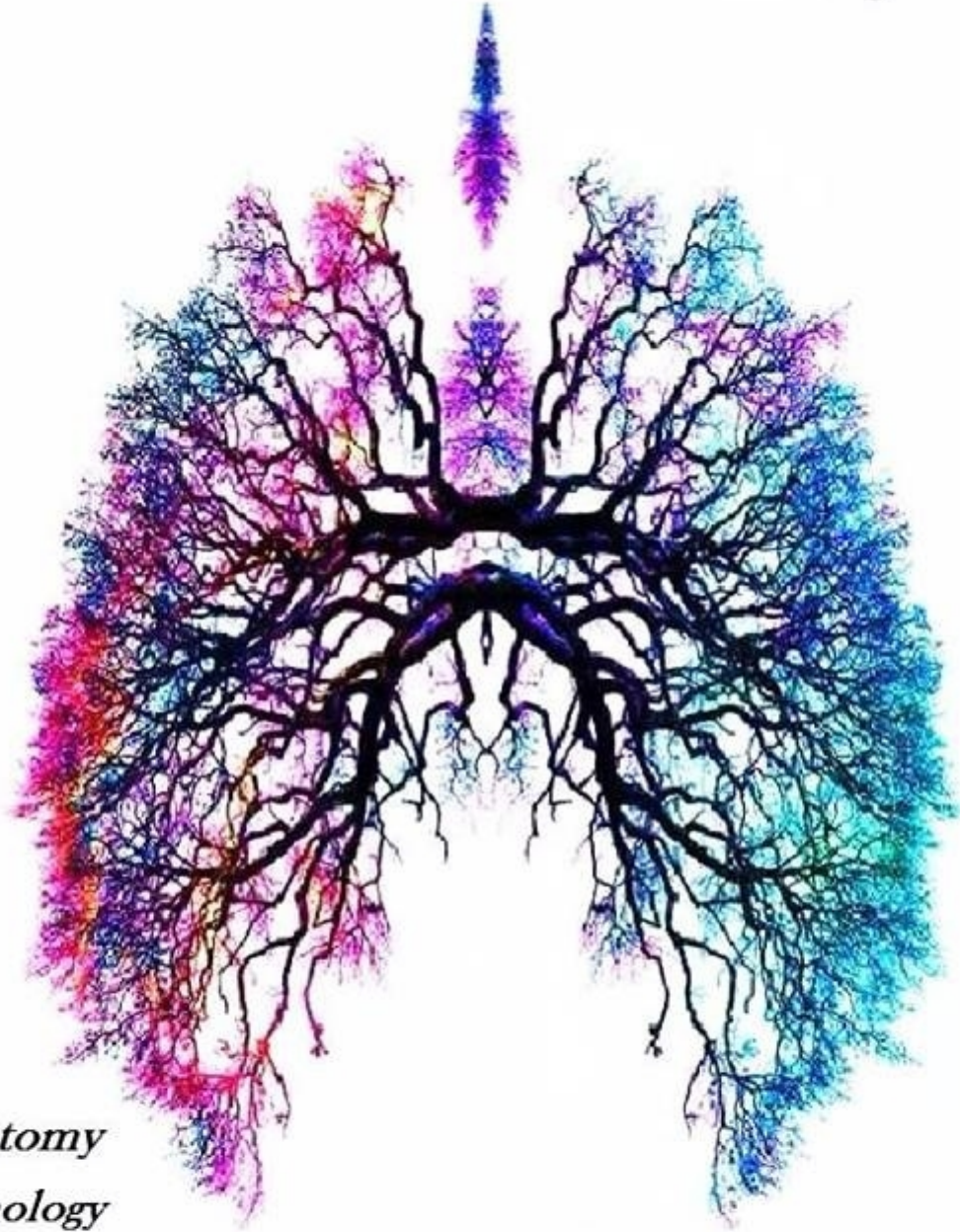


RESPIRATORY SYSTEM

Cover by: *Aseel Khatib*



- Anatomy*
- Pathology*
- Physiology*
- Pharmacology*
- Microbiology*
- PBL*

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Lecture # 1 (viro)

Done By: Mahmoud Shehab

Sheet

Slide

Other



Upper Respiratory Tract Infections

In this lecture we are going to talk about URT infections including bacterial and viral infections and the difference between them. The objects are to see the causative agents , pathogenesis , diagnosis and treatment of a patient with URT infection .

