

Acute Otitis Media

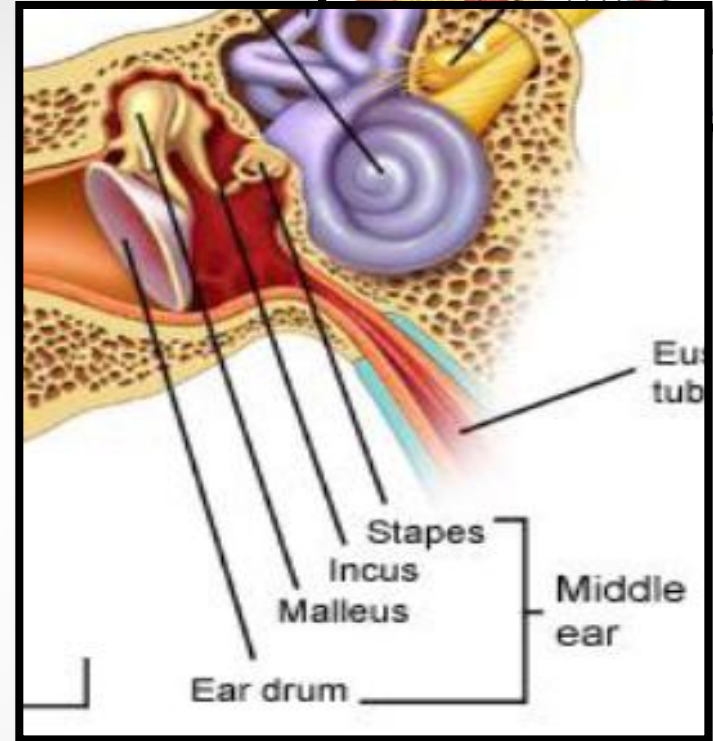


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Otitis Media

- **Otitis Media (OM)**
 - “acute inflammation of middle ear (cleft or mucosa).”
- **Acute Vs Chronic OM:**

If it was less than 6 weeks it's called (acute otitis media), more than 6 weeks it's chronic.
- **Otitis Media with effusion (OME)**
 - “Presence of MEE without signs or symptoms of infection, previously named: secretory, serous, or glue ear.”



Acute Otitis Media

Its an acute (short lived) inflammation of the middle ear cavity, that most commonly follows an acute upper respiratory tract infection.

Acute otitis media (AOM) is one of the most common infectious diseases seen in children, with its peak incidence in between the first 6 month and 3 years of life.

Epidemiology

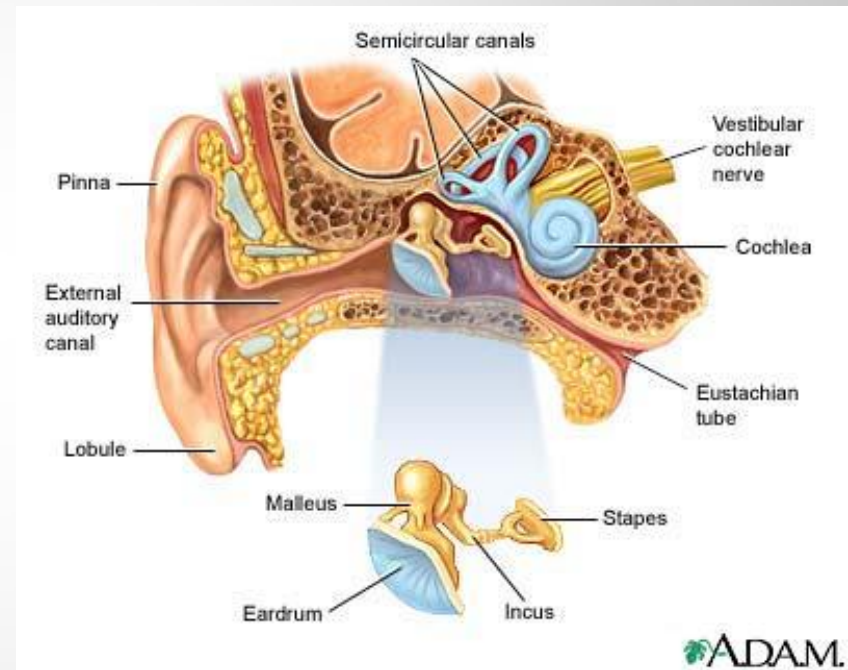
- 31 million visits to physicians annually in U.S.
- **The most common diagnosis made by pediatricians, second only to the common cold.**
- Diagnosed > 5 million times a year.
- 3-5 billion \$/year in U.S.
- **Two thirds of all American children have had at least one episode of AOM prior to 1 year of age, and 80% have had one by 3 years of age**

