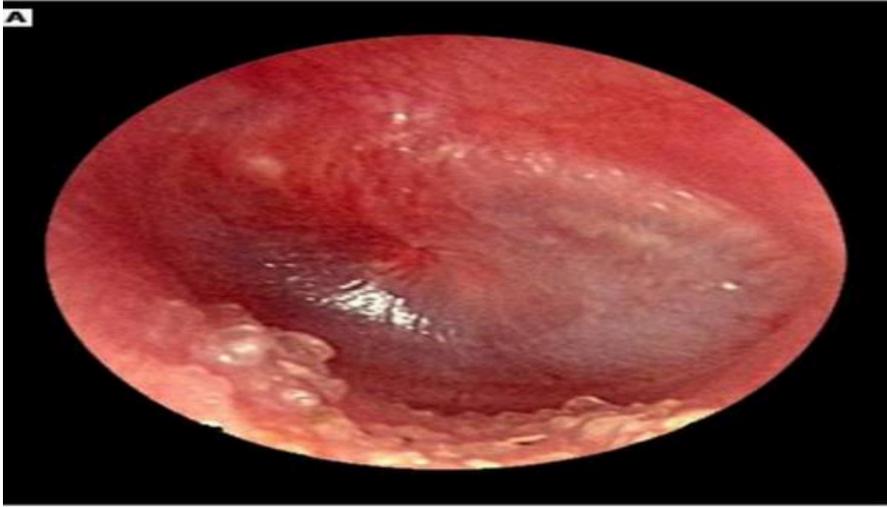
2. **Tenderness:** There is usually some tenderness to pressure on the mastoid bone.

3. **Mucoid (sticky) discharge** from an ear must mean that there is a perforation of the tympanic membrane.

There are no mucous glands in the external canal. Otoscopy and interpreting the findings can be difficult in a fractious child.

The tympanic membrane The tympanic membrane varies in appearance according to the stage of the infection:

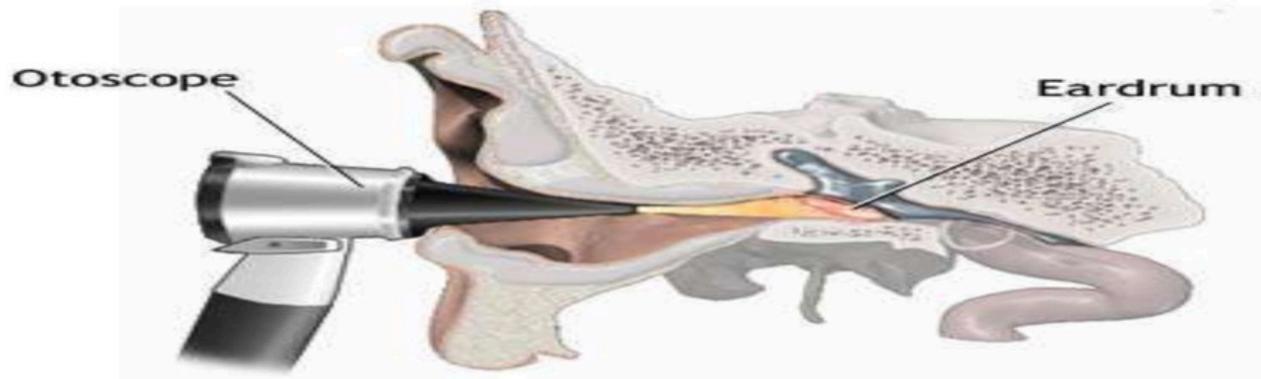
1. **Loss of lustre and break-up of the light reflex.**
2. Congestion of the small vessels around the periphery and along the handle of the malleus.
3. **Redness and fullness of the drum;** the malleus handle becomes more vertical.
4. **Bulging with loss of landmarks.** Purple colour. Outer layer may desquamate, causing blood-stained serous discharge. Early necrosis may be recognized, heralding imminent perforation.
5. **Perforation with otorrhoea,** which will often be blood-stained. Profuse and mucoid at first, later becoming thick and yellow



- **A-Early AOM with inflammation;subsequently progressed to effusion**
- **B-Purulent effusion with air fluid level**
- **C-Bulging purulent effusion filling the middle ear**

# Investigations

- Usually **no investigation** is required.
- Culture of discharge from ear may be indicated in chronic or recurrent perforation.
- **Audiometry** should be performed if chronic hearing loss is suspected; however, not during acute infection.
- So diagnosis simply by detect an active infection in the middle ear is to look in the child's ear with an **otoscope**, a light instrument that allows the physician to examine the outer ear and the eardrum. Inflammation of the eardrum indicates infection.



# Treatment

- The treatment **depends on the stage** reached by the infection.
- The following stages may be considered:
  - 1.Early 2.bulging 3.discharging.
- Most cases of AOM improve **spontaneously**. Cases that require treatment may be managed with **antibiotics** and **analgesics** or with observation alone.
- The recommendations offer more rigorous diagnostic criteria to reduce unnecessary antibiotic use.

