

## Research Article

# Comparison between inter atrial and trans-septal approach in mitral valve surgery

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**Received:** 24 January 2016

**Accepted:** 04 February 2016

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## ABSTRACT

**Background:** Two traditional approaches performed in mitral valve surgery, no solid indication for either technique. Our aim of this study is to compare the indications, and the outcome of these two techniques.

**Methods:** In this retrospective study we analysed the data of 148 patients who underwent mitral valve procedure from January 2013 till the end of December 2013 using the medical records. The procedures done either isolated mitral valve surgery (42%) or as a concomitant with other procedures (58%), total number of males were 58 cases (39%), and the average age was 54±8 years. We divided the patients into two groups; group one for those who underwent the procedure using direct left atrial approach by doing incision through the intertribal groove, and group two for those who underwent the procedure through inter atrial septum after opening of the right atrium (trans-septal), total number of group one was 78 (53%), while for group two the number was 70 (47%). Preoperative, intraoperative and post-operative variables were analysed and compared.

**Results:** Total mortality was 6 patients (4%), 4 of the in group one and 2 in group two, bleeding more than 750 ml post operatively was seen in 38 patients (26%), 15 (39%), 23 (61%) in group one and two respectively. Reopening for bleeding performed for 11 cases (7%), 2 of the in group one (18%) and 9 in group two (82%). Postoperative atrial fibrillation and heart block was more in group two.

**Conclusions:** Mitral valve surgery can be done traditionally using two different approaches, no solid indications for either technique. The decision to choose either approach should be taken preoperatively.

**Keywords:** Mitral valve, Atrial septum, Atrial fibrillation

## INTRODUCTION

Now a day's more than 30000 cases of mitral valve surgery done in USA per year. While rheumatic fever is decreasing all over the world especially in the developed countries due to improvement of the preventive measures, at the same time increasing in diagnostic measures and improvement in echocardiograph technology, the number of patients who are referred to surgeons to do mitral valve surgery is increasing.<sup>1</sup>

Since the introduction of mitral valve surgery different techniques were tried to exposed the mitral valve, the two most commonly approaches are the left atriotomy, through incision in the interatrial groove, and trans-septal approach through incision in the interatrial septum after opening of the right atrium.<sup>2</sup>

In our present study we compared the preoperative, intraoperative variables for all patients who underwent mitral valve surgery either isolated or as concomitant with other procedures for both approaches.

## METHODS

In this retrospective study we analyzed 148 patients who underwent mitral valve procedure using medical records.

All were done through median sternotomy, cardiopulmonary bypass and cross clamp were applied to all patients.

The average age was  $54 \pm 8$  year, while number of male patients was 58 (39%). The patients were divided into two groups, group one in whom left atrial approach was performed through incision in the left atrial groove, group two in whom trans-septal approach was performed through incision in the inter atrial septum after opening of the right atrium.

**Table 1: Preoperative data.**

	Total number =148 patient	Group one 78 ((53%))	Group two =70 (47%)
Males	58 (39%)	19 (33%)	39 (67%)
Age	$54 \pm 8$ year	$51 \pm 9$	$61 \pm 15$
Left atrial size	$45 \pm 3$ mm	$43 \pm 2$ mm	$44 \pm 3$
Left atrial thrombus	9 (6%)	5 (56%)	4 (44%)
Ejection fraction less than 30%	32 (22%)	14 (44%)	18 (56%)
Ejection fraction more than 30%	116 (78%)	64 (55%)	52 (45%)
Mitral stenosis	89 (60%)	45 (51%)	44 (49%)
Mitral incompetence	59 (40%)	33 (56%)	26 (44%)
Atrial fibrillation	41 (28%)	16 (39%)	25 (61%)
Heart rate less than 40 BPM	7 (5%)	3 (43%)	4 (57%)
Pulmonary artery pressure $\geq 45$ mmhg	38 (26%)	14 (37%)	24 (63%)
Previous cardiac operation (redo)	11(7%)	3(27%)	8 (73%)

Preoperative data was analyzed (Table 1), it was compared to both groups. Intraoperative data (Table 2) were also analyzed which showed that isolated mitral valve surgery was performed to 62 patients (42%), from those 48 (77%) patients underwent the procedure through left atriotomy (group one), while 14 (33%) were

performed using the trans-septal approach (group tow). Eighty six patients (58%) underwent mitral valve surgery as concomitant procedure with other procedure, from those 30 patients (35%) was in group one and 56 patient (65%) in group two.

