Determinants of Outcome After Isolated Coronary Artery Bypass Grafting in Patients Aged ≤50 Years (from the Coronary aRtery diseAse in younG adultS Study)

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This study was planned to identify the determinants of outcome after coronary artery bypass (CABG) in young patients. Data on 592 patients aged ≤50 years who underwent CABG from 9 European institutions were collected retrospectively. Twenty-eight percent of patients received at least 2 arterial grafts. Clopidogrel was used at discharge in 16.2% and statins in 67.2% of patients. Freedom from major adverse cardiac and cerebrovascular events at 1, 3, and 5 years was 93.8%, 90.1%, and 85.0%; survival rate was 98.3%, 96.3%, and 94.9%; freedom from myocardial infarction was 96.3%, 95.1%, and 92.5%; and freedom from repeat revascularization was 96.3%, 95.1%, and 92.5%, respectively. Neither types of grafts nor medication at discharge had any impact on the late outcome. Age <40 years (relative risk [RR] 2.19, 95% confidence interval [CI] 1.17 to 4.11), diabetes (RR 1.71, 95% CI 1.02 to 2.88), estimated glomerular filtration rate <60 ml/min/1.73 m^2 (RR 2.44, 95% CI 1.26 to 4.72), non−ST-elevation myocardial infarction/ST-elevation myocardial infarction (RR 2.12, 95% CI 1.27 to 3.55), emergency procedure (RR 2.34, 95% CI 1.13 to 4.88), and left ventricular ejection fraction <30% (RR 3.18, 95% CI 1.41 to 7.16) were independent predictors of major adverse cardiac and cerebrovascular events. Patients with left ventricular ejection fraction <30% had a particularly poor survival rate (at 5 years 67.7% vs 96.1%; adjusted analysis RR 14.01, 95% CI 5.16 to 38.03). Poor left ventricular function, myocardial infarction, diabetes, renal failure, and age <40 years are major determinants of late outcome after CABG in young patients. In conclusion, data from this real-world registry indicate that multiple arterial grafts and statin treatment are largely underutilized in these patients. **(Am J Cardiol 2014;113:275−278)**

The prevalence and prognosis of coronary artery disease in young patients requiring coronary artery bypass grafting (CABG) are ill defined. In a large multicenter study, D'Errigo et al.[1] showed that the prevalence of patients aged <50 years among those undergoing CABG was 5% and varied significantly between institutions from 0% to 10%. The pooled immediate mortality in these young patients is 0.9%,[1] but data on their late outcome are scarce.[2−4] Herein we report on the late outcome of patients aged ≤50 years old who underwent CABG.

Methods

The CRAGS (Coronary aRterydiseAse in younG adultS) study is a retrospective study performed by collecting data from 15 European centers of cardiac surgery and cardiology. This study was registered at *ClinicalTrials.gov* (no. NCT01838746). Eligible study participants were patients aged 18 to 50 years who received a diagnosis of stable angina, unstable angina, silent ischemia, ST-elevation myocardial infarction (STEMI) or non-STEMI (NSTEMI) and underwent isolated CABG. Data on preoperative and procedural variables and on the immediate outcome were retrieved from patients' records. Late events were recorded by contacting patients, their relatives, and/or their general practitioner as well as by checking patients' record for any event of interest. In countries with centralized referral pathway, only patients residing in the referral area were

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Table 1
Clinical characteristics and operative details of 592 patients aged ≤50 years who underwent coronary artery bypass grafting

