

Retrospective Review of Coronary Artery Bypass Graft surgery at The Karen Hospital, Kenya

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Received: April 20, 2018; Published: May 28, 2018

Abstract

Background: There is an increasing incidence of coronary artery disease in Kenya. We are witnessing an epidemiological shift from communicable diseases to non-communicable diseases.

Methods: A retrospective review of patients presenting to The Karen Hospital, a tertiary cardiac center in Kenya, who underwent Coronary Artery Bypass Graft surgery (CABG). The in-hospital mortality, comparison of outcomes with Euro SCORE, morbidity related to renal failure, stroke, and prolonged ventilation, were reviewed.

Results: 19 patients underwent surgery during the period of eleven months. There were 16 male and 3 female patients with an average age of 62.6 years. The average number of risk factors was 4 with the most frequent being hypertension. Average predicted mortality with Euro SCORE (European System for Cardiac Operative Risk Evaluation) II was 6.5% with two mortalities. Three patients required hemodialysis. There were no strokes and no wound infections. No patients required prolonged ventilation.

Conclusion: There is greater need for good local data to inform on prevalence and available management strategies for coronary artery disease in Kenya, in particular regarding CABG.

Keywords: Coronary Artery Bypass Graft; Africa; Coronary Artery Disease; CABG; CAD

Background

In sub-Saharan Africa there is an increasing incidence of ischemic heart disease which requires the development of facilities and expertise for Coronary Artery Bypass Surgery [1]. Atherosclerotic cardiovascular diseases are becoming more common among patients with heart failure (HF) in Sub Saharan Africa [2,3].

Ischemic heart disease (IHD) and atherosclerosis have historically accounted for < 2% of the burden of HF in sub-Saharan Africa (SSA) [4].

Ischemic heart failure is more common in Kenya than previously recognized with a possible prevalence of 17.8% [5]. Ischemic heart disease is currently ranked eighth among the leading causes of deaths in sub-Saharan Africa [6]. It was estimated that age-standardized mortality rates for IHD would rise by 27% in African men and 25% in women by 2015, and by 70 and 74%, respectively by 2030 [7].

Nguchu, *et al.* in 2009 illustrated that acute coronary syndromes accounted for 35% of the morbidity in type 2 diabetics with ischemic ECG's presenting to an accident and emergency department in Kenya [8]. More specific data on CABG comes from Harun, *et al.* who reviewed 111 patients admitted with Acute Coronary Syndromes between April 2008 and May 2010. Twenty per cent (six) of the patients who had coronary angiography in the STEMI subgroup had multi-vessel disease and over half (56%) the patients in the NSTEMI/Unstable Angina subgroup had angiographically double- or triple-vessel disease. Of the NSTEMI/ Unstable Angina subgroup, 29% [14] were deemed appropriate, and referred for surgical revascularization [9].

Ademoya, *et al.* showed a similar rate of referral in Nigeria, 28 patients (36.4%) had lesions too complex for PCI and had to be referred abroad for CABG [10]. Kimeu and Kariuki in their retrospective study of 64 patients presenting with ACS between 2007 and 2009, showed that 19.1% had a coronary artery bypass graft [11]. There is no specific information in the sub-Saharan African literature about Off-Pump Coronary Artery Bypass Surgery (OPCAB) and there is limited information about CABG in general [1].

Methods

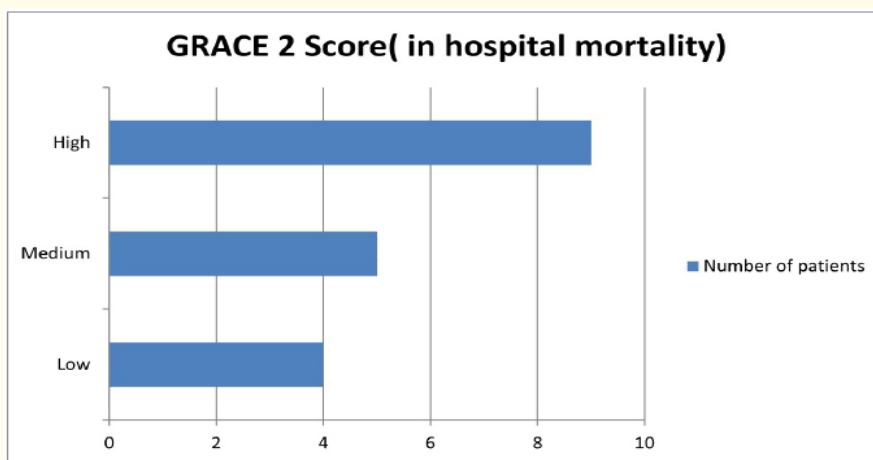
This is a retrospective review between May 2017 and February 2018 of 241 patients who underwent coronary angiography at The Karen Hospital in Kenya. Of these, 46 had a percutaneous coronary intervention, 21 were referred for surgery and 19 underwent coronary artery bypass grafting. Demographic data, presentation, risk factors, ejection fraction on echocardiogram were collected.

