

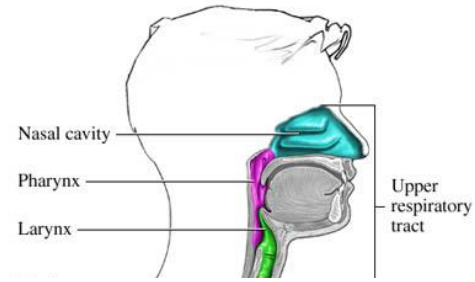
URT Infections

Color index:

- Important
- Doctor Notes
- Extra, TN



Introduction:



Upper respiratory tract infection (URTI)

Pharyngitis

Diphtheria

GAS

Pertussis

Sinusitis

Epiglottitis

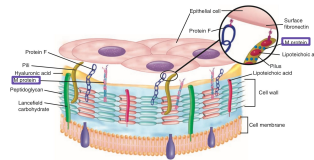
Haemophilus

Otitis Media

Deep neck
space
infections

GAS (Group A Streptococcus)

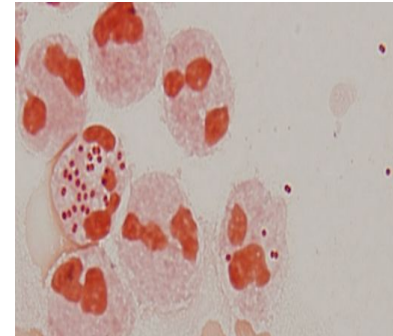
- Gram positive cocci, Facultative anaerobic, In chains (Catalase -ve), Beta haemolytic.
- **Causes:**
 - Respiratory infections:
 - Pharyngitis. (*Streptococcus pyogenes*).
 - Otitis.
 - Sinusitis.
 - other infections:
 - Skin and soft tissue.



- **Virulence factors:**
 - Capsule. work as **Antiphagocytic** for the bacteria.
 - M protein in cell wall. work as **Antiphagocytic** for the bacteria.
 - Streptolysin O. toxin that capable of lysing erythrocytes, leukocytes, and platelets.
 - Streptolysin S. toxin that capable of lysing erythrocytes, leukocytes, and platelets.
 - Streptococcal pyrogenic exotoxins (SPE). Superantigen toxin.

Moraxella catarrhalis

- Gram negative diplococci, Catalase positive, and Oxidase positive.
- **Infections:**
 - Otitis.
 - Sinusitis.
 - Pneumonia.
- **Treatment:**
 - Amoxicillin-Clavulanic acid



Haemophilus influenzae (divided into 2 types)

Haemophilus influenzae

- Gram negative pleomorphic, coccoid to rod-shaped cells (coccobacilli).
(facultatively anaerobic)
- Oxidase and catalase positive.
- Requires X (heme) and V (NAD) factors for growth
(need chocolate agar to grow which is heated blood and contains the nutrients needed for its growth).
 - Used to confirm ID.



treatment :

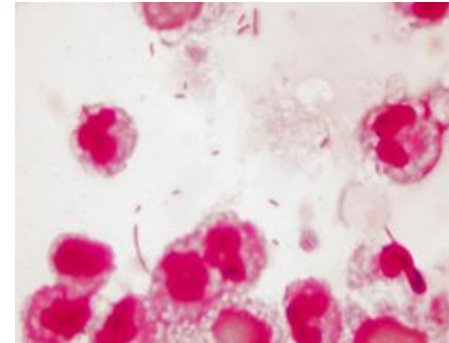
- Amoxicillin-clavulanate
- 2nd or 3rd generation cephalosporin

1-Encapsulated (typable) strains

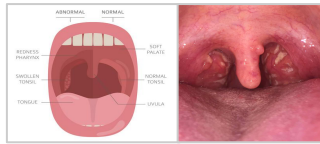
- **Encapsulated** (main virulence factor)
- A to F (A,B,C,D,E,F)
- Most important is type b
(has a special capsule)
- Prevention through vaccination
- Causes invasive disease (e.g. epiglottitis, meningitis)
- **More severe.**

2-Nonencapsulated (nontypable) strains

- **Non-Encapsulated**
- Causes **local infections:**
 1. sinusitis
 2. otitis
 3. pneumonia in elderly



Pharyngitis:

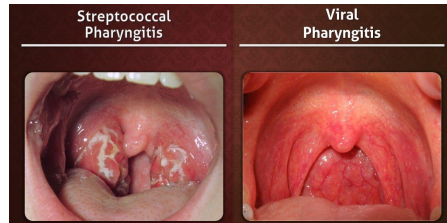


Epidemiology

- Sore throat.
- Very common in Late fall, winter, early spring.
- Mainly affects **children from 5 to 15 years old.**

