Predictors of survival in octogenarians after mitral valve surgery for degenerative disease: The Mitral Surgery in Octogenarians study

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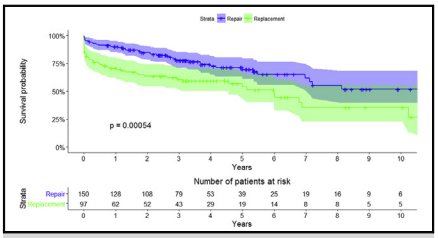
ABSTRACT

Objectives: An increasing number of octogenarians are referred to undergo mitral valve surgery for degenerative disease, and percutaneous approaches are being increasingly used in this subgroup of patients. We sought to determine the survival and its predictors after Mitral valve Surgery in Octogenarians (MiSO) in a multicenter UK study of high-volume specialized centers.

Methods: Pooled data from 3 centers were collected retrospectively. To identify the predictors of short-term composite outcome of 30 days mortality, acute kidney injury, and cerebrovascular accident, a multivariable logistic regression model was developed. Multiple Cox regression analysis was performed for late mortality. Kaplan–Meier curves were generated for long-term survival in various subsets of patients. Receiver operating characteristic analysis was done to determine the predictive power of the logistic European System for Cardiac Operative Risk Evaluation.

Results: A total of 247 patients were included in the study. The median follow-up was 2.9 years (minimum 0, maximum 14 years). A total of 150 patients (60.7%) underwent mitral valve repair, and 97 patients (39.3%) underwent mitral valve replacement. Apart from redo cardiac surgery (mitral valve repair 6 [4%] vs mitral valve replacement 11 [11.3%], $P = .04$) and preoperative atrial fibrillation (mitral valve repair 79 [52.6%] vs mitral valve replacement 34 [35.1%], $P < .01$), there was no significant difference in terms of any other preoperative characteristics between the 2 groups. Patient operative risk, as estimated by logistic European System for Cardiac Operative Risk Evaluation, was lower in the mitral valve repair group (10.2 ± 11.8 vs 13.7 ± 15.2 in mitral valve replacement; $P = .07$). No difference was found between groups for duration of cardiopulmonary bypass and aortic crossclamp times. The 30-day mortality for the whole cohort was 13.8% (mitral valve repair 4.7% vs mitral valve replacement 18.6%; $P < .01$). No differences were found in terms of postoperative cerebrovascular accident (2% vs 3.1%; $P = .9$), acute kidney injury requiring dialysis (6.7% vs 13.4%; $P = .12$), and superficial or deep sternal wound infection (10% vs 16.5%, $P = .17$; 2% vs 3.1%, $P = .67$, respectively). The final multiple regression model for short-term composite outcome included previous cardiac surgery



Kaplan–Meier survival curves between the 2 groups (raw data).

Central Message

In octogenarians, MVr demonstrated good in-hospital outcomes and provided better survival compared with MVR.

Perspective

An increasing number of octogenarians are undergoing valve surgery, and there is a large body of evidence showing that octogenarians derive benefit from cardiac surgery. We demonstrated that MVr is safe and effective even in elderly patients, providing better short-term outcomes and long-term survival compared with MVR.

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Abbreviations and Acronyms

AKI	= acute kidney injury
BMI	= body mass index
CI	= confidence interval
COPD	= chronic obstructive pulmonary disease
euroSCORE	= European System for Cardiac Operative Risk Evaluation
HR	= hazard ratio
IABP	= intra-aortic balloon pump
LVEF	= left ventricular ejection fraction
MiSO	= Mitral valve Surgery in Octogenarians
MR	= mitral regurgitation
MVr	= mitral valve repair
MVR	= mitral valve replacement
OR	= odds ratio

Scanning this QR code will take you to the supplemental tables and figure for this article.

