



SUPERIOR SEPTAL APPROACH VS LEFT ATRIOTOMY IN REDO MITRAL VALVE REPLACEMENT - A COMPARATIVE STUDY

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ABSTRACT

Mitral valve replacement needs a good exposure of the mitral valve apparatus to assess the valve mobility, thickening, calcification and nature of sub valvular apparatus . In Redo surgeries , there will be dense adhesions of the pericardium with the underlying right ventricle, left ventricle and right atrium.1 In such conditions, selection of the surgical approach plays a crucial role for good visualisation of the mitral valve apparatus. Larger operation area can be achieved by superior septal approach in which the inter atrial septum and left atrial (LA) roof will be opened .Conventional left atrial approach is a more familiar approach for mitral valve procedures in which sinus node artery will be well preserved2. In our study, we compared these two approaches for redo mitral valve replacement and analysed various parameters. Two groups were divided with 25 patients in each group. One group of patients undergo superior septal approach and the other group of patients with conventional left atriotomy incision in redo mitral valve replacement. Our study results conveyed that superior septal approach appeared to be good alternative to conventional left atriotomy incision in redo mitral valve replacement.

KEYWORDS : Superior Septal, Left atrial, Cardiopulmonary bypass, Cross clamp time, Mitral apparatus.

I. Introduction

Mitral valve replacement needs a good exposure of the mitral valve apparatus to assess the valve mobility, thickening, calcification and nature of sub valvular apparatus . In Redo surgeries , there will be dense adhesions of the pericardium with the underlying right ventricle, left ventricle and right atrium. The mobility of the cardiac structures will be diminished because of the adhesions. In such conditions, selection of the surgical approach plays a crucial role for good visualisation of the mitral valve apparatus. Larger operation area can be achieved by superior septal approach in which the inter atrial septum and left atrial (LA) roof will be opened .Only stay sutures are required for retraction in this approach. Degree of manipulation on the mitral annulus against the fixed cardiac structures due to adhesions will be less in superior septal approach³ . Cardiac arrhythmias are the major drawbacks of this procedure, according to the literature. Conventional left atrial approach is a more familiar approach for mitral valve procedures in which sinus node artery will be well preserved. In our study, we compared these two approaches for redo mitral valve replacement and analysed various parameters including, exposure of the mitral apparatus, operation time, cardiopulmonary bypass time ,ventricular injury, alterations in the cardiac rhythm, post operative blood loss and cost factor.

II. Material And Methods

Centre: Department of cardiothoracic surgery, Rajiv Gandhi Government General Hospital and Madras medical college

Duration of the Study: 1 year(December 2016 to December 2017)

Study Design: Prospective and retrospective study

Subject Selection: All the patients according to the following criteria and willing to be participate in the study after written informed consent were included

Inclusion Criteria: All adult patients who underwent closed mitral commissurotomy, mitral valve repair & replacement admitted with mitral valve pathology.

Exclusion Criteria: Patients who underwent mitral valve procedures along with coronary artery bypass grafting, aortic valve replacement, tricuspid valve repair or replacement

Procedure methodology

Two groups were divided with one group of patients undergo superior septal approach and the other group of patients with conventional left atriotomy incision in redo mitral valve replacement. A prospective and retrospective analysis of various parameters including release of the adhesions(pre bypass time), handling of the heart, safeguarding the epicardial vessels, exposure of the mitral apparatus, amount of traction on the papillary muscles, aortic cross clamp time, cardiopulmonary bypass time, alterations in the cardiac rhythm, post operative blood loss ,cost factor (use of surgical hemosealants), post operative ejection fraction and the mortality rate were evaluated. Electrocardiographic and echocardiographic findings were compared between the study groups. Need for pace maker (temporary or permanent) was studied. Follow up period was 3 months. . A p value of less than 0.05 was considered significant.

Screening Procedures / Visits: NO

Follow up Procedures / Visits: ECG and ECHOCARDIOGRAM.

Assessments of Parameters:

Proforma for data collection and master chart format are attached. Appropriate stastical tests were applied with the help of a statistician.

