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Case Report
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Manouguian Patch Repair for Pseudoaneurysm of Mitral-aortic Intervalvular Fibrosa

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SUMMARY

Pseudoaneurysm of the mitral-aortic intervalvular fibrosa (MAIVF) is a rare complication of native aortic valve endocarditis. Herein we report the case of a patient with infective endocarditis of aortic and mitral valves complicated with perforation and pseudoaneurysm formation of MAIVF. After extensive debridement, double valve replacement was done with reconstruction of MAIVF with Manouguian patch.

Key words : double valve replacement, infective endocarditis, Manouguian patch, pseudoaneurysm of mitral-aortic interventricular fibrosa,

INTRODUCTION

Pseudoaneurysm of the mitral-aortic intervalvular fibrosa (MAIVF) is a rare but serious complication of infective endocarditis. We report a case with infective endocarditis of aortic and mitral valves complicated with pseudoaneurysm of MAIVF, which required extensive debridement, double valve replacement and reconstruction of aorto-mitral continuity with Manouguian patch.

CASE REPORT

A 76-year-old man with persistent fever and weight loss for 4 months was admitted to our institution for detailed examination for possible malignancy

in the hematology department. Because multiple blood cultures were positive for *Streptococcus mutans* and transthoracic echocardiography (TTE) revealed large vegetations on the aortic and mitral valves, he was immediately referred to our department.

The electrocardiogram (ECG) showed normal sinus rhythm with normal voltage. Transesophageal echocardiography (TEE) revealed severe aortic regurgitation due to prolapse of right coronary cusp and mobile vegetations attached to all the three leaflets, the largest one measuring 9×3 mm (Fig. 1a-c). There was an abnormal space behind left and noncoronary cusps (Fig. 1a-c). Mitral valve had mild regurgitation with a mobile vegetation measuring 18×5 mm on A2 segment (Fig. 1c). ECG-gated contrast-enhanced computed tomography (CT) revealed an abnormal cavity between aortic root and left atrium (Fig. 1d), which was suspected to be a pseudoaneurysm of MAIVF.

Under cardioplegic arrest the aorta was opened through oblique incision and all three cusps with vegetations were completely removed. The vegetation was found to be extended to the anterior mitral leaflet

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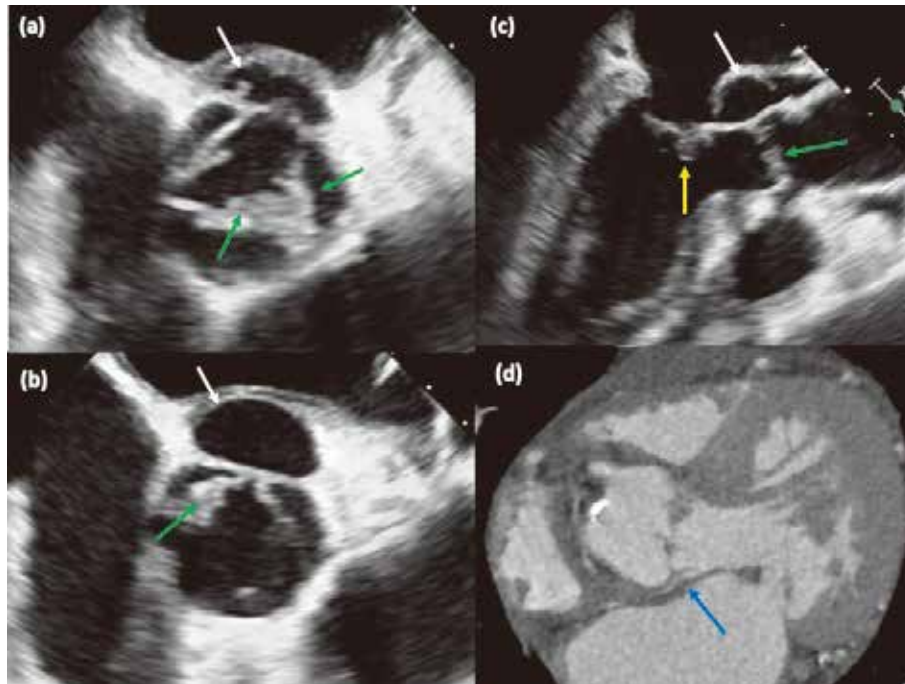


Fig. 1

(a, b, c) Transesophageal echocardiography (TEE) demonstrated an abnormal space behind non and left coronary cusps of the aortic valve (white arrow). Vegetations attached to all the three leaflets (green arrow). (c) The anterior mitral leaflet on the LV side had a large and mobile vegetation (yellow arrow). (d) Electrocardiogram-gated contrast-enhanced CT demonstrating a perforation site at mitral-aortic intervalvular fibrosa (blue arrow).

