Pulmonary artery vegetation in a pediatric patient with ventricular septal defect: a case report

Haryo Aribowo
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Thoracic and Cardiovascular Surgery Division, Department of Surgery, Faculty of Medicine, Universitas Gadjah Mada/Dr. Sardjito General Hospital, Yogyakarta, Indonesia

ABSTRACT

Infective endocarditis (IE) is one of the congenital heart disease complications which is frequently seen in ventricular septal defects (VSD). The Duke criteria are the diagnostic criteria for IE. One of the major criteria is evidence of vegetation. In VSD complicated with IE, vegetation is frequently found on the opening of the defect, on the right ventricular side of the opening, on the tricuspid valve, and less frequently it is found on the pulmonary valve. Vegetation found in the lumen of pulmonary artery is rarely reported. In this article, we reported a rare case of pulmonary artery vegetation in a boy with moderate VSD and treated with combination of parenteral antibiotic followed by successful surgical vegetation evacuation and VSD closure. A 6 years old boy was consulted with congenital heart disease. His chief complaint was shortness of breath. He came with unspecific signs and symptoms with a history of frequent hospitalization due to pneumonia and paleness. Chest X-ray showed enlargement of heart chambers. Transthoracic echocardiography (TTE) revealed moderate size VSD and multiple vegetation on right ventricle outflow tract, pulmonary artery valve, and inside the lumen of main pulmonary artery and right pulmonary artery. The blood culture showed a positive result for *Streptococcus viridans*. He was treated with parenteral antibiotic and operated on later. We successfully performed evacuation of the vegetation and VSD closure.

ABSTRAK

INTRODUCTION

Infective endocarditis (IE) is one of the congenital heart disease complications. Incidence of IE is approximately 0.05-0.12 case/1000 patients/year.\(^1\) IE is found in 60% of congenital heart disease cases, and 14% of them are ventricular septal defects.\(^2\) The Duke criteria are used to establish IE diagnosis. Vegetation is one of the major diagnostic criteria for infective endocarditis.\(^3,4\) Vegetation is defined as an intra-cardiac mass composed of microorganisms (bacterial or fungal) and surrounded by layers of platelet/fibrin which are attached to the endothelium.\(^5\) In cases of VSD complicated with IE, vegetation is frequently found on the opening of the defect, on the right ventricular side of the opening, on the tricuspid valve and the less frequently it is on the pulmonary valve. Vegetation found in the lumen of pulmonary artery is rarely reported.\(^6\) In this article, we reported a rare case of pulmonary artery vegetation in a pediatric patient with a ventricular septal defect.

CASE REPORT

A 6 years old boy was consulted to thoracic and cardiovascular surgery division of Dr. Sardjito General Hospital, Yogyakarta with congenital heart disease. The patient’s chief complaint was shortness of breath. There was a history of paleness, frequent cough and cold, weight loss, and fatigue/intolerance to exercise. Those symptoms were reported since he was 2 years old and worsened in the past week. There were also several histories of prior hospitalization due to pneumonia and anemia. On physical examination, blood pressure was 83/46 mmHg, heart rate was 116 bpm, respiratory rate was 32x/minutes, and there was no febrile. On auscultation, there was inconstant S2 split and grade 4/6 pansystolic murmur in the left parasternal line. Other physical exams showed no abnormality. Chest x-rays showed cardiomegaly with enlargement of the left atrium and ventricle (FIGURE 1). Transthoracic echocardiography revealed a perimembranous VSD with the size of 1.4 cm with multiple vegetation and moderate tricuspid regurgitation. The vegetation was located on the right ventricle outflow tract (RVOT), pulmonary artery valve, and inside the lumen of the main pulmonary artery (MPA) and the right pulmonary artery (RPA) (FIGURE 2 and 3). Vegetation on the pulmonary artery valve was moving into the main pulmonary artery at the systolic phase. Blood culture was done following the TTE finding which suggested the diagnosis of IE. The blood culture result showed a growth of *S. viridans* and was tested sensitive to ampicillin and ceftriaxone.
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FIGURE 1. Chest x-ray showed enlargement of the heart with cardiac-thoracic ratio >0.5

FIGURE 2. Transthoracic echocardiography showed moderate size of VSD. RV: right ventricle; LV: left ventricle; RA: right atrium; LA: left atrium; VSD: ventricular septal defect.

FIGURE 3. Vegetation inside the lumen of main pulmonary artery and RVOT. AO: aorta; MPA: main pulmonary artery; RVOT: right ventricular outflow tract
The diagnosis of IE was established regarding the Duke criteria. We found two major criteria of IE: positive blood culture and evidence of vegetation. A final diagnosis of VSD, IE of RVOT and the pulmonary artery valve with the involvement of MPA and RPA, and moderate tricuspid insufficiency was considered. Due to the IE, intravenous antibiotic treatment was given. He was treated with intravenous ampicillin (50 mg/kg/day) and gentamycin (3 mg/kg/day) for 4 weeks. We evaluated the patient after the antibiotic therapy, and dyspnea was less than before, blood culture was negative for any pathogens, however, some remaining vegetation was still to be found on pulmonary artery valve and main pulmonary artery. We switched the antibiotics to ceftriaxone (50 mg/kg/day) for 2 weeks and gentamycin (3 mg/kg/day) for 3 days. On the TTE evaluation, the vegetation was not significantly reduced and tended to be permanently attached. Later on, we decided to do surgical evacuation due to no significant reduction in size and the mobility of the vegetation.

