A Rare and Life-Threatening Complication of Infective Endocarditis: Pseudoaneurysm of the Mitral – Aortic Intervalvular Fibrosa

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A 59 year-old previously healthy male was admitted to the hospital with fever reportedly several days in duration. His physical examination was unremarkable at first. Pneumonia was initially diagnosed, but acute pulmonary edema with a new grade III to and fro murmur developed 1 week later. Transesophageal echocardiography (TEE) disclosed a pseudoaneurysm of the mitral-aortic intervalvular fibrosa (P-MAIVF). Subsequent consultation with a cardiovascular surgeon resulted in a repaired aorta with otherwise uneventful results. P-MAIVF is a very rare complication of prosthetic aortic valve (AV) infective endocarditis, and even in native AV. Therefore a careful and through physical examination of patients and early TEE examination are essential in this rare complication of infective endocarditis.

Key Words: Echocardiography • Infective endocarditis • Mitral-aortic intervalvular fibrosa • Pseudoaneurysm

INTRODUCTION

Pseudoaneurysm of the mitral-aortic intervalvular fibrosa (P-MAIVF) is a rare but serious complication of infective endocarditis (IE).1,2 In prosthetic or rare native aortic valve IE, bacteria may spread to the aortic ring, which can lead to ring abscess. If there is a delay in diagnosis or treatment, the bacteria may invade into the fibrous tissue between the mitral and aortic valve and cause P-MAIVF. Complication of P-MAIVF includes several catastrophic results, such as rupture into the left atrium or aorta, cardiac tamponade or even sudden death. In this report, we discussed an IE patient with acute aortic regurgitation and pulmonary edema, where P-MAIVF was diagnosed by transesophageal echocardiography (TEE) and successfully repaired by surgery.

CASE REPORT

A 59 years-old previously healthy male was admitted to the hospital complaining of fever for four days accompanied by progressive shortness of breath. On physical examination, his blood pressure was approximately 130/84 mmHg, pulse rate was 95/min and body temperature was 38 °C. Bilateral low lung field fine crackle was noted on auscultation, but no audible murmurs or signs of systemic emboli. The patient’s chest x-ray disclosed increased infiltration on both sides with lung fields and without enlarged cardiac silhouette. The results of laboratory testing showed leukocytosis (white cell count: 15300/μL) and deteriorated liver function (GOT: 80 U/L, GPT: 123 U/L). Working with a diagnosis of community acquired pneumonia, after three sets of blood culture were obtained, the patient was started on penicillin in-
travenous injection treatment. However, a blood culture report disclosed staphylococcus aureus infection 1 week later. There were no specific risk factors of IE including drug abuse or history of dental procedure. Additionally, focus transthoracic echocardiography (TTE) was performed without providing any significant finding.

However, high fever persisted after antibiotic treatment and a new onset grade III to and fro murmur developed on the right upper sternal border after 1 week of antibiotic treatment. TTE disclosed moderate to severe aortic regurgitation and mitral regurgitation, but no vegetation was seen. Working with a strongly suspected IE, TEE was performed which showed no vegetation on cardiac valves, but did reveal dilated sinus of valsalva and a pseudoaneurysm formation between the aorta and left atrium (LA) (Figure 1). The pseudoaneurysm had a communication with left ventricular outflow track, with marked pulsating systolic expansion and diastolic collapse (Figure 1A, B, Figure 2). Under the diagnosis of P-MAIVF, a cardiovascular surgeon was consulted for surgery. During the surgical procedure, an aortic root annulus abscess and a huge pseudoaneurysm (3 × 3.5 cm) over the left and non sinus of Valsalva with a stalk attached to the aortic root were noted. The surgeons then performed aortic valve replacement, mitral valve repair and aorta reconstruction. A second set of blood cultures were positive for oxacillin-sensitive staphylococcus. After successful operation and antibiotics treatment, the patient was discharged uneventfully.