## For early stage :

### 1. Antibiotics

- **Penicillin** remains the drug of choice in most cases, and ideally should be given initially by **injection** followed by **oral** medication.
- **In children under 5 years**, when *Haemophilus influenzae* is likely to be present, **amoxycillin** will be more effective, and should always be considered if there is not a rapid response to penicillin.
- **Co-amoxiclav** is useful in *Moraxella* infections.
- Be guided by sensitivity reports from the laboratory.

### 2. Analgesics

-Simple analgesics, such as **aspirin** or **paracetamol** suffice.

-**Avoid the use of aspirin in children** because the risk of reye's syndrome

### 3. Nasal vasoconstrictors

- The role of **0.5% ephedrine** nasal drops is traditional but its value is uncertain in **the presence of acute inflammation of the middle ear**.

### 4. Ear drops

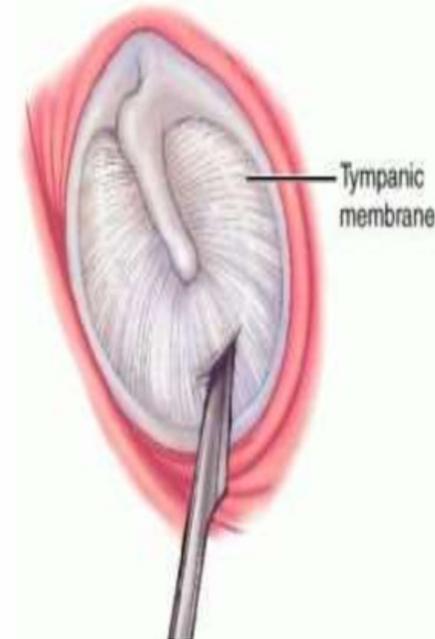
- Ear drops are of no value in acute otitis media **with an intact drum**. Especially illogical is the use of drops containing local anaesthetics, which can have no effect on the middle-ear mucosa yet may cause a sensitivity reaction in the meatal skin.

## In bulging stage:

- **Myringotomy** is necessary when bulging of the tympanic membrane **persists, despite adequate antibiotic.**

### - Adequate antibiotic therapy :

- **Choice of drug** (according to the organism and antibiotic resistance) .
- **Dose** (according to body weight) .
- **Compliance** .



- It should be carried out **under general anaesthesia** in theatre and a **large incision in the membrane should be made** to allow the ear to drain. **Pus** should be **sent** for **bacteriological** assessment.
- **Following** myringotomy, the ear will discharge and the outer meatus should be **dry-mopped regularly.**

## In discharge :

- Discharging—nature's myringotomy
- If the **ear is already discharging** when the patient is first seen, a **swab** should be sent for culture of the organism. **Antibiotic therapy** should be started but modified if necessary when the result of the sensitivities is known.
- **Regular aural toilet** will be necessary.
- Further management .**Acute otitis media is not cured until the hearing and the appearance of the membrane have returned to normal.** This can take several weeks and a persistent effusion of fluid in the middle ear is especially common in children.
- If there is **no resolution suspect:**
  1. the nose, sinuses or nasopharynx; **infection** may be present;
  2. low-grade infection in the **mastoid cells.**
  3. the **choice or dose** of antibiotic

## Recurrent Otitis Media

- Some children are susceptible to **repeated attacks of AOM.**
- There may be an underlying immunological deficit such as **IgA** deficiency or **hypogammaglobulinaemia** that will need to be investigated.
- Long-term treatment with **half-dose cotrimoxazole** may be beneficial
- If the attacks persist, **grommet insertion**  
Tympanostomy tube may prevent further attacks but may result in purulent discharge.

# Tympanostomy tube indication

- people who have **three or more** episodes of acute otitis media in 6 months .
- or **four or more in a year**, with **at least one** episode or more attacks in the **preceding 6 months**
- **complication :**  
most common **otorrhea**

## Grommet insertion



# COMPLICATIONS

## - Otologic complications :

- TM perforation,
- chronic suppurative OM
- cholesteatoma
- ossicular necrosis
- chronic otorrhoea

## -Other complications include:

- mastoiditis
- labyrinthitis
- sigmoid sinus thrombophlebitis.

## - Intracranial complications

- meningitis extradural abscess
- brain abscess

# CLINICAL PRACTICE POINTS

- **Ear drops** are of no value in acute otitis media with an **intact** drum.
- Adequate analgesia is essential.
- If antibiotics are withheld, make sure you can review the child after 24 h.
- Passive smoking predisposes children to otitis media.

**THANK YOU!**

تذكر حلاوة الوصال يهن عليك مُر المجاهدة.  
(فوائد من كتاب الفوائد لابن القيم)

