

Technical Details of Redo Aortic Valve Replacement Using St. Jude Medical Mechanical Prosthesis in a Patient with Thrombosed Aortic Mechanical Prosthesis: A Video Presentation

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Abstract

Keywords

- ▶ redo aortic valve replacement
- ▶ St. Jude Medical mechanical prosthesis
- ▶ thrombosed aortic mechanical prosthesis

Current consensus guidelines of the American Heart Association and European Society of Cardiology uniformly recommend either type of prosthetic valve for patients aged between 60 and 70 years and mechanical prosthesis for patients aged less than 60 years. These recommendations are based on the results of randomized controlled trials that demonstrated no significant difference in late survival. Two of these trials compared mechanical and bioprosthetic valve models implanted in 1970s and 1980s. The other two trials included patients undergoing aortic valve replacement. Contemporary data are limited to small single-center studies

Introduction

Current consensus guidelines of the American Heart Association (AHA) and European Society of Cardiology (ESC) uniformly recommend either type of prosthetic valve for patients aged between 60 and 70 years and mechanical prosthesis for patients aged less than 60 years.^{1–4} These recommendations are based on the results of four randomized controlled trials that demonstrated no significant difference in late survival.^{2–6} Two of these trials compared mechanical and bioprosthetic valve models implanted in 1970s and 1980s.^{5–7} The other two trials

included patients undergoing aortic valve replacement. Contemporary data are limited to small single-center studies.^{1,2,8–10}

Valve replacement in young adults entails a choice between a mechanical prosthesis with risks of anticoagulation-related bleeding/thrombosis versus bioprosthetic necessitating eventual reoperation.

Despite usage of carbon pyrolite and central flow design of St. Jude Medical mechanical prosthetic valve, thromboembolism and anticoagulant-induced hemorrhage after surgery continue to account for 75% of all valve-related complications.^{11,12}

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Thrombolysis of thrombosed St. Jude mechanical valves is safe and is the preferred first choice of treatment in the absence of other contraindications for anticoagulation.^{11–15} Cinefluoroscopy is the preferred method for diagnosis and follow-up of St. Jude thrombosis in our institution.¹¹ Doppler echocardiography and cinefluoroscopy have complimentary role in assessing prosthetic valve function during thrombolytic therapy.^{5–8,16–19}

Patients who do not respond within 48 to 72 hours should be referred for surgery because these patients may have tissue ingrowth obstructing the prosthetic valve (Pannus formation) and usually do not respond to continued thrombolytic treatment. Explantation of the prosthetic valves during redo surgical procedures presents formidable surgical challenges in many instances.

We present herein a 48-year-old male patient diagnosed to have a chronic thrombosed St. Jude Medical aortic valve prosthesis, with failed thrombolysis, who underwent explantation of the thrombosed aortic prosthesis and re-replacement of the mitral valve using another 21 mm St. Jude Medical mechanical prosthesis. The technical details of explantation and re-replacement procedure without causing injury to the cardiac chambers and great vessels have been discussed in detail. Postoperative recovery was uneventful.

Surgical Techniques

Following systemic heparinization, elective right femoral arteriovenous cannulation is done using long femoral arterial and venous cannulae (Edwards Lifesciences LLC, One Edwards Way, Irvine, California, United States).

Under cardiopulmonary bypass, secondary median sternotomy is performed with the heart decompressed on bypass. The pericardium overlying the aorta, right ventricular outflow tract, and superior vena cava is dissected.

An 18-Fr sump suction vent is placed over the main pulmonary artery for further decompression of the heart to facilitate dissection. The superior caval vein is being dissected and cannulated directly using an angled metal tipped venous cannula and drained directly into the oxygenator. The intrapericardial inferior caval vein is dissected and looped for later occlusion.

After aortic cross-clamping, an oblique horse-shoe shaped aortotomy was performed in between stay sutures 1.5 cm above the sinus of the right coronary artery stopping approximately 1 cm above the midpoint of the noncoronary sinus. Myocardial protection was achieved by integrated myocardial protection using direct ostial St. Thomas (II)-based cold blood cardioplegia (4:1) and topical cardiac cooling using ice cold saline. Successive doses of cardioplegia were repeated every 30 minutes.

Two stay sutures of 2–0 Ethibond (Johnson and Johnson Ltd., Ethicon, LLC, San Lorenzo, California, United States) are placed over the prosthetic mitral annulus to facilitate later explantation of the aortic prosthesis.

An incision is made on the aortic prosthetic ring using a No.11 scalpel blade. The prosthetic valve is detached from the aortic annulus by a combined sharp and blunt dissection.

A small right-angle forceps is insinuated within the opening to facilitate explantation of the aortic prosthesis. The prosthetic

valve is explanted by incising the prosthetic fibrous capsule on both aortic and ventricular surface. Extreme precautions are taken not to cause aorto-ventricular discontinuity. Precautions are also taken not to dislodge the thrombus contained within the prosthetic mitral valve.

Re-replacement of the mitral valve is done using a 21 mm St. Jude mechanical aortic prosthesis (St. Jude Medical; St. Jude Medical; St. Paul, Minnesota, United States) and interrupted 2–0 Ethibond mattress suture. The aortotomy is closed in two layers using 4–0 polypropylene sutures (Johnson and Johnson Ltd., Ethicon, LLC, San Lorenzo, California, United States) (►Video 1).

Video 1

Technical Details of Redo Aortic Valve Replacement Using St. Jude Medical Mechanical Prosthesis in a Patient with Thrombosed Aortic Mechanical Prosthesis: A Video Presentation. Online content including video sequences viewable at: <https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0042-1757367>.

Results

The patient was weaned off cardiopulmonary bypass on dopamine 5 µg/kg/min and nitroglycerin 0.5 µg/kg/min. He was extubated after 6 hours. At 12 months follow-up, he is in New York Heart Association functional class I with left ventricular ejection fraction of 0.60, in normal sinus rhythm. Echocardiographically, the mean systolic left ventricle-to-aortic pressure gradient was 8 mm Hg, no aortic regurgitation and there was no paravalvular/cuff leakage.

Conclusions

Elective institution of cardiopulmonary bypass through femorofemoral arterio-venous cannulation prior to sternotomy prevents accidental injury to the cardiac chambers and great vessels during sternal entry. Pulmonary artery venting and cannulation of the superior vena cava further facilitate dissection of the cardiac chambers without causing injury. Placement of two stay sutures on the prosthetic annulus and intracapsular dissection greatly facilitates explantation without causing aorto-ventricular discontinuity.

Take-Home Message

- Elective institution of cardiopulmonary bypass using femoral arteriovenous cannulation prior to sternotomy prevents cardiac and great vessel injury, facilitates dissection, and minimizes bypass time.
- Placement of two stay sutures on the prosthetic annulus and intracapsular dissection facilitates explantation of the mitral prosthesis without causing rupture of the left ventricle.

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None.

Conflict of Interest

None declared.

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