Are Octogenarians in Good Condition after Cardiac Valvular Surgery?

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Purpose: With the aging of society in developed countries and advances in surgical technology in recent years, surgery is increasing in elderly patients. When performing surgery in older patients, both surgical outcomes and the maintenance of postoperative quality of life (QOL) are important issues. This study investigated surgical outcomes and postoperative QOL in octogenarians who underwent cardiac valvular surgery.

Methods and Results: Fifty-nine (16 males) octogenarians (80–89 years old, mean age, 82.4 ± 2.4 years) underwent cardiac valvular surgery between August 1999 and June 2011. A QOL questionnaire, which included the Barthel Index (BI), Fillenbaum Instrumental Activities of Daily Living (FIADL), and the Vitality Index (VI), was sent to all survivors. Kaplan-Meier analysis was used to assess survival. Hospital mortality was 1.6% (1 patient). The 3-, 5-, and 7-year survival rates were 81.2%, 75.4%, and 67.8%, respectively. The BI showed that 87.5% of patients did not require caregiving, the FIADL showed that 32.5% were highly independent, and the VI showed that 87.5% were motivated to live.

Conclusions: Short-term outcomes were satisfactory, with low complication and mortality rates. Mid-term outcomes showed maintenance of the minimal required ADL and good motivation for living. However, independence in social activities was decreased, suggesting the need for comprehensive social support.

Keywords: octogenarians, elderly, cardiac valvular surgery, quality of life, activities of daily living

Introduction

In an aging society, the number of open heart surgeries in elderly patients is increasing, and surgical outcomes in these older patients are frequently reported. However, few studies have examined such patients’ quality of life (QOL) after open heart surgery. Therefore, the present study investigated surgical outcomes and postoperative QOL in patients aged ≥80 years (octogenarians) who underwent cardiac valvular surgery. The following three parameters were included for analysis: need for caregiving; ability for independent living; and motivation to live.

Materials and Methods

This study included patients who were octogenarians at the time of surgery between August 1999 and June 2011. There was a total of 923 cases of cardiac valvular surgery during this period, including 58 octogenarians (59 cases; reoperation in 1 patient), which accounted for 6.4% of all cardiac valvular surgeries. Based on the judgment of the operating team, patients with severe dementia,
as well as those with a high likelihood of needing caregiving, were not eligible for surgery. The patients included 16 men (27.1%), with a mean age of 82.4 ± 2.4 years (men, 82.4 ± 2.6 years; women, 82.3 ± 2.2 years).

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

Preoperative factors
Preoperative status was NYHA class ≥III in 33 patients (72.8%). Of 33 patients, 2 patients (3.3%) had chronic obstructive pulmonary disease (COPD), 9 (15.2%) had cerebrovascular disease, and 5 (8.4%) had renal insufficiency (creatinine ≥2.0 mg/dL), including 2 (3.3%) on dialysis (Table 1).

Surgical procedures
The surgical procedures were as follows: single valve surgery in 37 patients (62.7%); multiple valve surgery in 7 (11.8%) (including reoperation in 1 patient with multiple valve surgery); and combined surgery in 15 (25.4%). A tissue (bioprosthetic) valve was used in all cases for valve replacement (Table 2).

QOL assessment
QOL was assessed using the following 3 instruments: the Barthel Index (BI); Fillenbaum Instrumental Activities of Daily Living (FIADL); and the Vitality Index (VI).8–11 The BI was used to assess the need for caregiving. The total score was 100, with ≤20 indicating totally dependent, ≤40 indicating severe impairment, and ≥60 indicating highly independent. The FIADL was used to assess ability for independent living. The highest score was 5, and ≥4 indicated a high level of independence. The FIADL score was used together with the BI to evaluate and assess ability for independent social living. The VI was used to assess motivation (volition) for living. The highest score was 10, and ≥7 indicated motivation for living.

Follow-up
Patients were followed-up once a year after surgery via a postal survey of survival and QOL. The mean follow-up period was 3.3 ± 3.1 years (range, 0.3–11.4 years), and the follow-up rate was 93.2% (55 cases).

Analysis
Survival rates were analyzed by Kaplan-Meier survival curves. The log-rank test was used to examine differences in survival rates between sexes.