The normal physiologic functions of the eustachian tube

- (1) maintain the gaseous pressure within the middle ear cleft at a level that approximates atmospheric pressure.
 - (2) prevent reflux of the contents of the nasopharynx into the middle ear.
 - (3) clear secretions from the middle ear by both mucociliary transport and a “pump action” of the eustachian tube.
- The failure of any or all of these normal functions of the eustachian tube can result in OM.

Pathophysiology

- Eustachian tube obstruction
 - Length: shorter in children
 - Angle: 10° children vs. 45° adult
- Decreased immunocompetence
- Follows upper respiratory infection (URI)
 - Peak incidence 2 - 4 days



• Anatomic obstruction

- Inflammation of the eustachian tube mucosa or extrinsic compression by tumor or large adenoids.

• Functional obstruction

- Insufficient stiffness of the cartilaginous portion of the eustachian tube (child)
- The more acute angle (**Angle: 10° children vs. 45° adult**) of the eustachian tube result in impaired function of the tube opening.
- **The failure of the normal muscular mechanism of eustachian tube opening, Ex; in cleft palate:** Because the tensor-veli-palatini muscle lacks its normal insertion into the soft palate.
- If the eustachian tube is abnormally patent or short, its normal protective function against the reflux of nasopharyngeal contents is lost. (Often seen in patients with **Down syndrome**)

Pathogens

Bacterial

- *Streptococcus pneumoniae*
- *Haemophilus influenzae*
- *Moraxella catarrhalis*

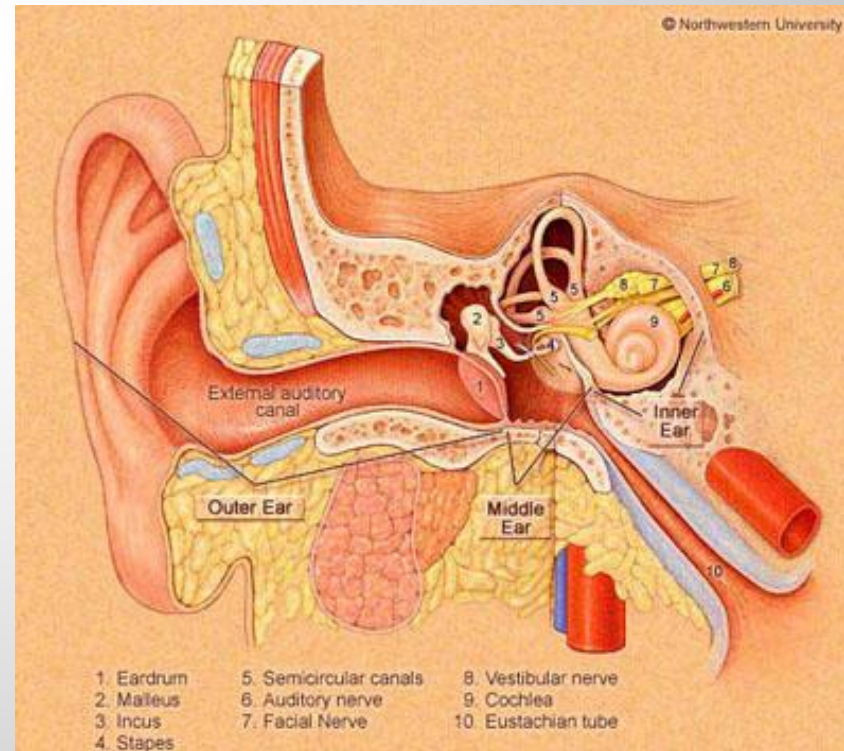
Viral

- RSV
- Influenzae A & B
- Parainfluenzae 1,2, & 3
- Rhinovirus
- Adenovirus
- Enterovirus
- Coronavirus

