Micro sheet #10

Refer to slide #4

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We have a group of viruses that’s not necessarily a part of the classical form of viral respiratory tract infection. They could start in the upper respiratory tract like mumps and measles but later they can show skin infection and other serious manifestations. An example of this group is Rhinovirus .

**\*\*Rhinovirus :**

- As its name indicates this virus is related to the nose, producing sever damage in its mucosa .

- Belongs to **Picorna virus group**( picorna means very small ).

- They have a positive sense single stranded RNA genome (similar to influenza and Para influenza virus) , and a special protein compound known as “Viral Protein 1-4” . Those proteins contribute in the attachment with the mucosa of the respiratory tract (act just like hemagglutinin and neuraminidase) , and later they enhance the invasion of the virus to reach the cytoplasm and start with their replication cycle .

- There are 2-3 major types of Rhinovirus ( A , B and recently they have discovered C ). Those are responsible of 10-20 % of all respiratory tract infection which called common cold . The importance of these 3 groups came from their antigenic surface component ( the viral protein 1-4 ) . They are divided into 100 serotypes , which means that each serotype can produce infection and this infection will produce a specific antibody directed against this specific serotype , -so within the same month we can be infected with 2 or 3 or 4 types of rhinovirus due to the presence of large number of serotypes - .

- Rhinoviruses produce infection all over the year .Generally , in our Arab-mid east countries the infection starts in spring and return back in autumn and early winter .

- This virus is highly communicable; which means that small number is needed to produce an infection in the upper respiratory tract and in majority of cases the infection is mild while few might be associated with complications.

the infection can be sporadic in single cases or in outbreaks .

And despite the fact that the infection starts in the nose, it does spread from the upper respiratory tract to the tonsils to produce mild to some sever infection dependingon the age of the patient. Generally in children, the respiratory tract infection is associated with *otitis media and sinusitis***,** whereas in adults the infection is recognized as mild running nose - discharge of fluids with pus and epithelial cells from the nose -.

-Some serotypes are more pathogenic than the other,It’s all related to the serotype but all have the same clinical features.

*-Rarely* Rhinovirus disseminate to the lower respiratory tract - like influenza and parainfluenza - and If it reaches the lower respiratory tract this means that the patient is immunosuppressed or has a problem in the lung.

-Generally , its infection isn’t serious and no treatment is required even supportive therapy isn’t necessary . only needing 2-3 days to recover from the infection . Also there is no vaccine.

**\*\*Corona respiratory virus :**

-Has a positive single stranded RNA genome structure.

-also has a lipoprotein layer which represents the envelop of the virus . This virus has a special structure , it has numerous spikes originated from the capsule . The number of spikes can reach to 500 or more. These spikes produce a specific glycoprotein which allows the virus to attach to the mucosa of the respiratory tract and therefore producing clinical features similar to influenza and parainfluenzaviruses .

-Due to intense inflammation the patient might have sore throat, in contrast to Rhinovirus which doesn’t cause sore throat -no inflammation in tonsils -.

-In certain cases the infection of Corona virus might be so sever its NOT NECESSARY due to the status of the patient “immunocompromized”, its due to unknown cause.

-Corona virus is more sever in *middle aged* and *old patients* than in young adults and children, mainly due to immune response. Generally, young adults and children respond more to the infection.

-It is recognized during winter and spring -like influenza and parainfluenza viruses-.

-Although respiratory tract infection is mild but pharyngitis might be associated with Corona virus, and in this case it can be misdiagnosed with bacterial infection. Remember it’s associated also with nasal discharge -exactly like Rhinovirus that cause running nose- and fever.

-All in all, the clinical features of Corona virus isn’t easily distinguished from other viral respiratory tract infection especially influenza and parainfluenza**–** since it has cross signs and symptoms with these two viruses-.Rarely associated with complication in CNS or others .

-Corona virus can be recognized in sporadic cases and in form of outbreaks also .

-Unlike Rhinovirus and parainfluenza virus -which are related to human host not to animals and birds- , Corona virus originally found in birds and later some strains of these viruses have been mutated and became adapted to human hosts.

-Recently, in the beginning of this century, there was a new type of virus called **Sever Acute Respiratory Syndrome Virus** . It starts as simple respiratory tract infection like infleuza and parainfleunza, but within short period it produces more sever damage associated with heart and kidney failure and even death -it can be so sever within short period-.

This virus was firstrecognized in china, and has been found that this virus is a type of Corona virus found in respiratory tract of birds , and then transmitted to humans due to gene mutations.

The first outbreak of this virus was in 2003, which resulted in infection that reached 200,000,000 people within 2 months in countries like China .

-Later, they discovered a new type of this virus in Saudi Arabia . At the beginning they thought it was the same virus that was found in china , but later they have discovered that it’s a new strain of SARS like virus which is called **Middle East Respiratory Syndrome** that is transferred from camels .

Humans can be infected by contact with camels , which lead to sever respiratory infection, and associated with damage of the respiratory tract within a short period of time , also it could be associated with damage to kidney ,liver and CNS.*fatal virus that has high mortality* .

