Lecture outline: 16.2.2016

Erythrovirus virus B19 (Parvovirus B19)

•These are the smallest DNA animal viruses known.
•Parvovirus B19 is the only parvovirus that causes disease in humans.
•Its name doesn't mean anything, the virus was found in unit of blood in a bloodbank, and B19 was just the batch no. for that blood.

Family: Parvoviridae. Two sub families
•**1. Parvovirinae (infect vertibrates)**
•Sub family: 1. Parvovirinae
Three genera:
1. Parvovirus (i.e. canine parvovirus)
2. **Erythrovirus (i.e. B19 virus)**
3. Dependoviruses (i.e.Adeno-associated viruses/AAV)

•**Genome**: ssDNA,
•**Morphology:**
•Non enveloped, 22nm size, icosahedral particles

Erythrovirus virus B19: diseases
•1. This virus was only discovered in the 1970's, although the disease it causes, ***erythema infectiosum***, has long been described.

•It is also sometimes called **"fifth disease"** from an historical enumeration of the rash diseases of childhood, or "**slapped cheek disease/rash/syndrome**" because of the facial rash.

•Its name "B19" refers to the batch number of a serum in the blood bank in which the virus was discovered.

•2. Parvovirus B19 has other unique complications in children and adults because of its tropism (predilection or affinity) for immature red cells.

–**Aplastic crisis** in anaemic individuals
–**Arthropathy** in adults
•3. Intra uterine infection : **foetal death, hydrop foetalis**
•4. Persistent infection in immunodeficient individuals
•5. Symptom-less infection is common.

***Erythema infectiosum* /"fifth disease" ("slapped cheek disease/rash/syndrome"):**

•Parvo B19 is also spread by the respiratory route (droplet infection), and the rash appears after about 17 days.

•It's distinctive feature is the red cheeks, with circumoral pallor.

•Bright red rash coalesces at the cheeks forms a "**slapped face appearance**."
(Hall mark sign)

•On the rest of the body it is a lacy, pink macular rash that fades quickly, but may reappear after a warm bath.

•Arthralgia or frank arthritis, in fingers and knees most commonly, is more frequent and troublesome than in rubella.

•The arthritis can in some cases persist for months, and can even imitate juvenile rheumatoid arthritis.

Pathogenesis
•Parvo B19's site of replication is red cell precursors in the bone marrow.

•It utilizes as its receptor the P antigen (a red cell surface glycoprotein).
•The infection will cause a temporary shut-down in red cell production until the virus is eliminated by the immune system, usually within 10 days.

"aplastic crisis":
•In a normal child this causes an insignificant drop in haemoglobin of around 1g/dl.

•However, people with hereditary red cell disorders (eg sickle cell anaemia, hereditary spherocytosis, thalassaemia) have either red cell under-production or rapid red cell destruction by haemolysis.

•In this context, the brief cessation of red cell supply caused by parvo B19 infection will precipitate an **"aplastic crisis"** ie. severe anaemia.

•These patients present with extreme pallor, lethargy and sometimes in cardiac failure, and require blood transfusion.

Infection in immuno-compromised patients
•In persons with AIDS, or other immunodeficiency states.
e.g. children with leukaemia on chemotherapy, inability to clear the virus can cause chronic anaemia.
Normal immunoglobulin preparations for intra-muscular injection contain parvo B19 antibodies and will usually successfully eliminate the infection in immuno-compromised patients

Maternal infection with parvo B19 in pregnancy

•Maternal infection with parvo B19 in pregnancy leads to intrauterine /congenital infection

•can cause foetal infection, and foetal anaemia.

•In the worst cases (rare, usually second trimester infection) this may manifest as foetal hydrops.

•The mechanism here is severe foetal anaemia causing cardiac failure with oedema.

•This may end in intra-uterine death, but it has been possible to treat severely affected foetuses by intra-uterine transfusion, given the right technology.

•The milder cases tend to resolve spontaneously.

Laboratory diagnosis

Because the rash and mild illness cause by parvo B19 is very similar to rubella, it is essential in pregnant women to distinguish between the two virus infections by laboratory diagnosis.

Note that parvovirus B19, unlike rubella, is not teratogenic, and outcome of infections in pregnancy is usually good

Laboratory diagnosis of acute parvo B19 is also based on the presence of IgM antibodies. Detectable at the time of rash & for 2-3 months

The virus cannot be cultivated in routine cell culture lines,
Molecular tests are useful to detect B 19 DNA in fetal blood when hydrops fetalis is suspected
Direct detection of the viral DNA may be achieved by PCR & DNA hybridisation (dot blot in serum).

No specific treatment or vaccine. A parvo B19 vaccine will soon be available.

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