

OTITIS MEDIA

micr**B**iology
434



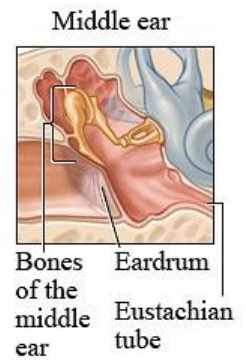
- Important
- Extra explanation

Otitis Media:

Inflammation of the middle ear

Middle ear:

is the area between the tympanic membrane and the inner ear
[including the Eustachian tube]



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Eustachian tube:

- a tube that vents the nasopharynx
- provides balance between air inside and outside for preventing infection
- has a surface of cartilage
- lined by lymphatic tissue [extension of adenoidal tissue tonsils from the back of the nose]
- Function: [**ventilation – protection – clearance**]

Epidemiology:

- Most common in [6 – 18 m infants] → 2/3 of cases
 - Because of the **horizontal + short** shape of the Eustachian tube → difficult to drain + easy transmission of bacteria from the oral cavity to the middle ear by negative pressure
- Accompanied by **viral** upper respiratory tract infection [URTI] ↑ nasal secretions → block Eustachian tube + destruction of mucosa
- More common in males
- Vaccination → ↓ incidence of OM




Pathogenesis:

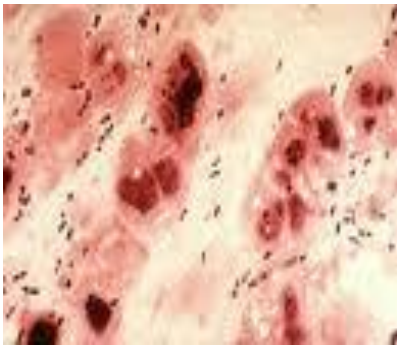
URTI or allergic condition → edema or inflammation of tube → tube function disturbed → oxygen lost → -ve pressure → pathogens enter nasopharynx → go to middle ear via the Eustachian tube → colonization and infection

Risk factors:

- Anatomic abnormalities [of face or tube]
- Exposure to pathogens from daycare
- Exposure to smoking
- Medical conditions :
 - cleft palate
 - immune dysfunction
 - obstruction [adenoid لوز - malignancy - nasogastric tube انبوب تغذية عن طريق الانف]



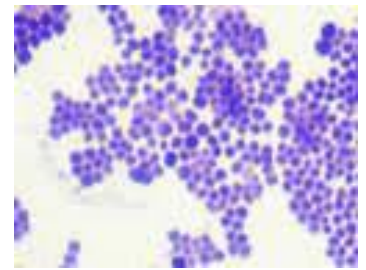
Types	Acute OM		Chronic OM	Serous OM [w/ effusion]	Viral
Organisms	< 3 month	> 3 month	<ul style="list-style-type: none"> • Mixed flora in 40% of cases • anaerobic bacteria • proteus species • K.pneumoniae 	<ul style="list-style-type: none"> • Same as <u>chronic</u> but most effusions are sterile • Few acute inflammatory cells 	<ul style="list-style-type: none"> • RSV (Respiratory Synsechial Virus) -74% • Rhinovirus • Parainfluenz a virus • Influenza virus
	S.pneumoniae				
Clinical presentation	<ul style="list-style-type: none"> • Often bacterial → severe continuous pain • Often a complication of viral URTI 		<ul style="list-style-type: none"> • from unresolved acute infection due to: <ol style="list-style-type: none"> 1-inadequate treatment 2-host factors → perpetuate the inflammatory process. • perfusion of tympanic membrane + active bacterial infection for long period. • Otorrhea: Pus draining to the outside → Result in <u>destruction</u> of mid ear structures and significant risk of <u>permanent hearing loss.</u> 	<ul style="list-style-type: none"> • Collection of fluid within the mid ear as a result of negative pressure produced by altered Eustachian tube function • Represent a form of <u>chronic OM</u> or <u>allergy-related inflammation.</u> • Over weeks to months, mid ear fluid become very thick and glue like (glue ear). • Tends to be chronic, with non-purulent secretions. • Causes conductive hearing impairment. 	
	First 1 – 2 days : By otoscopy				
	<ol style="list-style-type: none"> 1- Fever – irritability – earache 2- tympanic membrane bulging + poor mobility 3- muffled noise 4- obstruction by fluid or inflammatory cells 				
	3-8 days				
	<ol style="list-style-type: none"> 1- Pus and ear exudative discharge release spontaneously → ↓ fever & pain 				
	2-4 weeks [Healing phase]				
Pictures			 <p>Otorrhea</p>	 <p>Glue ear</p>	