Results
Short-term outcomes
Operative mortality was defined as death within 30 postoperative days. No operative mortality occurred. One

Table 1 Patients’ characteristics

<table>
<thead>
<tr>
<th>Total operations</th>
<th>59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>58</td>
</tr>
<tr>
<td>Follow-up rate</td>
<td>93.2% (55/59)</td>
</tr>
<tr>
<td>Sex (male/female)</td>
<td>16/43</td>
</tr>
<tr>
<td>Age (years)</td>
<td>82.4 ± 2.4</td>
</tr>
<tr>
<td>Follow-up period (years)</td>
<td>3.3 ± 3.1</td>
</tr>
<tr>
<td>Left ventricular ejection fraction (EF%)</td>
<td>64.9 ± 12.3</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>17 (28.8%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>30 (50.8%)</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>29 (33.8%)</td>
</tr>
<tr>
<td>Reoperation</td>
<td>4 (6.6%)</td>
</tr>
<tr>
<td>NYHA III</td>
<td>27 (45.7%)</td>
</tr>
<tr>
<td>NYHA IV</td>
<td>16 (27.1%)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>10 (16.9%)</td>
</tr>
<tr>
<td>COPD</td>
<td>2 (3.3%)</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>9 (15.2%)</td>
</tr>
<tr>
<td>Renal insufficiency (Cre ≥2.0 mg/dL)</td>
<td>5 (8.4%)</td>
</tr>
<tr>
<td>Hemodialysis (including CAPD)</td>
<td>2 (3.3%)</td>
</tr>
<tr>
<td>Liver dysfunction (T-Bil ≥2.0 mg/dL)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

NYHA: New York Heart Association; COPD: chronic obstructive pulmonary disease; Cre: creatinine; CAPD: continuous ambulatory peritoneal dialysis; T-Bil: total bilirubin value

Table 2 Surgical procedure

<table>
<thead>
<tr>
<th>Single valve surgery</th>
<th>n = 37</th>
<th>62.7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVR</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>MVR</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MV plasty</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Multiple valve surgery</td>
<td>n = 7</td>
<td>11.8%</td>
</tr>
<tr>
<td>AVR + MVR</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>AVR + MV plasty</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MVR + TVR</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MVR + TAP</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MV plasty + TVR</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Combined surgery</td>
<td>n = 15</td>
<td>25.4%</td>
</tr>
<tr>
<td>AVR + CABG</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>AVR + ASD closure</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>AVR + Asc. Aorta replacement</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MVR + CABG</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MV plasty + CABG</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>TVR + CABG</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>TVR + ASD closure</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
| A VR: aortic valve replacement; M VR: mitral valve replacement; M V plasty: mitral valve plasty; TV R: tricuspid valve replacement; T AP: tricuspid valve plasty; C ABG: coronary artery bypass graft; A SD: atrial septal defect
patient died on day 40 during hospitalization after AVR due to a ruptured thoracoabdominal aneurysm. The mean hospital stay was 29.3 ± 27.6 days. Seventeen cases were discharged safely, and 41 were transferred to other facilities. One patient was transferred with a tracheostomy and gastrostomy tube, and another patient was transferred from peritoneal dialysis to maintenance dialysis. No other cardiac-related complications were observed.

**Mid-term outcomes**

Of the 58 surviving cases (57 patients, reoperation in 1 patient) who were discharged from the hospital, the status of 4 patients was unknown at the time of the survey. Their survival was confirmed to be 0.55, 1.35, 2.22, and 3.98 years, respectively. Late deaths occurred in 12 cases (11 persons), including 4 men (36.3%). Cardiac-related deaths occurred in 6 patients as follows: heart failure in 1; myocardial infarction in 1; sudden death due to arrhythmia in 1; sudden death due to unknown cause in 1; and cerebral infarction in 2. Non-cardiac-related deaths included the following: malignant tumor in 1 patient; intestinal necrosis in 1; sepsis in 1; chronic subdural hematoma in 1; and unknown cause in 1.

The Kaplan-Meier survival curve analysis showed a 1-year survival rate of 87.4% (men, 83.9%; women, 94.6%), a 3-year survival rate of 81.2% (men, 57.5%; women, 90.5%), a 5-year survival rate of 75.4% (men, 57.5%; women, 82.9%) and a 7-year survival rate of 67.8% (men, 57.5%; women, 73.7%) (Fig. 1).

The questionnaire on current ADL in the 42 surviving patients was returned by 40 patients (response rate, 95.2%). Current residence was at home in 28, a care facility for the elderly in 3, and hospital in 4. No response was received from 5 patients concerning their current residence.

**Quality of life**

The patients’ mean age was 86.2 ± 3.1 years at the time of the ADL survey. The mean BI score was 79.3 ± 27.7, with a score of ≥60 in 87.5%, indicating no need for caregiving. The mean FIADL score was 2.1 ± 2.1, with a score ≥4 in 32.5%, indicating a high level of independence. The mean VI score was 8.8 ± 1.9, with a score ≥7 in 87.5%, indicating motivation for living. In addition, all patients with a VI score ≥7 also had a BI score ≥60 (Table 3).

**Discussion**

The percentage of elderly persons, as well as surgery in elderly patients, is increasing in developed countries, and age is reported to be a major surgical risk factor. The operative risk is about 2 times higher in patients ≥75 years old than in non-elderly patients. The indications for surgery in octogenarians should be decided based on preoperative status, surgical risks, and postoperative prognosis. In our view, QOL is more important than survival alone. Therefore, this study investigated postoperative QOL.

