



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



MONA MAGHRABY

Short Term Outcome of off Pump versus on Pump Coronary Artery Bypass Graft

Thesis

*Submitted for Partial Fulfillment of Master Degree of
Cardiothoracic Surgery*

By

Amr Elsayed Mohamed

M.B., B.Ch. June 2013

Faculty of Medicine - October 6 University

Supervisors

Prof. Dr. Ahmed Ibrahim Rezk

Professor of Cardiothoracic Surgery

Faculty of Medicine - Ain Shams University

Prof. Dr. Mohamed Ali ElGhanam

Assistant professor of Cardiothoracic Surgery

Faculty of Medicine - Ain Shams University

Dr. Moustafa Gamal El-Din Moustafa

Lecturer of Cardiothoracic Surgery

Faculty of Medicine - Ain Shams University

Faculty of Medicine

Ain Shams University

2020

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببنا انك لا تعلم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to Allah, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to Prof. Dr. Ahmed Ibrahim Rezk, Professor of Cardiothoracic Surgery, Faculty of Medicine - Ain Shams University, for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.

I am also delighted to express my deepest gratitude and thanks to Prof. Dr. Mohamed Ali ElGhanam, Assistant professor of Cardiothoracic Surgery, Faculty of Medicine - Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.

I am deeply thankful to Dr. Moustafa Gamal El-Din Moustafa, Lecturer of Cardiothoracic Surgery, Faculty of Medicine - Ain Shams University, for his great help, active participation and guidance.

I would like to express my hearty thanks to all my family for their support till this work was completed.

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Amr Elsayed

List of Contents

Title	Page No.
List of Tables	i
List of Figures	iii
List of Abbreviations	v
Abstract	vi
Introduction	1
Aim of the Work.....	4
Review of Literature	
Anatomy of Coronary Arteries	5
Surgical Technique	15
MIDCAB	56
Patients and Methods	64
Results	70
Discussion	100
Conclusion.....	107
Summary.....	109
References	111
Arabic Summary	

List of Tables

Table No.	Title	Page No.
Table (1):	Age distribution in both groups	70
Table (2):	Male to female distribution in both groups.....	71
Table (3):	BMI between the two groups.....	72
Table (4):	NYHA classification between on-pump group and off-pump group.....	73
Table (5):	Diabetes and hypertension distribution	74
Table (6):	Preoperative echocardiography findings.....	76
Table (7):	Number of diseased coronary arteries.....	77
Table (8):	ECG findings	78
Table (9):	Routine laboratory investigation	79
Table (10):	Operative time	80
Table (11):	The need for cardiac inotropes	81
Table (12):	Conversion to on pump	82
Table (13):	Aortic cross clamp time and bypass time in on-pump group	82
Table (14):	Intraoperative bleeding	83
Table (15):	Number of distal anastomosis.....	84
Table (16):	The Use of IABP	84
Table (17):	The Use of pace maker.....	85
Table (18):	The Use of DC shock.....	85
Table (19):	Postoperative MI	86
Table (20):	Postoperative CVS	86
Table (21):	Postoperative Cardiac arrhythmia in ICU	87

List of Tables (cont...)

Table No.	Title	Page No.
Table (22):	Sternal wound infection.....	88
Table (23):	The postoperative elevation of troponin.....	89
Table (24):	The postoperative elevation of CK-mb	91
Table (25):	Postoperative ECG.....	93
Table (26):	The use of IABP	94
Table (27):	Ventilation time in hours	95
Table (28):	Renal failure requiring dialysis	96
Table (29):	The elevation of liver enzymes postoperative	96
Table (30):	Postoperative bleeding and needs for re- exploration	97
Table (31):	ICU stay in hour	98
Table (32):	The mortality rate	99