The GRACE (Global Registry of Acute Coronary Syndromes) [12], Euro SCORE [13] and Syntax score [15], were calculated. Patients were accepted for surgery by the Heart Team if their Syntax score recommended CABG or PCI and the patient was agreeable to the procedure. The Euro SCORE was used to compare outcomes versus predicted risk. The surgeon decided on a case to case basis regarding on-pump versus off-pump surgery.

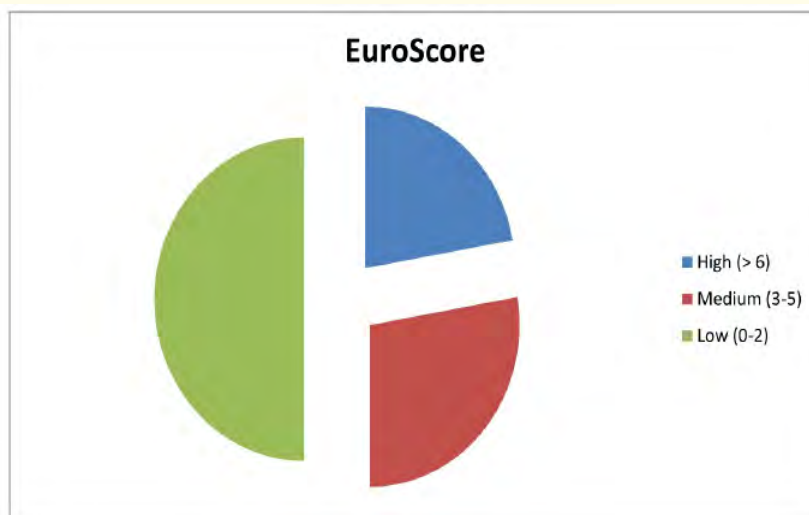
Consent from the hospital ethics committee was granted. Patient files were reviewed at 30 days post-surgery. Primary end points were of repeat myocardial infarction and mortality. Secondary endpoints were prolonged ventilation, morbidity related to acute renal failure and hospital readmission.

Results

19 patients underwent surgery over eleven months. There were 16 male and 3 female patients with an average age of 62.6 years. The average number of risk factors was 4 with the most frequent being hypertension, present on 16 patients. 9 patients had Diabetes, 6 smoked cigarettes and 2 had elevated lipids. 9 patients had unstable angina and 10 NSTEMI. Average predicted mortality with Euro SCORE II was 6.5% with two in-hospital mortalities. The average number of grafts was 2. The calculated in-hospital mortality for the two mortalities was GRACE (20, 0.6) and Euro SCORE (29.5, 1.02). Secondary endpoint of patients requiring hemodialysis occurred in three patients. There were no strokes and no wound infections. No patients required prolonged ventilation.



Graph 1: Comparison of GRACE scores of patients undergoing CABG.



Graph 2: Comparison of Euro SCORE (predicted mortality rate after CABG).