Etiology

- Viruses (i.e. respiratory viruses) are the **most common cause.**
- Bacterial causes include:
 - **Group A streptococcus (streptococcus pyogenes)**
 - **Corynebacterium diphtheriae. (rare)**
 - Fusobacterium necrophorum (Anaerobic bacteria, cause of Lemierre's syndrome)
 - Neisseria gonorrhoeae

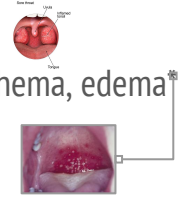


Signs and symptoms

Sore Throat

Pharyngeal erythema, edema

Fever.



The 3 C's:

1- **Coryza** (pathology) Inflammation of the mucous membranes lining the nasal cavity, usually causing a **running nose**, nasal congestion and loss of smell.

2- **Cough**

3- **Conjunctivitis**



The 4 E's:

1- Exudate of tonsils.

2- Enlarged, tender of lymph nodes >1 cm.

3- Edema

4- Erythema & Fever 38.4 to 39.4° C.

● More consistent with viral.

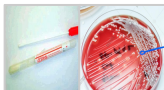
● More consistent with bacterial (GAS).

GAS Pharyngitis:

Diagnosis:



- Throat swab:
 - Rapid Bacterial antigen detection. Imp in ER.
 - Culture on blood agar.
- **Antistreptolysin O.**



Treatment:

- **Drug of choice:** **Penicillin** x 10 days
- In case of **Allergy to penicillin**, we use: **Clindamycin** or **macrolide** (e.g. **Clarithromycin**) Clarithromycin is a new type which has fewer side effects, better penetration, & longer half-life.

Complications:

Suppurative (Formation of pus):	Non-suppurative:	
Occurs right away after the infection. E.g. Peritonsillar abscess, parapharyngeal space abscess.	Occurs 1-6 weeks after acute S. pyogenes infection.	
	Rheumatic fever:	Acute Glomerulonephritis:
	<p>When it happens? after <u>respiratory tract infection</u>. what does it do to the body? mainly cause inflammation of heart (pancarditis). and inflammation of joints, blood vessels, and subcutaneous tissue. How it happens? results from cross reactivity of anti-M protein Ab and the human heart tissue.</p>	<p>When it happens? after infection of the <u>skin or respiratory tract</u>. What are the Symptoms? - Edema, hypertension, hematuria, and proteinuria. Why it happens? Initiated by Ag-Ab complexes on the glomerular basement membrane.</p>

Diphtheria:

Etiology:

- Pharyngitis caused by a gram +ve bacilli, Aerobic, non-spore forming. (**Corynebacterium diphtheriae**).
- Found most in **Non-developing** countries.
- Mainly presents as **URTI**.
- one of its characteristic is formation of **pseudomembranes** in the throat.
- **Virulence:**
 - **Diphtheria toxin :**
 - It's a toxin produced by C. diphtheriae, which inhibit the protein synthesis of the cell and cause cell death, targets: heart/ nerves/epithelium

Diagnosis:

- Throat swab.
- Culture on special media containing tellurite (e.g. **Tinsdale** media).
- **ELEK's Test** for confirmation of toxin production. A test strip of filter paper containing diphtheria antitoxin is placed in the center of the agar plate. Strains to be tested (patient's isolate), known positive and negative toxigenic strains are also streaked on the agar's surface in a line across the plate and at a right angle to the antitoxin paper strip.

Complications:

- **Mycocarditis** also known as inflammatory cardiomyopathy, is inflammation of the heart muscle.
- **Neuritis** it is inflammation of a nerve or the general inflammation of the peripheral nervous system. Symptoms depend on the nerves involved.

Treatment:

- **Antitoxin + antibiotic Penicillin or erythromycin** if the child is allergic to penicillin.

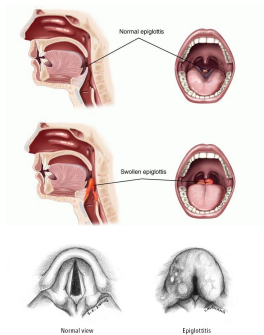
Prevention:

- Vaccination with diphtheria toxoid.

Epiglottitis:

Epiglottitis

- Usually young unimmunized children.
(life threatening condition as it affects breathing)
- **clinical presentation:**
 - **The 3 D's:**
 1. **D**ysphagia .
 2. **D**rooling.
 3. respiratory **d**istress.



