

# Tissue versus mechanical valve replacement: Short term outcome among a sample of Egyptian patients with rheumatic mitral valve disease in Minia Governorate

Faisal A. Mourad <sup>a,\*</sup>, Mohsen M.A. Fadala <sup>a</sup>, Ahmed A. Ibrahim <sup>a</sup>,  
Hossam E.A. Abdel-Hameed <sup>a</sup>, Shady E. Moussa <sup>b</sup>, Sherif A.A. Mansour <sup>a</sup>,  
Mohamed A.S. Zahran <sup>b</sup>

<sup>a</sup> Cardiothoracic Surgery Department, Ain-Shams University Hospital, Cairo, Egypt

<sup>b</sup> Department of Cardiothoracic Surgery, Minia University Hospital, Minia, Egypt

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## Abstract

**Background:** The aim of this study was to compare the short-term outcomes of mechanical valve replacement versus tissue valve replacement in cases of rheumatic mitral valve disease in Minia governorate in Upper Egypt known to have a relatively low socioeconomic status.

**Patients and methods:** Over the period of 12 months January 2013 and January 2014, 60 patients with rheumatic mitral valve diseases (stenosis, regurgitation or both) were admitted to Cardiothoracic Surgery Unit, Minia University Hospital, and underwent MVR. These patients were classified into two groups; group A (30 patients underwent MVR with mechanical valves, female to male ratio was 2:1 and mean age was  $39.6 \pm 10$  years), and group B (30 patients underwent MVR with tissue valves, female to male was 4:1 and mean age was  $38 \pm 10.5$  years).

**Results:** There was no overall significant difference between the two groups regarding preoperative patient characteristics, peri-operative and postoperative outcomes except for thrombo-embolic complications. Six patients (20%) developed postoperative complications in group A and four patients (13.3%) in group B. Cardiac tamponade rates were similar in mechanical and tissue valve recipients (3.3%). Thromboembolism rates, prolonged ventilation, new-onset of arrhythmia, wound infection; bleeding rates and low cardiac output state (LCOS) were significantly higher in mechanical valve recipients.

**Conclusion:** Tissue mitral valve offers excellent early postoperative results and less complication rate than mechanical mitral valve. The EOA is significantly bigger in the tissue mitral valve in sizes 27–29 thus offering less patient prosthesis mismatch. Tissue valves are suitable for populations with lower socioeconomic status as Minia Governorate.

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**Keywords:** Mitral valve; Rheumatic; Mechanical valve; Tissue valve

\* Corresponding author.

E-mail address: [faisalmourad@gmail.com](mailto:faisalmourad@gmail.com) (F.A. Mourad).

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## 1. Introduction

In Egypt, rheumatic heart disease (RHD) was rampant in 1950's. There is slow and steady decline in the prevalence of the disease but not reaching the ideal goals. Unfortunately, it affects young adults in their most productive years adding to the economic burden of the involved families and the nation as well [1].

There are 2 main types of valves implanted in cases of mitral valve disease (mechanical and tissue valves) [2].

In general, mechanical are preferred over tissue valves due to freedom from valve reoperation but not from valve-related morbidities. Tissue valves are made from porcine or bovine pericardial tissue. They deteriorate with time, either becoming calcified or stenotic [3].

The purpose of the present study was to compare between the surgical outcome of mitral valve replacement using mechanical and tissue valves over 1 year in a sample of Egyptian population with rheumatic heart pathology.

## 2. Patients and methods

Over 12 month's period between January 2013 and December 2013, 60 patients with rheumatic mitral valve diseases (stenosis, regurgitation or both) were admitted to Cardiothoracic Surgery Unit, Minia University Hospital, and underwent mitral valve replacement (MVR). These patients were classified into two groups; group A (30 patients underwent MVR with mechanical valves), and group B (30 patients underwent MVR with tissue valves). The inclusion criteria included: 1) Adult male or female patients referred to Minia University hospitals to undergo MVR with implant sizes range from 27 to 33. 2) Patients with isolated rheumatic mitral valve disease ( $\pm$ functional tricuspid valve disease). 3) Patients willing to participate in the study and accepting to sign the informative consent. Exclusion criteria included: 1) Emergency cases. 2) Redo cases. 3) Patients with infective endocarditis. 4) Patients presenting with liver cirrhosis or renal failure. 5) Patients with aortic valve disease. 6) Patients necessitating any other cardiac surgery procedure (apart from tricuspid valve repair. 7) Organic tricuspid valve disease.

Choice of the prosthesis was determined based on the patient's age, special request, and comorbid factors. Choice of the prosthetic size was defined on the basis that mild mismatch occurs if indexed effective orifice area is within the range of 0.9–1.2 cm<sup>2</sup>/m<sup>2</sup> and severe mismatch is defined by effective orifice area index of less than 0.9 cm<sup>2</sup>/m<sup>2</sup>.

The type of mechanical prostheses included St. Jude Medical, ATS, and Sorin. The bioprosthetic valve was exclusively St. Jude Epic porcine heart valve. 26 patients were suffering from moderate or severe functional tricuspid regurgitation. 16 of them underwent MVR using mechanical prosthesis and the remaining 10 patients used bioprostheses. All of them underwent De Vega's tricuspid annuloplasty.

Patients were transferred out of the intensive care unit (ICU) on the first postoperative day if they were hemodynamically stable, as indicated by no fever, no wound complication, no arrhythmia, and stable hemodynamics. We compared postoperative outcome measures as amount of postoperative blood loss and sternal wound infections. Other routinely recorded measures will also be noted including time of mechanical ventilation, ICU and hospital stays, need for re-exploration, need for inotropic support, renal or hepatic failure, central nervous system complications, thromboembolic events or hemolysis (Table 1).

Echocardiography was done routinely during hospital stay, 3 months, 6 months and after 1 year respectively. Echo data included Left Ventricular End Diastolic Diameter (LVEDD), Left Ventricular End Systolic Diameter (LVESD), Left Ventricular Outflow

Table 1  
Postoperative complications in the studied groups and NYHA classification postoperatively.

| Variables                             | Group A (n = 30) | Group B (n = 30) | p-value |
|---------------------------------------|------------------|------------------|---------|
| Overall complications                 | 10 (33.3%)       | 4 (13.3%)        | 0.009   |
| Prolonged ventilation                 | 1 (3.3%)         | 0                | 0.31    |
| LCOS                                  | 4 (13.3%)        | 3 (10%)          | 0.68    |
| Reoperation for bleeding              | 1 (3.3%)         | 0                | 0.31    |
| Anticoagulant related bleeding events | 5 (16.6%)        | 0                | 0.006   |
| Wound infection                       | 2 (6.7%)         | 1 (3.3%)         | 0.55    |
| Cardiac tamponade                     | 1 (3.3%)         | 0                | 0.31    |
| New onset of arrhythmia               | 2 (6.7%)         | 1 (3.3%)         | 0.55    |
| Neurological deficit                  | 1 (3.3%)         | 0                | 0.31    |
| NYHA I                                | 12 (40%)         | 10 (33.3%)       | 0.54    |
| NYHA II                               | 13 (43.3%)       | 17 (56.7%)       |         |
| NYHA III                              | 5 (16.7%)        | 3 (10%)          |         |

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