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Quality of life following aortic valve replacement in octogenarians

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【Purpose】 We aimed to evaluate the outcomes of and the quality of life (QOL) after conventional aortic valve replacement (AVR) amongst octogenarians.
【Methods】 We enrolled 48 patients aged ≥80 years who underwent conventional aortic valve replacement between May 1999 and November 2012. Patient conditions were assessed before surgery, at 6 and 12 months after surgery, and during the late period regarding the need for nursing care, degree of independent living, and living willingness.
【Results】 The follow-up rate was 100% with 45.6 ± 41.3 months follow-up. Two patients (4%) died during hospitalization and 11 (23%) died during the follow-up period. The 1-, 5-, and 10-year survival rates were 84.9, 76.9, and 39.6%, respectively. During the late period, of 35 surviving patients, 31 (88%) were living at home. The degree of independent living score decreased after surgery. However, scores of the need for nursing care and living willingness remained preoperative level.
【Conclusions】 QOL following conventional aortic valve replacement for elderly patients aged ≥80 years who showed independence in activities of daily living (ADL) before surgery were satisfactory. Therefore, aortic valve replacement could be a viable option for elderly patients aged ≥80 years after accounting for preoperative ADL levels.

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Key words: open heart surgery, aortic valve replacement, octogenarians, Barthel Index, quality of life, activities of daily living.

Introduction

The increase in average life expectancy and the higher incidence of cardiovascular disease with advancing age has resulted in a significant increase in the number of people aged more than 80 years. A number of reports have also described older age amongst cardiovascular surgery patients[1-14]. In elderly patients, the indications for surgery should be considered while accounting for various risks, which differ from those in younger patients. While considering cardiac surgery for elderly patients, the parameters assessed differ from those used for younger patients. These include the need for nursing care, degree of independent living, and living willingness, all of which account for patient dignity as well as social living. Thus, postsurgical quality of life (QOL) and activities of daily living (ADL) have received increased attention nowadays[15-17]. For patients at high risk of complications in whom aortic valve replacement (AVR) is difficult to perform, minimally invasive trans-catheter aortic valve implantation is now available, and treatment strategies have been carefully evaluated and selected. In this study, the significance of conventional AVR for elderly patients aged ≥80 years was evaluated by examining mid-term prognoses after conventional AVR, detailed QOL.

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Patients and Methods

A total of 2469 patients (>85 years old, 46 [1.86%]; 80-84 years old, 213 [8.63%]; 70-79 years old, 921 [37.3%]; 60-69 years old, 683 [27.6%]; 50-59 years old, 363 [14.9%]; 40-49 years old, 137 [5.5%]; <39 years old, 106 [4.3%]) underwent cardiac and thoracic aortic surgery at Nagasaki University Hospital between May 1999 and November 2012, of which 48 patients (12 men and 36 women) aged ≥80 years at the time of surgery who underwent conventional AVR were evaluated (Tables 1). A tissue (bioprosthetic) valve was used in all cases age ≥80 years, and concomitant procedure were described (Tables 2). The age at the time of surgery ranged from 80 to 90 years old (83 ± 2.4). Two patients died in the hospital and thus were excluded.

Prognostic assessment was performed in 46 patients. The follow-up rate was 100%; mean follow-up period, 45.6 ± 41.3 months; and maximum follow-up period, 158 months. Of the 46 patients, 35 survived at ≥6 months (11 cases died and were excluded), and of the 35 patients, 33 were assessed before surgery and at 6 months after surgery, 28 at 12 months after surgery, and 26 at the late period (>18 months after surgery) using the Barthel Index (BI; 100-point scale), Fillenbaum instrumental ADL scale (Fillenbaum IADL; 5-point scale), and Vitality Index (VI; 10-point scale) [18-21]. The BI was used to assess the need for care[18]. The total score was 100, with a score ≤20 indicating total dependence, ≤40 severe impairment, and ≥60 high independence. The Fillenbaum IADL was used to assess the ability for independent living[19, 20]. The highest score was 5, with a score ≥4 indicating a high level of independence. The Fillenbaum IADL was also used together with the BI to evaluate the ability for independent social living. The VI was used to assess motivation (volition) for living[21]. The highest score was 10, and a score ≥7 indicated motivation for living. The survey was conducted using mailed questionnaires and telephone questionnaires.

