

**Case  
Report**

# Prosthetic Valve Endocarditis after Double Valve Replacement with the Manouguian Procedure

Tamaki Takano, MD, Takamitsu Terasaki, MD, Kohei Takahashi, MD, Yoshinori Ohtsu, MD, Yuko Wada, MD, Daisuke Fukui, MD, and Jun Amano, MD

**Prosthetic valve endocarditis is a rare but severe complication after double mitral and aortic valve replacement. It is debated whether or not all prostheses should be replaced simultaneously, because of high operative mortality with redo double valve replacement. We report a case of prosthetic valve endocarditis after double mitral and aortic valve replacement with the Manouguian procedure. A 56-year-old man had undergone double valve replacement 12 years prior and presented with high fever 2 months after dental treatment. Enterococcus faecalis was isolated from blood cultures twice. Transthoracic echocardiography showed perivalvular mitral regurgitation, but no vegetations or abscess. Transesophageal echocardiography revealed an abscess on the aortomitral continuity of the Manouguian patch. We removed all previous prostheses and performed redo aortic and mitral valve replacements with a repeat Manouguian procedure. The postoperative course was satisfactory. Precise preoperative evaluation by transesophageal echocardiography and radical removal of the infected prostheses resulted in successful treatment.**

**Keywords:** prosthetic valve endocarditis, Manouguian procedure, double valve replacement, transesophageal echocardiography

## Introduction

Prosthetic valve endocarditis (PVE) is a rare but severe complication after prosthetic valve replacement, with an incidence rate of less than 0.5% and a mortality rate of 30%–50%.<sup>1)</sup> Emergency surgery for PVE in patients with double mitral and aortic valve prostheses is considered a challenging procedure with a high mortality rate, and single valve replacement of the involved prosthesis is recommended.<sup>2)</sup>

We report a case of PVE after double mitral and aortic

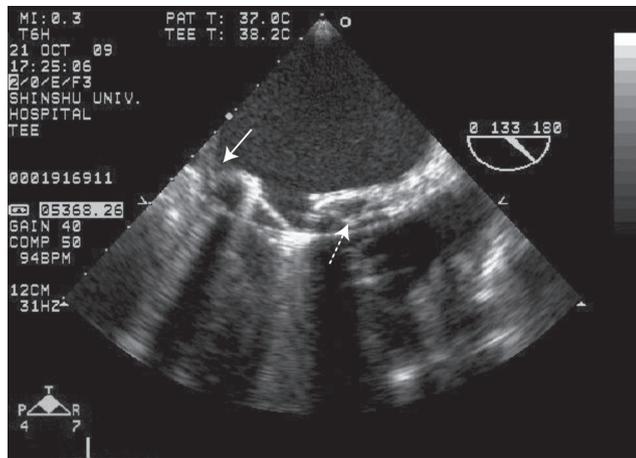
valve replacement with the Manouguian procedure, in which transesophageal echocardiography (TEE) findings indicated a need for emergency redo mitral and aortic valve replacement with a repeat Manouguian procedure.

## Case Report

A 56-year-old man had undergone double aortic and mitral valve replacement (Carbomedics23A, 29M; Sorin SPA, Milano, Italy) with the Manouguian procedure 12 years prior, for aortic and mitral stenosis with a small aortic annulus. He had been treated for a carious tooth 4 months prior, and 2 months prior he had presented with a temperature of >38°C. Enterococcus faecalis was isolated from blood cultures on two occasions, even though complete blood count and C-reactive protein were normal. Transthoracic echocardiography (TTE) showed moderate perivalvular mitral regurgitation, but did not detect vegetations on the prosthetic valves or valve annuli. He was admitted to hospital for administration of intravenous penicillin G,

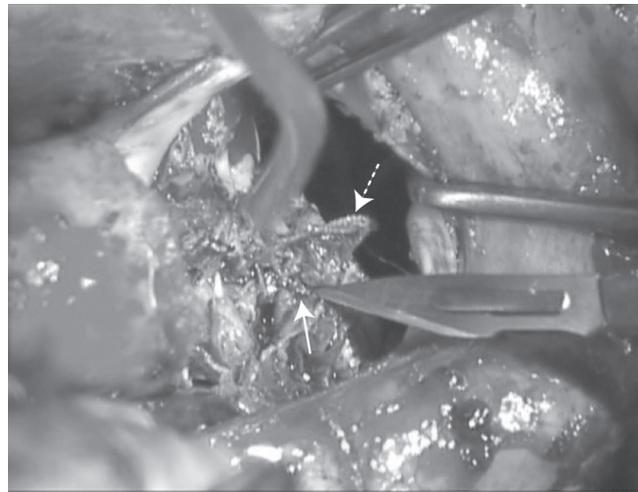
*Shinshu University School of Medicine, Department of Cardiovascular Surgery, Matsumoto, Nagano, Japan*

