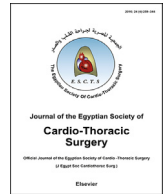


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# Short term outcome of coronary artery bypass graft surgery: Evaluation of recently established cardiac center

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## ABSTRACT

**Background:** Overall, coronary artery bypass graft (CABG) surgery achieves excellent outcomes regarding anginal relief and resumption of normal activities. In general, completeness and stability of revascularization are superior with surgical revascularization versus percutaneous interventions.

This study aimed at assessment of the early postoperative outcome of the first 100 CABG cases grafted in the cardiothoracic surgery department, Qena university hospital, Qena, Egypt.

**Results:** This study was conducted on 100 patients with coronary artery disease. Only 5 patients had single vessel disease and 95 patients had multi-vessel disease, two or more. No one had left main disease. There was a great prevalence of diabetes mellitus (55%), hypertension (69%), dyslipidaemia (55%) and smoking (58%). Operatively, we used left internal mammary artery to left anterior descending coronary artery anastomosis in the majority of cases. In only two cases, right internal mammary artery was used, and great saphenous vein graft was used in anastomosis of remaining diseased vessels. Most cases underwent elective CABG. An intra-aortic balloon pump was used only in 2% of cases. Septicaemia was a significant complication. After 6 months, 97% of the patients were alive.

**Conclusions:** Institutional results are essential to enable surgeons and interventionists to decide if international data is keeping with local findings or not. However, the likenesses between international data and our results confer confidence in our findings.

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## 1. Introduction

Coronary artery disease (CAD) represents the commonest cause of myocardial hypoxia. Understanding the pathophysiology of arterial disease with subintimal atheroma and plaque formation has been a breakthrough of modern medicine. The

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outcome of coronary artery bypass graft surgery (CABG) carries an overall mortality of about 3%; elective primary coronary bypass causes a mortality rate of approximately 1.7%.

CABG Complications include renal failure, neurologic injury, heart failure, haemorrhage, respiratory failure, and renal dysfunction. Overall, CABG achieves excellent outcomes regarding anginal relief and resumption of normal activities. In general, completeness and stability of revascularization are superior with surgical revascularization versus percutaneous interventions [1].

The aim of this work was to assess early post-operative outcome of the first 100 CABG cases grafted in the cardiothoracic surgery department, Qena university hospital, Egypt.

## 2. Patients and Methods

This study was conducted in Qena University Hospital, Qena, Egypt on 100 patients who did CABG from July 2012 to Aug 2015. This observational retrospective study was conducted after a written consent was signed by the participants. Patients were identified by their medical record numbers. Data were collected from patient's files and computer records, and from follow up echo at outpatient clinic. Patients with left main coronary artery occlusion, redo surgery, patients' needs valve replacement surgery with CABG were excluded from this study. We had divided data into patient's demographic and pre-operative data including comorbidities; intraoperative data and complications; and postoperative data at ICU as recent myocardial infarction (MI). Follow up data at outpatient clinic one month and six months after operation were collected. Patient evaluation included mortality, recurrence of chest pain, need for revascularization and follow up echo provided us information about cardiac function, wall motion abnormalities and cardiac chamber dimensions.

All patients fulfilled the following:

### **Preoperative:**

- Demographic data (age, sex, race and BMI).
- Detailed medical history.
- Complete general and local cardiac examination.
- 12 leads ECG & plain chest X ray.
- Complete preoperative laboratory investigations (complete blood picture, coagulation profile, complete liver and kidney function tests, cardiac enzymes, arterial blood gases analysis, and lipid profile).
- Echocardiographic assessment including EF, LVEDD, LVESD and wall motion abnormalities.
- Coronary angiography.

### **Intraoperative:**

- Traditional CABG was performed through median sternotomy incision with use of cardiopulmonary bypass (CPB).
- Myocardial preservation was provided by warm cardioplegia.
- The procedure involved bypassing the coronary blockages with conduits.
- The left internal mammary artery (LIMA) was usually used as a pedicled graft to the left anterior (LAD) coronary artery. Right internal mammary artery (RIMA) was used and in two cases. Saphenous vein grafts were used for the other anastomoses.
- The aortic cross clamp (ACC) & total CPB time.
- The inotropic support and vasodilators needed for each patient.
- Intraoperative complications.

### **Postoperative:**

- All the patients were admitted to ICU. Clinical decisions on patient management in the ICU and the ward were based on our local protocols and guidelines; including decisions on extubation, blood transfusion, the start of the anticoagulation regimen, and discharge plan.
- 12 leads ECG and plain chest X ray.
- Pre-discharge complete clinical examination was done to all participants.
- Follow up echocardiography EF, LVEDD and LVESD done every 6 months
- Assessment of morbidity & mortality.

