شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومـــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

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بالرسالة صفحات

لم ترد بالأصـــل

CORONARY REVASCULARIZATION IN PATIENTS WITH DIFFUSE CORONARY ARTERY DISEASE

Thesis

submitted to the Faculty of Medicine,
University of Alexandria,
in partial fulfillment of the requirements
of the degree of

DOCTOR OF CARDIOTHORACIC SURGERY

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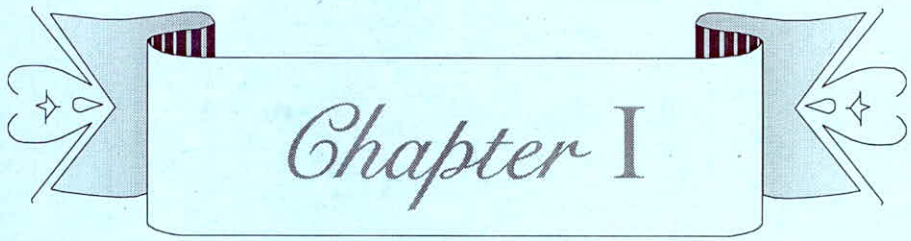
CONTENTS

List of abbreviations

BARI	:	Bypass Angioplasty Revascularization Investigation
CABG	:	Coronary Artery Bypass Graft surgery
CAD	:	Coronary Artery Disease
CASS	:	Coronary Angioplasty versus Surgery Study
CCS	:	Canadian Cardiovascular Society
CEA	:	Coronary endarterectomy
CHF	:	Congestive heart failure
COPD	:	Chronic obstructive pulmonary disease.
CVA	:	Cerebrovascular accident
Cx	:	Circumflex coronary artery
DM	:	Dibetes Mellitus
EF	:	Ejection fraction
ESRD	:	End-stage renal disease
HDL	:	High density lipoprotein
IABP	:	Intra-aortic balloon pump.
IMA	:	Internal mammary artery
LAD	:	Left anterior descending coronary artery
LAO	:	Left Anterior Oblique projection
LCOS	:	Low cardiac output syndrome
LDL	:	Low density lipoprotein
LIMA	:	Left internal mammary artery
LMCA	:	Left main coronary artery
LV	:	Left ventricle
LVAD	:	Left ventricular assist device
LVD	:	Left ventricular dysfunction
LVEDD	:	Left ventricular end diastolic dimension
MI	:	Myocardial infarction
NYHA	:	New York Heart Association
PDA	:	Posterior descending coronary artery
PLV	:	Posterior left ventricular branch
PTCA	:	Percutaneous Transfemoral Coronary Angioplasty
RAO	:	Right Anterior Oblique projection
RCA	:	Right coronary artery
RIMA	:	Right internal mammary artery
THI	:	Texas Heart Institute
TMLR	:	Transmyocardial Laser Revascularization
X-CLAMP	:	Cross clamp



INTRODUCTION

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History of Surgery for Ischemic Heart Disease

Angina pectoris was first described by Heberden in 1772[1]. Over the next 150 years, the understanding of the pathology, pathophysiology, and the clinical correlation slowly evolved. By the early 20th century, the clinical presentation and consequences of sudden coronary artery occlusion were recognized. The first successful heart suture was made by Rehn in 1896. In the 1920s mitral valve surgery began by Souttar and Cutler[2]. This led to the development of the first procedures to treat patients with myocardial ischemia.

The first operations were indirect methods to either influence the pain of myocardial ischemia by the interruption of the sensory nerve pathways, or to decrease the cardiac workload by lowering the body's metabolic requirements.

François Frank[3] suggested in the 19th century that the sympathetic ganglionectomy of the upper thoracic ganglia would relieve angina. It was not until 1916 when Jonnesco[4] performed a bilateral cervical sympathectomy including the upper dorsal ganglia. Kocher[5] in 1901 had observed that a patient with angina became asymptomatic after total thyroidectomy. This was explained by the reduction of cardiac work by decreasing the metabolic rate. Thyroidectomy became popular until the operation was supplanted by the availability of the antithyroid drugs, including the radioactive iodine. So, like sympathectomy, thyroidectomy was abandoned when results of the operative efforts to increase myocardial blood flow were judged promising.

Alexis Carrel[6] performed the first coronary artery bypass graft in 1910. He anastomosed the innominate artery of one dog to the distal coronary artery of another. In other animals, he used a free carotid artery to graft between the descending thoracic aorta and the left coronary artery. Carrel also performed the first vein bypass graft by interposing a vein segment into the descending thoracic aorta of a dog.

