STANDARD MEDIAN STERNOTOMY VERSUS RIGHT ANTEROLATERAL THORACOTOMY FOR MITRAL VALVE REPLACEMENT

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ABSTRACT

Objective: To compare the morbidity and mortality of standard median sternotomy with right anterolateral thoracotomy for procedure of mitral valve replacement.

Material and Methods: All patients who were selected for mitral valve replacement in the department of Cardiovascular Surgery Lady Reading Hospital were included in the study. They were randomly assigned to one of the group. Group I patients of SMS and Group II Patients of RALT. Patients of both groups were operated as per standard protocols of the procedures for mitral valve replacement. All patients had a similar pre and post operative care. The groups were compared for aortic cross clamp time, procedure time, mortality, hospital stay etc.

Results: Total of 281 cases was included in the study. There were 204 cases in group I of SMS and 77 in group II of RALT. Female were 73% in group I and 76% in group II. Mean age of patients in group I was 28 ± 11 years and in group II was 26± 12 years. Almost all patients were having rheumatic mitral valve disease. Mean CPB time was 92±12 mints in group I while 100±14 in group II with a p value of <0.0001 Aortic cross clamp time was 61± 15 mints in group I and 69±12 mints in group II which was statistically significant. Ventilation time in group I was 8.9±0.8 hours and 6.75±1 hour in group II with significant p valve of <0.0001. 6.86% of patients died in group I compared to 5.2% of group II which is not statistically significant. None of the patients with RALT were reopened compared to 10(4.875%) of the patients with SMS which was highly significant with a p value of 0.001. Similarly infection did not occur in any patient in RALT group compared to 6(2.92%) patients of SMS group.

Conclusion: Right anterolateral thoracotomy for mitral valve replacement in a selected group of patients was safe with fewer per and postoperative morbidity and mortality compared standard median sternotomy.

Key words: RALT, SMS, Rheumatic heart disease, Mitral valve replacement.

INTRODUCTION

Standard median sternotomy is standard surgical approach of all cardiac surgeries that need cardiopulmonary bypass including mitral valve replacement. Although it has pros of easy access and cardiac mobilization, but it is also associated with some complication including deep bone infection, wound dehiscence, delayed recovery and increased hospital stay.[1] The large scar of the sternal wound has got cosmetic problems in female patients in particular. Sternotomy independently increases the risk of postoperative morbidity and mortality in patients of cardiac surgery especially when associated with other comorbid conditions like diabetes[1]. There has always been a search for less invasive surgical techniques among the cardiac surgeons.

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With the rapid development of surgical techniques and the assistance of advanced instrumentation, the clinical results of cardiac surgery have been dramatically improved in recent years. As a result, cosmetic and psychological implications of surgery have assumed increasing importance in the same time frame[2] and a variety of minimally invasive cardiac surgical techniques have been developed, including parasternal incision[3], right thoracotomy[4], port-access surgery[5,6], and video-assisted methods[7,8].

Right anterolateral thoracotomy has been recommended as an alternative approach to standard median sternotomy for patients undergoing mitral valve replacement. Approach to mitral valve via right anterolateral thoracotomy is not new. The principle of this kind of approach is to reduce the morbidity and the cost, speed hospital discharge and shorten the rehabilitation time[9,10]. A report from the Port-Access multicenter registry suggested that this approach was safe and effective[11]. Simultaneously Navia and Cosgrove[12] and Cohn et al[13] reported minimally invasive MVR using right para-sternal approaches with direct aortic cross clamping. All of these experiences fueled expectations that by avoiding a conventional sternotomy, safe and

reproducible results could be achieved with minimally invasive valve surgery, while minimizing morbidity, pain, blood loss, and hospital length of stay. The purpose of this study was to compare right anterolateral thoracotomy with standard median sternotomy for mitral valve replacement in terms of cost benefits and other variables including cosmetic aspects.

MATERIAL AND METHODS

This prospective study was carried out in the Department of Cardiovascular Surgery, Lady Reading Hospital, Peshawar from January 2009 to December 2011. This study included 281 patients. Patients were randomly allocated into two groups using computer generated random numbers who required mitral valve replacement (MVR). All patients who underwent mitral valvereplacement (MVR) according to the ACC/AHA guidelines (11) were included. Patients with age > 80 years old Patients having incomplete data or loss of follow up < 1 year were excluded from the study. The study was conducted after approval from hospitals research and ethical board. All patients appearing in our department meeting the inclusion criteria were enrolled in the study. Complete history, detailed clinical examination and routine laboratory investigations were taken on already designed questionnaire.