URT infections including the followings:

- Common Cold
- Pharyngitis/tonsillitis
- Quinsy
- Epiglottitis
- Otitis media
- Sinusitis

*Some of these are caused by bacteria NOT viruses . The Dr mentioned that URT infections mainly are caused by viral infections (80 to 90% , in winter).

Common cold is cold like symptoms like runny nose , sneezing , mild fever, coughing and general fatigue . Common cold is one of the most pronounced URT infections that are caused by viruses so we always describe the case as " flu " BUT it's not always caused by influenza . Viruses that commonly cause common cold are called Common cold viruses which are the *Rhinovirus* and *Coronavirus* .

In the rhinoviruses , we have more than 100 serotypes that cause the common cold. This variation is less in the coronaviruses.



*The Dr asked about the main causative agent in case of pharyngitis/ tonsillitis and he answered that they are mainly by viruses (80%) . When we say pharyngitis/tonsillitis we describe the illness that has sore throat , mild fever or no fever and it's always associated with common cold symptoms such as sneezing , coughing

Quinsy (tonsillar abscess) is caused by bacteria .

Epiglottitis is mostly caused by bacteria which is *Haemophilus influenza* and it's a medical emergency so if you suspect an epiglottitis you should NOT examine the patient with the tongue depressor because this might lead to edema.

Otitis media and *Sinusitis* (the inflammation of the middle ear and the paranasal sinuses respectively) are caused by bacteria rather than viruses .

Common cold :

Causative agents : mainly *rhinoviruses* & *coronaviruses*

Epidemiology : more in the winter and in the fall and spring

Clinical presentations : rhinitis , headache , conjunctival suffusion sneezing and coughing

Management : Antimicrobial drugs (antibiotic) are NOT to be given in this case because it's mainly a viral not a bacterial infections(as we said 80 to 90%) so don't ever give an antibiotics in a confirmed viral infections generally.

.Symptomatic relief may be accompanied by mucopurulent rhinitis(thick,opaque or discolored nasal discharge), this is not an indication for antimicrobial treatment unless it persists without signs of improvement 10-14 days suggesting possible sinusitis.

*Common cold accounts for 1/3 to 1/2 of the URT infections



*Rhinoviruses are responsible for 30 to 50% of common cold and Coronaviruses for 10 to 30% , the rest is due to other viruses which are Adenovirus , respiratory syncytial virus (RSV) , enterovirus , influenza virus and parainfluenza virus and these may cause symptoms that are indistinguishable to those of rhinovirus and coronavirus . The Dr said that common cold can be by all viruses of the RS but the most commonly are caused by coronavirus & rhinovirus .

Common cold is a self-limited illness meaning that the patient will back to normal within short time (5-7 days) without any medical intervention .

Note: More than 100 serologic types of rhinoviruses (No vaccine)

The receptors for the rhinovirus is an intracellular adhesion molecule (I-CAM 1) so the virus will bind to it and most of the viral replication occurs in the nose. The severity of the symptoms correlates with the quantity of the virus in the nasal secretion (the higher the titer ... more severe symptoms such as more rhinorrhea, more cough, more sneezing and the patient may become febrile). Replication of the rhinovirus occurs in the nasal cavity because this virus prefers to replicate at 33-34 C as in the nasal cavity .

Rhinovirus is transmitted directly from person to person via respiratory droplets and it also can be transmitted indirectly (more common than the direct way) in which the droplets are deposited in the hands and other surfaces and then transported into fingers then to nose .An individual may suffer from 2 to 5 episodes in one year because he can be infected with many different serotypes (more than 100 serotypes) AND these viruses lack proof reading (RNA viruses) so the virus produces mutations when replicating (genetic variation in the genes of the virus especially in viral glycoproteins that will not be recognized by our immune system) .