Table 1. patient's characteristics

No. of patients	48
Follow-up rate	100% (48/48)
Sex (male/ female)	12/36
Age (years)	83 ± 2.4
Body weight(Kg)	49.7 ± 10.26
BSA(m^2)	1.42 ± 0.16
Alb(g/dl)	3.92 ± 0.47
Follow-up period (months)	45.6 ± 41.3 (maximum 158 months)
Atrial fibrillation	7 (14.6%)
Hypertension	21 (43.8%)
Diabetes mellitus	8 (16.7%)
COPD	2 (4.2%)
Asthma	3 (6.3%)
Cerebrovascular disease	8 (16.7%)
Renal insufficiency (Cre ≥ 1.5 mg/dL)	4 (8.3%)
Hemodialysis	1 (2%)
Liver dysfunction (T-Bil >2.0 mg/dL)	3 (6.3%)
Reoperation	1 (2%)
NYHA ≧ III	18 (37.5%)
Preoperative IABP support	1 (2%)
Emergency	2 (4.2%)
Shock	2 (4.2%)
RMI	2 (4.2%)
OMI	1 (2%)

COPD: chronic obstructive pulmonary disease; Cre: creatinine; T-Bil: total bilirubin value; NYHA: New York Heart Association; RMI: recent myocardial infarction; OMI: old myocardial infarction;

Results are expressed either as percentage or as mean ± standard deviation. Survival rates were analysed by Kaplan-Meier survival curves (SPSS statistics Ver.22. IBM Inc., Armonk, NY, USA).

Ethical approval was obtained from an institutional review committee. Written informed consent was obtained from all patients before participation in the study.

Table 2. operative procedure

AVR with bioprosthetic valve	48 (100%)
Concomitant procedure	15 (31%)
AVR+CABG	12
AVR+MVR	1
AVR + MV plasty	1
AVR + LVOT Myectomy + VSD closure + Rt. lower lobectomy	1

AVR: aortic valve replacement; CABG: coronary artery bypass graft; MVR: mitral valve replacement; MV plasty: mitral valve plasty; VSD: ventricular septal defect;

Results

Of the 48 patients aged ≥80 years who underwent AVR, 15 patients had combined surgical procedures (coronary artery bypass graft, 12; mitral valve replacement, 1; mitral valve repair, 1; left ventricular outflow tract myectomy and ventricular septal defect closure and right lower lobectomy, 1). In-hospital death occurred in two patients (4%): one with thoracoabdominal aortic aneurysm rupture after 40 days and one with multiple organ failure after 9 days following intra-operative myocardial infarction. The mean length of hospital stay was 32 ± 18.7 days. Twelve patients were discharged to home, and 34 patients were transferred to other hospitals primarily to improve walking ability. During the follow-up period, 11 (23%) died. The causes of death were congestive heart failure in two patients, gastrointestinal necrosis in two patients, and other causes in seven patients (pneumonia, cancer, arrhythmia, chronic epidural hematoma, senility, lymphoma, and acute myocardial infarction). The 1-, 5-, 10-year survival rates were 84.9, 76.9, 39.6%, respectively (Fig. 1). There was no correlation between cause of death after discharge and postoperative complications.

In the late period, of the 35 surviving patients, 31 (88%) were living at home, one patient was at a nursing home, and three (3%) were at the hospital. Of the 35 questionnaires, 33 were available and used for evaluation. The BI score was 94.5 ± 12.9 before surgery, 92.9 ± 12.7 at 6 months after surgery, 95.2 ± 7.95 at 12 months after surgery, and 82.3 ± 27.1 during the late period. Although the postoperative mean values remained comparable to the preoperative mean values, 22/28 (85%) patients had a BI score of >60 in the late period, indicating that nursing care was not needed. The mean Fillenbaum IADL score was 2.62 ± 1.98, which was lower than the preoperative score of 4.0 ± 1.5. During the late period, 11/26 patients (42%) had a Fillenbaum IADL score of ≥4, which indicates the ability to live independently. The mean VI score, which was used as an index of living willingness, was 9.48 ± 1.08 before surgery, 9.30 ± 1.33 at 6 months after surgery, 9.53 ± 0.94 at 12 months after surgery, and 8.85 ± 1.68 during the late period. In the late period, 24/26 patients (92%) had a VI score of ≥7 points, which indicates a high willingness to perform activities (Table 3).

