



MITRAL VALVE REPAIR IN PATIENTS WITH PREDOMINANT MITRAL REGURGITATION

Cardiology

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ABSTRACT

Valve repair needs proper preoperative diagnosis, subtle patient selection, availability of transesophageal echo cardiography, adequate surgical experience and proper rigorous follow up. In rheumatic disease, it poses special problems. We present our experience of operating upon predominant mitral regurgitation lesions with the help of repairing the valve. In young patients and pregnant females, it is an added boon to do repair in view of avoiding problems related to anticoagulation in mechanical prosthetic valve and degeneration in bio prosthetic valve. It also helps to preserve geometry of LV and decreases LV dysfunction as seen in valve replacement.

KEYWORDS

Aim :

To determine the feasibility of repair in predominantly mitral regurgitation, identify patient subset, results and early follow up, incidence and causes of failure, determine the effect of mitral valve repair on left ventricular dimensions and function.

INTRODUCTION :

Rheumatic heart disease is a leading cause of cardiac mortality and morbidity in developing countries like India¹. Mitral valve affection is the dominant expression of rheumatic affection of the valve. Mostly seen lesions are stenotic and mixed, however pure mitral regurgitation is also seen a certain subset of patients. Patients affected are usually young and in child bearing age. Replacement of these valves with mechanical valves is associated with risk of anticoagulation and foetal wastage. Bio-prosthetic valves have a propensity to degenerate early especially in mitral position. Average 10 years survival following mitral valve replacement with mechanical heart valves in a young population is 78% while the 11 year survival in similar population undergoing mitral valve repair is 92%².

In our hospital, approximately 150 mitral valve replacements are done annually. About 10% patients have a pure mitral regurgitation amenable for repair. We have done a prospective study of mitral valve repair in our institution. The present endeavour is with the object of optimizing the quality of life in this subset of patients.

MATERIALS AND METHODS :

A randomized prospective study was conducted at Department of Cardiovascular and Thoracic Surgery, G. S. Medical College and KEM Hospital. During the period from July 2014 to June 2018, The study comprised of 14 patients with 8 females and 6 males. The age of patients ranged from 18 to 56 years. 5 patients were below the age of 25 years. All patients were predominant mitral regurgitation (MR). All patients were in New York Heart Association (NYHA) class 3-4 of which 2 has severe congestive cardiac failure who were unresponsive to anti-failure treatment. They were given 3ug/kg/min dopamine support for 5-7 days prior to surgery. Etiologically, 12 patients had rheumatic heart disease, 1 had ischemic regurgitation and 1 was completely treated for infective endocarditis. Patients were investigated for confirmation of diagnosis and suitability of mitral valve repair. Investigations performed were x-ray chest, electrocardiogram and transthoracic as well as transesophageal echocardiography. Parameters assessed were that of wilkin's score (thickness, pliability, calcifications, subvalvar apparatus).

Gradient across the mitral valve, severity of MR, size of left atrium, left ventricular internal dimensions, end systolic and end diastolic volumes/sq.m, pulmonary arterial pressures, associated valve lesions and right/left ventricular function were noted for pre and post operative analysis of mitral valve. Patient operated as per standard institutional protocol. 1 patient was re explored for persistent bleeding in the post operative period for bleed from left atrial suture line. No patient

required re-operation or valve replacement in the early post-operative period. Mean post operative stay in the ward was 5.6 days. Patients were discharged on anti failure treatment and low dose warfarin for 3 months. The INR was maintained between 1.5-2.0 and warfarin was discontinued after 3 months. Patients were evaluated at the end of 3rd, 6th, 9th and 12th month. Clinical examination, x-ray, ECG and transthoracic echocardiography were performed.

Factors studied were

X-ray : cardiothoracic ratio

ECG : presence of LV strain, LV volume overload, LV hypertrophy

ECHO : Mitral valve area and gradients, residual regurgitation, post operative ejection fraction (EF), Left ventricular internal dimensions, LA size, pulmonary artery systolic pressure.

Determinants of mitral valve replacement were fixed as symptomatic deterioration, grade 3/3 regurgitation, congestive cardiac failure or reappearance of significant symptoms.

Observation and Results :

A total of 14 patients were studied

Sex	No. of patients
Male	5
Female	9

Age group

Mean age of patients was 29.36 years with 5 patients being less than 25 years.

Age group	No. of patients
15-20	3
21-25	4
26-30	2
31-40	4
41-60	1

Clinically, all 14 patients had NYHA class 3-4, 2 had signs of severe congestive cardiac failure. They were stabilised with intravenous diuretics and 3ug/kg/min dopamine 4 to 5 days before surgery. Almost all had palpitations with effort and none had any previous neurological event. 4 patients had history of rheumatic fever.

Etiology :

Etiology	No. of patients
Rheumatic heart disease	12
Infective endocarditis	1
Ischemic heart disease	1

Clinically, all patients had signs of MR such as pansystolic murmur. X-ray had cardiothoracic ratio of 0.64+/- 0.05, LV apex, LA enlargement, Kerley's lines present in 3 cases.

