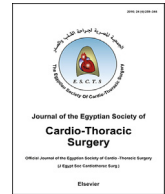


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# Prognosis of diabetic coronary artery bypass graft surgery patients

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## ABSTRACT

**Background:** Diabetes mellitus (DM) is considered as mortality and morbidity risk factor for coronary artery bypass graft surgery (CABG). Studies revealed that there are controversies concerning the results of a post coronary surgery diabetic patients. The aim of our study was the evaluation of the short-term outcomes in this group of patients.

**Methods:** This was a single-center retrospective study of 180 patients that were subjected to CABG between January 2014 and January 2016 in Zagazig University Hospital, Zagazig, Egypt. Sixty-one patients (34%) were diabetic (group I) and 119 patients (66%) were non-diabetic (group II). During follow-up period the hospital mortality, complications and major cardiovascular events were analyzed. All patients admitted with a diagnosis of diabetes had an HbA1c  $\geq$  6.5% or fasting blood glucose (FBG)  $\geq$  126 mg/dL (7.0 mmol/L).

**Results:** Operative mortality was 3% (n = 2) in the diabetic group and 1% (n = 1) in non-diabetic patients (p = 0.3). Euro score was predictably higher in diabetic patients (1.2 vs 0.84, p = 0.001). The study of the risk factors associated with hospital complications revealed that the absence of diabetes was a protective factor for hospital complications but statistically insignificant. The rate of major cardiovascular events at 2 years period of follow-up in diabetic and non-diabetic groups was (12/50) 24% and (16/93)17%, respectively (p = 0.43).

**Conclusions:** The improvement in management of DM patients leads to acceptable operative mortality post-CABG and decrease the incidence of complications and events in the short-term follow-up period.

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## 1. Introduction

Diabetes mellitus (DM) remains a factor in increasing patient's morbidity and mortality and it is a risk factor that doubles the incidence of coronary artery disease [1,2]. Surgical revascularization by coronary artery bypass graft surgery (CABG) is a key factor in the management of multi-diseased coronary arteries, where diabetics appear to benefit more from angioplasty percutaneous revascularization [3,4]. However, the postoperative results of coronary surgery in diabetic patients are classically less compared to non-diabetic patients [5,6]. Recent studies have suggested improved outcomes in diabetic patients

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and raised the question of the potential influence of diabetes on early postoperative outcomes [7,8]. Improved perioperative management and surgical techniques significantly improved clinical outcomes [9]. The objective of this work was to evaluate the short term results of coronary surgery in diabetic and non-diabetic patients.

## 2. Patients and methods

This was a single-center retrospective study of 180 patients that were subjected to CABG between January 2014 and January 2016 at our cardiothoracic surgery department, Zagazig University Hospital, Zagazig, Egypt. Sixty-one patients (34%) were diabetic (group I) and 119 patients (66%) were non-diabetic (group II). During follow-up period the hospital mortality, complications and major cardiovascular events were analyzed. All patients of group I were admitted with a diagnosis of DM (type 1 and type 2) with an HbA1c  $\geq$  6.5% or a fasting blood glucose (FBG)  $\geq$  126 mg/dL (7.0 mmol/L). All patients who underwent CABG were included in the study. We excluded patients with associated pathology such as valvular or ascending aortic surgery, repair of left ventricular aneurysm, and closure of ventricular septal defects.

### 2.1. Data collection and definition of variables

The protocol of this study was approved and accepted by our department and hospital scientific committee. The preoperative variables collected were age, sex, cardiovascular risk factors (hypertension, DM, tobacco, dyslipidemia, body mass index (BMI), menopause, and family heredity), previous myocardial infarction (MI), chronic preoperative renal insufficiency, history of coronary angioplasty, and extent of coronary artery disease, ventricular ejection fraction (EF), Euro SCORE II and peripheral vascular disease. Intraoperative variables included aortic clamping and extracorporeal circulation (CPB), number of grafts per patient. Postoperative variables included operative mortality and hospital complications: MI, low cardiac output syndrome, which included the use of positive inotropic drugs beyond the 10  $\mu$ g/kg/min dose and the use of an intra-aortic balloon pump (IABP), stroke, acute renal failure, respiratory complications, rhythmic, hemorrhagic and deep infections of the surgical site. Follow-up data were obtained either through consultation or with the attending cardiologist.

The searched components in the follow-up were cardiovascular mortality and major cardiovascular events: MI, development of heart failure, need for a new revascularization procedure and stroke. Undifferentiated diabetic patients with HbA1c  $\geq$  6.5% or glucose  $\geq$  7.0 mmol/l preoperative were also included. Preoperative chronic renal failure was defined as a creatinine clearance of less than 30 ml/min. Peripheral vascular involvement was defined as the presence of one or more of the following: lower limb arterial disease stage I or II of the Leriche and Fontaine classification, and a history of vascular surgery. Operative mortality was defined as any death occurring during the 30 days postoperatively or during the first hospitalization. Respiratory complications were defined by the presence of one or more of pneumonia, pulmonary atelectasis, and respiratory insufficiency (prolonged intubation > 72 h or reintubation or tracheotomy). Rhythmic complications were defined by the presence of a supraventricular or ventricular rhythm disorder. Acute renal failure was defined as a rise in the creatinine level (absolute  $\geq$  0.3 mg/dL, percentage  $\geq$  50%) or the need for dialysis sessions. The MI was defined by the appearance of a new Q wave within 48 h postoperatively. Hemorrhagic complications were defined by reoperation to control bleeding or to evacuate a hematoma within 36 h postoperatively. Deep-site surgical infections were defined as a surgical infection occurring within 30 days, extending beyond the deep tissue plane with at least one of the following criteria: bacteriological samples of positive infected tissues or organs, purulent discharged from the surgical site, abscess or other evidence of an infectious process by a Radiological examination or intraoperatively at the time of surgical resumption. We separated mediastinitis with retrosternal and mediastinal involvement and sternitis with osseous involvement without mediastinal involvement. Cerebral vascular disease was defined by a new focal or global deficit for at least 24 h. The overall hospital complication rate was calculated on the basis of the number of patients with at least one hospital complication.

### 2.2. Preoperative preparation of diabetic patients

Biguanides were discontinued 48 h prior to surgery, normal insulin was used when FBG was above 11.11 mmol/l, patient should be fast (>12 h) was recommended. Exclusion of any hypoglycemic treatment on the morning of the intervention, and sedative premedication was the rule because the surgical stress was source of imbalance of the diabetes.

In preoperative period, no blood glucose control and prescription of any perfusion of glucose or insulin. Postoperative administration of the regular insulin at the pump in IU/hour from the operating room and for the first 48 h whenever the blood glucose exceeds 11.11 mmol/l, then the relay was taken by the Oral hypoglycemic agents beyond the 48th hour.

### 2.3. Surgical procedure

The procedure was performed in all cases by vertical median sternotomy and extracorporeal circulation. The myocardial protection was achieved by moderate hypothermia with an antegrade blood cardioplegic solution. The left internal mammary artery (LIMA) was harvested as a pedicle graft, sometimes skeletonized and grafted, exclusively, on the left anterior descending coronary artery. The right internal mammary artery (RIMA) was removed as a pedicle graft or, in a minority of cases, free graft and grafted on the left or right coronary artery, depending on the case. The strategy of use of the two

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