Repeat sternotomy for surgical aortic valve replacement in octogenarian patients with aortic valve stenosis and previous coronary artery bypass graft operation: What is the operative risk?

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Objectives: There are limited data defining the risk of repeat sternotomy for surgical aortic valve replacement in octogenarian patients with aortic valve stenosis and previous coronary artery bypass graft operation. Our study assesses the risk of operation.

Methods: We conducted a retrospective review of 629 octogenarian patients with aortic stenosis who received isolated surgical aortic valve replacement between January 1993 and December 2011. Patient characteristics included age 83.7 ± 3.2 years, male sex in 322 patients (51.2%), and Society of Thoracic Surgeons predicted risk of mortality of 6.2% ± 4.4%. Operations included a primary sternotomy in 518 patients (82.4%) and a repeat sternotomy in 111 patients (17.6%) who had previous coronary artery bypass graft operation. Patients with other cardiac operations were excluded from the study.

Results: Cardiopulmonary bypass time was longer with repeat sternotomy (88.0 ± 45.7 minutes) in comparison to primary sternotomy (66.5 ± 25.1; P < .001); but there was no difference in the aortic crossclamp time (51.1 ± 19.7 minutes vs 49.2 ± 17.7 minutes; P = .282). Stroke occurred in 3 patients (2.7%) following repeat sternotomy and in 10 (1.9%) after primary sternotomy (P = .710). Rates of myocardial infarction, renal failure, and reoperation for bleeding were similar between the 2 groups. Operative mortality occurred in 7 patients (6.4%) after repeat sternotomy and in 19 patients (3.7%) following primary sternotomy (P = .196). Repeat sternotomy was not predictive of operative mortality.

Conclusions: Repeat sternotomy and surgical aortic valve replacement can be done with low risk in octogenarian patients with previous coronary artery bypass graft operation. (J Thorac Cardiovasc Surg 2014;148:1899-902)

Surgical aortic valve replacement improves symptoms and prolongs survival with low operative morbidity and mortality rates in most series of patients.1,2 In general, repeat sternotomy does not increase the risk of operation.3 There are limited data on repeat sternotomy for surgical aortic valve replacement in octogenarian patients, with some series reporting an operative mortality of around 20%.4,5 But no study has looked specifically at the outcome in octogenarian patients with previous coronary artery bypass graft operation. Unfortunately, such patients may be denied operation, or offered alternative therapy (ie, transcatheter aortic valve replacement), based on a perception of prohibitive risk of operative morbidity and/or mortality associated with surgical replacement.

The objective of our study was to define the risk of repeat sternotomy for surgical aortic valve replacement in octogenarian patients with previous coronary artery bypass graft operation.

METHODS

This study was approved by the Mayo Clinic Institutional Review Board. We reviewed the records of 1745 octogenarian patients who received aortic valve replacement for aortic valve stenosis between January 1993 and December 2011. We excluded from study patients with a history of previous noncoronary artery bypass graft cardiac operation (eg, valve replacement or pericardiectomy) or infective endocarditis. In addition, we excluded patients who received planned concomitant coronary artery bypass graft operation, transcatheter aortic valve replacement, or other nonaortic valve-related operation (eg, mitral or tricuspid valve operation or pericardiectomy). We included in the study patients who received an aortic root patch or enlargement procedure.

We identified an intent-to-treat cohort of 637 octogenarian patients who met our inclusion and exclusion criteria. Of this group, 8 patients refused research authorization; they were subsequently excluded from further study. That left 629 octogenarian patients for study. We formed 2 study groups that included 518 patients (82.4%) who received primary sternotomy (primary sternotomy group) and 111 patients (17.6%) who received repeat sternotomy (repeat sternotomy group). All patients in the repeat sternotomy group had undergone previous coronary artery bypass graft operation. All operations were performed at Mayo Clinic, Rochester, Minn.

The Division of Cardiovascular Surgery database and individual patient medical records were reviewed for data on patient characteristics and...
operative intervention, morbidity, and mortality. Data on these variables were collected in keeping with the standard definitions set forth by the Society of Thoracic Surgeons (STS) as part of the National Adult Cardiac Surgery Database. Operative mortality was defined as death occurring within 30 days of operation or at any time during the index hospitalization.

Descriptive statistics for categorical variables are reported as frequency (percentage) whereas continuous variables are reported as mean ± standard deviation or median (range) as appropriate. Categorical variables were compared using χ² or Fisher exact test and continuous variables using 2-sample t test or Wilcoxon rank-sum test where appropriate. Logistic regression models were used to find the univariate and multivariate predictors of operative mortality. The multivariable model considered univariate significant variables (P < .05) with model selection using the stepwise method. All statistical tests were 2 sided.

