CASE REPORTS/CLINICAL VIGNETTES

Secondary Symptomatic Parvovirus B19 Infection in a Healthy Adult

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Parvovirus B19 is a common infection in adults and children. There are reports of secondary parvovirus infection in immunocompromised persons, but no reports of symptomatic secondary infection in healthy persons. We describe a healthy 39-year-old woman who presented with fever, rash, and arthralgia. Her symptoms were thought most compatible with parvovirus B19 infection, but she reported prior positive parvovirus antibody 2 years earlier during prenatal care. Tests were therefore also sent for HIV, streptococcal infection, hepatitis C, and Lyme disease. Testing revealed both elevated IgG and IgM antibodies for parvovirus B19; previously, the patient was positive only for IgG. On a subsequent visit she related that a community outbreak of parvovirus developed in her town and church group. We believe this case demonstrates that a symptomatic secondary infection with parvovirus can occur in healthy persons, and that prior positive antibody test does not preclude the development of acute infection.

KEY WORDS: secondary parvovirus; parvovirus; recurrent parvovirus.
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INTRODUCTION

Parvovirus B19 is the cause of erythema infectiosum, or Fifth's disease, in children. In adults, the clinical syndrome can include fever, rash, and symmetric peripheral arthropathy, and is generally self-limited. In patients with underlying chronic hemolytic anemia, transient aplastic crisis can occur. In immunocompromised patients, persistent infection can be associated with severe and persistent anemia.[1] Seroprevalence for parvovirus ranges from 2–15% in children ages 1–5 and from 30–60% in adults.[2] The presence of IgG antibody is thought to be protective and to correlate with a lower risk of infection based on a study in healthy volunteers, and some authorities recommend serologic testing to determine susceptibility to infection.[3,4]

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Secondary parvovirus B19 infection is reported in immunocompromised patients.[5,6] In both of these cases, there was no source of infection identified. Reactivation of latent virus in the setting of waning IgG antibody is likely given that persistent and relapsing viremia is described in immunocompromised patients.[7,8] Probable reinfection, rather than reactivation, is described in a young patient post renal transplant, who had contact with his parvovirus B19–infected mother. This child developed serologic evidence of secondary infection, but without clinical disease.[9] In this report, we describe a healthy patient who we believe developed a natural symptomatic secondary parvovirus B19 infection from reinfection.

CASE

A 39-year-old woman presented with 4 days of an erythematous rash on her extremities and torso, and 2 days of bilateral joint pain of the knees, ankles, feet, and wrists. Symptoms began 7 days before, with 3 days of a low-grade fever at 99–100°F, myalgia, fatigue, and a stiff neck for less than 1 day. She denied recent cold symptoms, but had a mild sore throat 3 to 4 weeks earlier. She was a homemaker in a monogamous relationship, used condoms for birth control, had regular menses, and denied vaginal discharge or pelvic pain. Her history included mild mitral regurgitation, anxiety, and HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count) with her first pregnancy; a subsequent pregnancy was uncomplicated. She never received intravenous immunoglobulin or blood products. Her only medications were fluoxetine and clonazepam.

On examination her temperature was 98.3°F, heart rate 70 and regular, blood pressure 104/53. Her neck was supple without meningismus, and her oropharynx, lungs, heart, and abdomen were normal. A diffuse maculopapular eruption with areas of confluence was present over her bilateral extremities, torso, and face. There were no vesicles nor was there involvement of the palms, soles, or mouth. Her joints had full range of motion without effusions, but there was a slight asymmetric warmth of her right wrist and left ankle. The diagnosis of parvovirus was discussed with the patient. She recalled that she had tested positive for parvovirus antibody 2 years previously during her pregnancy. She never had clinical symptoms, but her obstetrician had suggested testing for the antibody before a visit with an infected family member. Although her antibody was positive, she chose not to visit.

Table 1. Parvovirus antibody

	Parvovirus B19 IgM	Parvovirus B19 IgG
2 yr earlier	Negative	5.91
At presentation	4.53	2.69
2 wk later	8.43	4.24

Indexes are measured by enzyme immunoassay, and reported by the commercial lab as an index to allow comparisons between assays. The index value is the sample absorbance divided by a cutoff value determined by a calibrator sample absorbance and a lot-specific constant provided by the manufacturer. An index of 1.2 or greater indicates positivity.