(AML) over the MAIVF, and there was a hole in MAIVF just below the commissure between left and noncoronary leaflets (Fig. 2a). Through this hole, there was a communication between left ventricular outflow tract (LVOT) and a pseudoaneurysm developed in a space between aortic root and left atrium. There was also a huge vegetation and perforation on AML. Oblique aortic incision was extended to MAIVF and AML, and all the infected tissues including pseudoaneurysm, aortic and anterior mitral annulus, and AML were resected (Fig. 2b). A long teardrop shaped patch was made with bovine pericardium, and the anterior mitral annulus was reconstructed using the lower edge of this teardrop patch (Fig. 2c). A mitral bioprosthesis (Mosaic 27mm, Medtronic, Minneapolis, MN, USA) was sutured intraannularly using pledgetted mattress sutures (Fig. 2d). MAIVF, aortic annulus, and aortic wall was also reconstructed with this same patch (Fig. 2e), and an aortic bioprosthesis (Mosaic Ultra 23mm, Medtronic, Minneapolis, MN, USA) was

sutured on a supra-annular position using pledgetted mattress sutures (Fig. 2f). The aortotomy was closed using this patch with running sutures.

The patient had an uncomplicated postoperative recovery and was discharged home after one-month of antibiotics administration.

COMMENT

Aortic valve endocarditis can lead to destruction or perforation of the leaflets, ring abscess, fistula or perivalvular regurgitation; less commonly, the regurgitation itself may result in secondary damage to subaortic structures. Pseudoaneurysm of the MAIVF is a rare complication of native aortic valve endocarditis. This entity is defined as a pseudoaneurysm at the inter-annular zone between the mitral and aortic valves and its communication with the LVOT between the left coronary or noncoronary aortic cusp and the anterior leaflet of the mitral valve¹⁾. The MAIVF is a fibrous structure between the aortic and

