

Posterior Mitral Annuloplasty through the Aortic Root

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A case of mitral regurgitation associated with aortic root aneurysm treated with posterior mitral annuloplasty is presented. The annuloplasty was performed through the aortic annulus using valve-preserving aortic root reconstruction. Postoperatively, mitral regurgitation resolved, and the degree of aortic regurgitation decreased from severe to mild. Thus, we conclude that the transaortic approach is useful for simple mitral valve repair with concomitant aortic root surgery. (Ann Thorac Cardiovasc Surg 2005; 11: 264–6)

Key words: mitral valve repair, aortic root aneurysm, multiple valve surgery, aortic root remodeling

Introduction

Patients with underlying aortic root disease, including those with Marfan's syndrome, have progressive dilation of the aortic sinuses and dilation and distortion of the aortic annulus that results in aortic incompetence. If the structure of the aortic valve leaflet is unaffected, valve-preserving aortic root reconstruction^{1,2)} can be employed to correct aortic incompetence in these patients.³⁻⁵⁾ However, mitral insufficiency is often associated with aortic root disease. We present a case of aortic and mitral insufficiency caused by aortic root aneurysm without Marfan's syndrome that was treated with valve-preserving aortic root reconstruction and transaortic mitral annuloplasty.

Case Report

A 71-year-old woman was referred to our hospital for treatment of aortic regurgitation with aortic root aneurysm and mitral regurgitation. The patient had a 2-year history of palpitations, and there was no family history of Marfan's syndrome or other connective tissue diseases.

Patient height was 148 cm and weight was 76 kg. Blood

pressure was 146/48 mm Hg, and heart rate was 70 beats per min. A grade 3/6 to-and-fro murmur was auscultated over the left precordium, and a chest radiogram showed cardiomegaly. An echocardiogram demonstrated left ventricular end-diastolic/systolic diameter of 63/41 mm and markedly dilated sinuses of Valsalva (60 mm). Cardiac Doppler studies indicated the presence of severe aortic valve regurgitation and mild mitral valve regurgitation. Central regurgitant jets were present on color-flow imaging at the aortic and mitral positions. Angiography corroborated these findings and demonstrated normal coronary arteries and no involvement of the distal ascending aorta.

Correction of aortic dilation and incompetency of the aortic and mitral valves were treated during the same procedure. Following median sternotomy, cardiopulmonary bypass was established with bicaval drainage and axillary artery perfusion at mild hypothermia. The ascending aorta was clamped just proximal to the brachiocephalic artery. The aortic root was entered through a transverse incision, and the coronary orifices were perfused with cold blood cardioplegic solution. The left ventricle was vented with a cannula inserted through the right superior pulmonary vein and mitral valve. While the sinuses of Valsalva were markedly dilated, the structure of the aortic valve leaflets was generally normal. The diameter of the aortic annulus was 25 mm. The ascending aorta was transected just above the commissure, and the mitral valve leaflets were readily inspected through the aortic annulus (Fig. 1).

Posterior mitral annuloplasty was performed using the

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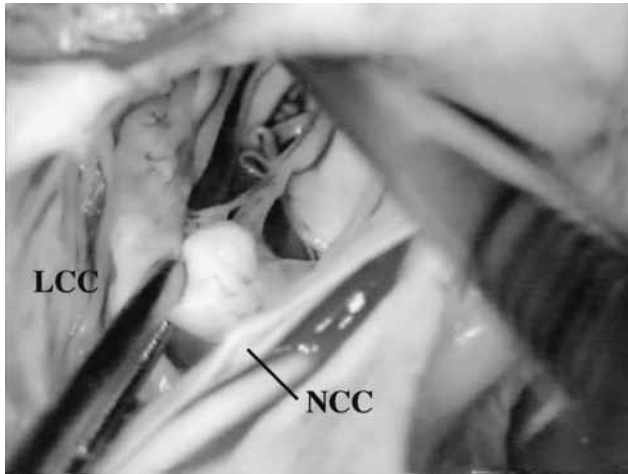


