Mitral valve plasty for a hammock mitral valve in an adult patient

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Abstract

A 50-year old woman presented with arterial thrombosis in the right leg. Echocardiography revealed a mobile left atrial thrombus and severe mitral stenosis. She underwent a left atrial thrombectomy, the maze procedure and mitral valve plasty. Anterior and posterior mitral leaflets arose directly from the anterior papillary muscle, and from the posterior papillary muscle intervened by short chordae. This suggested a hammock mitral valve. A posterior papillary muscle division and commissurotomy were performed. The anterior leaflet was divided off the anterior papillary muscle, then extended by a triangular-shaped autologous pericardial patch and apically reattached. The postoperative mean pressure gradient of the mitral valve was 2.2 mmHg, and there was no regurgitation. The patient was in NYHA Class 1 and in sinus rhythm, 14 months after the operation.

Keywords: Hammock mitral valve • Mitral valve plasty • Pericardium • Congenital mitral valve stenosis

INTRODUCTION

Congenital mitral valve diseases are rare anomalies usually manifesting in childhood. Hammock mitral valve is characterized by underdeveloped or absent chordae tendineae, abnormally hypertrophic papillary muscles reaching their tips just underneath the leaflet, resulting in mitral stenosis, regurgitation or both [1]. We describe a rare case of a hammock mitral valve surgically repaired in an adult.

CASE

A 50-year old woman was admitted to our hospital complaining of right leg pain and coldness. She had no history of rheumatic fever. An electrocardiogram showed atrial fibrillation. Whole-body computed tomographic scans with contrast enhancement revealed occlusion of the right superficial femoral artery, left renal infarction and left atrial thrombi. Echocardiography revealed two mobile thrombi in the right leg. She had no history of rheumatic fever. An electrocardiogram showed atrial fibrillation. Whole-body computed tomographic scans with contrast enhancement revealed occlusion of the right superficial femoral artery, left renal infarction and left atrial thrombi. Echocardiography revealed two mobile thrombi in the right leg. She had no history of rheumatic fever. An electrocardiogram showed atrial fibrillation. Whole-body computed tomographic scans with contrast enhancement revealed occlusion of the right superficial femoral artery, left renal infarction and left atrial thrombi. Echocardiography revealed two mobile thrombi in the right leg. She had no history of rheumatic fever.

Under general anesthesia, balloon thrombectomy of the right superficial femoral artery was performed at first, followed by cardiac surgery. A mini-right thoracotomy approach under endoscopic assistance, with femoro-femoral cardiopulmonary bypass was used. After cardioplegic arrest, a right-side left atriotomy was completed using a CO₂-based cryoprobe. The mitral valve leaflet had no calcification. A circular fibrous ring was recognized inside the mitral annulus. A saline injection test showed an almost competent valve (Fig. 2A). Antero-lateral commissurotomy and direct attachment of the anterior and posterior leaflets to bulky anterior papillary muscle were observed. The antero-lateral half of the mitral valve was funnel-shaped without communication to the left ventricle. From the posterior papillary muscle, short and rudimentary chordae arose and connected to medial side leaflets giving a limited valve opening (Fig. 2B). These were the typical findings of congenital mitral stenosis, also called a ‘hammock valve’. We repaired the valve because the leaflet tissue was pliable, the patient was relatively young and the annular size seemed equivalent to that of a 25 mm prosthetic valve which is relatively small for her body surface area of 1.79 m². Initially, the leaflet edge of A1 to A2 was detached from the anterior papillary muscle. Then, commissurotomy of the anterior commissure was made. A triangular shaped, 2 cm in width and 3 cm in height, glutaraldehyde-treated autologous pericardial patch was prepared. The base of the pericardial patch was sutured to the cut margin of the anterior leaflet, and the summit was fixed to the basal part of the anterior papillary muscle, relocating the connection point of the anterior leaflet more apically than the original point (Fig. 2C and D). We intended that the basal part of the triangular pericardial patch act as an augmented coaptation zone, and the pointed
summit part as chordae tendineae. For the posterior papillary muscle, a longitudinal papillotomy was made. After these procedures, a 22 mm-sized cylindrical sizer just passed the mitral orifice. A saline injection test showed a competent valve, and a prosthetic ring was not placed. The fibrous intramitral ring was left untoucheed. After the left atrium was closed, a tricuspid annuloplasty ring (32 mm Cosgrove Band, Edwards Lifesciences, Irvine, CA, USA) was placed. Her postoperative course was uneventful. On postoperative echocardiography, the mean transmitial pressure gradient was 2.2 mmHg. Mobility of the anterior mitral valve increased (Fig. 1B), mitral regurgitation was trivial and there was no tricuspid regurgitation. The patient was in NYHA Class I, free of anticoagulation and in sinus rhythm 14 months postoperatively. Follow-up echocardiogram taken 1 year after surgery showed a left ventricular ejection fraction of 57%, pliable pericardial mitral leaflet without regurgitation and transmitral mean pressure gradient of 2.5 mmHg.

DISCUSSION

Hammock mitral valve, also called anomalous mitral arcade [2], is caused by developmental arrest occurring during differentiation of muscle into chordal tissue. Leaflets are connected to papillary muscles directly or intervened by short, rudimentary chordae [1, 2]. Supra-annular mitral ring is sometimes accompanied by a hammock mitral valve. Remenyi and Gentles [3] reported that a supramitral ring is usually located between the left atrial appendage and the mitral annulus but sometimes at a subannular position as an ‘intramitral ring’, as observed in our patient.

Few reports exist about patients with a hammock mitral valve operated on in adulthood, and usually valve replacement was performed when the predominant feature was mitral stenosis [4]. Although placement of an adequate-sized prosthesis is usually possible in an adult, valve repair may be considered if the leaflets...
retain pliability. In this patient, we relieved the stenosis by commissurotomy, papillotomy and apical reattachment of the extended leaflet. Although it is an unusual technique to substitute en bloc pericardium for leaflet and chordae, we previously reported its effectiveness [5]. The mitral orifice area after repair was not optimal, although the transmitral mean pressure gradient was acceptable. Replacement with a mechanical valve could be a reasonable option in this case, especially in regard to haemodynamics. However, we preferred slightly less orifice area after repair, instead of lifelong anticoagulation.

CONCLUSION

We described a rare case of a hammock mitral valve in an adult, with surgical images recorded by high-definition endoscopy.

Conflict of interest: none declared.

REFERENCES