Routine of infection

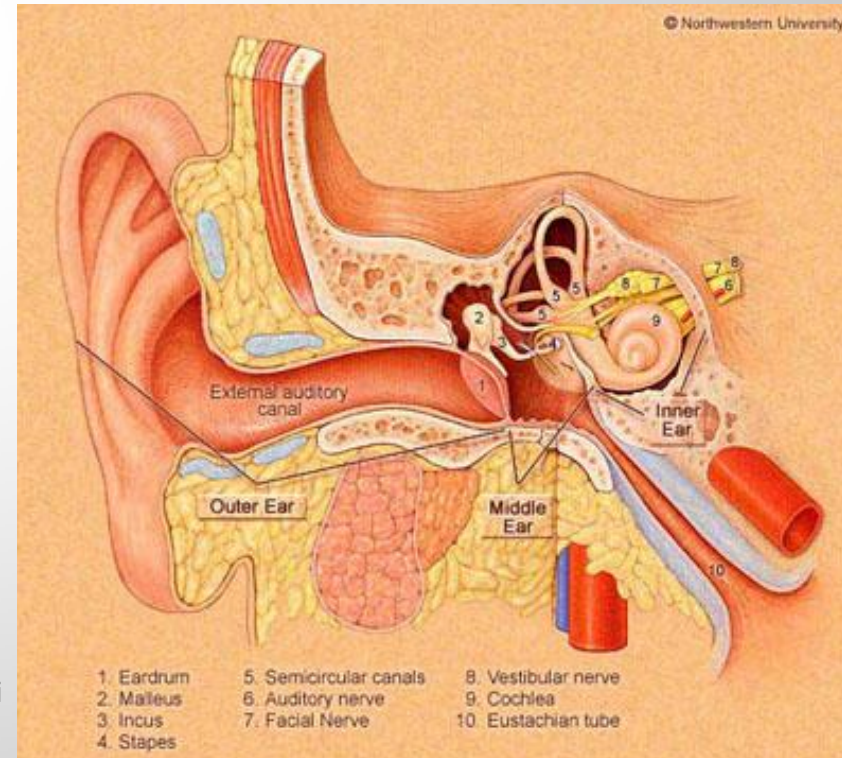
- Via eustachian tube
 - upper respiratory infection (acute rhinonitis and nasal pharyngitis)
 - Upper respiratory communicative disease (diaphea, mealse, etc.)
 - Swimming and dive in unclear water
 - Anatomic contribution (Eustachian tube in infant is wide and short and the two orifice in the same level)

Ahmad Rimawi



Routine of infection

- Via external acoustic canal and TM
 - Perforation
 - Myringotomy or myringotomy
- Via blood supply



Factors relevant to the epidemiology of otitis media.

Environmental Factors

Day-care attendance

Not being breast-fed

Exposure to tobacco smoke

Seasonal variation in respiratory infections

Host Factors

Genetics

Immunodeficiency

Birth defects

Cleft palate

Down syndrome

Stages of acute otitis media:

1. Microorganism invades the mucosa leading to inflammation, edema, exudates & pus.
2. obstruction of the Eustachian tube leading to prevention of aeration, drainage & the -ve pressure in the middle ear, & tympanic membrane retraction.
3. with increase pressure the tympanic membrane will bulge.
4. necrosis of the tympanic membrane ending with perforation.
5. the ear will continue to drain until the infection resolves.

