

Surgical Treatment of Early Acute Thrombosis of Mechanical Mitral Prosthesis

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ABSTRACT

Prosthetic valve thrombosis is a rare but life threatening complication of mechanical heart valve prosthesis. A 44-year-old woman diagnosed with rheumatic heart disease with severe mitral valve stenosis, moderate tricuspid valve insufficiency, and atrial fibrillation underwent transeptal mitral valve replacement and tricuspid valvuloplasty in our department. Heparin and warfarin were routinely used postoperatively. Although the international normalized ratio (INR), activated partial thromboplastin time ratio, and platelet count were satisfactory, the patient presented with severe dyspnea suddenly 10 days after discharge; echocardiogram showed that the prosthetic posterior leaflet was immobile. The patient suffered cardiac arrest suddenly during the examination and cardiopulmonary resuscitation was carried out successfully. Emergent surgery was performed, confirming the prosthetic valve thrombosis. The prosthetic valve was replaced with another mechanical prosthesis. The patient recovered smoothly and was discharged 14 days later with atrial fibrillation. During the 12-months follow-up period, her prosthetic valve and heart function were normal with INR around 3.0. This case highlights the need for awareness among clinicians for the possibility of valve thrombosis in the early postoperative period.

INTRODUCTION

Prosthetic valve thrombosis (PVT) is a rare but life threatening complication of mechanical heart valve prosthesis. Almost 50% of obstructed valves cases are diagnosed at autopsy [Kontos 1989]. There are only a few cases successfully treated with surgery reported in the literature.

CASE REPORT

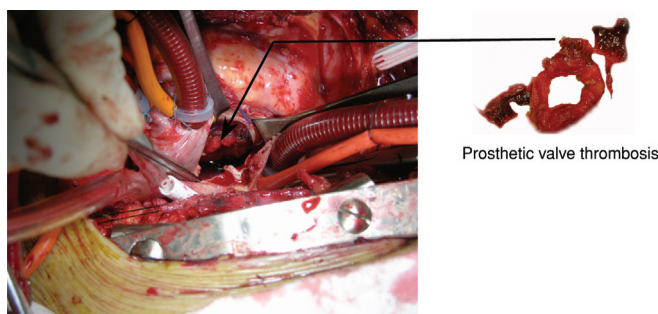
A 44-year-old woman was diagnosed with rheumatic heart disease; she presented with New York Heart Association Class III dyspnea. Clinical examination found her to be in atrial fibrillation, having mixed mitral valve disease and signs of tricuspid

regurgitation. Transthoracic echocardiography revealed severe mitral valve stenosis and moderate tricuspid valve insufficiency. The left ventricular function was preserved, the cardiac chambers were dilated, and there was no mural thrombus. Pulmonary artery and pulmonary artery wedge pressures were 60/30 and 35 mm of mercury, respectively. Using moderate hypothermic cardiopulmonary bypass and intermittent antegrade cold blood cardioplegia, she underwent transeptal mitral valve replacement and tricuspid valvuloplasty. The ON-X bileaflet mechanical mitral valve prosthesis (CONFORM-X, Medical Carbon Research Institute, LLC, Austin, TX, USA) was inserted using 2-0 prolene interrupted suture technique. The posterior leaflet and subvalvular apparatus were preserved. No thrombus was seen on the left atrial wall or the atrial appendage. The left atrial appendage was excluded surgically. DeVega tricuspid annuloplasty was also performed. The patient was weaned off cardiopulmonary bypass in atrial fibrillation and on modest inotropic support with a cardiac index of 3.7 L/min per m² and pulmonary artery wedge pressure of 14 mm of mercury. She was extubated 12 hours later on the first postoperative day and maintained normal blood gases. Heparin and warfarin were routinely used postoperatively. The international normalized ratio (INR), activated partial thromboplastin time (APTT) ratio, and platelet count were satisfactory. The patient recovered smoothly with INR ranging from 1.6 to 3.1 in-hospital and was discharged 7 days later. The echocardiogram examination showed normal prosthetic valve status and heart function. The patient presented with severe dyspnea suddenly at 4:00 in the morning of November 4, 2008, 10 days after discharge. The sound of the mechanical valve was poor, and echocardiogram showed that the prosthetic posterior leaflet was immobile. The patient suffered cardiac arrest suddenly during the examination and cardiopulmonary resuscitation was carried out successfully. The patient's INR was 1.46. The investigation of antithrombin III was normal, but protein C and protein S were deficient (44.2% and 20%, respectively). The echocardiogram examination results were unclear as to the cause of the immobilization of the prosthetic posterior leaflet, and the entrapment of the subvalvular apparatus could not be ruled out.