Received: January 25, 2012; Accepted: February 20, 2012  
Corresponding author: Tamaki Takano, MD. Shinshu University School of Medicine, Department of Cardiovascular Surgery, 3-1-1 Asahi, Matsumoto, Nagano 390-8621, Japan  
Email: ttakano-ths@umin.ac.jp  
©2012 The Editorial Committee of *Annals of Thoracic and Cardiovascular Surgery*. All rights reserved.



**Fig. 1** TEE showed dehiscence of the prosthetic mitral valve (white arrow) and an annular abscess of the aortic valve (broken arrow).

gentamycin, dopamine, dobutamine, and human atrial natriuretic peptide, and repeat mitral valve replacement was scheduled for 1 week later. On the day after admission, he was intubated due to exacerbation of heart failure. TEE revealed mitral valve detachment, severe mitral regurgitation, and an abscess of the aortomitral continuity of the Manouguian patch (**Fig. 1**). Emergency surgery was performed. Cardiopulmonary bypass (CPB) was initiated with cannulation of the ascending aorta and bicaval cannulation, the ascending aorta was cross-clamped, and an aortotomy was made on the Manouguian Dacron patch. No vegetations were found on the aortic prosthesis or the aortic annulus, but valve dehiscence had occurred and an abscess was found at the Dacron patch as seen on TEE before surgery (**Fig. 2**). We excised the Dacron patch and aortic prosthesis en bloc. Dehiscence of the mitral valve prosthesis was also observed at the posterior annulus, which had fibrous thickening, but no abscess was observed at the mitral annulus. After removal of both prosthetic valves and the Dacron patch, and the aortic and mitral annuli were thoroughly debrided. Sutures (2-0 polyester with PTFE pledgets) were placed on the posterior 3/4 of the mitral annulus and were passed through the sewing cuff of an Optiform 27 mm mechanical valve (Sorin SPA, Milano, Italy). The aortomitral continuity and the anterior 1/4 of the mitral annulus were reconstructed using Hemashield fabric (Boston Scientific Corporation, Maple Grove, MN, USA). Mattress sutures (4-0 polypropylene) were passed through the incised left atrial walls, the fabric, and the sewing cuff before all the valve sutures were tied down. The left atrial wall was reconstructed with the fabric patch using the polypropylene



**Fig. 2** Operative view of the abscess on the Manouguian patch. White arrow shows the abscess, and broken arrow shows the patch.

sutures. An ATS 18 AP prosthetic valve (ATS medical Inc, Minneapolis, MN, USA) was placed on the aortic annulus and the fabric using 2-0 polyester sutures. The aortotomy was closed with the fabric patch using mattress and continuous sutures. The patient was weaned off CPB with intra-aortic balloon pump (IABP) support. CPB time was 382 min, cardiac arrest time was 299 min, and total operation time was 666 min. Continuous hemodiafiltration was started postoperatively to treat acute renal failure, and was discontinued on postoperative day (POD) 13. IABP support was required until POD12 for congestive heart failure. The patient was extubated on POD 19. He received intravenous penicillin G (24 million U/day), vancomycin (1000 mg/day), and gentamycin (120 mg/day) for 2 months, followed by oral minomycin (300 mg/day) for 1 year. He was discharged from hospital on POD 65 after complete recovery of heart and renal function and was able to return to his normal daily life.

## Discussion

PVE after double mitral and aortic valve replacement with the Manouguian procedure is an extremely rare and serious condition, and we were unable to find any reports of cases which had been successfully treated by surgery.

