Lecture – 1

Middle Ear Infection (Otitis Media~OM)

Microbiology team 430

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❖ Otitis Media

Def: Inflammation of the middle ear.

- It's classified into: acute, serous "Secretory" and chronic.

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

❖ Epidemiology:

Most common in infants 6 to 18 months of age (2/3 of cases)
It's common in winter and **associated with viral URTI**

It's more common in infants because of the Eustachian Tube (a tube which connects the middle ear with nasopharynx) it's shorter and more horizontal (causes difficulty in drainage naturally)

Breastfeeding an infant in a horizontal plane can lead to OM because the milk may drain to the Eustachian tube and middle ear

❖ Pathogenesis:

1. URTI or allergic conditions cause edema or inflammation of the Eustachian tube.
2. Functions of the tube (*ventilation, protection and clearance)* will be disturbed.
3. Oxygen lost leading to negative pressure.
4. Pathogens enter from nasopharynx into middle ear.
5. Colonization and infection result.

❖ Risk factors:

- Anatomic abnormalities.
- Medical conditions:
  (**Cleft palate**, malignancies, immune dysfunction, obstruction of Eustachian tube due to adenoids)
- Exposure to pathogens from day care.
- Exposure to smoking.

❖ Pathogens:

Streptococcus pneumoniae (gm+ diplocooci optochin sensitive)	Most common	
Haemophilus influenzae (gm -)	Most common	Could also cause **meningitis**
Group A beta-hemolytic streptococcus		Could also cause Rheumatic fever
group *B Streptococcus*	In infants under 3 months	
Pseudomonas aeruginosa (gm – lactose non-fermentive oxidase +)	In diabetic patients	Cause internal and external infection
Moraxella catarrhalis		

- Chronic and serous OM have mixed collection of bacteria.
- In serous OM most of the effusions "exudates" are **sterile** (culture will be negative)
- Respiratory syncytial viruses "RSV" can cause OM.

❖ Clinical presentation:

- **1-2 days** (fever, irritability, earache and red Bulging tympanic membrane on otoscopic examination).
- **3-8 days** (Pus and ear exudate discharge, pain and fever begin to decrease).
- **2-4 weeks** (Healing phase, discharge dies up and hearing becomes normal)

Serous OM	Chronic OM
Collection of fluid within the middle ear (result from negative pressure produced by altered function of Eustachian tube)	Result from unresolved acute infection
Represent a form of chronic OM with non purulent secretions	Result in destruction of middle ear structures
Cause hearing deficit	significant risk of permanent hearing loss

❖ Diagnosis:

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

- If the tympanic membrane was closed we just diagnose clinically.
- If treatment didn't work we can rapture the tympanic membrane and aspirate fluid to determine the organism

❖ Management:

- Acute OM requires antimicrobial therapy usually empirical, we use:
  - **Amoxicillin** (+ Clavulanic acid if it was β-lactamase bacteria).
  - **1st G cephalosporin** (if it was resistant to penicillin).
  - **Macrolides** (if it was resistant to penicillin).
- If the patient was **2 years or younger or immune-compromised,** we treat immediately.
- If the patient was **older than 2 years with no life threatening condition,** we check up after 2-3 days, if it didn't get better we treat the patient.

❖ Complication:

- **Meningitis.**
- **Hearing loss.**
- **Tympanic membrane perforation.**
- **Mastoiditis.**
- Cholestatoma.
- Labyrinthitis.
- Extradural abscess.
- Sudural empyema.
- Brain abscess.

❖ Summary:

1- OM most commonly occurs in infants and pre-school age (until 4 years).
   - Why? Because of the horizontal position of the Eustachian Tube
2- OM is usually preceded by viral URTI or allergy.
3- Cleft palate is a risk factor for OM.
4- OM most commonly caused by S.pneumoniae then H.influenzae
5- Chronic and serous OM have mixed collection of bacteria.
6- In serous OM most of the effusions "exudates" are sterile (negative on culture).
7- Serous OM represents a form of chronic OM with non purulent secretions.
8- A patient with OM will present with fever, irritability, earache and red bulging tympanic membrane.
9- Chronic OM can result in permanent hearing loss.
10- OM can be diagnosed by:
   - Clinical examination by otoscope
   - Tympanometry
   - Gram stain and culture
11- Acute OM should be treated with empirical therapy immediately even before investigation in infants and immune-compromised patients.
12- Amoxicillin used as empirical therapy for OM, if resistant we use 1st G Cephalosporin or Macrolides.
13- **Meningitis**, Hearing loss, Tympanic membrane perforation and Mastoiditis are the most common complications resulting from OM.

Good Luck ☺