Nonelective cardiac surgery in the elderly: Is it justified?

Ravi K. Ghanta, MD, Prem S. Shekar, MD, Siobhan McGurk, BS, Donna M. Rosborough, RN, MS, and Sary F. Aranki, MD

Objective: Elderly patients might be denied nonelective cardiac surgery because of the perception of poor outcomes and an unacceptable quality of life. In this study we evaluate long-term survival and quality of life in these patients.

Methods: From 1994 to 1999, 262 consecutive patients older than 80 years underwent urgent (n = 223) or emergent (n = 39) cardiac surgery. Of these patients, 160 (61%) underwent coronary artery bypass grafting, 64 (24%) underwent coronary artery bypass grafting plus valve surgery, 17 (7%) underwent valve surgery, and 21 (8%) underwent aortic surgery. Kaplan–Meier survival analysis and quality-of-life assessment were performed, and result were compared with age-adjusted population data. Risk factors for mortality were determined by using Cox regression. The utility of Society of Thoracic Surgeons and EuroSCORE risk scoring were assessed by using area under receiver operating curves.

Results: Early mortality was 11% (n = 29) overall, 7% (n = 16) in urgent cases, and 33% (n = 13) in emergent cases. Five-year survival was 50% (n = 132) overall, 53% (n = 105) in urgent cases, and 36% (n = 18) in emergent cases. There was no difference in 10-year survival between patients undergoing urgent surgical intervention and age-adjusted population data. Among survivors, quality-of-life measures were equivalent to those of the general elderly population. Risk factors for early mortality were age, emergent procedure, aortic procedure, bypass time, and postoperative complication (renal failure, myocardial infarction, cerebrovascular accident, pneumonia, and reoperation for bleeding). Risk factors for late mortality were peripheral vascular disease, emergent procedure, bypass time, and new renal failure. The EuroSCORE and Society of Thoracic Surgeons risk scores were equivalent but only moderately predictive of mortality.

Conclusions: Long-term survival and quality of life after nonelective cardiac surgery can equal that of the general elderly population. Age alone should not disqualify a patient for urgent or emergent cardiac surgery. (J Thorac Cardiovasc Surg 2010;140:103-9)

Supplemental material is available online.

Eighteen million persons are currently older than 75 years in the United States, and the number is expected to increase significantly over the next decade.[1] Similar trends are occurring worldwide.[2] Cardiovascular disease remains the leading cause of morbidity and mortality in the elderly population.[3] As the elderly population increases, cardiac surgery in octogenarian and nonagenarian patients is becoming increasingly common.[4-6] However, elderly patients are less likely to be referred for elective cardiac surgery than younger patients. Many elderly patients view cardiac surgery as a risky proposition with little potential gain. Similarly, referring physicians also perceive poor outcomes and poor postoperative quality of life (QoL).[7-9] For these reasons, elderly patients are more likely to present with unstable symptoms than younger patients, forcing consideration for urgent or emergent cardiac surgery.[10] Several studies have demonstrated encouraging survival and QoL in elderly patients undergoing cardiac surgery but note that nonelective surgery is associated with 2 to 3 times greater risk.[4,10-13]

No prior study has evaluated long-term survival and QoL outcomes of elderly patients undergoing urgent or emergent cardiac surgery, and few data exist to guide clinical decision making for this patient population. The goal of this study is to evaluate the long-term survival and QoL for nonelective cardiac surgery in our octogenarian and nonagenarian patients. We compare these outcomes with age-adjusted population data. We also identify risk factors for early and late mortality and evaluate the utility of existing clinical predictive algorithms for this patient population.

MATERIALS AND METHODS

Patients

All patients 80 years of age or older who underwent nonelective cardiac surgery between January 1994 and December 1999 at Brigham and

From the Division of Cardiac Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, Mass.

Supported by Brigham and Women's Hospital, Division of Cardiac Surgery.
Disclosures: None.
Received for publication July 9, 2009; revisions received Sept 16, 2009; accepted for publication Oct 3, 2009; available ahead of print Dec 14, 2009.

Address for reprints: Sary F. Aranki, MD, Division of Cardiac Surgery, Brigham and Women's Hospital, 75 Francis St, Boston, MA 02115 (E-mail: saranki@partners.org).

0022-5223/$36.00

doi:10.1016/j.jtcvs.2009.10.001

Abbreviations and Acronyms

AUROC = area under the receiver operating curve
CABG = coronary artery bypass grafting
CVA = cerebrovascular accident
LOS = length of stay
MI = myocardial infarction
QoL = quality of life
SF-12 = Medical Outcomes Study Short Form 12
STS = Society of Thoracic Surgeons

Women's Hospital were identified. Nonelective surgery was defined as an urgent or emergent operation, as defined by the Society of Thoracic Surgeons, required for acute myocardial infarction (MI), unstable angina, critical coronary anatomy, cardiogenic shock, or aortic rupture or dissection. During this 5-year period, 262 consecutive patients were identified, of whom 223 (80%) underwent urgent surgery and 39 (20%) underwent emergent surgery. Patients' preoperative, operative, and postoperative variables were retrieved from the prospective Brigham Cardiac Surgery Database. Procedures were divided into coronary artery bypass grafting (CABG) alone, valve surgery with or without CABG, and aortic surgery.