In 1932 Claude Beck[7] observed that in pericarditis, the adhesions between the pericardium and epicardium were vascular. So he developed several procedures to promote vascular anastomoses between coronary arteries and surrounding tissues. He produced a sterile pericardtitis by mechanically abrading the epicardium and pericardium and encouraging the formation of collateral circulation procedures, which he termed cardiopericardiopexy and poudrage. Gross[8] in 1936 redirected the venous drainage of the heart back into the myocardium. This technique was the basis for retrograde coronary sinus cardioplegia.

In 1933 Wearns and colleagues[9] described a unique aspect of the myocardial microanatomy; the sinusoids. They described the presence of direct channels between the heart chambers and the myocardium,which encouraged other investigators to attempt direct myocardial revascularization from the left ventricle.In 1946, Vineberg[10] implanted the cut end of the internal mammary artery (IMA) into the myocardium of a human in an attempt to encourage the development of collaterals between the systemic and coronary circulations (Fig. 1). He believed that the myocardial sinusoids would initially absorb the flow of

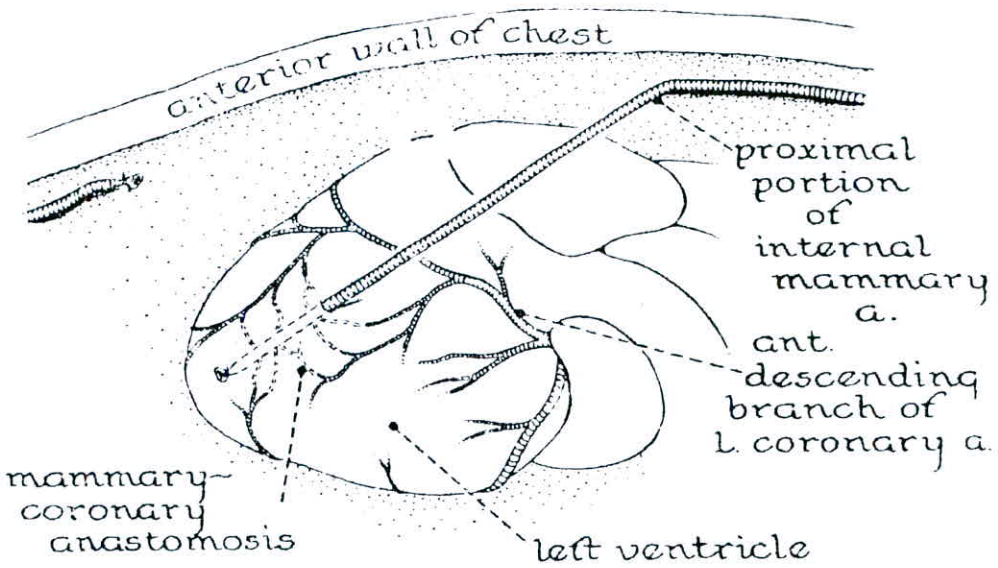

Figure 1. Internal mammary artery detached from its chest wall attachment and buried in a tunnel in the left ventricular myocardium. Open stumps of intercostals not shown.

Adapted from Vineberg A.[11]

blood and eventually capillaries would form between the implanted vessel and the myocardial arterioles. Massimo and Boffi[12] implanted T-shaped tubes into the myocardium. Unfortunately, none of these techniques were successful, as the created channels were occluded by thrombosis, scarring, or both.

In 1954, Murray[13] experimentally performed direct coronary artery bypass grafting using the carotid, axillary, and internal thoracic arteries. Gibbon[14] developed the first heart/lung machine, which was first used in the Mayo Clinic in 1954. Charles Bailey performed the first closed endarterectomy without cardiopulmonary bypass in 1956[15] using a retrograde, distal, blind technique. In 1957, Sabiston[16] and colleagues anastomosed the internal thoracic (mammary) artery (ITA) to coronary vessels and subsequently used free carotid artery grafts experimentally. William Longmire[17] performed the first human ITA to coronary artery anastomosis in 1958.

In 1959, F. Mason Sones[18] introduced selective coronary angiography, providing for the first time precise knowledge of the location and extent of the coronary lesions, and allowing to objectively assess postoperative results. This technique allowed myocardial revascularization to become a viable clinical procedure.

The first aortocoronary bypass using saphenous vein was performed by Sabiston in 1962[19]. By the late 60's, techniques were well established and safe, encouraged by the reliability of coronary angiography. Sen and colleagues[20] reported the application of myocardial acupuncture, or the use of needles to create channels between ventricular blood into the myocardium. Favaloro and colleagues[21] aggressively worked on the clinical application of coronary bypass and demonstrated its effectiveness. They were the first to use a free saphenous