List of Figures

Fig. No.	Title	Page No.
Figure (1):	Left anterior descending artery and diagonal branches.....	7
Figure (2):	Right coronary artery	10
Figure (3):	Internal thoracic artery (ITA) harvest.....	19
Figure (4):	Radial artery harvest.....	23
Figure (5):	Saphenous vein harvest: open and bridged technique	25
Figure (6):	Endoscopic saphenous vein harvest	26
Figure (7):	Cannulation	30
Figure (8):	Arteriotomy	33
Figure (9):	Distal anastomosis suture technique.....	36
Figure (10):	Sequential anastomosis.....	39
Figure (11):	Coronary endarterectomy: Open extended technique.....	41
Figure (12):	Proximal anastomosis.....	46
Figure (13):	<u>Stabilization:</u> View from the surgeon's side of table. With cardiac positioner placed on the apex, the heart can be easily displaced to expose the inferior wall vessels	53
Figure (14):	<u>Stabilization:</u> View from surgeon's side of table. With LAD grafting, excellent exposure can be obtained with lateral traction of the "deep stitch" and the coronary stabilizer.....	54
Figure (15):	Distal anastomosis: An obtuse marginal artery is prepared for grafting.....	55
Figure (16):	LIMA harvest setup	58

List of Figures (Cont...)

Fig. No.	Title	Page No.
Figure (17):	Distal anastomosis setup	62
Figure (18):	Age distribution in both groups.	70
Figure (19):	Male to female distribution in both groups.	71
Figure (20):	BMI between the two groups.	72
Figure (21):	Diabetes and hypertension distribution.....	75
Figure (22):	Operative time.	80
Figure (23):	The need for cardiac inotropes.	81
Figure (24):	The postoperative elevation of troponin.....	90
Figure (25):	The postoperative elevation of CK-mb.	92
Figure (26):	Ventilation time in hours.	95
Figure (27):	ICU stay in hour.....	98

List of Abbreviations

Abb.	Full term
<i>AF</i>	<i>Atrial Fibrillation</i>
<i>CABG</i>	<i>Coronary Artery Bypass Grafting</i>
<i>CBC</i>	<i>Complete Blood Count</i>
<i>CPB</i>	<i>Cardiopulmonary Bypass</i>
<i>CT</i>	<i>Computerized Tomography</i>
<i>DSWI</i>	<i>Deep Sternal Wound Infection</i>
<i>ECG</i>	<i>Electrocardiogram</i>
<i>EF</i>	<i>Ejection Fraction</i>
<i>IABP</i>	<i>Intra Aortic Balloon Pump</i>
<i>IMA</i>	<i>Internal Mammary Artery</i>
<i>ITA</i>	<i>Internal Thoracic Artery</i>
<i>LAD</i>	<i>Left Anterior Descending</i>
<i>LIMA</i>	<i>Left Internal Mammary Artery</i>
<i>MIDCAB</i>	<i>Minimally Invasive Direct Coronary Artery Bypass</i>
<i>MR</i>	<i>Mitral Regurgitation</i>
<i>MRI</i>	<i>Magnetic Resonance Imaging</i>
<i>OPCAB</i>	<i>Off Pump CABG</i>
<i>PVCS</i>	<i>Premature Ventricular Contractions</i>
<i>RIMA</i>	<i>Right Internal Mammary Artery</i>
<i>SPSS</i>	<i>Statistical package for Social Science</i>
<i>SSWI</i>	<i>Superficial Sternal Wound Infection</i>
<i>SWMA</i>	<i>Segmental Wall Motion Abnormalities</i>

ABSTRACT

Background: Coronary-artery bypass grafting (CABG) has traditionally been performed with the use of cardiopulmonary bypass (on-pump CABG). CABG without cardiopulmonary bypass (off-pump CABG) might reduce the number of complications related to the heart–lung machine.

Aim of the Work: To compare the short term outcome of off pump versus on-pump coronary artery bypass graft concerning the efficiency and safety of both procedures.

