

A Direct Suture Repair for a Paravalvular Leak 23 Years after the Second Mitral Valve Replacements: A Case Report

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A 59-year-old male was referred for surgery resulting from a paravalvular leak at the mitral position. The patient underwent his first mitral valve replacement with a Bjork-Shiley valve 33 years before this situation arose. He underwent his second mitral valve replacement with a St. Jude Medical mechanical prosthesis for valve thrombosis 10 years later. Serial echocardiography had always shown good results until this time; thus the leak suddenly occurred 23 years after his second mitral valve replacement without any preceding signs. At surgery, a small fistula was observed. The paravalvular leak was successfully repaired by a direct suture repair. Although his postoperative course was complicated by a deep sternal infection, he has fully recovered and currently is in the New York Heart Association class 1 three years after the surgery. (Ann Thorac Cardiovasc Surg 2010; 16: 448–450)

Key words: paravalvular leak, mitral valve, reoperation

Introduction

A paravalvular leak (PVL) is an important complication of the prosthetic valve replacement.^{1,2)} It usually occurs early in the postoperative period.³⁾ We herein present a case of successful mitral valve surgery for severe PVL that occurred 23 years after a second mitral valve replacement. This time interval from the previous surgery was exceptionally long. The patient underwent his first mitral valve replacement 33 years before this operation, which makes this surgery a third-time reoperation.

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Received July 8, 2009; accepted for publication September 14, 2009
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Case

A 59-year-old male was referred because of a possible prosthetic valve dysfunction. The patient visited his physician on the same day, and the doctor noticed that he had developed hemolytic anemia and congestive heart failure. The patient noted that his urine had become red one week before visiting the doctor. Dyspnea and dizziness gradually developed thereafter.

The patient complained of dyspnea, even when he was resting. Auscultation showed the lungs to be clear. A grade 2 systolic murmur was heard at the apex, and he had edema in his lower extremities.

A chest radiograph showed the typical pattern of pulmonary edema. His blood test revealed hemoglobin of 9.6 g/dl and lactate dehydrogenase of 3186 IU/L. He had chronic atrial fibrillation.

The patient had undergone mitral valve replacement twice before this admission. The first operation was done with a Bjork-Shiley valve (Pfizer Inc., NY, USA) 33 years before this episode. He suffered from thrombosis of the valve 10 years after the first operation. He was in shock when he was transferred to the hospital where he was

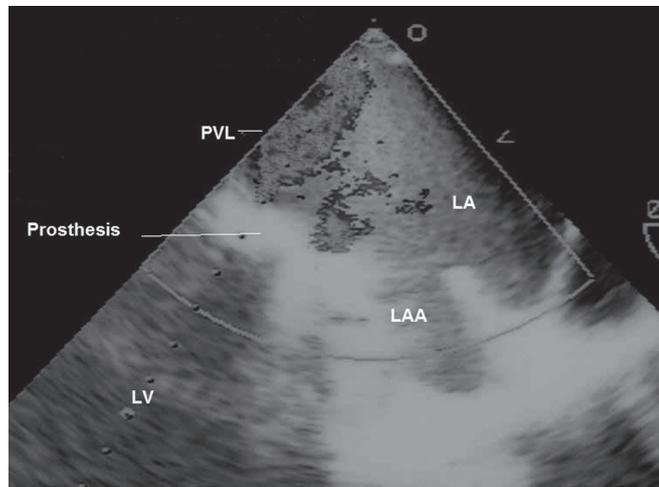


Fig. 1. Intraoperative transesophageal echo.
LA, left atrium; LAA, left atrial appendage; LV, left ventricle;
PVL, paravalvular leakage.

treated. He underwent an emergency redo mitral valve replacement with a St. Jude mechanical prosthesis (St. Jude Medical, St. Paul, MN, USA). He suffered from a stroke at that time. He has suffered from epilepsy since then and was therefore being administered an anticonvulsant. The patient had undergone annual echocardiography, and no sign of PVL has ever been detected. His lactate dehydrogenase level had always been less than 600 IU/L until this episode.

A transthoracic echo, which was done after admission, revealed a PVL through the posterior part of the mitral annulus. The left ventricular diastolic diameter was 6.4 cm. The ejection fraction was 38%, and an image of intraoperative transesophageal echo is shown in Fig. 1.

He underwent preoperative cardiac catheterization. The coronary arteries were normal. The systolic pulmonary pressure was 47 mmHg, and the mean pulmonary pressure was 32 mmHg.

