

# RESECTION AND EXTENSIVE MYECTOMY OF DISCRETE SUBAORTIC STENOSIS RESULTS AND COMPLICATIONS

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## **ABSTRACT**

### **OBJECTIVES**

In this study we reviewed and assessed our experience with the resection and extensive myectomy of the localized type of subvalvular aortic stenosis.

### *Design :*

The preoperative and postoperative reports from transthoracic echocardiography examination were analyzed and compared to assess the results of surgery. In addition we reported our complications.

## **RESULTS**

Immediately postoperative maximum LVOT gradient dropped from  $77.08 \pm 48.35$  to  $17 \pm 9.26$  mmHg ( $P = 0$ ), and mean LVOT gradient dropped from  $33.52 \pm 22.4$  mmHg to  $9.4 \pm 5.3$  mmHg ( $P = 0$ ). There were

no early or late deaths. Eleven patients (44%) developed transient bundle branch block and weaned off bypass on temporary pace maker. Eight of them (32%) reversed within 3 days completely, while 3 patients (12%) developed complete heart block and required permanent pace maker. No patient had developed endocarditis or recurrence requiring re-intervention.

## **CONCLUSION**

The aggressive surgical approach to a discrete subvalvular aortic stenosis reduces the gradient significantly across the LVOT and reserves the function of the aortic valve at early and midterm follow up.

*Keywords :* Congenital Subaortic Stenosis – Fibromuscular Ridge- Subaortic Membrane

## INTRODUCTION

Congenital aortic stenosis is a cardiac anomaly which includes a range of left ventricular outflow tract obstruction at different levels and of unequal severity [1]. The narrowing occurs at valvar, subvalvar, supra-valvar, or combined multiple levels and results in a systolic pressure gradient between the inflow portion of the left ventricle and the aorta beyond the obstruction [2]. Discrete subvalvular aortic stenosis is an obstruction beneath the aortic valve caused by either a short localized fibrous or fibromuscular ridge or a longer diffuse fibrous tunnel. The localized form of discrete subvalvar aortic stenosis involves a spectrum of pathology varying from discrete short fibrous ridge, a thicker discrete fibromuscular shelf and a long fibrous tunnel. The ridge may present as a complete fibrous diaphragm with a central or eccentric stenotic orifice. This ridge may be present at any level between the nadir of aortic cusps and the free edge of the anterior mitral leaflet. It might be attached to the aortic cusps but usually separated from it with few millimeters. The muscular ventricular septum beneath the right aortic cusp shows variable degree of hypertrophy and prominence and may contribute im-

portantly to stenosis. This fibromuscular subaortic stenosis is a progressive condition, which requires an aggressive approach to relieve the obstruction, decreases the acquired damage to the aortic valve, decreases the incidence of endocarditis and reduces the recurrence rate [3, 4]. Operative resection of the localized subvalvar aortic stenosis is not considered complete unless a generous amount of muscle has been removed leftward of the nadir of the right coronary cusp [2, 3, 4, 5, 6].

## PATIENTS AND METHODS

From June 2000 to October 2002, 25 patients underwent surgical treatment of discrete subaortic stenosis in Cardio-thoracic Surgery Department, Mansoura International Hospital in Egypt. Indications of surgery included left ventricular outflow tract gradient > 30 mmHg, evidence of progressive aortic regurge, or coexisting cardiac lesions requiring repair. There were 14 males and 11 females; with the median age at repair was 17.6 years, range (4 – 51 years). Twenty patients were in NYHA class III or IV, while 5 patients were in NYHA class I or II. The preoperative maximum LVOT gradient was 77.08 mmHg (range: 17-177 mmHg), and the preoperative

mean gradient 33.52 mmHg with the range between 9 – 82 mmHg. Echocardiography examination of the aortic valve showed thickened aortic valve cusps in all patients. All patients had grade II- III / IV aortic regurge. Other concomitant lesions were mitral regurge grade III – IV / IV in two patients, patent foramen ovale in one patient and perimembranous VSD in one patient. The subaortic stenosis was in the form of a complete diaphragm with a central stenotic orifice in 3 patients only, while in the other patients it was present as a fibrous ridge. The average distance between the ridge and the right coronary cusp was 0.7 cm, range between 0.3 – 2.4 cm. Aortic valve replacement was done in two patients using bileaflet mechanical valve, mitral valve replacement was done in two patients, closure of VSD was done in one patient, and closure of a patent foramen was done in one patient.

