MICROBIOLOGY
TEAM 432

Lecture (1)

Microbiology of middle ear infection

Color guide:

- Very important
- Additional information
- Male doctor's notes
- Female doctor's notes

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Note: Please make sure that you study the last 3 slides very carefully

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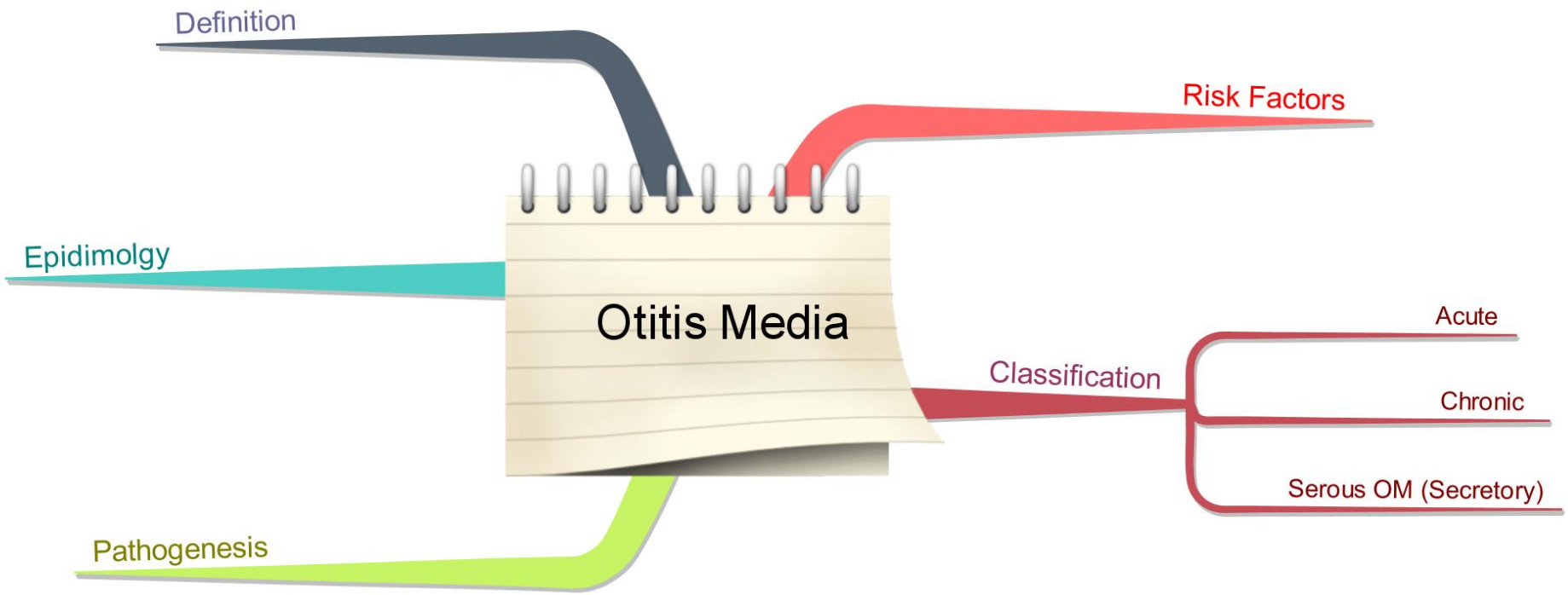
Objectives:

1. Define middle ear infection
2. Know the classification of otitis media (OM).
3. Know the epidemiology of OM
4. Know the pathogenesis & risk factors of OM.
5. List the clinical features of OM.
6. Know the diagnostic approaches of OM.
7. Know the management of OM.
8. Recall common complications of OM.

Mind map
(middle ear infection)

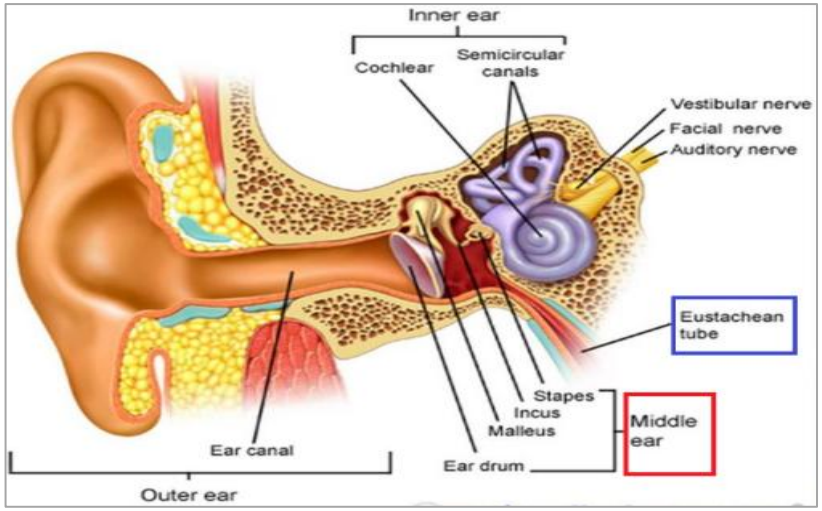


Microbiology of meddle ear infection
(Oitits Media)

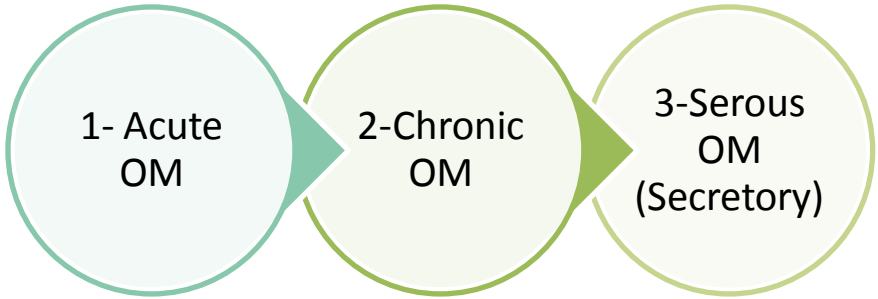
Definition :

- Oitits Media (OM) is the inflammation of middle ear
  Middle ear is the area between tympanic membrane
  & inner ear including *Eustachian tube

*Eustachian tube : is a tube that links the nasopharynx to the middle ear. It is a part of the middle ear and function as Pressure equalization .



