

Possible Infective Endocarditis in 14 Years Old Male with Atrial Septal Defect and History of Rheumatic Heart Disease in Southwest Sumba: A Case Report from Remote District Hospital

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Abstract: Background: Infective endocarditis (IE) is a rare disease in children. The epidemiology of IE has shifted in recent years with congenital heart disease (CHD) as the common predisposed risk factor than rheumatic heart disease (RHD). While its incidence is low, it may cause serious complications such as heart failure to death. Case illustration: Fourteenth year-old male presented to emergency room with high fever history and unquantified weight loss. Patient was in the treatment history of RHD. Physical examination detected pansystolic murmur at the cardiac apex area with a fixed splitting of S2. The electrocardiograph showed a Katz-Wachtel phenomenon. On the 10th day of medication, patient was referred to cardiology department of West Sumba to perform an echocardiography. Etiological investigation revealed a secundum atrial septal defect, mitral, aortic and tricuspid regurgitations with 6 x 9 mm vegetation on the anterior mitral leaflet. A possible IE was made based on the modified Duke criteria. Ceftriaxone as the single antibiotic and heart failure therapy was administered although no blood culture was performed because of facility limitation in hospital. Patient showed an improved clinical condition and chooses conservative therapy as the next treatment program due to socio-economic limitations. Discussion: Left-sided cardiac valves regurgitation with an ASD is a rare condition, this can occur due to RHD in predisposed IE with vegetation as the hallmark lesion. Treatment of IE depends on specific antibiotic activity based on the blood cultures results. The newest recommendation showed Ceftriaxone as bactericidal antibiotics has better effect than bacteriostatic and preferred in combination for determining the standard duration's therapy. Conclusions: Infective endocarditis should be suspected in febrile children with history of cardiac disease and single antibiotic therapy as ceftriaxone showed a good progression in treatment of IE although no blood culture was performed in remote area.

Keywords: Infective endocarditis, congenital heart disease, atrial septal defect, rheumatic heart disease

1. Introduction

Infective endocarditis (IE) is an infection of the endocardium that can be caused by bacteria, viruses or fungi. The incidence of IE is 0.43/ 100.000 child-years.¹ This condition made IE in children less common than adults.² While its incidence is low, it may cause serious complications like heart failure to death.³ The risk factors for IE, include congenital heart disease (CHD), rheumatic heart disease (RHD), and hospital-acquired bacteremia.¹ Congenital heart disease becomes the most risk factor for IE in children and unpaired CHD has higher morbidity risk. Predicted mechanism is the presence of blood turbulence that damages the endocardium wall causing the formation of matrix-protein complex that trigger bacterial colonization.⁴ We report case of a 14 years old male presenting symptoms of IE with ASD and history of RHD.

2. Case Presentation

A fourteenth year-old Indonesian boy was referred to our hospital with a history of fever from 5 days before with other symptoms like dyspnea, palpitation, anorexia, and unquantified weight loss. Previously, the patient often felt short of breath and tired quickly while doing heavy activities. His medical history was RHD with no routine control to the hospital because of socio-economic reasons.

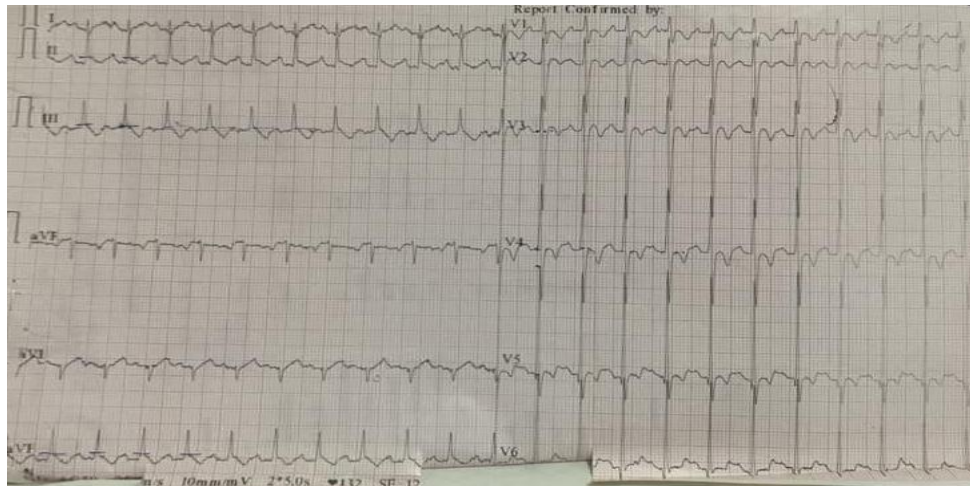
His parents denied any history of illness in the family. At the time of presentation to our facility, The Glasgow coma scale (GCS) E4V5M6. On the physical examination, the pulse rate was 132x/min, respiration rate was 36x/min, and the axilla temperature was 39° Celsius. Auscultation was the presence of bibasilar rales with pansystolic murmur Grade 4/6 at the region of cardiac apex and fixed splitting of S2. Other physical examination was found redness appearance Janeway lesion on his palm.

