

Parvovirus Infection Causing Aplastic Anaemia in an Immunocompetent Patient Diagnosed by Bone Marrow Aspiration Cytology

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ABSTRACT

Human Parvovirus infection is associated with transient aplastic crisis as a most common complication in chronic haemolytic anaemia patients. Very few case reports are available regarding aplastic crisis in immunocompetent patients. Here the authors are reporting a case of 17-year-old immunocompetent male that presented with fever, headache for three days. Complete blood count showed pancytopenia. Bone marrow aspiration and trephine biopsy revealed hypocellularity. Giant pro-erythroblasts with multiple cytoplasmic projections (dog ear appearance) and prominent intranuclear inclusions were seen in marrow aspirated cytology. Classical cytological findings in bone marrow aspiration raised the suspicion of human parvovirus infection. Findings were confirmed by positive Deoxyribonucleic Acid Polymerase Chain Reaction (DNA PCR) for parvovirus B19 and parvovirus Immunoglobulin M (IgM) antibody using Enzyme Linked Immunosorbent Assay (ELISA) test. Patient was managed with antibiotic therapy and was transfused three units of blood. Complete blood count became normal after two months. This emphasises the role of keeping high index of suspicious for Parvovirus B19 infection as a cause of aplastic anaemia even in individual without underlying diseases. Secondly characteristic morphological changes in the erythroid precursors in the bone marrow aspiration is highly suggestive of Parvovirus B19 infection.

Keywords: Dog ear appearance, Erythroblasts, Haemolytic anaemia, Polymerase chain reaction, Trephine biopsy

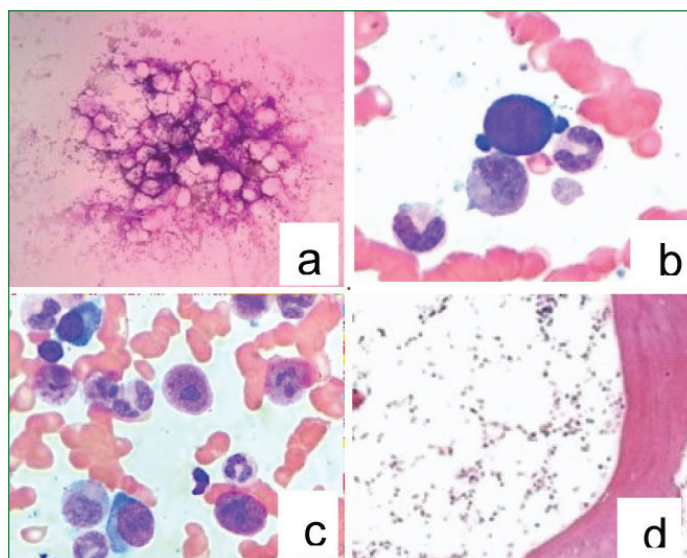
CASE REPORT

A 17-year-old immunocompetent male patient presented to Medicine Department with the complaints of fever and headache for last three days. The patient had pallor and mild hepatosplenomegaly. Complete Blood Count (CBC) showed Haemoglobin (Hb) of 7 gm/dL. Total Leucocyte Count (TLC)-3000/cmm (neutrophils 38%, lymphocytes 58%, eosinophils 1%, monocytes 3%), platelet count- 50,000/cmm, reticulocyte count was 0.25%. Other haematological and biochemical parameters were unremarkable. Marrow aspiration showed marrow hypocellularity comprised of predominantly lymphocytes and few plasma cells [Table/Fig-1a]. The haematopoietic cells were of erythroid series cells i.e. the giant proerythroblasts with multiple cytoplasmic projections (dog ear appearance) [Table/Fig-1b], some with prominent intranuclear inclusions [Table/Fig-1c]. Marrow trephine biopsy showed hypocellularity [Table/Fig-1d]. Megakaryocytes were not seen. Marrow aspiration findings were consistent with a diagnosis of aplastic anaemia. Classical morphology of erythroid cells in marrow aspiration raised suspicion of parvovirus infection. It was confirmed by positive DNA PCR for parvovirus B19 and parvovirus IgM antibody using ELISA test.

The patient was managed with antibiotics like amoxicillin, clavulanic acid and three units of blood transfusion. Because of financial constraint, immunosuppressive therapy could not be given. CBC and peripheral blood smear examination was done regularly. His CBC became normal after two months. Mild hepatomegaly was persistent, which may be because the patient was from malaria endemic zone.

DISCUSSION

Human parvovirus B19 is a single stranded DNA virus [1]. It has a high degree of tropism to human bone marrow [2]. It replicates in erythroid progenitor cells in marrow leads to transient aplastic crisis in patients with haemolytic anaemia. In immune deficient patients, failure to produce neutralising antibodies results in persistent parvovirus B19 infections [2,3]. Rare causes of severe aplastic



[Table/Fig-1]: a) Bone marrow aspiration in scanner view shows particle with hypocellularity (Leishman stain, 40X); b) Giant proerythroblast with dog ear appearance of cytoplasm (arrow) (Leishman stain, 1000X, oil immersion); c) Prominent intranuclear inclusion (arrow) (Leishman stain, 400X); d) Marrow trephine biopsy shows hypocellularity (H&E 40X).

anaemia associated to acute parvovirus infection in individual with no underlying disease have been documented [4,5]. An Indian reported 40.7% occurrence of parvovirus B19 IgM and in and 37% viral DNA in aplastic anaemia patients respectively. This shows the association of parvovirus infection with aplastic anaemia [6].

Underlying pathogenesis of severe aplastic anaemia due to parvovirus infection is still not clear. Viral propagation takes place in marrow cells and proteins of parvovirus B19 were expressed. Destruction of marrow elements occurred because of the direct cytotoxicity by these viral proteins. The common host cell of parvovirus B19 is human erythroid progenitor cells [7]. This tropism is because of Globoside (erythrocyte P antigen) that acts as receptor for the virus

[2]. Other cells such as megakaryocytes may be lysed by restricted expression of viral proteins in the absence of viral propagation.

This case highlights the classical morphological features in bone marrow aspiration cytology which warrants the suspicion of human parvovirus B19 infection which was subsequently confirmed by PCR and antibody test. In this case, incidentally bone marrow aspiration was the first investigation to diagnose viraemia as classical morphological features of parvovirus B19 infection is rarely seen in bone marrow examination [4]. It also emphasises that Parvovirus B19 can have significant marrow aplastic crisis even in an immunocompetent individual.

CONCLUSION(S)

Maturation arrest in erythroid series cells with characteristic morphological changes in the erythroid precursors in the bone marrow aspiration is highly suggestive of parvovirus B19 infection. It emphasises the role of keeping high index of suspicion for

parvovirus B19 infection as a cause of aplastic anaemia even in an immunocompetent patient.

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