



CASE REPORT

A Hypertrophic Cardiomyopathy Patient with Post Exercise Gradient about 45

Running Title: Coronary Artery Bypass Graft, Mitral Valve Replacement and Septal Myectomy

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ABSTRACT

Introduction: Surgical septal myectomy has brought a considerable increased survival from all cause mortality and even hypertrophic cardiomyopathy related mortality in comparison with unoperated hypertrophic cardiomyopathy. Case presentation: **Case Presentation** A fifty-five man who referred to Tehran Heart Center Hospital in April 2009 with dyspnea on exertion grade (NYHA class III) and chest pain (NYHA grade II) and occasional palpitation. **Conclusion:** The left ventricular outflow tract gradient increment leads to hemodynamic obstruction. The recommended treatments for patients with this problem varied from medical treatments to surgical myectomy and septal ablation. We herein depicted the multi problem case which undertaken multiple management in one operation.

INTRODUCTION

Surgical septal myectomy is the treatment of choice in case of severe heart failure with poor prognosis or refractory to medications, as well as patients who have considerable functional limitation (NYHA III, IV) or reveals left ventricle out flow tract obstruction under basal conditions and physiologic exercises ($G \geq 50$) (1).

The septal myectomy is a surgical procedure for removing a portion of thickness of hypertrophied septum. This procedure has brought a considerable increased survival from all cause mortality and even hypertrophic cardiomyopathy (HCM) related mortality in comparison with unoperated HCM. The outcome of the surgery depends on to the degree of pressure decompensation and elimination of valvular leakage (2).

Herein, we present the case who was candidate for coronary bypass graft surgery and mitral valve replacement, but his post exercise out flow tract gradient is borderline. We will discuss around the risks and benefits of these procedures if performed all together in the same time.

CASE PRESENTATION

A fifty-five man who referred to Tehran Heart Center Hospital in April 2009 with dyspnea on exertion grade (NYHA class III) and chest pain (NYHA grade II) and occasional palpitation. He was former smoker and had addiction to opioids. He was a professional boxer. He had a history of cerebrovascular accident (CVA) five months ago and had some

speech problems. Also, he has a history of type II diabetes mellitus. The only finding of his physical examination was an III/VI systolic murmur that was audible at apex. His Electrocardiogram (ECG) pattern was AF rhythm. ECG showed no ischemic changes. Transthoracic echocardiography (TTE) showed Left Ventricle (LV) segments hypertrophic except posterior basal and inferior basal without considerable left ventricle outlet gradient (LVOT) ($pG=7$). Other echocardiographic findings were moderate to severe mitral stenosis (MS) and Moderate mitral regurgitation (MR) as well as mild tricuspid regurgitation (TR). Also, severe calcification of posterior annulus and both mitral leaflets had been visualized. Right Ventricle (RV) size and function were in normal range. According to these findings exercise stress echocardiography (SE) was recommended. SE showed severely dilated left atrium and its increased size to 60 mm. Interventricular septum diameter was detected 19 mm and posterior wall diameter and cardiac ejection fraction were measured 13 mm and 55%, respectively. The left ventricular outflow tract (LVOT) gradient after exercise reached to 45 mmHg and pericardium was normal. Diagnostic cardiac catheterization and angiography were performed and revealed that an atherosclerotic plaque in obtuse marginal (OM) artery. Right circumflex artery (RCA) was dominant and had cutoff from mid portion. (Two vessel disease, Severe MS). Informed written consent was obtained from the patient. In operation room, he underwent general anesthesia and his heart was approached via median sternotomy. Antegrade cardioplegia

was administered. Four veins graft were placed on OM1, OM2, RCA and RCA branches. Cardiopulmonary bypass (CPB) time and Aortic cross clamp time were 324 and 242 minutes, respectively. The mitral valve leaflets were calcified with stony composition, so, a great patch of pericardium had been taken to make a basis for prosthetic mitral valve. For myectomy a wedge cut performed between right and left leaflet. The type of mechanical valve which used for this patient was ST. Jude 25. Retrograde cardioplasia was done. The patient was weaned from CPB without any problem. Post CABG TTE performed on 15th day of post-operative period showed LV size and function in satisfying condition, mild to moderate LVH and mild LVOT dynamic obstruction. Also, the mechanical prosthetic valve with increased mean (MVG), high normal RV size with mildly reduced RV systolic function; trivial TR; mild pulmonary arterial hypertension (PAH) and mild pericardial effusion were detected. The patient was discharged from hospital in good condition on 17th day post procedure. Now after about seven months he hadn't cardiac related signs and symptoms.

DISCUSSION

Fifty years ago, Brock presented the first modern depiction of HCM according hemodynamic at cardiac catheterization or operation in 1957 (3). In 1958 Teare described the same case from the autopsy laboratory (4).

