Early Outcome of Coronary Artery Bypass Graft (CABG) in Patients with Low Ejection Fraction (EF)

Thesis

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Loay Aly Fathy Aljunaidy

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List of Abbreviations

ACE	:	Angiotensin Converting Enzyme.
APO I	:	Apolipoprotein I.
ASE	:	American Society of Echocardiography.
BIMA	:	Bilateral Internal Mammary Artery.
BMI	:	Body Mass Index.
CABG	:	Coronary Artery Bypass Graft.
CAD	:	Coronary Artery Disease.
CBF	:	Coronary Blood Flow.
CCA	:	Cardiac Coronary Angiography.
CCTA	:	Coronary Computed Tomography Angiography.
CCU	:	Cardiac Care Unit.
CMV	:	Cytomegalovirus.
CRP	:	C Reactive Protein.
CT	:	Computed Tomography.
CVR	:	Coronary Vascular Resistance.
DSE	:	Dobutamine stress Echocardiography.
FFR	:	Fractional Flow Reserve.
GRC	:	Global Risk Classification.
HAV	:	Hepatits A Virus.
HDL	:	High Density Lipoprotein.
HF	:	Heart Failure.
HSP-60	:	Heat Shock Protein 60.
HSV	:	Herpes Simplex Virus.
ICAM-1	:	Intercellular Adhesion Molecule 1.
IMA	:	Internal Mammary Artery.
LAD	:	Left Anterior Descending.
LCS	:	Left Coronary Sinus.

List of Abbreviations (Cont.)

LCX	:	Left Circumflex.
LDL	:	Low Density Lipoprotein.
LIMA	:	Left internal mammary artery.
LITA	:	Left internal thoracic artery.
LMS	:	Left main stem.
LV	:	Left Ventricle.
MCP-1	:	Monocyte Chemotactic Protein 1.
MI	:	Myocardial Infarction.
MRI	:	Magnetic Resonant Image.
MV	:	Myocardial Viability.
MVD	:	Multi-Vessel Disease.
NO	:	Nitric Oxide.
NOS	:	Nitric Oxide Synthase.
O_2	:	Oxygen
OM	:	Obtuse marginal.
OPCAB	:	Off Pump Coronary artery bypass.
PCI	:	Percutaneous Coronary Intervention.
PCR	:	Polymerase Chain Reaction.
PDA	:	Posterior Descending Artery.
PET	:	Positron Emission Tomography.
PLB	:	Postero-Lateral Branch.
RCA	:	Right Coronary Artery.
RCS	:	Right Coronary Sinus.
SAN	:	Sino-Atrial Node.
SVG	:	Saphenous Vein graft.
SSWI	:	Surgical Site Wound Infection.
TEE	:	Trans-Esophageal Echocardiography.

List of Abbreviations (Cont.)

VACAM-1 : Vascular Cell Adhesion Molecule 1.

VF : Ventricular Fibrillation.

V-Tach : Ventricular Tachycardia.

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Introduction

Ischemic heart disease is one of the major causes of death, disability and health care resource utilization worldwide but recent advances in operative techniques and perioperative care have resulted in an increasing number of elderly patients undergoing Coronary artery bypass grafting (CABG) with significant improvements in health-related quality of life as a marker of outcome after CABG.[(1)]

CABG is one of the most common surgical procedures performed worldwide. The operation improves survival as well as the quality of life of patients with coronary artery heart disease. The use of the internal mammary artery (IMA) graft has become increasingly popular in CABG operations due to its demonstrated better long-term patency as compared with that of the saphenous vein graft. [(2)]

CABG is very effective at relieving angina and improving survival, which are the primary indications for the operation. Traditional outcome measures assessing the quality of CABG have been morbidity and mortality. However, with improvements in perioperative care, cardiopulmonary bypass and surgical techniques, the overall mortality associated with CABG has declined despite an increasingly elderly and sicker patient cohort. [(3)]

Cardiovascular disease unfortunately remains the leading cause of mortality in world, accounting for 40% of the total number of deaths, with 20% related to coronary artery disease which still a leading cause of death among both

men and women. Cardiovascular disease causes the premature death of 1.5 million people per year. [4]

The identification of a dysfunctional (but viable) myocardium in patients with depressed left ventricular function has important therapeutic and prognostic implications. Myocardial viability (MV) can be assessed using several diagnostic techniques, including dobutamine stress echocardiography (DSE). The "gold standard" for MV assessment was defined as myocardial functional recovery after revascularization. The patency of the revascularized coronary artery affects myocardial functional recovery in patients subjected to CABG. [5]

