Clinical Results and Quality of Life after Nonelective Cardiac Surgery in Octogenarians

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Abstract

Background We analyzed the short-term and mid-term outcomes as well as the health-related quality of life (HRQOL) of octogenarians undergoing elective and urgent cardiac surgery.

Patients and Methods We retrospectively identified 688 consecutive octogenarians who underwent cardiac surgery at our center between January 2012 and December 2019. A propensity score matching was performed which resulted in the formation of 80 matched pairs. The patients were interviewed and the Short Form-36 survey was used to assess the HRQOL of survivors. Multivariable analysis incorporated binary logistic regression using a forward stepwise (conditional) model.

Results The median age of the matched cohort was 82 years ($p = 0.937$), among whom, 38.8% of patients were female ($p = 0.196$). The median EuroSCORE II of the matched cohort was 19.4% (10.1–39.1%). The duration of postoperative mechanical ventilation was found to be independently associated with in-hospital mortality (odds ratio: 1.01 [95% confidence interval: 1.0–1.02], $p = 0.038$). The survival rates at 1, 2, and 5 years was 75.0, 72.0, and 46.0%, respectively. There was no difference in the total survival between the groups ($p = 0.080$). The physical health summary score was 41 (30–51) for the elective patients and 42 (35–49) for the nonelective octogenarians ($p = 0.581$). The median mental health summary scores were 56 (48–60) and 58 (52–60), respectively ($p = 0.351$).

Conclusion Cardiac surgery can be performed in octogenarians with good results and survivors enjoy a good quality of life; however, the indication for surgery or especially for escalation of therapy should always be made prudently, reserved, and in consideration of patient expectations.

Keywords
- octogenarians
- cardiac surgery
- outcome
- health-related quality of life
- Short Form-36

Introduction

The operability of octogenarians has since long been under scrutiny.[1] However, the number of older patients requiring cardiac surgery has been on the rise. In Germany, patients older than 80 years accounted for 13.8% of the patients undergoing cardiac surgery in 2012, and this rose to 18.6% in 2019.[2] Earlier, it was recommended to avoid urgent surgery in octogenarians; however, in recent times, it has been reported that octogenarians exhibit a better quality of life and a considerable increase in their emotional well-being, as well as an increase in their functional status following cardiac surgery.[1,3]

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Several factors such as surgical complexity, ventricular function, and the number of preexisting comorbid conditions make surgical treatment a medical and ethical challenge. Reliable data that address the issue of whether or not octogenarians benefit from surgery, especially nonelective treatment, are limited. We analyzed the short-term and mid-term outcomes as well as the health-related quality of life (HRQOL) of octogenarians undergoing cardiac surgery.

Patients and Methods

Study Design and Definition of Groups

We retrospectively identified 688 consecutive octogenarians who underwent cardiac surgery at our center between January 2012 and December 2019. At our institution, procedures are performed in accordance to the heart team decision. Patients undergoing transcatheter-based valve interventions or underwent emergency open heart surgery after transcatheter aortic valve replacement complications were excluded from this study. The assessment of urgency was made according to the definition of the Society of Thoracic Surgeons.[4] Among these patients, 105 patients underwent urgent surgery. The study was approved by the institutional ethics committee and the requirement for individual patient consent was waived (project number: 17-463, dated April 20, 2020).

Data Collection and Statistical Analysis

All patients consented to surgery; postoperative treatment and data acquisition were performed as part of routine patient care. Patient details were collected from our institutional database and deidentified. Preoperative cardiopulmonary resuscitation (CPR), preoperative mechanical ventilation, preoperative inotropic support, and preoperative intra-aortic balloon pump (IABP) were defined as one of the above within 30 days prior to surgery. Additionally, the EuroSCORE II[5] was calculated, which predicted the total perioperative mortality. Data were analyzed using IBM SPSS version 25 (Statistical Package for the Social Sciences). Data were tested for normal distribution using the Kolmogorov–Smirnov's test with Lilliefors correction. Categorical variables were evaluated using the chi-square and Fisher's exact method and continuous variables were evaluated using the Mann–Whitney's *U*-test. Survival analysis was performed with Kaplan–Meier's curve and log-rank test. All analyses were two tailed. The null hypothesis was rejected, and significant difference was assumed with *p*-values <0.05. Data are presented as medians (25th–75th quartiles) or absolute values (percentages) unless otherwise specified. To compensate for the differences in this retrospective, nonrandomized study, a propensity score matching analysis was performed. For this purpose, logistic regression was used to develop a propensity score. A propensity score difference of 0.1 was used as a maximum caliper for matching the two groups. Factors included to compute the propensity score were: age, EuroSCORE II, acute myocardial infarction, instable angina pectoris, preoperative CPR, preoperative mechanical ventilation, preoperative inotropic support, and preoperative IABP. This resulted in the formation of 80 matched pairs. Multivariable analysis incorporated binary logistic regression using a forward stepwise (conditional) model, where significance for entry was set at $p < 0.05$ and significance for exit was $p < 0.10$.

