Parvo virus

Structure of Parvovirus

- Very small, non enveloped virus with single- stranded DNA genome.
- The genome is negative strand DNA,but there is no virion polymerase.
- The capsid with icosahedral symmetry.
- There is one serotype.

Receptors

The virus is highly tropic for human erythroid cells. The cellular receptor for B19 is blood group P antigen (globoside).

P antigen is expressed on mature erythrocytes, erythroid progenitors, megakaryocytes, endothelial cells, placenta, and fetal liver and heart, which helps explain the narrow tissue tropism of B19 virus.

B19 virus replicate only when a cell is in the S phase , which explains why the virus replicates in red blood cells precursors but not in mature RBC

The replicative cycle of human B19 parvovirus

- After adsorption to host cell receptors, the virus penetrate and move to the nucleus, where replication occurs.
- Cellular DNA polymerase is used by the virus single stranded DNA genome to provide the progeny genomes
- The viral mRNA is synthesized by cellular RNA polymerase from double strand intermediate.
- The progeny virion are assembled in the nucleus.

Transmission and epidemiology

- Respiratory route
- Transplacental
- Blood transfusion.

- B19 virus infection occurs world wide
- Human are natural reservoir.

Pathogensis and immunity

B19 virus infects primarily two types of cells:

- Red blood cell precursor (erythroblast) in the bone marrow which accounts for aplastic anaemia
- Endothelial cells in the blood vessles, which accounts in part for the rash associated with erythema infectiosum.

- Immunocomplexes composed of virus and IgM or IgG also contribute to the pathogenesis of the rash and to the arthritis that is seen in some adult patient.

- Hydropes fetalis is secondary to congestive heart failure caused by severe anemia due to death of B19 parvo virus infected erythroblast in the fetus.

Clinical findings

There are five important clinical presentations

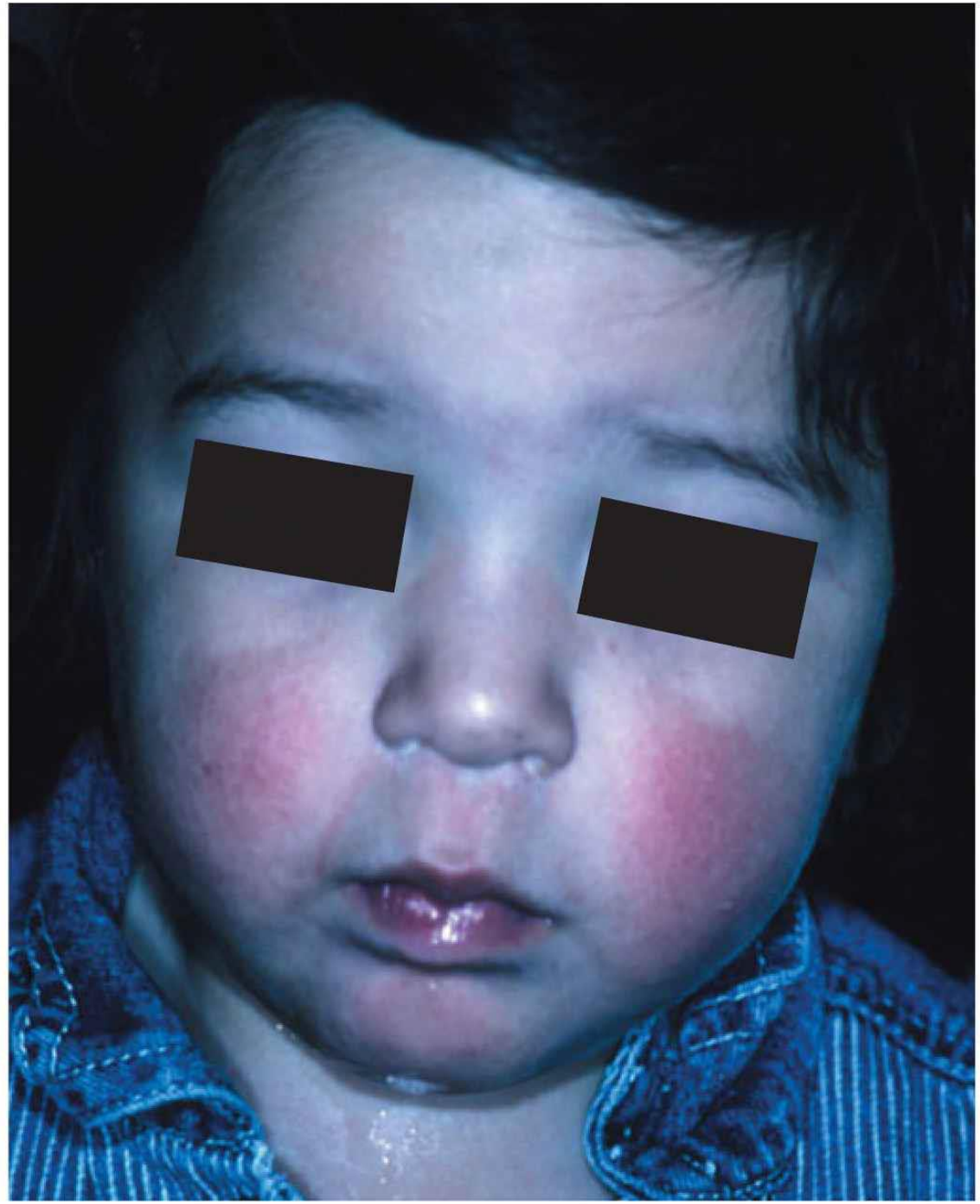
Erythema infectiosum (Slapped Check Syndrome, Fifth Disease)

- Mild disease of childhood
- Characterized by bright red rash that is most prominent on the cheeks, accompanied by low grade fever, runny nose (coryza) and sore throat.
- A lacy , less intense erythematous rash appears on the body.
- The symptoms resolve in about 1 week.

- It is also called fifth disease. The four other macular rash of childhood are measles,rubella,scarlet fever and roseola

Diseases caused by Parvoviruse B19

- Erythema infectiosum ("fifth disease").
- polyarthralgia-arthritis syndrome in normal adults.
- aplastic crisis in patients with hemolytic disorders
- fetal infections including hydrops fetalis.



Aplastic crises

- Children with chronic anemia , such as sickle cell anaemia, thalassemia can have transient but severe aplastic anaemia (aplastic crises) when infected with B19 virus.

- People with normal RBC don’t have clinically apparent anemia, although their RBC precursors are infected.

Fetal infections

- Infection during first and second trimester of pregnancy, the virus may cross the placenta and infect the fetus.
- First trimester associated with fetal death.
- Second trimester leads to hydrops fetalis.
- Third trimester do not results in important clinical finding.

Arthritis

- Parvo B19 virus infection in adults especially women, can cause arthritis mainly involving the small joints of the hands and feet bilaterally.
- It resembles rheumatoid arthritis.

Chronic B19 infection

- Immunodeficient patient especially HIV, chemotherapy or transplant patients can have chronic anemia, leukopenia or thrombocytopenia as a result of B19 infection

Laboratory diagnosis

- Fifth disease and aplastic crises are usually diagnosed by detection of IgM antibodies.
- B19 can be isolated from throat swab but this usually not done.
- In Immunoompromised patients antibodies may not be detectable, therefore, viral DNA in the blood can be assay by PCR
- Fetal infection can be determined by PCR analysis of amniotic fluid.

Treatment

- No specific treatment
- Pooled Immunoglobulin may have beneficial effect on chronic infection in Immunocompromised patients.
- No vaccine or chemoprophylaxis is available.