Fig. 1. Intraoperative findings. The mitral valve is seen clearly through the aortic annulus. The posterior mitral leaflet is pulled up.
NCC, noncoronary cusp; LCC, left coronary cusp

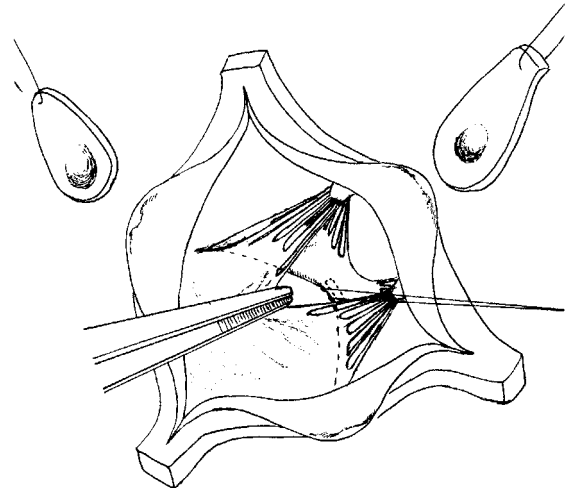


Fig. 2. An initial mattress suture is passed through the central position of the posterior mitral annulus.

flexible linear reducer (FLR).⁶ A 3-0 braided polyester suture was placed at the center of the posterior mitral annulus, and the suture was passed from the ventricle into the atrium through the posterior mitral annulus (Fig. 2). Applying traction to the mitral suture created an adequate view for placement of other sutures (Fig. 3). Multiple mattress sutures were placed in the posterior mitral annulus between fibrous trigones. The sutures were then passed evenly through the FLR, which was then lowered in position. After tying the sutures securely, the FLR was fixed on the atrial side of the posterior mitral annulus, and the mitral annuloplasty was completed (Figs. 4 and 5). The proximal ascending aorta was dissected circumferentially to just below the lowest portion of the aortic valve. All three sinuses of Valsalva were excised, except for the islands of aortic tissue from which the coronary arteries arose. Valve-preserving aortic root reconstruction was performed with a 24 mm Dacron graft following the “remodeling” procedure.² The mobilized coronary arteries were reattached by suturing the islands of aortic tissue to openings made in the graft and incorporating a circular strip of Teflon felt to add strength and protect the anastomosis. The upper end of the graft was then anastomosed to the aorta with multiple horizontal mattress sutures, and the distal anastomosis was reinforced with a Teflon felt strip. Bypass was terminated without complications, with aortic clamp time of 166 min and total bypass time of 206 min. The patient’s postoperative course was uneventful. Mitral regurgitation was not ob-

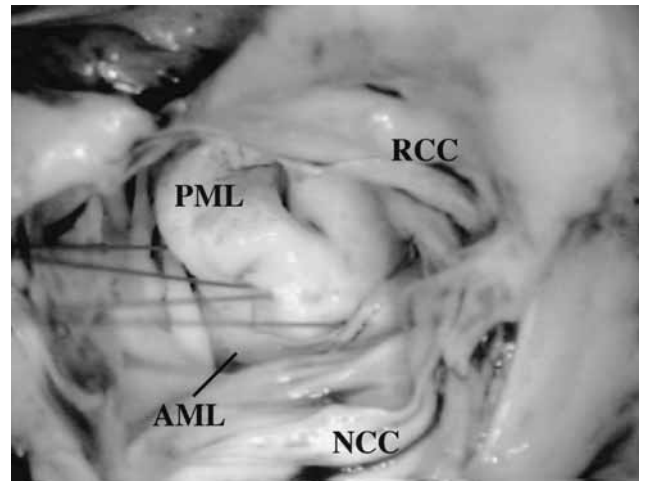


Fig. 3. Applying traction to the initial suture creates an excellent visual field for subsequent manipulation.
PML, posterior mitral leaflet; AML, anterior mitral leaflet; RCC, right coronary cusp; NCC, noncoronary cusp

served, and only mild aortic regurgitation was present on a postoperative transthoracic echocardiogram. The patient was discharged on the 17th postoperative day and remains asymptomatic.