Evaluation of Health-Related Quality of Life and Follow-up

Short Form-36 Health Survey Questionnaire

The Short Form-36 (SF-36) questionnaire was used to evaluate HRQOL of the patients discharged from the hospital as previously described.[6,7] Both groups of patients were compared with respect to HRQOL.

Follow-up

Data in the follow-up period were available for 132 patients (82.5%) and included outpatient clinical records or data from telephone interviews with the general practitioner. To assess the HRQOL of the survivors, study participants were interviewed and the SF-36 survey was used. Patients were observed for a total of 496 person-years, and the median follow-up time was 3.6 years (0.9–5.2 years). The details of follow-up of the unmatched cohort are outlined in detail in ►**Supplementary Table 1**, ►**Supplementary Figs. 1** and **2**, available online.

Results

Baseline parameters of the matched and unmatched cohorts are listed in ►**Table 1**. The median age of the matched cohort was 82 years (82 [81–84] vs. 82 [81–84], $p = 0.937$), among whom 38.8% of patients were female ($p = 0.196$). The median EuroSCORE II of the matched cohort was 19.4% (10.1–39.1%) and was comparable among thegroups ($p = 0.051$).

A significantly higher number of patients in the elective group had cerebral vascular disease (31.3 vs. 10.0%, $p = 0.0001$), chronic kidney disease (41.3 vs. 20.0%, $p = 0.004$), prior neurological disorders (25.0 vs. 7.5%, $p = 0.003$), and pulmonary hypertension (26.3 vs. 7.5%, $p = 0.003$). We observed no differences in the matched cohort with respect to acute myocardial infarction, instable angina pectoris, preoperative CPR, preoperative mechanical ventilation, preoperative inotropic support, and preoperative IABP.

Details of the surgical procedures performed in the matched cohort are presented in ►**Table 2**. There were neither differences concerning the duration of surgery, duration of cardiopulmonary bypass, nor concerning the duration of aortic cross-clamping. Isolated aortic valve replacement was more prevalent in the elective group (11 [13.8%] vs. 1 [1.2%], $p = 0.005$), whereas surgery of the aorta was more prevalent in the urgent group (9 [11.2%] vs. 27 [33.8%], $p = 0.001$). A significantly higher number of patients in the elective group underwent reoperations (18 [22.5%] vs. 2 [2.5%], $p < 0.001$).

Postoperative complications and outcomes in the matched cohort are listed in ►**Table 3**. A higher number of patients in the urgent group developed new-onset atrial fibrillation (21.8 vs. 47.5%, $p = 0.001$). We observed no other differences in the rates of complications among the groups. A total of 16 patients (80.0%) who underwent reoperation survived to discharge. Patients undergoing elective surgery had a significantly