Early mortality refers to patients who died during operation, during hospital stay or within one month after operation. Follow-up lasted for 6 months.

The data had been compiled and checked on PC then analyzed using SPSS V24.0 software.

Mean and standard deviation were computed and test of significance (student *t*-test) was used to evaluate quantitative variables, and chi-square test for qualitative variables. All of these tests were used to find any significant relations between patient demographic and clinical characteristics and adverse postoperative outcomes. A *p*-value <0.05 was considered as statistically significant. The odds ratios and corresponding 95% confidence intervals were computed.

### 3. Results

This study was conducted on 100 patients with CAD. Only 5 patients had single vessel disease and 95 patients had multivessel disease; two or more. No one had left main disease due to lack of resources to operate urgent cases in our recent center. There was a great prevalence of diabetes mellitus (DM) (55%), hypertension (69%), dyslipidaemia (55%) and smoking (58%) (Table 1). Operative details showed that most of the patients had 3 or more vessels, and we used LIMA to LAD anastomosis in most of cases. Only two cases of RIMA were used due to failure of LIMA harvesting. Great saphenous vein graft used in anastomosis of remaining diseased vessels. Obviously, all cases underwent elective CABG. The intraoperative complications were listed in Table 2. Intra operative bleeding was a significant complication 7%. Intra-aortic balloon pump (IABP) used only in 3% of cases; 1 case due to failure of CPB weaning and two cases due to low cardiac output. The immediate postoperative complications were mentioned in Tables 3 and 4. Prolonged ventilation was a series problem; 10% of cases were ventilated more than 24 h. Those patients had multiple risk factors including; smoking and prolonged total bypass time. Postoperative outcome was precised in Table 5. 89% of patients had no anginal pain postoperatively. Three patients needed rehospitalization. Concerning sternal rewiring, chronic cough and diabetes were risk factors. Two patients suffered from post-operative depression and two patients from heart failure. One month follow up showed that 98% of the patients were alive. After 6 months, 97% of the patients were alive.

**Table 1**  
Demographic data.

Variable	(n = 100)
Male	75 (71%)
Female	24 (24%)
Mean age (years)	55.82 ± 9.5
Mean BMI (kg m <sup>2</sup> )	28.2 ± 4.4
Diabetes	55 (55%)
Hypertension	69 (69%)
Diabetes & hypertension	44 (44%)
Dyslipidaemia	55 (55%)
History of smoking	58 (58%)
Chronic lung disease	6 (6%)
Myocardial infarction	30 (30%)
Family history of CAD	10 (10%)
Congestive heart failure	6 (6%)
Cardiogenic shock	3 (3%)

**Table 2**  
Intraoperative complications.

Complication	No. of patients
Bleeding	7(7%)
Graft failure	2(2%)
Cardiac arrest	2(2%)
V tach	5(5%)
DIC	1(1%)

**Table 3**  
In-hospital complications.

Complication	No. of patients
All complications	24(24%)
Prolonged ventilation > 24 h	10(10%)
Septicaemia	0(0%)
Cardiac arrest	1(1%)
New requirement of dialysis	1(1%)
Pleural effusion	3(3%)
Pulmonary oedema	1(1%)
Atrial fibrillation	6(6%)
Stroke	2(2%)

**Table 4**  
Postoperative details.

Variable		No. of patients
No. of vessels affected	One	5(5%)
	Two	18(18%)
	Three or more	77(71%)
Mean number of grafts		3 ± 1
Operative status	Elective	100(100%)
IABP used overall		3(3%)
• Failure of CPB weaning.		1(1%)
• Low cardiac output.		2(2%)

**Table 5**  
Postoperative outcomes.

Outcome		No. of patients
Overall mortality		3(3%)
30-day survival	Alive	98(98%)
	Dead	2(2%)
6 months follow-up	Alive	97(97%)
	Dead	3(3%)
Quality of life (Return to work)		45 ± 10 days
Systolic function (improvement in EF)		75(75%)
Rehospitalization		7(7%)
• Sternal Dehiscence needing rewiring		3(3%)
• Psychological problems		2(2%)
• Heart failure		2(2%)
Relief from angina and dyspnea		89(89%)
Psychological outcome		88(88%)
• Anxiety		10(10%)
• Depression		2(2%)

#### 4. Discussion

CAD is the main cause of mortality and morbidity all over the world. Because of the immense load of the disease, many modalities have been designed to change the disease progress and these modalities include medical interventional and surgical techniques. To make a consensus about timing and selection of the suitable modality, variable disease classification scores have been suggested. CAD was classified regarding angiographic findings as it is more simple and comparable. We aimed to establish the outcomes of CABG in Qena university hospital, Egypt and determine if the outcomes are going with outcomes in the developed world. A literature review of the type of revascularization technique needs to be conducted to detect the suitable mean for each specific situation [2].