Also, within a short period it causes damage to the lungs , that’s why the patient gets supportive therapy and may be admitted to ICUs , and this may allow a super bacterial infection.

It has been proved that Middle East Respiratory Virus is a mixed infection (bacteria + virus). In our respiratory tract we have endogenous normal flora that contains Strep. Pneumonia and H. Influenza , if they are activated , in addition to the presence of the virus , they will produce lower respiratory tract infection , so then we have to inspect in mixed infection which is more fatal , progressive and appears earlier . It leads to death in 7 out 8 cases , which means if the patient get infected , the complications will be so sever .

No vaccine is available and no specific antiviral drugs . The only treatment is to have supportive therapy.

**\*\*Rubella virus :**

-Its associated more with sporadic cases in our countries .

-If a pregnant woman gets infected, It leads to abortion or produces infection for the fetus that might not be recognized during delivery of the baby, but after 1-2 years problems like CNS retardation and in liver and kidney will appear.

-In our country we have 98-99 % of immunization against Rubella virus ( MMR vaccine ) . But certain number of females might not develop enough immunity against Rubella virus , so its recommended to do a test , which checks the sufficient availability of antibodies against this virus especially IgG&IgM ABs , before conception -before pregnancy- .

-According to the special genome structure of Rubella virus :

**1-**it belongs to a special group . Firstly, it was considered part of Enterovirus group but later it has been considered as part of **Toka**family .

Toka family is related to Arbo viruses which produce infection in CNS , and often transmitted through insects In tropical and subtropical countries .

**2-** It carries only hemagglutinin which contains 2 types of glycoprotiens : E1 and E2 –responsible for attachment and pathogenicity-.

-Luckily, Rubella virus has only one antigenic type -its not easy to change the gene of this virus -, it has a stable genome , and even if there was mutation usually it will not be associated within the infection process . So the infection can be controlled easily.

-Rubella infection starts in the respiratory tract as mild infection -similar to influenza, parainfluenza and even rhinovirus- , but later it rapidly spreads to the blood stream and produces viremia , and then its transmitted to the skin , kidney and then excreted in the urine . It has an incubation period of **2 weeks** .

Once the infection reaches the skin it causes skin rushes . Skin rushes caused by Rubella has a characteristic appearance : start as small spots on the face , later it will spread to the abdomen and trunk .

Under normal conditions Its not easily to recognize the infection, because the skin rushes may appear for 2 to 3 days and then will disappear, so you may not notice that , and that was a problem before having MMR vaccine.

The percentage of asymptomatic infection in Rubella reaches**50%**. But sometimes in certain cases during the acute stage - which is similar to flue like infection - , the virus can be detected in saliva, urine, feces and skin -due to the presence of viremia -. So in this case saliva could be a source of infection even with no clinical signs and symptoms among the infected person.

-NOTE : Once threres skin rushes it means that there is viremia, because rushes appear only when the infection reaches the blood and the virus has transmitted to the saliva …. Etc .

If a pregnant women (especially in the first 3 months of pregnancy) had a contact with a person who is infected with Rubella , she might get infected even if she is immunized , and later either :

1.The fetus might get infected and lead to complications in 50-70% like abortion or sever damage for still birth baby.

2.Or in certain cases the baby may be born normally but at age of 1- 2 years the complications will appear , ex : deafness , coma , heart and kidney abnormalities and later may suffer from mental retardation .

-To make sure that there is no Rubella infection , we must look for specific antibodies:**IgM and IgG** . As we know IgM can’t cross the placenta to give the immunity for the fetus , but IgG may cross the placenta ( so looking for IgG alone isn’t enough, we must look for IgM also). If we found IgM antibodies in the blood of the fetus , it means that he got the infection.

Also if a woman wanted to get pregnant and contacted with a person that is infected with Rubella , also we can look for the specific IgG and IgM antibodies. Normally : if there is a high level of IgM it means that there is acute infection and will result with immunity , whereas high IgG means she is immunized, which is good .

Another testa lady can dofor the Rubella virus antibodies is by taking a blood sample , if there is sufficient IgG there is no problem , but if there is a high titer of IgM it means that a new infection with this virus -which is also good , because it will develop immunity against it “will be immunized”-, but she must wait for **4-8 weeks** before getting pregnant , because viremia that is associated with Rubella will stay for 4 weeks . \*\*notice that in the slides its written that she must wait for 2-3 months!

If there is not enough level of IgG ,it means either immunization or natural infection , so remember that we should take “Rubella vaccine” NOT “MMR” .

As we said , Rubella virus will be associated with mild infection in males and females in most cases , but re-infection specially in **adults** will lead to certain complications like **arthritis** in joints -in 1-2% of cases-.

So early infection and subsequently immunization will develop more solid immunity and less side effects , whereas infection after puberty might be associated with some side effects like as we said arthritis and arthralgia .

GOOD LUCK ^\_\_^