Table 1 Baseline parameters

	Before matching				After matching			
	Elective ($n = 583$)	Urgent ($n = 105$)	Total ($n = 688$)	*p*-Value	Elective ($n = 80$)	Urgent ($n = 80$)	Total ($n = 160$)	*p*-Value
Age (y)	81 (80–83)	82 (81–83)	81 (80–83)	0.012	82 (81–84)	82 (81–84)	82 (81–84)	0.937
BMI (kg/m^2)	25.9 ± 4.0	25.7 ± 3.5	25.9 ± 3.9	0.700	25.6 ± 3.9	25.5 ± 3.1	25.5 ± 3.5	0.943
EuroSCORE II (%)	5.5 (2.6–11.3)	27.1 (15.2–36.6)	6.8 (3.0–15.4)	<0.001	14.9 (4.8–35.5)	22.2 (13.4–30.9)	19.4 (10.1–31.9)	0.051
Female (%)	204 (35.0)	41 (39.0)	245 (35.6)	0.425	35 (43.8)	27 (33.8)	62 (38.8)	0.196
LVEF < 30% (%)	25 (4.3)	8 (7.6)	33 (8.5)	0.142	4 (5.0)	4 (5.0)	8 (5.0)	1.000
Arterial hypertension (%)	524 (89.9)	93 (88.6)	617 (89.7)	0.685	75 (93.8)	69 (86.3)	144 (9.0)	0.115
Atrial fibrillation (%)	161 (27.6)	22 (21.0)	183 (26.6)	0.155	24 (30.0)	18 (22.5)	42 (26.3)	0.283
Cerebral vascular disease (%)	118 (20.2)	15 (14.3)	131 (19.0)	0.059	25 (31.3)	8 (10.0)	33 (20.6)	0.001
Chronic kidney disease (%)	184 (31.6)	28 (26.7)	212 (30.8)	0.313	33 (41.3)	16 (20.0)	49 (30.6)	0.004
COPD (%)	109 (18.7)	10 (9.5)	119 (17.3)	0.022	12 (15.0)	6 (7.5)	18 (11.3)	0.135
Diabetes mellitus (%)	145 (24.5)	28 (26.7)	173 (25.1)	0.696	27 (33.8)	16 (20.0)	43 (26.9)	0.051
Pacemaker (%)	43 (7.4)	4 (3.8)	47 (6.8)	0.183	5 (6.3)	2 (2.5)	7 (4.4)	0.248
Peripheral vascular disease (%)	80 (13.7)	10 (35.7)	90 (15.4)	0.241	13 (16.3)	6 (7.5)	19 (11.9)	0.088
Prior neurologic disorder (%)	70 (12.0)	9 (8.6)	79 (11.5)	0.310	20 (25.0)	6 (7.5)	26 (32.5)	0.003
Pulmonary hypertension (%)	85 (14.6)	7 (6.7)	92 (13.4)	0.031	21 (26.3)	6 (7.5)	27 (16.9)	0.003
Acute myocardial infarction (%)	118 (20.2)	40 (38.1)	158 (23.0)	<0.001	30 (37.5)	31 (38.8)	61 (38.1)	0.871
Instable angina pectoris (%)	44 (7.5)	20 (19.0)	64 (9.3)	<0.001	14 (17.5)	13 (16.3)	27 (16.9)	0.833
Preoperative CPR (%)	2 (0.3)	4 (3.8)	6 (0.8)	<0.001	1 (1.3)	1 (1.3)	2 (1.3)	1.000
Preoperative mechanical ventilation (%)	3 (0.5)	10 (9.5)	13 (1.9)	<0.001	2 (2.5)	2 (2.5)	4 (2.5)	1.000
Preoperative inotropic support (%)	6 (1.0)	15 (14.3)	21 (3.1)	<0.001	5 (6.3)	5 (6.3)	10 (6.3)	1.000
Preoperative IABP (%)	0 (0.0)	2 (1.9)	2 (0.3)	<0.001	0 (0.0)	0 (0.0)	0 (0.0)	1.000

Abbreviations: BMI, body mass index; COPD, chronic obstructive pulmonary disease; CPR, cardiopulmonary resuscitation; IABP, intra-aortic balloon pump; LVEF, left ventricular ejection fraction.
Note: Data are presented as mean [plusminus] standard deviation, medians (25th–75th quartiles) or absolute numbers (percentages).

Table 2 Details of surgery after matching

	Elective ($n = 80$)	Urgent ($n = 80$)	Total ($n = 160$)	*p*-Value
Duration of surgery (min)	252 ± 71	253 ± 68	256 ± 76	0.758
Duration of cardiopulmonary bypass (min)	127 ± 62	129 ± 60	131 ± 66	0.982
Duration of aortic cross-clamping (min)	83 ± 42	81 ± 46	84 ± 45	0.429
CABG (%)	27 (33.8)	37 (46.2)	64 (40.0)	0.146
CABG + AVR (%)	12 (15.0)	11 (13.8)	23 (14.4)	1.000
CABG + valve surgery (%)	8 (10.0)	2 (2.5)	10 (6.2)	0.098
Isolated AVR (%)	11 (13.8)	1 (1.2)	12 (7.5)	0.005
Single valve surgery (%)	6 (7.5)	2 (2.5)	8 (5.0)	0.276
Multiple valve surgery (%)	5 (6.2)	0 (0.0)	5 (3.1)	0.059
Aortic surgery (%)	9 (11.2)	27 (33.8)	36 (22.5)	0.001
VSD closure (%)	2 (2.5)	0 (0.0)	2 (1.2)	0.497
LIMA grafts (%)	39 (48.8)	42 (52.5)	81 (50.6)	0.752
Radialis grafts (%)	4 (5.0)	2 (2.5)	6 (3.8)	0.681
Reoperation (%)	18 (22.5)	2 (2.5)	20 (12.5)	<0.001

Abbreviations: AVR, aortic valve replacement; CABG, coronary artery bypass graft; LIMA, left internal mammary artery; VSD, ventricular septal defect.
Note: Data are presented as mean ± standard deviation or absolute numbers (percentages).

