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MEDICINE
KING SAUD UNIVERSITY
436

Microbiology
team 436

Lecture :
Upper Respiratory Tract Infection (URTI)

important
Extra notes
Doctors notes

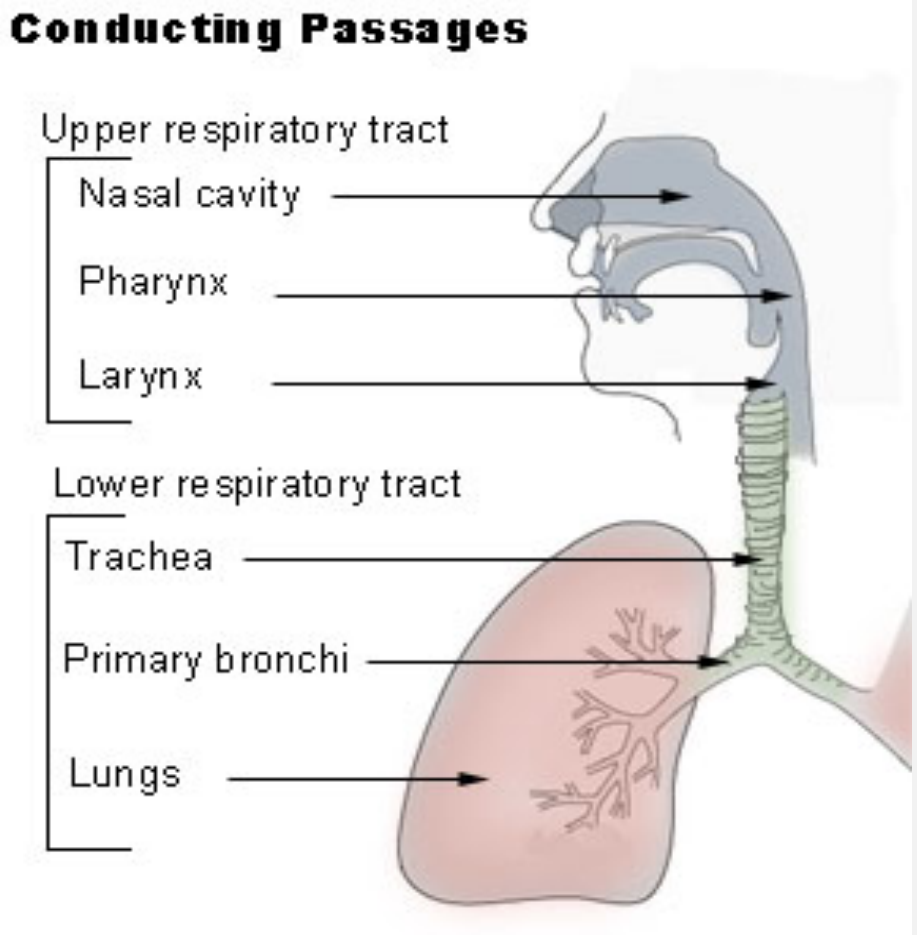
"لا حول ولا قوة إلا بالله العلي العظيم "وتقال هذه الجملة إذا دهم الإنسان أمر عظيم لا يستطيعه ، أو يصعب عليه القيام به.

Objectives:

- To learn the **epidemiology** and various clinical presentation of URT
- To identify the common **etiological** agents causing these **syndromes**
- To study the **laboratory diagnosis** of these syndromes
- To determine the **antibiotic of choice for treatment**

Overview of the lecture :

1- Pharyngitis
2- Diphtheria
3- Epiglottitis
4- Pertussis السعال الديكي
5- Acute otitis media
6- Sinusitis (acute – chronic)
7- Deep neck infection -read only
8- Other infections -read only



Pharyngitis:

Epidemiology

- Common in children (5-15)
- Occurs in late fall[1],winter and early spring

Signs & symptoms

Remember 4 E's

- Erythema [2]
- Edema
- Exudate[3] (sometimes)
- Enlargement >1 cm and tender of lymph node
- Fever 38.4 to 39.4ºC or even 40ºC. + Sore throat
- No signs and symptoms of viral infections

[1]: فصل الخريف
[2]: redness
[3]: Mass of cells and fluid that has seeped out of blood vessels or an organ which is filled with protients, especially in inflammation

Pharyngitis:

Etiology

- Viral infection (**most common**) — Respiratory viruses : Enterovirus, HSV, EBV, HIV
  - swap is taken Nasopharyngeal
- Bacterial infection
  - When it's a bacteria infection : (fever + sore throat BUT NO runny nose (no upper symptoms)
  - Group A streptococcus, diagnose by
    - Group A strept (also called pyrogen!)
    - Antistreptolysin O (ASO) [5]
    - Culture
    - Rapid Bacterial antigen detection.
  - Neisseria gonorrhoeae
  - Anaerobic bacteria (Causes Lemierre's syndrome[4])
  - Corynebacterium diphtheria (normal flora)

- swap taken from throat except Corynebacterium diphtheriae from Nasopharyngeal!!! مهم
- children more susceptible because they have large lymph nodes

[4].: A complication of a bacterial sore throat. [5]: A test that measures antibodies against streptolysin O.

*في آخر المحاضرة يوجد تشبيه لتسهيل حفظ المرض

Diphtheria

Epidemiology
- common cause of death on non-vaccinated children 1-5 years.
- Toxin mediated disease[1].

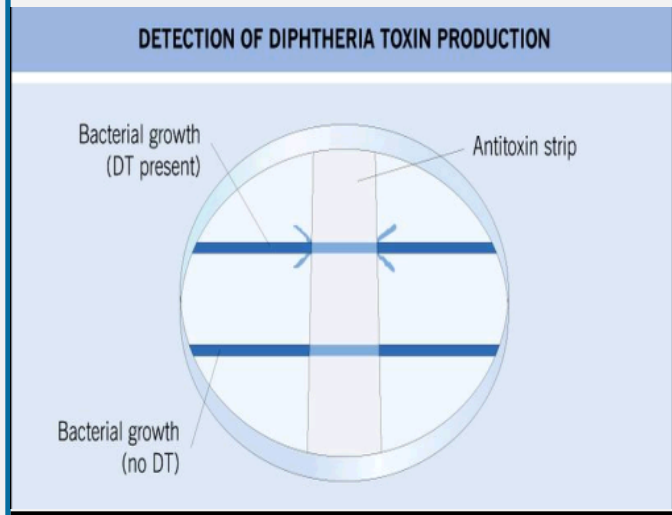
Pathogenesis
- Rapid progression
- Tightly adhering grey membrane in the throat[2]

difficulty breathing and swelling and cause suffocation and death ومن هنا جاءت التسمية ..مرض الخانقة

Etiology — Corynebacterium diphtheriae

Diagnosis
- Tinsdale medium [3]
- ELIK's Test[4] for confirmation

Treatment
- Penicillin
- Erythromycin if the child is allergic to Penicillin



[1]: The bacteria will produce toxins move from throat and affect other organs usually heart and the peripheral nerves and sometimes the adrenal glands

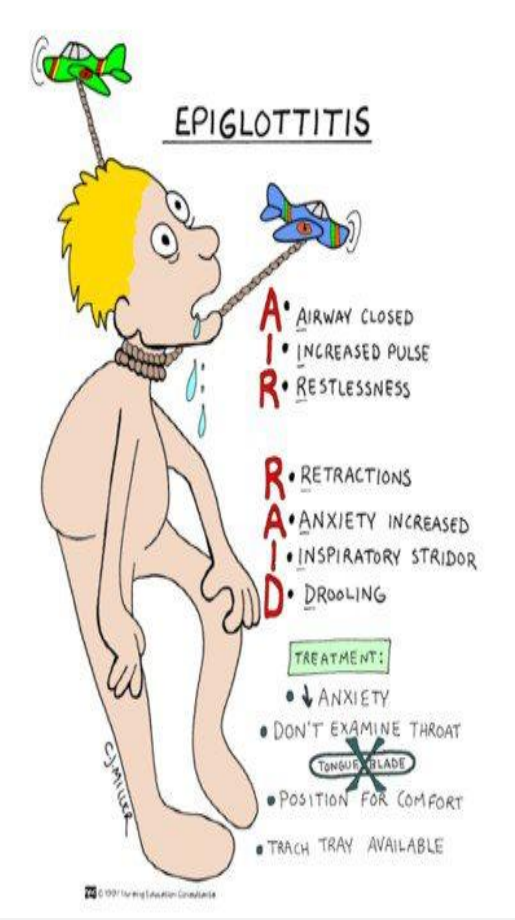
[2]:symptoms : sore throat, difficulty in breathing, swallowing ,drooling ((سيلان of saliva. The membrane can get bigger until it obstructs the airway causing suffocation(اختناق), death