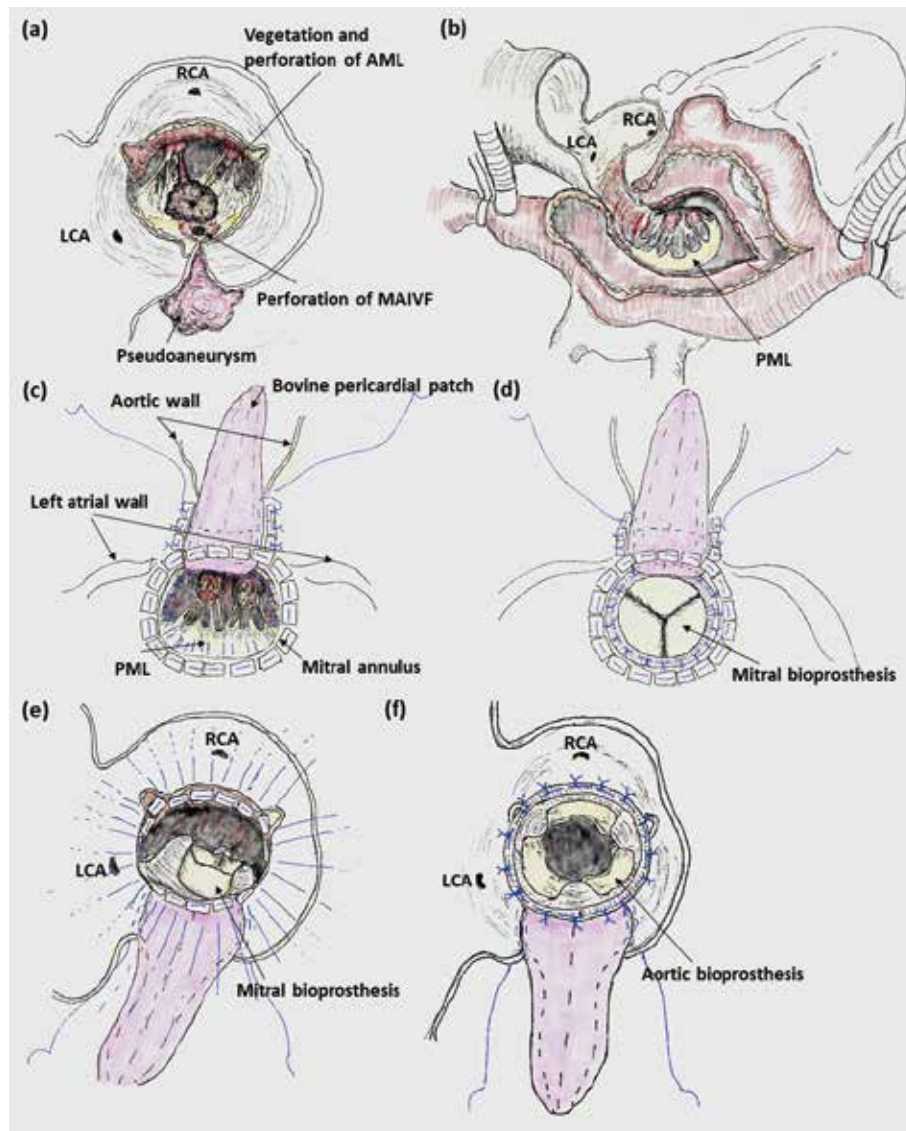


Fig. 2

Schema of operative findings. (a) View of the left ventricular outflow tract after resection of the aortic valve. Perforation of mitral-aortic intervalvular fibrosa (MAIVF) and pseudoaneurysm formation was seen. Huge vegetation and perforation were found on the anterior mitral leaflet. Aortotomy was extended to MAIVF. (b) Mitral valve was approached through trans-septal approach. All the infected tissues including pseudoaneurysm, aortic and anterior mitral annulus, and anterior mitral leaflet (AML) were resected. Posterior mitral leaflet (PML) was preserved. (c) A long tear-drop shaped patch was made, and the mitral annulus was reconstructed. (d) Mitral bioprosthesis was sutured intra-annularly. (e) MAIVF and aortic annulus were also reconstructed with the same patch. (f) Aortic bioprosthesis was sutured supra-annularly.

mitral valves where the anterior mitral leaflet becomes continuous with the noncoronary cusp of the aortic valve. Its relative avascular nature makes it prone to infection and injury resulting in pseudoaneurysm formation. Staphylococci and Streptococci are the most common agents responsible for pseudoaneu-

rysm of MAIVF¹⁾. The most common clinical presentation is related to symptoms and/or signs of infection from active endocarditis. Enlargement of the pseudoaneurysm may lead to compression of adjacent structures including the left atrium, coronary arteries, and the pulmonary artery. Once a pseudoaneurysm devel-

ops, it is prone to rupture. Such a rupture may occur in the pericardium, resulting in cardiac tamponade and death²⁾; in the left atrium, resulting in an eccentric jet of mitral regurgitation; or in the aorta, resulting in a fistula connecting the left ventricle to the ascending aorta³⁾.

Surgery is currently the recommended treatment to prevent further enlargement and complications¹⁾. Aortic valve replacement was used in most patients in conjunction with some type of pseudoaneurysm repair, which varied from simple aneurysmal mouth closure to using pericardial⁴⁾ or synthetic graft over sewn for reinforcement¹⁾. In the present case, all the structures surrounding MAIVF, i.e., aortic valve, aortic annulus of the noncoronary cusp, MAIVF, anterior mitral annulus, and anterior mitral leaflet, were involved in the infection. Although complete and extensive debridement of the infected lesion is the fundamental principle for cardiac surgeons in infective endocarditis, it is very difficult to determine the appropriate procedure for patients with multiple infected lesions including MAIVF. A monobloc aorto-mitral homograft would be a good option in such cases⁵⁾ but it is not commercially available in Japan. The use of a monobloc mechanical⁶⁾ or bioprosthetic⁷⁾ valve, which should be prepared before cardiopulmonary bypass, has also been reported. Double valve replacement with patch enlargement of both aortic and mitral annulus was initially reported as a technique of double valve replacement for patients with small aortic and mitral annulus⁸⁾. The patch used to cover the oblique aortic incision extended to MAIVF and AML is called Manouguian patch⁸⁾, and in this case, we utilized a single pericardial sheet as this patch. Application of this technique was quite simple and easy to reconstruct the heart after aggressive debridement of all the infected tissues surrounding MAIVF.

In conclusion, we reported a case with infected endocarditis of aortic and mitral valves complicated

with pseudoaneurysm of MAIVF. Double valve replacement along with reconstruction of aorto-mitral continuity using Manouguian patch was a good option.

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