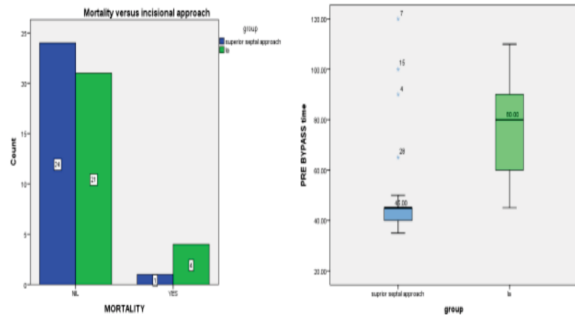
Statistical analysis

This descriptive study was conducted in the Department of Cardiothoracic surgery for a period of one year from march 2105-16 among those patients who underwent redo mitral valve replacement through superior septal and conventional left atriotomy incisions. A total of 50 patients were included in this study with 25 patients underwent redo MVR through superior septal and the remaining through left atriotomy incisions and analysed as follows,

TEST PERFORMED INDEPENDENT SAMPLET TEST

	group	N	Mean	Std. Deviation	P value
AGE	SUP.SEPTAL	25	40.0800	9.40709	0.496
	LA	25	41.8000	8.29659	
PRE BYPASS time	SUP.SEPTAL	25	49.6000	21.74281	0.000
	LA	25	77.8000	17.91647	
X CLAMP time	SUP.SEPTAL	25	74.4000	14.05643	0.647
	LA	25	76.2000	13.52775	

CPB time	SUP.SEPTAL	25	112.2000	19.55121	0.039
	LA	25	125.9600	25.76897	
1st POD BLOOD lossin ml	SUP.SEPTAL	25	435.0000	131.10111	0.000
	LA	25	718.6000	234.00285	
HOSPITAL stay in days	SUP.SEPTAL	25	11.6800	2.07605	0.078
	LA	25	10.7200	1.67133	
POST OP ef in %	SUP.SEPTAL	25	51.8800	4.53064	0.319
	LA	25	50.3600	6.04070	



III. Discussion

This study was conducted for a period of one year among patients who underwent Redo mitral valve replacement through superior septal and left atriotomy approaches in our institute. A total of 50 patients were included in our study, with 25 patients underwent redo MVR through superior septal approach and the remaining 25 patients through conventional left atriotomy approach. The following factors were analysed to evaluate their role in our study,

AGE:

The mean age of patients in superior septal approach study group was 40 years and it was 41 years in left atriotomy approach. This difference was not statistically significant, tested using independent sample t test. In our two study groups, no significant difference was found in mean age of patients underwent redo MVR.

SEX:

In our comparative study, 64% of patients were females and 36% were males. Per operative and post operative events were not statistically significant corresponding to the age of the individual.

PREVIOUS SURGICAL HISTORY:

In our study, 47 patients had history of previous closed mitral commissurotomies, 1 patient underwent previous mitral valve repair, 1 patient had past history of mitral valve replacement and 1 patient underwent previous open mitral valvotomy. Indications for redo mitral valve replacement: 48 patients in our study groups had mitral restenosis followed by previous palliative procedures (47 patients had previous closed mitral commissurotomies and 1 patient had open mitral valvotomy). 1 patient underwent mitral valve repair before 4 months and admitted with infective endocarditis and vegetation of size 1.5 cms over the posterior mitral leaflet. 1 patient had mitral valve replacement (27 mm st.jude medical valve) before 1 year for mitral stenosis and admitted with struck valve and NYHA class IV symptoms. Superior septal approach was used for the 2 patients who underwent midline sternotomy in the past, as there was dense adhesions over the previous left atriotomy site. Among the remaining 48 patients, 23 patients underwent redo MVR through superior septal approach and 25 patients through the conventional left atriotomy. Statistical data implies that, superior septal approach may be planned, if the patient had previous midline sternotomy with left atriotomy and there was no any significance in the surgical approaches, if they had previous CMC.

PREBYPASS TIME:

Average pre bypass time in superior septal approach group was 49.6 minutes where as in patients who underwent redo MVR in left atriotomy was 77.8 minutes. According to the independent sample

T test, P value is very much significant (0.000). For left atriotomy approach, adhesions between the pericardium and the underlying right ventricle, left ventricle, left atrial appendage and the right atrium must be carefully dissected by sharp dissection. Utmost care should be given to avoid injury to the epicardial coronaries and the myocardium. The mitral apparatus will be visualized and found to be operable without any difficulties in left atriotomy approach, only after the release of the pericardial adhesions⁵. So the pre bypass time will be much more in redo MVR planned through left atriotomy approach⁶. In case of superior septal approach, the pericardial adhesions, need not be released and the mitral apparatus can be adequately visualized by opening the inter atrial septum and the LA roof⁷. Thus pre bypass time may be minimized in superior septal approach and it may be especially useful in unstable heart, where early start of CPB was in need⁸.