Table 3 Postoperative complications and outcomes matched

	Elective ($n = 80$)	Urgent ($n = 80$)	Total ($n = 160$)	p-Value
Postoperative adverse events				
Adverse cerebrovascular events (%)	0 (0.0)	2 (2.5)	2 (1.2)	0.497
Low cardiac output (%)	12 (15.4)	7 (8.8)	19 (12.0)	0.228
Re-explorative surgery (%)	9 (11.3)	18 (22.5)	27 (16.9)	0.052
Pacemaker implantation (%)	3 (3.8)	3 (3.8)	6 (3.8)	1.000
Postoperative respiratory failure	14 (17.5)	7 (8.8)	21 (13.1)	0.159
Postoperative CPR (%)	1 (1.2)	2 (2.5)	3 (1.9)	1.000
Postoperative myocardial infarction (%)	2 (2.5)	1 (1.2)	3 (1.9)	1.000
Postoperative delirium (%)	11 (14.1)	18 (15.0)	23 (14.6)	1.000
Postoperative mechanical circulatory support (%)	2 (2.5)	2 (2.5)	4 (2.5)	1.000
CIP (%)	7 (8.8)	5 (6.2)	12 (7.5)	0.765
Surgical site infection (%)	5 (6.2)	3 (3.8)	8 (5.0)	0.719
Infection				
Sepsis (%)	6 (7.5)	1 (1.2)	7 (4.4)	0.117
Nosocomial pneumonia (%)	22 (27.5)	29 (36.2)	51 (31.9)	0.309
Urinary tract infection (%)	6 (7.5)	6 (7.5)	12 (7.5)	1.000
Catheter associated infection (%)	2 (2.5)	1 (1.2)	3 (1.9)	1.000
Unknown focus (%)	5 (6.2)	10 (12.5)	15 (9.4)	0.278
New-onset atrial fibrillation (%)	17 (21.8)	38 (47.5)	55 (34.8)	0.001
Renal replacement therapy (%)	14 (17.5)	12 (15.0)	26 (16.2)	0.831
Reintubation (%)	5 (6.4)	9 (11.2)	14 (8.9)	0.403
Tracheotomy (%)	3 (3.8)	4 (5.0)	7 (4.4)	1.000
Outcomes				
Length of hospital stay (d)	16 (13–24)	12 (5–17)	14 (8–21)	<0.001
Length of ICU stay (d)	3 (2–6)	5 (3–8)	4 (2–7)	0.001
Duration of PMV (h)	14 (9–24)	24 (13–59)	17 (10–33)	<0.001
In-hospital mortality (%)	6 (7.5)	12 (15.0)	18 (11.2)	0.210
Transfer to other hospitals (%)	20 (25.0)	39 (48.8)	59 (36.9)	<0.001
Discharge to cardiac rehabilitation centers (%)	54 (67.5)	29 (36.2)	83 (51.9)	<0.001

Abbreviations: CIP, critical illness polyneuropathy; ICU, intensive care unit; PMV, postoperative mechanical ventilation.
Note: Data are presented as medians (25th–75th quartiles) or absolute numbers (percentages).

shorter duration of postoperative mechanical ventilation (PMV) (14 [9–24] vs. 24 [13–59] hours, $p < 0.001$) and length of intensive care unit stay (3 [2–6] vs. 5 [3–8] days, $p = 0.001$). A significantly higher number of patients in the elective group were discharged to cardiac rehabilitation centers (67.5 vs, 36.2%, $p < 0.001$), whereas a significantly higher number of patients in the urgent group were transferred to other hospitals (25.0 vs. 48.8%, $p < 0.001$).

In the matched patient cohort, differences were observed in terms of postoperative complications, length of total hospital stay, and duration of PMV. The total rate of re-explorative surgery was 1.7% ($p = 0.685$) and the rate of adverse cerebrovascular events was 1.7% ($p = 0.685$). Renal replacement therapy was required in 3.1% ($p = 1.000$) of the total patient cohort. Postoperative mechanical support was required in a total of four patients (2 [2.5%] vs. 2 [2.5%], $p = 1.000$).

Mortality and Follow-up

The in-hospital mortality of the matched cohort was 11.2%, and we observed no significant difference between the groups (6 [7.5%] vs. 12 [15.0%], $p = 0.210$). The rate of mortality with respect to the surgical procedures is outlined in ►**Fig. 1**. The duration of PMV was found to be independently associated with in-hospital mortality (odds ratio: 1.01 [95% confidence interval: 1.0–1.02], $p = 0.038$). The survival rates at 1, 2, and 5 years were 78.0, 74.0, and 60.0%, respectively. There was no difference in the total survival between the groups ($p = 0.080$) (►**Fig. 2**).

