



## RETROSEPECTIVE COMPARATIVE STUDY BETWEEN MINIMALLY INVASIVE MITRAL VALVE REPLACEMENT AND CONVENTIONAL MITRAL VALVE REPLACEMENT

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### ABSTRACT

Minimally invasive cardiac surgery as an alternative to conventional open cardiac surgery has been growing steadily in the recent years. The options of minimal scar, lesser pain, shorter ICU stays make them an attractive option for the patient. However, the actual benefits of the minimally invasive cardiac surgery are yet to be translated completely in daily clinical practice. Studies suggest that the benefits are better appreciated in high volume centers and even at those center the steep learning curve, longer operating times deter the enthusiastic young surgeons. In this study, we attempt to analyze and compare the operative outcome between those patients who underwent minimally invasive mitral valve replacement Vs Conventional open mitral valve replacement.

**KEYWORDS :** MICS, Minimally Invasive Cardiac surgery, MVR

### Introduction:

Minimally invasive cardiac surgery as an alternative to conventional open cardiac surgery has been growing steadily in the recent years. The options of minimal scar, lesser pain, shorter ICU stays make them an attractive option for the patient (4). However, the actual benefits of the minimally invasive cardiac surgery are yet to be translated completely in daily clinical practice. Studies suggest that the benefits are better appreciated in high volume centers and even at those center the steep learning curve, longer operating times deter the enthusiastic young surgeons. In this study, we attempt to analyze and compare the operative outcome between those patients who underwent minimally invasive mitral valve replacement Vs Conventional open mitral valve replacement.

### Objectives of the Study:

The study was carried out in a tertiary care teaching hospital in Chennai, where almost all the patients requiring mitral valve replacements were operated through conventional open surgery. With this background, the minimally invasive cardiac surgery was a very recent addition to our armamentarium and hence we decided to conduct this study to analyze the operative variables only between the two groups. The objectives of the study were to compare

1. The cross clamp time between the two groups
2. The cardiopulmonary bypass time between the two groups

### Materials and Methods:

This retrospective study was done to compare the operative outcomes between patients undergoing minimally invasive mitral valve replacement and conventional mitral valve replacements. A total of 30 patients were included in the minimally invasive group and they were matched with similar group of 30 patients who underwent conventional surgery. The matching was done by comparing the age, sex, Body Mass Index, comparable severity of valve lesions and Left Ventricular Function.

The inclusion criteria for the study were:

- Age between 20-50 yrs
- Isolated mitral valve lesions (Mitral stenosis/ regurgitation)
- Adequate LV function
- No other co-morbid illness

The exclusion criteria for the study were:

- Age below 20 and above 50 yrs
- Co existing valve lesions
- Poor LV function
- Co-morbid illness

### Open Group:

All patients underwent routine blood investigations and pre-operative evaluations required for adequate optimization of the patient to undergo the procedure. The open conventional surgery patients underwent a median sternotomy, bicaval venous cannulation and left atriotomy approach for mitral valve replacement. Post operatively all patients were electively ventilated until the next day morning. They were placed under ICU monitoring for the subsequent 48 hrs and shifted to step down ICU were they recuperated until they were deemed fit for discharge, which was usually by the tenth post operative day. They were started on acenocoumarol on the first Post operative day, if no significant bleeding was noticed and dose titrated to reach levels of around INR 2.5-3 by the time of discharge.

### Minimally invasive group:

All patients underwent routine blood investigations and pre-operative evaluations required for adequate optimization of the patient to undergo the procedure. This group of patients underwent left sided double lumen endotracheal intubation, right lower anterior mini thoracotomy approach, femoral cannulation through seldinger technique, percutaneous SVC cannulation through right internal jugular vein, aortic cross clamp was done using chitwood aortic clamp inserted through a separate stab incision at the 2nd intercostal space, left atriotomy approach for mitral valve replacement. Temporary epicardial pacing was done in every case. Following the procedure, two drains were kept, one in the pleural cavity and the other in the mediastinum. The patient was kept in the ICU for three days, sometimes longer if required. Intravenous antibiotics were given as per the hospital protocol. They were continued for a period of 7 days after which they were switched to oral antibiotics. An echocardiograph was done on the day of surgery and on the 5th day. The intercostal drains were removed when the output was below 50 ml per day. Most of the patients were discharged between the 10th and 12<sup>th</sup> day.

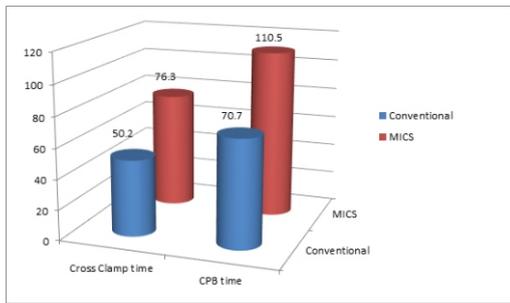
### Results:

A total of 30 patients underwent minimally invasive mitral valve replacement during the study period. Among these, 20 were males and 10 were females. A similar matched group of patients were chosen from the open conventional group for comparison.

The average cross clamp time in the minimally invasive group was 76.3 minutes and the average cardiopulmonary bypass time was 110.5 minutes.

The average cross clamp time in the conventional group was

50.2 minutes and the average cardiopulmonary bypass time was 70.7 minutes.



**Fig 1:** Operative outcomes between MICS and Conventional groups

#### Discussion:

Minimally invasive cardiac surgery is not an uncommon surgery anymore. However, the skill required to perform a safe and efficient surgery which can match the outcome of conventional surgery is certainly high.

In several studies the ischemia and bypass times are considerably more than conventional sternotomy which is understandable considering the limited exposure of the approach, but the average length of stay and hospital costs were lesser than the conventional approach(3). On the other hand we found that in high risk patients minimally invasive procedures may not be as useful given the requirement for speed and efficiency to minimize operating times.

Cheng et al(2) in their meta-analysis of 35 studies comparing open vs minimally invasive cardiac surgery have concluded that cross clamp time and cardiopulmonary bypass time to be significantly longer in minimally invasive group. Our observations were also in similar lines.

Svensson et al(1) in their study of 2124 patients have observed slightly longer cross clamp times and no difference in cardiopulmonary bypass times. This may be due to the large volume of cases performed in the centre and thereby the team could have achieved a high degree of skill which may not be reciprocated elsewhere. We do agree that on achieving greater experience our operating times reduced a little compared to the first few cases.

#### Conclusion:

New technology and methods must provide the same safety and efficacy as the conventional methods. If there is scientific data to suggest minimally invasive surgery does lower the complication rates then all surgeons must get trained in the techniques. However given the wide variety of patients, surgical population, type of training each surgeon must also choose what he or she is comfortable with while giving the best outcome possible. The steep learning curve, appropriate patient selection and longer cross clamp times may not be suitable for all patients groups. The bottom line is that minimally invasive approaches can provide safe and familiar exposure of the cardiac anatomy with results comparable to those of conventional approaches. However a prospective randomised control trial comparing conventional sternotomy and minimally invasive approaches is yet to be carried out. With growing expertise and association with interventional cardiologists, we believe more complex surgeries may be performed through this approach.

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