It is debated whether or not both prostheses should be simultaneously replaced in cases of PVE with double mitral and aortic prostheses, because of the high mortality rate associated with redo double valve replacement. Sheiku et al. reported that the mortality rate of simultaneous mitral and aortic valve redo surgery for PVE was

28.1%.<sup>3)</sup> In another report, simultaneous replacement of double mitral and aortic valve prostheses for PVE resulted in death in 3 out of 4 cases. They concluded that in patients with PVE who had double mitral and aortic valve prostheses, single replacement of the involved prosthesis seemed a safer strategy because of this high mortality rate.<sup>2)</sup> The European Society of Cardiology recommends that if infection can be controlled with antibiotics, firmer tissues allow more secure fixation of a replacement prosthesis and might permit repair of damage at another valve site, thus avoiding the need for a second prosthesis, although urgent surgery is nearly always required for infection control when the causative organism is staphylococcus.<sup>4)</sup> We initially planned to perform only redo mitral valve replacement due to the increased risk of operative mortality with redo double valve replacement. However, TEE revealed abscess formation in the aortomitral continuity of the Manouguian patch, and we performed redo double mitral and aortic valve replacements with a repeat Manouguian procedure after removal of the prosthetic valves and Dacron fabric and debridement of the infected tissues. This radical resection seems to have contributed to successful treatment<sup>1,4,5)</sup> in the present case.

We used Optiform 27 for the mitral valve re-replacement in the presenting case. The mitral annulus was fibrously thickened, and it was apparently difficult to implant the same size as the initial prosthesis even after the annular debridement in the mitral position. We chose ATS AP valve instead of ATS standard valve in the aortic position because supra-annular type of the prosthetic valve was considered preferable to avoid leaflet confliction of both of the mitral and aortic prosthesis. A size of 18 AP valve could be smoothly passed through the reconstructed aortic annulus with Dacron patch. ATS 18 AP has 1.5 cm<sup>2</sup> of effective orifice area,<sup>6)</sup> and it was implanted without difficulty in the aortic annulus. These prosthetic valves seemed to have enough effective orifice area for the patient whose body surface area was 1.55 m<sup>2</sup>. TTE showed that max pressure gradient of the aortic valve and mean pressure gradient of the mitral valve was 32 and 3.5 mmHg, respectively before hospital discharge.

TEE is useful for the diagnosis of PVE, especially in patients with mechanical valves. The sensitivity and specificity of TEE in the diagnosis of PVE have been reported as 100% and 83%, respectively.<sup>7)</sup> In the present case, TEE clearly revealed the abscess on the Manouguian patch, but TTE could not detect the abscess because there were mechanical valves implanted in both the mitral and aortic positions and reverberation limited the

viewing field. In a recent review,<sup>8)</sup> TEE was described as superior to TTE in detecting vegetations and annular abscesses of native valve endocarditis, although TTE provides enough information for diagnosis with advancements in imaging technology. TEE is a helpful tool for deciding surgical strategy for PVE treatment and is an important addition to TTE for PVE diagnosis.

## Conclusion

We report a case of PVE which was successfully treated by emergency redo mitral and aortic valve replacements with a repeat Manouguian procedure. Precise evaluation by TEE and radical removal of the infected prostheses contributed to the successful treatment.

## Disclosure Statement

We have no financial or other interest in the manufacture or distribution of the device.

## References

- 1) Pibarot P, Dumesnil JG. Prosthetic heart valves: selection of the optimal prosthesis and long-term management. *Circulation* 2009; **119**: 1034-48.
- 2) Guerrero ML, Alonso J, Rey M, et al. Surgical treatment of prosthetic valve endocarditis in patients with double prostheses: is single-valve replacement safe? *Eur J Cardiothorac Surg* 2010; **37**: 159-62.
- 3) Sheikh AM, Elhenawy AM, Maganti M, et al. Outcomes of double valve surgery for active infective endocarditis. *J Thorac Cardiovasc Surg* 2009; **138**: 69-75.
- 4) Butchart EG, Gohlke-Bärwolf C, Antunes MJ, et al. Recommendations for the management of patients after heart valve surgery. *Eur Heart J* 2005; **26**: 2463-71.
- 5) De Oliveira NC, David TE, Armstrong S, et al. Aortic and mitral valve replacement with reconstruction of the intervalvular fibrous body: an analysis of clinical outcomes. *J Thorac Cardiovasc Surg* 2005; **129**: 286-90.
- 6) ATS Medical, Inc. ; Pre-market approval application-summary of safety and effectiveness. Washington D.C.; U.S. Food and Drug Administration. 2000; P990046
- 7) Lengyel M. The impact of transesophageal echocardiography on the management of prosthetic valve endocarditis: experience of 31 cases and review of the literature. *J Heart Valve Dis* 1997; **6**: 204-11.
- 8) Mestres CA, Fita G, Azqueta M, et al. Role of echocardiogram in decision making for surgery in endocarditis. *Curr Infect Dis Rep* 2010; **12**: 321-8.