MINIMALLY INVASIVE (LIMITED ANTERIOR THORACOTOMY) VERSUS CONVENTIONAL APPROACH (MEDIAN STERNOTOMY) FOR MITRAL VALVE SURGERY

PROSPECTIVE STUDY

Thesis

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Dedication

This work is dedicated

to my parents for their love and support

to my patients for their bravery

to my professors, and colleagues for their inspiration

and finally to my beloved wife who was my back bone in this work.

Contents

Abbreviations

ABG	Arterial Blood Gases
ACT	Activated clotting time
ARDS	Acute respiratory distress syndrome
AV	Atrioventricular.
CBC	Complete Blood Count
CPAP	Continuous Positive Airway Pressure
CPB	Cardiopulmonary Bypass
DC	Direct Current
DVT	Deep venous thrombosis
ECG	Electrocardiogram
EF	Ejection fraction
ERO	Effective Regurgitant Orifice
ESD	End systolic dimension
HF	Heart Failure
HS	Highly significant
ICU	Intensive Care Unit
LA	Left atrium
LV	Left ventricle
MIMVS	Minimally invasive mitral valve surgery
MR	Mitral Regurge
MS	Mitral Stenosis
MV	Mitral valve
MVD	Mitral valve disease
MVR	Mitral Valve Replacement
NS	Not significant
NYHA	New York Heart Association
PS	Pressure Support
RFTs	Respiratory function tests
SD	Standard deviation
SPSS	Statistical Package for Social Science
TEE	Trans esophageal echocardiography
VAS	Visual Analog Scale

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ABSTRACT

Background

Although both minimally invasive right anterolateral minithoracotomy and median sternotomy have been used for mitral valve surgery (repair / replacement), the latter approach is still considered the standard approach for mitral valve surgery. We hypothesized that mitral valve surgery, if performed through a right anterolateral minithoracotomy, would not only be better accepted cosmetically by patients, but also make redo surgery through a median sternotomy easy and trouble free from re-entry bleeding and less postoperative complication with better pulmonary function.

Objectives

The aim of the study was to evaluate and compare procedure and early postoperative outcome (3 months and 6 months postoperatively) of minimally invasive right anterolateral minithoracotomy versus median sternotomy in mitral valve surgery.

Patients and Methods

Our study was conducted in Armed Forces Hospitals (Maadi Hospital, Kobry Elkoba Hospital & Algalaa Hospital) during (2013-2015) It was a prospective comparative study and after approval of the ethical committee on the study protocol and procedure, sixty patients with Rheumatic mitral valve disease were randomized into two equal groups; Group “I” 30 patients underwent mitral valve surgery through standard median sternotomy. group “II” 30 patients underwent mitral valve surgery through a minimally invasive right anterolateral minithoracotomy. The mean age for group “I” was 49.8 ± 11.79 SD (with a range of 29-66 years). The mean age for group II was 43.04 ± 12.62 SD

(with a range from 23-61 years). Standard aortic and bicaval cannulation with antegrade aortic root crystalloid cardioplegia was adopted in group“I”, while femoral (venous, arterial) cannulation with antegrade aortic root crystalloid cardioplegia was adopted in group “II”.

Results

There was no statistical difference between the two groups preoperatively regarding their age, sex, NYHA class, EF%, LA dimension,. There was no operative mortality in both groups but fewer postoperative complications such as wound infection; post-operative arrhythmias occurred in both groups. Total hospital stay, ICU stay, postoperative bleeding, inotropic requirement, ventilatory support and blood transfusion were less in group “II” with highly significant statistical difference *(P-value < 0.01)*, with better cosmetic appearance.

Conclusion

Our study proved that the right anterolateral minithoracotomy minimally invasive technique provides more convenient exposure of the mitral valve, even with a small atrium and offers a better cosmetic lateral scar which is less prone to keloid formation. In addition, minimally invasive right anterolateral minithoracotomy for mitral valve surgery was comparable to median sternotomy technique regarding safety, with fewer complications and postoperative pain, less ICU and hospital stay, faster postoperative return to work with no movement restriction after surgery. It should be used as an alternative approach for mitral valve surgery.

Key Words

- Minimally invasive right anterolateral minithoracotomy
- Mitral valve surgery.
- Median sternotomy.

INTRODUCTION

Approximately 20 million cases of rheumatic fever are diagnosed annually in third world countries, with a correspondingly high incidence of advanced mitral stenosis later in life. A genetic predisposition to develop rheumatic heart disease (RHD) appears to be important in certain countries like India, Egypt, Turkey **(Haffejee, 1995).**

Full median sternotomy has been well established as a standard approach for all types of open heart surgery for many years. Although well established, the full sternotomy incision has been frequently criticized for its length, post-operative pain and possible complications like wound infection and instability ***(Rajesh Thosani et al., 2011)***.

Less invasive mitral valve operations offer certain advantages, such as reduce post-operative discomfort and decrease postoperative recovery time **(Grossi et al., 2012).**

Interest in minimally invasive cardiac surgery continues to grow rapidly. Although conventionally mitral valve surgery has been performed via a full incision through the sternum, a variety of technologies and techniques have enabled minimally invasive mitral valve surgery (mini-MVS) to be performed through one or more small incisions in the thorax with assisted vision using cameras. In some cases, robotic surgery may be used for mini-MVS. The goal of mini-MVS is to reduce the surgical trauma to the patient (presumably to reduce pain scarring, and inflammatory response) while maintaining the proven surgical efficacy of the conventional open approach. Minimally invasive

mitral valve surgery is safe, with low perioperative morbidity, and low rates of reoperation **(Cheng et al., 2011)**.

Minimally invasive mitral valve surgery has been proven a feasible alternative to the conventional full sternotomy approach with low perioperative morbidity and short-term mortality, Efforts to minimize surgical trauma, hasten patient recovery, increase patient satisfaction, and reduce cost, without compromise to surgical repair or replacement techniques, continue to be the rationale for minimally invasive procedures **(McClure et al., 2009).**

Endoscopically assisted minimally invasive mitral valve surgery relates to mitral valve surgery procedures which use thoracoscopic visualization of the operative field for at least part of the operation.

Minimally invasive surgical techniques aim at reducing the consequences of currently used large incisions, such as bleeding, pain, and risk of infection, minimally invasive approach has become increasingly acceptable and its effectiveness with satisfactory clinical outcome has been demonstrated in large numbers of patients undergoing mitral valve surgery, the absence of cannulae in the field gives better vision and surgical precision. This approach offers better cosmetic results, reduces the incidence of sternal infection, causes less pain, requires less blood transfusion, hastens the recovery and reduces hospital stay. In COPD patients in whom the risk of sternotomy dehiscence is high, the preservation of the sternum preserves the mechanics of breathing, the sternotomy approach is easier to adopt as most surgeons are used to midline approach. There is neither a requirement of special instrumentation nor a struggle for the depth of the operative field.