ECG showed LVH and LVVO, LV strain, normal sinus rhythm in 10 patients and atrial fibrillation in 4 cases.

Transthoracic & transesophageal echo was mainstay of preoperative diagnosis and selection of patients. Pure MR was present in 13 cases, 1 patient had additional mild mitral stenosis (MVA=2.4 cm²).

Following was pre operative data

Mean LA size	5.45 +/- 1.0 cm
Mean LV systolic dimension	40.6 +/- 7.51 cm
Mean LV diastolic size	60.43 +/- 8.06 cm
Mean EF	60.91 +/- 7.69 %
Mean LV systolic volume	32.9 +/- 9ml/m ²
Mean LV diastolic volume	79.49 +/- 19.49 ml/m ²
Mean PASP	38.04 +/- 12.56 mm

A rigid posterior ring annuloplasty was performed in all the patients.

Chordal shortening 5 patients

Commissurotomy 2 patients

Size of ring	No. of patients
26	2
28	7
30	4
32	1

Associated procedures :

CABG 1 patient

Maze 5 patients

ICRASD 1 patient

None of the patients had more than trivial MR after the repair. An acceptable repair was defined as one with low LA pressures and acceptable haemodynamics on minimal inotropic supports. Mean LA pressure recorded was 5 +/- 2 mm Hg.

Inotropic support	No. of patients
Dopamine 3 ug/kg/min	7
Dopamine 5 ug/kg/min	4
Dopamine + Adrenaline	3

The mean ICU stay in these patients was 2.1 +/- 0.5 days.

Morbidity	No. of patients
Infection	0
Re exploration	1
Re operation for MVR	0
Low cardiac output	0

Mean duration of stay in the ward was 5.9 days with range of 4-15 days.

Status at discharge :

Status	No. of patients
Class I	12
Class II	2

Of the 5 patients, who had undergone a committant modified maze procedure, 2 patients were found to have atrial fibrillation with controlled ventricular rate at discharge. Both these patients had a preoperative LA size of more than 6 cm.

No patient required reoperation for failed repair in the immediate or in the follow up period. Mean follow up period was 12.5 +/- 5.6 months. Both patients in class II NYHA were in cardiac failure preoperative.

Grade of MR

Grade	No. of patients	Percentage
None	5	35.71
1	8	57.14
2	1	7.14
3	0	0

None of the patient had any significant LVOT gradients postoperatively. No patient had increase in the LV dimension or volumes during follow up.

There was gradual reduction in LV dimensions in follow up.

Dimension	Pre op	Post op
CTR	0.64 +/- 0.05	0.54 +/- 0.04
LA size	54.04 +/- 10.81	42.30 +/- 10.49
EF	60.43 +/- 7.70	51.13 +/- 2.00
LVID (s)	40.60 +/- 7.51	32.73 +/- 6.58
LVID (d)	60.43 +/- 8.06	47.17 +/- 6.42
LV ESV/sq. m	32.9 +/- 9.76	26.84 +/- 5.29
LV EDV/sq. m	79.49 +/- 19.56	54.85 +/- 8.83
PASP	38.04 +/- 12.56	20.34 +/- 19.67
MV gradient		8.56 +/- 3.03
MVA		2.16 cm ² /m ²

DISCUSSION :

Rheumatic heart disease is a leading cause of cardiovascular morbidity and mortality affecting young people in developing countries like India¹. Replacement with mechanical prosthesis is associated with the attendant risk of anticoagulation and sub optimal preservation of LV function leading to reduced survival².

In addition, poor compliance with anticoagulation, growth and pregnancy remain important issues in young patient population, especially in developing countries. Mitral valve repair is procedure of choice for degenerative MR, its use in rheumatic lesions is scant. It is because of technical difficulty and high failure rates³.

MR imposes volume load on LV with corresponding remodelling to accommodate the excess load. This leads to silent clinical phase and gradual development of LV dysfunction. There is higher incidence of mortality in EF < 50%. They require high inotropes as well.

Procedures towards mitral valve repair are directed towards the restoration of the pathologic anatomy towards normal. Annuloplasty is used by most surgeons as a primary modality for treating annular dilation. Chordal shortening, lengthening, transfer and substitution are being performed in an increasing number around the world. There was no hospital mortality or neurological event in our study. There was no reoperation^{4,5}.

Favourable regression of LV dimensions and volumes have been reported. There has been no significant decrease in EF, LVID and LA size. No case of post repair mitral stenosis was seen in this study^{6,7}.

CONCLUSION :

Mitral valve repair can be done in patients with acceptable morbidity and mortality. None of the patients required re-operation during mean follow up of 12.5 months.

Significant improvement in LV function, dimensions are noted on follow up. Longer term follow up is required to assess the durability of repair and its determinants.

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