Age, sex, mean cross clamp time, mean bypass time, ICU stay, hospital stay and overall co morbidity with sternotomy and Sepsis were noted from patient record. Patients are followed for 2 year period in outpatient department in clinic. All the data was analyzed in SPSS vesion 17.0. Mean and Standard Daviation was calculated for frequency and percentage was calculated for categorical variables like gender and sepsis, healing, cosmetic quality. The results were presented as mean ±2 standard deviation. Statistical analysis was performed between the two groups using the independent sample t test and Chi square test. A significant difference was recorded if the P value was less than or equal to 0.05.

The study group comprised patients who underwent MVR via right anterolateral thoracotomy and control group including other patients subjected to MVR via median sternotomy. The same general anesthetic techniques with routine arterial and venous monitoring were utilized for both groups.

In regard to thoracotomy group incision was made in the right sub-mammary fold starting 3-5 cm from the lateral border of the sternum. The breast tissue in females was gently mobilized and the right chest cavity was entered through the fourth intercostal space. Aortic and bicaval cannulation was then performed in the usual manner and cardiopulmonary bypass instituted. After cooling to 32°C,the aorta was cross clamped using a long curved aortic clamp in order to keep it out of the surgeon's field, and aortic root blood cardioplegia was delivered. The left atrium was opened through an incision posterior and parallel to the interatrial groove that accessed the mitral valve. The diseased mitral valve was excised and then replaced by aprosthetic valve secured to annulus using continuous 2/0 prolene suture. The left atriotomy was closed by a singlelayer of 3/0 silk suture and de airing was performed through the suture line before removing the aortic cross clamp. Following re-warming to 37°C, the heart was allowed to take over the circulation. Decannulation was then performed and the suture line secured before giving the protamine. This was followed by complete closure of the pericardium by continuous sutures, leaving a small drain.The chest was then closed in layers leaving a separate thoracic drain. As for the control group, the approach was through the standard median sternotomy, but otherwise the operative technique was essentially the same.

Patients were electively ventilated overnight. Post extubation patients were shifted from ICU after completely assessing the general condition and hemodynamics of the patients along with baseline investigations and blood gases. Oral anticoagulant was started on second postoperative day with acenocoumarol to maintain an International normalized ratio (INR) of 2.0 2.5. Intravenous antibiotics, a combination of ceftriaxone/sulbactam and amikacin were administered during hospitalization and changed according to clinical situation. Intravenous antibiotics were continued during the hospital stay.

RESULTS

Total of 281 cases were included in the study. There were 204 cases in group I of SMS and 77 in group II of RALT. Female were 73% in group I and 76% in group II. Mean age of patients in group I was 28± 11 years and in group II was 26 ± 12 years. Almost all patients were having rheumatic mitral valve disease. Mean CPB time was 92±12 mints in group I while 100±14 minutes in group II with a p value of <0.0001. Aortic cross clamp time was 61± 15 mints in group I and 69±12 mints in group II which was statistically significant. Ventilation time in group I was 8.9±0.8 hours and 6.75 ± 1 hour in group II with significant p valve of <0.0001. 6.86% of patient died in group I compared to 5.2% of group II which is not statistically significant Table 1.

None of the patients with RALT were reopened compared to 10(4.875%) of the patients with SMS which was highly significant with a P value of 0.001. The over all morbidity is shown in Table 2. Similarly infection did not occur in any patient in RALT group compared to 6(2.92%) patients of SMS group. The events in followup period is shown in Table 3.

DISCUSSION

In our study, most patients were females. Rheumatic fever affects both men and women equally, but MS and mitral regurgitation (MR) is more common among females with rheumatic fever. This was consistent with

the study performed by Kumar AS et al.[15] at AIIMS on 38 patients 34 females and 4 males) who underwent mitral valve surgery through a limited right anterior thoracotomy. Srivastava AK[16] studied 52 patients among them 30 were females and 22 were males. In another study performed by Mishra YK et al[14] two-thirds of patients who came for mitral valve surgery were young women.

