Parvovirus B19-induced severe anemia in heart transplant recipient
A case report

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Abstract

Rationale: Human parvovirus B19 (B19V) is a non-enveloped single-stranded DNA virus associated with a variety of human diseases. Reports of B19V infection after cardiac transplantation are relatively rare.

Patient concerns: We report a case of a 48-year-old women who underwent orthotopic heart transplant for dilated cardiomyopathy. She developed an anemia after cardiac transplantation. Anemia was most severe 2 months after surgery, with a decrease in reticulocyte count. Serological DNA test for parvovirus B19V was performed and the result was positive.

Diagnoses: B19V infection.

Interventions and outcomes: Intravenous immunoglobulin administration resulted in a resolution of the anemia. The patient’s blood test results showed a normal hemoglobin and reticulocyte count 1 year after surgery.

Lessons: Patients with parvovirus B19V infection may develop severe anemia after heart transplantation. The diagnosis mainly relies on viral DNA detection. Intravenous immunoglobulin is an effective treatment for viral infection.

Abbreviations: B19V = parvovirus B19, IVG = intravenous immunoglobulin.

Keywords: anemia, heart transplant, parvovirus B19

1. Introduction

Human parvovirus B19 (B19V) is a non-enveloped single-stranded DNA virus associated with a variety of human diseases.[1] B19V infection usually occurs in childhood, with 50% of adolescents developing antibodies to the virus before age 15.[2] It has been reported that recipients are particularly susceptible to B19V infection after transplant operation, especially kidney and liver transplantation.[3] However, reports of B19V infection after cardiac transplantation are relatively rare. Here, we report a patient with severe anemia caused by B19V infection after cardiac transplantation.

2. Case report

A 48-year-old female patient was admitted to our hospital 2 months ago because of dilated cardiomyopathy and heart transplantation operation was performed successfully. A triple anti-rejection regimen of tacrolimus, motimecocurphon, and prednisone was administered postoperatively. The patient began to show progressive decline in hemoglobin, which was 97 g/L on the first day after surgery, and reduced to 63 g/L 2 weeks later. Hemoglobin increased to 76 g/L after infusion of red blood cell suspension. Factors related to bleeding were excluded, and the patient was discharged 1 month after surgery.

During follow-up, the patient complained of intermittent palpitation accompanied by fatigue, without symptoms such as hematemesis, hematochezia, black feces, and weight loss. The result of hemoglobin was 59 g/L, and the patient was readmitted to hospital for further evaluation. Physical examination showed a pale face. Laboratory examination suggested a hemoglobin of 50 g/L, transferrin saturation 50.1% and ferritin 306 μg/L. B19V infection was suspected and serological DNA test for B19V was performed. At the same time, the patient was given 2 units of red cell suspension. Factors related to bleeding were excluded, and the patient was discharged 1 month after surgery.

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Informed written consent was obtained from the patient for publication of the case details.

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symptoms. Laboratory examination showed that the hemoglobin was 130g/L, and the mean hemoglobin volume, hematocrit, mean erythrocyte volume, and reticulocyte count were all within the normal range.

3. Discussion

The etiology of post-heart transplant anemia is multifactorial and includes medications (e.g., those used as immunosuppressive and antimicrobial prophylaxis), perioperative bleeding, decrease in intestinal absorption of vitamins, renal failure, and low levels of erythropoietin, and elevated levels of hepcidin associated with inflammation and reduced availability of iron. However, the incidence of B19V infection after transplantation is not clear. Studies have reported that it is about 0% to 58%. Incidence of B19V infection after transplantation is not clear. Of course, clinicians should consider the possibility of B19V infection in patients with progressive hemoglobin decline and poor response to routine correction of anemia. Our case presented severe anemia after heart transplantation, but there was no evidence of blood loss, hemolysis, iron absorption disorder, and renal insufficiency. Moreover, the anemia symptom had no significant improvement after receiving 2 blood transfusions. After eliminating the above possible causes, a reticulocyte examination was performed and the result was significantly reduced. We suspected that the patient’s anemia was caused by acute B19V infection, so serological DNA tests for B19V was performed and the results confirmed our suspicion.