Etiology

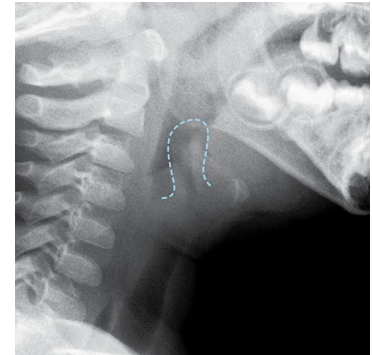
- **H. influenzae Type b.**
- **S. pneumoniae.**
- S. aureus.
- Beta hemolytic streptococci.

Diagnosis


- Blood cultures
- Culture of epiglottic surface (under controlled setting)
 - You can't take swab, because the patient can't breath.

Management

- Maintenance of airway.
- Empiric treatment:
Ceftriaxone+Vancomycin
- Prevention: **HiB vaccination**



Pertussis (Whooping cough):

Etiology	<ul style="list-style-type: none">● Bordetella pertussis (GNB). 	Diagnosis	<ul style="list-style-type: none">● sample :<ul style="list-style-type: none">❖ Nasopharyngeal (NP) swabs● Special media needed:<ol style="list-style-type: none">1. Charcoal blood (Regan-Lowe)2. Bordet-Gengou	Epidemiology & Phases	<ul style="list-style-type: none">● mainly in infants and children (most severe & deadly).● adults can get infected also.● associated with vomiting.
	Virulence		Treated by: Macrolide (erythromycin) (Antibiotics that inhibit protein synthesis).		★ prevention: Acellular pertussis-containing vaccine.
	<ul style="list-style-type: none">● Virulence:<ol style="list-style-type: none">1. Pertussis toxin2. Filamentous hemagglutinin3. Pertactin	Management			

Acute Otitis Media

Fluid + inflammation of the mucosal lining of the middle ear.

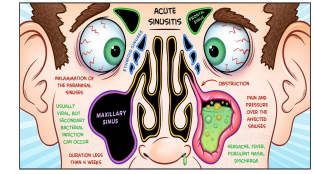
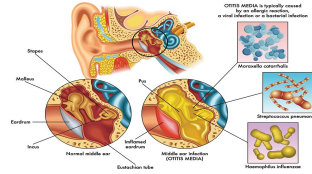
Acute Bacterial Sinusitis

More common in **children**.

Clinical features

- Fever
- tympanic membrane (TM) will look erythematous (red)

- Occurs with viral URTI.
- nasal discharge
- sinus pain, and low grade fever.



- Can be acute or chronic .
- complication:
 1. periorbital cellulitis.
 2. Brain abscess & meningitis

Etiology

- **Streptococcus pneumoniae**
- **H. influenzae (non typable)**
- **Moraxella catarrhalis**, Group A streptococcus, Staph aureus, and Anaerobic bacteria also can cause both of otitis & sinusitis.
- Viral (alone or with bacteria). → (E.g. RVS, Rhinovirus).

Diagnosis

- Mainly clinical diagnosis.
- Tympanocentesis sometimes needed;
 - Middle ear fluid can be sent for culture.

- Mainly clinical diagnosis.
- Imaging (CT/MRI) when there is suspicion of complications.

Treatment

Amoxicillin or Amoxicillin Clavulanic acid

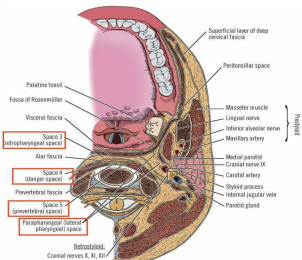
Amoxicillin Clavulanic acid for 1 to 2 weeks

Deep neck space infections:

for your own knowledge

Deep neck space infections

- Lateral pharyngeal, retropharyngeal or prevertebral space.
- Patients are very sick and toxic
- Neck stiffness can occur with retropharyngeal space infection/abscess
- Retropharyngeal (danger space) infection may extend to mediastinum and present as mediastinitis



Etiology

- Usually polymicrobial
- Mainly streptococci and oral anaerobes

Management

- **Surgery**
- **Antibiotics:**
 1. Meropenem
 2. Piperacillin
 3. Clindamycin
- **Duration:**
 - 2-3 weeks