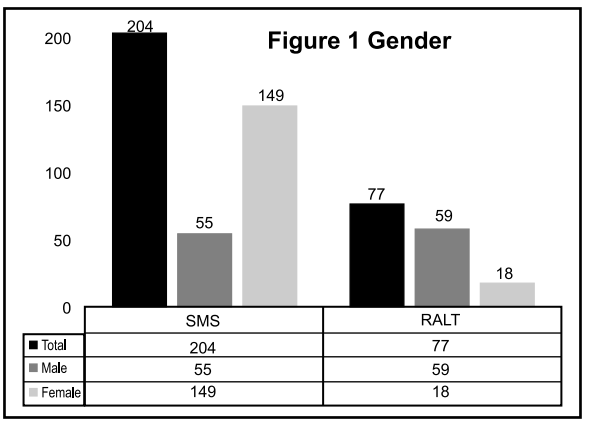

Table 1: Demographic Variables

Demography	Group-I	Group-II	P value
Procedure	SMS	RALT	
Age	28 + 11	26 + 12	0.1861
Total	204	77	
Male	55 (26.69%)	59 (23.37%)	<0.0001
Female	149 (73.03%)	18 (76.62%)	<0.0001

Table 2: Outcomes

Outcome	Group-I (n-204)	Group-II (n-77)	P Value
Mortality	14 (06.86%)	04 (05.19%)	0.61
CPB Time	92+12 min	101+14 mint	<0.0001
Cross Clamp Time	61+15 min	69+12 min	<0.0001
Ventilatory Time	8.90+0.8 hrs	6.75+1 hrs	<0.0001
Time to establish CPB	36+07 min	71+15 min	<0.0001
Chest/ Mediastinal Drainage	710+50 ml	212+30 ml	<0.0001
Post op Blood Transfusion	5.1+2 units	1.3+0.5 units	<0.0001
Post op hospital stay	08.5+1 days	05+1 days	<0.0001
ICU stay	04.7+1 days	02+0.5 days	<0.0001

Table 3: Morbidity

Morbidity	Group-I (n-204)	Group-II (n-77)	P Value
Reopening	10 (04.87%)	00	0.04788
Infection	06 (02.92%)	00	0.128
Sternal Dehiscence	02 (00.97%)	00	0.383
CVA	01 (00.48%)	01 (01.31%)	0.47
Renal Impairment	01 (00.48%)	02 (02.63%)	0.125

Table 4: Follow Up

	Group-I	Group-II	P Value
Loss to follow up	14 (6.82%)	08 (10.52 %)	0.326
Anticoagulant related events	17 (08.29%)	04 (05.26%)	0.372
Endocarditis	02 (00.97%)	01 (01.31%)	0.816
Infections needing wire removal	04 (01.96%)	00	0.215

Mean aortic cross clamp time was 61±15 minutes in sternotomy group and 69±12 minutes in thoracotomy group (p=<0.0001). The observed values were well below the highest cutoff value for cross clamp time of 150 min which is significantly associated with postoperative morbidity, and particularly with postoperative stroke[14]. The lesser cross clamp time in thoracotomy was due to easy accessibility to left atrium even with smaller atrial size. The observed cross clamp time was consistent with those t of Mohamed M. El-Fiky et al, studies (27±8 min)[17], Zapolanski A, et al. (70.0 min)[18] and Grossi EA, et al. (92.0 hours)[19].

In our study we had a choice of shifting the patients early to high dependency area of our general post operative ward. Duration ICU stay was 4.7±1 days in sternotomy and 2±0.5 days in thoracotomy with p value <0.0001. This is consistent with other studies performed[18,19,20].

Significant difference in duration of postoperative hospital stay was observed (P= <0.0001) between the two groups (8.5±1 days and 5±1 days with sternotomy and thoracotomy respectively). Result was consistent with other studies[20,21]. Early ambulation, with subsequent early appreciation of patient's well-being and faster recovery reduced the overall hospital stay in thoracotomy group.

CONCLUSION

Sternum sparing Mitral valve replacement can be done safely in selected cases. It gives better cosmetic results in female. RALT also result in decrease stay in hospital and postoperative ICU stay.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Malik A: Concieved the idea, Operating surgeon.

Asghar M: Collected and interpreted the data.

Farman T: Data collection, followup of patients.

Laiq N: Correcting the manuscript, Anaesthtic team member.

Shah SMA: Manuscript writing, collection of data.

Khan RA: Operative surgeon, overall finalized the study.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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