

Surgical Treatment in a Patient with Multiple Systemic Complications of Prosthetic Aortic Valve Endocarditis: Case Report

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ABSTRACT

A 31-year-old woman who had undergone aortic and mitral valve replacement 1 year previously was hospitalized with suspected prosthetic valve endocarditis. Freestyle stentless aortic xenograft was successfully replaced using free-standing total aortic root replacement techniques at the left ventricular outflow tract position, and aorta-to-right coronary artery bypass was also applied with a saphenous vein graft. The patient developed multiple systemic problems during the preoperative and postoperative periods and was successfully treated with intensive interventions. She was discharged at the postoperative fourth month, and the following 28 months were uneventful.

INTRODUCTION

The overall incidence of prosthetic valve endocarditis (PVE) ranges from 0.32% to 1.20% per patient-year. The cumulative risk of PVE is 3.2% in 5 years and 5% in 10 years [Mihaljevic 2001]. Prosthetic valve endocarditis is a serious and potentially fatal complication after cardiac valve replacement, and an aggressive combined surgical and medical approach is essential for effective treatment [Peric 2000]. Urgent surgical treatment must be performed for patients with PVE, persistent infection, paravalvular abscess, prosthetic valve dehiscence, and metastatic infections. Recently, The use of stentless aortic bioprostheses has improved the outcome of patients with aortic prosthetic valve endocarditis [Sakaguchi 1999].

The purpose of this study was to present a case of PVE successfully treated with total aortic root replacement using the Freestyle stentless porcine aortic bioprosthesis.

CASE REPORT

A 31-year old woman who had undergone aortic and mitral valve replacement 1 year previously was admitted to

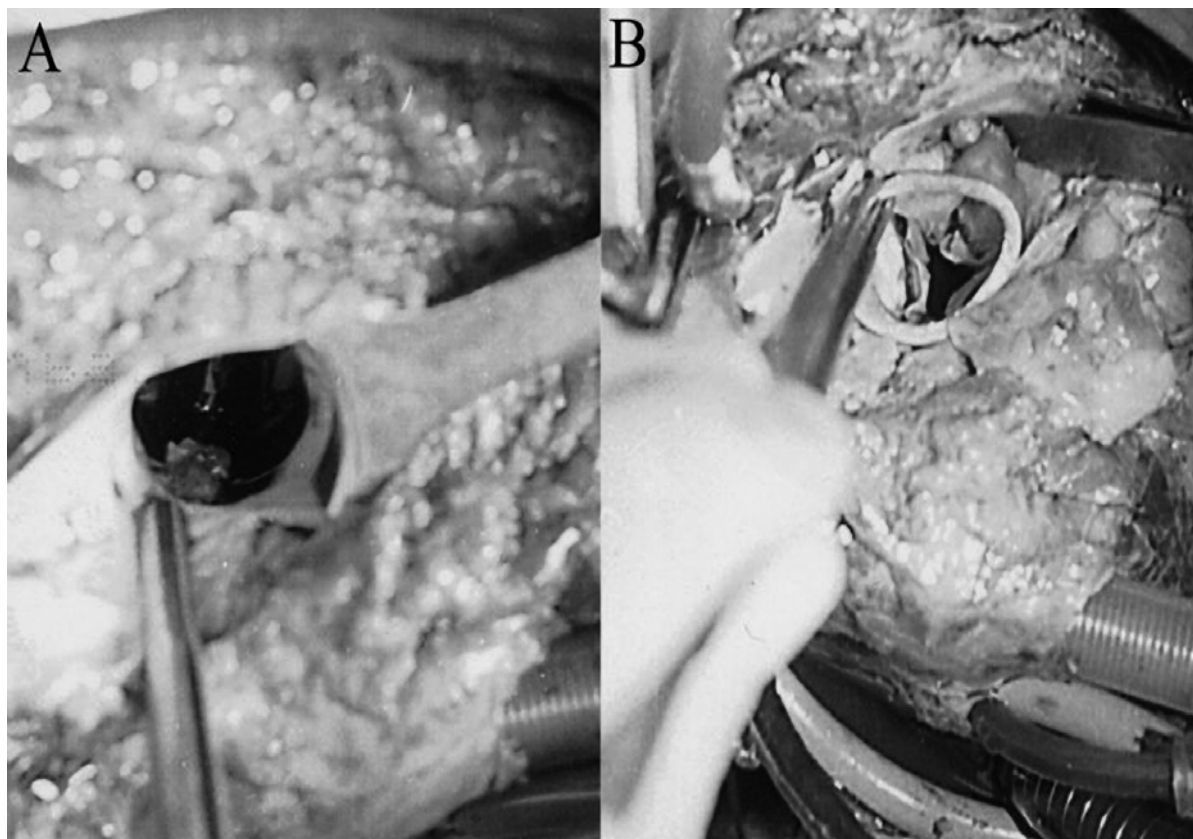
our clinic with complaints of fever, palpitations, and sweating. The patient was hospitalized with suspected endocarditis.

