INTERNAL MEDICINE

□ CASE REPORT □

Enormous Pedunculated Vegetation Originating in the Left Ventricular Apex in a Patient with Infective Endocarditis

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Abstract

A healthy teenage Japanese girl was admitted to our hospital after experiencing out-of-hospital cardiac arrest. She had attempted to commit suicide by taking 4,950 mg of disopyramide and 12 mg of flunitrazepam. Mechanical cardiopulmonary support was started with percutaneous cannulation of the femoral vessels. Several days later, a blood culture tested positive for *Staphylococcus aureus*. Transthoracic echocardiography showed a large mobile and solid mass attached to the apical part of the left ventricle. To the best of our knowledge, the anatomical location of a pedunculated mass originating from the apex is a rare condition.

Key words: disopyramide intoxication, venoarterial extracorporeal membrane oxygenation, infective endocarditis

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Introduction

Venoarterial extracorporeal membrane oxygenation (VA-ECMO) can maintain hemodynamic stability in the absence of an intrinsic cardiac rhythm or effective cardiac output and provide excellent mechanical circulatory support in such urgent or emergent situations. VA-ECMO has been shown to be effective in patients with secondary cardiac failure due to drug overdose (1, 2). Although VA-ECMO is a strong tool in such patients, several complications, including infection, can occur. We herein report the rare appearance of a vegetation in a patient treated with VA-ECMO.

Case Report

A healthy teenage Japanese girl was admitted to our hospital after experiencing out-of-hospital cardiac arrest. She had attempted to commit suicide by taking 4,950 mg of disopyramide and 12 mg of flunitrazepam, which was prescribed to her mother (she was diagnosed with paroxysmal atrial fibrillation). Her friend discovered her unconscious and not breathing. Effective cardiopulmonary resuscitation was promptly commenced, and a laryngeal mask was inserted by paramedics. The patient was then transported to our hospital. On admission, her initial cardiac rhythm was cardiac arrest. She was intubated, and sinus rhythm with wide QRS was restored after the administration of adrenaline 3 mg and atropine 1 mg as adjuvants. A large-volume gastric lavage followed by activated charcoal was performed to eliminate the drugs. Despite medical therapy with intravenous catecholamine, her cardiac function deteriorated with the left ventricular ejection fraction decreasing to 13%. To provide mechanical cardiopulmonary support, the patient was cannulated for VA-ECMO into the right femoral artery (17 Fr cannula) and vein (21 Fr cannula) percutaneously using the Seldinger technique. An intra-aortic balloon pump (IABP) and catheter for continuous hemodiafiltration (CHDF) and direct hemoperfusion were introduced into the left femoral artery and left internal jugular vein, respectively.

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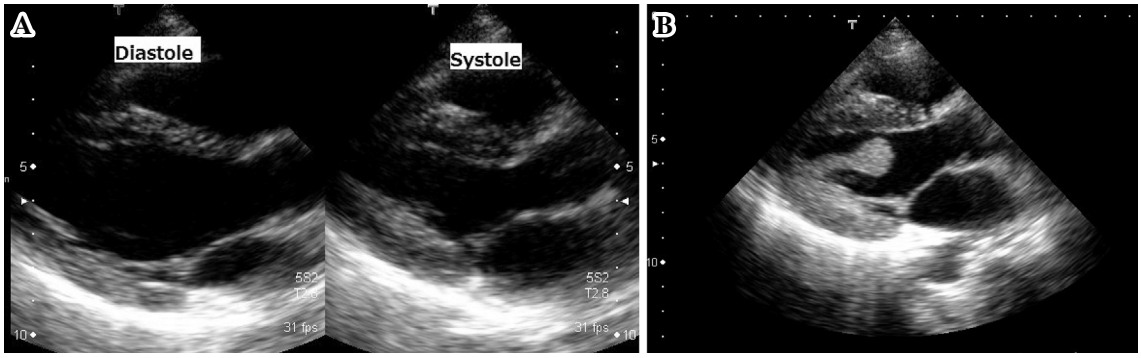

Figure 1. **Transthoracic echocardiogram. A: A parasternal long-axis view on the 2nd hospital day. B: A parasternal long-axis view showing a large vegetation attached to the apical part of the left ventricle.**

