Mitral valve replacement for mitral stenosis: A 15-year single center experience

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Objectives: **Mitral valve replacement with either a bioprosthetic or a mechanical valve is the treatment of choice for severe mitral stenosis. However, choosing a valve implant type is still a subject of debate. This study aimed to evaluate and compare the early and late outcomes of mitral valve replacement [mechanical (MMV) vs. bioprosthetic (BMV)] for severe mitral stenosis.**

Methods: **A retrospective cohort study was performed on data involving mitral stenosis patients who have undergone mitral valve replacement with either BMV ($n = 50$) or MMV ($n = 145$) valves from 1999 to 2012. Data were collected from the patients' records and follow-up through telephone calls. Data were analyzed for early and late mortality, New York Heart Association (NYHA) functional classes, stroke, pre- and postoperative echocardiographic findings, early and late valve-related complications, and survival. Chi-square test, logistic regression, Kaplan–Meier curve, and dependent proportions tests were some of the tests employed in the analysis.**

Results: **A total of 195 patients were included in the study with a 30-day follow-up echocardiogram available for 190 patients (97.5%), while 103 (53%) were available for follow-up over the telephone. One patient died early postoperatively; twelve patients died late in the postoperative period, six in the bioprosthesis group and six in the mechanical group. The late mortality had a significant association with postoperative stroke ($p < 0.001$) and postoperative NYHA Classes III and IV ($p = 0.002$). Postoperative NYHA class was significantly associated with age ($p = 0.003$), pulmonary disease ($p = 0.02$), mitral valve implant type ($p = 0.01$), and postoperative stroke ($p = 0.02$); 14 patients had strokes in the mechanical (9) and in the bioprosthetic (5) groups. NYHA classes were significantly better after the replacement surgeries ($p < 0.001$). BMV were significantly associated with worse survival ($p = 0.03$), worse NYHA postoperatively ($p = 0.01$), and more reoperations ($p = 0.006$). Survival was significantly better with MMV ($p = 0.03$). When the two groups were matched for age and mitral regurgitation, the analysis revealed that BMV were significantly associated with reoperations ($p = 0.02$) but not significantly associated with worse survival ($p = 0.4$) or worse NYHA ($p = 0.4$).**

Conclusion: **MMV replacement in mitral stenosis patients is associated with a lower reoperation rate, but there was no difference in survival compared with BMV replacement.**

Keywords: Bioprosthetic valves, Mechanical valves, Mitral stenosis, Outcome, Valve replacement

Disclosure: Authors have nothing to disclose with regard to commercial support.
Received 1 October 2015; revised 2 February 2016; accepted 11 February 2016.

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Peer review under responsibility of King Saud University.
URL: www.ksu.edu.sa
http://dx.doi.org/10.1016/j.jsha.2016.02.007

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Please cite this article in press as: Al Mosa A.F. et al., Mitral valve replacement for mitral stenosis: A 15-year single center experience, J Saudi Heart Assoc (2016), http://dx.doi.org/10.1016/j.jsha.2016.02.007

Introduction

Mitral stenosis (MS) is most commonly due to rheumatic fever resulting in rheumatic heart disease [1]. A surgical pathology series of 452 MS patients concluded that 99% of the patients had postinflammatory disease that was believed to be rheumatic in origin [2].

Symptomatic MS can be treated by percutaneous mitral balloon valvotomy, surgical valvotomy, or surgically replacing the dysfunctional valve with either a mechanical mitral valve (MMV) or a bioprosthetic mitral valve (BMV) [3]. Open valvotomy is a repair procedure that involves direct visualization of the valve and debridement of the valve structure and reconstruction of subvalvular apparatus. Mitral valve replacement is usually preserved for severe MS that is not fit for percutaneous mitral balloon valvotomy or valve repair [4].

The purpose of this study was to compare mitral valve replacement, with either a BMV or a MMV, in MS patients and evaluate their early survival and long-term outcome.

Abbreviations

MS	Mitral Stenosis
BMV	Bioprosthetic Mitral Valve
MMV	Mechanical Mitral Valve
NYHA	New York Heart Association
DM	Diabetes Mellitus
HTN	Hypertension
CHF	Congestive Heart Failure
LV	left Ventricle
MR	Mitral Regurgitation
EF	Ejection Fraction
Op	operative
MVR	Mitral Valve Replacement
AVR	Aortic Valve Replacement
TV	Tricuspid Valve
AV	Aortic Valve

Materials and methods

Setting and patients

The study was conducted in a tertiary care cardiac center (King Abdulaziz Cardiac Center) in Riyadh, Saudi Arabia, and the study population included all consecutive adult mitral valve replacement (MVR) patients operated on for mitral valve stenosis from 1999 to 2012. All patients that fit the inclusion criteria were enrolled in the study regardless of their sex and nationality. All the available patients were included in the study.

Study design

This study is a retrospective cohort of patient data collected from the center and the follow-up data gathered by contacting the patients through the telephone.

Data collection

Eighty variables were collected. They were representing information related to demographics, preoperative underlying conditions, early and late valve related complications, and pre- and postoperative echocardiogram data. Patients' demographics, underlying conditions, preoperative echocardiograms, and early postoperative complications were obtained from the records of the patients. Patients' records were provided as a soft copy in the form of Excel sheets (Microsoft Corporation, Redmond, WA, USA), which was then transferred into SPSS statistical package software version 20.0 (SPSS Inc., Chicago, IL, USA) for analysis. Postoperative echocardiogram data were collected using the Picture Archiving and Communication System to access the echo database. Late follow-up data (long-term) was acquired by calling the patients' phone numbers provided in their hospital records via the hospital telephone. The patients were called over a period of 1 month after the data were collected from the medical records. A total of three calls were made. The patients who did not respond to the first call were again contacted after 2 weeks and those remaining were contacted 1 week after the second phone call.

A standardized and Institutional Review Board, King Abdullah international Research Center, Riyadh approved consent form was used during telephone calls in gathering the long-term outcomes information (late follow-up) to collect the following: (1) late mortality; (2) New York Heart Association (NYHA) functional class; (3) late valve-related complications [bleeding (which required blood transfusion), stroke (embolic or hemorrhagic), abdominal embolism, and endocarditis]; and (4) reoperation.

Data management

The patients who underwent MVR were divided into a BMV group and a MMV group. NYHA Classes I and II were grouped together as one group in the analysis, and the same was done for NYHA Classes III and IV. Ejection fraction (EF) groups are as follows: (1) normal EF ($\geqslant$55%); (2) mild left ventricular dysfunction

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