The patient had a history of medical abortus 2 months previously, without prophylaxis for endocarditis. Antibiotic treatment was started for suspected endocarditis because initial echocardiogram results were normal, and the infecting agent found in blood sample cultures was *Staphylococcus aureus*. Because of uncontrolled sepsis and ultrasonographically demonstrated splenic abscess within the second week of initiation of appropriate antibiotic treatment, splenectomy was performed.

Two weeks later, open-heart surgery was planned because of uncontrolled sepsis, progressive congestive failure, and multiple peripheral emboli occurrence. In addition to these problems, echocardiographic analysis revealed vegetations on the prosthetic aortic valve and paravalvular leak. The prosthetic mitral valve was normal according to the echocardiographic examination. Surgery was performed with the patient under hypothermic cardiopulmonary bypass and cross clamping. During surgery, destruction of the right coronary artery ostium, large aortic ring abscesses, annular destruction, and paravalvular leak were detected. There was no infection in the prosthetic mitral valve, and its functions were normal. The mechanical aortic valve was removed, and radical surgical debridement was performed for annular abscesses and vegetations (Figure, part A). Because a 19-mm sizer fit snugly into the patient's left ventricular outflow tract, a 19-mm Freestyle stentless aortic xenograft (Medtronic, Minneapolis, MN, USA) was successfully replaced at the left ventricular outflow tract position (Figure, part B), and the left main coronary artery was reimplanted on the xenograft. Aorta-right coronary artery bypass was also applied with a saphenous vein graft. Because of low cardiac output at the end of the operation, despite the insertion of an intraaortic balloon, the patient was not weaned from cardiopulmonary bypass. An extracorporeal membrane oxygenation (ECMO) procedure performed with femoral cannulation was continued in the intensive care unit during the first 24 postoperative hours. Then this procedure was ended because of improvement of cardiac performance, and insertion of the intraaortic balloon was continued during the next 72 hours. Acute renal failure and spontaneous liver rupture developed on the postoperative second day. We detected profuse diffuse bleeding from the liver, and packing was performed because of uncontrolled bleeding. Twenty-four hours later, when packing was removed and abdominal reexploration performed, bleeding

Received September 21, 2004; received in revised form November 3, 2004; accepted November 16, 2004.

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Intraoperative view. A, The annular vegetation can be seen clearly. B, After removal of the mechanical aortic valve and radical surgical debridement, a 19-mm Freestyle stentless aortic xenograft (Medtronic, Minneapolis, MN, USA) was successfully replaced at the left ventricular outflow tract position.

had ceased and homeostasis had been achieved. Approximately 60 units of blood were transfused during this period. Vancomycin dosage was regulated according to creatinine clearance. A percutaneous tracheotomy was made to continue mechanical ventilation with positive pressure, and the patient needed mechanical ventilation for 10 weeks. Urine output started, and the patient's renal function gradually improved during the 10 days after hemodialysis. In addition, *Candida albicans* was seen in blood and urine cultures and was treated with 1 mg/kg per day intravenous amphotericin B for 6 weeks, and no recurrence was seen at 1-year follow-up. After postoperative renal functions improved the patient received vancomycin 30 mg/kg per day and rifampin 15 mg/kg per day for 6 weeks and gentamicin 3 mg/kg per day for 2 weeks for *Staphylococcus aureus*.