Diagnosis: Clinical Manifestations

- **Specific**

- **Otalgia**

- 60% patients can spontaneous remission

- **Otorrhea**

- mucoid ear discharge which means a perforation.
- If child has it, would culture it

- **Dizziness**

- **Hearing loss**

- may be associated with tinnitus

- **Non-specific**

- Fever (50%)

- Vomiting/diarrhea

- Anorexia

- Irritability

- Fullness



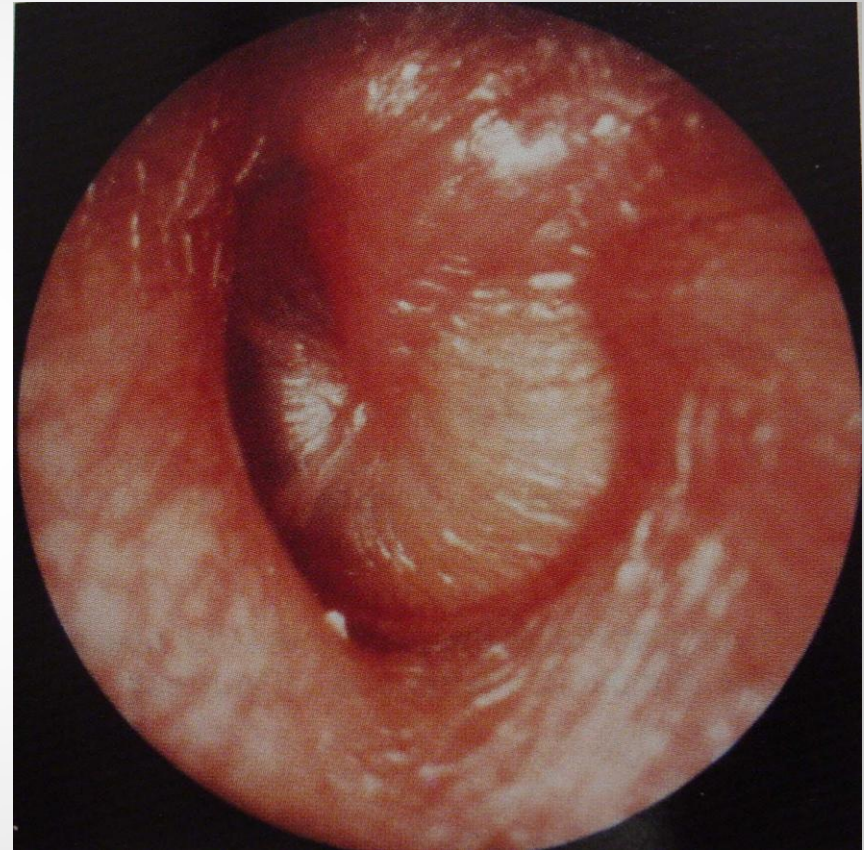
Diagnosis: Clinical Findings

- Otoscopic findings
 - Bulging TM
 - Yellow, white, or bright red color
 - Opacification of eardrum
 - Impaired visibility of ossicular landmarks
 - Squamous exudate