### **SURGICAL PROCEDURE**

All procedures were performed under standard cardiopulmonary bypass, using cold potassium or blood cardioplegia. A transverse aortotomy extending into the non-coronary cusp was done in all patients. Circumferential resection of the discrete subvalvu-

lar fibrous ridge or membrane was done, followed by generous myectomy of the ventricular septum to the left side of the right coronary cusp. A right lateral left atriotomy was required in two cases for concomitant mitral valve replacement.

### **STATISTICAL ANALYSIS**

Results are expressed as a range with the mean + the standard deviation. The results were compared with Student's test (paired sample test), and the  $P < 0.05$  was considered significant.

### **RESULTS**

There was no early or late postoperative death. There was significant improvement of symptoms, three patients were in NYHA class III / IV while 22 patients were in NYHA class I – II/ IV. Immediately postoperative maximum LVOT gradient significantly dropped from  $77.08 \pm 48.35$  mmHg to  $17 \pm 9.26$  mmHg ( $P = 0$ ), and mean LVOT gradient significantly dropped from  $33.52 \pm 22.40$  mmHg to  $9.4 \pm 5.3$  mmHg ( $P = 0$ ). Eleven patients (44%) developed transient bundle branch block, and eight of them (32%) reversed within 3 days completely. While 3 patients (12%) developed complete heart block and required

permanent pace maker. At a mean follow-up of 24 months (17 – 33 month), no recurrence was seen in the overall group.

## DISCUSSION

Discrete subaortic stenosis remains a surgical challenge. The recurrence rate is high and the aortic regurge is little changed, despite sufficient conventional resection and relief of obstruction [4,6,7]. In the recent published literature there is an agreement that the surgical resection of the subaortic fibrous ridge or membrane is not considered complete unless a generous amount of muscle has been removed leftward of the nadir of the right coronary cusp [2,4,6,7]. This more aggressive approach produces excellent relief of the obstruction and frees the valve leaflets, significantly reducing associated aortic regurge at early and midterm follow up with low mortality. Overzealous resection in the ventricular septum can lead to heart block from damage to the conduction system, iatrogenic ventricular septal defect, or damage to the anterior leaflet of the mitral valve [4]. In 1999, Yacoub and colleagues adopted a more aggressive technique in which they excised all components of the fibrous ring, with mobilization of

the left and right fibrous trigones. This results in restoration of the normal dynamic behavior of the left ventricular outflow tract with maximal widening of the tract [8]. In our study we performed the myectomy after removing the fibrous ridge. We did not have any mortality in our series. We did not have any case of iatrogenic ventricular septal defect but we had a high incidence of transient bundle branch block (44%). All of these cases were weaned off the pump on a temporary pace maker, and within the third post-operative 32% of the patients were weaned off the pace maker and discharged from the hospital. In three patients (12%) there was a complete heart block and we were unable to wean them off the temporary pace maker, and eventually a permanent pace maker was inserted to them. Although some of the published literature reported no incidence of heart block after resection and myectomy [7], others confirmed the high incidence of heart block after such procedures. Parry and colleagues, had 5 patients out of 37 patients (13.5%) developed complete heart block and required permanent pace maker after the aggressive surgical approach to such cases [6]. The aortic regurge decreased slightly or remained un-

changed in our patients, but did not increase. Long term follow up is required to confirm these early results. Although the aortic valve remains a potential site for development of endocarditis, none of our patients had developed endocarditis pre or post operative during the course of this study. In short and mid term follow up (24 month), there was no recurrence in any of our patients this is due to performing extensive myectomy to relieve the LVOT obstruction.

## CONCLUSION

Combined resection of the fibrous ridge and myectomy as an aggressive surgical approach to a discrete subvalvular aortic stenosis reduces the gradient significantly across the LVOT. Postoperatively, aortic regurge will regress or remain stationary at early and midterm follow up.

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