Rhinovirus has a short incubation period (2-4 days)

URIs caused by rhinoviruses usually begin with sneezing, followed soon by rhinorrhea. The rhinorrhea increases and is then accompanied by symptoms of nasal obstruction. Increased levels of bradykinin: increased secretions, vasodilation, cough and sore throat. headache, malaise and the "chills" (rigors).



.This illness peaks in 3-4 days and lasts for 7 days as its self-limited .The complications of common cold are acute bacterial sinusitis , acute bacterial otitis media , asthma attacks and worsening of chronic bronchitis .

Now , how does the viral infection lead to bacterial superinfection (otitis media and sinusitis)? One of the mechanism is that viral infection leads to drop in the patient immunity. The other mechanism is about the normal flora; in case of viral infection, there will be an inflammation in the pharynx and the surrounding tissue and we get secretions. As a result of this we get narrowing of the connection between the middle ear and the oral cavity(the Eustachian tube), this narrowing makes the sinuses and middle ear are air filled cavities , and the narrowing makes a negative pressure in these cavities , this will cause the flora to move and we get otitis media and sinusitis .So both drop in the immunity and the narrowing participate in these infections.

Common cold is diagnosed clinically based on history and clinical presentations . You can do a clinical examination for further confirming , you may do chest X-ray and blood test when thinking about something else but simple common cold needs no further investigation.

There is no specific antiviral drug for rhinoviruses , but there are some recommendations like : taking antihistamine , nonsteroidal anti-inflammatory drugs , decongestants and cough suppressants (narcotics). These recommendations can decrease the cough and the amount of secretions and to improve the lifestyle of the patient.

There is no vaccine for this virus because of having more than 100 serotypes , the second thing is that the virus causes a mild self-limited illness so no need to spend money and time investigating a vaccine.

Antibody directed at the virus receptor or a recombinant soluble receptor ICAM-1 might block attachment of rhinovirus



. Hand hygiene is also important in order not to transmit the virus.

Coronavirus:

Named because of crown-like projections on its surface . We have at least 10 species recognized. From these is human coronavirus 1 and the others are in animals so we have animal and human coronaviruses .

It's a + ssRNA , enveloped , has a helical symmetry (helical capsid).Three antigenic molecules are found in the virions i.e. nucleocapsid, surface projection and transmembrane proteins. The main antigenic determinants reside on the surface projections. Human coronavirus strains fall into serological groups, which are named OC43, and 229E . Infections happen during winter or spring. This virus has a high frequency of deletion mutations and high frequency of recombination during replication which is unusual for an RNA virus with unsegmented genome. So , as the result of this deletion and recombination we end up with genetic variation and there is high variability of coronavirus .

Clinical picture of this virus is same as in case of rhinovirus , peaks in 3 days , 15-30% of respiratory illness in adults during winter months but lower respiratory infections were rare. Antibodies appear early in childhood and are found in 90% in adults (that means during childhood Most people have been exposed to coronavirus at least once) . Coronaviruses may be associated with gastroenteritis which occurs year-round. So coronavirus has been isolated from patients who have gastroenteritis. Coronaviruses have fastidious growth requirement in cell culture.

.Diagnosis is based on clinical picture and history and clinical picture, there is no antiviral drug for this virus, treatment and presentations are the same for rhinovirus infection.



Other viruses to cause common colds are : 1-Coxsackie virus which is an enterovirus that causes herpangina (severe sore throat and vesiculoulcerative lesions in the palate or around the tonsils) 2- Adenovirus which also responsible for pharyngitis and even for pneumonia 3-influenza (A,B and C , C is associated with very mild illness so we concern with A,B).

We finished with the common cold , here the Dr started talking about pharyngitis but we will take it in the next lecture .

