

## Early Hospital Outcome of Using Both Internal Mammary Arteries in Cairo University Hospital

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### Abstract

**Background:** Long-Using both mammary arteries in coronary artery bypass surgery has a good term results, but it is not recommended in old patients due to its technical difficulty and increased incidence of sternal wound complications. Several studies declared that bilateral internal mammary arteries (BIMA) grafting has a great benefit in patients aged 50–60 years, but this benefit does not extend to patients aged > 60 years. This study was designed to analyze the early hospital results, and experience in preventing sternal wound complications for BIMA grafting in patients 50–60 years old.

**Objective:** To detect early outcome of using both internal mammary arteries in patients aged 50-60 years in Cairo University Hospital.

**Patients and Methods:** Clinical data and echocardiographic and coronary angiography data of 100 patients who underwent BIMA grafting for coronary artery disease between 2017 and 2019 were analyzed retrospectively to detect the early hospital results. 100 patients aged 50 to 60 years. The operation time, aortic clamp time, and cardiopulmonary bypass time were studied to analyze the operation difficulty. The flow and P.I were studied to analyze the coronary artery graft function. The left ventricular end-diastolic dimension (LVEDD) and left ventricular ejection fraction (LVEF) were studied to detect heart function.

**Results:** The operation time, aortic clamp time, and cardiopulmonary bypass time as well as the flow and pulsatility index were recorded. There was no incidence of sternal wound complications or graft occlusion. Furthermore, there was no significant difference in LVEF post-operation.

**Conclusions:** Using both mammary arteries in coronary artery bypass surgery is safe and effective for patients 50–60 years old similar to younger patients (< 50 years).

**Keywords:** Coronary artery disease, Internal mammary arteries, Cairo University Hospital.

### INTRODUCTION

Due to the increase in life expectancy, the proportion of coronary bypass surgery for elderly patients increases<sup>(1)</sup>. Due to the high rate of opening of the arterial ducts and its protective effect on the coronary course of patients<sup>(2)</sup>.

Several studies have shown that the use of both breast arteries in coronary artery bypass surgery is better than a single breast graft in protecting heart function and long-term follow-up after surgery<sup>(3, 4)</sup>. However, due to the increased operation time, technical difficulties, and increased incidence of complications of sternal wounds, the application of BIMA vaccination is not widely used<sup>(5)</sup>. The use of the BIMA vaccination is about 6% worldwide and is only recommended for younger patients<sup>(6)</sup>. **Mohammadi et al.**<sup>(7)</sup> reported that BIMA vaccination has great benefit in patients aged 50-59 years.

Thus, this study was designed to analyze the experience of the operation, the graft function during surgery, early hospital outcomes, and the experience in preventing sternal complications of the use of both mammary arteries in coronary artery bypass surgery in patients 50-60 years old.

Aim of the present work was to detect early outcome of using both internal mammary arteries in patients aged 50-60 years in Cairo University Hospital.

### PATIENT AND METHODS

From January 2017 to January 2019, 100 patients with coronary artery disease underwent BIMA grafting in our hospital.

**Inclusion criteria:** patients with multi vessel disease.

**Exclusion criteria:** 1) emergency surgery or patients with other critical diseases requiring concurrent surgery; 2) patients with severe cardiac failure or multiple organ dysfunction before surgery.

### Ethical and patients' approval:

**An approval of the study was obtained from Cairo University academic and ethical committee.** Every patient signed an informed written consent for acceptance of the operation.