Infection	Etiology	Diagnosis	clinical features	management
GAS Pharyngitis	Group A streptococcus (streptococcus pyogenes)	<ul style="list-style-type: none"> Throat swab Rapid Bacterial antigen detection Culture on blood agar Antistreptolysin O 	<ul style="list-style-type: none"> Exudate of tonsils Enlarged, tender of lymph nodes Edema & Erythema Fever 38.4 to 39.4° C. 	Penicillin x 10 days Allergy= Clindamycin or macrolide
Diphtheria	Corynebacterium diphtheriae	<ul style="list-style-type: none"> ELEK's Test Culture on special media containing tellurite (e.g. Tinsdale media) 	<ul style="list-style-type: none"> Formation of pseudomembranous Diphtheria toxin undeveloped countries 	Antitoxin + antibiotic (Penicillin or erythromycin) Vaccination with diphtheria toxoid containing vaccine.
Epiglottitis	H. influenzae Type b (mainly)	<ul style="list-style-type: none"> Blood cultures Culture of epiglottic surface (under controlled setting) 	<ul style="list-style-type: none"> dysphagia . drooling. respiratory distress. 	Ceftriaxone+Vancomycin Prevention: HiB vaccination
Pertussis	Bordetella pertussis (GNB).	<ul style="list-style-type: none"> Nasopharyngeal (NP) swabs Charcoal blood or Bordet-Gengou media	<ul style="list-style-type: none"> severe coughing vomiting divided into phases 	Macrolide (erythromycin) prevention : Acellular pertussis-containing vaccine
Acute Otitis Media	<ul style="list-style-type: none"> S. pneumoniae H. influenzae (non-typable) Viral 	<ul style="list-style-type: none"> Mainly clinical diagnosis Tympanocentesis sometimes needed 	<ul style="list-style-type: none"> Fever tympnic membrane (TM) will look erythematous(red) 	Amoxicillin or Amoxicillin Clavulanic acid
Acute Bacterial Sinusitis	-S. pneumoniae -H. influenzae (non-typable) -M. catarrhalis -Anaerobes -Viral	<ul style="list-style-type: none"> Mainly clinical diagnosis. Imaging (CT/MRI) when there is suspension of complications 	<ul style="list-style-type: none"> nasal discharge sinus pain Patient have viral URTI. 	Amoxicillin Clavulanic acid for 1 to 2 weeks

Quiz :

1) An 8-year-old boy has been listless and irritable for a week. The mother says he had a sore throat 3 weeks ago but did not see a physician because the family lacks health care coverage and "it wasn't that bad." Examination reveals arthritis in two joints and a heart murmur. His antistreptolysin O (ASO) titer is elevated. His cardiac findings are most likely due to antibody stimulated by:

A. Pyrogenic exotoxin

B. M protein

C. Streptolysin O

D. Lipoteichoic acid

2) A 5-year-old girl has a sore throat. She is febrile and has a scant exudate on one tonsillar pillar. The most sensitive way to detect whether this infection is due to group A streptococci is:

A. Streptococcal M protein antigen detection

B. Gram stain

C. ASO titer

D. Throat culture

3) With otitis media. If a patient is particularly unwell what antibiotic is the first line therapy?

A. amoxicillin

B. benzylpenicillin

C. benzylpenicillin

D. Macrolides

1) A 17 year-old student has an upper respiratory infection with nasal discharge and quite severe pain over her maxillary sinuses. It started five days ago and does not seem to be improving. Her temperature is 39.1°C, She has no allergies.

What is the most likely diagnosis?

bacterial sinusitis

Which antibiotics would you prescribe?

Amoxicillin

2) 6 month old was seen in the ER, with severe cough started by runny nose, then cough that got worse and after a week the baby still coughing, then lead to vomiting. What is the most likely diagnosis and organism?

Pertussis, *Bordetella pertussis*.

Team Leaders

Badr AlQarni

Renad AlMutawa

Team Sub-Leader

Abdullah Alassaf


 **This lecture is done by:**

Team Members

Boys

- ★ Faisal Alkoblan
- ★  Faris Almubarak
- ★ Alwaleed Alazmi
- ★ Mohammed Alshoieer
- ★ abdullah Alothman
- ★ Faisal Alzahrani
- ★ Abdullah Alzamil

Girls

- ★ Noura Almazrou
- ★  Rema Almutawa
- ★ Elaf Almusahel
- ★ Lina Alosaimi
- ★ Ghada Alsadhan
- ★ Sarah Alhelal
- ★ Amerah Alzahrani
- ★ Rawan Alzayed
- ★ Sarah Alkhalife



Contact us:



Editing
file



Microbiologyteam438@gmail.com