Baseline Characteristics	n (%) or Mean (SD)	MACCE RR, 95% CI	Mortality RR, 95% CI	Myocardial Infarction RR, 95% CI	Repeat Revascularization RR, 95% CI
Age (yrs)	45.9 ± 3.9				
Age <40 yrs	53 (9)	2.19, 1.17–4.11			
Female gender	74 (13)				
Family history of CAD	306 (53)				
Dyslipidemia	399 (68)				
Treatment for hypertension	338 (58)				
Smoking habit	370 (63)				
Diabetes	141 (24)	1.71, 1.02–2.88			
Extracardiac arteriopathy	63 (11)				
eGFR (ml/min/1.73 m^2)	95 ± 42				
eGFR <60 ml/min/1.73 m^2	40 (7)	2.44, 1.26–4.72	10.65, 4.24–26.74	4.91, 1.55–15.59	
Congestive heart failure	47 (8)				
History of TIA or stroke	10 (2)				
History of myocardial infarction	213 (36)				
Previous PCI	88 (15)				
Previous CABG	2 (1)				
NSTEMI/STEMI	189 (32)	2.12, 1.27–3.55	2.84, 1.123–6.56	6.63, 2.15–20.41	2.26, 1.17–4.35
Emergency	35 (6)	2.34, 1.13–4.88			
Left main stenosis	136 (23)				
Left ventricular ejection fraction*					
>50%	402 (69)				
30%–50%	162 (28)				
<30%	19 (3)	3.18, 1.41–7.16	14.01, 5.16–38.03		
No. diseased vessels	2.6 ± 0.6				
1-vessel disease	48 (8)				
2-vessel disease	152 (26)				
3-vessel disease	392 (66)				

Results of multivariate analysis are summarized for each main outcome end point. Nominal variables are reported as absolute number and percentage; continuous variables are reported as mean and SD.

CAD = coronary artery disease; eGFR = estimated glomerular filtration rate; TIA = transient ischemic attack.

* Data available on 583 patients.

included in the study, and data on their late outcome were retrieved from patients' records. The primary end point of this study was a composite of major adverse cardiac and cerebrovascular events (MACCE), including death from any cause, myocardial infarction, stroke, and repeat coronary revascularization during the follow-up. Secondary end points included the individual components of the primary end point: death from any cause, myocardial infarction, stroke, and repeat coronary revascularization. Furthermore, we evaluated need of de novo dialysis and reoperation for bleeding as secondary immediate adverse events.

Statistical analysis was performed using an SPSS software statistical software (version 20, IBM SPSS Inc., Chicago, Illinois). Continuous data are reported as mean and SD. Nominal variables are reported as counts and percentages. No attempt to replace missing values was made. The impact of baseline clinical characteristics and procedural data on the immediate and late postoperative outcome were evaluated by the use of Mann-Whitney and Cox proportional hazards tests for continuous variables and the Fisher's exact test and Kaplan-Meier method for categorical variables. Logistic regression was used for multivariate analysis of immediate postoperative events. The Kaplan-Meier and Cox methods were used to estimate survival and to evaluate the impact of baseline and operative variables on late outcome. A p value <0.05 was considered statistically significant.

Results

Between January 2002 and December 2012, 592 patients aged ≤50 years underwent CABG in 9 European centers of cardiac surgery. Their clinical and operative characteristics are summarized in Tables 1 and 2. Thirty-day postoperative mortality in this series was 1.4%, stroke was 0.7%, de novo dialysis was 1.2%, and re-exploration was for bleeding 5.7%. Repeat revascularization was required in 7 patients (1.2%) within 30 days after surgery. Logistic regression showed that estimated glomerular filtration rate <60 ml/min/1.73 m^2 (p = 0.005, odds ratio [OR] 11.59, 95% confidence interval [CI] 1.39 to 63.18), left ventricular ejection fraction <30% (p = 0.022, OR 10.06, 95% CI 1.39 to 72.85) and STEMI (p = 0.008, OR 8.86, 95% CI 1.75 to 45.01) were independent predictors of 30-day mortality.

The mean follow-up of this study was 3.8 ± 3.0 years. Survival rate at 1, 3, and 5 years was 98.3%, 96.3%, and 94.9%; freedom from MACCE was 93.8%, 90.1%, and 85.0%; freedom from myocardial infarction was 98.9%,