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Brief Report

Incidental detection of parvovirus myocarditis at time of resection of discrete subaortic stenosis

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Abstract We report an asymptomatic 18-month-old boy who underwent surgical resection of the discrete subaortic stenosis. Histopathologic examination of the muscle demonstrated diffuse lymphocytic infiltration of the myocardium. Polymerase chain reaction analysis of blood demonstrated parvovirus. This report highlights that asymptomatic myocarditis may be more prevalent than we realise, and that involvement of the myocardium by parvovirus may be entirely asymptomatic.

Keywords: Parvovirus; myocarditis; viral infection of myocardium

MYOCARDITIS IS AN IMPORTANT CAUSE OF significant morbidity and mortality in children.[1] Viral aetiologies predominate, including adenovirus, coxsackievirus, parvovirus, cytomegalovirus, influenza A, Ebstein Barr virus, and respiratory syncytial virus. In the majority of cases, reported patients are symptomatic, although rare reports of asymptomatic disease secondary to mycoplasma, giant cell granulomatous disease, and eosinophilic myocarditis have been described.[2–3] The prevalence of asymptomatic myocarditis within the community remains unknown, and is difficult to study.

Case report

An asymptomatic 18-month-old boy was referred for evaluation because of a systolic murmur. Physical examination demonstrated an acyanotic boy in no respiratory distress. His brachial and femoral pulses were normal. There was a mild right ventricular heave. On auscultation there was a normal first and split second heart sound, with an ejection click but no gallop. There was a long harsh ejection systolic murmur best heard at the left lower sternal edge radiating to the left upper sternal edge. The chest was clear to auscultation, and there was no organomegaly on abdominal examination. Chest radiography was normal, and electrocardiogram demonstrated mild left ventricular hypertrophy. The echocardiogram demonstrated discrete subaortic stenosis, with a maximum instantaneous gradient of 50 millimetres of mercury across the left ventricular outflow tract. There was a bifoliate aortic valve, with slightly thickened leaflets permitting trivial regurgitation. The left ventricular systolic function was normal, with a shortening fraction of 34%. The myocardium also appeared normal. At 22 months of age, he underwent surgical resection of the discrete subaortic fibrous shelf under cardiopulmonary bypass. His family reported him to have had a febrile illness three months prior to his surgical procedure, but there was no rash associated with this illness or other illnesses directly prior to surgery. The resected specimen of myocardium was sent for histological evaluation.

Histological evaluation revealed a diffuse lymphocytic infiltrate in the myocardium consistent with viral myocarditis, but with no evidence of myocytic necrosis or fibrosis (Figs 1,2). He had no significant post-operative complications, was weaned from inotropic support on the day of surgery, and was extubated one day following surgery. He was discharged home one week after surgical intervention.

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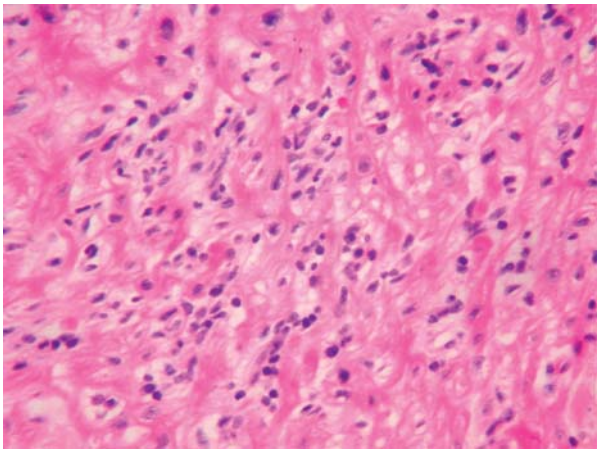

Figure 1.
Diffuse viral lymphocytic infiltration of the myocardium as demonstrated using haematoxylin and eosin.

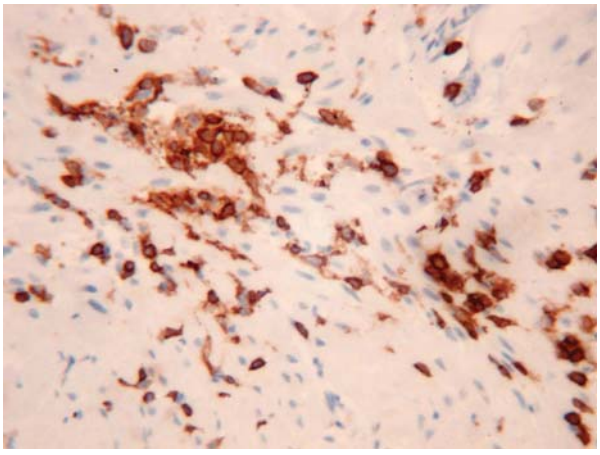

Figure 2.
The viral infiltration is confirmed using staining for common leucocyte antigen.