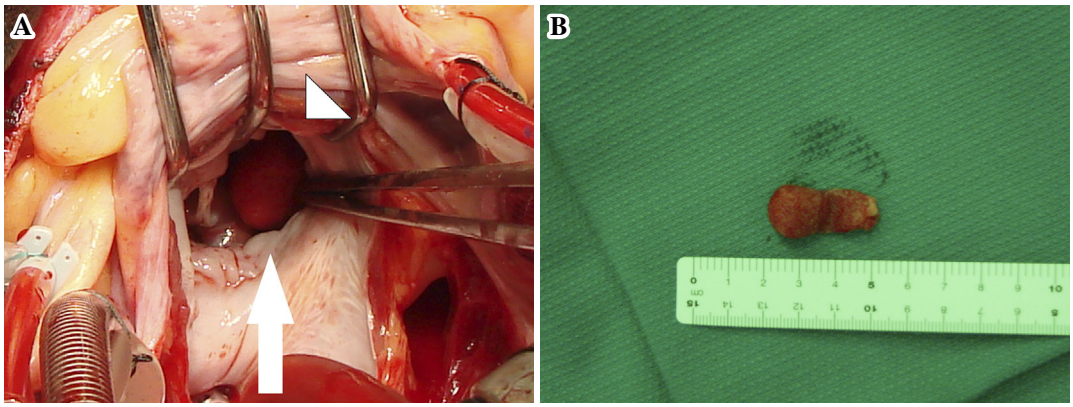

Figure 2. **A: The arrow shows a vegetation that developed from the left ventricular endocardium. The arrowhead shows the mitral valve. B: Macroscopic findings of the 3 cm long vegetation.**

The activated clotting time was maintained at 150-200 seconds. Subsequently, the electrocardiography (ECG) improved to narrowing of the QRS complexes. The next day, transthoracic echocardiography (TTE) showed that her cardiac function had gradually improved without any valvular abnormalities (Fig. 1A). Intensive cardiac support was effective, and the patient's cardiac function recovered. However, a fever developed (38.3°C) on the 3rd hospital day. After the patient was weaned from VA-ECMO, the femoral artery and venous cannulae were surgically removed and the cannulation sites were repaired. The IABP and catheter for continuous CHDF were also removed. Blood cultures were subsequently performed, and vancomycin was administered. After obtaining the blood culture results, which were positive for methicillin-sensitive *Staphylococcus aureus* (*S. aureus*), we switched the antibiotic to cefazolin. Despite intravenous antibiotics, the fever persisted and the C-reactive protein level and white blood cell count increased to 28.95 mg/dL and 17,200/μL, respectively. Ten days later, TTE showed a large mobile and solid mass attached to the apical part of the left ventricular apex without any valvular abnormalities (Fig. 1B). A diagnosis of endocarditis associated with sepsis due to *S. aureus*, and an oscillating intracardiac mass documented by an echocardiogram was made according to the modified Duke's criteria (3). Gentamicin was subsequently added as a standard therapy of infectious endocarditis, and the patient underwent urgent surgery (Fig. 2A). A pedunculated mass originating from the apex of the left ventricle was exposed and excised with a substantial portion of the normal myocardium (Fig. 2B). After the operation, the patient was treated for 4 weeks with intravenous antibiotics (2 weeks of vancomycin (2 g/day), and 2 weeks of cefazolin (4 g/day) and gentamicin (180 mg/day), which were suitable for methicillin-sensitive *S. aureus* after the pathologic specimen confirmed *S. aureus*) and had an excellent clinical response.

Discussion

Bleeding, hemolysis, and infection are common complications that contribute to VA-ECMO-related morbidity and mortality. The overall infection rates in temporary mechanical circulatory support are as high as 30-40% (3). Immobilization, a poor nutritional status, and indwelling catheters and tubes are all likely to contribute to the high incidence of infection. The risk of endocarditis is largely confined to pa-

tients with prolapse, thickened valve leaflets (>5 mm), and mitral regurgitation (4). We considered three important factors in the development of vegetation at the apex of the left ventricle. The first factor is endothelial damage. A healthy cardiac endothelium is generally resistant to frequent bacteremia caused by daily activities (5). Endothelial damage at the apex increases a patient's risk of developing bacteremia. Sepsis itself (direct bacterial activity, particularly from *S. aureus*) also causes endothelial damage (6). The second factor is arrest time. The arrest time was around 8 minutes in this case. Endothelial damage can occur after as little as 8 minutes of ischemic duration. The apex is easily injured when the coronary flow is decreased because it is in a peripheral area. The third factor is circulation using VA-ECMO, especially in patients with cardiac arrest. VA-ECMO allows gas exchange and hemodynamic support while the blood is pumped from the venous system close to the right atrium on the atrial side (femoral artery). Therefore, during cardiac arrest, little blood flow reaches the left ventricle, which makes it easy to form a vegetation in the left ventricle. The vegetation formed in the apex of the left ventricle in our patient. Prophylactic antibiotics are not always administered prior to cannulation in urgent cases, as the focus is on saving the patient's life. Additionally, the patient was afebrile 2 days after cannulation. The administration of antibiotics should be considered in cases in which repeat cannulation is required.

In conclusion, we herein reported a patient with infective endocarditis in which a vegetation formed at the apex of the left ventricle. Our findings showed that prophylactic antibiotics should be administered to patients treated with VA-ECMO.

The authors state that they have no Conflict of Interest (COI).

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