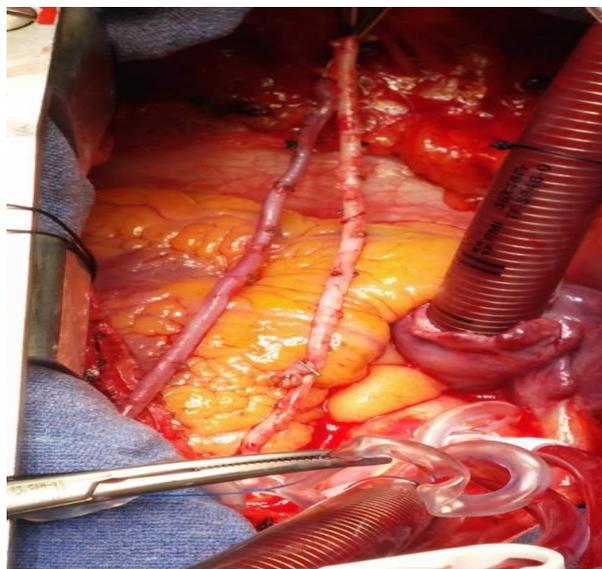
### Operative methods

The surgeries were performed via median sternotomy. The BIMA and great saphenous vein were harvested. In 100 patients the internal mammary artery (IMA) was harvested using skeletonization technique (Fig. 1). After the IMA was harvested, heparin was given, and the distal end was cut off. Then, it was wrapped in warm wet gauze for preservation. All of the surgeries were performed using heart lung machine and warm antegrade cardioplegia. The distal and proximal end were anastomosed before unclamping of the aorta. The common grafting methods were as follows: the left

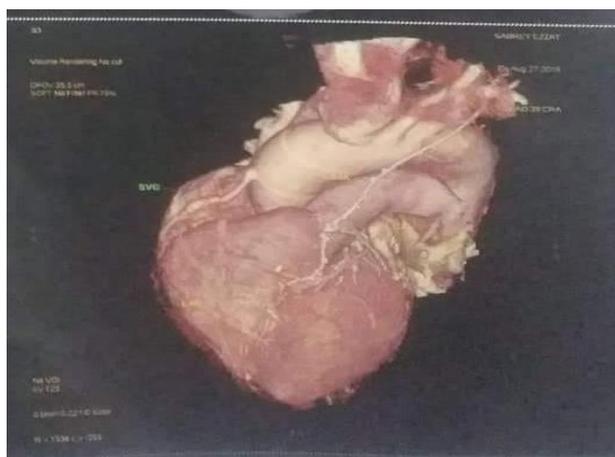


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internal mammary artery (LIMA) was anastomosed to the left anterior descending artery (LAD), the right internal mammary artery (RIMA) was anastomosed to the diagonal branch artery and obtuse marginal branch (OM) and the great saphenous vein was anastomosed to the right coronary or its branches. All LIMAs were in situ grafts, while all RIMAs were free grafts (fig. 2).



**Figure (1):** Skeletonized both internal mummies.



**Figure (2):** RIMA was free graft, and it was anastomosed to OM. RIMA, right internal mammary artery; OM, obtuse marginal branch.

**Table (1):** Operative details of arterial grafts

LIMA-LAD	100
RIMA-OM	95
LIMA -D-LAD	5
RIMA—D-OM	5

#### Collection of the data:

Preoperative data included the sex, age, diabetes, preoperative haemoglobin A1c, hypertension, body mass index (BMI), previous myocardial infraction, serum creatinine, hyperlipidaemia, cardiac function, and left ventricular ejection fraction (LVEF). Besides, the operative time, aortic cross clamp time, CPB time, number of distal coronary anastomosis, flowmetry of

the LIMA, RIMA, and early postoperative complications were also recorded. The flowmetry of the IMA graft were measured by Veri Q system (Medistim, Sandakervn, Norway), and LVEF were recorded in every patient using echocardiography. Mild sternal wound complications referred to sternal wound discharge without sternal rocking or wound infection. It could be cured by frequent dressing.

#### Statistical analysis

Data were analyzed using the software SPSS (Statistical Package for the Social Sciences) version 20. Quantitative variables were described using their means and standard deviations. The level of statistical significance was set at 5% ( $P \leq 0.05$ ). Highly significant difference was present if  $P \leq 0.001$ .