The patient was discharged at the postoperative fourth month without residual problems, and the following 28 months were uneventful.

DISCUSSION

Experience with infectious complications of prosthetic valve surgery shows that a useful purpose is served by classifying PVE according to the time at which infection occurs after surgical insertion of the valve. Early PVE occurs within the first 60 days after surgery and is generally due to organisms

acquired during or shortly after the operation, whereas late PVE occurs 2 months postoperatively or later and shares pathogenesis with endocarditis on native heart valves. The incidence of PVE is highest within 12 months of valve replacement surgery and ranges between 1.4% and 3.1% [John 1998]. In our patient, late PVE occurred 1 year after valve replacement surgery and was a complication of a non-protected abortion.

Optimal diagnosis and management of patients with infective endocarditis requires sound clinical judgment based on extensive experience, especially in regard to the indications and timing for surgery. To achieve the best possible outcomes, surgical intervention during treatment is required in 25% to 30% of patients with infective endocarditis. Heart failure and progressive left-sided valvular dysfunction are the most common indications for operation. Successful management of perivalvular abscesses and prosthetic valve infections requires radical removal of infected tissue followed by reconstructive procedures performed by experienced surgeons. Emergency or urgent surgery should seldom be delayed [Olaison 2003]. In our patient, urgent surgical treatment was performed because of inability to control the infection, severe aortic insufficiency, valve dehiscence, vegetations on the prosthetic aortic valve, intractable congestive heart failure, and multiple systemic embolizations. There were none these problems when the patient was initially hospitalized. Two

weeks later, these problems occurred, and open-heart surgery was performed.

Previous reports on surgically treated patients with infective endocarditis indicate that paravalvular abscess was present in 11% to 28% of the cases of native valve endocarditis and in 40% to 63% of the patients with PVE [d'Udekem 1997]. We detected large paravalvular abscesses and annular destruction in our patient as well.

For aortic valve endocarditis, if greater than 50% of the annulus has been destroyed or there is extensive ventricular-aortic discontinuity, homograft or xenograft, root replacement may be preferable. A homograft is the preferred procedure if it is possible. In reported series, operative mortality rates were soberingly high ($13\% \pm 2\%$ for native valve endocarditis and $29 \pm 5\%$ for PVE) [Moon 1997]. The stentless xenograft valve can be implanted using the freehand complete subcoronary, the modified subcoronary, the inclusion root, and the freestanding total aortic root replacement techniques [Kirsch 2001]. The use of the modified subcoronary technique creates an obligatory space between the porcine and native human aortic wall, and the persistence of a periprosthetic dead space exposes the patient to the risk for superinfection [Kirsch 2001]. The use of the freestanding total aortic root replacement, which avoids the occurrence of such a periprosthetic dead space, has gained wide acceptance [Kon 1999]. In our patient, a Freestyle stentless aortic xenograft was successfully replaced by using freestanding total aortic root replacement techniques at the left ventricular outflow tract position after radical surgical debridement was performed for annular abscesses and vegetations. Radical surgical debridement is particularly crucial in cases of PVE, in which any delays may be fatal because of rapid cardiac deterioration and development of disabling complications.

There is no report in the English medical literature about hepatic rupture in patients with PVE. In the present case, intraabdominal bleeding led to hypovolemic shock, and emergency laparotomy was performed to control the bleeding. We could not detect the cause of hepatic rupture, but septic emboli and parenchymal infarct may have

led to bleeding in this patient, who was receiving high-dose heparin treatment during cardiopulmonary bypass and ECMO.

This experience illustrates that early surgical treatment during the active phase of endocarditis in a patient with PVE should be considered as soon as any complications occur and/or antibiotic treatment alone proves to be ineffective. Furthermore, as illustrated by the present case report, the use of the freestanding total aortic root replacement should be preferred.

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