Quality of Life

The median scores of the study cohort for the eight subscale categories for the elective and nonelective groups are illustrated in ►**Fig. 3**. The values of the individual

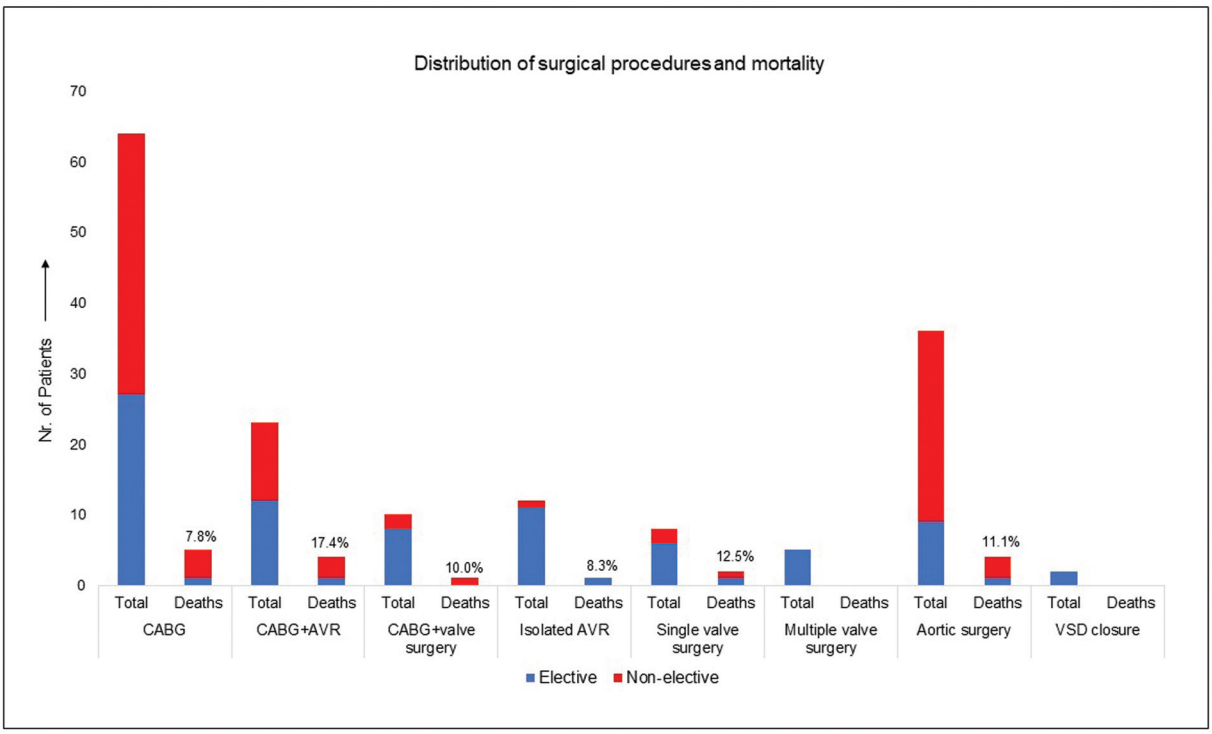
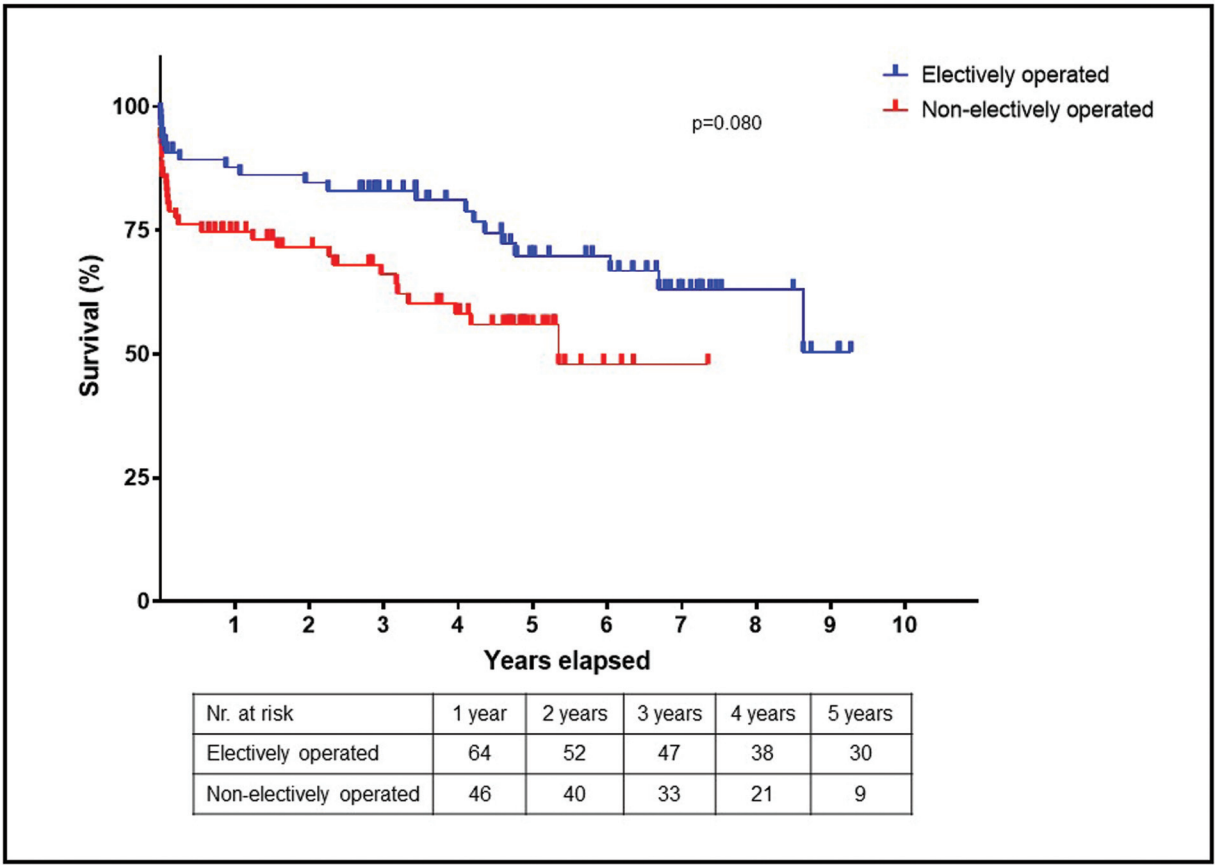


