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Higher Age Predicts Adverse Outcome and Readmission after Coronary Artery Bypass Grafting

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Abstract. The present prospective clinical study was carried out to investigate the effect of age on mortality, morbidity, and readmission rates after coronary artery bypass grafting (CABG). Data on 1131 consecutive CABG patients were collected in a surgical center and in all 18 secondary referral hospitals up to 3 months after discharge. Analysis was based on three age groups: 64 years or less (510 patients), 65 to 74 years (448 patients), and 75 years or more (173 patients). Thirty-day mortality rates were 1.6% for the youngest, 5.4% for the middle age group, and 6.9% for the oldest. Major complications occurred in 10.8%, 21.2%, and 24.9% of these patients, respectively. Higher age was associated with more readmissions to health care facilities: The oldest patients had a rate twice as high as those in the youngest group (34.5% vs. 18.6%). Atrial fibrillation (15.4%), chest pain (10.6%), and congestive heart failure (8.5%) were the most common reasons for readmission. In conclusion, elderly patients, who are often suboptimal candidates for CABG, have higher 30-day mortality, higher morbidity, longer length of stay in health care facilities, and an increased risk of readmission within 3 months after CABG; age was an independent predictor of 30-day mortality and postdischarge readmission. Despite the higher risk of adverse events after surgery, three out of four elderly patients recover uneventfully.

During the past two decades, the median age of patients selected for coronary artery bypass grafting (CABG) has increased [1–4]. Even though improved myocardial preservation, anesthesia, surgical techniques, and postoperative care have improved the outcome of surgery, older age still causes increased morbidity and longer hospital stays together with a growing need for care-taking resources [5–7]. The current emphasis on cost reduction has spurred efforts to boost efficiency and to reduce hospital expenditure and postoperative length of stay. Readmissions negatively affect such efforts and are disruptive to patients and their families.

The purpose of this follow-up study was to investigate age-related differences in late co-morbidity and the length of stay in health care facilities during the 3 months following coronary artery bypass surgery. We also investigated readmissions within 3 months after CABG to identify common patterns leading to such readmissions in our growing elderly population. We have a well defined area of service with a good level of care for cardiac patients in community health centers and in the local district and general hospitals, which provide care for the local population. Our health care infrastructure therefore enables us to retain medical follow-up information on our patients. Hence we decided to study the immediate results of CABG in our patients after their initial discharge from hospital treatment.

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Materials and Methods

Preoperative, intraoperative, and postoperative clinical data were prospectively collected and entered into a computerized database for all 1131 patients undergoing isolated CABG in Tampere University Hospital between May 2, 1999 and November 30, 2000. The study was approved by the institutional review board of Tampere University Hospital, and each patient gave written informed consent to participate. There were 826 male (73.0%) patients, with an age range of 34 to 92 years (median 66 years). Altogether, 689 (60.9%) of the procedures were performed electively, 400 (35.4%) urgently, and 42 (3.7%) as emergencies. Among the patients, 1016 (89.8%) underwent bypass grafting via a sternotomy incision with cardiopulmonary bypass (CPB) (on pump) instituted using ascending aortic and right atrium cannulation. Antegrade and retrograde cold blood cardioplegia were usually used for myocardial protection. Only 115 (10.2%) patients were operated on without CPB (off pump). In these cases, commercially available retractor and stabilization systems (Octopus: Medtronic, Minneapolis, MN, USA; CTS: Cardio-Thoracic Systems, Cupertino, CA, USA) were used during construction of the anastomosis.

All patients were kept in the postoperative surgical intensive care unit (ICU) overnight and, if stable, transferred to the surgical ward the next day. Extubation was done as soon as clinically indicated, but no attempt was made to extubate patients in the operating room at the conclusion of the procedure. Furthermore, no concerted effort was made to "fast-track" patient discharge. Most patients were discharged on the sixth postoperative day (median) to the local district hospital where they stayed for another 6 days (median). Only 2.4% of the patients were discharged straight home.

During the primary hospital stay a comprehensive pre-, peri-,

Table 1. Distribution of preoperative clinical characteristics in various age groups.