Electrocardiograph (ECG) showed a sinus tachycardia with Katz-Wachtel phenomenon (biphasic QRS complexes in the precordial leads) suggest biventricular hypertrophy (**Picture 1**). Haematological count revealed an infection and anemia (White blood cell: 15.38 x 10³/uL, Haemoglobin: 8.2 gr/dL, granulocyte dominant at 71.9%). Urinalysis, malaria, and dengue tests were not significant results. On chest X-ray showed a cardiac enlargement (71.9%), a rounded apex, enlarged left atrial appendage, double contour (+), with pulmonary oedema. Echocardiography showed a secundum ASD with 20 mm of diameter, moderate mitral regurgitation (MR), severe tricuspid regurgitation (TR), mild aortic regurgitation (AR), and high probability of pulmonary hypertension (PH). In the left ventricular chamber, there is a spontaneous echocardiographic contrast with 6 x 9 mm vegetation at the anterior mitral leaflet (**Picture 2**). No

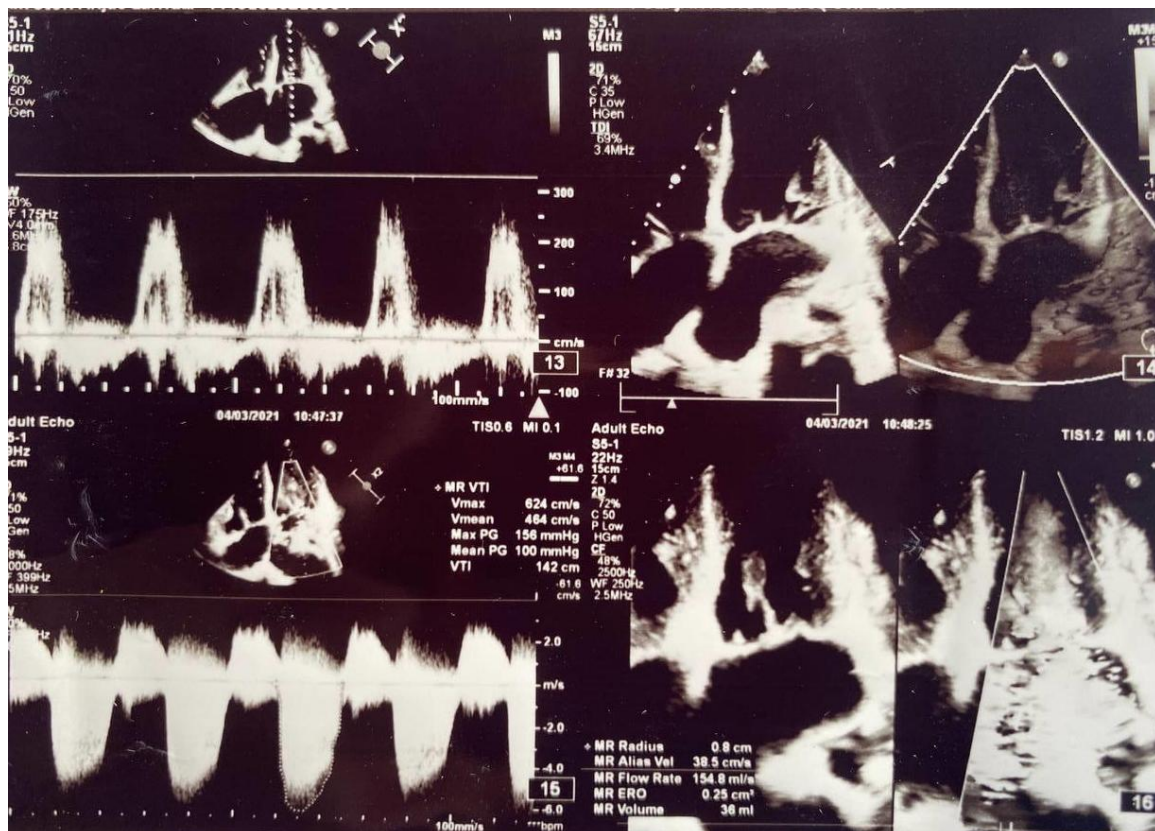
blood culture was performed due to equipment limitation in our hospital.

Patient was diagnosed with possible endocarditis infective with ASD. A treatment regimen of Ceftriaxone 1 gr intravenous (IV) twice daily was administered. Other regimen therapy includes furosemide 30 mg (IV) twice

daily, paracetamol 300mg (IV) third daily, captopril 12.5 mg twice daily, digoxin 0.125 mcg twice daily, and spironolactone 25 mg twice daily. The patient was observed for 4 weeks. The patient was scheduled for echocardiography evaluation and surgery intervention after the IE was treated, but the parent was refused because of the cost and socio-demographic limitation.