DISCUSSION

The presence of aortic valve endocarditis is common with involvement of the aortic annulus, particularly in patients with prosthetic valves, bicuspid, unicuspid aortic valve (AV) or patients with a history of intravenous drug abuse; such invasion is typically associated with worse prognosis. The damage caused by aortic valve endocarditis can lead to destruction or perforation of the leaflet, ring abscess, and perivalvular regurgitation; less commonly the regurgitation itself may result in secondary damage to subaortic structures, such as mitral-aortic intervalvular fibrosa (MAIVF) and anterior mitral leaflet (AML). MAIVF is an avascular structure between the non-, left coronary cusps and AML. It plays an important role in maintaining the geometry and function of both valves, but can be easily infected by bacteria and lead to abscess formation. In rare cases, the bacteria spread from AV to nearby MAIVF and leads to

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**Figure 1.** In parasternal long axis view showed dilated sinus of Valsalva and abscess formation (A) with marked pulsatile systolic expansion (B) and diastolic collapse (A). In short axis view showed eccentric aortic regurgitation over non and left coronary cusps (C). Multi-detector computed tomography (MDCT) confirmed a 3 × 4 cm pseudoaneurysm of the mitral-aortic intervalvular fibrosa (P-MAIVF) with connection to the left ventricle outflow track (D. Left panel in systolic phase, right panel in diastolic phase).

**Figure 2.** Multi-detector computed tomography disclosed a pseudoaneurysm with a stalk attached to sinus of Valsalva, and communicating with aorta. (A, C: pseudoaneurysm in diastolic phase, B, D: pseudoaneurysm in systolic phase). Ao, aorta; LA, left atrium; LV, left ventricle; PE, pleural effusion; RV, right ventricle.
serious complication including abscess or aneurysm formation, perforation into the LA, AML aneurysm and perforation. There are scant case reports and reviews that have been published discussing this rare complication of AV infective endocarditis. Afridiet et al. reported a total of 20 cases (2%) of P-MAIVF out of 818 cases suspected of infective endocarditis over a 5-year period. Most of the cases in these series had prosthetic or congenital abnormality of AV before MAIVF abscess. Only 2 cases (0.24%) involved infection of native AV which resulted in P-MAIVF.

In our case, a previously healthy older male patient without valvular heart disease developed P-MAIVF after fever for 1 week, and mitral valve anterior leaflet was also involved by directly bacteria invasion. TEE provided higher resolution than TTE in the diagnosis. The pulsatile feature of the pseudoaneurysm with systolic expansion and diastolic collapse suggested communication with the left ventricle. The pulse phenomenon is the major difference between P-MAIVF and aorta abscess, in which pulsatility is absent.

Early diagnosis of this rare complication of AV IE may prevent further catastrophic results, including rupture into the aorta or LA. In patients with persistent high fever with aortic valve lesion, including stenosis, regurgitation or prosthetic valve, careful examination by way of TTE or TEE is essential. Aortic annulus ring abscess or small aneurysm may be an early sign of P-MAIVF.

At presence, surgery is the first line recommended treatment due to possible complications, such as fistula formation and coronary artery compression. Prior to surgery, 3-dimensional TEE, magnetic resonance imaging or multi-dimensional computed tomography may provide additional information.

CONCLUSIONS

P-MAIVF is a rare complication of IE, which is typically caused by trauma, cardiac surgery or prosthetic valve implantation. However, a delay in diagnosis can lead to devastating outcome. Therefore, echocardiographic examination focused on subaortic structures and anterior mitral valve leaflet is essential. In case of suspected aortic root or base of AML abscess, TEE is the first choice for further evaluation. Aorta parasternal long axis view by TTE or longitudinal view by TEE imaging can easily identify the extra space between LA and aorta; the pulsatile feature of the space provides a further strong hint of this rare condition. Therefore, if there was space disclosed in the MAIVF, a diagnosis of IE with P-MAIVF should be considered.

REFERENCES