Case Report

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Extended septal myectomy for midventricular obstruction in hypertrophic cardiomyopathy

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Abstract

Midventricular obstruction (MVO) is a rare form of hypertrophic cardiomyopathy (HCM). While surgical treatment for HCM is among the most technically challenging cardiac operations for acquired disease, surgery for MVO is rarely reported. A 38-year-old man was admitted to our hospital with a cough and dyspnea. Transthoracic and transesophageal echography and computed tomography revealed extensive left ventricular hypertrophy, extending from the anteroseptal wall to the apex, and marked papillary muscle hypertrophy. We underwent septal myectomy via aortotomy (Morrow procedure) and apical surgery. Extended myectomy provides the best exposure to the hypertrophied septum and improves the functional status of patients.

Keywords

Cardiomyopathy, hypertrophic, obstruction, myectomy

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Introduction

Midventricular obstruction (MVO) is a rare form of hypertrophic cardiomyopathy (HCM). MVO is less common than subaortic obstruction.[1]

We describe a rare case of MVO that was treated using a combined transaortic and apical approach (extended myectomy) and by excising the thickened muscles. Our approach resulted in excellent functional improvement and relief from outflow tract obstruction.

Case report

A 38-year-old man was admitted to our hospital with a cough and dyspnea. His medical history included hypertension, dyslipidemia, type 2 diabetes mellitus, and ablation for atrial flutter. He had no family history of heart disease. Transthoracic and transesophageal echography and computed tomography revealed widespread left ventricular (LV) hypertrophy from the anteroseptal wall to the apex, as well as marked papillary muscle hypertrophy with normal positioning. The LV diastolic dimension was 48 mm, the LV systolic dimension was 33 mm, the intraventricular septal thickness in diastole was 18 mm, the LV posterior wall thickness in diastole was 11 mm, and the LV ejection fraction was 59% (Figure 1(a)). Further assessment revealed grade 3 tricuspid regurgitation. Mitral valve regurgitation and anterior systolic motion of the mitral valve were not observed. Median sternotomy was performed, and standard cardiopulmonary bypass was established with ascending aorta and bicaval venous cannulation. An aortic cross-clamp was applied, and antegrade cold blood cardioplegia was initiated. Transverse aortotomy was performed, and the classical portion of myectomy involved making parallel longitudinal incisions in the septum using the 11th scalpel blade, as described by Morrow[1] (Figure 2(a)). The left anterior descending artery (LAD) was identified, and an apical

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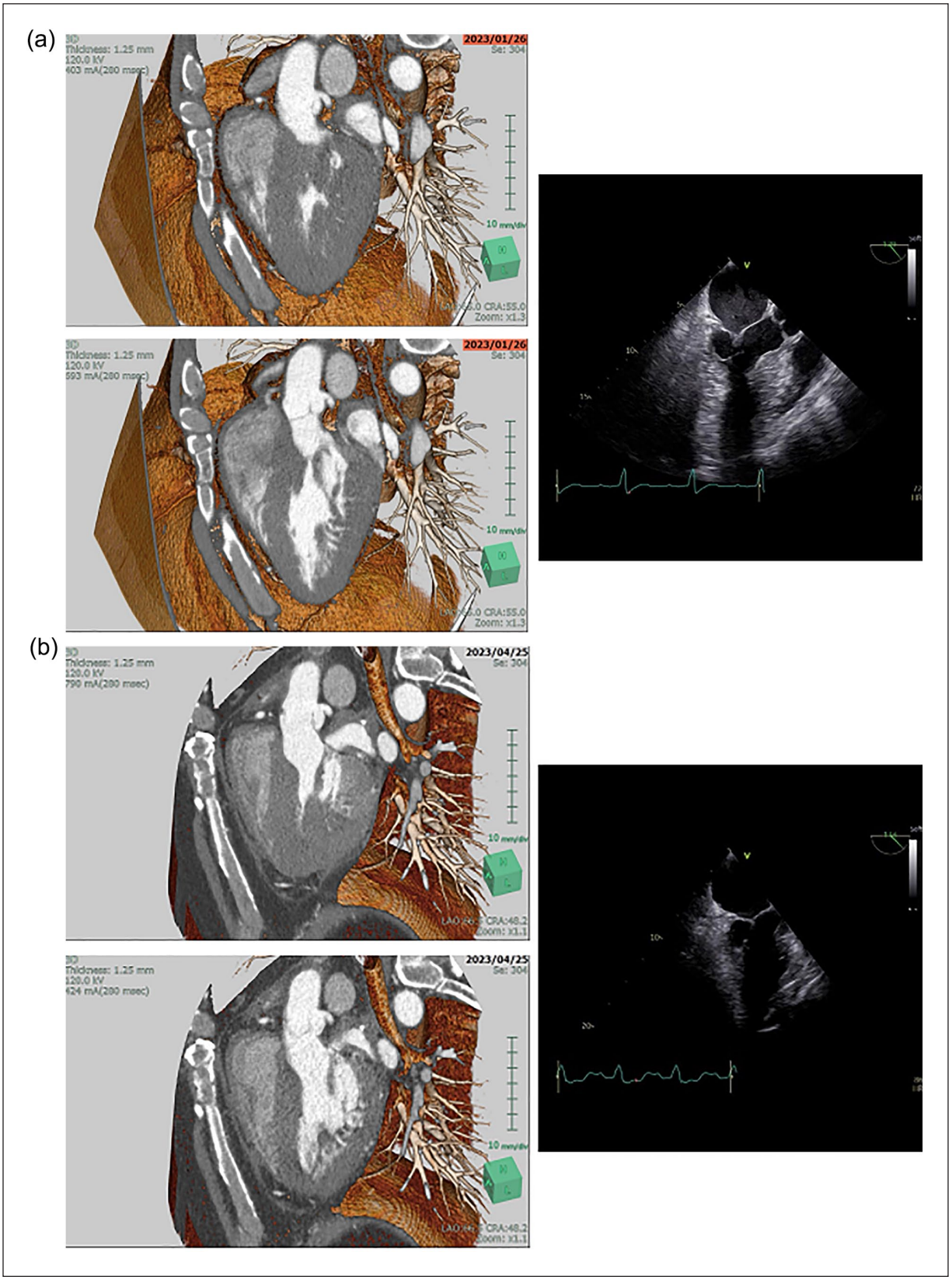