Parameter	Percent, by age			
	−64 (n = 510) %	65–74 (n = 448) %	75+ (n = 173) %	p
Male gender (%)	83.3	67.6	56.6	< 0.001
Age (years), mean and SD	55.8 (6.1)	69.5 (2.9)	77.9 (3.2)	< 0.001
EuroScore (median)	1	4	7	< 0.001
Operative priority				< 0.001
Elective	69.0	58.9	42.2	< 0.001
Urgent	28.2	35.9	54.9	< 0.001
Emergency	2.7	5.1	2.9	0.123
Ejection fraction < 50%	19.2	25.7	30.5	0.002
Left main stem ≥ 50%	18.6	22.6	30.4	0.005
NYHA III or IV	69.0	85.3	97.1	< 0.001
Redo surgery	5.7	5.8	0.6	0.016
Off-pump procedure	12.5	8.7	6.9	0.045
Risk factors				
Creatinine ≥ 141 μmol/L	1.6	2.5	3.5	0.322
COPD	4.9	8.9	9.8	0.021
BMI ≥ 30	22.6	22.4	15.3	0.105
Diabetes	17.5	23.7	17.9	0.043
Hypertension	52.4	56.5	54.9	0.441
Lipid-lowering drug.	80.2	69.0	57.8	< 0.001
Smoking	40.8	12.9	7.5	< 0.001
History of stroke	3.5	6.5	9.2	0.010
AMI within 90 days	18.4	23.8	28.9	0.011
Extracardiac arteriopathy[a]	8.4	12.3	12.1	0.105

NYHA: New York Heart Association; COPD: chronic obstructive pulmonary disease; BMI: body mass index; AMI: acute myocardial infarction.

[a]Defined as the presence of one or more of these risks: intermittent claudication, carotid disease (> 50% stenosis) and previous or already planned surgery for vascular disease.

and postoperative data body was collected. The current preoperative data are shown in Table 1. EuroScore risk scores were also reported. The EuroScore model was originally developed and validated for the prediction of early mortality in cardiac surgical patients in Europe on the basis of objective risk factors [8]. In all, 128 centers from eight European countries participated in the project, giving a total of 19,030 patients for analysis. Since its publication in 1999 the EuroScore model has been widely used in European centers. Perioperative data were collected during the operation and ICU stay. The criteria for perioperative infarction included a new Q wave on the electrocardiogram or a peak CK-MB level of more than 150 μmol/l. The length of the ICU stay was recorded. The data from the 18 secondary discharge hospitals were collected by referring physicians and sent to the first author (O.J.) for analysis. These data were obtained for 1044 (95.5%) of the 1093 patients discharged from the primary hospital. All outcome events, including 30-day mortality and complications, were recorded for joint analysis with the primary hospital data. Major postoperative complications included mortality, stroke, mediastinitis, sepsis, clinical low-output syndrome [early resternotomy due to the low output, postoperative intraaortic balloon pump (IABP) use or prolonged need for inotropics], prolonged ventilatory support (> 36 hours), acute renal failure requiring dialysis, perioperative myocardial infarction, pulmonary embolism, and severe cardiac failure or severe ventricular arrhythmia requiring an ICU or cardiac care unit (CCU) stay in the primary or secondary referral hospital. Superficial wound infections, atrial fibrillation, or other mild supraventricular arrhythmias were considered minor complications.

Postdischarge follow-up physical examinations were performed by the referring physicians, on average, 12 to 16 weeks (mean ± SD 105.7 ±39.6 days) after the operation. These follow-up data were available for 1006 (92.0%) of the 1093 discharged patients. The items here included clinical status, New York Heart Association (NYHA) status, current medication, and documentation of possible readmissions and their diagnoses. Admission diagnoses were categorized into four classes: cardiac-related (recurrent chest pain, myocardial infarction, arrhythmia, mild congestive heart failure or pulmonary edema, pericardial effusion, postpericardiotomy syndrome), wound problem (sternal or limb), respiratory or urinary tract infections, and miscellaneous reasons (e.g., gastrointestinal problem, cerebrovascular event, pulmonary embolism, deep venous embolism, psychological problem). For patients with multiple problems or readmissions the most proximate or dominant condition resulting in the first readmission was recorded as the reason for readmission.

