Early bioprosthetic valve failure caused by preserved native mitral valve leaflets

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Abstract

The importance of preservation of subvalvular apparatus and valve-ventricular continuity during mitral valve replacement (MVR) has been suggested for many years. The chordal-sparing MVR has been shown to be superior to the standard MVR with chordal resection in terms of improved left ventricular function and has been considered to be a safe procedure. However, we encounter a rare case requiring early reoperation for bioprosthetic valve failure caused by preserved leaflets after chordal-sparing MVR.

Keywords: Mitral valve replacement • Failure • Bioprosthesis

CASE REPORT

A 42-year old female with a history of rheumatic fever as a child developed mitral regurgitation and eventually underwent mitral valve replacement (MVR) with a 27 mm Carpentier–Edward pericardial prosthesis (Edwards Lifesciences, Irvine, CA) at an outside hospital. Bioprosthetic valve was selected in order to avoid anticoagulation because of her history of haemorrhagic stroke. Because there was no severe leaflet and subvalvular fusion and thickening, all anterior and posterior chords were preserved in place without transposition at that time. She subsequently developed possible endocarditis on the prosthetic valve but treated with antibiotics successfully. She also had a stroke that may have been related to paroxysmal atrial fibrillation after surgery, but recovered without sequelae.

Four years later, the patient developed worsened dyspnoea on exertion and was referred to our hospital for evaluation. Transthoracic echocardiography revealed preserved left ventricular function with an ejection fraction of 65%, moderately dilated left atrium, and severe prosthetic stenosis with a mean gradient of 18 mmHg. There was also moderate tricuspid regurgitation. Transoesophageal echocardiography demonstrated severely restricted leaflet motion and commissural fusion of prosthetic valve, and moderate mitral regurgitation without any perivalvular leakage (Fig. 1).Cardiac catheterization showed normal coronary artery system, severe pulmonary hypertension with 73/27 mmHg, elevated pulmonary capillary wedge pressure of 29 mmHg and left ventricular end-diastolic pressure of 12 mmHg. The decision was made to proceed the reoperation.

The operation was performed through a redo standard median sternotomy. After dissecting adhesion around the heart, cardiopulmonary bypass was established through ascending aortic and bicaval cannulations. After the cross clamping and obtaining cardioplegic cardiac arrest, mitral valve was exposed through the right-sided left atriotomy. The bioprosthetic mitral valve was well incorporated into the annulus. On the excision of prosthetic valve, we observed that the preserved native anterior and posterior leaflets of native mitral valve were entirely adhesed on to the ventricular aspect of mitral prosthesis, causing a severe stenosis (Fig. 2). Leaflets of prosthetic valve itself were grossly normal. This valve was excised and replaced with a 29 mm new pericardial prosthesis (Carpentier–Edwards, Edwards Lifesciences, Irvine, CA). Concomitant tricuspid annuloplasty and maze procedure were also performed. The procedure was completed uneventfully, and the patient recovered well. Postoperative echocardiogram demonstrated well-functioning mitral prosthesis with a mean gradient of 5 mmHg. There were no mitral and tricuspid regurgitations.

DISCUSSION

Compared to MVR with chordal resection, preservation of subvalvular apparatus and valve–ventricular interaction was proved to play an important role in preserving left ventricular regional wall motion and global function [1]. Furthermore, it may help prevent serious complications of mitral valve surgery such as myocardial rupture. Nonetheless, in our case, complete preservation of the mitral leaflets led to early failure of the valve. Although the structural valve deterioration is a common form of bioprosthetic failure especially in young patient as our case [2], the valve itself was grossly normal and the adhesion of preserved leaflets was the only cause of severe mitral stenosis and regurgitation.

Recent improvement in bioprosthetic valve in terms of long-term durability and the ability to avoid anticoagulation make us increasingly use bioprostheses for valve replacement [3]. Even in such an enthusiastic era of bioprostheses, we should be aware that there have been a few reports of rare early bioprosthetic failures.
failures requiring reoperation after chordal-sparing MVR. Fasol and Lakew [4] reported early thrombotic occlusion of cusps presumably due to blood turbulences between preserved posterior leaflet and cusps of the implanted bioprosthetic valve. In our case, we could not find any thrombus formation. However, our patient was complicated by possible endocarditis after her original surgery. Inflammation occurred in situ might enhance the progression of leaflet adhesion between native valve leaflets and cusps of the implanted valve. Robertson et al. [5] reported two similar cases to ours. In one case, both leaflets chordae were spared without any transposition for myxomatous mitral valve prolapse. In the other case, chordal-sparing MVR with an anterior leaflet incision and transposition towards posterior leaflet was performed for rheumatic mitral stenosis. They advocated that an alternative surgical method of preserving the subvalvular apparatus [6], rather than simply preserving whole leaflets, could prevent this rare complication. These cases, including ours, initially underwent successful chordal-sparing MVR but developed severe mitral stenosis due to adhesions of native mitral leaflet after 3–5 years of initial surgery. Although this rare complication could not be predicted, careful echocardiographic follow-up may be warranted especially in patients with recurrent symptoms in the intermediate term after chordal-sparing MVR with bioprostheses. These reports, including ours, are not suggested as a reason to abandon this valuable technique but rather to alert surgeons to possible complications.

Conflict of interest: none declared.

REFERENCES