Figure 1. Computed tomography images. (a) Preoperative computed tomography images at the systolic (left upper) and diastolic phases (left lower). Diastolic transesophageal echography (right) showing widespread left ventricular (LV) hypertrophy from the anteroseptal wall to the apex. (b) Postoperative computed tomography images at the systolic (left upper) and diastolic phases (left lower) and transesophageal echography at the diastolic phase (right) show an improved LV cavity.

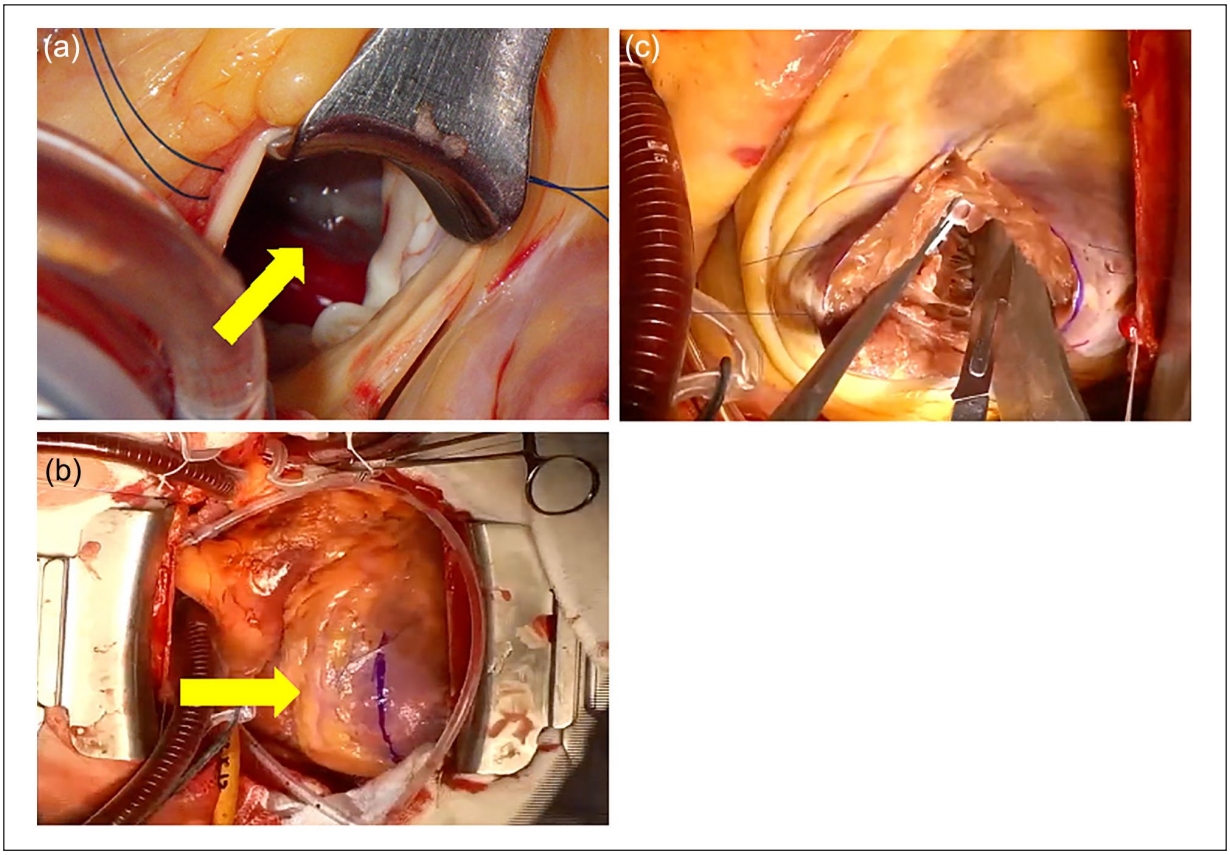

Figure 2. Septal myectomy. (a) A transaortic view of the bulging hypertrophied septum below the right coronary valve leaflet (yellow arrow). (b) An apical incision is made in the avascular area, approximately 6 cm in length, 2 cm lateral to the left anterior descending artery (yellow arrow). (c) Combined transapical and transaortic myectomy was performed in the left ventricular cavity using the 11th scalpel blade.

incision was made in the avascular area, approximately 6 cm in length, 2 cm lateral to the LAD. A combined transapical and transaortic and myectomy was performed to address the widespread LV hypertrophy from the anteroseptal wall to the apex (Figure 2(b) and 2(c)). The hypertrophied anterolateral papillary muscle was partially resected. The ventriculotomy was repaired using reinforcement with two layers of felt strip, and tricuspid valve annuloplasty with a 28-mm Physio Tricuspid ring (Edwards Lifesciences, Irvine CA, USA) was also performed. The cardiopulmonary bypass and aortic cross-clamping times were 187 and 123 min, respectively.

The postoperative course was uneventful, and the patient was discharged from the hospital on day 17 after surgery. Postoperative echography and computed tomography 1 month postoperatively revealed a smaller LV cavity. The LV diastolic dimension was 48 mm, the LV systolic dimension was 33 mm, the intraventricular septal thickness in diastole was 12 mm, the LV posterior wall thickness in diastole was 9 mm, and the LV ejection fraction was 59% (Figure 1(b)). Following the partial resection of the papillary muscle, mitral valve regurgitation was not observed. After 6 months of follow-up, the patient had no signs of heart failure.

Discussion

