Cardiology in the Young (2017), **27**, 1644–1646
doi:10.1017/S1047951117000889

Brief Report

Remarkable improvement in mitral valve regurgitation in paediatric eosinophilic granuloma with polyangiitis

Niek E. van der Aa, Heynric B. Grotenhuis, Hans (J.) M. Breur

Department of Pediatric Cardiology, Wilhelmina Children's Hospital, University Medical Center, Utrecht, The Netherlands

Abstract We report the case of a 12-year-old boy who presented with acute heart failure due to newly developed mitral valve regurgitation. The boy's history combined with raised levels of inflammatory markers was suggestive of paediatric eosinophilic granuloma with polyangiitis. The echocardiographic course and rapid response to therapy are presented.

Keywords: Cardiomyopathy; echocardiography; treatment; contractile function; prednisolone

Received: 6 December 2016; Accepted: 8 April 2017; First published online: 29 May 2017

A 12-YEAR-OLD BOY WAS REFERRED TO OUR paediatric cardiology department because of a newly developed cardiac murmur and suspected heart failure. His medical history mentioned asthma and Asperger syndrome. A month before admission, he had spiking fever for 1 week that resolved spontaneously; 3 weeks later, he developed itchy hands and feet with purpura, and reported generalised malaise without fever. He was initially considered to have a viral infection, but when he also developed tachypnoea and dyspnoea, a new cardiac murmur, electrocardiographic abnormalities, and elevated C-reactive protein he was referred to our hospital for suspected endocarditis.

On admission, physical examination showed purpura on his chest, hands, and feet. He had tachypnoea and dyspnoea and a soft systolic murmur – best heard at the lower left parasternal border. Laboratory tests demonstrated elevated leucocyte (21×10^9/L), neutrophil (9.4×10^9/L), and eosinophil (5.6×10^9/L) counts as well as C-reactive protein (12.7 mg/dl), erythrocyte sedimentation rate (83 mm/hour), troponin (2672 ng/L), and B-natriuretic peptide (2627 pg/L). Electrocardiography showed low QRS voltages in the extremity leads, inverted T-waves in V5 and V6, and ST depression in leads II and V5–V6. Echocardiography revealed a fractional shortening of 13–16%, a thickened anterior mitral valve leaflet with severe mitral valve regurgitation with globally decreased left ventricular function, increased right ventricular pressure with tricuspid valve gradient of 35 mmHg, and mild dilatation of the left atrium (Fig 1a). Bacterial endocarditis was suspected, and intravenous antibiotics were initiated after blood cultures were obtained. Enalapril, furosemide, and spironolactone were added because of signs of pulmonary congestion due to severe mitral valve insufficiency.

Given the boy's history of asthma combined with purpura on presentation and the elevated eosinophil count of 5.6×10^9/L (reference 0–0.5×10^9/L), eosinophilic granulomatosis with polyangiitis was considered. On the 2nd day of admission, further increases in eosinophil count and troponin were observed, and prednisolone was started to treat a possible eosinophilic granulomatosis with polyangiitis. A skin biopsy revealed a leucocytoclastic vasculitis, and the Lanham criteria – asthma, peripheral blood eosinophilia, and a systemic vasculitis involving two or more

Corresponding author: N. E. van der Aa, MD, PhD, Department of Pediatric Cardiology, Wilhelmina Children's Hospital, University Medical Center, PO Box 85090, 3508 AB, Utrecht, The Netherlands. Tel: +31 88 7554002; Fax: +31 88 7555347; E-mail: n.vanderaa@umcutrecht.nl