Pharyngitis : is an inflammatory process of the pharynx caused by viral agents mainly and bacteria (mostly strep group A (pyogens), 20%) , in the next lecture we will differentiate clinically between viral and bacterial infections for pharyngitis/tonsillitis . Plz check the table in the slides to see the **Microbial Causes of Acute Pharyngitis – the Dr read them.**

Patient presents with sore throat , pain during •
swallowing and could be with dysphagia. Fever and other URT symptoms like enlargement of the cervical lymph nodes and common cold symptoms also present . Inflammation of the pharynx and tonsils, enlarged lymph nodes, common cold symptoms

. Exudative or Diffuse erythema is associated with : •
Group A , C, G Streptococcus , EBV, Neisseriae gonococcus C.diphtheriae, A.haemolyticum and Mycoplasma pneumonia.

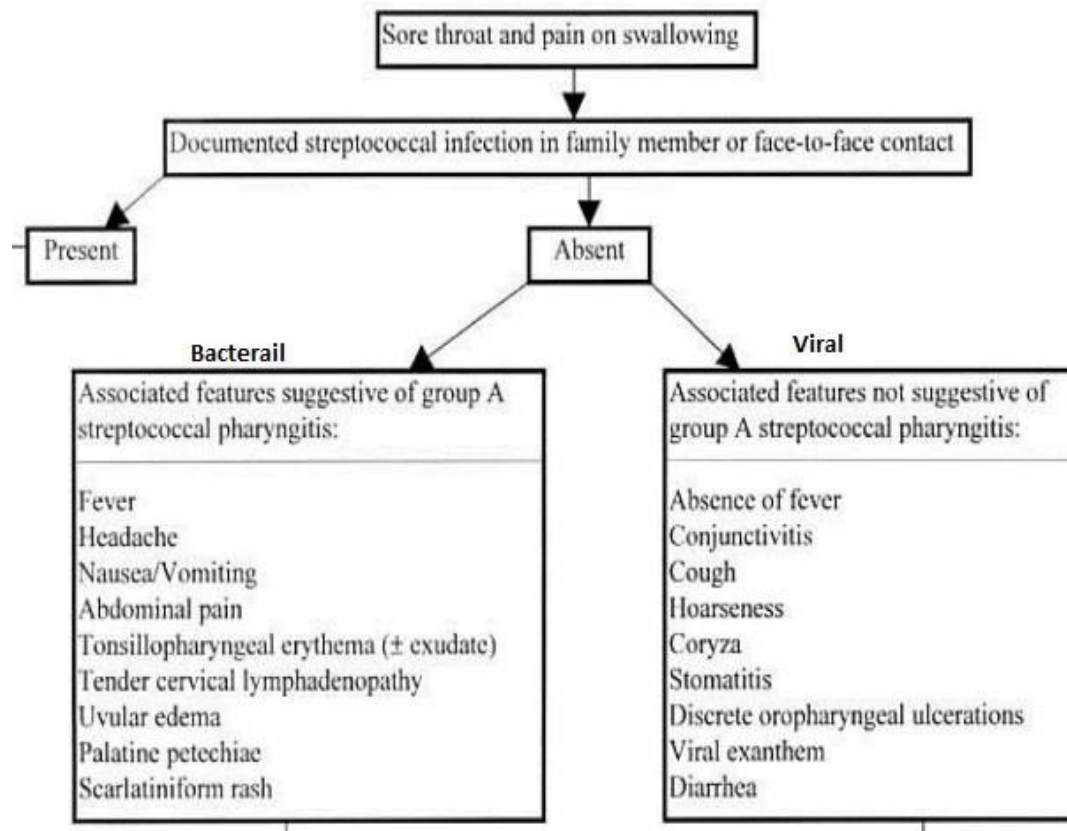
Most of the time when you see vesicle which ulcerates •
its an indication of a viral infection and when you see an exudate that is the whitish substance covering the pharynx or tonsils then you should always think of bacteria even though that certain viruses can cause this whitish lesion such as Adenovirus , EBV and fungi in case



of immunocompromised patients . Corynebacterium diphtheria rarely causes an infection (Membranous presentation) .