Physical findings

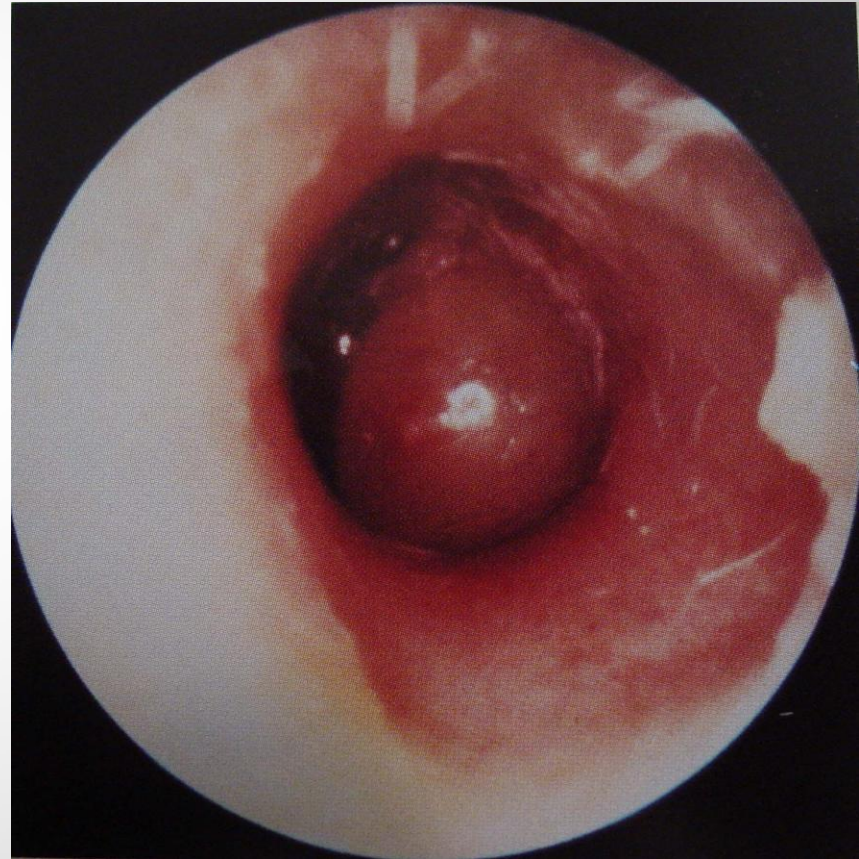
- Increased vascularization of the TM, initially located in pars flaccida, frequently spreading beyond the annulus to the skin of the external canal.
- Bony landmarks are visible.



Thickened, bulging, hyperemic tympanic membrane.

Physical findings

- Rapid middle ear exudation occurs,
- Blurring of the malleolus short process, followed by edema and bulging of the pars flaccida.



Physical findings

- The progression of this disease may result in rupture of TM, releasing the middle ear contents (beating sign) leads to relief of otalgia and retraction of the pars flaccida

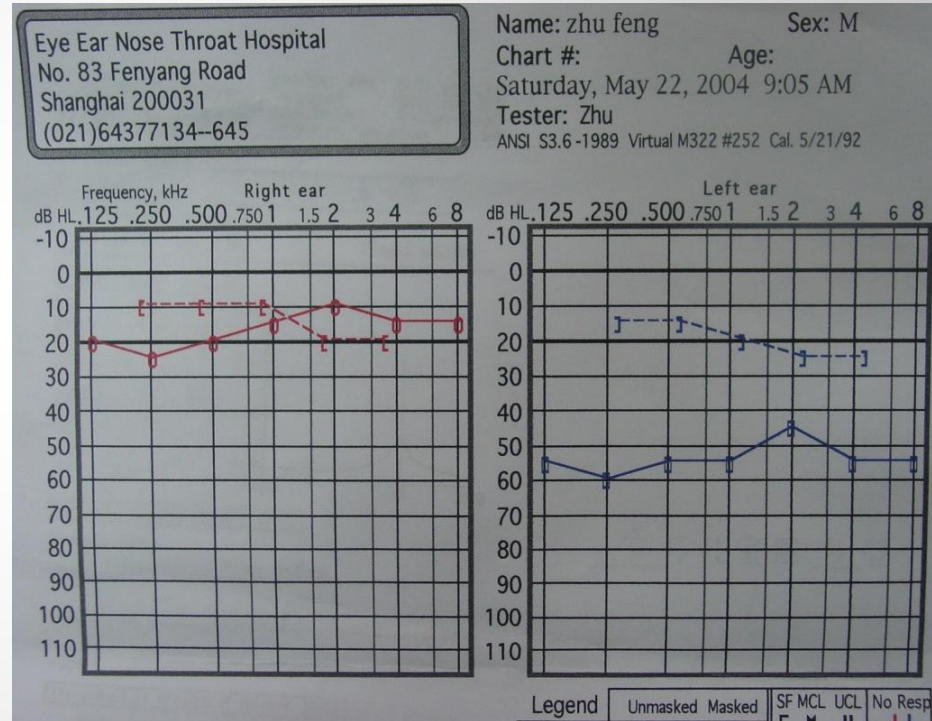


Lab tests

- Blood counts usually shows leukocytosis with polymorphonuclear elevation.
- CT and MRI is necessary only for the rare patients with a serious complication (meningitis or brain abscess)

