Predictors of survival, functional survival, and hospital readmission in octogenarians after surgical aortic valve replacement

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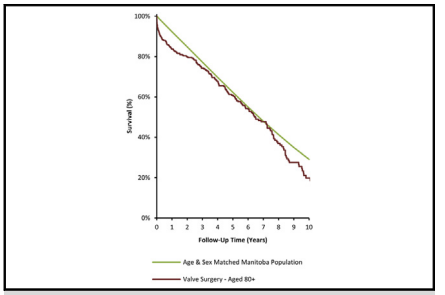
ABSTRACT

Objective: To analyze outcomes and predictors of functional survival (personal care home admission and mortality) and hospital readmission in patients aged ≥80 years who underwent surgical aortic valve replacement (SAVR) in a Manitoba hospital.

Methods: This was a retrospective cohort study of patients aged ≥80 years who underwent SAVR with or without coronary artery bypass grafting in Manitoba between 1995 and 2014. Data from the Manitoba Adult Cardiac Surgery database and the Manitoba Centre for Health Policy were used. Kaplan–Meier estimates of outcomes and Cox multivariate regression analysis of risk factors were performed. Survival was compared with that of age- and sex-matched life expectancy.

Results: A total of 1872 patients were aged ≥50 years and 378 were aged ≥80 years, 55% of whom (n = 208) underwent concurrent coronary artery bypass grafting. Compared with younger patients, octogenarians had higher in-hospital mortality (8.5%; P <.001), longer median intensive care unit stay (47.2 hours; P <.001), and longer median in-hospital stay (13 days; P <.001). The median follow-up was 5.2 years. Functional survival was 82.4% at 1 year and 56.5% at 5 years, and freedom from hospital readmission was 61.5% at 1 year and 28.4% at 5 years. Survival approximated the age- and sex-matched life expectancy at 1 year (83.8%) and 5 years (60.8%). Preoperative atrial fibrillation, peripheral vascular disease, female sex, postoperative acute kidney injury, and blood transfusion were associated with adverse outcomes.

Conclusions: In eligible octogenarians, SAVR has acceptable 1- and 5-year functional survival and hospital readmission rates, but significant perioperative mortality and morbidity. (J Thorac Cardiovasc Surg 2017;154:1544-53)



Life expectancy of age- and sex-matched Manitobans versus surgical aortic valve replacement recipients aged ≥80 years.

Central Message

Survival of surgical aortic valve replacement recipients aged ≥80 years approximates the life expectancy of age- and sex-matched Manitobans.

Perspective

This provincial longitudinal based analysis provides a reference standard for octogenarian patient selection for surgical aortic valve replacement (SAVR). These results can help the SAVR and transcatheter aortic valve implantation team decide which option should provide the best long-term patient outcome and guide the healthcare team and patient–family unit with the informed decision making process. These data can aid prospective healthcare resource planning.

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The lifespan in Canada has been increasing since the mid-1960s, resulting in a greater number of people living beyond age 80 years.[1,2] Presently, octogenarians are the population with the fastest growth rate, more than tripling in number over the last 3 decades.[1] The prevalence of calcific aortic stenosis (AS) increases exponentially with age, and recent

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Abbreviations and Acronyms

AKI = acute kidney injury
AS = aortic stenosis
CABG = coronary artery bypass grafting
HRQoL = health-related quality of life
ICU = intensive care unit
IQR = interquartile range
LVEF = left ventricular ejection fraction
PCH = personal care home
SAVR = surgical aortic valve replacement
STS = Society of Thoracic Surgeons
TAVI = transcatheter aortic valve implantation

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population studies report that 9.8% of octogenarians have AS.[3-5] Left untreated, symptomatic AS has a 2-year mortality rate as high as 90%.[6,7] Consequently, as our population ages, greater numbers of octogenarians are being referred to cardiac surgery for aortic valve disease.