Classification :



Epidemiology :

- Most common in infants 6 – 18 months old (2/3 of cases) , because of :
  - the Eustachian tube is shorter and at more of a horizontal angle than in the adult ear, so it is difficult to drain naturally (big chance to develop bacteria) , Surface of Eustachian Tube consists of cartilage and lymphatic tissue lining is an extension of adenoidal tissue from the back of the nose. (adenoid = nasopharyngeal tonsil)
- Improves with age (because of weakness of immune system in childhood)
- It is accompanied by VIRAL UPPER RESPIRATORY TRACT INFECTIONS (URTI)

Pathogenesis:

- URTI or allergic conditions could cause Edema and Inflammation of the tube
- OM causes disturbed functions (Ventilation - Protection - Clearance) of the tube
- negative pressure due to oxygen loss (no air in middle ear because of inflammation)
- Pathogens from nasopharynx will enter into the middle ear leading to Colonization & infection

Risk Factors:

- Anatomical abnormality
- Medical conditions such as : cleft palate - obstruction because of:
  - **a) Enlarged (please check) adenoid**
  - **b) Nasogastric Tube**
  - **c) Malignancy**
  - **d) Immune dysfunction**
- Exposure to pathogens from day care
- Exposure to smoking (Destroys the cilia).

Acute OM :

First 1-2 days:

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

3-8 days

- Spontaneous discharge of Pus + ear exudative
- Decrease in pain and fever

2-4 weeks:

- Healing phase
- discharge ends
- hearing returns normal

Chronic OM :

- Usually occurs as result of untreated acute infection due to inadequate treatment or host factors that perpetuate the inflammatory process.
- Involves perforation of tympanic membrane and long period of active bacterial infection.
- Pus may drain to the outside (otorrhea).
- It lead to destruction of middle ear structures and significant risk of permanent hearing loss.

Serous (Secretory) :

- Collection of fluid within the middle ear as a result of negative pressure produced by alterd 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 (pus) secretions .
- Cause conductive hearing impairment.

OM	Acute		Chronic	Serous (Secretory)
Causes	Mostly bacterial S.Pneumoniae , H.influenzae		Mixed Flora (40% of cases) e.g. *P.aeruginosa*, *H.influenzae*, *S.aureus*	Same as chronic OM, Except: most effusions are sterile
	< 3 month of age	>3 month of age		
	Gram -ve bacteria P.Aeruginosa	S.pyogenes Moraxella catarrhalis S.Aureus		
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.			
Management	▪ Antimicrobial usually empirical depending on the most likely bacterial pathogens, usually cover S.pneumonia and H.influenzae. ▪ Amoxicillin is commonly used to treat OM. ▪ Drainage of exudate may be required.		• need complex management, possibly surgical	

Complications	
Extracranial	Intracranial
Hearing loss Tympanic membrane perforation Mastoiditis (Osteomyelitis)	- **Meningitis** - Extradural abscess - Brain abscess - Subdural empyema

Summary

* **Otitis media**, is inflammation of the middle ear and commonly affects the Eustachian tube .

* It can be acute, chronic or serous.

* infants 6 – 18 months old are more susceptible to this condition and one theory is that this is because the Eustachian tube is shorter and at more of a horizontal angle than in the adult ear.

***Generally, the most common organisms Causing Otitis Media** are the normal Flora of the Upper Respiratory tract (pharynx) .

* **The most common etiology of acute OM** are Streptococcus Pneumoniae and Haemophilus influenzae.

***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.

***Acute OM :** infection with fever ,pus and ear pain within 7 days .

*Chronic OM : No fever within 4 months and diagnostic by examination

*Secretory OM : NO infection , fluid and ear pain - Tends to be chronic, with non –purulent secretions

*Risk factor : anatomical abnormality , smoking ,hospital workers .

* Complication : Meningitis , Tympanic membrane perforation , Mastoiditis (Osteomyelitis)

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

* In general treatment: drain abscess Ampicillin, cefuroxime" zinnat "

*On otoscop for acut OM : 1-redness 2-no contraction 3- bulging of tympanic membrane .

*the golden standard for diagnosis is culture

*the period treatment for chronic OM is 15 days .

* Immunocompromised patient present with no fever even if it was acute OM .

Questions

1. What is the most common epidemiology of OM ?

A : adults

B : elderly people

C : teenagers

D : infants

2. What is the most dangerous complication of OM ?

A : UTU

B : Meningitis

C : Sinusitis

D : Sore throat

3. What is the most common organism causing OM ?

A : staph.coccus

B : strept.pneomonia

C : h.infleunzea

D : b and C

4.What is the main complaints about OM ?

A: fatigue

B : Fever

C: pain

D : B and C

Qs	answer
1	D
2	B
3	D
4	D

Shade to see the answers

For any problems and suggestions please contact:

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Thank you