Gram +ve Diplococci **Strept.pneumoniae**



DNase test for identification of :
staph aureus Zone of clearance

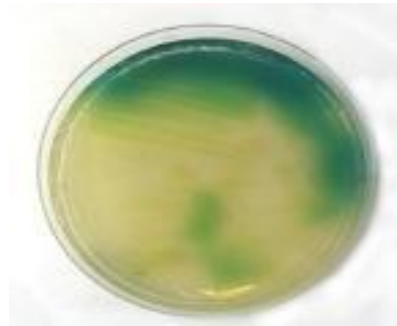


Gram +ve Cocci in clusters,
staph.aureus



Blood agar alpha hemolysis: [greenish]

- streptococcus pneumonia sensitive to optichian
- veridans streptococci is resistant to optichian



Pseudomonas aeruginosa

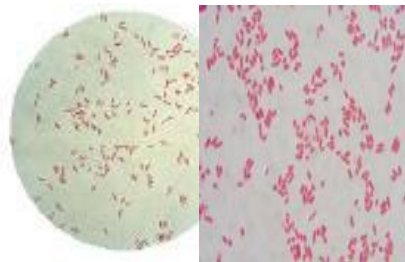


Gram -ve Coccobacilli
H.influenzae

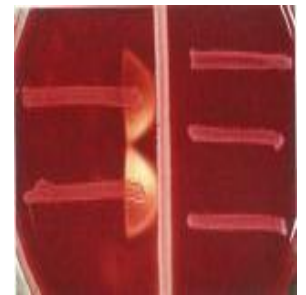


nutrient agar

- Hemophilus influenzae is the one in the top because there is growth



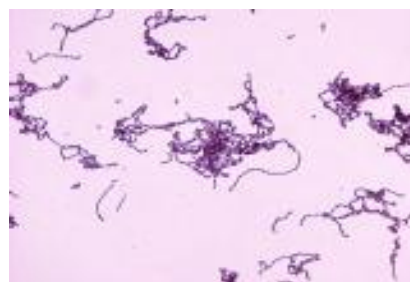
Gram -ve Bacilli



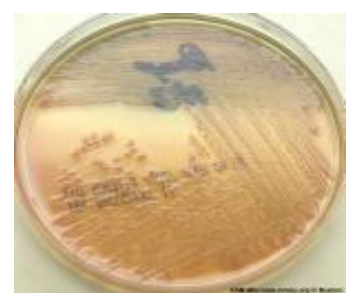
Group B Strept. Agalactia
[Camp test]



Beta hemolytic [yellowish] streptococci
sensitive to **bacitracin**



Gram +ve streptococci in chains



Nonlactose Fermenting Pseudomonas

Diagnostic approaches:

- Clinical examination
- Tympanometry (detect the presence of fluid)
- Gram stain and culture of aspirated fluid to determine the etiologic agents [not a swab].

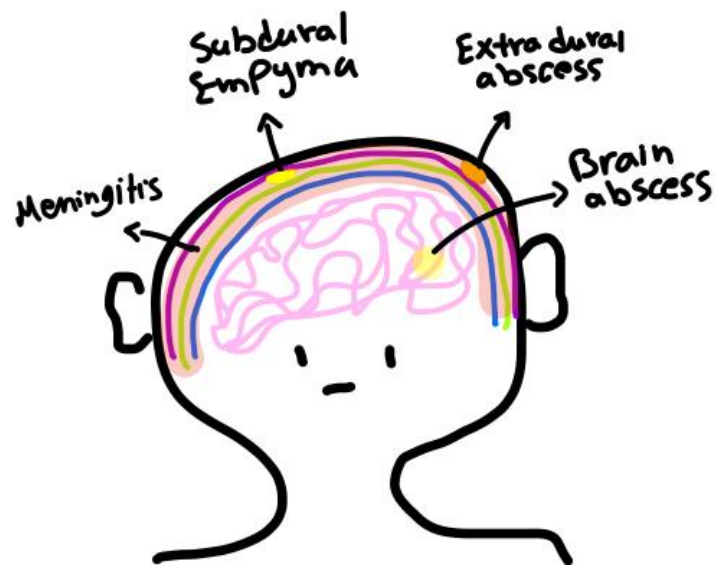
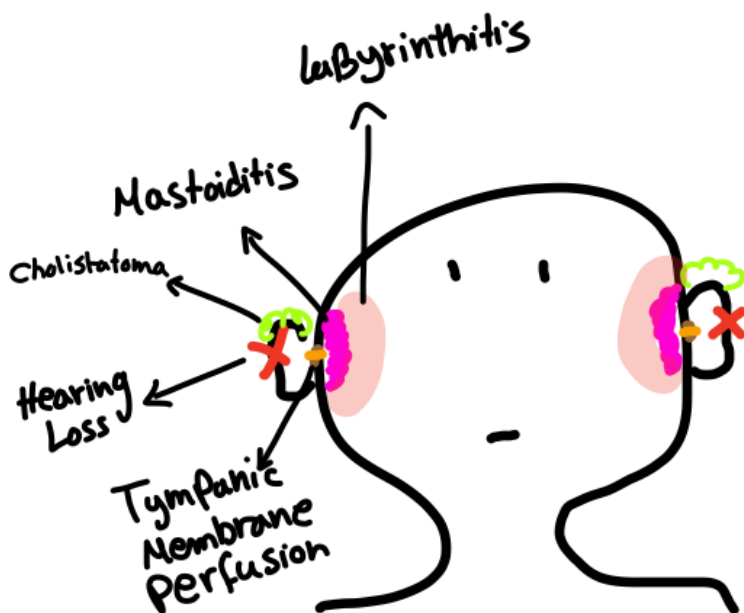
Not in all cases of OM puss comes out; because if treated early tympanic membrane won't perforate. But if there is rupture → do culture

