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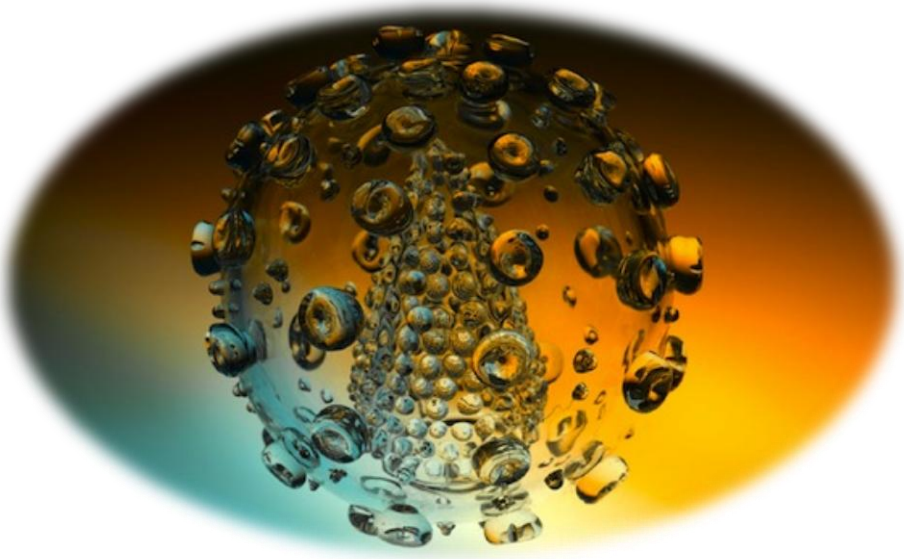
Microbiology Team

CNS BLOCK



Otitis Media

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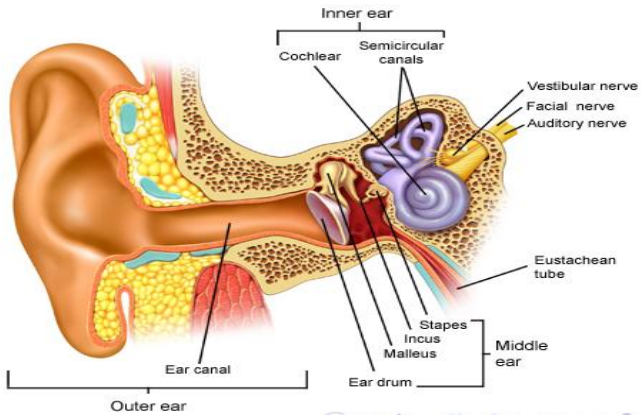
Definition of Otitis Media (OM):

Inflammation of the **middle ear**

Middle ear is the area between tympanic membrane & inner ear including Eustachian tube



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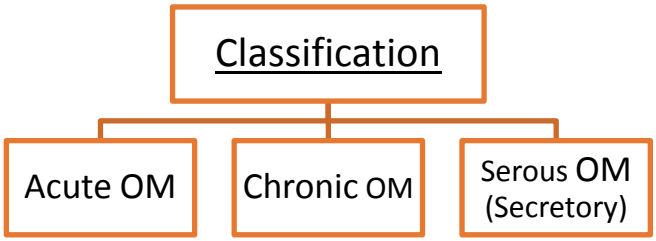

Epidemiology:

1. **Most common in infants 6 – 18 months old** (2/3 of cases) , because of :

Eustachian Tube (that vents middle ear to nasopahrynx)is**horizontal** in infants.

Breast feeding an infant in a horizontal position may lead to Otitis Media because the milk may drain into Eustachiantube then to middle ear.

2. It is accompanied by VIRAL UPPER RESPIRATORY TRACT INFECTIONS (URTI)

Eustachian Tube

1. is difficult to drain naturally
2. Surface of Eustachian Tube consists of cartilage
3. The lymphatic tissue lining is an extension of adenoidal tissue from the back of the nose. (adenoid = nasopharyngeal tonsil)

Pathogenesis:

- URTI or allergic conditions → could cause: 1- Edema or 2- Inflammation of the tube
- OM causes disturbed functions (Ventilation - Protection - Clearance) of the tube
- Oxygen is lost (no air in middle ear because of inflammation) leading tonegative pressure
- Pathogens from nasopharynx will enter into the middle ear → Colonization & infection result

Risk Factors:

- Anatomic abnormality
- Medical conditions such as : cleft palate - obstruction because of:

  a) Enlarged (please check) adenoid b) Nasogastric Tube c) Malignancy

- Immune dysfunction
- Exposure to pathogens from day care
- Exposure to smoking (Destroys the cilia).