Outcomes

We evaluated the frequency of postoperative complications, length of stay (LOS), discharge disposition, early mortality, long-term survival, and long-term QoL. In all patients the postoperative course was followed, and intubation time and intensive care unit and hospital LOS and patient disposition were determined. Complications, such as death, cerebrovascular accident (CVA), pneumonia, new-onset atrial fibrillation, postoperative MI, reoperation for bleeding, and new-onset renal failure were identified. Early mortality was defined as death within 30 days of the operation or at any point while still in the hospital. CVA included strokes, transient ischemic attacks, and coma. New-onset renal failure was defined as a creatinine value of greater than 2.0 mg/dL with no history of preoperative renal failure. Pneumonia was identified in patients with positive bacterial sputum cultures or radiographic findings consistent with pulmonary infection. Postoperative MI was defined as the presence of at least 2 of the following: prolonged typical chest pain not relieved by nitrates, enzyme level increase, new wall motion abnormalities, and/or ST-segment or Q-wave electrocardiographic changes in 2 or more contiguous leads.

The vital status of all discharged patients was determined from medical records, a query of the Social Security Death Index, and/or communication with the patient's family or physician before August 2004. Survivors were then sent the Medical Outcomes Study Short Form 12 (SF-12) Health Survey, version 2, to evaluate QoL.[14,15] The deadline for questionnaire return was March 2005. Long-term mortality through June 2008 was ascertained by means of a subsequent query of the Social Security Death Index and medical records.

Analysis and Statistical Methods

Statistical analyses were performed with SPSS 13.0 software (SPSS, Inc, Chicago, Ill), and a P value of less than .05 was considered statistically significant. Evaluation of dichotomous variables was done with the Fisher's exact test. One-way analyses of variance were used to evaluate continuous variables. Survival curves were calculated by using the Kaplan–Meier method.[16] Observed postoperative survival was compared with predicted survival of a similarly aged cohort from United States census data.[17] A univariate followed by multivariate Cox proportional hazards regression from preoperative, operative, and postoperative variables was performed to identify risk factors for late mortality. For early/operative mortality, only a univariate Cox proportional hazards regression was performed because there were too few mortalities to perform a multivariate model. The predicted operative mortality was calculated by using the Society of Thoracic Surgeons (STS) and the logistic European system for cardiac risk assessment (EuroSCORE) algorithms to evaluate the utility of existing clinical risk stratification protocols.[18,19] The STS- and EuroSCORE-predicted operative mortality was then compared with the observed mortality. Receiver operating curves were determined, and the area under the receiver operating curve (AUROC) was used to assess the accuracy of the score in predicting mortality.[20] QoL data were compared with normative data for patients 75 years or older and patients with cardiac disease.[14]

RESULTS

Patient Demographics

Patient characteristics and comorbidities are summarized in Table 1. The mean age of patients at the time of surgical intervention was 83 ± 3 years, with a range of 80 to 93 years. There were 8 nonagenarians overall, with 4 undergoing urgent operations and 4 undergoing emergent operations. Preoperatively, 52% of patients demonstrated New York Heart Association Class III or IV heart failure. The most frequent preoperative comorbidities were hypertension (74%), diabetes (25%), renal failure (16%), and history of CVA (12%). Only 1 patient with preoperative renal failure was hemodialysis dependent. CABG alone was performed in 61% of patients, representing the most common surgical procedure. Valve surgery with or without CABG was performed in 31% of patients. Aortic surgery was performed in 8% of patients, including 5 patients with acute type A aortic dissection and 1 patient with a type B aortic dissection. Fourteen patients had an ascending aortic aneurysm with either possible rupture or concomitant ischemia and valve dysfunction requiring urgent or emergent repair. One patient had a ruptured descending thoracic aneurysm. Aortic surgery was more common in emergent cases. The most common indication for urgent surgery was unstable angina requiring intravenous nitroglycerin (29%). The most common indication for emergent surgery was evolving MI (41%). All procedures were performed with cardiopulmonary bypass. Thirty-one (12%) patients had undergone previous cardiac operations.

Postoperative Complications and Early Mortality

Postoperative morbidity, mortality, and LOS are summarized in Table 2. Early mortality was 11% overall, 7% in urgent cases, and 33% in emergent cases. The surgical procedures and cause of death in the emergent cases are listed in Table E1. The most frequent causes of death in this group were CVA, multisystem organ failure, and cardiac arrest. Overall, the most frequent postoperative complication was atrial fibrillation (48% of patients) followed by pneumonia (28%), new-onset renal failure (7.3%), reoperation for bleeding (7.6%), and CVA (5.7%). The median hospital LOS was 9 days, with a median intensive care unit LOS of 3