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ORIGINAL ARTICLE

Surgical Aortic Valve Replacement in Very Elderly Patients Aged 80 Years and Over: Evaluation of Early Clinical Outcomes

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Background An increasing number of very elderly patients aged ≥80 years will require aortic valve replacement (AVR) for severe aortic stenosis (AS). Many are classified as high-risk surgical candidates. Transcatheter aortic valve implantation (TAVI) has been proposed as an alternative to surgical AVR (SAVR) for high-risk patients. We evaluated early clinical outcomes of very elderly patients undergoing SAVR to optimise TAVI candidate selection.

Methods We conducted a retrospective case review of 132 consecutive patients aged ≥80 years undergoing isolated SAVR (49 patients) or combined SAVR/CABG (83 patients) during February 2002–January 2010 at a single tertiary referral hospital. Risk for cardiac surgery was calculated using the logistic EuroSCORE (ES_{log}). Mortality and morbidity data were collected for the 30-day postoperative period.

Results Thirty-day mortality rate was 8.3% for patients undergoing SAVR (6.1% for isolated SAVR and 9.6% for SAVR/CABG). Permanent stroke occurred in 3.8% and renal insufficiency in 7.6% of the cohort. Thirty-five percent of patients had left ventricular ejection fraction <50%, 67% had advanced symptoms (NYHA class III or IV), and 42% of patients were stratified as high-risk ($ES_{log} \geq 20\%$).

Conclusions SAVR can be performed in very elderly patients with acceptable operative morbidity and mortality. The outcomes at our institution are comparable to contemporary SAVR and TAVI outcomes.

Keywords Aortic stenosis • Aortic valve replacement • Elderly • Octogenarians • Transcatheter aortic valve implantation

Introduction

The prevalence of degenerative aortic stenosis (AS) is increasing with the ageing population. According to a large population study conducted in 2006, prevalence of AS was 2.8% in those aged 75 or older [1]. Patients with severe AS (aortic valve area <1.0 cm^2, mean gradient >40 mmHg or jet velocity >4.0 m/s [2]) often develop symptoms of angina, syncope and/or congestive heart failure. Symptomatic AS is associated with a high mortality rate approaching seventy-five percent within three years of symptom onset if the stenosis is not relieved [3]. Surgical aortic valve replacement

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(SAVR) is the definitive treatment for AS and can restore the life expectancy of a patient close to that of unaffected individuals [4]. The American Heart Association currently recommends SAVR for patients with symptomatic AS and asymptomatic patients with an ejection fraction <50% [2]. Importantly, age is not a contraindication for SAVR [5] and elderly patients with severe AS who undergo SAVR have better outcomes than those who do not have surgery [6–8]. AVR has been demonstrated to be cost-effective in octogenarians [9]. Taken together, there is strong evidence that surgical AVR should be performed in elderly patients with severe AS.

Elderly patients (i.e. age ≥80) often have comorbidities that place them at high risk for open cardiac surgery under cardiopulmonary bypass. The logistic EuroSCORE (ES_{log}) risk stratification system is a popular algorithm for estimating the operative mortality risk in high-risk patients [10–12]. Such algorithms are useful to identify elderly patients in whom operative risk may outweigh benefit and alternate strategies should be considered. Management of AS with HMG-CoA reductase inhibitors [13–15] and balloon valvuloplasty [16,17] has delivered inferior outcomes to SAVR. Percutaneous transcatheter aortic valve implantation (TAVI) was pioneered in 2002 [18] and has emerged as an alternative for selected patients with symptomatic severe AS who are unsuitable for SAVR. Several TAVI devices are currently undergoing worldwide clinical trials, for example the landmark PARTNER trial that demonstrated TAVI was non-inferior to SAVR for selected high-risk patients [19,20]. Data from large multicentre TAVI registries have also been recently published allowing comparison of outcomes [21–24].

This retrospective case review evaluates the 30-day morbidity and mortality of patients aged 80 years and over with AS undergoing SAVR at our hospital. This data could assist patient selection for TAVI and aid critical evaluation of TAVI outcomes.

Patients and Methods

Patients

During February 2002–January 2010, a total of 132 consecutive patients aged ≥80 years underwent SAVR with or without concomitant CABG at the Department of Cardiothoracic Surgery in Royal North Shore Hospital, Sydney.

Data Collection

We retrospectively reviewed the medical records for patient demographics, haemodynamic and functional status, operative details, post-operative complications and 30-day mortality. The study was approved by the local Health Research Ethics Committee (Northern Sydney Central Coast Health Research Ethics Committee). Logistic EuroSCORE (ES_{log}) were calculated using the published algorithm [12]. The definitions of risk factors and complications from Roques et al. were used [11]. Surgical risk was defined as low risk (ES_{log} < 10%), moderate risk (10% ≤ ES_{log} < 20%) and high risk (ES_{log} ≥ 20%) as per Leontyev et al. [25].

Operative Technique

Candidates for SAVR were selected by referring physicians, cardiologists and cardiothoracic surgeons. All operations were conducted using standard cardiopulmonary bypass techniques with antegrade blood and selective retrograde blood cardioplegia with moderate systemic hypothermia (28–34 °C).

Statistics

Continuous data were expressed as mean (±standard deviation) if normally distributed, and expressed as median with interquartile ranges if distribution was skewed. Categorical variables were compared using Fisher's exact tests, and continuous variables compared using Student's *t*-test.

Results

Study Population Demographics

Baseline demographic data, pre-operative haemodynamic parameters and functional class are presented in Table 1. The majority of the cohort had advanced symptoms corresponding to NYHA classes III and IV. The median ES_{log} in the cohort was 16.5% (IQR, 10.1–25.8%), and there were more patients classified as high-risk by ES_{log} than in the low and moderate risk categories.

Operative Characteristics

Operation details are presented in Table 2. Operations were performed emergently or urgently in 45% of patients. The majority of the cohort underwent AVR with concomitant CABG, with longer duration of aortic cross-clamp and cardiopulmonary bypass as expected during the combined procedure.

Post-operative Mortality and Morbidity

Post-operative (30-day) mortality and complications are presented in Table 3. The mortality rate in all patients undergoing AVR was 8.3%. The mortality rate was higher in procedures performed emergently or urgently (7/60, 11.7%) compared with elective procedures (4/72, 5.6%), although the difference did not reach statistical significance ($P = 0.22$). The mortality rate was also higher in the cohort undergoing AVR with concomitant CABG (8/83, 9.6%) compared with isolated AVR (3/49, 6.1%), but this difference was not significant ($P = 0.75$). No statistical difference was observed in the mortality rate for patients aged 80–85 (8/101, 7.9%) compared with patients aged 86 and over (3/31, 9.7%) ($P = 0.72$). In addition, there were no significant differences in mortality rates between males and females ($P = 0.75$), between patients with LVEF <50% and patients with LVEF ≥50% ($P = 0.51$), or between patients classified as NYHA class I/II and those classified as NYHA class III/IV ($P = 0.75$). Mortality rates were lower than predicted by ES_{log}, especially in the high-risk group. Mortality rate was 6.6% (2/30) in the low risk group (ES_{log} <10%), 6.5% (3/46) in the