(odds ratio [OR], 4.47; 95% confidence interval [CI], 1.37-17.46; $P = .02$), intra-aortic balloon pump use (OR, 4.77; 95% CI, 1.67-15.79; $P < .01$), and mitral valve replacement (OR, 7.7; 95% CI, 4.04-14.9; $P < .01$). Overall survival for the entire cohort at 1, 5, and 10 years was 82.4%, 63.7%, and 45.5% (mitral valve repair vs mitral valve replacement: 89.9% vs 70.7% at 1 year, 69.6% vs 54% at 5 years, and 51.8% vs 35.5% at 10 years; $P = .0005$). Cox proportional hazard model results showed mitral valve replacement (hazard ratio, 1.88; 95% CI, 1.22-2.89; $P < .01$) and intra-aortic balloon pump use (hazard ratio, 2.54; 95% CI, 1.26-5.13; $P < .01$) to be independent predictor factors affecting long-term survival. Logistic European System for Cardiac Operative Risk Evaluation did not perform well in predicting early mortality (area under the curve, 0.57%).

Conclusions: In octogenarians, mitral valve repair for degenerative disease is associated with good survival and remains the gold standard, whereas mitral valve replacement is still associated with significant mortality. Logistic European System for Cardiac Operative Risk Evaluation was unable to predict early mortality in our cohort of patients. Larger international multicenter registries are required to optimize the decision-making process in such a high-risk subgroup. (J Thorac Cardiovasc Surg 2017;■:1-9)

In the past 2 decades, the definition of the ''elderly'' population in the cardiology literature has evolved: initially age more than 70 years, then more than 75 years, and now more than 80 years.[1,2] The expectancy and quality of life of the elderly population continue to increase at the cost of a growing prevalence of cardiovascular conditions,[1-4] such as mitral valve disease. Thus, an increasing number of octogenarians are referred to undergo cardiac surgical procedures.[4] Mitral valve repair (MVr) is the treatment of choice for severe mitral regurgitation (MR) in the general population, because it has been shown to provide a significant survival benefit over both medical treatment and mitral valve replacement (MVR).[5-11] However, the feasibility and efficacy of mitral repair in very elderly patients are more controversial.[12] Overall, there is a large body of evidence showing that octogenarians derive benefit from cardiac surgery.[13-26] In the last decade, several studies have shown that cardiac surgical procedures performed in elderly patients, in otherwise good physical and mental health, can improve their mortality, morbidity, and quality of life.

Transcatheter mitral technologies are emerging as a viable option to treat high-risk and inoperable patients with mitral valve disease.[27-32] These have shown promising early outcomes, especially in terms of procedural safety, and have being increasingly used in otherwise fit octogenarians requiring intervention for degenerative mitral valve disease. To this end, a clear understanding of the risks and benefits of mitral surgery in octogenarians in the current era is needed for rational decision-making regarding the best management option in this cohort of patients.

The purpose of this study was to determine the survival and determinants of its predictors after surgical MVr and MVR in octogenarians in a multicenter UK study, Mitral valve Surgery in Octogenarians (MiSO), of high-volume specialist centers in the MitraClip (Abbott Vascular, Inc, Menlo Park, Calif) era.

PATIENTS AND METHODS

Study Population and Definitions

MiSO is a multicenter, retrospective, observational study based on prospectively collected data obtained from institutional cardiac surgery datasets of 3 high-volume specialist UK centers (Bristol, Papworth, and Southampton). The study was conducted in accordance with the principles of the Declaration of Helsinki. Institutional board approval was obtained for the study, and patient consent was waived.

Between January 2001 and October 2015, 252 octogenarians underwent mitral valve surgery. All the purely endocarditis, rheumatic, or ischemic cases were excluded to prevent selection bias. The final cohort consisted of 247 patients with degenerative MR (Figure E1 shows the distribution and type of surgery over the years). All patients were approached through a median sternotomy. Risk scoring has been calculated using the logistic European System for Cardiac Operative Risk Evaluation (euroSCORE). Degenerative disease was defined as single- or multi-segment prolapse due to chordal elongation or rupture. Emergency surgery was defined as surgery carried out within 24 hours of unscheduled admission, including