Valve-sparing Root Replacement after Prior Starr-Edwards Aortic Valve Replacement

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Historically, patients with prior aortic valve replacements who subsequently present with an ascending aortic aneurysm require placement of a valve conduit. However, if the patient has a functional mechanical valve with proven long-term durability, an attempt can be made to preserve the intact valve and to graft the aneurysmal aortic root. The case is described of a patient with a previously placed Starr-Edwards aortic valve who subsequently developed a 6-cm ascending aortic aneurysm. By removing the valve ball and using the existing sewing ring, a proximal graft anastomosis was created with ease, eliminating valve excision.

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Typically, patients who have undergone aortic valve replacement and subsequently develop an ascending aortic aneurysm require surgical repair with a valve conduit (1,2). However, in those with a competent mechanical aortic valve, an attempt can be made to perform a supravalvular resection and to graft the ascending aortic aneurysm. The case is described of an ascending aortic graft repair in the setting of a prior aortic valve replacement with a Starr-Edwards valve (Edwards Lifesciences, Irvine, CA, USA).

Case report

This 75-year-old white male had undergone aortic valve replacement with a Starr-Edwards mechanical valve 10 years previously for aortic stenosis. His past medical history was significant for hypertension, chronic renal insufficiency, type II diabetes mellitus and paroxysmal atrial fibrillation. Recently, the patient presented with acute onset of left parasternal chest pain which radiated to the back. The work-up was negative for a myocardial infarction. Computed tomography of the chest revealed the presence of a 6-cm ascending aortic aneurysm, beginning at the level of the prosthetic valve and extending to the innominate origin (Fig. 1)

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Cardiac catheterization revealed no significant coronary disease. Echocardiography demonstrated a competent Starr-Edwards valve and severe tricuspid insufficiency with a dilated right atrium and a normal left ventricular ejection fraction.

A re-do sternotomy was performed. Cardiopulmonary bypass (CPB) was initiated through the right axillary artery, a percutaneous cannulation of the right femoral vein, and a superior vena cava venous cannula. The patient was cooled to 18°C and myocardial protection achieved with antegrade and retrograde cold crystalloid cardioplegia.

After aortotomy, the Starr-Edwards valve was inspected. There were no vegetations noted and the ball-cage mechanism functioned well. The diseased aortic root was excised and coronary buttons were created (Fig. 2). The ball was removed from the cage to

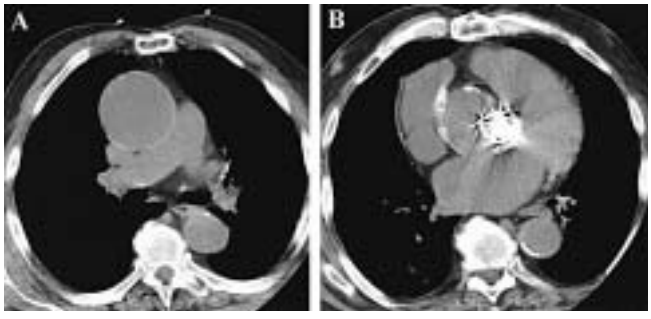

Figure 1: Computed tomography of (A) ascending aneurysm and (B) aortic root with the Starr-Edwards valve.

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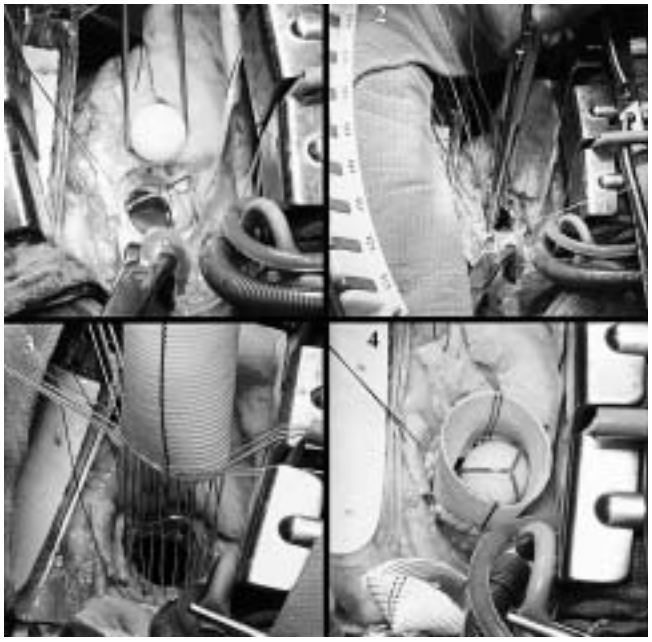

Figure 2: Reconstruction of the aortic root. 1) Removal of the ball. 2) interrupted suturing of the existing ring; 3) seating of the graft; 4) the completed proximal anastomosis.

facilitate placement of 2-0 Ticron (Syneture, Norwalk, CT, USA) pledgeted horizontal mattress sutures. Sutures were passed through the sewing ring of the Starr-Edwards valve, then through a 30-mm Hemashield graft (Boston Scientific, Natick, MA, USA). After completion of the graft-to-valve anastomosis, circulatory arrest was instituted to allow a clampless distal anastomosis to the arch of the aorta. A second section of graft was anastomosed to the aorta in a beveled fashion, just proximal to the innominate artery. Antegrade cerebral perfusion was utilized during this anastomosis. The graft was clamped just proximal to the arch suture line and full CPB resumed. The ball was replaced (Fig. 2), followed by anastomosis of the coronary buttons to the proximal graft. This was followed by a graft-to-graft anastomosis to complete the ascending aorta reconstruction. A tricuspid valve annuloplasty was then performed using a 36-mm Carpentier (Edwards Lifesciences) ring annuloplasty. The CPB time was 184 min.

Postoperatively, the patient required a pacemaker for bradycardia due to medical therapy of rapid atrial fibrillation. A late pericardial fluid collection developed following anticoagulation, and the patient was surgically evacuated on postoperative day 10. Currently, he continues to improve at home.

Discussion

Starr-Edward valves, which are known for their longevity (3), provide a large sewing ring that, in the present case, enabled a durable proximal anastomosis to be made. Although the sewing ring had endothelialized, the ring was easily visible and secure bites could be placed because of its size. In addition, because the valve ball was removable, the placement of sutures and retrieval of needles was facilitated.

To the present authors' knowledge, this procedure has not been reported previously with a Starr-Edwards valve. Wickstrom (4) described a case with a previously placed St. Jude Medical prosthesis, though with the smaller ring and leaflet design the St. Jude valve may represent a greater surgical challenge. Despite the fact that the present valve was 10 years old, reports of 30- to 40-year follow up have been described with the Starr-Edwards prosthesis (5), and this further substantiated the desire to save the valve in this case. In addition, by not excising a chronically implanted prosthetic aortic valve, potential morbidities including septal conduction injury and aortoventricular discontinuity were avoided. For reasons of longevity, a large sewing ring and a detachable ball, a mechanical valve-sparing aortic root replacement was a viable and possibly superior alternative to valve conduit placement in the present case.

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