Picture 1: The ECG showed biventricular hypertrophies



Picture 2: The TTE showed ASD with vegetation and mitral regurgitation

3. Discussion

Rheumatic Heart disease and CHD increases the risk of IE in children.³ From the last decade, epidemiology of IE changes based on demographic characteristics and the risk factor. Previous research in developing countries showed an increased incidence of IE was 4.6/100.000 people.⁵ This infection pathogenesis was the result of interaction

between blood pathogens, matrix protein, and platelets on the damaged endocardium layer.⁶ When CHD is present, different pressures of each chamber cause a blood turbulence that will damage endocardium or valvular tissue, which will trigger formation of a matrix protein complex. This complex area contains fibrin and platelets that bind each other, named non-bacterial thrombotic endocarditis (NBTE). This form predisposed microbial

adherence leading into bacterial colonization and invasion triggering an infection of endocardium.^{4,6,7}

Bacteremia may originate from other sites, such as intravenous procedure (skin), gingival crevices, oropharynx, urethra, and the gastrointestinal tract.⁶ Besides CHD, RHD also increases the risk of IE.¹ Although CHD and RHD are not directly related to each other, both conditions were the common risk factor of IE. Most cases are caused by Gram positive bacteria such as *Staphylococcus aureus* (40%), and *Streptococcus spp.* (35%).⁸ Gram negative HACEK group bacteria (*Haemophilus aphrophilus*, *Actinobacillus*, *actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens*, and *Kingella kingae*) cause 16% of cases.⁴ In the developing countries, incidence of infection *Staphylococcus* increases and leads to the common cause of IE.⁵

Infective endocarditis should be suspected in abnormal cardiac condition patients with presenting fever and newly presenting congestive heart failure (CHF). A prompt diagnostic workup includes blood cultures, inflammation parameter determination, and echocardiography,⁴ which are required for diagnosis of IE based on modified Duke criteria.^{4,9} From the modified Duke criteria, IE was divided into 3 different categories (definitive IE, possible IE, and rejected IE) based on major and minor criteria.⁹ From this case, the patient was diagnosed with possible IE because one of the major and three minor criteria. As the major criteria finding, vegetation was a hallmark lesion of IE, with 75% in sensitivity on transthoracic echocardiography (TTE) and 90% on transoesophageal echocardiography (TOE).¹⁰ Transthoracic echocardiography is the first line imaging modality of the suspected IE.¹¹ From the minor criteria, the patient felt high fever more than 38°C, patient on treatment of rheumatic heart disease and we found erythema lesion like Janeway lesion on his palm. Auscultation showed a pansystolic murmur at the area of cardiac apex. Echocardiography showed vegetation at the mitral valve and a secundum ASD with mitral valve regurgitation

Other echocardiography findings such as MR could help the clinicians to detect IE. However, MR from the case, is thought to be due to RHD because of left-sided cardiac valves regurgitation. Mitral regurgitation is rarely present with ASD, even its present, can be due to acquired from RHD, especially in developing countries.¹²

No blood culture was performed in this case, because our facility in limited area. Blood cultures play an important role for the treatment of IE to specific antibiotics activity. However, in some cases, negative results often occur because of administered antibiotics before the test was performed.⁷ Bactericidal antibiotics have a better outcome than bacteriostatic activity. As the treatment of IE, Beta-lactam groups such as Ceftriaxone are the therapeutic options and duration of the treatment depends on combinations of two antibiotics. Ceftriaxone 2 gr/ day (child doses 100 mg/ kg/ day) have standard therapy for 4 weeks (Class I, level B). But, the combination of Ceftriaxone with other (Gentamicin or Neomycin) have

shorter standard therapy for 2 weeks (Class 2, level B).⁹ The patient was administered Ceftriaxone as a single empirical antibiotic that handles both Gram-positive and Gram-negative bacteria.

From the newest recommendation, they recommended to focus mainly on dental and oral hygiene rather than antibiotics prophylaxis in preventing IE. Recommendation of antibiotics prophylaxis may be considered to the highest-risk group (previous IE, unrepaired cyanotic CHD, prosthetic material or device during 6 months after the procedure, repaired CHD with residual defect at the site, and recipients of cardiac transplants) before certain dental procedures. The patient cardiovascular histories would be important information for healthcare to determine their part of treatment program.² Patient was scheduled for an echocardiography evaluation and surgical therapy, but of the socio-economic limitation, the parents refused them and choice conservative treatment as the next option therapy. Patient was planned with anti-failure therapy and erythromycin 250 mg twice daily for the secondary prevention of recurrence acute rheumatic fever. During the conservative treatment, the patient showed good progression and became more stable.

4. Conclusion

Infective endocarditis should be always suspected in febrile children with abnormal cardiac conditions. Rheumatic Heart Disease is the most common predisposing factor for IE in children. Diagnosis is based on modified Duke criteria based on symptoms, together with new echocardiographic alterations. Specific antibiotics therapy is the basis for standard durations of treatment. Finally, the most important key is prevention, based on dental as oral hygiene and antibiotics prophylaxis prior to high-risk invasive procedures.

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