

**Comparison between Reconstruction and
Conventional Grafting of the Diffusely
Atherosclerotic Left Anterior
Descending Artery**

Thesis

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By

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Contents

List of Abbreviations	I
List of Tables	III
List of Figures	VI
Introduction	1
Aim of the Work.....	3
Review of Literature	
• Historical Background	4
• Surgical Anatomy	7
• Pathophysiology of Coronary Artery Disease	17
• Indications for Coronary Revascularization	24
• Conduit Options in Coronary Artery Bypass Surgery	35
• Conduct of the Operation	59
• Outcome of GABG Operation with Reconstructed LAD	75
Patients and Methods	87
Results	95
Discussion	117
Summary	128
Conclusion	130
References	131
Arabic Summary	--

List of Abbreviations

Abb.	Description
ACC	American College of Cardiology
ACS	Acute coronary syndrome
AHA	American Heart Association
ASIST	Atenolol Silent Ischemia Study
BARI	Bypass Angioplasty Revascularization Investigation
CABG	Coronary artery bypass graft
CCS	Canadian Cardiovascular Society
CCTA	Coronary computed tomography angiography
CE	Coronary endarterectomy
CPB	Cardiopulmonary bypass
cTnI	Cardiac troponin I
CVA	Cerebrovascular accident
CVP	Central venous pressure
ECG	Electrocardiography
EF	Ejection fraction
IABP	Intra-aortic balloon pump
ICU	Intensive care unit
IL	Interleukin
IMA	Internal mammary artery
IVUS	Intravascular ultrasonography

Abb.	Description
LAD	Left anterior descending
LDL	Low density lipoprotein
LIMA	Left internal mammary artery
LVF	Left ventricular function
LVEF	Left ventricular ejection fraction
MDCT	Multi-detector computed tomography
MI	Myocardial infarction
MMPs	Matrix metalloproteinases
PTCA	Percutaneous transluminal coronary angioplasty
RA	Radial artery
RGEA	Right gastroepiploic artery
RIMA	Right internal mammary artery
SD	Standard deviation
SMCs	Smooth muscle cells
SWM	Segmental wall motion
SWMA	Segmental wall motion abnormality
TEE	Transesophageal echocardiography
TNF	Tumor necrosis factor

List of Tables

Table	Title	Page
1	Canadian Cardiovascular Society angina classification	25
2	AHA/ACC guidelines for CABG	31
3	Conduits for CABG	35
4	Origin of the Internal Mammary Arteries	46
5	Level of Termination of Internal Mammary Artery	49
6	Patency of Free IMA in Bilateral Grafts	54
7	Comparison between 2 intervention groups (Reconstruction) and (Conventional) as regard Demographic Characteristics, Disease status and Special Habits of Medical Importance	96
8	Comparison between 2 intervention groups (Reconstruction) and (Conventional) as regard Preoperative Lab tests	97
9	Intraoperative Comparison between 2 intervention groups (Reconstruction) and (Conventional) as regard intraoperative variables	100
10	Postoperative Comparison between 2 intervention groups (Reconstruction) and (Conventional) as regard postoperative variables	102

Table	Title	Page
11	Comparison between Troponin Levels before and After Surgery in Reconstruction Group (Group I)	104
12	Comparison between Troponin I Levels before and After Surgery in Group II	105
13	Comparison between group I and group II as regard preoperative troponin I levels	105
14	Comparison between group I and group II as regard postoperative troponin levels	106
15	Comparison between CK-MB Levels before and After Surgery in Group I	107
16	Comparison between CK-MB Levels before and After Surgery in Group II	108
17	Comparison between group I and group II as regard preoperative CKMB levels	108
18	Comparison between group I and group II as regard postoperative CK-MB levels	109
19	Relationship between Endarterectomy and occurrence of Perioperative Infarction in group I	110
20	Comparison between EF % before and After Surgery in Group I	110
21	Comparison between EF before and after Surgery in Group II	111
22	Comparison between group I and group II as regard preoperative EF	111

Table	Title	Page
23	Comparison between group I and group II as regard postoperative EF	112
24	Comparison between SWMA before and after Surgery in Reconstruction Group (Group I)	113
25	Comparison between SWMA before After Surgery in Group II	115
26	Comparison between group I and group II in Troponin I	125
27	Comparison between group I and group II in CK-MB	125
28	Preoperative and Postoperative Left Ventricular Anterior Segmental Wall Motion	127

List of Figures

Figure	Title	Page
1	The main stem of the left coronary artery courses from the left sinus of Valsalva anteriorly, inferiorly and to the left between the pulmonary trunk and the left atrial appendage	8
2	The short extent of the main stem of the left coronary artery is seen before it branches into the circumflex and anterior descending arteries. Note the small right coronary artery in this heart, in which the circumflex artery was dominant	9
3	The important branches of the anterior descending artery are the first septal perforating and diagonal arteries	11
4	The important branches of the circumflex artery, seen in anatomic orientation	12
5	The coronary veins on the diaphragmatic surface of the heart, seen in anatomic orientation, have been emphasized by filling them with sealant	15
6	Positive and negative arterial remodeling	19
7	Saphenous vein harvest: open and bridged technique	39
8	Endoscopic saphenous vein harvest	41
9	Internal thoracic artery (ITA) harvest	50
10	Cannulation for cardio-pulmonary bypass	60

