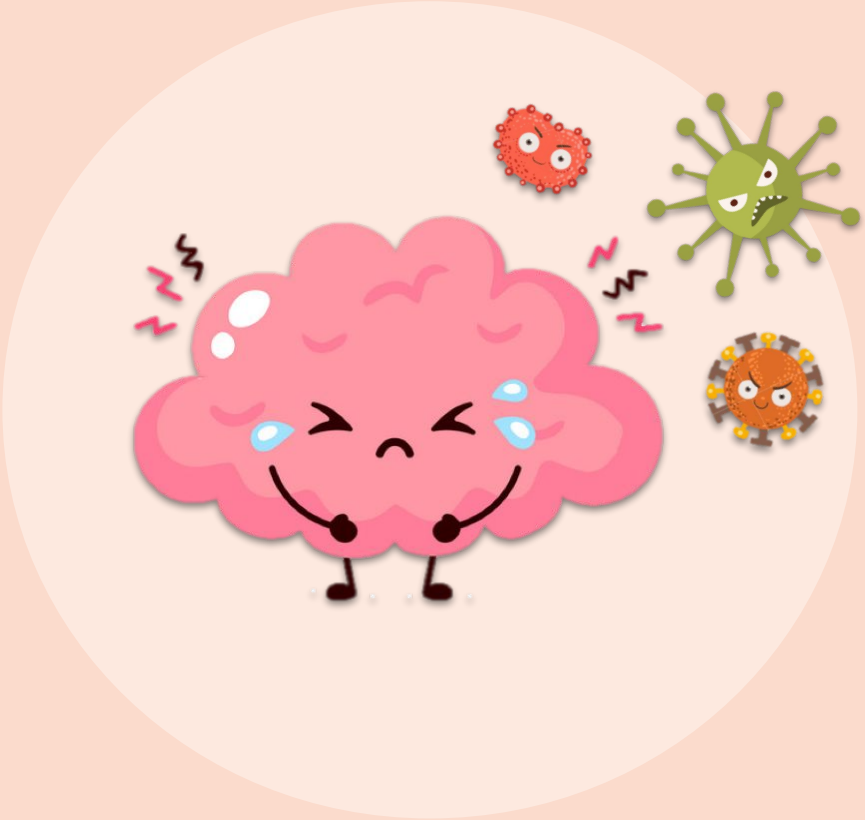
Otitis media



Objectives

- ★ Define middle ear infection
- ★ Know the classification of otitis media (OM).
- ★ Know the epidemiology of OM
- ★ Know the pathogenesis & risk factors of OM.
- ★ List the clinical features of OM.
- ★ Know the diagnostic approaches of OM.
- ★ Know the management of OM.
- ★ Recall common complications of OM.

Color index:
- Important
- Doctors note
- Extra

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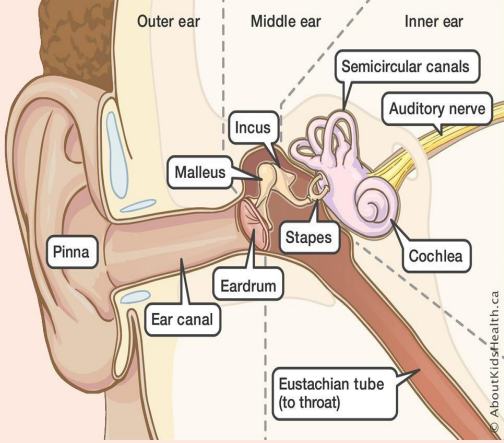
Anatomy of middle ear

- Middle ear is the area between the *tympanic membrane* and the *inner ear*, contains the Eustachian (auditory) tube.
- It is an **air-filled** cavity → fluid-accommodation with inf = OM.
- It's close to the CNS → OM might cause meningitis or other CNS infections.

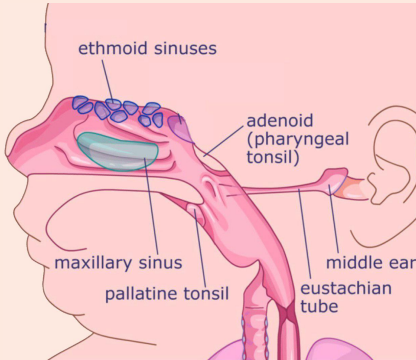


Otitis media (OM)

