Research Article

Cardiac surgery in an octogenarian Indian population

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Abstract

Background: With increase in the elderly population, octogenerians requiring cardiac surgery have also increased in India. Previous literature suggest that surgical intervention performed in selected patients with preserved physical and mental health can provide acceptable outcomes with good quality of life.

Aim: This study aims to analyze the immediate postoperative outcomes of cardiac surgery in octogenarians.

Result: The Octogenarians (n=21) who underwent cardiac surgery between January 1st, 2017 and July 31st, 2023, were included. The mean age was 81.76 ± 1.76. The incidence of left main coronary artery disease, carotid disease, peripheral vascular disease and history of recent acute coronary syndrome were 13 (65%), 5 (23.8%), 6 (28.6%) and 15 (71.4%), respectively.

Discussion: Mostly, patients underwent elective procedure (n=20, 95.23%) except one patient (4.76%) who underwent emergency Bentall procedure for acute type A dissection. The need for prolonged ventilation, intra-aortic balloon pump usage and pacemaker implantation were 4.76% (n=1), each. Incidence of acute kidney injury was 2 (9.52%), but none of the patients required dialysis. The mean postoperative ICU and hospital stay were 2 and 7 days, respectively. The expected (EuroSCORE II)

versus observed in-hospital mortality was 6.25% versus 9.5% (O/E = 1.52).

Conclusion: We conclude that cardiac surgery in Indian octogenerians is safe in selected patients.

Keywords: Octogenarians; Cardiac surgery; Euro score II

Introduction

The life expectancy at birth in Indian population was 69.27 years at 2020[1]. With improvement in life expectancy, elderly population presenting with cardiac diseases has also increased. Several studies performed in other countries have proven that performing cardiac surgery in octogenerians carries higher risk than operating on younger population[2–5]. With necessary risk stratification, and on meticulous case selection, cardiac surgery in octogenerians can provide acceptable outcomes with improved quality of life[2,6–9]. Similarly, a study conducted in Indian scenario has shown that newer surgical techniques have been successful in octogenerians but with increased morbidity and longer hospital stay [10]. This study analyses clinical outcomes in an octogenarian population who underwent cardiac surgery in an Indian setting.

Methods and Materials

This is a retrospective observational study which includes octogenarians (age between 80 to 89 years) who underwent cardiac surgery in our institution between January 1st, 2017 and July 31st, 2023. Those who underwent concomitant non cardiac procedures were excluded from the study. Since this study was retrospective and did not involve contact with patients, ethics committee approval was not obtained.

Outcomes: The primary outcome was the in-hospital mortality. The secondary outcomes include evaluation of postoperative variables like hospital stay, ICU stay, prolonged ventilation, intra-aortic balloon pump usage, permanent pacemaker implantation, re-exploration and incidence of acute kidney injury.

Definition: In-hospital mortality was defined as deaths that occurred during hospital stay following surgery and before discharge. Prolonged ventilation is defined as ventilatory support provided for more than 24 hr after surgery[11]. Acute kidney injury is defined as increase in serum creatinine to 1.5 times or more than baseline of the prior 7 days[12]. Emergency cardiac surgery was defined as the surgery necessarily done

within 24 hr of referral to the surgeon[13]. Euro score II was calculated using online calculator

Statistical analysis: Statistical analyses were performed with SPSS software (version 22.0. IBM Corp., Armonk, NY, USA). Continuous variables were described as mean, and variation of each observation from the mean value (Standard deviation) represented as mean ± SD or median and interquartile range (analyzed using *Mann Whitney U Test*) if they failed to follow a normal distribution. Categorical variables were described by taking percentages.

Key results

During the study period, 1106 patients underwent cardiac surgery, of which 21 patients (1.9%) were included in the study. The baseline, intraoperative and postoperative descriptive variables are given in table 1. The mean age of the population was 81.76 ± 1.76 years, of which majority were male population (90.5%). The incidence of left main coronary artery disease, carotid disease, peripheral vascular disease and history of recent acute coronary syndrome were 13 (65%), 5 (23.8%), 6 (28.6%) and 15 (71.4%), respectively. All the patients underwent elective cardiac surgery, except one patient who underwent emergency Bio - bentall procedure for acute type A aortic dissection. Elective procedures include 17 (81%) off pump coronary artery bypass surgery (CABG), one (4.76%) on pump CABG, one (4.76%) CABG with mitral valve replacement (bioprosthetic valve) and one (4.76%) CABG with aortic valve replacement using a suture-less valve. Prolonged ventilation was required in one patient (4.76%). Incidence of post-operative acute kidney injury was 9.52% (n=2). However, none of them required dialysis. The average ICU and hospital stay was 2 days and 7 days, respectively. None of the patients had neurological stroke or postoperative atrial fibrillation. The mean EuroSCORE II predicted hospital mortality was 6.25% and the observed in-hospital mortality was 9.5% (n=2).