Hearing tests

- Conductive hearing loss
 - Degree of hearing loss will depend on the amount and viscosity of the middle ear exudate, TM edema
 - It vary from 10-50 dB with predominant involvement of the low frequencies
 - Hearing loss may mixed when there is labyrinthine extension.



Treatment Considerations

- Allergies
- AOM history
- Spectrum of activity
- Local resistance pattern
- Recent antibiotic treatment
- Age
- Duration
- Compliance
- Adverse drug events
- Cost

Treatment Considerations

- Drug resistant *S. pneumoniae* (DRSP) incidence increasing
- Patients at high risk for DRSP
 - Attending day care
 - < 2 years old
 - Antibiotic therapy in preceding 3 months

Why Focus on Pneumococcus?

- Most common initial bacterial pathogen
- Most common isolate after failed therapy
- Least likely bacterial pathogen to self resolve
- Most likely to cause severe otitis media
- Most likely to cause suppurative complications of otitis (mastoiditis)

Treatment

AOM spontaneously resolves 40 - 60%

1. Watchful waiting—The current practice guidelines

Advise on an initial watchful waiting without antibiotic therapy for healthy 2-year-olds or older children with **nonsevere illness (mild otalgia and fever < 39 °C) because AOM symptoms improve in most within 1–3 days**. However, guidelines should not replace clinical judgment. Watchful waiting is **not recommended for children < 2 years old if AOM is certain**.

2. Antibiotic therapy—If AOM does not settle after

The watchful waiting period, then antibiotic therapy should begin.

- **Amoxicillin (80 * mg/kg/d given in three divided doses for 10 days) remains the first-line therapy for AOM.**

- In resistant cases, amoxicillin should be combination with clavulanate

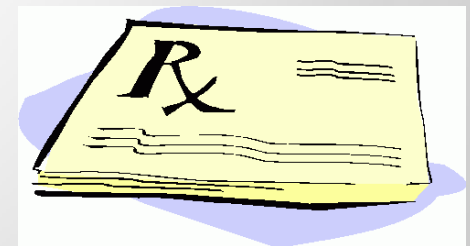
3. Adjunctive therapy—The adjunctive therapy for

AOM should include analgesics and antipyretics. There is no role for oral decongestants or antihistamines in the treatment of AOM.

(*) SOME SAY 90 mg/kg/d

Treatment Options

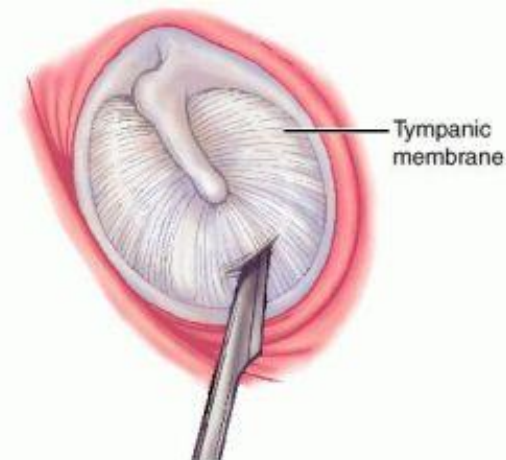
- Who to treat with antibiotics?
 - < 2 year old
 - AOM \geq 3 days
 - Ill-appearing patients
 - Patients at an increased risk of DRSP