[3]:Tinsdale Agar used to identify C. diphtheria

[4]:Test for toxigenicity of C. diphtheria

Epiglottitis:

Epidemiology	Affects young unimmunized children		
Signs and symptoms	Usually presented with three D's: **1-Dysphagia** (difficulty or discomfort in swallowing) **2-Drooling** (dropping saliva uncontrollably from the mouth) **3-distress** (anxiety)		
Etiology	Bacteria	Fungal	Viral
	• Haemophilus influenza Type b • Streptococcus pneumoniae • Staphylococcus aureus • Beta hemolytic streptococcus	Candida	
Treatment	Crftriaxone		



- normal can't see with X-ray
- X-Ray = thumb sign علامة
- Don't try examine airway by opening mouth --> suffocation and death! Instead diagnose with X-ray
- throat swap
- patient will be leaning forward, open mouth, difficulty swelling

Type B is encapsulated so it can invade the blood, we also used the capsule to develop the the vaccine against this bacteria.

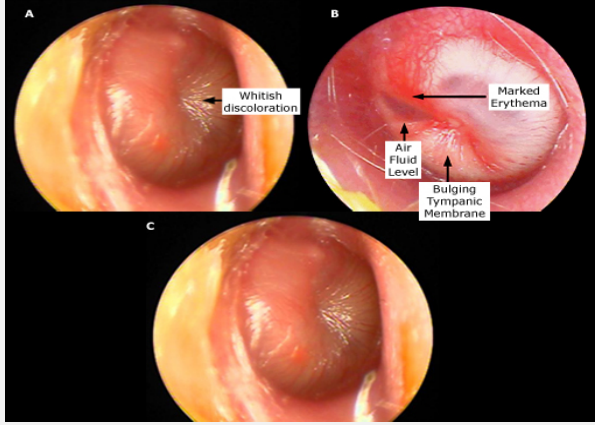
Pertussis (whopping cough السعال الديكي):

- Etiology :
  - ✓ Caused by Bordetella pertussis (gram –ve)
- Pathogenesis:
  - ✓ the bacteria attaches to the cilia of the respiratory epithelium, then produce **(pertussis toxin)** that will cause inflammation to the respiratory tract and interferes with the pulmonary secretions, it also produce **Filamentous hemagglutinin (FHA) and Pertacin (PRN),** these products responsible for the clinical features.
  - ✓ Causes leukocytosis with lymphocyte predominance **(it is the only bacterial infection that causes lymphocytosis in this lectuere)**
- Clinical Course
  - ✓ Incubation period 1 to 3 wks
  - ✓ Catarrhal Stage 1-2 weeks
  - ✓ Paroxysmal Stage 1-6 weeks
  - ✓ Convalescent Stage 3-6 weeks
- Diagnosis:
  - ✓ nasopharyngeal swabs (NB), the swab is cultured in a special media called
  - ✓ Charcoal-horse blood T media (regan-lowe) – bordetella selectve media (bordet-gengou)
- Treatment :
  - ✓ Erythromycin
- Prevention :
  - ✓ By vaccination

*Hemagglutinin :Large, filamentous protein that gives attachment factor for adherence to host ciliated epithelial cells.
*pertactin: highly immunogenic virulence factor of Bordetella pertussis.

- Children = cyanosis because they have small trachea and increased mucus
- Adult = chronic cough

Acute otitis media: Secondary bacterial infection



Etiology	• Streptococcus pneumoniae. • Haemophilus influenzae. • Group A streptococcus (GAS) • Staphylococcus aureus.(S.aureus) • Moraxella catarrhalis.	Viral and Fungal too.
Diagnosis	• Tympanocentesis **(Drainage of fluid from the middle ear)**	
Treatment	• Amoxicillin o r AMC (Amoxicillin + clavulanate). • If mastoiditis **(Inflammation of the mastoid process)**, treat for 2 weeks.	

