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Slide :

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As you remember we spoke about poliomyelitis viruses and we have mention that we have 3 types of polio viruses A , B , C and its not easily to predict causative agent of poliomyelitis if its belong to type A or B or C . therefore in order to cover the 3 types of viruses they have produce a vaccine ,and there is 2 type of vaccines available in the market

First one : Salk Poliovaccine

It composed of inactivated virus prepared by using formaldehyde and there is normal replication of the virus especially in the oral cavity, intestine in order to enhance the production of specific antibodies IgA in the intestine , this vaccine produced in 1956 in united states and it still used in few countries in the world like Sweden , Norway , fern land and America

This vaccine rarely associated with any complications, therefore its in certain type of infants who have CNS disorder this vaccine is highly safe and it should be used

Second : Poliovaccine Sabin

It indroduce few years later in England and now it's used in most countries including our county , this type is life attenuated vaccine ( not complete inactivated ) which means that it should be given orally not by injectable rout like salk vaccine , this means again that in this vaccine few numbers of the attenuated virus reach intestine and begin to replicate but not extensively and not associated with developing clinical features of asymptomatic or symptomatic features of poliomyelitis , only 1 case per million maybe associated with clinical features poliomyelitis

Importance of this vaccine which given few drops orally , they are 4 doses and should be given within first year of newborn babies , but before giving this vaccine for any infant the physician should sure that infant does not suffer from respiratory or GI infections **why**?

Because if infant have GI infection the vaccine can't establish in the intestine and it will be washed off because of diarrhea and the vaccinated child will be not immunized and respiratory tract infection usually cause fever and the vaccine will increase fever

And one important thing for the ladies when taking their infants for vaccination it's very important to make sure that the vaccine is taken from refrigerator not kept in room temperature because it might be inactivated within 1 hr and it will effect immune response and later may cause some problems in relation to paralysis not sever as flaccid paralysis but it might cause septic meningitis and extra

Very rare any vaccinated child will suffer from diarrhea following administration; he might suffer from elevation in body temperature but only for 24 – 48 hrs and its easily controlled

And end result for all vaccines they are associated with high percentage of immune response up to 99%

Now we are going to mention several types of viruses that have similar features especially in relation to gastrointestinal and respiratory tracts infection also in relation to developing skin rashes and sometimes ulceration to oral cavity and extra

Difference between this group of vriuses **Coxsakieviruses** and the **Echoviruses** exactly these two groups its not easily to distinguish in the clinical practice , it need special laboratory tests and these tests are not available in many labs , recently they introduce PCR to diagnose these viruses but before it was very difficult

Differential diagnose between this and many other type of infection is often based on clinical signs and symptoms and roughly not 100% the physician can tell that this infection due to **Coxsakieviruses** or other and also in relation to other enteroviruses

**Coxsakieviruses:**

Its large group as part of **Picornaviruses , all** of them have similar structure and there is many serotypes and its classified into two major groups : A and B

Both have similar rout of infection by contact with infected person who carry organism or due eating or drink contaminated or food, which mean that infection might start in the mucosa of the respiratory tract or in the GI

in both cases there is certain inflammatory reactions in the mucosa which demonstrated in the RT as mild sore throat which can be caused by other many viruses like influenza and adenoviruses .. , but in addition **Coxsakieviruses** more frequent reach blood stream and produce viremia and this mean that it can easily spread to CNS and might be associated with Aseptic meningitis, in clinics the pediatrician always believe that 50% of infants and young children up to age of 2yrs who developed aseptic meningitis due to **Coxsakieviruses** , but its rarely associated with more severe infection

however in 90% of all **Coxsakieviruses** cause Asyptomatic mild infection in relation to RT and GI and only 10% might be associated with sever infection especially in **group A** :

**1-Acute Hemorrhagic Conjunctivitis :**

Very common which might cause damage to the cornea similar to Adenoviruses but here pain is less

Its highly contagious, swelling in the eyelids, might cause Conjunctive Bleeding which is very dangerous and it not related to any age both children and adults could be affected

**2-Herpangina:**

Very common in all communities and all countries and we might recognize it in our practice

**Herp** in relation to herpes virus because clinical features of **Herpangina** is similar to infection with herpes simplex type 1 or 2 and mainly type 1

And here we might recognize from mild to severe sore throat and some ulceration to the oral mucosa but the ulceration in the oral mucosa in relation to **Coxsakieviruses** is more inside oral cavity in floor of the mouth or in the mucosa not extra orally at junction with lips , and in small vesicular lesions might produce larger swallowed ulcers lesions and it does not disappear like herpes in few days it might persist for 2 weeks painful during eating

and in addition the infection with **Coxsakieviruses** once establish in the oral cavity of any person he might be re-infected and develop again eruption in the mucosa and ulceration each 1 to 2 months or maybe in one year 3 or 4 times and maybe this ulceration recognized for a long time due to the fact that infection with **Coxsakieviruses** is not easily prevented by presence of specific Abs because Abs will be humeral not localized Abs.