Emergent surgery was performed, and the thrombosis around the prosthetic valve was confirmed during operation. The whole sewing cuff of the mitral prosthesis was covered by thrombus (Figure), which also interfered with the mobility of the prosthetic posterior leaflet. The left atrium itself was free of thrombus. The subvalvular apparatus did not seem to affect the excursion of valve leaflet.

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Prosthetic valve thrombosis was confirmed during emergent surgery.

We recommended to the patient replacing the prosthetic valve with a bioprosthetic valve, but the relatives of the patient refused, thinking about the patient's young age and relatively poor economic condition. So another mechanical prosthesis was used. The procedure was successful, and the patient recovered smoothly. Besides warfarin, the patient took aspirin (100 mg/d) and INR was kept around 2.5 to 3.0, because the protein C and protein S were deficient (44.2% and 20%, respectively). The patient recovered smoothly, and the echocardiogram examination showed that prosthetic valve status and heart function were normal. She was discharged 14 days later with atrial fibrillation. During the 12-month follow-up period, her prosthetic valve and heart function was normal, and the INR was kept around 3.0.

DISCUSSION

Mechanical valvular prostheses have the advantage of longevity, but carry a risk of thrombosis, with an incidence of 0.2% to 6% in left heart chambers, and up to 20% in tricuspid valve prosthesis [Cáceres-Lóriga 2006]. The main factor predisposing to thrombosis is inadequate anticoagulation, which is observed in 82% of the cases [Lengyel 2001; Ozkokeli 2005; Cáceres-Lóriga 2006]. Other significant risk factors include tilting disc prosthesis, large prosthesis, atrial fibrillation, enlarged left atrium, time from implantation greater than 4 years, and age between 40 to 50 years [Renzulli 1992]. Shachar and colleagues [1981] found obstruction of mitral prosthesis by bulky mural thrombus originating at the septal wall of the left atrium, which might result from trauma to these structures during operative procedure. Other factors known to precipitate a thrombotic process are coagulation abnormalities such as protein C, protein S, and antithrombin III deficiency [Gonzalez-Lavin 1984], left ventricular dysfunction, or low cardiac output state [Hagley 1995]. The importance of subvalvular apparatus and the preservation of annuloventricular continuity in mitral valve replacement is well documented; however, complications such as chordal entrapment of bioprosthesis, which can initiate a thrombotic process, have been reported [Prabhakar 1994].

It is difficult to conclude the etiology of PVT in our patient, though she had risk factors of atrial fibrillation and coagulation abnormalities. Perhaps it is related to the relatively low level of INR.

PVT is a rare but devastating complication. Surgical intervention has been the conventional treatment for PVT; however, morbidity and mortality may be as high as 69% in patients with NYHA class III and IV heart failure [Cáceres-Lóriga 2006]. So for those who are at high risk for a surgical intervention, thrombolytic therapy for PVT is acceptable, but the patient may suffer from the high risk of embolism (12%-17%) or hemorrhage suffering from thrombolysis [Roudaut 2003].

For the reoperation of mechanical PVT, the tissue valve maybe a better choice, but the decision must consider the individual attitude of the patient and his or her relatives.

CONCLUSION

The incidence of PVT has decreased in recent years as a result of improved design and hemodynamic profile of valvular prostheses. Thrombosis, however, remains a devastating complication. Emergency surgical intervention may be helpful. This case highlights the need for awareness among clinicians for the possibility of valve thrombosis in the early postoperative period, especially for those who have coagulation disturbance.

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