Fig. 1 Distribution of surgical procedures and mortality. AVR, aortic valve replacement; CABG, coronary artery bypass graft; VSD, ventricular septal defect.



Nr. at risk	1 year	2 years	3 years	4 years	5 years
Electively operated	64	52	47	38	30
Non-electively operated	46	40	33	21	9

Fig. 2 Kaplan–Meier's survival curves of octogenarians after elective surgery compared with those after nonelective surgery of the matched cohort.

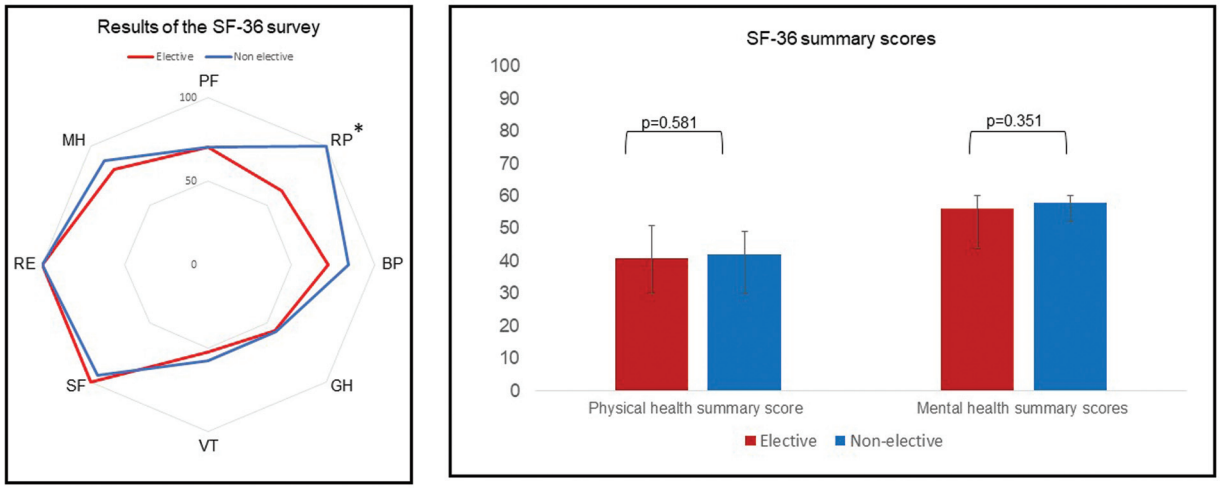


Fig. 3 Results survey of the octogenarians and summarized scores for physical and mental health from SF-36 after elective surgery compared with those after nonelective surgery. BP, bodily pain; GH, general health; MH, mental health; PF, physical functioning; RE, role emotional; RP, role physical; SF, social functioning; SF-36, Short Form-36; VT, vitality; *, statistical significance.