According to the echocardiographic reference books the treatments which offered for HCM is varied, from medical treatments such as beta-blockers and calcium channel blockers to surgical choices such as surgical myotomy, myectomy or alcohol ablation of septum. The mechanism of surgical treatment defers to lightening hemodynamic deviances involving MR and outflow tract obstruction. Successful procedure outcomes were acute and effective attenuation of the proximal septum and relieving the notable outflow obstruction or mitral regurgitation. The alternative HCM treatment would be dual-chamber pacing, employing to improve abnormal short diastolic filling period (5, 6).

Septal myectomy indications including; resistance to appropriate medical therapy such as β -adrenergic and calcium channel blocker, pacemaker therapy, septal ablation, as well as, high LV outflow gradient at rest position (usually greater than 50 mmHg). Another indication for surgical myectomy is trivial or distant gradients at rest which increase (more than 50 mmHg) by exercise (isoproterenol), after an ectopic beat, or ending the exercise phase. Episode of atrial fibrillation is considered as another indication of surgical myectomy. Consequently, patients with limited symptoms but severe increased LVOT gradients especially if there is considerable simultaneous mitral regurgitation or history of faint or obscure cardiac arrest and young-age patients who had experienced gradient elevation more than 100 mmHg are candidate for operation. As a result, coronary artery bypass grafting (CABG) alone doesn't alleviate symptoms in patients with HCM and coronary artery disease, so in HCM patients who also, suffer from coronary artery disease both CABG and septal myectomy are advisable (7).

To the best of our knowledge, there was no data about non-obstructive HCM patients who get candidate for simultaneously

valve repair and CABG surgery. In Dimitrow et al. study 37 non-obstructive HCM patients were studied. The mean value of septal wall thickness in these patients were 23.3 ± 4.1 mm. Patients were on medical treatment with verapamil or beta blockers. They aimed to improve the diagnosis of obstruction by inducible gradient through exercise, even in patients without obstruction in supine resting position. In these patients LVOT gradient at rest and in supine position was less than 30 mmHg. Eight patients showed upright position related gradient increment for more than 30 mm. In remained 10 patients, significant LVOT gradient increase were measured at peak of the exercise (1).

Our study presents a patient with post exercise LVOT gradient increment who undertook Mitral valve replacement (MVR) and CABG and septal myectomy simultaneously. His post exercise LVOT gradient had borderline elevation, then septal myectomy considered the best choice accompanied by CABG and MVR.

The LVOT gradient threshold for implementation of major invasive interventions, such as septal myectomy is about 50 mmHg. As Mingo et al. study shows, one of the most important independent predictive factors in mortality of hypertrophic cardiomyopathy is outflow tract obstruction. Other predictive factors that had been mentioned in this study were atrial fibrillation, restricted functional capacity (NYHA class II, III or IV) and the ultimate left ventricular wall thickness was at least 30 mm (8).

CONCLUSION

The LVOT gradient increment leads to hemodynamic obstruction. The recommended treatments for patients with this problem varied from medical treatments to surgical myectomy and septal ablation. We herein depicted the multi problem case which undertaken multiple management in one operation.

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AUTHOR CONTRIBUTION

All the authors contributed in designing the study and preparing the manuscript. All the authors have read and approved the final manuscript.

CONFLICT OF INTEREST

None.

REFERENCES

1. Dimitrow PP, Bober M, Michalowska J, Sorysz D. Left ventricular outflow tract gradient provoked by upright position or exercise in treated patients with hypertrophic cardiomyopathy without obstruction at rest. *Echocardiography*. 2009;26:513-20.
2. Dawn B, Paliwal VS, Raza ST, Maštali K, Longaker RA, Stoddard MF. Left Ventricular outflow tract obstruction provoked during dobutamine stress echocardiography predicts future chest pain, syncope, and near syncope. *Am Heart J*. 2005;149:908-16.

3. Brock RC. Functional obstruction of the left ventricle (acquired aortic subvalvular stenosis). *Guys Hosp Rep.* 1957;106(4):221-38.
4. Teare D. Asymmetrical hypertrophy of the heart in young adults. *Br Heart J.* 1958;1-8.
5. Armstrong WF, Ryan T. *Feigenbaum's echocardiography.* Lippincott Williams & Wilkins; 2012.
6. La Canna G, Airoidi F, Capritti E, Grimaldi A, Colombo A, Alfieri O. Alcohol septal ablation versus surgical myectomy: a patient with obstructive HCM. *Nat Rev Cardiol.* 2007;4(10):570.
7. Maron BJ, editor. *Diagnosis and management of hypertrophic cardiomyopathy.* John Wiley & Sons; 2008 Apr 15.
8. Mingo S, Benedicto A, Jimenez MC, Pérez MA, Montero M. Dynamic left ventricular outflow tract obstruction secondary to catecholamine excess in a normal ventricle. *Int J Cardiol.* 2006;112(3):393-6.