Historically, octogenarians have been considered too high risk for surgical aortic valve replacement (SAVR) because of high rates of mortality, rehospitalization, and poor functional survival (as assessed by personal care home [PCH] admission or mortality).[8] However, over the past 2 decades, advances in intraoperative techniques/technologies and perioperative care have decreased the risks associated with SAVR, allowing the procedure to be considered in individuals of all ages with or without serious comorbid disease.[9-12] It has been shown that properly selected octogenarians can have excellent survival rates, functional recovery, and health-related quality of life (HRQoL) after cardiac surgery.[6,10,11,13,14] Globally, SAVR has been the treatment of choice and reference standard for this patient group, because age itself is no longer an absolute contraindication to surgery. Other perioperative risk factors (eg, urgency of surgery, associated coronary artery bypass grafting [CABG], New York Heart Association class III-IV, respiratory failure, diabetes, renal failure, ventricular dysfunction) are more important clinical indicators of outcome than age.[10,14-17]

With the increasing demand for definitive treatment of AS, less-invasive technologies have been developed. Transcatheter aortic valve implantation (TAVI) is increasingly performed in high-risk patients as an alternative to SAVR.[11,18,19] In the recent PARTNER 1 trial, 5-year clinical outcomes following TAVI were comparable to those following SAVR in high-risk patients.[20] With improving TAVI technology, clinical experience, and patient selection, indications for the use of TAVI are expected to expand as clinical outcomes improve.[20] Therefore, understanding outcomes of SAVR for comparison with TAVI in octogenarians is relevant for informed shared decision making by the heart team, the patient, and his or her family.

Although numerous studies have described perioperative predictors of long-term mortality after SAVR, there is a lack of information on the rates of rehospitalization and functional survival in older adult patients nearing the Canadian life expectancy (≥80 years) compared with younger cohorts of active/employed (50-65 years) or retired (66-79 years) groups undergoing SAVR. Addressing this gap in knowledge is important, given that these outcomes are of equal if not greater importance than mortality in older adults with AS.[10,13,14] Therefore, the objectives of the present study were to assess outcomes and predictors of mid-term and long-term survival, rehospitalization, and functional survival after SAVR in Manitoba's older adult patients relative to younger cohorts, and secondarily, to provide a context for these outcomes in octogenarians using age-matched population life expectancy data from Statistics Canada.

METHODS

Study Design

This retrospective cohort study was approved by the University of Manitoba's Health Research Ethics Board and Manitoba Health Information and Privacy Committee, and the requirement for individual consent was waived. Between April 1995 and March 2014, 1872 patients, the full cohort of patients 50 years or older inclusive of all surgical urgency status, underwent SAVR with or without concomitant CABG. Patients with infective endocarditis, previous cardiac surgery, and concomitant procedures besides CABG were excluded. Patients were stratified into groups; age 50 to 65 years (n = 425), the active/employed group; age 66 to 79 years (n = 1069), the retired group; and age ≥80 years (n = 378), a group nearing Canadian life expectancy.

Preoperative, intraoperative, and postoperative data were collected in the Manitoba Adult Cardiac Surgery database initiated in April 1995. This database includes information on patients who underwent surgery at St. Boniface Hospital (1995 to present) and the Health Sciences Centre (1995 to 2006). The Manitoba Centre of Health Policy collected information from Diagnostic Services Manitoba, Winnipeg Regional Health Authority, Manitoba Vital Statistics, and Manitoba Jobs and Economy. Aggregate deidentified patient data obtained from the Manitoba Centre of Health Policy was linked with the Manitoba Adult Cardiac Surgery database to obtain surgical outcomes from a total of 42 preoperative, intraoperative, and postoperative patient variables. Significant variables are detailed in Tables 1 and 2. The definitions were in accordance with Society of Thoracic Surgeons (STS) guidelines.[21] Before 2009, acute kidney injury (AKI) was defined as a postoperative increase in serum creatinine ≥176 μmol/L; after 2009, AKI was defined according to STS guidelines as an increase in serum creatinine ≥1.5 times over the baseline value within the previous 7 days.[22] Prolonged mechanical ventilation was defined as ventilator support for >48 hours. The outcome assessment included 30-day mortality, morbidity, mid- and long-term survival, functional survival (PCH admission and mortality), and hospital