There is currently no specific method for isolation of viruses from clinical specimens. Therefore, the diagnosis of the disease mainly relies on the detection of IgM and IgG antibodies and PCR detection of viral DNA. In immunocompetent individuals, diagnosis depends on serological detection of parvovirus B19 IgG and IgM. However, antibody responses are often absent in immunocompromised patients. Therefore, the diagnosis of B19V infection requires quantitative PCR detection of B19V DNA in peripheral blood, bone marrow samples, or biopsy tissue specimens. During the initial period of infection, B19V DNA is detectable at a high titer (>10^9 IU/mL) for 2 to 4 days, then dropped to between 10^2 and 10^4 IU/mL and usually disappeared by day 14.

IVIG has a good effect in the treatment of anemia induced by B19V infection after transplantation. Because immunoglobulin contains antibodies that neutralize B19V. A small number of patients who were not treated with IVIG but were given erythropoietin, iron supplements and blood transfusions also had better recovery of anemia. However, there is no consensus on the optimal dosing schedule and duration of IVIG treatment. Most of the patients received 300 ~ 400 mg/kg/d IVIG for 7 ~ 10 d, and some patients needed to extend the treatment time. Limited data suggest that a 2-day course of IVIG may be as effective as a 7-day course of 400 mg/kg/d as long as the total dose is at least 2 g/kg. Tacrolimus has a stronger immunosuppressive effect than cyclosporine A, the use of immunosuppressant should be minimized or the conversion of tacrolimus to cyclosporine A should be helpful after diagnosis of parvovirus B19V infection. However, Crabol et al. believed that IVIG is an effective method for the treatment of B19V infection and may avoid the need to discontinue immunosuppression with tacrolimus. Our patient received a 9-day course of IVIG (300 mg/kg/d) without discontinuing tacrolimus, and his anemia also improved significantly. Of course, for patients with severe immunosuppression, IVIG combined with reduction or substitution of tacrolimus for cyclosporine A may lead to a faster recovery time.

4. Conclusion

Patients with parvovirus B19V infection may develop severe anemia after heart transplantation. The diagnosis mainly relies on viral DNA detection. IVIG is an effective treatment for viral infection. For patients with severe immunosuppression, the treatment regimen of immunosuppression should be adjusted simultaneously.

Author contributions
Conceptualization: Ximing Qian.
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References
[1] Kaufmann B, Simpson Alan A, Rossmann Michael G. The structure of human parvovirus B19. Proc Natl Acad Sci U S A 2004;101:11628–33.
[2] Young Neal S, Brown Kevin E. Parvovirus B19: N Engl J Med 2004;350:586–97.
[3] Bisogno JD, Morgan MB, Lowes BD, et al. Acute parvovirus infection in a heart transplant recipient. Transplant Proc 1999;31:2159–60.
[4] Przybylowski P, Malyszko J, Malyszko JS. A possible role of hepcidin in the pathogenesis of anemia in heart allograft recipients. Transplant Proc 2010;42:1803–7.
[5] Carratuero A, Catalani V, Ottaviani D, et al. Parvovirus B19 infection and severe anemia in renal transplant recipients. Sci World J 2012;12:102829.
[6] Park JB, Kim D-J, Woo S-Y, et al. Clinical implications of quantitative real time-polymerase chain reaction of parvovirus B19 in kidney transplant recipients - a prospective study. Transpl Int 2009;22:455–62.
[7] Berton E, Rosati A, Zanazzi M, et al. Aplastic anemia due to B19 parvovirus infection in cadaveric renal transplant recipients: an underestimated infectious disease in the immunocompromised host. J Nephrol 1997;10:152–6.
[8] Eid Albert J, Brown Robert A, Patel R, et al. Parvovirus B19 infection after transplantation: a review of 98 cases. Clin Infect Dis 2006;43:40–8.
[9] Guo Y-M, Ishii K, Hironaka M, et al. CpG-ODN 2004 and human parvovirus B19 genome consensus sequences selectively inhibit growth and development of erythroid progenitor cells. Blood 2010;115:4569–79.
[10] Pinto Natalia C, Newman C, Gomez Carlos A, et al. Parvovirus B19-induced severe anemia in heart transplant recipients: case report and review of the literature. Clin Transplant 2019;33:e13498.
[11] Ramage JK, Hale A, Gane E, et al. Parvovirus B19-induced red cell aplasia treated with plasmapheresis and immunoglobulin. Lancet 1994;343:667–8.
[12] Crabol Y, Terrier B, Rozenberg F, et al. Intravenous immunoglobulin therapy for pure red cell aplasia related to human parvovirus b19 infection: a retrospective study of 10 patients and review of the literature. Clin Infect Dis 2013;56:968–77.