**Table 2: Type of the procedure performed.**

Procedure	Total number =148	Group one =78 (53%)	Group two=70 (47%)
Isolated mitral valve surgery	62 (42%)	48 (77%)	14 (23%)
Mitral and tricuspid	34 (23%)	9 (26%)	25 (74%)
Mitral, tricuspid, aortic valve	13 (9%)	2 (15%)	11 (85%)
Mitral and CABG	21 (14%)	14 (67%)	7 (33%)
Mitral, tricuspid, CABG	6 (4%)	2 (33%)	4 (67%)
Mitral, tricuspid, aortic, CABG	3 (2%)	0	3 (100%)
Mitral and left atrial myxoma	9 (6%)	3 (33%)	6 (67%)

CABG: Coronary artery bypasses grafting

Mitral valve replacement was done in 91 cases (61%), 49 of the in group one (54%), 42 in group tow (46%), while mitral valve repair was done in 57 cases (39%), of them 29 (51%) and 28 cases (49%) in group one and two respectively. Cardiopulmonary bypass time was  $78 \pm 15$  minute,  $75 \pm 10$  minutes for group one and  $79 \pm 15$  minutes for group tow. The cross clamp time was  $51 \pm 14$  minutes,  $48 \pm 11$  minutes,  $54 \pm 12$  minutes for group one and two respectively (Table 3).

**Table 3: Intraoperative data.**

Intraoperative variables	Total number= 148 patients	Group one=78 (53%)	Group two=70 (47%)
Duration of CPB	$78 \pm 15$ minutes	$75 \pm 10$	$79 \pm 16$
Cross clamp time	$51 \pm 14$ minutes	$48 \pm 11$	$54 \pm 12$
Left atrial thrombectomy	21 (14%)	9 (42%)	12 (57%)
Ligation of left atrial appendage	98 (66%)	56 (57%)	42 (43%)
Mitral valve replacement	91 (61%)	49 (54%)	42 (46%)
Mitral valve repair	57 (39%)	29 (51%)	28 (49%)
Closure of right atrium on beating heart	88 (59%)	_____	_____

CPB: cardio pulmonary bypass

## RESULTS

Total number of mortality was 6 patients (4%), four of them in group one and 2 in group two, the mortality was not related to the approach but most of the was due preoperative cardiac condition, low ejection fraction and respiratory complications.

Thirty eight patients bled more than 750 ml in the first 24 hours of the operation (26%), 15 of them in group one (39%), 23 cases in group two (61%). Eleven patients required reexploration sternotomy for bleeding (7%), 2 of them was in group one (18%) while 9 of them was in group two (82%) in group two. The intraoperative findings for reopening were non surgical in 10 cases, and surgical in one case, this case the site of bleeding was from the right atrial incision.

Atrial fibrillation occurred in 31 cases (21%), of the 11 was in group one (35%), and 20 in group two (65%).

Low heart rate less than 40 beat per minute noticed 7 cases (5%), 2 of them were in group one (28%), and 5 cases in group two (72%).

Three patients required reoperation of the mitral valve within 30 days of the operation, 2 of them done for failed mitral valve repair which managed by mitral valve replacement, and one patient who developed thrombus over the mitral valve prosthesis which was managed by replacement of the valve. All reoperations were performed through the same previous approach (Table 4).

**Table 4: Postoperative data.**

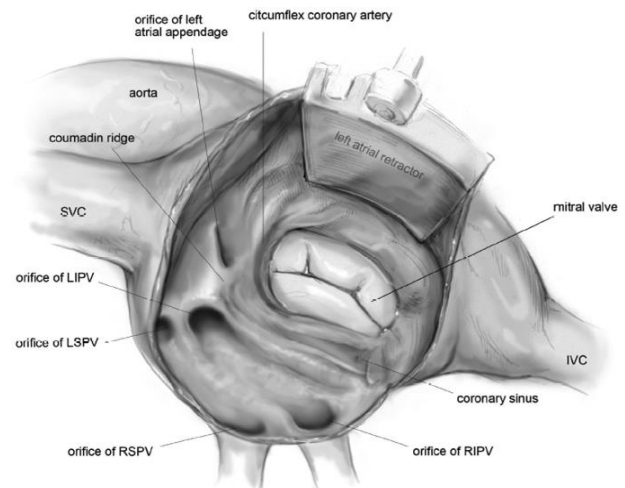
Post op variables	Total number= 148	Group one = 78 (53%)	Group two= 70 (47%)
Mortality	6 (4%)	4 (67%)	2 (33%)
Bleeding $\geq$ 750 ml	38 (26%)	15 (39%)	23 (61%)
Reopening for bleeding	11 (7%)	2 (18%)	9 (82%)
Post op AF	31 (21%)	11 (35%)	20 (65%)
Heart block	7 (5%)	2 (28%)	5 (72%)
Reoperation of the mitral valve	3 (2%)	2 (67%)	1 (33%)