Managements

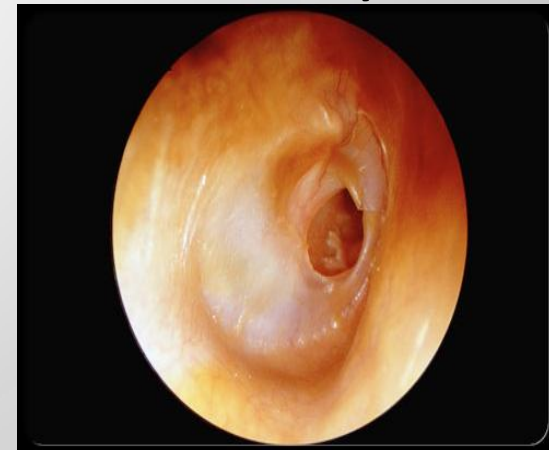
1. Pre-perforation

- Pain relief drugs
- Bulging of the tympanic membrane give analgesic & penicillin or cephalosporin first by injection then orally for 5-10days .
- Surgery: **myringotomy**
 - Progression with a red, bulging TM, severe otalgia and fever
 - Otitis media with impending complications
 - perforation is not big enough to drain all pus
- If H.influenza is suspected amoxicillin will be more effective than penecillin, while if Moraxella, co-amoxiclav will be more beneficial.
- Ear drops are of no value in AOM with intact membrane.



Managements

- Post-perforation :
 - Clear-up pus with 3% hydro-oxygen
 - Antibiotic ear drops (send a sample for the sensitivity testing)
 - With pus decreased and inflammation disappeared, alcohol can be used to facilitate dry ear.



Treatment Failure

- No improvement in ear pain, fever, or tympanic membrane otorrhea, bulging or redness after 3 days of antibiotic therapy
- 2nd Line Therapy
 - DRSP
 - Beta-lactamase producing *H.influenza* and *M. cattarhalis*
- If relapse within 1 month, use 2nd line agent but
- If >4 weeks could be new pathogen and OK to use HD amoxicillin

Prevention

- Pneumococcal conjugate vaccine (n=37,868)
 - Reduction of otitis office visits
 - Reduction of antibiotic prescriptions
- Influenza vaccine
 - Goal: decrease number of URI
- Breast feeding
- The prophylactic use of tympanostomy tubes (not myringotomy alone)
- Adenoidectomy (less effective)

Recurrent AOM

Recurrent AOM: is defined as ≥ 3 episodes of acute suppurative OM in a 6-month period, or ≥ 4 episodes in a 12-month period, with complete resolution of symptoms and signs between the episodes.

- Maybe an underlying immunological deficit **such IgA deficiency Or Hypogamma-globulinaemia**
- Antibiotic prophylaxis of recurrent AOM is once-daily oral amoxicillin at 20 mg/kg/d

Follow-up

- Adequately treated AOM effusion may persist for 2-6 weeks or even longer.
- Managements may require
 - extended antibiotic treatment
 - Otoscope and audiometric tests should be performed 3-4 weeks following apparent resolution of the acute infection
 - Insertion of pressure equalization tubes due to fluid persists beyond 3 months

Otitis media with effusion (OME)

It's an accumulation of fluid in the middle ear following an episode of otitis media the child could be deaf for several weeks

It is not necessary to have a prior episode of acute otitis media, it's a short-lived & resolves completely no need for treatment called (middle ear effusion).

But if the fluid persists with an intact ear drum (no perforation) 3 months or more this is abnormal & called (OME) or "glue ear".

OME affects most children at one time or another in up to 1/3 persist for 3 months or more, it's commoner in winter & small children & cause significant deafness if left untreated, may result in permanent middle-ear changes.