The VSD was closed through the median sternotomy approach. Superior vena cava, inferior vena cava, and aorta were cannulated and connected to a cardiopulmonary bypass machine. Cardioplegic agent was administered and the heart became asystole. First incision was made on the pulmonary artery, where we found multiple vegetation with size varied between 2-5 mm. The remaining vegetation in the pulmonary valve and pulmonary artery was manually evacuated. We found perimembranous VSD with diameter of 14 mm. We performed VSD closure using a GoreTex patch sewn to the rightward aspect of the defect. We closed the heart and placed a pericardium drain.

### DISCUSSION

We found IE with pulmonary artery involvement, which is rarely to be found. Once it exists, it is most likely to be associated with pulmonary artery valve endocarditis. Isolated pulmonary valve endocarditis and pulmonary artery endarteritis is a very rare condition. IE pathogenesis involves pathogen access to the systemic blood flow, endothelial damage, and formation of vegetation which may become an emboli and flow to other site. In this study, the patient has VSD as a risk factor for developing IE. Children with congenital heart disease (CHD) have a greater risk for developing IE, with 42% of pediatric IE cases reported with CHD as an underlying disease. VSD is the third most common defect among patients with IE, after cyanotic CHD and Atrium septal defect. The abnormal hemodynamic from the heart defect shunting may cause injury to the endothelial layer and provide suitable medium for bacterial colonization resulting in IE.

We found nonspecific complaints related to IE in this patient. One study shows various clinical presentations of pediatric IE, where it is classified into two categories, subacute and acute. Subacute IE shows low grade fever and nonspecific symptoms such as fatigue, arthralgia, myalgia, weight loss, fatigue/exercise intolerance, and diaphoresis, while Acute IE shows rapidly progressive disease with high fever and severely ill appearance. However, low-grade fever is only present in 3-15% of patients.

The murmurs on specific locations that we found in this case were suggestive to be caused by the VSD and tricuspid regurgitation. Murmurs were also found in 80% to 85% of IE patients as a sign of valvular regurgitation. Other signs of IE such as Osler’s nodes, Janeway lesions, and Roth spots are rarely to be found. We used TTE in order to observe the
vegetation in the heart and pulmonary artery. TTE is a diagnostic modality used in detecting the presence of vegetation in pediatric patients with IE. TTE had a mean sensitivity of 97% for the detection of vegetation in pediatric patients. Vegetation is further defined as an echogenic mass adhering to the wall or valve leaflet with different characteristics from the remaining original heart tissue. In this case, we found the vegetation extended from the right ventricular outflow tract, to the pulmonary artery. The characteristic of the vegetation is best described as tending to extend from the heart defect into the upstream chamber after the defect.

We found no complications related to the presence of vegetation in the pulmonary artery. However, prior research shows it may cause pulmonary hypertension, lung embolization, and pulmonary artery dissection which increases the patient’s morbidity and mortality rate. In this case, we found positive blood culture result for *S. viridans*. Blood culture is one of the major Duke criteria for IE. The causative pathogen is found in 86% of IE cases, and the most frequently found pathogens are gram-positive bacteria. The remaining are fungi and gram-negative bacteria. In community-acquired IE, *Streptococcus viridans* is the most isolated bacteria, followed by *S. aureus*. Other causative pathogens are classified into the HACEK group which consists of *Haemophilus spp*, *Aggregatibacter spp*, *C. hominis*, *E. corrodens*, and *Kingella spp*. Our finding is concordant with a prior study which states that *S. viridans* infection manifests as subacute IE.

We administered a combination of antibiotics followed by surgical therapy in this patient. Intravenous antibiotic therapy should be started as soon as IE diagnosis is established, and it should be administered for at least 4 weeks and may be continued to 6-8 weeks. Continuing the antimicrobial treatment despite the negative blood culture is reasonable as a prophylactic against reinfection. Surgical interventions are a secondary therapy in IE. The right timing to perform surgical intervention in IE is still controversial, however, earlier intervention should be considered in order to reduce the risk of severe complications and improves patient prognosis. Surgical interventions in IE include: removal of vegetation, repair of damaged heart tissue, and correction of the abnormal structure.

**CONCLUSION**

We reported a rare case of pulmonary artery vegetation in a boy with moderate VSD that we treated with a combination of parenteral antibiotics followed by successful surgical vegetation evacuation and VSD closure.

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**REFERENCE**


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