Patients were divided into three groups according to age: 64 years or less (510 patients), 65 to 74 years (448 patients), and 75 years or more (173 patients). Patient and outcome variables were, in most cases, expressed as a percentage of the total in each group. Categorical variables between the groups were compared using Pearson's χ^2 test. Continuous variables were compared by one-way analysis of variance (ANOVA) for variables with normal distributions and the Kruskal-Wallis test for variables with nonnormal distributions. Predictors exhibiting a statistically significant relation with adverse events in univariate analyses were taken for multivariate logistic regression analysis to investigate their independence as predictors. Odds ratio (OR) and 95% confidence intervals (CI) were evaluated. Any p values of 0.05 or less were considered statistically significant. All statistical analyses were performed using SPSS 7.5 for Windows.

Results

The distributions of a wide range of preoperative characteristics in the three age groups are listed in Table 1. Men were more common in younger age groups. Elderly patients were more likely to have most of the adverse prognostic characteristics and co-morbidities, but they were less likely to be overweight or smokers or to have previously undergone cardiac surgery.

Increasing age prolonged the need for mechanical ventilatory support in that the mean supported ventilation times among the patients under age 65 years, 65 to 74 years, and 75 years or more were 15.6, 21.4, and 25.6 hours, respectively ($p < 0.001$). A similar association can be seen between age and ICU stay, the mean length of ICU stay in these groups being 1.5, 2.1, and 2.9 days, respectively ($p < 0.001$). More patients in the oldest age group (58.1%) received packed red blood cells during the postoperative ICU stay than in the middle (50.7%) and youngest (41.2%) age groups ($p = 0.016$). However, the postoperative need for fresh frozen or platelet-rich plasma did not vary by age.

There was an obvious tendency to more adverse events among the elderly, as shown in Table 2. Altogether, 11.0%, 21.2%, and 24.9% of patients aged under 65 years, 65 to 74 years and 75 years or more, respectively, had major complications before discharge home ($p < 0.001$). When minor complications (superficial wound infection, atrial fibrillation) were added, the occurrences were 27.8%, 51.3%, and 61.3%, respectively ($p < 0.001$). Atrial fibrillation was the most common postoperative complication, occurring

Table 2. Clinical outcomes of patients by age.

Outcome	Percent, by age −64 (n = 510)	65–74 (n = 448)	75− (n = 173)	p
30-Day mortality	1.6	5.4	6.9	0.001
Stroke	0.6	3.3	4.5	0.001
Impaired renal function[a] > 50% rise in creatinine	9.1	25.2	33.0	< 0.001
Concentration Dialysis	0.6	3.1	4.7	0.002
Mediastinitis[a]	1.0	1.1	1.2	0.971
Perioperative MI	2.7	4.7	6.4	0.080
Resternotomy for Bleeding	2.9	5.1	4.0	0.530
Low output	0.8	1.3	1.7	0.201
IABP postoperatively	0.2	0.4	0.0	0.582
New atrial fibrillation	18.4	44.6	51.4	< 0.001
Wound problem[a]	7.8	15.0	17.3	< 0.001
Ventilation time > 36 hours	2.6	5.3	7.6	0.011
ICU stay ≥3 days	8.6	20.1	36.4	< 0.001
Postoperative days in hospital ≥21	3.8	14.5	28.4	< 0.001

MI: myocardial infarction; IABP: intraaortic balloon pump.
[a]Data were examined up to 3 months postoperatively.

in 423 patients (37.4%). Most (90.5%) of these episodes occurred during the primary hospital stay; the other 9.5% were detected some days later during the patient's stay in the secondary referral hospital. Advanced age appeared to be an independent significant risk factor for atrial fibrillation in the multivariate logistic regression analysis (65–74 years: OR 3.80, 95%CI 2.85–5.08; ≥ 75 years: OR 4.48, 95%CI 3.06–6.57). Left main coronary artery disease, urgency of operation, number of bypasses done, and on-pump versus off-pump procedure had no significant predictive role.

The 30-day mortality was statistically significantly associated with advanced age; 8 (1.6%) deaths occurred in the youngest age group, 24 (5.4%) in the middle age group, and 12 (6.9%) in the oldest age group ($p = 0.001$). Altogether, 68% of the deaths were for cardiac-related reasons. Preoperative predictors of 30-day mortality are shown in Table 3. Emergency operation, subnormal ejection fraction, redo operation, age ≥ 65 years, and female gender were identified in the multivariate analysis as being independent predictors of 30-day mortality. In all, emergency operations were associated with 28.6% mortality.