**3-Hand-Foot-Mouth Disease**

This disease associated with skin body whether hands or any parts of the body, as well as included face and mouth. Ulcerations might start from the oral cavity through the contamination of finger, especially in children, it might infect any part of the body and ulceration may found in many parts of the body.

Also this disease found in animals, there are special viruses in animal and not part of Coxsakieviruses , they might produce similar disease of Coxsakieviruses , and rarely transmitted to human.

More dangerous if the virus reaches the blood stream via oral infection ulceration, or hand or any part of the body.

**4-Hemolytic Uremic Syndrome (HUS):**

If the virus reaches the blood stream it will cause viremia. Later, it might reach and produce damage in the kidney and produce a syndrome known as hemolytic uremic syndrome ,and that's mean infiltration in the kidney will be to some extent suppressed and it might release some protein and red blood cells in the urine. And keep in your mind that this syndrome might be cause by Enterohaemorrhagic E-coli.

Coxsakieviruses A and B might produce this syndrome, and under certain condition this virus will reach CNS and produce a type of clinical disease similar to polioviruses related to flaccid paralysis but this paralysis is mild for a short period.

Note: all the Coxsakieviruses viruses in general affect mainly young children and adult. And Coxsakieviruses are dangerous mainly in immune compromised persons.

**Coxsakieviruses group B** :

more simple and there are few serotypes, and might be the infection due to 1 serotype or 2 or 3 , it can be 3 at the same time. And the infection is mainly viremia , what's mean the first stage which related to oral cavity ulceration it might not be recognized, but the secondary stage can be recognized which is the manifestations related to infection especially to the heart muscle produce myocarditis, pericarditis and might affect the liver produce form of liver cirrhosis and might affect pancreas and they believe that Coxsakieviruses are responsible for certain percentage of diabetes , but it mainly effect immunocompromised persons not in healthy people.

In General there's no vaccine; there is no need to use any type of antiviral drugs. Only supportive therapy to treat in such type of infection, and might even these type of infection not recognized.

The most important for you as dentists, is present of ulcerations in oral cavity usually in the soft palate or any part of the mucosa of the oral cavity, you might recognized whitish yellow lesions and more inflammation associated with etching and erythema than herpes. Herpes rarely reach inside the oral cavity, they associate more with lips or junction of the lips and gingival "in form of gingivostomatitis" but not sever and painful as Coxsakieviruses infection.

**Echoviruses:**

The word Echoviruses originated from " Enteric Cytopathgenic Human Orphan " orphan that's mean the origion of this virus is not well establish. And it's a part of Picornaviruses and enteroviruses. And they have 30 serotypes ( larg number ) , all these serotypes produce similar clinical features, and often our body if responded to production of specific antibodies against one, might lead to some extent cover the infection to another. This means we might during our childhood be infected with few different serotypes which later resulted in developing immunity against all serotypes

Clinical disease mostly asymptomatic like Coxsakieviruses , asymptomatic related to respiratory tract or intestinal tract or both or each alone. Rarely associated with severe diarrhea its mild diarrhea, and often the infection usually associated with water especially during swimming, these swimming pools controlled with chlorine gas, which kill majority of organisms but Echoviruses resist to some extent to chlorine, but Coxsakieviruses and other viruses usually killed.

The problem of these viruses that these viruses might following asymptomatic infection reach blood stream and multiply there and produce a variety of clinical infections involve of aseptic meningitis , encephalitis , hemorrhagic hepatitis , myocarditis, Pericarditis *,* Hemolytic Uremic Syndrome and many human syndromes, and mostly in young children and rarely in adults. And if the infection happens in adults it often in immune-compromised persons, infection usually related to neonatal babies due to the lack of maternal antibodies.

Its improved by many researches that approximately when we reaching the age of 10 years the majority of population they have already immunity against Echoviruses and Coxsakieviruses.

No vaccine , no antiviral treatment .