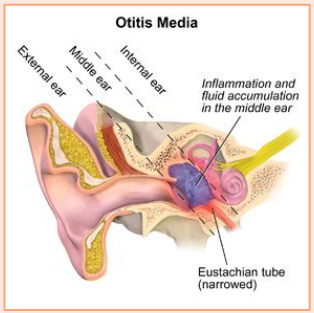
- Inflammation of the middle ear.
- **Classifications:**
  - Acute OM
  - Secretory (Serous) OM
  - Chronic OM

Epidemiology

- Most common in **infants** 6-18 months of age (⅔ of cases).
- improve with age, why? The Eustachian tube which vents the middle ear to the nasopharynx, is **horizontal in infants**:
  - Difficult to drain naturally → will be a good environment for bacterial growth.
  - Its surface is cartilage, & lymphatic tissue lining is an extension of adenoidal tissue from back of the nose.
  - The angle will change over the years.
- Accompanied with viral URTI.
- Usually seen after the winter. We all got OM after GOT ending.



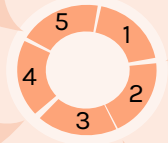
Pathogenesis:



Colonization and infection result.

URTI or allergic condition cause edema or inflammation of the tube.

Pathogens enter from Nasopharynx into the middle ear.



Functions of the tube (ventilation, protection and clearance) disturbed.

Oxygen lost leading to negative pressure

Risk Factors:

Anatomic abnormalities

Medical conditions such as Cleft palate ,obstruction due to adenoid or Nasogastric tube or malignancy, immune dysfunction.

Exposure to pathogens from day care.

Exposure to smoking.

Etiology:

Types	Acute	Chronic	Serous (OM with effusion)

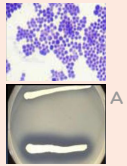
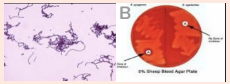
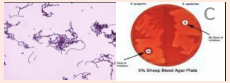
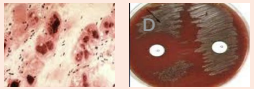
Bacterial causes	• **< than 3 months of age:**
	  ○ Strep.pneumoniae(40%)
	  ○ Group B Streptococcus
	  ○ H.influenzae (non typable)
	  ○ Gram negative bacteria including Pseudo.aeruginosa, E.coli
	• **> Than 3 months of age :**
	  ○ Strep.pneumoniae
	  ○ H.influenzae
	Others eg:
	  ○ Strep.pyogenes
	  ○ Moraxella catarrhalis
	  ○ Staph.aureus
		• Mixed flora in 40% of cases
		  ○ Pseudo.aeruginosa
		  ○ H.influenzae
		  ○ Staph.aureus
		  ○ Proteus species
		  ○ K.pneumoniae
		  ○ Moraxella catarrhalis
		  ○ anaerobic bacteria.
			• Same as chronic OM, but most of the effusions are sterile (non-infected) with Few acute inflammatory cells.
			• It's accumulation of serous fluid with no pus due to:
			  ○ viral infection
			  ○ allergy
			  ○ abnormalities of Eustachian tube. (as Adenoid hyperplasia, or Chronic URTI)
			  ○ complication of COM unresolved OM can cause SOM
			  ○ When child being bottle-feed while lying on the back.
			• cause hearing deafness
			• Bacteria don't cause SOM

Viral causes	• RSV(Respiratory Syncytial Virus) 74% • Rhinovirus • Para-influenza virus • Influenza virus		

only the pictures were in the doctors slides

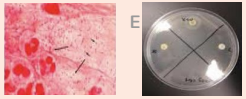
About the bacteria in this lecture (EXTRA)

Gram +ve

	catalase	coagulase	distinguishing features
staph. aureus	+	+	- Cocci in clusters yellow colonies on blood agar - DNAse +ve [A] 
strept. pyogenes (group A)	-	-	- Cocci in chains - **β** hemolytic - Bacitracin sensitive [B] 
strept. agalactiae (group B)	-	-	- Cocci in chains - **β** hemolytic - Bacitracin resistant [C] 
strept. pneumoniae	-	-	- Diplococci - ***α*** hemolytic - Bile soluble - Optochin sensitive [D] 

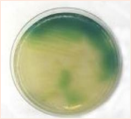
Gram -ve

H.influenzae:
- coccobacilli
- requires growth factor x (hemin) and v (NAD) [E]

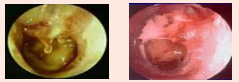
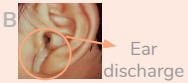