Figure	Title	Page
11	Distal anastomosis: Arteriotomy	62
12	Distal anastomosis suture technique	65
13	Sequential anastomosis	67
14	(a) Extension of the arteriotomy on the left anterior descending artery; (b) vein patch reconstruction of the artery roof; and (c) left internal mammary artery graft onto the patch	69
15	Proximal anastomosis	72
16	(A) Y-graft anastomotic technique. (B) Total arterial revascularization: As shown, arterial revascularization can be performed using the right internal mammary artery (RIMA) off the left internal mammary artery (LIMA) as a Y graft and liberal use of sequential grafting	73
17	Comparison between 2 intervention groups (Reconstruction) and (Conventional) as regard Preoperative SWMA	98
18	Postoperative Comparison between 2 intervention groups (Reconstruction) and (Conventional) as regard Dobutamine Echo (3M).	103
19	Comparison between Group I and Group II as regard Troponin I Preoperative, Post operative D0, D1, D2	106

Figure	Title	Page
20	Comparison between Group I and Group II as regard CK-MB Preoperative, Post operative D0, D1, D2	109
21	Comparison between Group I and Group II as regard EF Preoperative and 3 months Post operative	112
22	Comparison between SWMA before and After Surgery in Reconstruction Group (Group I)	114
23	Comparison between SWMA before and After Surgery in conventional Group (Group II)	116

Introduction

Revascularization of the diffusely diseased coronary artery is a big challenge for both interventional cardiologists and cardiac surgeons. ⁽¹⁾

With the increased use of percutaneous interventions by invasive cardiologists, the number of high-risk and elderly patients referred for Coronary artery bypass grafting (CABG) operation has increased. ⁽²⁾

CABG significantly increases life expectancy and improves quality of life, and complete myocardial revascularization should be the main goal of the surgical intervention. ⁽³⁾

The internal mammary artery (IMA) has been proven to be the best conduit for CABG, with excellent long-term patency rates and better patient outcomes than with other conduits. The best prognosis is achieved with complete revascularization using the IMA grafted to the left anterior descending artery (LAD). ⁽⁴⁾

In cases with a diffusely diseased coronary artery in the LAD territory, complete revascularization cannot be obtained by conventional grafting to the distal LAD alone, because side branches diverging from the diseased segments would not be perfused. ⁽⁵⁾

A diffusely diseased LAD is characterized by the presence of multiple stenoses downstream from the first major proximal lesion. In patients with such lesion, a long-segmental LAD reconstruction was performed by covering the arteriotomy with saphenous vein as onlay graft. ⁽⁶⁾

Long reconstruction is one of the coronary artery bypass grafting methods for treating severely or diffusely diseased coronary arteries. The greatest advantage of this method is that the myocardium supplied by the side branches of the diffusely diseased coronary artery can be revascularized simultaneously. ⁽⁷⁾

Previous experience with coronary endarterectomy for diffusely diseased coronary arteries has been limited due to poor clinical results in the early years. More recently, however, the benefits of LAD endarterectomy have been gradually recognized because surgical techniques and technologies have evolved. Furthermore, coronary artery reconstruction with an exclusion of plaque has also been performed for diffusely diseased LAD. ⁽⁸⁾

Coronary endarterectomy has been shown to be an effective adjunctive technique of revascularization for diffuse coronary artery disease. A long arteriotomy and reconstruction of the LAD are occasionally required for complete extraction of the atherosclerotic plaque. ⁽⁹⁾

Aim of the Work

The aim of this study is to compare between long segmental reconstruction of the diffusely atherosclerotic LAD using saphenous vein patch with or without endarterectomy and conventional grafting by following the short term clinical outcome.

Historical Background

Dr. Ludwig Rehn, a surgeon in Frankfurt, Germany, performed what many consider the first successful heart operation. After repairing the first cardiac wound in 22 year old gardener he stated that: This proves the feasibility of cardiac suture repair without a doubt I hope this will lead to more investigation regarding surgery of the heart. This may save many lives. ⁽¹⁰⁾

In 1876 Adam Hammer established that angina pain could be attributed to interruption of coronary blood supply and that heart attacks occurred when at least one coronary artery is blocked. ⁽¹¹⁾

Indirect methods to restore blood supply to the ischemic myocardium were pioneered by *Claude Beck* (1935) who reported the placement of a pedicled pectoralis muscle flap on the abraded epicardium.

Surgical attempts at increasing blood flow to the ischemic myocardium originated century ago when Alexis Carrel anastomosed a carotid artery segment between the descending aorta and left coronary artery in a dog, for which he was later awarded the Nobel prize. ⁽¹²⁾ The earlier surgical attempts to improve myocardial blood supply were indirect procedures. Cervical sympathectomy was suggested as a method of cardiac denervation and reduction of heart rate. ⁽¹³⁾

Three decades later, Arthur Vineberg started implanting the left internal mammary artery (LIMA) into