RESULTS

Patient characteristics included a mean age of 83.7 ± 3.2 years, male sex in 322 patients (51.2%), and an STS predicted risk of mortality of 6.2% ± 4.4%. Operation occurred during the second half of the study period in 86 patients (78.2%) in the repeat sternotomy group and in 357 patients (67.6%) in the primary sternotomy group (P = .065). Patient characteristics of the 2 study groups are detailed in Table 1.

All patients received surgical aortic valve replacement. Operations included an aortic root enlargement in 5 patients (4.6%) in the repeat sternotomy group and in 36 patients (6.8%) in the primary sternotomy group (P = .126). Cardiopulmonary bypass time was longer in the repeat sternotomy group (88.0 ± 45.7 minutes) in comparison to the primary sternotomy group (66.5 ± 25.1 minutes; P < .001). But there was no difference in the aortic crossclamp time in the repeat sternotomy group (51.1 ± 19.7 minutes) in comparison to the primary sternotomy group (49.2 ± 17.7 minutes; P = .282). Intra-aortic balloon pump therapy was used in 15 patients (13.5%) in the repeat sternotomy group and in 10 patients (1.9%) in the primary sternotomy group (P < .001).

We report operative morbidity and mortality data in Table 2. Stroke occurred in 3 patients (2.7%) following repeat sternotomy and in 10 patients (1.9%) after primary sternotomy (P = .710). Rates of myocardial infarction, renal failure, and reoperation for bleeding were similar between the 2 groups. Operative mortality occurred in 7 patients (6.3%) in the repeat sternotomy group and in 19 patients (3.7%) in the primary sternotomy group (P = .196). The cause of death was cardiac-related in 16 patients (64.0%). In the repeat sternotomy group, 1 death was related to a sternal reentry injury of the right ventricle and left internal mammary artery bypass graft. There were no operative deaths in the 7 patients who received either a third (n = 6) or fourth (n = 1) sternotomy.

We report the results of univariate logistic regression of variables predicting operative mortality in Table 3. The only preoperative patient characteristics predictive of death were ejection fraction (odds ratio [OR], 0.97; 95% confidence interval [CI], 0.95-1.0; P = .032) and previous myocardial infarction (OR, 6.99; 95% CI, 1.47-49.45; P = .014). Repeat sternotomy was not predictive of operative mortality in the univariate analysis (OR, 1.77; 95% CI, 0.68-4.14; P = .387). Multivariate analysis identified only previous myocardial infarction as being predictive of operative mortality (OR, 5.63; 95% CI, 0.96-43.87; P = .042).

DISCUSSION

The main finding in our study is that repeat sternotomy is not a predictor of operative mortality for isolated surgical aortic valve replacement. We evaluated 629 octogenarian patients with aortic valve stenosis who underwent operation for isolated surgical aortic valve replacement. Of those patients, 111 (17.6%) required repeat sternotomy because of a previous coronary artery bypass graft operation. Patients who underwent a repeat sternotomy had greater prevalence of preoperative comorbidity and higher STS predicted risk of mortality scores. Despite the greater operative risk, the repeat sternotomy group experienced similar operative mortality in comparison to patients who received primary sternotomy (6.4% vs 3.7%; P = .196).

The outcome of medical management in elderly patients with symptomatic severe aortic is disappointing. Leon and colleagues demonstrated a 1-year mortality rate of 49.7% with aggressive medical therapy in patients (mean age, 83.2 years) with symptomatic severe aortic valve stenosis. However, there is general agreement in the literature that such patients benefit from surgical aortic valve replacement. For instance, Varadarajan and colleagues reported 5-year survival of 68% in elderly patients (mean age, 85.3 years) treated with surgical aortic valve replacement in comparison to 22% in patients (mean age, 83 years) managed without operation (P < .001). And importantly, Saxena and colleagues reported the 5-year survival of male elderly patients (mean age, 83.4 years) undergoing surgical aortic valve replacement at 65%, which is comparable to the expected survival of age-matched Australian men (mean age, 83 years) at 64.3%.

As a general finding, repeat sternotomy does not increase the risk of operative mortality. LaPar and colleagues reported the outcome of 99 patients who underwent operation from 2004 through 2007 with repeat sternotomy for surgical aortic valve replacement. The group had equivalent mortality to patients who underwent operation for primary sternotomy (3.5% vs 2.0%; P = .65). Importantly, in this series, patients undergoing repeat