Because of her history of a positive parvovirus antibody, a broad differential diagnosis was considered. Her erythrocyte sedimentation rate was 30 mm/hour, and CBC, ALT, AST, alkaline phosphatase, BUN, creatinine, urinalysis, EKG, and chest x-ray were normal. A throat culture for group A streptococcus, ANA, rheumatoid factor, hepatitis C, and Lyme antibodies were all negative. An antistreptolysin O antibody titer was minimally positive at 400–800 IU (ref. range <200 IU/ml). Her parvovirus B19 IgM and IgG antibody indexes are shown in Table 1, including those from 2 years prior that were ordered by her obstetrician. We repeated the tests 2 weeks later. All parvovirus B19 antibodies were measured by the same clinical laboratory using an enzyme immunoassay by Biotrin. Her ASO titer was repeated as well, and remained at 400–800 IU/ml. Because of reports of secondary parvovirus B19 infection in immunocompromised persons, she consented to an HIV antibody test, which was negative. She was treated with ibuprofen, and her symptoms completely resolved. During follow-up, she reported that there was a community outbreak of parvovirus B19 among children and adults in her town and church group.

DISCUSSION

We believe that this patient developed a secondary parvovirus infection. She was exposed to parvovirus in a community outbreak, developed a clinical syndrome consistent with parvovirus infection, and had an expected rise of IgM antibody. It is extremely unlikely that the initial IgG antibody preceding this patient's illness was a false positive. Although the current and previous antibodies were not measured simultaneously, internal kit testing by the manufacturer using control samples provided by the Center of Disease Control resulted in a specificity of 100%, with all of the negative samples being correctly identified by the IgG assay.[10] In addition, her original IgG index was high, and therefore unlikely to be the result of a nonspecific cross reaction to another IgG.

To our knowledge, natural secondary parvovirus B19 infection has not been reported in a healthy person. However, experimental reinfection was reported in one out of four healthy volunteers who were IgG-positive for parvovirus B19 before intranasal inoculation with human parvovirus. This volunteer had a low IgG antibody level at the time of inoculation. Clinical symptoms included fever, headache, and myalgia for 24 hours, but no rash nor arthralgia/arthritis. IgM antibody and low quantities of serum viral DNA were detected, and an early rise in the IgG antibody was seen.[3] Similar to this volunteer, our patient may have had waning IgG antibody to parvovirus B19, making her susceptible to the virus during a community outbreak. We believe that this secondary infection represents reinfection rather than reactivation as she is a healthy woman with no evidence of being immunocompromised and was exposed to the virus in her community.

This case is important in demonstrating that secondary infection with parvovirus B19 can occur in healthy persons, and that history of a positive antibody test may not represent current immunity. Therefore, a previous positive antibody should not dissuade clinicians from suspecting recurrent infection in a healthy person with the appropriate clinical presentation.

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REFERENCES

1. **Young NS, Brown KE**. Mechanisms of disease—parvovirus B19. N Engl J Med. 2004;350:586–97.
2. Center for Disease Control and Prevention. Current trends risks associated with human parvovirus B19 infection. MMWR Morb Mortal Wkly Rep. 1989;38(6):81–97.
3. **Anderson MJ, Higgins PG, Davis LR, et al.** Experimental parvoviral infections in humans. J Infect Dis. 1985;152:257–65.
4. American Academy of Pediatrics. Parvovirus B19. In: Pickering LK, Baker CJ, Overturf GD, Prober CG, eds. 2003 Red Book of the Committee on Infectious Diseases, American Academy of Pediatrics, 26th edition. Elk Grove Village, Il: American Academy of Pediatricians; 2003:459–61.
5. **Bremmer JAG, Beard S, Cohen BJ, Alimenti A, Cantiniaux B, Levy J.** Secondary infection with parvovirus B19 in an HIV-positive patient. AIDS 1993;7:1131–32.
6. **Weiland HT, Salimans MMM, Fibbe WE, Kluin PM, Cohen BJ.** Prolonged parvovirus B19 infection with severe anemia in a bone marrow transplant recipient. Br J Haematol 1989;71:299–304.
7. **Kurtzman GJ, Ozawa K, Cohen B, Hanson G, Oseas R, Young NS.** Chronic bone marrow failure due to persistent B19 parvovirus infection. N Engl J Med 1987;317:287–94.
8. **Kurtzman GJ, Cohen B, Meyers P, Amunullah A, Young NS.** Persistent B19 parvovirus infection as a cause of severe chronic anaemia in children with acute lymphocytic leukaemia. Lancet 1988;2:1159–62.
9. **Pillay D, Patou G, Griffiths PD, Rees L.** Secondary parvovirus infection in an immunocompromised child. Pediatr Infect Dis J 1991;10:623–24.
10. Biotrin International Ltd., Dublin Ireland. Test Kit Specifications for Parvovirus B19 IgM Enzyme Immunoassay and IgG Enzyme Immunoassay, US Patent No. 5,508,186 and 5,827,647. Dublin Ireland, Biotrin International Ltd.