AF: Atrial fibrillation

## DISCUSSION

Since the number of mitral valve surgery is increasing, and since there is vast advancement in the technology which was introduced in cardiac surgery, many alternative approaches were tried in mitral valve surgery other than traditional two approaches that are used for decades.<sup>1,2</sup>

The most commonly used approaches are left atriotomy through incision in the interatrial groove (Figure 1), this incision can be extended up ward below the superior vena cava and down in the posterior wall of the left atrium, to gives more exposure to mitral valve .the second approach is trans-septal approach through incision in the inter atrial septum after opening of the right atrium, this incision also can be extended downward and upward to give more exposure.<sup>3</sup>



**Figure 1: Left atriotomy through inter atrial groove.**

No solid indications for either approaches, but as a usual trend, most surgeons use the interatrial approach in case of isolated mitral valve surgery, large left atrium ,and when there is another intra atrial procedure like ligation of left atrial appendage or left atrial thrombectomy, although these procedure can be done using the other technique.<sup>4</sup>

Left atrial myxoma also another entity , because different approaches can be done, some surgeons use both incisions at the same time to expose the myxoma and to prevent fracture in the tumor itself when they remove it through one incision, others use only one incision according to their preference.<sup>5</sup>

Trans-septal approach can be used in small size left atrium and in case where another procedure will be done in addition to mitral valve surgery especially tricuspid valve repair.<sup>6</sup>

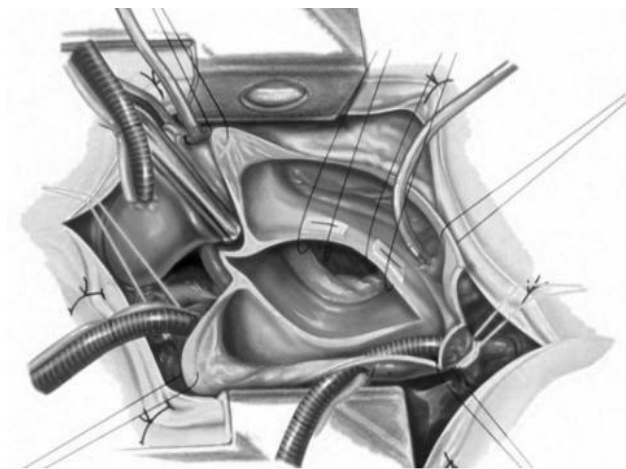
No specific complications that can be occurred in one technique over the other, the cross clamp time will not increase in trans-septal technique as most of the surgeons close the right atrium after removing the cross clamp.<sup>8</sup>

It was thought that the trans-septal technique can increase the rhythm disturbances especially atrial fibrillation and heart block but most of the studies said that this approach does not have any increase to this complication, and if we see this complication postoperatively, this is because the patient himself is having the risk to have atrial fibrillation

or block which means that it is patient factors not related to the approach it self.<sup>9</sup>

One of the most issue concerned in cardiac surgery is the post-operative bleeding , in most of the studies the incidence post-operative bleeding is almost equal with slightly more prevalence in trans-septal approach, the usual site of bleeding is from the right atrial incision, the thin wall right atrium is more prone for bleeding than the thicker walled left atrium theoretically but our idea is if you close the atrium in 2 layers with fine stitches and if it is closed on arrested heart rather than beating heart then the risk of bleeding will be minimized.<sup>10,11</sup>

The approach should be planned preoperatively, the preoperative medical history, the planned procedures, for example; deep chest, previous lung resection ,previous coronary bypass grafting (especially patent saphenous vein and mammary arteries), large or posterior sessile left atrial tumors, combined mitral/tricuspid access, left atrial clot, left ventricular hypertrophy secondary to calcific aortic stenosis, Kent bundle resection in Wolff-Parkinson-White (WPW) syndrome, idiopathic hypertrophic subaortic stenosis (IHSS) with mitral valve replacement (MVR) and septal resection, redo mitral valve surgery, and more recently pain and cosmesis considerations, all these factors can help to take decision for either techniques or to use alternative approaches.<sup>12,13</sup>



**Figure 2: Trans-septal approach.**

## CONCLUSIONS

Mitral valve surgery can be done traditionally using two different approaches, no solid indications for either technique.

The incidence of postoperative complications is almost equal. The decision to choose either approach should be taken preoperatively.

## ACKNOWLEDGEMENTS

We would thank all the staff in the intensive care unit, operating theatre and the medical records officers who helped us to collect the data and organize it.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by ethical committee of the queen alia heart institute*

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**Cite this article as:** Altaani HA, Alfawares S, Asharoo S, Obeidat M, Maloof K. Comparison between inter atrial and trans-septal approach in mitral valve surgery. *Int J Adv Med* 2016;3:229-33.