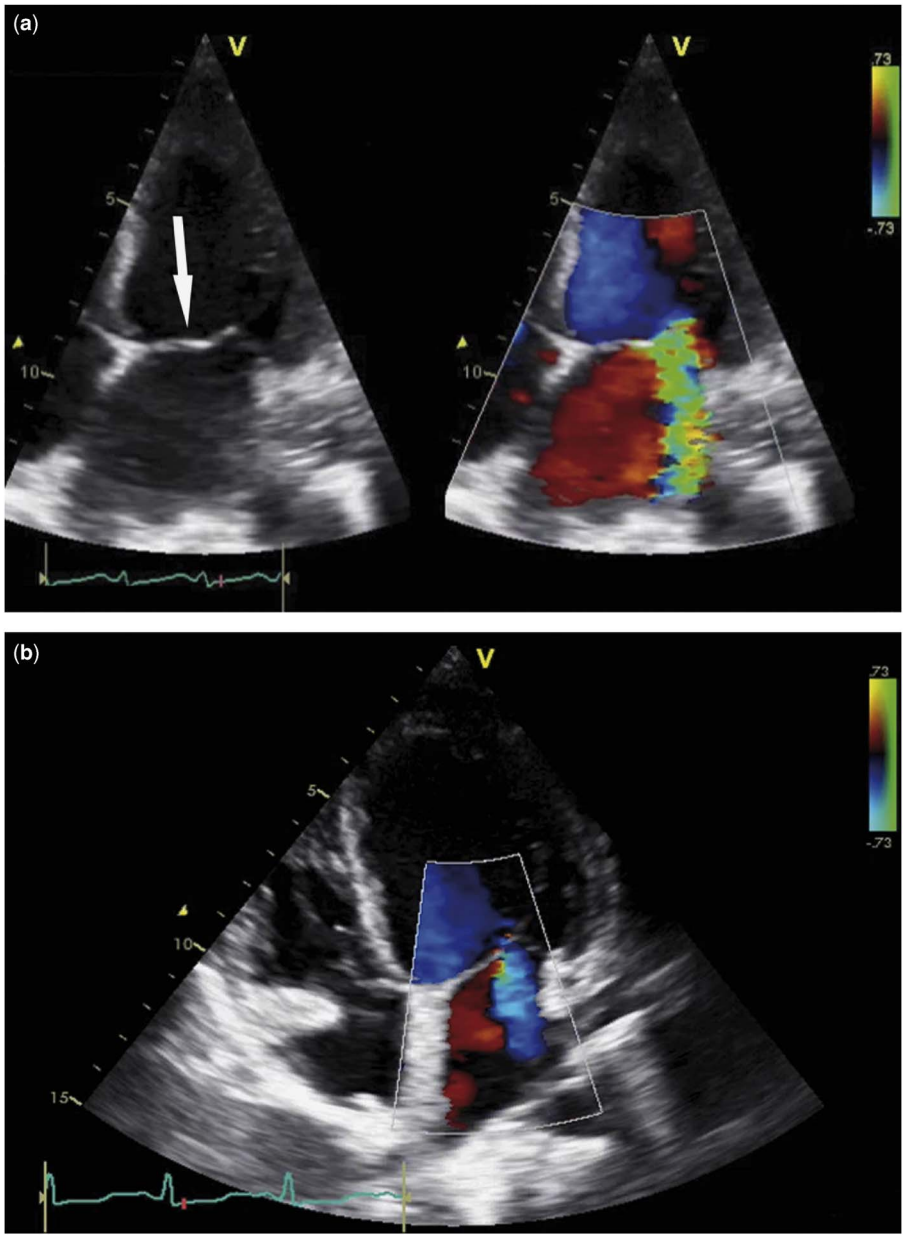

Figure 1.
*Echocardiography images with flow measurements acquired at admission (**a**) and on day 6 (**b**), 4 days after starting prednisolone. At admission, a thickened anterior mitral valve leaflet was observed (arrow). The severe mitral regurgitation that could be observed on admission decreased significantly at day 6.*

extrapulmonary sites – were met, leading to the diagnosis of eosinophilic granulomatosis with polyangiitis. The boy clinically improved on prednisolone with normalisation of laboratory results within the following days (Fig 2). Additional immunosuppression was started on day 4 using mycophenolate mofetil. The antibiotics were discontinued given the negative blood cultures and absence of fever. Cardiovascular MRI on day 5 of admission demonstrated reduced left ventricular ejection fraction (33%), left ventricular dilation, and delayed enhancement in the subendocardial region of the left ventricular wall. A small thrombus at the left ventricular apex was also observed, for which dalteparin and acenocoumarol were initiated. CT of the coronary arteries showed no evidence of stenosis. Echocardiography on day 6 after admission showed resolvement of the mitral valve thickening, improved left ventricular systolic function dimensions, and a significant reduction of the mitral valve regurgitation (Fig 1b). Given the rapid clinical and echocardiographic improvement, the boy was discharged and his clinical condition was monitored in the outpatient clinic. He was asymptomatic 2 weeks after his initial presentation, and echocardiography showed further

https://doi.org/10.1017/S1047951117000889 Published online by Cambridge University Press

