Disseminated Parvovirus Infection with Interstitial Pneumonia and a Pericardial Effusion in an Adult Allogeneic Stem Cell Transplant Patient

Abstract

Parvovirus represents a common infection encountered by many people throughout childhood and adult hood. Commonly the disease will present as a simple febrile illness, rash in infants, bone marrow compromise, or even isolated arthralgias. However, in the immune compromised population, the presentation can be more atypical and can result in dissemination with major organ compromise. We present the first reported case of parvovirus pneumonia with disseminated disease in an adult allogeneic stem cell transplant patient. This case represents the importance of having a high suspicion for parvovirus infection in any transplant patient without focus on purely hematologic compromise or classic presentations. A clinician must have a high suspicion for this disease in immune compromised patients as its treatment is easily given and highly effective.

Introduction

Parvovirus B19, after being discovered by Yvonne Cossart in the 1970’s, derived its name from the discovery that pathognomonic viral particles in human serum, after an anomalous reaction in an assay for hepatitis B, were occupying position 19 in plate B [1]. The virus is very common in childhood as roughly half of children at age 15 are seropositive for parvovirus B19 antibodies [2]. Infection also continues to occur throughout adulthood as seropositivity approaches nearly 100% in the elderly. Clinical syndromes in juvenile erythema infectiousum, Fifth’s disease, with classic erythematous cheeks and fever in young children. In adults it is an implicated agent for a symmetric arthritis usually of the hands, wrist, knees, and ankles. The rash seen in Fifth disease and arthritis in adults in thought to be related to immune complex deposition as the main target of parvovirus particles is erythroid prescursors [3]. In sickle cell patients and aplastic crises can occur as a result of infection causing severely depressed red blood cell counts. White blood cell and platelet counts may also fall, with asplenics being the most susceptible [4]. In pregnant women, placental transfer combined with an immature immune system in a fetus results in hydrops fetalis. However, most infections including those in adults are largely asymptomatic [5].

Though parvovirus B19 can be detected in serum by electron microscopy or hem agglutination, the virus is most commonly detected by direct hybridization or polymerase chain reaction (PCR). The PCR technique is at least 10^4 times more sensitive than hybridization and detects fewer than 10 genomes [6]. Serology testing can be used to reliably diagnose infections however there is diminished specificity of some assays especially with cross-reactivity with EBV and rubella [7]. As the clinical presentation can be vague, especially in transplant patients, serology must be combined with clinical suspicion or other diagnostic techniques to ensure validity. In some cases, even further confirmation with tissue usually in the form of bone marrow is needed to confirm including special staining to identify the presence of the virus.

Parvovirus B19 is a relatively rare infection in transplant patients, both solid organ and stem cell as demonstrated by the paucity of trials, prospective or retrospective. However, two retrospective studies and one case series studying the incidence of parvovirus B19 infections in solid organ transplants have been conducted [8-10]. In renal transplant patients the incidence of parvovirus viremia is 21-31% with 12% having greater than two positive serum samples [8,9]. In a retrospective analysis of adult bone marrow transplant patients, an incidence of 15% having parvovirus B19 infection was measured in 60 patients receiving bone marrow transplants [11]. Presentation in transplant patients can vary but the large majority present with some derivation of anemia. Nearly all case reports in bone marrow transplant patients report infection resulting in pure red cell aplasia or bone marrow failure [12-19]. These manifestations happen as early as the early phase of transplantation and as late as ten years following transplant. There are case reports in solid organ transplant patients of parvovirus resulting in myocarditis [20], hepatitis [21], CNS vasculitis [22], and severe multiorgan failure [23]. There are two reported cases of pneumonia secondary to parvovirus B19 infection, one in a heart transplant patient [24] and the other in a pediatric bone marrow transplant patient [25]. The spectrum of disease can vary widely but should largely be considered.
Case Report

The patient is a 61 year old female who initially presented in May of 2008 with acute myeloid leukemia initially presenting as leukemia cutis, oral ulcers and gingival infiltration. Initial studies demonstrated a bone marrow biopsy consistent with AML (M4/M5), normal cytogenetics with no high risk features but she was considered high risk due to the extramedullary involvement with gingival infiltration confirmed on biopsy. She entered complete remission after 7+3 induction and completed three cycles of consolidation chemotherapy. Her initial course was complicated by neutropenic fevers and thrombocytopenia with bleeding requiring recurrent platelet transfusions. This eventually resulted in alloimmunization requiring HLA-matched platelets with every transfusion. She was referred for a matched allogeneic transplant in early 2009 during CR1 due to platelets with every transfusion. She was referred for a matched sibling allogeneic transplant in early 2009 during CR1 due to likely extramedullary disease given M5 component which has a sibling allogeneic transplant in early 2009 during CR1 due to platelets with every transfusion. She was referred for a matched sibling allogeneic transplant in early 2009 during CR1 due to likely extramedullary disease given M5 component which has a high likelihood of extramedullary disease.

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Figure 3: The bone marrow core biopsy section viewed in high power field from a patient with acute parvovirus infection shows giant erythroblasts with intranuclear inclusions.

Figure 4: This bone marrow core biopsy section from a patient with acute parvovirus infection shows the virally infected erythroblasts highlighted by immunoperoxidase stain for parvovirus.

In any transplant patient with anemia that is new, persistent, or unexplained.

Though the main target of parvovirus B19 is erythroid precursors in the bone marrow, it may appear there is tropism within other cells from major organs including lungs, liver, and heart. There is little data to support this theory in humans but based on the case reports presented in this paper, there are multiple instances where the virus has localized and replicated within all of the major vital organs in addition to the hematopoietic tissues. Though largely a disease that is self-limited in immune competent patients, persistent or severe infection is successfully treated with prompt initiation of immune globulin in immune compromised populations. Some initial trials investigating the possibility of a vaccine were conducted; yet, none of these efforts have resulted in a successful way to enact primary prevention. However, with clinical suspicion and timely diagnosis, cases of parvovirus B19 infection in transplant patients can be easily managed and successfully treated.

References