- **It's caused by the stagnant accumulation of contaminated fluid coming from the Nasopharynx into the middle ear causing the infection and inflammation of the middle ear. In the sever cases the middle ear can rupture and cause the fluid or pus to come out.**

Bacterial sinusitis: usually self limiting

	Acute sinusitis	Chronic sinusitis
	• Children	
Etiology viral	• 13% of cases	
Etiology (Bacterial)	• S.pneumonia • H.infuenza • M.catarrhalis	• S.pneumonia • H.infuenza • M.Catarrhalis • Oral anaerobes
Signs and symptoms		• Mimic allergic rhinitis. • Less local symptoms
Diagnosis	• Mainly clinical diagnosis • Aspiration in case Immunocompramized , treatment failure • Diagnosis X-rays CT/MRI • Periorbital cellulitis R/O sinusitis by CT/MRI • Post-septal involvement treat as meningitis.	• Obtain odontogenic (1)X-rays if maxillary sinus (2). • Dx Image less useful than acute (changes persist after Treatment and to R/O tumor)
treatment	• Quinolones or Ceftriaxone For 1-2 weeks.	• Quinolones or Ceftriaxone (For 2-4 weeks)

(1) Tooth or the closely surrounding tissues. (2) The maxillary sinus is one of the four paranasal sinuses, which are sinuses located near the nose.

Deep neck space infections:

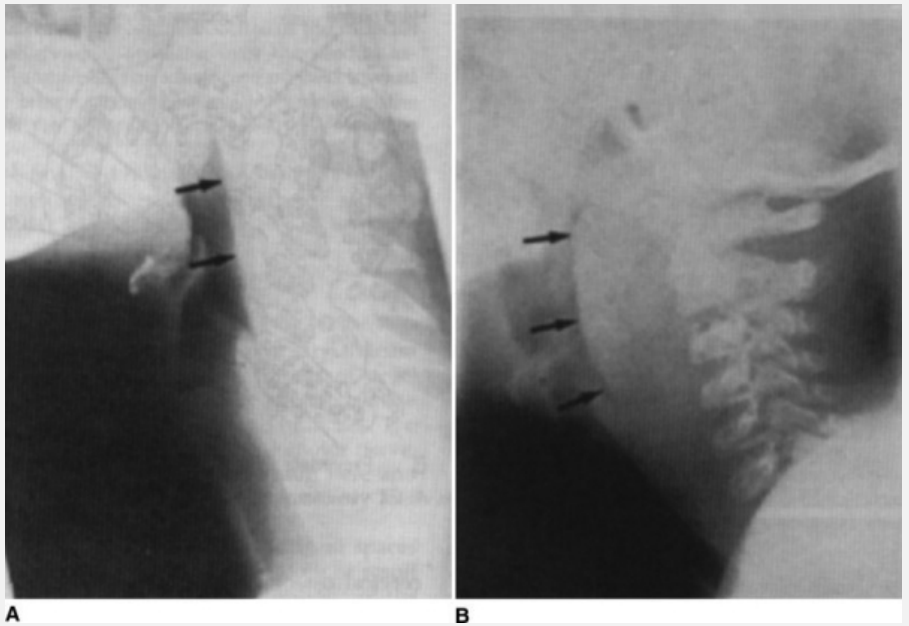
(Usually a complication of another infection and is very rare nowadays)

- Lateral pharyngeal, retropharyngeal or prevertebral space.
- Patients are toxic with unilateral posterior pharyngeal soft tissue mass on oral exam.
- Neck stiffness with retropharyngeal space infection/abscess.
- Retropharyngeal (danger space) infection may extend to mediastinum and present a mediastinitis.
- Prognosis is poor if surgical drainage has not been done.
- **Etiololgy** :

  Usually the pathogens that cause Deep Neck Space infections are Streptococci and Anaerobes.

- **Treatment**:

  Meropenem or Piperacillin or Clindamycin for 2 weeks (All of these antibiotics cover Anaerobes).



You can read this slide

Other infections:

Lemierre's Syndrome:

- It is a complication of a peritonsillar abscess (It generally involves a pus-filled pocket that forms near one of your tonsils) or a postdental infection.
- Clinical Presentation: Sore Throat, Fever, Shock.
- The presenting symptoms are due to IJV (Internal jugular vein) *thrombophlebitis which leads to multiple septic emboli in the lung (a blood clot, fat globule, gas bubble or foreign material in the bloodstream that is caused by bacteria).
- It is caused by Fusobacterium Necrophorum
- **Treatment** is the same as Deep Neck Space infection. Meropenem or Piperacillin or Clindamycin for 2 weeks, **If** the patient does not respond to the treatment, venotomy must be done.

