Mitral valve replacement in a 15-month-old infant with infective endocarditis

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Abstract

This report describes a 15-month-old child without particular heart problems, presenting prolonged high-grade fever, an impaired level of consciousness, right hemiparesis and cutaneous lesion on admission. Medication was started according to the initial diagnosis of bacterial or viral meningitis, however, congestive heart failure was suddenly observed 15 days after the admission. Echocardiography revealed a mass in the right atrium, and mitral valve regurgitation due to the irregularly thickened and aneurysmal anterior leaflet with a perforation, consistent with infective endocarditis. Mitral valve replacement with a mechanical prosthesis was performed and the postoperative course was uneventful.

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1. Introduction

Infective endocarditis (IE) in an anatomically normal heart is rare in childhood, especially in the first 2 years of life, and only a few cases have been successfully treated with surgery because of the difficulty of making a precise diagnosis in the early stage of the disease. This report reviews a rare case of a surgically treated IE of the mitral valve (MV) with a mass in the right atrium (RA).

2. Case

A 15-month-old boy was admitted to the Department of Neurology for prolonged high-grade fever, impaired level of consciousness, right hemiparesis, and rash. His past history included bronchial asthma and chickenpox at 10 months of age, but no previous congenital cardiac anomaly was mentioned. On admission, his body temperature was 40°C, and eczema in the extremities and petechiae on the body surface were noted. Respiratory and heart sounds were normal. Neurologically, drowsiness, apparent neck stiffness, and positive Babinski reflex were present. Laboratory findings were as follows: white blood cell; 15000/μl with leftward shift; c-reactive protein 7.6 mg/dl. Spinal fluid showed pleocytosis (cell count 254/μl with 75.7% neutrophils) without changes in total protein or glucose levels. An electroencephalogram was consistent with the decreased level of consciousness, and computed tomography (CT) of the brain showed only slight edema of the cortex. Bacterial or viral meningitis was strongly suspected, and ampicillin and acyclovir infusions were immediately started, but high-grade fever persisted. Fifteen days after admission, a heart murmur was noticed and his condition deteriorated rapidly. Echocardiography revealed a mass in the RA (Fig. 1), and the anterior leaflet of the MV was irregularly thickened and aneurysmal with a perforation, causing massive regurgitation. These results confirmed the diagnosis of IE. His hemodynamic and infectious status were stabilized, and surgery was performed 28 days after admission. Intraoperatively, a mass of about 2 cm was attached to the free wall of the RA with a broad basement next to the inferior vena cava (Fig. 2). The anterior leaflet of the MV was almost completely replaced with vegetation, and also already fibrotic and aneurysmal in the mid-scallop accompanying perforation. MV replacement using a 18 mm ATS valve prosthesis (ATS Medical, Inc., Minneapolis, MN) and resection of RA mass were performed, and his postoperative
course was uneventful. Histopathological study revealed that the mass was a thrombus consisting of a platelet component, without evidence of infection. The resected valves were disruptive and focally fibrotic with inflammatory change, but the examination failed to demonstrate any organisms. None of the cultures examined throughout the course, including resected MV and thrombus, revealed any growth of microorganisms. A series of brain CT scans later proved multiple micro-embolisms in the left posterior hemisphere, which could explain the neurological findings on admission. As for postoperative anticoagulation, warfarin was offered, and prothrombin time-International normalised ratio (PT-INR) was controlled between 2.0 and 2.5.