AORTIC CROSS CLAMP TIME:

Total aortic cross clamp time was 74 minutes in superior septal group and 76 minutes in left atriotomy group. P value was 0.647 by independent sample T test and it was not statistically significant. In superior septal approach, mitral leaflets were excised with clear visualization of the mitral apparatus and the traction on the mitral annulus will be minimized⁹. Mirtal valve replacement duration was shorter in this approach while the closure of the septum and the LA roof was technically challenging and time consuming, as any bleeding from the end of the LA roof may not be controlled without reestablishing the CPB¹⁰. Where as in left atriotomy approach, mitral valve apparatus visualization was not so good as compared to superior septal incision and the excision of the leaflets and the mitral valve replacement was time consuming. By the same time, left atriotomy closure was easier than the meticulous closure of LA roof¹¹.

CARDIOPULMONARY BYPASS TIME:

In our study, the total CPB time on an average was 112 minutes in superior septal approach and 126 minutes. P value was 0.039 and it was statistically significant. In superior septal approach, after closure of the LA roof and the inter atrial septum, cross clamp may be released and the RA was closed there after. 1 patient had bleeding from the LA roof and the site was reinforced by re establishing the CPB. Remainig 24 patients had no any bleeding from the surgical sites or on the surface of the myocardium, as the pericardial dissection was limited in this approach. In LA approach group, CPB time was increased mainly due to the time taken to arrest the surface bleeding from the myocardium¹².

RHYTHM DISTURBANCES:

In superior septal group, 4 patients had new rhythm disturbances and 5 patients developed new abnormal rhythms in left atriotomy group. SA nodal artery may be injured in superior septal incision and there will be the possibility of nodal block and junction rhythms as per the literature^{9,13}. In our study, there was no any statistical significance as the P value was 1.000. Transient changes in cardiac rhythm include prolonged PR interval, variations in P-wave axis and morphology, junctional rhythm, atrioventricular block, atrial flutter and atrial fibrillation were noted by Kovacs et al in his study on superior septal approach.

TEMPORARY PACEMAKER:

The need for temporary pacemaker arises, if the patient developed abnormal sinus rhythm¹⁴. In our study groups, 3 patients in superior septal approach needs temporary pacemaker and 4 patients in left atriotomy needs it. P value is 0.500 and hence it was statistically insignificant.

HEMOSEALANTS:

The need for hemosealants like tisseal, coseal, flowseal, surgical, fibrillar, gelfoam etc were more in patients underwent redo MVR in left atriotomy approach in our study. (8 patients needed hemosealants in left atriotomy approach, whereas 1 patient in superior septal approach needed hemosealants). P value is 0.023 by

Fisher exact test and it was statically significant.

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RE EXPLORATION:

Post operative re exploration within the first 24 hours were more in the left atriotomy group, as 4 patients had re exploration for mediastinal bleeding and only one patient in the superior septal approach group had re exploration. Bleeding points were seen on the myocardial surface, epicardial pacing wire site and the sub sternum. There was no bleeding from the surgical sites.

MORTALITY:

In our study, in hospital the mortality rate was overall 10%. 5 patients died in our study groups with 1 patient in superior septal approach and the remaining 4 patients in left atriotomy group. Of these, 1 patient died of sepsis and multi organ failure and the other 4 patients died of aspiration pnemonitis, renal failure, mediastinitis and sepsis respectively. There was no any correlation between the surgical approaches and mortality in our study. A study by Hunaid A. Vohra et al¹⁵ had shown operative mortality rates between 1.5 and 17.5%.

Conclusion

- Our study results conveyed that superior septal approach appeared to be good alternative to conventional left atriotomy incision in redo mitral valve replacement.
- Mitral valve exposure in redo conditions is excellent in superior septal approach
- Pre bypass time and total cardiopulmonary bypass time were less in superior septal approach compared to the left atriotomy approach.
- No statistically significant increase in new rhythm disturbances and the need for temporary pacemakers among the study groups.
- Need for hemosealants (cost factor), post operative bleeding and re exploration rate were comparatively less in superior septal approach.
- Though overall mortality rate was 10% in our study, there were no any direct factors associated with the surgical approaches.

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