He was managed medically for three days before surgery, where a standard redo median sternotomy was performed. A cardiopulmonary bypass was established by bicaval cannulation and an aortic cannulation at the cephalic end of the ascending aorta. A standard left atriotomy was made. The mitral prosthesis and the left atrium were observed. A fistula was observed at 4 o'clock (Fig. 2). The sutures at the site of leakage were neither cut nor loosened. The fistula appeared to be formed outside the sutures, and there were no apparent findings of infection. One-fourth of the sewing ring from 3 o'clock to 6 o'clock was not covered by tissue. The valve was not replaced because the left atrial tissue

around the fistula looked good, and the fistula could be securely closed by using the left atrial wall. Three pledget-supported braided polyester stitches were placed as horizontal mattress sutures through a fold of the left atrial wall, then brought into the sewing ring at the posterior part of the prosthesis (Fig. 3).

The cross-clamp time was 51 minutes, and the pump time was 99.

The patient's early postoperative course was good, and he was extubated on postoperative day 1 and transferred from ICU in two days. However, a week later he developed a deep sternal infection and underwent irrigation for 7 days, then omentum pexy. His postoperative course was not further complicated. A postoperative echo showed no perivalvular leak. He went home in good condition at 70 days after surgery. It has been three years since the operation, and the patient is well. He has New York Heart Association class 1 symptoms. The most recent echocardiography findings showed no paravalvular leak.

Discussion

PVL is a major complication of prosthetic valve replacement.^{1,2)} It occurs most frequently in the early postoperative period. Genoni et al. reported a median time of 119 days (range: 1 day to 23 years) after primary mitral valve replacement in 96 patients with mitral PVL.³⁾ Twenty-three years could be considered an exceptionally long interval from the previous mitral valve replacement, though a case in which the patient developed PVL 25 years after surgery has



Fig. 2. Intraoperative picture before the repair.
The arrow indicates the fistula.

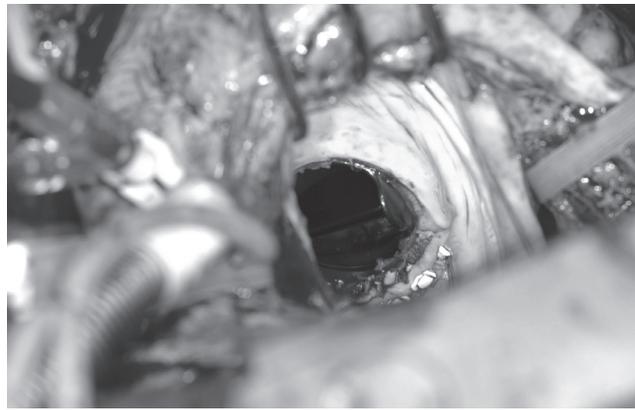


Fig. 3. Intraoperative picture after the repair.
Three pledget-supported braided polyester sutures were placed.

been reported.⁴⁾ Because 1/4 of the sewing ring around the fistula was not covered by tissue, the patient could have had small PVL from the early postoperative period, though it had not been detected by serial transthoracic echocardiography for years. However, it was uncertain why he became symptomatic so suddenly. Because the second mitral valve replacement was a rescue surgery performed when the patient was in cardiogenic shock and apparently required surgery in a difficult situation, there could be some technical problems. Annular calcification, continuous running sutures in placing a prosthesis, and endocarditis are associated with the development of PV.^{2,5,6)} No apparent annular calcification was found in this case. The prosthesis had been secured with interrupted mattress sutures with pledget support. Furthermore, based on the intraoperative findings and laboratory data of this case, an infection did not seem to be the cause.

The fistula was closed by direct pledget-supported sutures. PVL can be treated by either direct suture repair of the leak site or by replacement of the valve. The results of valve replacement are no better than suture repair in surgery for PVL. A failure rate of 35% is reported after replacement, whereas it is 13% after suture repair.⁵⁾ Repair of the leak was undertaken by apposition of healthy left atrial tissue against the denuded sewing ring of the valve, as already described. The patient has remained free of paravalvular leakage for 3 years since the repair. This simple technique appeared to offer a durable solution in this case. Suture repair can be chosen when patients have healthy and soft tissue around the prosthesis, especially when it is a normally functioning mechanical valve.

The long-term results of surgically treated paravalvular leak vary among papers. The 10-year survival is from 30% up to 88% at 10 years.^{3,7)} Although the patient is currently doing well, a careful follow-up is necessary.

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