3. Discussion

Generally, IE in an anatomically normal heart is rare in small children, and its reported incidence has been about 0.2% in autopsy or 0.8% in children with sepsis. Because of its very low incidence and nonspecific clinical appearance, it is often difficult to make a definite diagnosis in the early stage of the disease, and to our knowledge only two cases that have been successfully treated with surgery have been reported in the literature [1,2]. On admission, this patient might have already had IE of the MV with multiple microembolisms. The rash could be consistent with the symptoms, but the interval from onset must have been so short that brain CT could not detect the related lesions. The neurological findings, leukocytosis, and spinal fluid findings were so outstanding that the possibility of meningitis instead of endocarditis was strongly suggested at the referral point. Although we failed to demonstrate growth of microorganisms nor histologic evidence of any organism from the resected samples, the clinical course strongly suggested the diagnosis of culture-negative endocarditis [3]. Minor morphologic abnormalities of valves may have some relation (e.g. aneurysmal change of the MV in this case). Such subtle changes often have little clinical significance, but sometimes they may be the result of IE. Therefore, it is difficult to clarify their actual contribution to the disease. Use of a central venous (CV) catheter is often mentioned as a common cause for preceding sepsis in IE of small children. This patient received 10 days of CV catheter insertion in which the tip reached deep into the RA. It is natural to consider this as having a possible relation to the thrombus formation. However, the mass revealed no evidence of infection, which suggests that prolonged use of the CV catheter may have had less impact on this disease entity than we considered, and the preceding infection itself was important.

Finally, the results of MV replacement in small children, especially in the neonate, are still not satisfactory [4], however, surgical treatment must be considered a treatment of choice in this disease with a definite diagnosis in the early stage and careful selection of patients.

References

Appendix A. ICVTS on-line discussion

**Author:** Dr. Theodor Tirilomis, University Göttingen, Thoracic, Cardiac, and Vascular Surgery, Robert-Koch-Str. 40, 37075 Göttingen, Germany

**Date:** 03-Apr-2003 08:40

**Message:** This very interesting case shows clearly how important careful clinical examination is and especially across different medical specialties. Despite improved outcomes, infective endocarditis in children remains a very serious condition. In the presented case there was no previous history of cardiac disease. However, were the described aneurysmal changes of the anterior mitral valve leaflet a result of infective endocarditis or could it have preexisted, in the sense of dysplasia of mitral valve?

The results of mitral valve replacement in small children are indeed still not satisfactory, although in the current era operative risk is low and survival prospects have improved substantially over the last decade (Christou A, Galogavrou M, Chen Q, McDonald A, Salmon AP, Keeton BK, Haw MP, Monro JL. Mitral valve replacement with mechanical prostheses in children: improved operative risk and survival. Eur J Cardiothorac Surg 2001; 20:105-113). Continuous anticoagulation treatment, management of possible complications (e.g. thrombembolism, recurrent infection), or late reoperations for "outgrowing" are important restrictions. Nevertheless valve surgery may save the life of these small patients with infective endocarditis.

Additionally I would like to address some questions to the authors regarding antibiotic management: were blood cultures taken after echocardiographic diagnosis of infective endocarditis, changed antibiotic treatment after diagnosis of infective endocarditis, and which was the antibiotic treatment after surgery?

**Response**

**Author:** Dr. Aya Saito, University of Tokyo, Cardiothoracic Surgery, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan

**Date:** 06-Apr-2003 04:49

**Message:** The questions posed are what we have also wondered about.

First of all, the question of whether the aneurysmal change in the anterior scallop of the mitral valve was a result of infective endocarditis or preexisted. The resected valve was highly fibrotic as well as aneurysmal, and so we strongly believe this change to be a result of inflammation due to infection in this case, though we cannot clearly prove it. It might be difficult to identify the incidence of minor cardiac anomaly which produces no symptoms, and this case seems to belong to this kind of disease category.

Second, the question on the antibiotic therapy. Because the symptom on admission was so compatible with meningitis and the initial culture was only taken for spinal fluid, Ampicillin administration was started immediately, followed by Gentamicin, Cefazidime, and Panipenem/Betamipron (PAPM/BP). The series of culture study including blood culture revealed negative probably because of the continuous use of antibiotics, however, PAPM/BP was clinically effective. PAPM/BP was continued during perioperative period, and Amikamycin (AMK) was also added postoperatively.

I hope that these comments will help for a better understanding of this case.