Proteus species:
- bacilli
- non-lactose fermentation
- oxidase -ve
- urease +ve

Pseudo. aeruginosa:
- bacilli
- non-lactose fermentation
- oxidase +ve



Moraxella catarrhalis:
- Diplococci
- oxidase +ve

Types	Acute	Chronic	Serous
Clinical presentation	• Mostly Bacterial →Severe and continuous Pain • Often a complication of viral URTI. **First 1-2 days** • Fever (39 C), irritability, earache (otalgia). • Muffled nose • Bulging tympanic membrane [A] , poor mobility and obstruction by fluid or inflammatory cells on otoscopic examination. **3-8 days** Pus and ear exudative discharge released spontaneously (otorrhea) → then pain and fever begin to decrease. **2-4 weeks** Healing phase, discharge clears and hearing becomes normal.	• Usually result from unresolved acute infection due to inadequate treatment or host factors that perpetuate the inflammatory process. • Involves perforation of tympanic membrane and active bacterial infection for long period. • Pus may drain to the outside (otorrhea).[B] • Results in destruction of middle ear structures and significant risk of permanent hearing loss.	• Collection of fluid within the middle ear as a result of negative pressure produced by altered Eustachian tube function. • Represents a form of chronic OM or allergy related inflammation. • Over weeks to months, middle ear fluid become very thick and glue like (glue ear)[C] • Tends to be chronic , with non-purulent secretions. • Cause conductive hearing deficit.
Images	A 	 B  Ear discharge	C  Tube to decrease the tension and the ear discharge

Diagnostic approaches of Otitis Media

- Clinical examination
- **Tympanometry** (detect the presence of fluid, for abnormal air conduction)
- Gram stain & culture of aspirated fluid to determine the etiologic agents.

Management of Otitis Media

Acute OM

- Requires antimicrobial therapy & careful follow up.
- Antimicrobial usually empirical depending on the most likely bacterial pathogens, usually to cover S.pneumoniae and H.influenzae.
- Drainage of exudates may be required.

Chronic and Serous OM

need complex management, possibly surgical.

Antibiotics

green mentioned by dr

- Amoxicillin (as strat).
- Amoxicillin / clavulanic acid (if u suspect H.inf, or Moraxella [1]).
- TMP-SMX (can be used except for GAS)
- Cloxacillin (for MSSA).
- Erythromycin (If patient allergic to penicillin).
- Cephalosporin (ceftriaxone , cefuroxime).

[1] these organisms produce beta lactamase, also MSSA.

Complications of Otitis Media

Misdiagnosis of OM can leads to major things:

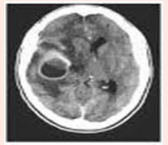
Extracranial

- **Hearing loss**
- **Tympanic membrane Perforation**.
- **Mastoiditis** [A]
- Cholesteatoma
- Labyrinthitis & others

[A]

Intracranial

- **Meningitis**
- Extradural abscess
- Subdural empyema
- Brain abscess & others



Quiz :

Q1/ Which one of the following is NOT correct regarding SOM etiology:

A. Viral infection.
B. Allergy.
C. Bacterial infection.
D. As a complication of COM.

Q2/ a 10 months old baby was diagnosed with otitis media, the culture showed a gram negative coccobacilli that required a special media to grow , what is the most likely organism?

A. Pseudo.aeruginosa
B. Strep.pneumoniae
C. H.influenzae
D. Moraxella catarrhalis

Q3/ Which of the following is an extracranial complication of otitis media?

A. Meningitis
B. Extradural abscess
C. Subdural empyema
D. Mastoiditis

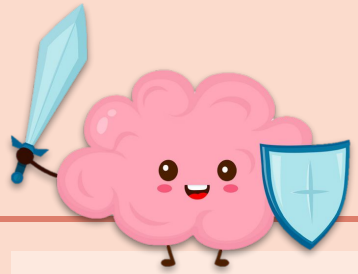
Q4/ Bulging tympanic membrane, poor mobility and obstruction by fluid or inflammatory cells on otoscopic examination , is a clinical presentation of ?

A. Chronic OM
B. Acute OM
C. Serous OM
D. Mastoiditis

SAQ/ A 2 months old infant, was brought by his parents to the ER, and he was diagnosed with Acute OM, culture showed gram +ve, diplococci, alpha hemolytic, optochin sensitive, what most likely the organism is?[1] and what are the symptoms and signs for the first two days?[2] and what is the Antibiotic that you can start with?[3]

1/ Strept.pneumonia.
2/ Slide 7
3/ Amoxicillin

Q1/C
Q2/C
Q3/D
Q4/B



THANK YOU

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Editing file

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