The COURAGE trial, including 2287 patients with stable CAD, compared the outcomes of optimal medical therapy with or without PCI for stable coronary disease.

In the framework of clinical practice, the results of COURAGE concluded that optimization of medical therapy without PCI is sufficient for initial treatment of patients with stable CAD as well the addition of PCI to optimal treatment does not decrease mortality or cardiac outcome. In chronic stable angina, medical treatment with change in lifestyle should be tried before PCI is decided. The introduction of drug-eluting stents (DES) with the associated lower rates of restenosis has provided renewed hope for PCI [3,4].

The SYNTAX trail compared PCI versus CABG in patients with left main artery lesion or with three vessels lesion. This randomized clinical trial was conducted on 1800 classified into two groups: CABG group that included 897 patients and PCI group that included 903 patients. The SYNTAX trail concluded that CABG is associated with low major cardiac effect than PCI. 5 years follow up revealed that reintervention, death, and MI were all significantly higher with the PCI. So, CABG should remain standard treatment for patients with complex disease [3,4].

The SYNTAX trial revealed that mortality rate in the CABG group after one year was 3.5%. This is comparable to our results as we found an overall mortality of 3%. There was a hospital mortality 0 (0%) of our 2 patients who did an off-pump procedure.

Moreover, we found that 69% of patients were hypertensive. The link between hypertension and CAD is well established and several studies have worked on quantifying this risk. One study found out that combined hypertension and DM was an independent risk factor for a high SYNTAX score; 44% of our study participants had both of these comorbidities, and considering that the majority had the multi-vessel disease, our results supports that hypertension and DM increase the severity of CAD [5].

Relief of anginal pain is one of the most common indications of CABG. Many studies comparing medical treatment with surgical intervention have demonstrated that in patients with angina pectoris surgery results in relief of anginal pain and decreased need for anti-anginal treatment [6].

Another study found that 80% of CABG patients were anginal pain free up to 5 years [7].

Increased physical activity after CABG has been reported in many studies. One study found that 6 months after CABG, usual daily physical activity had increased and patients were able to carry out usual activities [8].

Anxiety is high among CABG patients because of many reasons; patients wait long time before surgery on waiting list with an unknown surgery date and fear of dying before [9]; anxiety itself can exacerbate CAD symptoms. After surgery anxiety may decrease to below pre-operative levels [10].

Depression is a major problem that increase risk for unplanned hospital readmission, cardiac events, anginal pain and decrease quality of life [11].

The ideal treatment option for patients with multivessel CAD is still uncertain despite innumerable randomized clinical trials performed in the last several decades. Several trials comparing CABG with PCI have stated parallel mortality rates with the 2 treatment techniques [12,13].

Furthermore, they reported a similar rate of MI [12–14], although a longer-term follow-up of one of these trials proposed a reduction in MI with CABG [15].

As surgical treatment has no advantage regarding mortality and MI and gives an increase in early strokes. PCI is often considered as the treatment of choice in patients that have complex CAD. Therefore, between 2001 and 2006, the number of PCIs performed every year for multi-vessel disease was augmented by 56%, and the total number of CABG surgeries was lessened by 24% and continued to decline at a rate of nearly 5% per year successively [14].

In spite of the great number of clinical trials comparing CABG with PCI for multi-vessel CAD, all those trials were under-powered to distinguish a dissimilarity in all-cause mortality, the most significant outcome of cardiovascular trials [4,13].

Likewise, these trials were also unable to spot alterations in MI, a chief cause of morbidity in these patients. CABG versus PCI in the existing era of increased use of arterial grafts and DESs, needs to be re-examined to assess the reasonable effects of these measures on long-term mortality and morbidity [13].

In patients with the multivessel CAD, CABG does not only reduce the rate of repeated revascularization and major adverse cardiac and cerebrovascular event (MACCE) but also results in a 27% decrease in long-term all-cause death and a 42% drop in MI compared with PCI. The profits were not only noticed in trials of diabetic patients but also in trials where most of the patients were nondiabetic. Usage of bare-metal or DES does not affect the mortality rate. Due to all these significant benefits, CABG should be the ideal revascularization method for most patients with multivessel CAD [16].

## 5. Conclusions

Institutional results are essential to enable surgeons and interventionists to conclude to what extent international data is going with local findings. The data were collected from one center.

The resemblances between international data and our results added confidence and strength to our findings. This study emphasized the high load of DM and hypertension and the higher prevalence of smoking in Egyptian population, giving them a higher SYNTAX score and greater risk of adverse outcomes.

It can be concluded that this study is relevant for populations who have characteristics similar to those in our study. Also, it is believed that in our population, extreme caution needs to be practiced to avoid the ad-hoc process by which diagnostic angiography is immediately followed by PCI.

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