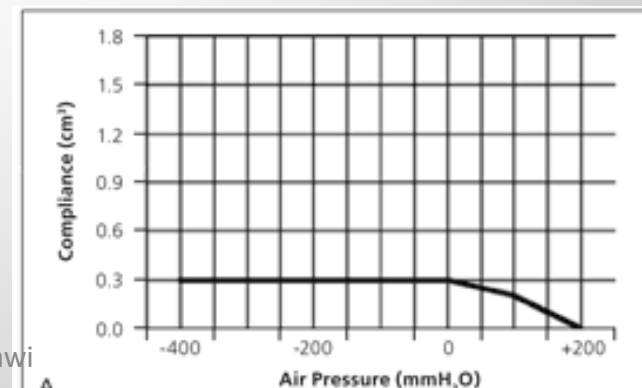
Etiology:

The most imp& common cause is AOM other causes :

- 1- Adenoid
- 2- Cleft palate
- 3- Down syndrome pt
- 4- Passive smoker pt
- 5- Nasal allergy eg:allergic rhinitis
- 6- Early exposure to pathogens
- 7- Pt's with mucociliary disorder.

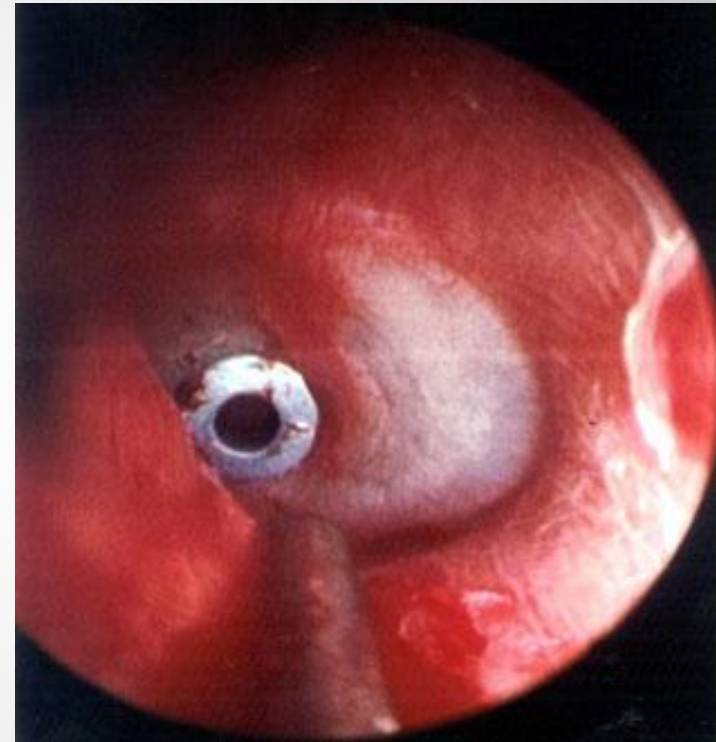
Symptoms:

- 1) Conductive deafness
 - 2) discomfort but not pain and sometimes tinnitus.
- Signs: by the otoscope the characteristic ***dull yellow appearance of fluid behind the ear drum*** will be obvious.
 - Flat curve on audiogram



Management of (OME):

- Many children will improve spontaneously (some try a single course of antibiotic)
- If there is a predisposing condition e.g. allergic rhinitis. or cleft palate you need to treat this on it's own.
- Treatment of OME is mainly toward improving the hearing by the insertion of a small tube in the eardrum (grommet) done under general anesthesia following the puncture of the drum and aspiration of the fluid (myringostomy).



OME in adults:

- OME in adults may follow an upper respiratory tract infection.
- The improvement is spontaneous and gradual may take up to 6wks .
- The effusion could also follow a sudden change in pressure e.g. deep sea diving or a rapid descent from an aircraft.
- Rarely a presentation of nasopharyngeal malignancy .

Treatment summary for otitis media.

| | Acute Otitis Media (AOM) | Otitis Media with Effusion |
|-----------------------|---|---|
| Watchful waiting | Up to 72 hours with analgesia/anti-pyretics if nonsevere and patient > 2 years old | For 3 months from onset or diagnosis |
| Medical therapy | Antibiotics (amoxicillin) | NI |
| Surgical intervention | Myringotomy for refractory AOM Cortical mastoidectomy in nonresponding mastoiditis | VT insertion if unresolved after 3 months Adenoidectomy on second VT insertion |

NI, not indicated; VT, ventilation tube.