Endocarditis with massive aortic root abscess and atrioventricular septal destruction

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Abstract

Endocarditis involving the aortic root and interavalvular fibrous skeleton presents a reconstructive dilemma. We report a case of endocarditis involving the aortic root and tricuspid valve with extensive destruction of the atrioventricular septum. Debridement necessitated resection of the aortic root, aortic valve, tricuspid valve, and a large portion of atrioventricular septum, leaving the right atrium, right ventricle, left ventricle and aorta in open communication. Reconstruction was accomplished by separating the left and right hearts with a Dacron patch, tricuspid valve replacement, and aortic root replacement. Proper planar localization of the aortic root was necessary to avoid left ventricular outflow obstruction and coronary torsion.

Keywords: Endocarditis; Aortic root; Tricuspid valve

1. Introduction

A 64-year-old male with a history of bicuspid aortic valve and known severe aortic stenosis presented to an outside hospital with fever, altered mental status, and chest pain. Head CT was negative. Initial transesophageal echocardiography (TEE) showed no evidence of endocarditis. Blood cultures grew out Staphylococcus aureus resistant only to penicillin. On hospital day 11, a repeat echocardiogram was obtained for continued fevers to 39.5 °C and continued positive blood cultures. It revealed extensive endocarditis with aortic root abscess and involvement of the tricuspid valve, and the patient was transferred to our institution for definitive management.

Intraoperative TEE revealed an extensively calcified bicuspid aortic valve, critical aortic stenosis, moderate aortic insufficiency, and tricuspid valve vegetations. Color flow Doppler demonstrated a fistula between the aorta and the right atrium, just above the tricuspid valve (Video 1).

The patient underwent median sternotomy, systemic heparinization, and aortic, bicalve, and retrograde coronary sinus cannulation. Cardiopulmonary bypass was initiated and the patient was cooled to 32 °C. A ventricular vent was placed via the right superior pulmonary vein. The ascending aorta was cross-clamped and the heart was arrested with retrograde cardioplegia and then aprotide cardioplegia after ascending aortotomy. The aortic valve was heavily diseased (Fig. 1a). It was excised, revealing an aortic root abscess burrowing posteriorly and medially toward the right heart (Fig. 1b). Further dissection revealed frank abscess tracking into the right ventricular free wall and onto the ventricular septum. A right atriotomy revealed the abscess perforating into the right atrium and a grossly infected tricuspid valve (Fig. 1c). Debridement of all necrotic infected material necessitated resection well onto the ventricular muscular septum, onto the ventricular free wall, and into the right atrial free wall. The aorta, left ventricle, right ventricle, and right atrium were left in open continuity (Fig. 1d; Video 2).

Given the need to securely anchor both aortic root and tricuspid valve prostheses, a large Dacron patch was chosen to separate the left and right hearts. Interrupted Tevdek pledgeted sutures were placed through the ventricular muscular septum, medial left and right ventricular free walls, and atrial septum to secure the patch (Figs. 1e,f and 2a). A #31 St Jude Biocor mitral valve was placed in a plane approximating the native tricuspid valve plane, with several of the sutures anchored to the Dacron patch (Fig. 2b). An aortic root bioprosthesis was then fashioned by seating a #27 St Jude Biocor aortic valve inside a #30 Valsalva graft conduit with a running 4-0 polypropylene suture (Fig. 2c). Aortic root anchoring sutures were placed circumferentially along the lower portion of the patch medially and the aortic annulus laterally (Fig. 2d) with careful attention to restoration of native geometry. The composite was then seated into the pseudoannulus, and the left and right main coronary buttons were reimplanted (Fig. 2e,f). The distal anastomosis to the ascending aorta was completed. Permanent epicardial pacing leads were placed and tunneled to a left subcostal pocket. Temporary pacing leads were placed. After reperfusion and optimization, cardiopulmonary bypass was weaned. Postbypass TEE
Video 1. Transesophageal echocardiogram showing aortic root abscess and tricuspid valve vegetations. Color flow Doppler demonstrates a fistula between the aorta and the right atrium, just above the tricuspid valve.

Fig. 1. Intraoperative photographs demonstrating aortic valve involvement viewed through the aorta (a). After resection of the aortic valve, the abscess is seen involving the aortic root and atrioventricular septum (b). Right atriotomy revealed tricuspid valve involvement (c). Removal of all necrotic infected material left the aorta, left ventricle, right ventricle, and right atrium in open communication (d). Placement of anchoring sutures for Dacron patch reconstruction of atrioventricular septum (e). Completed repair of atrioventricular septum viewed through the aortic root (f).

Video 2. Intraoperative video demonstrating continuity of the aorta, left ventricle, right ventricle, and right atrium.

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Fig. 2. Completed repair of atrioventricular septum viewed through the right atrium (a). Implantation of a biologic prosthetic valve in the tricuspid position anchored in part on the new Dacron atrioventricular septum (b). A St Jude Biocor valve is placed into a Valsalva graft conduit (c) and secured with running polypropylene. Anchoring sutures were placed around a pseudoanulus, including several through the Dacron atrioventricular septal patch (d). Anchoring sutures placed through valved conduit with needle placed through bioprosthetic valve annulus and conduit (e). Aortic root replacement with left main coronary button reimplanted, ready for right main coronary artery reimplantation (f).

showed an intact septum with well functioning valve prostheses and no paravalvular leak. There was mild mitral regurgitation.

The patient was extubated on postoperative day one. He remained afebrile and surveillance blood cultures remained negative since surgery. He was initiated on long-term antibiotic therapy. He underwent permanent pacemaker implantation utilizing the epicardial leads placed at surgery. Blood cultures were negative following surgery and initiation of maintenance antibiotic therapy. He was discharged on postoperative day 16 and has since returned to his normal daily activities. He continues to do well at the time of this publication.

2. Comment

Tricuspid valve and aortic root endocarditis with such extensive destruction of the atrioventricular septum provides a reconstructive challenge. While bovine pericardium or other biologic material is generally preferred to synthetic material such as Dacron in an infected field, in this case, we used a large Dacron patch to separate the left and right hearts as the heavier material provided a more secure anchor for the tricuspid valve and composite aortic root replacement. Long-term survival has been described
in several cases of mitral and aortic valve endocarditis in which Dacron patch was used to reconstruct the intervalvular fibrous body [1, 2]. More important than choice of prosthetic material is the durable restoration of proper three-dimensional spatial geometry to allow proper planar localization of the prosthetic tricuspid valve and aortic root to avoid left ventricular outflow obstruction and coronary torsion.

References
