A 61-year-old male patient was referred to us for a heart murmur and worsening exercise tolerance. He had a history of diabetes mellitus, which was controlled with oral medication. On admission, an ECG showed a sinus nodal rhythm with a complete right bundle-branch block. Transthoracic echocardiography revealed that the peak pressure gradient across the left ventricular outflow tract was 80 mmHg. The ventricular septum was asymmetrically hypertrophied, and its thickness was 26 mm. Furthermore, moderate-to-severe mitral valve regurgitation with systolic anterior movement of the anterior leaflet was observed. Transesophageal echocardiography showed systolic anterior motion of the anterior leaflet with moderate-to-severe mitral valve regurgitation. There was a discrepancy between the anterior leaflet and posterior leaflet owing to the elongation of the anterior leaflet (Figure 1A and 1B, Movie I in the online-only Data Supplement). In a short-axis view, there was excess tissue at the edge of the anterior mitral leaflet (Figure 1C and 1D, Movies II and III online-only Data Supplement). There was no finding of an anterior displacement of the papillary muscles. Coronary angiography showed significant stenosis at the right coronary artery.

The patient underwent an extended myectomy of the ventricular septum with mitral valve repair and coronary artery bypass (a saphenous vein graft to the right coronary artery and the left internal mammary artery to the posterior lateral branch). A cardiopulmonary bypass was initiated, and cardiac arrest was obtained. Through the ascending aortotomy, an 11-blade knife was inserted into the apex of the left ventricle and 2 parallel longitudinal incisions were made into the septal bulge and connected to remove the muscle mass. The mitral valve leaflet was examined via an aortotomy and left atriotomy. There was excess tissue with chordal attachment at the edge of the anterior leaflet (Figure 2). This tissue could be retracted toward the left ventricular outflow tract easily with a nerve hook. The excess tissue was carefully resected with an attached chordae, and leaflet continuity was restored by using 5-0 interrupted sutures. Finally, 3 pieces of excess tissue were resected from the anterior leaflet. No mitral regurgitation was observed with the use of the saline test via a left atriotomy. The height of the posterior leaflet was 18 mm.

Coming off the cardiopulmonary bypass was uneventful. The patient was extubated on the operative day, and the postoperative course was uneventful. Transesophageal echocardiography before discharge showed mild mitral valve regurgitation without systolic anterior motion, and the pressure gradient across the left ventricular outflow tract was 10 mmHg (Figure 3, Movie IV online-only Data Supplement). An ECG showed sinus rhythm. Histology of the resected cardiac muscle did not show typical disarray of cardiomyocytes. The patient was discharged uneventfully.

It is well known that some patients have hypertrophic obstructive cardiomyopathy that is associated with anomalies of the mitral subvalvular apparatus. These anomalies include direct papillary muscle insertion to the mitral leaflet, fusion of the papillary muscle and the ventricular septum, abnormal chordae attachment to the septum, and increased area and elongation of the leaflets. If these abnormalities are not repaired in addition to septal myectomy and myotomy, left ventricular outflow obstruction may not be satisfactorily relieved. Several techniques for repairing elongation of the anterior leaflet have been reported. Balaram et al reported the resection-plication-release strategy for repairing hypertrophic cardiomyopathy. As part of the repair process, they plicated the anterior mitral leaflet horizontally, and this usually results in a plication of 2 to 5 mm depending on the redundancy of the leaflet. They concluded that durable long-term results could be expected by using their resection-plication-release strategy. Other case reports showed a partial resuspension of the anterior mitral leaflet by connecting the left aspect of the leaflets to the posterior papillary muscle by using artificial chordae or complete resuspension of the anterior mitral leaflet by using...
the loop artificial chordae from both papillary muscles. In our case, we resected the excess tissue of the anterior mitral leaflet. An aortotomy revealed that the edge of the anterior leaflet was retracted by a nerve hook. Using this procedure, we ensured the redundancy of the mitral leaflet tissue and performed accurate resection of the tissues. It was obvious that this excessive mitral valve tissue played an important role for systolic anterior motion. Thus, we believe that it was difficult to improve the pressure gradient across the left ventricular outflow tract by using only myectomy and myectomy without the addition of the mitral leaflet resection technique.

In conclusion, in select cases of hypertrophic obstructive cardiomyopathy with mitral valve leaflet elongation, anterior mitral leaflet resection with septal myectomy can result in a more complete relief of the left ventricular outflow obstruction.

Disclosures

None.

References


Figure 1. Preoperative echocardiography. A, Preoperative transesophageal echocardiography in systole showed severe mitral regurgitation and systolic anterior motion of the anterior mitral leaflet. B, Color Doppler image of A. C, Preoperative 3-dimensional transesophageal echocardiography in early systole showed excess tissue at the edge of the anterior mitral leaflet (view from the left ventricular side). D, Preoperative transthoracic echocardiography in short-axis view showed excess mitral leaflet tissue at the edge of the anterior leaflet like the 3 sisters in Australia.
Figure 2. Intraoperative photograph of the excess tissue of the anterior mitral leaflet. Through the transverse aortotomy, there was excessive tissue at the edge of the anterior mitral leaflet.

Figure 3. Postoperative transesophageal echocardiography. Postoperative echocardiography in systole showed improved systolic anterior motion and decreased thickness of the ventricular septum. Pressure gradient across the left ventricular outflow tract was 10 mmHg.
Excess Anterior Mitral Leaflet in a Patient With Hypertrophic Obstructive Cardiomyopathy and Systolic Anterior Motion
Satoshi Numata, Hitoshi Yaku, Kiyoshi Doi, Sachiko Yamazaki, Tsuneyasu Yamamoto, Takuma Kobayashi, Kaichiro Manabe and Kohei Kawazoe

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