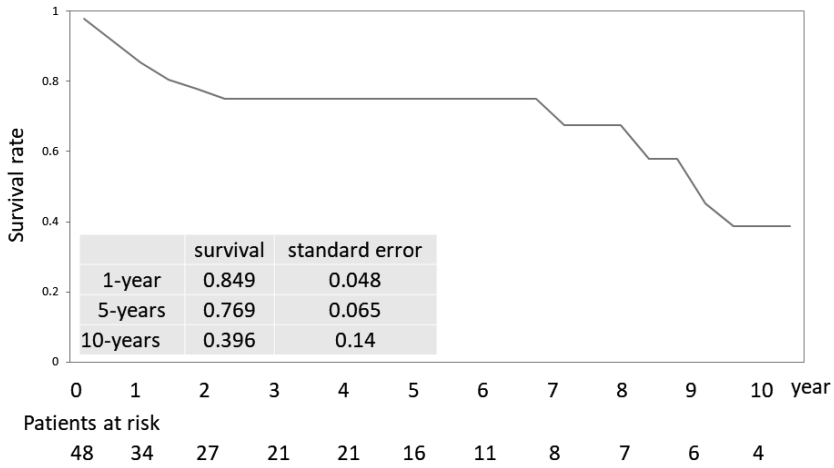

Figure 1. Kaplan-Meier curve for long-term survival.
1-year survival:84.9%, 5-year survival:76.9%, 10-year survival:39.6%.

Table 3. Change score of (a). Barthel Index: Need for caregiving (total score is 100 points), (b). Fillenbaum IADL: Ability for independent living (total 5 points), (c). Vitality index: Motivation for living (total 10 points)

	Mean score	Result
a		No need for caregiving (score ≥ 60)
Preoperative	94.5 ± 12.9	33/33（100%）
At 6 months	92.9 ± 12.7	33/33（100%）
At 12months	95.2 ± 7.95	28/28（100%）
Over 18months	82.3 ± 27.1	22/26（85%）
b		Highly independent (score ≥ 4)
Preoperative	4.0 ± 1.5	25/33（76%）
At 6 months	3.27 ± 1.88	18/33（54%）
At 12months	3.5 ± 1.74	18/28（64%）
Over 18months	2.62 ± 1.98	11/26（42%）
c		Motivation for living (score ≥ 7)
Preoperative	9.48 ± 1.08	33/33（100%）
At 6 months	9.30 ± 1.33	31/33（94%）
At 12months	9.53 ± 0.94	27/28（96%）
Over 18months	8.85 ± 1.68	24/26（92%）

IADL: instrumental activities of daily living

Discussion

A number of reports have described the increasing age amongst cardiovascular surgery patients[1-12]. The reported rates of in-hospital mortality after open heart surgery for elderly patients aged ≥80 years range from 4 to 10% after a single surgical procedure and exceed 20% after combined surgical procedures. The 5-year survival rate for elderly patients after open heart surgery ranges from 50 to 75%[1-4], and the incidence of postoperative cerebral infarction and postoperative renal failure was shown to be twice as high as that in younger patients[3]. According to several reports, the risks of postoperative death, neurological complications, and repeated thoracotomy to treat bleeding are higher in patients aged ≥80 years than in younger patients[5]. In our study, in-hospital mortality rate was 4%, which appears to be an average value after AVR. According to various reports, in-hospital mortality after AVR for aortic stenosis ranges from 3.2 to 9% in patients aged ≥80 years and from 2.9 to 7.4% in younger patients or patients of all ages; apparently, the difference between these rates is minimal[6-8]. Even in patients who had AVR combined with coronary artery bypass grafting, short-term and long-term outcomes do not vary greatly[7]; moreover, no difference in mortality, the incidence of acute cerebrovascular events and postoperative myocardial infarction, postoperative dialysis rate, frequency of pacemaker placement, and the incidence of major cardiovascular events including mediastinitis was noted. The age of 80 years or older is a predictive factor for late death; however, it is not considered to be a predictive factor for heart-related death or major cardiovascular events[6]. In elderly patients with severe aortic stenosis, the long-term prognosis for drug therapy is reportedly poor, as evidenced by 3-year survival rates ranging from 29 to 49% and 5-year survival rates ranging from 16 to 32%. Patients who underwent AVR had 3-year survival rates ranging from 80 to 85% and a 5-year survival rate of 56 to 90% (which are better than the rates achieved with drug therapy)[6-7, 9-14]; hence, surgery should be considered, even for elderly patients. Furthermore,

