

# So Many Ways. . .

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## Abstract

Enlargement of left ventricular outflow tract using an autologous pericardial patch for the anterior mitral valve leaflet and septal myectomy through trans-mitral approach for the hypertrophic obstructive cardiomyopathy Zhang et al (1) describe their experience in septal myectomy for hypertrophic obstructive cardiomyopathy. Of 247 consecutive cases with HOCM treated during 2016-2019 with a variety of techniques, this report is on 16 patients who underwent trans-mitral septal myectomy and enlargement of left ventricular outflow with an autologous pericardial patch in transverse configuration. The technique reportedly decreased the gradient from average 90+ to 10+ mm Hg and resolved systolic anterior leaflet motion in all with only mild residual mitral regurgitation. There were no deaths or any other major complications in this group. It is a small group of patients with excellent result but no definitive conclusion can be drawn regarding validity of the technique from this study. The controversy remains regarding the approach, trans-aortic vs. trans-mitral and whether leaflets should be left alone, plicated or lengthened as well as whether mitral valve should be repaired or replaced in addition to septal myectomy. One certainty remains, extended myectomy done either way, is the foundation of the surgical treatment of hypertrophic cardiomyopathy.

Commentary: So Many Ways. . .

Enlargement of left ventricular outflow tract using an autologous pericardial patch for the anterior mitral valve leaflet and septal myectomy through trans-mitral approach for the treatment of hypertrophic obstructive cardiomyopathy

Zhang et al (1) describe their experience in septal myectomy for hypertrophic obstructive cardiomyopathy. Of 247 consecutive cases with HOCM treated during 2016-2019 with a variety of techniques, this report is on 16 patients who underwent trans-mitral septal myectomy and enlargement of left ventricular outflow with an autologous pericardial patch in transverse configuration. The technique reportedly decreased the gradient from average 90+ to 10+ mm Hg and resolved systolic anterior leaflet motion in all with only mild residual mitral regurgitation. There were no deaths or any other major complications in this group. It is a small group of patients with excellent result but no definitive conclusion can be drawn regarding validity of the technique from this study. The controversy remains regarding the approach, trans-aortic vs. trans-mitral and whether leaflets should be left alone, plicated or lengthened as well as whether mitral valve should be repaired or replaced in addition to septal myectomy. One certainty remains, extended myectomy done either way, is the foundation of the surgical treatment of hypertrophic cardiomyopathy.

HCM is an autosomal dominant hereditary disease with variable penetration affecting one in 500-1000 population. Obstructive type comprises of 70% of disease spectrum (2). Mitral valve abnormalities are frequent and in some, abnormal papillary muscles are present. In the obstructive CM about 70% have abnormal mitral valve leaflets, usually longer relative to the size of LV cavity. In nonobstructive subset, AML is elongated as well, basically due to a phenotypic expression. An average size of anterior mitral leaflet (AML) is 24 mm in normal subjects, whereas patients with HOCM have average length of 34 mm. The leaflet protrudes into LV 26 mm above the mitral annular plane vs. 13 mm in normal hearts. Often a residual AML extends past

the coaptation point. MV is only restricted by LV and these free-floating leaflets lead to systolic anterior motion (SAM) of mitral valve (3).

Surgical septal reduction therapy in eligible patients refractory to medical treatment is a Class I (LOE :C), Class IIa (LOE: B), eligibility is defined as severe symptoms refractory to optimal medical treatment, dynamic LVOT gradient >50 mm Hg and targeted anterior septal thickness sufficient to perform the procedure safely and effectively, usually 18 mm or more (4). Trans-aortic approach to septal reduction surgery is more widely practiced and with excellent results. A vast majority of these cases did not require mitral valve intervention despite having elongated AML (5). It was felt that an extended myectomy beyond the point of septal contact adequately relieves LVOT obstruction, SAM and its associated mitral regurgitation. The incidence of mitral valve repair has been reported as low as 4.9% (5,8,10). In another study of patients treated with surgical septal reduction, 62% had AML plication (when elongated) in addition to extended septal myectomy and were compared to those with just extended myectomy alone, no statistically significant difference was found in reduction of gradient, relief of SAM and survival. The procedures were performed transaortic (6).

Trans-mitral approach whether through the left or right atrium has some advantage in exposure especially if the aortic annulus is small or the aorto-mitral angle is less than 120 degrees causing acute angulation (7). The techniques to visualize the IV septum vary between cutting all the AML attachments and then restoring these with artificial chords (9) or detachment of AML from annulus and primary reattachment or patch interposition as in the present study as well as others (1,13). The modes of re-attachment were with or without autologous pericardial patch. The results of have been generally very good but most of the series have been small, consisting of less than 30 patients in most. The approach may also be used primarily in patients with intrinsic MV disease which is not repairable requiring mitral valve replacement (14).

When anterior leaflet extension is employed, the mechanism of reduction in SAM and MR could possibly be stiffening of the AML counteracting the flow drag thus preventing inward displacement of papillary muscles and buckling of central portion of MV apparatus (12). This effect may not be solely due to leaflet extension with a patch.

The recognition of MV abnormalities have led to a variety of approaches to the mitral valve with septal reduction. Perhaps tailoring the procedure to the morphology such as in patient with less hypertrophy (septal thickness < 18 mm) and more dynamic obstruction with SAM, additional mitral valve procedures such as horizontal plication of AML or transverse patch approximation of detached AML would be beneficial. Mitral valve replacement for those where valves are not repairable due to rheumatic disease (14). A trans-aortic or trans-mitral approach to correction of hypertrophic obstructive cardiomyopathy hinges on the dominant anatomical feature of the disease (15). Full sternotomy, partial sternotomy, right anterior mini-thoracotomy, lateral approach or robotic assisted, are all dealers' choices.

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