Management:

- Acute OM requires antimicrobial therapy & careful follow up.
- Antimicrobial usually empirical depending on the most likely bacterial pathogens, usually to cover S.pneumonia and H.influenzae.
- Drainage of exudate may be required.
- Chronic or serous OM need **complex** management, possibly surgical.

If the patient is in severe pain and is feverish then rupturing of the tympanic membrane is helpful to reduce the pain

Complications of MO	
Intracranial [inside the ear]	Extracranial [outside the ear]
<ul style="list-style-type: none">• Hearing loss.• Tympanic membrane perforation. Membranes will heal again]• Mastoiditis.[inflamed mastoid process]• Cholestatoma.[tumor of the middle ear]• Labyrinthitis.	<ul style="list-style-type: none">• Meningitis.• Extradural abscess.• Subdural empyema. [collection of pus]• Brain abscess.



SAQ's:

1- What is otitis media?

- Otitis media is an inflammation in the middle ear (the area behind the eardrum) that is usually associated with a buildup of fluid. The fluid may or may not be infected.

Symptoms, severity, frequency, and length of the condition vary. At one extreme is a single short period of thin, clear, noninfected fluid without any pain or fever but with a slight decrease in hearing ability. The other extreme is repeated bouts with infection, thick "glue-like" fluid, and possible complications such as permanent hearing loss.

Fortunately, with early identification, serious medical complications can be controlled with medicine or surgery. However, there is one problem that nearly always occurs with all types of otitis media-fluctuating hearing loss.

2- Why is otitis media so common in children?

- The Eustachian tube, a passage between the middle ear and the back of the throat, is smaller and horizontal in children. Therefore, it can be easily blocked by conditions such as large adenoids and infections. Until the Eustachian tube changes in size and angle, children are more susceptible to otitis media.

3- How can otitis media cause a hearing loss?

- Three tiny bones in the middle ear carry sound vibrations from the eardrum to the inner ear. When fluid is present, the vibrations are not transmitted efficiently and sound energy is lost. The result may be a mild or even a moderate hearing loss. Therefore, some speech sounds may be muffled or inaudible.

Generally, this type of hearing loss is temporary. However, when otitis media occurs over and over again, damage to the eardrum, the bones of the ear, or even the hearing nerve can occur and cause permanent hearing loss.

4- List the complications of Otitis Media (extra cranial) :

- Meningitis - Extradural abscess - Subdural empyema - Brain abscess.

5- what is the function of the Eustachian tube ?

- ventilation – protection – clearance

6- A mother of a 12 months-old Child came to the pediatric clinic in her local area because she noticed that her son is suffering from fever and irritability in the last two days. Examination also showed Bulging of the tympanic membrane. The pediatrician decided to prescribe an empiric anti-biotic for the child is.....

- Amoxicillin.

7- A child was diagnosed with chronic suppurative otitis media that resists anti-Biotics. Culture of the pus showed gram negative oxidase positive rods. the etiology for this child is ?

- Pseudomonas aeruginosa

MCQ's:

1-what is the most serious complication of OM?

- a. mastoiditis
- b. meningitis
- c. brain abscess
- d. hearing loss

2- what are the two organisms that an empirical antibiotic should cover?

- a. H.influanza + P.aeruginosa
- b. s.aeruginosa + staph aureus
- c. moraxilla + catarrhalis
- d. S.pneumonia and H.influenzae

3- which of these is optichian sensitive ?

- a. S.pneumonia
- b. H.influenzae
- c. pseudomonas
- d. veridans streptococci

4- what kind of hearing loss is caused by serous OM?

- a. conductive
- b. sensorineural
- c. Both

5- The most common etiology for acute Otitis Media is?

- a. P.aeruginosa
- b.H.influanza
- c. veridans
- d.Streptococcus Pneumoniae

1- b 2- d 3- a 4- a 5- d

Videos:

<https://www.youtube.com/watch?v=1kmsPEd2Efk>

https://www.youtube.com/watch?v=y_t9YkJqeeW



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