Discussion

While several instances of mitral valve surgery through the aortic root have been previously described,^{7,8} this is the first report of posterior mitral annuloplasty performed in this manner. Crawford et al.⁷ demonstrated the advan-

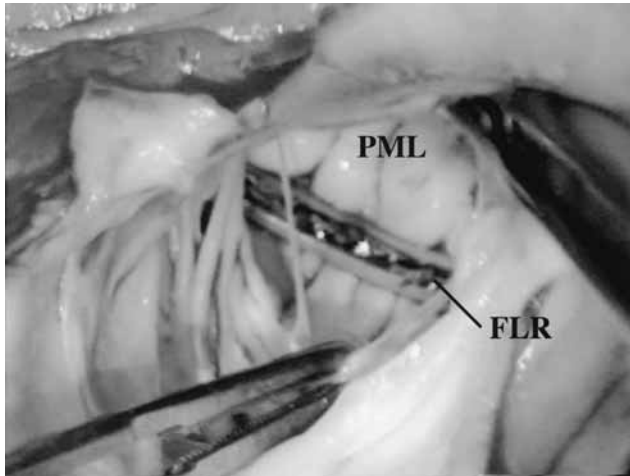


Fig. 4. The FLR is fixed at the atrial side of the posterior mitral annulus. The anterior mitral leaflet is pulled down. PML, posterior mitral leaflet; FLR, flexible linear reducer

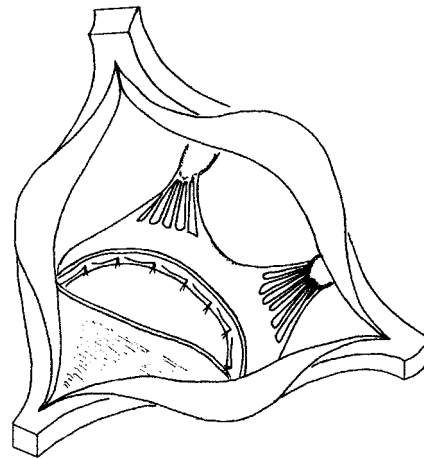


Fig. 5. Schematic view of the repaired mitral valve. The anterior cusp was cut for explanation.

tages of transaortic mitral valve replacement for patients with annuloaortic ectasia. For example, the transaortic approach provided excellent exposure for easy, rapid, and accurate mitral valve repair or replacement without the risk of injury to the heart and bleeding from cardiac suture line. Najafi et al.⁸⁾ described that the posterior leaflet could not be visualized prior to removal of the anterior leaflet. But in the present case, the posterior mitral annulus was easily identified, thereby dividing the obscuring anterior leaflet and attached chordae-papillary muscle complex. Posterior mitral annuloplasty via aortic annulus was safely completed.

With the present technique, it is difficult to determine the adequacy of mitral valve repair until cardiac activity has resumed. Therefore transaortic mitral valve surgery should only be employed in those patients that have co-existing dilated aortic root and mitral regurgitation. Mitral annuloplasty is appropriate for patients with a dilated mitral annulus with otherwise normal mitral apparatus. Valve replacement is recommended for other patients.

We employed FLRs for mild to moderate mitral regurgitation due to annular dilation.⁶⁾ Use of the FLR in the context of mitral regurgitation results in reduced left ventricular size and functional recovery.

Valve-preserving aortic root reconstruction with mitral valve repair is an ideal combination. Patients do not require postoperative anticoagulation therapy, and quality of life is likely improved.

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