MVO was found in approximately 10% of patients with HCM in a large-scale prospective study.[2,3] Patients with MVO had a significantly greater likelihood of HCM-related deaths than those without MVO.[1] While surgical treatment for HCM is among the most technically challenging cardiac operations for acquired disease, surgery for MVO is rarely reported. Conventional transaortic septal myectomy, also known as the Morrow procedure, is the standard technique for treating HCM.[4] However, surgery for MVO is challenging because of the septal bulge's limited exposure through the aortotomy view. However, Kunkala et al.[1] reported that MVO was most easily exposed through a transapical incision. The contact lesion that was uniformly present guided the excision of the septum. The intraoperative measurement of gradients was especially helpful in patients with combined subaortic and MVO.

In our case, we first performed conventional septal myectomy by the Morrow procedure, followed by combined transapical and transaortic myectomies in the LV cavity and resection of the hypertrophied anterolateral papillary muscle (Figure 2). These procedures helped enlarge the LV cavity, providing satisfactory late results (Figure 1(b)). Therefore, we strongly recommend considering extended septal myectomy with combined transapical and transaortic myectomy followed by resection of the hypertrophied papillary muscles to treat MVO cases. In the present case, because the papillary muscles showed marked hypertrophy on preoperative echography and computed tomography, the anterolateral papillary muscles were resected. There are very few reports on the surgical treatment of papillary muscles. However, Kunkala et al.[1] have reported that the hypertrophied and prominent anterolateral papillary muscle can be evenly shaved to reduce further obstruction of blood flow at the mid-ventricle.

Conclusion

In conclusion, through this case, we demonstrate that extended myectomy provides the best exposure for the hypertrophied septum and papillary muscles in patients with MVO, improving their functional status.

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None.

Author contributions

All authors have made substantial contributions to the conception and design, have been involved in drafting the manuscript and revising it critically for important intellectual content, and have given final approval of the version to be published.

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Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

Informed consent

Written informed consent was obtained from the patient for their anonymized information to be published in this article.

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