The length of stay, measured from the time of the procedure up to discharge home at any level of our health care, was significantly longer in the elderly: mean 19.4 days in the oldest age group, 15.3 days in the middle age group, and 11.7 days among the youngest patients ($p < 0.001$).

Three-month follow-up data were available for 1006 (92.0%) of the 1093 living patients. Of these, 246 (24.5%) were readmitted to the secondary referral or primary hospital within 3 months of discharge after the operation. As shown in Table 4, elderly patients were significantly more likely to be readmitted. The primary problems prompting readmission varied, although cardiac-related reasons were prominent in all age groups ($p = 0.16$, cardiac vs. others). Arrhythmias, most notably atrial fibrillation, were the most common cardiac-related admission diagnoses (36.5%). The other two common single reasons for readmission in this class were chest pain (in 25.0%) and congestive heart failure (in 20.2%). Predictors of readmission are shown in Table 5, where many preoperative and postoperative variables were risk factors for readmission (by the univariate analysis) but only ages 65 to 74 years and new-onset atrial fibrillation during the early postoperative period proved to be independent predictors in the multivariate analysis.

Three months after the operation 98.3%, 98.2%, and 96.6% of the discharged patients in the age groups 64 years or less, 65 to 74 years, and 75 years or more, respectively, were in NYHA functional class I or II. In all, 96.2% of these patients had improved by at least one functional class 3 months after the operation. During the same time period, the mean numbers of cardiovascular medications decreased from 4.1 to 3.0 among the youngest, from 4.3 to 2.8 in the middle age group, and from 4.4 to 2.7 among the oldest group.

Discussion

The median age of the population is increasing in Finland as elsewhere, creating a larger pool of patients suffering from coronary artery disease [1, 2]. Coronary artery bypass surgery in the elderly has become common, and nowadays more than one in four patients operated on in Europe and in the United States are older than 70 years of age [8–11]. Elderly patients undergoing CABG often have significant co-morbid illnesses possibly contributing to postoperative morbidity, which entails a growing need for care resources. An accurate prediction of postoperative morbidity and mortality would be useful for measuring the quality of care and estimating the need for resources. Although mortality, morbidity, and outcomes among the CABG patients have been investigated, there is surprisingly little information regarding the postoperative problems that precipitate hospital readmission during the early period after surgery.

The analysis carried out in the present study focused first on the influence of increasing age on early clinical outcome and subsequently on hospital readmissions during the 3 to 4 months after discharge following coronary bypass surgery. The data are fully representative of our material, as all isolated CABG procedures performed in our institution during the study period were included and our institution is the only tertiary referral cardiac center in the area. Our data also included events in the secondary referral hospitals, which is important, as only 2.4% of the patients were discharged straight home. Data from the secondary referral hospitals were obtained for 1044 (95.5%) of the 1093 patients discharged from the primary hospital. Patients with missing later data were, on average, 1 year older and had urgent surgery more often than the study patients, but the small number (49 patients) with missing data causes no significant bias. Data from the primary hospital care were complete. Moreover, most of the adverse outcome events occurred during the first days after the operation and were thus recorded for all the patients. With 92.0% completeness of the 3-month follow-up data, loss of information was negligible.

Of the 87 patients who were lost to follow-up, 6 died before the postdischarge examination, and 81 patients were lost for unknown reasons. They were, on average, 2 years older than the other study patients ($p = 0.080$). More patients in this small subgroup than in the entire cohort (11.1% vs. 2.4%) were discharged straight home after the operation. This may reflect even better conditions and thus fewer postoperative problems and readmissions among those patients.

Our elderly patients were in poorer clinical condition than the younger patients at the time of surgery. They were more likely to have adverse prognostic characteristics and co-morbidities, par-

Table 3. Preoperative predictors of 30-day mortality in logistic regression analysis.