Discussion

Age is a progressive non modifiable risk factor which increases the morbidity and mortality when associated with coronary artery disease[14]. However, the operability of the patients also depends on associated comorbidities, presentation of the disease, patient's consent and surgeon's choice. The mean age of our study population was higher than the life expectancy at birth among Indian

population[1]. In our study, the incidence of left coronary artery stenosis, peripheral vascular disease, carotid stenosis and diabetes mellitus was high compared to other studies [4,15,16]. This suggests that our subset of population had several confounding factors that affect the overall morbidity and mortality. The analysis on influence of these factors was not feasible due to small sample size. The in-hospital mortality reported among octogenarians ranges from 2- 16.8 % [2–5,8,15] over last two decades. Our in-hospital mortality also falls in the same range (n=2, 9.5%). One patient died of uncontrollable bleeding after emergency bentall operation for acute type A dissection and other patient due to low cardiac output syndrome from acute myocardial infarction post CABG. Mortality in our study was high compared to an in-hospital mortality (n=2, 3.2%) reported in a similar study conducted in Indian population by Khan *et a*l. [10]. Luc *et al*. [9] concluded that Euro SCORE II had better predictive ability than other commonly used scoring systems among octogenarians after isolated CABG . The comparison of expected mortality as per Euro SCORE II between our study and previous study was 6.25 ± 8.07% versus 4 ± 3% [9], respectively. The increased mean risk associated with our study could be due to the inclusion of valve replacement and emergency bentall procedure to the study population while Luc et al. included only isolated CABG patients. The ratio of observed/ expected mortality in our study is 1.52. This could be due to small sample size, inclusion of emergency case or underestimation of euro score II risk analysis for Indian population because geographic variation with respect to life expectancy is not taken into account.

The incidence of post-operative atrial fibrillation is high in elderly population. Scandrogolia et al. [8] report an incidence of 27% in octogenarians. We report zero incidence of AF postoperatively. We believe that this reduced incidence could be due to routine use of oral amiodarone, atorvastatin prophylaxis in the pre and postoperative period or due to small sample size. Prophylaxis with oral amiodarone is proven to be beneficial in preventing post-operative AF [17] and was prescribed one week prior to the surgery for our patients for the prevention of postoperative atrial fibrillation, to reach a cumulative maximum dose of 3000mg. The dose was adjusted based on baseline heart rate and after ruling out atrio-ventricular heart blocks. Atorvastatin was administered during pre and post-operative period (40/80 mg) as a part of post-operative AF

prevention. The use of atorvastatin has been proven beneficial in preventing AF, especially after cardiac surgery[18].

The incidence of stroke is comparatively high in elderly population[3]. Several studies have reported a wide range of stroke incidence from 0.77% [8] to 12% [3]. Our study cohort had zero percent of stroke incidence. The strategies followed to reduce stroke incidence includes, routine pre-operative carotid artery evaluation with doppler, on-table epiaortic ultrasound in all cases and anaortic surgical technique [19] to avoid placing partial clamp on the diseased aorta. The average ICU stay was reported as 4.36 ± 11.41 [4], 4 ± 8 days [8] and 2.6 ± 2.6 days [3] in previous studies, while it was 2 days in our study. Once patients were hemodynamically stable without inotropic supports, after removing chest drains and Foleys catheter, they were mobilized and ambulated before shifting to the ward. The mean hospital stay reported in previous studies ranges from 8 to 10.80 days [3–5,8], it was comparatively low (7 days) in our study. Once the pre-discharge evaluation done by clinical examination, 12 lead electrocardiogram, chest X-ray, 2D echocardiography and blood workup were normal, they were planned for discharge. All the patients were discharged to home and none of them where discharged to a nursing care facility. Previously reported incidences of acute kidney injury were 5.8% [8] and 7.3% [16], while it was higher in our study with an incidence of 9.52% (n=2). But none of the patients required renal replacement therapy.

Whenever an octogenerian patient was referred to our unit, routine blood workup, 12 lead electrocardiography, and 2D echocardiography were done. Doppler evaluation of bilateral lower limbs and carotids arteries were performed. The operability was confirmed based on initial assessment clinically, preoperative workup, feasibility based on coronary angiogram, frailty and physical activity of the patients. We strongly believe that selection of case plays a major role in outcomes of surgery in octagenerian patients.

Limitations

The major limitations are the retrospective nature of the study, small sample size and the selection bias associated with single surgeon study. Follow-up data in the form of survival percentage, re-hospitalization for cardiac cause, incidence of stroke were not analyzed in the study. Scoring systems that includes frailty of the patient were not used for risk stratification in the study.

Conclusion

Cardiac surgery in octogenarians is safe with acceptable outcomes for selected patients in Indian population.

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