Patients and Methods: This is prospective study including sixty patients diagnosed with chronic ischemic heart disease requiring coronary artery bypass grafting (CABG) operation, half of them were operated upon using CPB CABG and the other half were done off pump CABG (OPCAB) at Al-Maadi Armed Forces Medical Complex, Cairo, Egypt in the period between August 2017 and September 2018.

Results: There was no statistically significant difference between the two groups regarding preoperative data. Regarding intraoperative data, operation time and need for cardiac inotropes were significantly high in on-pump group (P-value 0.007, 0.000 respectively), regarding the myocardial revascularization in both groups, the total number of grafts were performed in on-pump group was 82 grafts, while in off-pump group it was 75 grafts with no significant difference. Regarding postoperative data, the postoperative elevation of troponin and CK-mb was significantly higher in on-pump group within 1st 6, 12 and 24 hours postoperatively with serially decrease after 12 and 24 hours, ventilation time and duration of ICU stay were significantly less in time in off-pump group (p-value 0.001 ,0.007 respectively). regarding the morality rate, in on-pump group there were 2 cases (6.7%), while in off-pump group there was only one case (3.3%) of mortality due to low cardiac output, there was no significant statistically difference between the two groups (P-value 0.554).

Conclusion: This study suggest that excellent results can be obtained with both techniques, In the OPCAB, there was a significant reduction operative time, ventilation time, ICU stay, cardiac enzymes postoperative. Thereby shortening the total hospital stay, because length of hospitalization is one of the major factors that affect overall cost. On the other hand, fewer grafts tend to be performed with OPCAB than with standard CABG.

INTRODUCTION

Surgery for human atherosclerotic coronary arterial disease began in 1935, when Beck attached a pedicled graft of pectoralis muscle to the heart in an attempt to provide a new blood supply (*Whittaker and Abela, 2012*). In 1941, Beck reported constricting the coronary sinus, mechanically abrading the pericardium and epicardium, instilling asbestos and trichloroacetic acid into the pericardium, and placing mediastinal fat onto the epicardial surface. In 1951, Vineberg described the implantation of the internal thoracic artery directly into the myocardium (*Cremer et al., 2017*).

Although long-term patency of the graft was demonstrated later, the amount of blood flow and region of distribution were insignificant with this approach. In the mid-1950s, Murray reported experimental studies of internal thoracic artery–coronary artery anastomoses (*Head et al., 2013*). In 1953, Gibbon successfully used cardiopulmonary bypass clinically for intracardiac surgery (*Loubon et al., 2015*).

In the late 1950s, Bailey described direct coronary endarterectomies (*Dimitrakakis et al., 2015*). In 1961, Senning described a patch angioplasty of a stenotic coronary artery (*Kuźma et al., 2016*). In 1962, Sones and Shirey reported the development of coronary angiography, which would

subsequently permit guided interventions for distinct coronary stenoses (*Nabel and Braunwald, 2012*).

Credit for performing the first coronary artery bypass procedure in humans is given to several different surgeons. In 1958, Longmire described a patient in which a coronary endarterectomy was attempted, but the coronary artery disintegrated. In a desperate attempt to reconstruct the coronary, the internal thoracic artery was harvested and anastomosed to the coronary artery (*Nnaji, 2015*).

In 1962, Sabiston reported the first aortocoronary bypass, but this patient died in the early postoperative period of a cerebrovascular accident (*D'amico, 2013*). Garrett and DeBakey are credited by some with performing the first successful aortocoronary bypass in 1964, although this was not reported until 1973 (*Lipcsey et al., 2014*). In 1964, Kolesov in Leningrad performed the first planned anastomosis between the left internal thoracic artery and the left anterior descending artery (*Khera and Panza, 2017*). In 1968, Favaloro reported the first large series of coronary artery bypass graft patients (*Mohr et al., 2013*).

From the late 1960s and early 1970s, aortocoronary venous bypass grafting, together with internal thoracic artery to coronary artery bypass grafting, grew rapidly in popularity to become one of the most commonly performed major operations today.