Age	Gender	Presentation	Left Ventricular Ejection fraction %	GRACE 2 score (in hospital mortality) %	Euro SCORE %	Syntax Score II (PCI) mortality %	Syntax Score II (CABG) mortality %	Syntax Recommendation
51	M	UA	> 50	2.8	4.84	18.1	20.1	CABG or PCI
70	M	NSTEMI	> 50	4.2	1.23	30.6	30.9	CABG or PCI
69	M	UA	30 - 50	20	29.5	55.8	38.6	CABG
76	M	UA	> 50	3.8	1.6	37.5	40.3	CABG or PCI
56	M	NSTEMI	< 30	17	26.1	57.5	40.2	CABG
68	F	UA	> 50	1.3	1.17	38	24	CABG
63	M	UA	> 50	0.6	1.02	24.7	29.3	CABG or PCI
79	M	NSTEMI	> 50	3.9	4.33	37.2	40.3	CABG or PCI
58	M	UA	> 50	0.8	1.05	22.7	19.6	CABG or PCI
59	M	UA	30 - 50	1.5	1.19	34.3	28.5	CABG or PCI
48	M	NSTEMI	30 - 50	1.3	1.45	29.5	17	CABG or PCI
49	F	NSTEMI	30 - 50	0.8	5.19	58.1	31.5	CABG
83	M	UA	30 - 50	6.2	3.36	42	43.1	CABG or PCI
60	M	UA	> 50	0.8	0.65	22.6	20.5	CABG or PCI
56	F	NSTEMI	63	3.7	3.5	29.4	13	CABG
64	M	NSTEMI	32	17	21.84	35.5	33.5	CABG or PCI
61	M	NSTEMI	56.5	3.3	7.54	35.3	28.6	CABG or PCI
57	M	NSTEMI	34	1.2	1.58	16.3	4.9	CABG

Table 1: Characteristics of patients.

Coronary Angiograms	241
Percutaneous Coronary Intervention	46
Angiograms with triple vessel disease or Left main disease	21
Referred for surgery	21
CABG	19

Table 2: Number of coronary angiograms and patients referred for PCI or CABG.

Discussion

There were two mortalities. The probability of one of the patients compared to their GRACE and Euro SCORE was unexpected. He had a low (< 1%) probability of in-hospital mortality. The second patient had a high (> 3%) probability. The predicted Euro SCORE and Grace Score of the first mortality was (0.6, 1.02) and for the second mortality (29.5, 20). The first patient had a previous PCI to the right coronary artery in 2014, the stent was still patent however the disease had progressed. He developed severe upper gastrointestinal bleeding on post-operative day seven and had cardiac arrest. The second patient had a previous PCI to LAD in 2008, with in-stent restenosis, Killip score of 4, and required hemodialysis prior to his operation. He had a myocardial infarction on day 30. Mortality post CABG is between 2 - 3% [24]. The mortality rate in our study is 11%, but this is expected to reduce as the number of operations increases and the case mix reflects a greater number of low and moderate risk patients. The number of high risk patients were 30% in relation to the Euro SCORE.

3 patients required hemodialysis during their hospital stay. Patients on dialysis sustain high in-hospital and 2-year mortality rates after coronary artery bypass surgery. Off-pump coronary artery bypass is associated with modestly increased survival compared with on-pump coronary artery bypass, a benefit most marked early after off-pump coronary artery bypass [22]. 3 patients had off pump CABG. There are two recent major trials comparing on pump and off pump cardiac surgery with 5 year follow up results. Data from the ROOBY trial showed at 1 year of follow-up, patients in the off-pump group had worse composite outcomes and poorer graft patency than did patients in the on-pump group [16]. Furthermore their 5 year data concluded, off-pump CABG led to lower rates of 5-year survival and event-free survival than on-pump CABG [17]. The ROOBY trials concluded that on pump surgery was superior in terms of mortality, number of grafts achieved and patency of grafts [16,17].

However, competing data from the CORONARY trial illustrate, the rate of the composite outcome of death, stroke, myocardial infarction, renal failure, or repeat revascularization at 5 years of follow-up was similar among patients who underwent off-pump CABG and those who underwent on-pump CABG [19]. In patients 75 years of age or older, there was no significant difference between on-pump and off-pump CABG [20]. According to the results, from a cohort study in 2016 the outcomes were similar between off-pump and on-pump CABG in patients who underwent primary isolated non-emergent CABG during the 6-year follow-up phase [21]. A metaanalysis of all the trials showed a statistical advantage for on-pump surgery, but it was not clear weather this translated to a clinical advantage [22].

Conclusion

We conclude that off-pump Coronary Artery Bypass Grafting surgery may provide a clinically equivalent and economical treatment option for the hospitals. Beating heart on-pump coronary artery bypass grafting (BH-ONCAB) is a safe and comparable alternative to conventional on-pump coronary artery bypass grafting (C-ONCAB) in terms of early mortality and late survival. Furthermore, BH-ONCAB may confer a particular advantage in preventing peri-operative myocardial infarction and reducing overall blood loss. We also conclude that there is greater need for good local data to inform on prevalence and available management strategies for coronary artery disease in Kenya, regarding CABG.

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Volume 5 Issue 6 June 2018

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