Causes:

OM-Microbiology-Bacterial Causes

Acute OM		Chronic OM	Serous OM
Younger than 3 Months of age	Older than 3 Months of age		
S.pneumoniae (40%) H.influenzae (non typable) Group B streptococcus Gram -ve bacteria such as P.aeruginosa	**S.pneumoniae** H.influenzae Other eg.: S.pyogenes Moraxella catarrhalis S.aureus	Mixed Flora (40% of cases) H.influenzae P.aeruginosa S.aureus Proteus species K.pneumoniae (less common) Moraxella	Same as chronic OM, BUT: MOST EFFUSIONS ARE STERILE

- Streptococcus pneumonia is the most common cause.
- In serous OM most of the effusion are sterile (means when it is negative in culture)
- Respiratory syncytial virus can cause OM

Clinical presentation

Acute OM

Mostly Bacterial, often a complication of viral URTI, Pain often severe and continuous in bacteria causes. Most common organisms "generally" are:

1- Streptococcus Pneumoniae. (Gram Positive diplococci).
2- Haemophilus Influenzae (Gram Negative coccobacilli).

First 1-2 days:

Fever (39 C) - irritability - earache - muffled nose- Bulging tympanic membrane - poor mobility and obstruction by fluid or inflammatorycells on otoscopic examination.

3-8 days:

Pus and ear exudative discharge released spontaneously then pain and fever begin to decrease.

2-4 weeks:

Healing phase, discharge dies up and hearing becomes normal.

Serous OM (OM with effusion)

"Not that important (in microbiology)"

- Collection of fluid within the middle ear as a result of negative pressure produced by altered Eustachian tube function.
- Represent a form of chronic OM or allergy-related inflammation.
- Over weeks to months, middle ear fluid become very thick and glue like(*glue ear*)
- Tends to be chronic, with non –purulent secretions.
- Cause conductive hearing impairment.

Chronic OM

- 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).
- Result in destruction of middle ear structures and significant risk of permanent hearing loss.

Diagnostic approaches of OM

- Clinical examination by otoscope (reddish bulged tympanic membrane).
- Tympanometry (detect the presence of fluid) *
- Gram stain and culture of aspirated fluid to determine the etiologic agents.

*** Tympanometry** is an examination used to test the condition of the middle earand mobility of the tympanic membrane and the conduction bones by creating variations of air pressure in the ear canal.

Management of OM

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.**Amoxicillin** is commonly used to treat OM.
- Drainage of exudate may be required.

Chronic or serous OM:

- need complex management, possibly surgical

Complications

Extracranial	Intracranial
Hearing loss	**Meningitis**
Tympanic membrane perforation	Extradural abscess
Mastoiditis (Osteomyelitis)	Sudural empyema
Cholestatoma , Labyrinthitis	Brain abscess

Figure 1: Mastoiditis

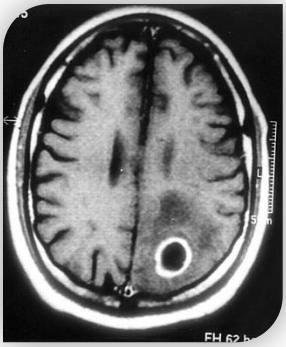

Figure 2: Brain Abscess

Figure 3: Perforated Tympanic Membrane

Summary

Otitis Media is the inflammation of the middle ear. It can be acute, chronic or serous. Generally, the most common organisms Causing Otitis Media are the normal Flora of the Upper Respiratory tract. **Streptococcus Pneumoniae** and **Haemophilus influenzae** are the most common etiology of acute OM. The most common Virus Causing OM is **Respiratory Syncytial virus** (RSV).

Chronic Otitis Media results from untreated acute infection. It is caused by **mixed flora** in40% of Chronic OM cases. Other organisms like **Pseudomonas aeruginosa** and **Anaerobes** also become likely to cause it.

Management of Acute Otitis media is usually empirical. **Amoxicillin** with clavulanic acid is very effective and it is commonly used.

Questions

1. 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. Which one of these antibiotics is the best for this case?

    A. Gentamicin.
    B. Amoxicillin.
    C. Metronidazole.
    D. Ciprofloxacin.

2. Which one of the following is the most common etiology for acute Otitis Media?

    A. Pseudomonas aeruginosa.
    B. Group A Streptococci.
    C. Streptococcus Pneumoniae.
    D. Staphylococcus Aureus.

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

    A. Streptococcus Pneumoniae.
    B. Staphylococcus aureus.
    C. Haemophilus influenzae.
    D. Pseudomonas aeruginosa.

Answers: B, C, D.