Virology

Lec (10)

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Teaching Objectives:
1. To define fifth disease.
2. To list general characteristic of human parvovirus B19
3. To describe the mechanism pathogenesis
4. To recognize methods of diagnosis, treatment and prevention.

Human parvovirus B19

Human parvovirus B19 causes erythema infectiosum (slapped cheek syndrome, fifth disease), aplastic anemia (especially in patients with sickle cell anemia), and fetal infections, including hydrops fetalis.

Important Properties

-Parvovirus B19 is a very small measuring about 22-nm.

- The genome consist of single-stranded DNA and it is negative-strand DNA, but there is no virion polymerase.

- The capsid has icosahedral symmetry and the virus is non-enveloped.

- There is one serotype and humans are the natural reservoir; animals are not a source of human infection.

Mod of transmission

- Human parvovirus B19 is transmitted primarily by the respiratory route.

-Infected mother to baby (transplacental transmission)

-Blood donated for transfusions also can transmit the virus.

Pathogenesis

Human parvovirus B19 is infects primarily two types of cells: red blood cell precursors (erythroblasts) in the bone marrow, which accounts for the aplastic anemia, and endothelial cells in the blood vessels, which accounts, in part, for the rash associated with erythema infectiosum. You can have a range of symptoms depending on your age and overall health. About two out of 10 people who get infected with this virus will have no symptoms. Others may have only mild, rash illness

Clinical Findings

There are five important clinical presentations.

1-Erythema infectiosum (slapped cheek syndrome, fifth disease): This is a mild disease, primarily of childhood, characterized by a bright red rash that is most prominent on the cheeks, accompanied by low-grade fever, runny nose (coryza), and sore throat. The symptoms resolve in about 1 week.

The disease in children is also called fifth disease. The four other macular or maculopapular rash diseases of childhood are measles, rubella, scarlet fever, and roseola.

2- Plastic anemia: Children with chronic anemia, such as sickle cell anemia, thalassemia, and spherocytosis, can have transient but severe aplastic anemia (aplastic crisis) when infected with human parvovirus B19.

3- Fetal infections: If a woman is infected with human parvovirus B19 during the first or second trimester of pregnancy, the virus may cross the placenta and infect the fetus. Infection during the first trimester is associated with fetal death, whereas infection during the second trimester leads to hydrops fetalis. Third-trimester infections do not result in important clinical findings.

4- Arthritis: Human parvovirus B19 infection in adults, especially women, can cause arthritis mainly involving the small joints of the hands and feet bilaterally. It resembles rheumatoid arthritis.

5- Chronic B19 infection: People with immunodeficiencies, especially HIV-infected, chemotherapy, or transplant patients, can have chronic anemia, leukopenia, or thrombocytopenia as a result of chronic human parvovirus B19 infection.

Laboratory Diagnosis

-Aplastic anemia is usually diagnosed by **detecting IgM antibodies**.

- Antibodies may not be detectable in immunocompromised patients, therefore, viral **DNA in the blood** can be assayed by polymerase chain reaction (PCR) methods.

-Fetal infection can be determined by PCR analysis of amniotic fluid.

Treatment and Prevention

- ✓ There is no specific treatment of human parvovirus B19 infection. Pooled immune globulins may have a beneficial effect on chronic B19 infection in patients with immunodeficiencies. There is no vaccine or chemoprophylaxis. You can reduce your chance of being infected with parvovirus B19 or infecting others by

- ✓ Washing your hands often with soap and water
- ✓ Covering your mouth and nose when you cough or sneeze
- ✓ Not touching your eyes, nose, or mouth
- ✓ Avoiding close contact with people who are sick
- ✓ Staying home when you are sick