(This can go the the internal jugular vein and cause an infection and will create a thrombosis that will ultimately end up in the lung causing the pulmonary embolism. It's diagnosed by X-ray)

You can read this slide

***thrombophlebitis** : Inflammation of the wall of a vein with associated thrombosis)

Name	diagnose	Etiology			Treatment
Pharyngitis	1.Antistreptolysin O (ASO) 2.Culture 3.Rapid Bacterial antigen detection.	**Viral (most common):** 1-Enterovirus 2-HSV 3-EBV 4-HIV	**Bacterial:** **1.**Group A streptococcus **2.**Neisseria gonorrhoeae **3.**Anaerobic bacteria **4.**Corynebacterium diphtheria		-
Diphtheria	1-Tinsdale medium 2-ELIK's Test	Corynebacterium diphtheriae			-Penicillin -Erythromycin
Epiglottitis	-	Bacteria: **1.**H. influenza Type b **2.**S. pneumoniae **3.**S. aureus **4.**Beta hemolytic streptococcus	Fungal: Candida	Viral	Crftriaxone
Pertussis	nasopharyngeal swabs -Charcoal-horse blood T media -bordetella selectve media	Bordetella pertussis			Erythromycin
Acute otitis media	Tympano centesis	Bacteria S. pneumoniae. H. influenzae. Group A streptococcus (GAS) S.aureus Moraxella catarrhalis.	Viral and Fungal.		-Amoxicillin -AMC (Amoxicillin + clavulanate).
Acute sinusitis	-Aspiration (Immunocompramized) -radiological	Bacteria: 1- S.pneumonia 2- H.infuenza 3- M.Catarrhalis	Viral 13% of cases		Quinolones or Ceftriaxone
Chronic sinusitis	-odontogenic -X-rays (maxillary sinus)	1- S.pneumonia 2- H.infuenza 3- M.Catarrhalis 4- Oral anaerobes			

SAQ:

An unvaccinated child with cough who seems to be gasping for a breath and makes a whooping sound. After taking a swab and under the microscope we found gram negative bacilli. We did the culture in blood agar and it was negative for that. Later with further investigation we found that the patient has Leukocytosis especially the lymphocytes.

Q1: What is the most likely diagnose in this case ?

Pertussis (Whooping cough)

Q2: What is the most likely bacteria can cause that ?

Bordetella pertussis

Q3: List three virulence factors does this bacteria have :

- **Pertussis toxin**
- **Filamentous hemagglutinin**
- **Pertactin**

Q4: Is there any culture media or agar you suggest it to confirm your diagnose ?

Bordet Gengou agar.

Q5: From where do you think the swab was taken ?

Nasopharyngeal.

Q6: Which antibiotic can be used as a treatment or even prophylaxis in this case ?

Erythromycin

Q7:This infection can be prevented by vaccine such as DPT. What are the other infections/disease can be prevented with the same vaccin ?

D for Diphtheria

P for Pertussis

T for tetanus

SAQ:

A 5 year-old suddenly complains of sore throat, malaise, and low grade fever. Examination reveals a white\grey thick coating of the tonsils, uvula, and palate. It cause sudden bleeding when we tried to scrape this coating.

Q1: What is the most likely diagnose in this case ?

Diphtheria

Q2: What is the most likely bacteria can cause that ?

Corynebacterium diphtheriae

Q3: Which agar can help us to identify this organism ?

Tinsdale agar

Q4: Is there any test for toxigenicity can be used in this case ?

ELIK's Test.

Q5:How can be treatment ?

Anti-toxin

Penicillin

Erythromycin " if there is allergy from penicillin"

دُف ثيريا (ثيريا لعبة لأطفال يلعبون بالشارع دايما) يلعبون فيها الأطفال اللي من سنة إلى 5 سنين, ولأنهم يلعبون بالشارع فبيكونون معرضين ل توكسيك ميدياتيد ديزيزز , فأنا كطبيب بعالجهم بالبنيسيلين لكنهم متعبين لأن ممكن يكونوا حساسين فبعطيهم ايريثرومايسين وبعطيهم بدائل ألعاب أحسن من دُف ثيريا بعلمهم (يلعبوا **تنس** مع **الكس**).

ELIK's Test Tinsdale medium

وشكراً عاتكة على التشبيه المميز

MCQs: https://www.onlineexambuilder.com/micro-uri/exam-131908

GOOD LUCK!

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