	Univariate analysis				Multivariate analysis[a]		
Parameter	No.	OR	95% CI	*p*	OR	95% CI	*p*
Age							
64	510	ref.			ref.		
65–74	448	3.55	1.58–7.99	0.002	2.71	1.05–6.97	0.039
≥ 75	173	4.68	1.88–11.64	< 0.001	4.72	1.47–15.15	0.009
Sex							
Male	826	ref.			ref.		
Female	305	2.84	1.55–5.21	< 0.001	2.21	1.08–4.53	0.030
Timing of operation							
Elective	689	ref.			ref.		
Urgent	400	1.99	0.98–4.03	0.055	0.87	0.35–2.16	0.760
Emergency	42	17.96	7.73–41.70	< 0.001	8.87	2.78–28.28	< 0.001
Ejection fraction							
≥ 50%	842	ref.			ref.		
30–49%	241	4.13	2.18–7.82	< 0.001	3.30	1.61–6.79	0.001
< 30%	17	5.77	1.23–27.3	0.026	6.16	0.78–48.51	0.084
EuroScore							
−5	841	ref.			ref.		
≥ 6	290	6.12	3.23–11.59	< 0.001	1.01	0.37–2.76	0.993
Redo surgery	56	5.69	2.59–12.52	< 0.001	5.27	1.82–15.30	0.002
Recent AMI (within 90 days)	248	3.88	2.07–7.00	< 0.001	1.76	0.77–4.03	0.183

ref.: reference value.

[a]After eliminating variables with $p > 0.05$ in univariate analysis: left main disease, diabetes, history of stroke, body mass index ≥ 30, and usage of CPB. Goodness of fit χ^2 (Hosmer and Lemeshow) = 5.38; df = 8; $p = 0.72$.

Table 4. Readmission within 3 months after discharge: distribution of main reasons by age.

	Percent, by age			
Parameter	64 ($n = 469$)	65–74 ($n = 392$)	75+ ($n = 145$)	*p*
Readmission	18.6	27.8	34.5	< 0.001
Primary reason for readmission (proportion of readmissions %) $n = 87$	$n = 109$	$n = 50$		
Cardiac related	35.6	43.2	52.0	
Wound problem	6.9	5.5	4.0	
Infection (nonsurgical)	16.1	11.9	6.0	
Miscellaneous	41.2	39.4	38.0	

Three months of follow-up data were available for 1006 (92.04%) of the 1093 discharged patients.

ticularly recent myocardial infarction, unstable angina, left main stenosis, history of stroke, and female sex; they also were more likely to require emergency surgery. The differences between the age groups may reflect the fact that older patients, if not acutely ill, are treated more often conservatively. These adverse baseline clinical characteristics clearly influenced the 30-day mortality, which was significantly higher with advanced age. The 30-day mortality (1.6%, 5.4%, and 6.9% among those aged less than 65 years, between 65 and 74 years, and 75 years or more, respectively) was nevertheless within the ranges previously reported for the elderly [7, 12–16]. Tu and associates found that the relative mortality risk in the short term after CABG increases to 2.1 for patients between 65 and 74 years of age and to 3.8 for those older than 75 years [17]. According to our study, an age of at least 65 years and especially 75 years or more is an independent risk factor for 30-day mortality. This reflects a lack of functional reserves, increased fragility of the organ systems, and an increased presence of co-morbidities, all of which are responsible for the higher mortality rate in the elderly.

The definition of "elderly" in the literature has gradually increased from 65 years or older to 80 years or older. In our study, we set the age of 75 years as the lower cutoff point for the oldest age group because only 3% of the patients were 80 or more years old. According to Kurki and Kataja [18] and Higgins and associates [19], age older than 70 years is an important preoperative predictive factor for increased morbidity after CABG. In a study by Parsonnet and associates, age older than 80 years was a good predictor of morbidity [20].

Also in our study, elderly patients had a higher incidence of postoperative complications than did the younger patients. The occurrence of a major complication or death was more than twice as high among patients aged 75 years or more as among those aged less than 65 years (25% vs. 11%). When all the adverse outcome events were taken into account, atrial fibrillation was the most common postoperative complication in all age groups, and it was significantly more common in the elderly. In a multivariate analysis, advanced age proved to be an independently significant risk factor for atrial fibrillation. As stated in the earlier literature [7, 21], postoperative atrial fibrillation prolongs hospitalization. This was also evident by 2 days in our data. Peterson and associates [13] analyzed the Medicare database and found that patients 80 years and older were hospitalized significantly longer than those aged 70 or younger (21.4 vs. 14.3 days). In our data, the oldest age group was treated for 7.7 more days in hospital when compared to the youngest group.