#### RESULTS

**Data of the study population:** There were 100 patients with an average age of 50-60 years. The incidence males were 80% and females were 20%. Rate of diabetes was 15%, hypertension was 90%, hyperlipidaemia was 80% and body mass index (BMI) was around 26%. NO previous myocardial infraction, LVEF was normal preoperative, HbA1c was below 7.5 and serum creatinine was normal (Table 2).

**Table (2):** Characteristics of the Study Population

AGE	50-60 years
MALES	80%
FEMALES	20%
BMI (weight in kg/height in m <sup>2</sup> )	Around 26%
Diabetic	15%
hypertension	90%
hyperlipidemia	80%
HBA1c (%)	Below 7.5
Cardiac function	normal

**Operative data:** The operative time, aortic clamp time and CPB time were recorded. The number of distal coronary anastomosis were around 3 to 4. The flowmetry of LIMA was around 40- 60 ml/min and below 2, while they were 20-30 ml/min and below 2 for RIMA respectively. The intra-operative data of the study population are shown in Table (3).

**Table (3):** Operative data of the Study Population

Operative time (h)	4.6 ± 0.5
Aortic clamp time (min)	60 ± 15
CBP (min)	75 ± 20
Number of distal coronary grafts	3-4
LIMA flow	40-60 ml/min
LIMA pulsatility index (PI)	Below 2
RIMA flow	20-30 ml/min
RIMA Pulsatility index (PI)	Below 2

**Post-operative Data:** The operative mortality was zero. Two patients needed re-exploration for high drainage. Four patients showed elevated creatinine in early post-operative but did not require dialysis. Five patients developed atrial fibrillation that responded to medical cardioversion. NO patients needed prolonged ventilation. NO patients developed deep sternal wound infection only superficial wound discharge. Post-operative echocardiography was normal.

**Table (4):** Post-operative data

Operative mortality	0
Re-exploration	2
RISING post-operative creatinine	4
ATRIAL fibrillation	5
Prolonged ventilation	0
Deep sternal wound infection	0
Post-operative echocardiography	Normal

## DISCUSSION

The main findings of this study were: (1) Arterial grafting is more difficult than conventional coronary artery bypass grafting (CABG). The operation time, aortic clamp time, and CPB time were longer than conventional CABG, (2) The flowmetry of arterial grafts of left anterior descending branch (LIMA) and right internal mammary artery (RIMA) were good. (3) There was no incidence of common complications, such as graft occlusion and sternal wound complications.

In this study, BIMA were skeletonized and BIMA grafting was done using heart-lung machine. Since, the LIMA is used to graft the left coronary system, so the LIMA was anastomosed to the LAD and the diagonal branch artery if possible. The RIMA is used to revascularize the branches of circumflex artery and prevention of sternal complications.

The main factors which decrease the application of BIMA grafting are poor sternal wound healing and mediastinitis (especially for patients with BMI > 35 kg/m<sup>2</sup>), elderly women, high HbA1c or patients with severe chronic obstructive respiratory dysfunction (COPD) <sup>(8)</sup>.

In this study, the incidence of deep sternal wound infection was 0%. Although there were 20 diabetic patients in our study, our strategy to prevent sternal wound complications was as follows: 1) for diabetic patients, preoperative HbA1c should be controlled below 7.5%. Several studies showed that elevated HbA1c was associated with high-risk factor of deep sternal wound infection <sup>(9)</sup>. 2) The skeletonization of the IMA can cause little damage to the chest wall, and preserves the branches of the IMA and internal mammary vein. It is of great value to the healing of sternal wound and venous reflux <sup>(10)</sup>. So, in BIMA grafting, a number of guidelines have recommended skeletonization OF IMA to reduce the sternal wound

infection <sup>(11,12)</sup>. 3) Sternal fixation was done by the “8-shaped method”. Four steel wires were used to fix the sternum.

## CONCLUSIONS

Using both mammary arteries in coronary artery bypass surgery is safe and effective for patients (50–60 years) similar to younger patients (< 50years). BIMA grafting in patients (50–60 years) could also achieve a satisfactory early results.

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