Viable myocardium can be defined as myocardium that shows severe hypokinesia or akinesia at resting echo-cardiogram which will improve in function after revascularization. [6]

Several prospective, retrospective studies and meta-analyses have consistently shown improved left ventricular function and survival in patients with ischemic but viable myocardium, who subsequently underwent revascularization. Conversely, patients without viability will not benefit from revascularization, and the high risk of surgery should be avoided. [4]

Dobutamine stress echocardiography is used for the assessment of the effect of surgical revascularisation on left ventricular (LV) systolic function in patients with viable and non-viable dysfunctional LV segments. [7]

Ejection fraction is used by many clinicians as a measure of contractility. However, ejection fraction is

influenced by preload and afterload alterations without any change in contractility. Depending on loading conditions, hearts with a lower ejection fraction can produce a greater cardiac output. Although roughly indicative of cardiac reserve, ejection fraction is an inconsistent marker for overall cardiac function perioperatively but is a useful, gross measure of cardiac reserve. [8]

In patients with coronary artery disease and low ejection fraction (EF), CABG can be performed safely & improvement in left ventricular function can be achieved with this procedure improving the quality of life. [9,10] These patients are at higher risk of post-operative complications. However cardiac surgery can be performed with acceptable mortality rates. [11]

Similar results have been reported from other studies of Percutaneous Coronary Intervention (PCI) in patients with multivessel disease and left ventricular dysfunction. Overall, the outcome with PCI appears less favourable than that obtained after CABG surgery, possibly as a function of more complete revascularization in surgical patients. [12]

The Aim of the Work

The aim of this work is to evaluate the short term outcome of Coronary Artery Bypass Grafting after 3 months in patients with low ejection fraction.

Normal Coronary Anatomy

The aortic root represents the outflow tract from the left ventricle and extends between the aortic valve and the sinotubular junction which demarcates the aortic root from the ascending aorta. Aortic root has three small dilatations called the coronary sinuses (Fig. 1a). More anteriorly located right coronary sinus (RCS) gives rise to the right coronary artery (RCA) and the left main coronary artery (LMCA) arises from more cephalically located the left coronary sinus (LCS) (Fig. 1b). The posteriorly located aortic sinus normally does not give rise to a coronary artery and named as the non-coronary sinus. **(13)**

A ***B***

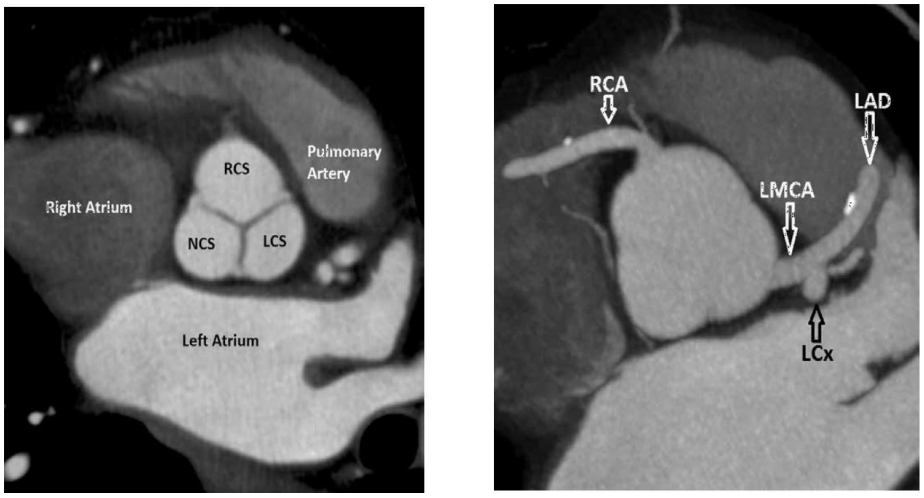

Figure (1): Normal anatomy of the aortic root and coronary arteries. Short- axis coronary computed tomography angiography image (a) shows that the aortic root has 3 aortic sinuses which are the right coronary sinus (RCS), left coronary sinus (LCS) and non-coronary sinus (NCS). Maximum intensity projection reformatted coronary CT angiography image (b) at the level of the coronary sinuses demonstrates that the right coronary artery (RCA) originates from anteriorly located the RCS and the left main coronary artery (LMCA) arises from posteriorly located the LCS. The LMCA divides into the left anterior descending artery (LAD) and the circumflex artery (LCX) **(13).**