After consultation with our consultants in infectious disease, given that he was entirely asymptomatic, it was decided to forego treatment with intravenous immunoglobulin or steroids. Four months after surgery, he remains asymptomatic and transthoracic echocardiography demonstrates no obstruction with the left ventricular outflow tract, mild to moderate regurgitation across the aortic valve, and normal left ventricular systolic function.

Polymerase chain reaction detected parvovirus within the blood, which was immunoglobulin G positive. Immunoglobulin M was not detected, though repeatedly very low concentrations of parvovirus deoxyribonucleic acid was detected (160 international units per millilitre), which can persist many months after the resolution of acute infection. Polymerase chain reaction analysis of the blood and viral cultures were negative for coxsackie, adenovirus, influenza, parainfluenza, hepatitis and mumps viruses.

Discussion

Myocarditis occurs when the myocardium becomes inflamed, and can be the result of a wide spectrum of aetiologies, from infectious to toxic to autoimmune. Its true incidence is unknown, as many cases may be asymptomatic, and hence it has been difficult accurately to quantify the prevalence of myocarditis in children. In one study of 60,000 children seen at a paediatric emergency department for illness, acute myocarditis was diagnosed in 7 patients (0.012%).[1] Cases of asymptomatic myocarditis have been reported in association with mycoplasma, giant cell granulomatous disease, and eosinophilic myocarditis.[2–3] Previously, enteroviruses were considered responsible for up to half the cases of acute myocarditis, but the introduction of techniques of polymerase chain reaction to identify their presence in the blood or myocardium has resulted in their increased detection, particularly that of adenovirus.[4]

Parvovirus B19 has also been emerging as a new and important aetiology for myocarditis.[5] This virus is the only member of the parvoviridae family known to cause disease in humans. Infection with this virus is global, with rates of seropositivity among young children are as high as 15%, increasing to more than 85% of adults older than 70 years. Although roughly half of infections are asymptomatic in all children, manifestations of myocarditis due to parvovirus have taken fulminant and fatal courses in fully immunocompetent children, illustrating the spectrum of infection to be much wider and multifaceted than previously recognized. Pankuweit et al.[6] detected the parvovirus B19 genome in endomyocardial specimens in 7 of 36 patients with myocarditis, and it has also been implicated in post transplant graft rejection.[7]

Although injury to the myocytes in myocarditis may arise either directly through viral cytotoxicity or indirectly through immune targeting of infected cardiomyocytes, the myocardial cytoarchitecture is typically well preserved in patients known to have been infected by parvovirus.[8] Murray et al.[9] have proposed that parvovirus may initiate some kind of cross-reactive immunologic reaction that affects the heart. The mechanism of viral-induced myocarditis is not entirely understood, although studies have associated the dystrophin molecule and the coxsackievirus B-adenovirus receptor with myocarditis and cardiomyopathy.[5,8] While myocarditis is generally rarely reported after infection with parvovirus, it seems to be more common in infants as a result of inherent susceptibility to viral infection during the neonatal period and infancy, due to the delayed

maturation of the immune system. Options for treatment include steroids, immunoglobulin, or combination therapy, although in our patients we decided not actively to treat, given the asymptomatic presentation. One study[10] demonstrated comparable efficacy in terms of outcome in patients who received immunoglobulin, steroids, or both and those who were not treated.

To the best of our knowledge, ours is the first reported case of asymptomatic myocarditis due to parvovirus, and the second case of subaortic stenosis associated with myocarditis. The clinical course of the disease was benign and asymptomatic. In fact, myocarditis may never have been detected had this child not undergone surgical resection of the subaortic stenosis. Our experience highlights the fact that myocarditis may be under-recognized in the community. More importantly, it prompts the question why some children develop severe ventricular dysfunction in the setting of viral infection, whereas others, such as our patient, are entirely asymptomatic with well preserved ventricular function.

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