it is assumed that the prognosis of elderly patients who developed heart failure is even worse; therefore, it seems prudent to consider surgery at an early stage[9, 10]. In our study, the 1-, 5-, 10-year survival rates were 84.9, 76.9, and 39.6%. Considering the in-hospital mortality and survival rates after discharge in our study, surgery for aortic valve lesions may be appropriate for patients aged ≥80 years.

In our study, 31 (88%) of the 35 surviving patients at >6 months were living at home, and 22 (85%) of the 26 surviving patients in the late period were able to perform ADL without any assistance and maintain their living willingness. However, the mean long-term Fillenbaum IADL score was 2.62 ± 1.98, which is lower than the preoperative score of 4.0 ± 1.5, and 11 of 26 patients (42%) had a Fillenbaum IADL score of ≥4 points in the late period, which indicates the ability to live independently. A decrease in the degree of independence required for independent living was observed. Several studies of open heart surgery for very elderly patients reported various results, and improvement was achieved after surgery, as assessed using the New York Heart Association classification[1-8]. Furthermore, in a study using the Short Form 12 (a scale measuring health-related QOL), physical function in both male and female patients recovered to the level of the general population in the same age group; however, decreased mental function was found in the female patients[15]. In a study using the Nottingham Health Profile, although conditions improved in 87% of patients postoperatively, physical activity and mental response measurements were significantly lower in patients aged ≥80 years than in those aged <80 years[16]. Moreover, mental health status scores were higher than those of general elderly people, although physical health status scores were comparable[4]. Surgery was also shown to improve lifestyle and decrease left heart failure risk[3]. This study indicates that elderly patients should not be denied surgery on the basis of age alone and that early surgery can be recommended in this population, with the exception of emergency cases. In elderly patients, open heart surgery also provided sufficient postsurgical benefits in terms of QOL[17].

Furthermore, in elderly patients, the indications for surgery should be considered while accounting for various risks. Cardiovascular surgery for elderly patients aged ≥80 years is associated with an extremely high risk; thus, the decision for surgical treatment have to be carefully considered. Hence, apart from determining the indications for surgery among elderly patients, cognitive impairment, a detailed understanding of their condition, and their desire for cardiac surgery must be evaluated. For patients who could not walk because of frailty or have advanced dementia that renders them unable to care for themselves, surgical treatment is not recommended. Elderly patients aged ≥80 years who are independent in terms of ADL before surgery and who survived the surgery had a favorable QOL. Therefore, considering that the long-term QOL was satisfactory, surgery could be a viable option for very elderly patients after accounting for preoperative ADL levels and other risks. However, the ability to live an independent daily life is decreased after surgery; thus, enhanced community-wide systems to provide comprehensive support are needed.

Limitations of the Study

This study has some limitations. First, this study was a retrospective study at a single center, with a relatively small sample size; thus, our study was vulnerable to all weaknesses and biases associated with such design. Second, our study included a questionnaire survey; therefore, subjective factors may have influenced the results. Third, as the QOL of elderly patients must be evaluated in detail by asking numerous questions to patients and families, the analysis of ADL was limited to the surviving patients at the time of investigation. BI, Fillenbaum IADL and VI were used for QOL assessment in this study. Additional evaluation of the Psychological and Social Health indices[22], in which psychological health can be assessed would have given incremental information.

Conclusion

Long-term functional status and QOL following conventional AVR for elderly patients aged ≥80 years who showed independence in ADL before surgery were satisfactory. Therefore, AVR could be a viable option for elderly patients aged ≥80 years after accounting for preoperative ADL levels. However, the ability to live an independent life is decreased after surgery. Hence, enhancing community-wide systems to provide comprehensive support to these patients is necessary.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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