**Short-term outcomes**

For all cases of cardiac valvular surgery in octogenarians during the last 12 years, no operative mortality (no deaths within 30 days postoperatively) occurred, and only one case of hospital death (1.7%) was reported. This is an acceptable outcome, even when compared to other reports.

**Mid-term outcomes**

The 1-, 3-, 5-, and 7-year survival rates in this study were 90.1%, 81.2%, 75.4%, and 67.8%, respectively (Fig. 1). This mid-term outcome is similar to outcomes reported by other medical centers. The results were also similar when comparing life expectancy.

**Quality of life**

Nikolaidis et al. evaluated QOL based on the NYHA classification in octogenarians who underwent AVR with or without CABG. Of their patients, 88.3% had a
“positive feeling about life”, and 82% were “happy” to have had surgery.14)

Yamaguchi et al. used Rosser distress and disability scores to compare QOL in patients age ≥70 years vs. <70 years who had undergone valve replacement surgery. In the age ≥70 years group, the distress and disability scores were improved, with significant improvements in symptoms and functional status.15)

Independent living refers to the ability to live one’s own life without support or assistance from others. The BI and FIADL were used to assess the ability to perform activities required for independent living.8–10,18) The VI, which is very useful for obtaining responses, even in patients with dementia, was used to assess life motivation (volition).11,18) In the present study, 87.5% of the survivors maintained the minimally required ADL (BI) and had good motivation (VI). On the other hand, the FIADL scores were not satisfactory.

The present results suggest that, after cardiac surgery for valvular disease in octogenarians, the minimally required ADL is maintained for daily living. However, independence in social activities is decreased, and comprehensive social support is necessary.

In the 59 surgical cases, ADL could be assessed preoperatively, but this assessment was limited to the BI alone. The mean preoperative BI was 73.9 ± 31.1. Eight patients had a BI ≤60, indicating a need for caregiving, but all patients were transferred to surgery because of symptoms of acute left heart failure. Treatment with intravenous infusions and bed rest was required during hospitalization (2 patients were intubated, and 1 patient with heart failure and complete AV block required a temporary transcutaneous pacemaker). Thus, ADL just before surgery could not be accurately scored.

The BI of the 40 patients who replied to the questionnaire were compared. In 40 patients, the average preoperative BI score was 87.1 ± 21.3; in 11 (27.5%) patients the postoperative BI was higher than the preoperative BI, in 9 (22.5%) the postoperative and preoperative BI scores were the same, and in 20 (50%) the postoperative BI scores were lower than the preoperative scores.

A total of 13 patients survived more than 4 years after surgery. Of these, the score went up in only 1, the scores were the same in 1, and 11 cases had lower scores. It was found that BI almost always decreased more than 4 years after surgery in octogenarians.

Transcatheter aortic valve implantation (TAVI) for AVR is now being performed in elderly patients, and both a 30-day mortality rate of 8%–10% and a 1-year survival rate of 60%–80% have been reported.19) This procedure may be indicated even in high-risk patients; however, even in octogenarians whose only operative risk is old age, short-term outcomes after open heart surgery are satisfactory, and mid-term outcomes, including maintained QOL, are also good.

This study did have some limitations. First, this was a retrospective study at a single center. Second, this was a questionnaire survey; therefore, subjective factors may have had an effect (e.g., overestimation), and dementia, when present, may have influenced the results. Third, numerous variations were seen in outcome measures.

Table 3 QOL summary

<table>
<thead>
<tr>
<th>QOL Summary</th>
<th>Mean</th>
<th>Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Need for caregiving: Barthel Index (total 100), No need for caregiving (score ≥60)</td>
<td>79.3 ± 27.7</td>
<td>35/40 (87.5%)</td>
</tr>
<tr>
<td>2. Ability for independent living: Fillenbaum IADL (total 5), Highly independent (score ≥4)</td>
<td>2.1 ± 2.1</td>
<td>13/40 (32.5%)</td>
</tr>
<tr>
<td>3. Motivation for living: Vitality Index (total 10), Motivation for living (score ≥7)</td>
<td>8.8 ± 1.9</td>
<td>35/40 (87.5%)</td>
</tr>
</tbody>
</table>

QOL: quality of life; IADL: instrumental activities of daily living

Fig. 2 Comparison of BI (Barthel Index) scores before and after surgery in 40 patients. In octogenarians with highly independent ADL (BI) before surgery, postoperative BI was good.
Conclusion

In octogenarians with independent ADL before surgery, cardiac valvular surgery was safe, and postoperative QOL was satisfactory. Over the mid-term, 87.5% of the survivors maintained minimally required ADL and good motivation for living.

Disclosure Statement

None of the authors have any conflicts of interest to declare.

References