domains were as follows: physical functioning, 70 [35–85] versus 70 [20–90] $p = 0.839$; role physical, 62.5 (62.5–100) versus 100 (75–100) $p = 0.011$; bodily pain, 72 (41–100) versus 84 (41–100) $p = 0.433$; general health, 56 (45.5–72) versus 58 (37–70) $p = 0.851$; vitality, 53 (30–75) versus 58 (34–70) $p = 0.492$; social functioning 100 (75–100) versus 94 (63–100) $p = 0.603$; role emotional, 100 (75–100) versus 100 (100–100) $p = 0.279$; and mental health, 80 (68–91) versus 88 (76–96) $p = 0.079$. The physical health summary score was 41 (30–51) for the elective patients and 42 (35–49) for the nonelective octogenarians ($p = 0.581$). The median mental health summary scores were 56 (48–60) and 58 (52–60), respectively ($p = 0.351$). The differences in summary scores were not significant (►**Fig. 3**).

Discussion

Although studies show that cardiac surgery can be performed in octogenarians with good results, such procedures are considered to entail considerable risk. It is for this reason that older patients often present with symptoms of hemodynamic instability, making nonelective cardiac surgery inevitable.[8] Our retrospective single-center study addressed HRQOL and survival after cardiac surgery of octogenarians undergoing urgent or emergency procedures. The principal findings were that cardiac surgery can be performed on octogenarians with an acceptable operative mortality and survivors can expect a good long-term survival with a satisfactory HRQOL, even after nonelective surgery.

Aortic stenosis is the most common valvular disease in an aging population in developed countries.[9] Isolated aortic valve surgery was performed significantly higher in octogenarians undergoing elective surgery, whereas surgery of the aorta was performed more frequently in patients undergoing nonelective cardiac surgery. Isolated aortic valve surgery in octogenarians has been reported to be feasible with acceptable mortality, excellent long-term survival, and functional recovery.[10] On the contrary, the repair of aortic dissections type A has been reported to have an increased risk of short-term mortality. However, the mid-term survival rates have been reported to be acceptable.[11]

In this cohort, one in eight patients underwent redo surgery, with the rate of redo surgery being significantly higher in the elective group. Reoperations in the octogenarians combine the risks and complications of reoperation coupled with the aging changes.[12] Among the 20 patients who underwent reoperations, 16 patients (80.0%) survived to discharge. In accordance with our data as well as several other reports, reoperations although associated with an elevated risk can be performed in octogenarians with good outcomes and improvements in quality of life for the survivors.[12–15]

Mechanical circulatory support in older patients has been shown to be effective in resuscitating older patients; however, it is associated with a long recovery period following weaning when feasible.[16] Although current literature suggests that the age itself does not affect the outcomes of extracorporeal life support (ECLS) in the older patients, the baseline condition is what influences the survival after ECLS therapy in older patients.[17,18] In the unmatched cohort, a total of 12 patients (1.7%) required ECLS postoperatively. Among these patients, only one patient survived to discharge. Due to the poor outcomes in older patients, the decision to escalate circulatory therapy by implanting an ECMO should be viewed very critically and only after weighing up individual risk factors. Avoiding mechanical circulatory support and thus respecting certain limits of this therapy appear to be both medically and ethically acceptable or even necessary in these situations. Therefore, the decision to escalate circulatory therapy by implementing mechanical circulatory support should be viewed very critically and only after weighing up individual risk factors.[19]

The poor early outcome may be strongly related to the complicated clinical course but also to the critical preoperative state. Other investigators reported renal insufficiency, preoperative stroke, urgent or emergent surgery, chronic obstructive pulmonary disease, age, aortic surgery, reoperative surgery, and prolonged bypass time as predictors of early mortality.[20–22]

Not surprisingly, the early mortality of urgently operated patients in our cohort was nearly twice as high as compared with those following elective surgery. It has been reported that in octogenarians without significant comorbidities, the rate of postoperative mortality approaches those of seen in younger patients.[21] In this matched cohort, we found that the duration of PMV was independently associated with in-hospital mortality in octogenarians undergoing cardiac surgery.