The prevalence of hospital readmissions during the early postdischarge period after cardiac operations has not been extensively studied. However, rehospitalization rates after surgical procedures can be used as an indicator of quality of care, and they also have financial implications. As a practical matter, readmissions are difficult to track, as most take place in other hospitals. Stanton and associates reported a 24% prevalence of readmission within 6 months after CABG [22]. More recent small single-institution studies have demonstrated the prevalence of early readmission to be 8% to 21% [23–25]. D'Agostino and associates found a 13.5%

Table 5. Predictors of readmission within 3 months after discharge: logistic regression analysis.

	Univariate analysis				Multivariate analysis[a]		
Parameter	No.	OR	95% CI	*p*	OR	95% CI	*p*
Preoperative characteristics							
Age							
≤ 64	469	ref.			ref.		
65–74	392	1.69	1.23–2.33	0.001	1.43	1.01–2.02	0.044
≥ 75	145	2.31	1.53–3.50	< 0.001	1.60	0.97–2.65	0.064
Timing of operation							
Elective	635	ref.			ref.		
Urgent	343	1.55	1.15–2.09	0.004	1.12	0.78–1.61	0.542
Emergency	28	1.47	0.63–3.40	0.373	1.10	0.44–2.75	0.841
Ejection fraction							
≥ 50%	765	ref.			ref.		
30–49%	199	1.55	1.10–2.19	0.013	1.32	0.92–1.89	0.130
< 30%–	14	0.96	0.26–3.47	0.950	0.84	0.22–3.15	0.791
Euroscore							
-5	776	ref.			ref.		
≥ 6	230	2.01	1.46–2.77	< 0.001	1.53	0.97–2.41	0.068
Recent AMI (within 90 days)	203	1.48	1.05–2.08	0.024	1.08	0.71–1.63	0.723
Peri/postoperative events							
Low-output syndrome[b]	28	3.22	1.51–6.84	0.002	1.74	0.71–4.26	0.230
ICU stay ≥ 3 days	152	1.92	1.33–2.78	< 0.001	1.43	0.84–2.43	0.184
> 50% Rise in creatinine conc.	66	2.03	1.17–3.51	0.012	1.28	0.69–2.37	0.431
Stroke	14	4.22	1.45–12.30	0.008	2.01	0.43–9.44	0.383
New-onset FA	370	1.74	1.30–2.33	< 0.001	1.84	1.15–2.93	0.010
Hospital stay > 21 postop. days	109	2.23	1.47–3.37	< 0.001	1.61	0.89–2.90	0.114

OR: odds ratio; CI: confidence interval; ICU: intensive care unit; postop.: postoperative; conc.: concentration; FA

Three months of follow-up data were available for 1006 (92.04%) of the 1093 discharged patients.

[a]After eliminating variables with $p > 0.05$ in the univariate analysis: sex, redo operation, diabetes, BMI ≥ 30, perfusion versus off-pump procedure, four or more bypasses done, aortic cross-clamp time > 100 min, cardiopulmonary bypass (CPB) time > 120 min, red blood cell transfusions in ICU, ventilation time > 36 hours, resternotomy for bleeding, perioperative MI, and discharge to the secondary referral hospital before fifth postoperative day. Goodness of fit χ^2 (Hosmer and Lemeshow) = 7.40; df = 8; $p = 0.49$.

[b]Prolonged need for inotropics or IABP during the postoperative ICU stay.

prevalence of readmission within 1 month [26]. Our finding of a 24.5% rate of readmissions to all of the hospitals in our area within 3 months is slightly higher than is reported from other countries. Readmissions among the patients aged 75 years or more were almost twice as common as in those aged under 65 years. Moreover, advanced age was revealed in the multivariate analysis to be an independent predictor of readmission. In accord with the findings of Ferraris and associates, cardiac-related reasons for readmission were prominent in our study [27]. Atrial fibrillation was the most common single readmitting diagnosis; it was responsible for every sixth rehospitalization.