**Rotavirus :**

This type of viruses is common and produce variety of dehydration and diarrhea, it can be mild or chronic or severe and might be associated with death especially in age less than one year .

This virus not part of Enteroviruses group not part of Picornaviruses family, it belongs to family of viruses called **Reoviridae** and they are double-SRNA. It has three major groups : A, B and C , and the majority of infection is related to A and C all around the world.

This virus is the most causative agent of diarrhea in infants less than one year. 50% of the all types of diarrhea might be because of the rotavirus in our country or any other country. Rarely rotavirus cause infection for children or adult, and this virus is highly communicable and highly contagious , easily contaminate in hospitalized patients. Also the nurses easily contaminated by contact with infected persons and easily this virus spread from one child to another due to the fact that rotavirus in relation to other viruses consider more resistant to environmental factor especially during winter months spread rabidly produce outbreaks among infants and nurseries and hospitalized childrens , and rarely rotavirus produce infection in the adult , if infected adult who have no immunity during their childhood it might be fatal especially in immunocompremised patient , so in 90% infection is mild, but 10% might developed chronic diarrhea.

The problem specially in developing countries because this type of diarrhea might not attract the attention of the mothers because its mild in the first days but this mild diarrhea of infant that weight 5 to 10 Kg might later become chronic and produce sever dehydration at the end , that’s why it consider killer number one of infant in developing countries ,based on statics of WHO: 2 to 3 million death of infant infected with this virus , imagine how this virus can be fatal to infant specially if they didn’t receive oral fluids , chronic diarrhea in infant cannot be observed because the mother think that is normal situation (stool motion) { there is traditional treatment done by the mothers without knowing that its caused by a virus which is they take water of a boiled rice to the infant and this help to restore oral fluids }

, generally the infant or young children will developed rapidly immune response which mainly related to the intestine which mean IgA , because its localized immunity , rotavirus is very common in poor community according to the stander of hygiene ( ↑hygiene → ↓infected with the virus , and vies versa ) .

They have developed a rapid test and it’s the only type of tests that is available in the majority of clinical laboratories because Rotavirus is very common in case of mild or chronic diarrhea which is Rota-Latex Test which can be done in 5 min because it a rapid and very common infection unlike the other viruses that require long time

there is no specific antiviral drug and recently they have introduce 2 types of vaccines which found in developed countries only and to some extent it can be protected up to 80%.

**Noroviruses & Other Caliciviruses**

other type of virus which might produce variety of infection related to respiratory system and GI system like noroviruses and other caliciviruses , they are consider an enteroviruses in the past because they can cause an acute gastroenteritis (diarrhea and vomiting) ,but now they have classified to different part.

**norovirus** : it is a new name were introduce 10 years ago , in order to separate it from caliciviruses , all infant and children acquired the infection early in their life : mild diarrhea, gastroenteritis for 1 or 2 days and often Asymptomatic infection associated with developing of immune response and rarely could cause any complication

but if there is an outbreak of gastroenteritis and we proved that the causative agent is not bacteria ( especially bacteria that produce toxins like staphylococcus.auras and bacillus cellius? that produce mainly gastroenteritis) then its most likely to be norovirus , because it associated with many common cold type of food like : ice-cream , cold water and all types of fishes ( in south east Asia countries norovirus is very common and often if we visit these countries we might suffer from diarrhea , vomiting and gastroenteritis in the first 24 hrs due to norovirus not bacterial infection )

**Calcivirus** **:** are similar to norovirus in morphology , structure and clinical features to norovirus , and rarely produce any complications .In addition to clinical feature of diarrhea and gastroenteritis it might develop infection related to muscles and in CNS like headache but usually the symptoms is short within 2 days the patient will recover without complications.

**Note** :Enteroviruses group is in relation to the intestine not to the morphology or to Picornaviruses family

**Astrovirus :**

Astro: star like appearance under the electron microscope , single strand –ve RNA , this virus produce clinical feature exactly like rotavirus which produce mild to severe or chronic diarrhea , and also like norovirus its related to the cold and fridge food like ice-cream and cold drinks

It's very common and often they produce short self limiting diarrhea, no need for drugs and rehydration as supportive treatment in most cases , enough to stop eating for 24 hrs

lastly, infection with these **Astrovirus and norovirus and Calcivirus** will result developing an immune response related to intestinal mucosa in form of IgA and this is enough to prevent re-infection with these viruses , and if there was a re-infection it might be due new types which required from another countries. And at the end there is no need to give antiviral drugs because its self-limiting only for 24 hrs.

GOOD LUCK ☺