The mortality rate of patients undergoing nonelective cardiac surgery has been reported to be as high as 32.3%.[19] Other studies report a higher rate of mortality in octogenarians undergoing unplanned surgery as compared with those undergoing planned surgery as well.[23] However, one must account for the preoperative status of the patients. Deschka et al[19] reported that the rate of mortality to be as high as 58.6% in patients undergoing emergency surgery. They attributed this to poor preoperative state due to cardiac compromise or shock as a result of acute myocardial infarction or valve dysfunction. In our matched cohort, the overall in-hospital mortality in the present study was 11.2% among octogenarians who underwent cardiac surgery, with no differences between the groups. Survival at 1 year was 82.0% in octogenarians undergoing elective surgery, whereas following nonelective surgery only 70.0% survived the first year. In the unmatched cohort, a total of 37 patients (5.4%) were in a critical state preoperatively, that is, on ventilator, on inotropic support, and/or undergoing CPR. Among these patients, a total of 31 patients (83.8%) survived to discharge and the 1-, 2-, and 5-year survival rates were 63.0, 63.0, and 54.0%, respectively. In several publications, comparable survival rates for octogenarians with an overall 1-year survival rate after elective surgery have been reported to range between 79 and 93%.[19,20,24]

There are several tools available to assess quality of life. We evaluated HRQOL by using the SF-36 survey, a well-established instrument for assessment of HRQOL. Our analysis revealed that hospital survivors had equivalent summary scores for physical health and mental health scores, and the achieved scores were independent from the urgency status of the cardiac surgery performed. Age and serious health events seem to have a major impact on the subjective quality of life and should therefore be taken into account when interpreting the results. The phenomenon that patients assess their health and HRQOL equal to or even better, especially after these serious health events, has been described by some authors and can be explained by an adaptation process referred to as a "response shift."[25] This term describes how individuals revise their health standards or their priorities as they grow older or more importantly suffer a significant deterioration in their objective health status.[26] The age of the patients is an important factor for the occurrence and extent of this adaptation process. Impairment of the subjective health does not always follow a decline of the objective quality of life, especially in older patients. Studies in the field of aging revealed that the association between physical health and self-rated health has been shown to weaken with increasing age, whereas the association between mental health and self-rated health becomes stronger.[26,27]

We found no differences in the summary scores of the SF-36. When interpreting the positive results of HRQOL of our patients, another aspect should also be considered. A survey of the survivors in the follow-up always represents a kind of positive selection. Unfortunately, the HRQOL of patients who died before the time of the survey remains unknown. If we now postulate that the results of the deceased patients were worse than the survivors, then it is understandable why there is a tendency to overestimate these results. In addition, the quality of life is influenced by a variety of factors. It can be assumed that with time the immediate influence of the experienced surgery on HRQOL fades. At the same time, other aspects, such as persistent chronic diseases and the patient's current environment, become increasingly important. This aspect should also be taken into account in the interpretation of the results. Of particular importance in this context is the urgent or emergency surgical treatment, which especially in the case of acute type A aortic dissection signifies life-prolonging therapy and is therefore of much greater importance in terms of the influence on the HRQOL. In fact, our current findings support the assumption that treating older patients not only prolongs life but also ensures a good quality of life. There are studies which also report that octogenarians benefit from improved quality of life and functional status following cardiac surgery.[3,28] However, it must also be mentioned that it has been reported that an apparent decrease in quality of life may be observed in 8 to 19% of octogenarians following cardiac surgery.[29]

Overall, cardiac surgery in octogenarians can be performed with good results with low rates of postoperative complications and perioperative mortality as well as encouraging mid-term survival rates and HRQOL. Furthermore, surgical acuity, meticulous hemostasis, perfect anesthesia, adequate myocardial protection, as well as an interdisciplinary approach of geriatricians, anesthesiologists, cardiologists, and surgeons are of paramount importance.[30]

Limitations

This being a cross-sectional study, there is no available data on the baseline HRQOL. Further larger studies are required.

Conclusion

The results of surgery in octogenarians must be considered in a differentiated manner. Survivors can expect a good long-term survival. They rate their quality of life and especially their mental condition as good and the urgency status of primary surgery does not seem to matter in either case. Especially after coronary and aortic surgery, encouraging survival rates can be achieved and should therefore not be withheld from older patients, especially in experienced high-volume centers. However, a complicated postoperative course can always limit survival, especially in older patients. Therefore, the indication for surgery or especially for escalation of therapy should always be made prudently, reserved, and above all in consideration of patient expectations.

Authors' Contribution

Shekhar Saha: Data curation, formal analysis, methodology, validation, visualization, writing—original draft, and revisions.

Andrea Lang: Data curation, methodology, and validation.

Julia von der Linden: Data curation, formal analysis, and validation.

Dietmar Wassilowsky: Project administration, validation, writing—review, and editing.

Maximilian Pichlmaier: Conceptualization, investigation, methodology, supervision, writing—review, and editing.

Christian Hagl: Conceptualization, resources and software, supervision, writing—review, and editing.

Gerd Juchem: Project administration, supervision, writing—review, and editing.

Dominik Joskowiak: Conceptualization, formal analysis, investigation, methodology, visualization, writing—original draft, and revisions.

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Conflict of Interest

None declared.

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