It should be emphasized that long-term survival and functional improvement can be achieved in the elderly patient despite severe cardiovascular disease and even when an urgent indication for surgery exists [5]. The present study clearly demonstrated an NYHA functional class improvement with patients in all age groups during the first 3 postoperative months. Study of long-term survival and quality of life was beyond the scope of this analysis, but we shall further investigate these issues at a later date.

Conclusions

Patients aged more than 75 who are often candidates for CABG surgery presented with more co-morbidities; they often have severe coronary heart disease and are in poor clinical condition. Our patients had higher 30-day mortality, postoperative morbidity, increased length of stay, and greater risk of readmission during the 3-month convalescence period than did the younger patients. Our results indicate that CABG in an elderly patient carries a 1.6-fold risk of some major complication compared to younger patients, but it may still be the best option, as recovery without any major complication is likely at a 75% level even in these older patients, and they often return home.

Résumé. Cette étude clinique prospective a été réalisée pour déterminer l'effet de l'âge sur la mortalité, la morbidité et le taux de réadmissions après by-pass coronarien artériel (BCA). Les données concernant 1131 patients consécutifs ont été recueillies à partir d'un centre hospitalier chirurgical et de 18 hôpitaux secondaires trois mois après la sortie du patient opéré d'un BCA. L'analyse a été réalisée selon trois groupes d'âge: 64 ans ou moins (510 patients), 65 à 74 ans (448 patients) et 75 ans ou plus (173 patients). La mortalité à 30 jours a été, respectivement, de 1.6% de 5.4% et de 6.9% pour les trois groupes. Des complications majeures ont été enregistrées, respectivement, chez 10.8%, 21.2% et 24.9% de ces patients. Il y avait deux fois plus de réadmissions chez les patients les plus âgés par rapport aux plus jeunes (34.5% versus 18.6%). Les raisons pour la réadmission ont été la fibrillation auriculaire (15.4%), la douleur thoracique (10.6%) et l'insuffisance cardiaque congestive (8.5%). En conclusion, les patients les plus âgés, souvent des mauvais candidats au BCA ont une mortalité à 30 jours et une morbidité plus élevées et une durée de séjour plus longue ainsi qu'un risque augmenté de réadmission dans les trois mois après BCA; l'âge était un facteur indépendant de mortalité à 30 jours et de réadmission après la sortie du patient. Malgré un risque plus élevé d'effets secondaires non désirables, trois patients âgés sur quatre ont finalement eu une évolution sans complication.

Resumen. El presente estudio clínico prospectivo tuvo como propósito investigar el efecto de la edad sobre las tasas de mortalidad, morbilidad y readmisión en pacientes sometidos a "bypass" coronario con injerto (BCI). Se recolectó la información de 1131 pacientes consecutivos con BCI en un mismo centro quirúrgico y en 18 hospitales de referencia secundaria hasta

tres meses luego del egreso. El análisis se basó en tres grupos de edad: 64 años o menos (510 pacientes), 65 a 74 años (448 pacientes) y 75 años o más (173 pacientes). Las tasas de mortalidad a 30 días fueron 1.6% para el grupo más joven, 5.4% para el de edad media y 6.9% para el de edad más avanzada. Se registraron complicaciones mayores en 10.8%, 21.2%, y 24.9%, respectivamente. La edad más avanzada apareció asociada con más readmisiones: los pacientes más ancianos mostraron una tasa dos veces mayor que la de los más jóvenes (34.5% versus 18.6%); las razones principales para readmisión fueron la fibrilación auricular (15.4%), el dolor torácico (10.6%) y la falla cardíaca congestiva (8.5%). En conclusión, los pacientes de edad avanzada, que son frecuentemente candidatos subóptimos para BCI, presentan mayor mortalidad a 30 días, mayor morbilidad, más prolongada hospitalización y una mayor probabilidad de readmisión en los primeros tres meses luego de BCI; la edad apareció como un predictor independiente tanto de mortalidad a 30 días como de readmisión. A pesar del mayor riesgo de eventos adversos luego de la cirugía, tres de cada cuatro pacientes ancianos se recuperan sin inconveniente.

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