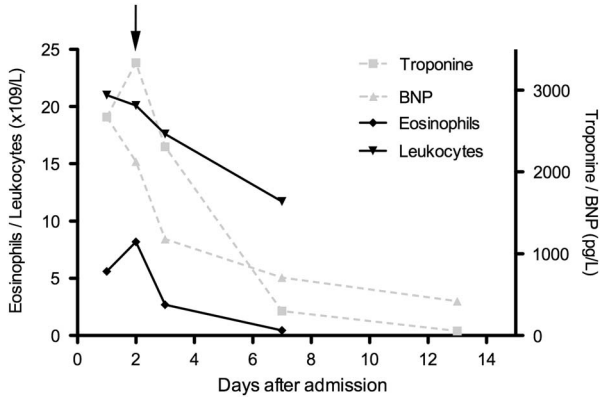

Figure 2.
Changes in eosinophils and leucocyte counts (black, on left y-axis) and troponin and B-type natriuretic peptide levels (grey, on right y-axis). B-type natriuretic peptide decreased after starting enalapril on admission. A decrease in troponin and eosinophil count can be observed after the start of methylprednisolone (arrow).

improvement in left ventricular function. His mitral valve insufficiency completely resolved with normalisation of left ventricular function and dimensions 6 weeks after presentation.

Discussion

Eosinophilic granulomatosis with polyangiitis – also known as Churg Strauss syndrome – is a condition with a much lower incidence in the paediatric population than in adults. According to the Chapel Hill vasculitis criteria, eosinophilic granulomatosis with polyangiitis is defined as an eosinophil-rich and necrotising granulomatous inflammation often involving the respiratory tract and necrotising vasculitis, predominantly affecting small- to medium-sized vessels. The disease classically starts with allergic rhinitis and asthma, followed by a phase of peripheral blood hypereosinophillia, ultimately resulting in systemic vasculitis. Extrapulmonary manifestations are common and affect the upper airways, gastrointestinal tract, musculoskeletal system, skin, kidneys, and central and peripheral nervous systems. In the case described here, the itchy hands and feet were probably secondary to a peripheral neuropathy. Cardiac abnormalities are more frequently observed in childhood eosinophilic granulomatosis with polyangiitis than in adults, and may include pericardial effusion, dilated cardiomyopathy, valvular insufficiency, ischaemia, and heart failure.[1] Little is known about the cardiac outcome after eosinophilic granulomatosis with polyangiitis, and echocardiographic follow-up studies are limited to adults.

A previous case report of an adult with eosinophilic granulomatosis with polyangiitis with cardiac involvement described eosinophilic infiltration of the endocardium and myocardial interstitium during the acute phase, resulting in dilated cardiomyopathy and valvular insufficiency.[2] Initial echocardiography in our case also revealed thickening of the anterior mitral valve leaflet, which may be explained by eosinophilic infiltration. Severe valvular insufficiency may require surgical valve replacement as described in a case series of adults with cardiac involvement.[3] In our paediatric case, the severe mitral regurgitation completely resolved after initiation of prednisolone – the mainstay therapy – without the need for surgical replacement. Long-term follow-up is advised, however, as the disease may flare up and cardiac manifestations are associated with increased mortality.[4]

Acknowledgements

None.

Financial Support

This research received no specific grant from any funding agency or from commercial or not-for-profit sectors.

Conflicts of Interest

None.

Ethical Standards

According to national guidelines, reporting an anonymous case requires no approval of the local institutional review board.

References

1. Gendelman S, Zeft A, Spalding SJ. Childhood-onset eosinophilic granulomatosis with polyangiitis (formerly Churg-Strauss syndrome): a contemporary single-center cohort. J Rheumatol 2013; 40: 929–935.
2. Terasaki F, Hayashi T, Hirota Y. Evolution to dilated cardiomyopathy from acute eosinophilic pancarditis in Churg-Strauss syndrome. Heart Vessels 1997; 12: 43–48.
3. Morgan JM, Raposo L, Gibson DG. Cardiac involvement in Churg-Strauss syndrome shown by echocardiography. Br Heart J 1989; 62: 462–466.
4. Eleftheriou D, Gale H, Pilkington C. Eosinophilic granulomatosis with polyangiitis in childhood: retrospective experience from a tertiary referral centre in the UK. Rheumatology 2016; 55: 1263–1272.