To diagnose, you base on the clinical picture . In case of bacterial infection, you need to take swab , culture, sensitivity . There are available antigens (antigen Kit) that can be used to know if its group A to start antibiotic treatment and it's important to determine if present as treatment reduces risk of acute rheumatic fever and will reduce duration of symptoms. In viral infections there is no fever .

Doctor read the following figure, he said that you're going to discuss these points in the following lecture

**MANAGEMENT OF PHARYNGITIS****Quinsy :**

its characterized with tonsillar abscess , pain , fever and difficulty in swallowing . Usually the treatment is done by drainage and antibiotics .

Epiglottitis :

Inflammations of the epiglottis due to an infection ,usually occurs in winter ,the causative agents are : h.influenza(most common , now rare) , sterp group A ,staph aureus and pneumococcus . As we said previously it's an emergency .



Otitis media :

We have acute and chronic otitis media , the acute one is linked to the viral infection . Signs of Middle Ear Effusion (Pneumatic otoscopy)-Bulging of tympanic membrane, Limited mobility, Airfluid level, otorrhoea. we can use the otoscope to see the tympanic membrane to check about one of these or you see otorrhoea that is fluid coming from the ear then you should diagnose with otitis media .

Evaluation of Signs and Symptoms of Middle Ear

Inflammination: Erythema of tympanic membrane or Distinct otalgia .The patients most of the time –especially children - present with severe pain that prevents them from sleeping and sometimes with otorrhoea. You should start antibiotic treatment immediately.

The main causative organisms are : 1-Strep Pneumoniae up to 50% 2- Haemphilus Influenzae 30% 3- Moraxella catarrhalis 3-30% 4- Rhinovirus/RSV/Coronaviruses/Adenoviruses/ Enteroviruses –40-75% collectively .

When we say otitis media , most of the time we talk about bacterial infection . When we say viral causes we mean the predisposing factor so the patient got infected with virus then 5-7 days later he will get –not necessarily- a bacterial superinfection on top of viral infection.

Symptoms: Infant excessive crying, pulling ear . Toddler: irritability , earache , both may have otorrhoea . Signs: Fever , bulging eardrum, fullness and erythema of tympanic membrane , may also be additional upper respiratory symptoms. You treat with antibiotics , you should also give analgesics against pain . Observation if appropriate at this level is not advised because treatment is immediate after diagnosing . The Dr here talked about drug abuse because



doctors give antibiotics most of time so we give in this case – even with viral ones ! (he meant the community system). In pharyngitis , if you see an exudate then you give an antibiotic (but remember that certain viruses can cause exudative pharyngitis, like adenovirus and EBV) otherwise more complications might appear.

We don't have a diagnostic tools in our hospitals or primary care centers to diagnose or differentiate between viral and bacterial infections , so empirically we treat with antibiotics without waiting culture results . If we get a negative result upon culturing , it's your choice to withdraw antibiotics treatment or continue. The drug of choice in otitis media is amoxicillin (80-90 mg/kg/day)

Sinusitis :

More than one type ; acute ,sub acute, recurrent acute, chronic and superimposed .We are going to talk about the acute one since its related indirectly to viral infections –

Epidemiology: children has 6-8 viral UTI per year and 5-13% may be complicated by sinusitis

otitis media and sinusitis are more pronounced in children more than adults.

Pathogens : strep pneumoniae , H.influenza and Moraxella catarrhalis. Both causative agents of sinusitis and otitis media are similar, usually they are part of normal flora but as the result of narrowing and secretions , they have been driven and entered to the middle ear and the sinuses .



Dedication to : Abu Zghoul , Abu Sqour , Abu Hudeib , Abu Smadi , Abu Ulbeh , Abu Alia , Hyasat , M.Safi , M.alkasem , A.Altaji , J.Tobeh , M.Madi , Reda Hj , A.Houri and Q .

- Special dedication to our football team ...

Written By : Mahmoud Shehab

GOOD LUCK :)