Evolution of Arterial grafts

Used In Coronary Artery Bypass Surgery

Essay

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BY

Mohamed Abdel Rehim M.Abouzaid

M.B.B.Ch

Prof.Dr.Khaled Aly Gawdat

Professor of general surgery

Ain Shams University

Prof.Dr. Ahmed Abdel Aziz Ibrahim

Professor of Cardio-Thoracic surgery

Ain Shams University

Dr.Al Sayed Mahmoud Salem

Lecturer of Cardio-Thoracic surgery

National Heart Institute

Faculty of medicine

Ain Shams University

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التطورات في الوصلات الشريانية المستخدمة فى جراحات الشرايين التاجية

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أستاذ الجراحة العامة
كلية الطب – جامعة عين شمس

الأستاذ الدكتور/ أحمد عبد العزيز
أستاذ جراحة القلب والصدر
كلية الطب – جامعة عين شمس

الدكتور/ السيد محمود سالم
مدرس جراحة القلب و الصدر
معهد القلب القومي

كـــليـــة الطـــب
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Dedication

To my parents who gave and still giving all things without taking any thing.

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Abstract

Coronary artery disease (CAD) is one of the leading causes not only of morbidity but also of mortality worldwide. Coronary artery bypass grafting (CABG) is becoming the treatment of choice in increasing number of patients. The need for alternative conduits is growing to face the increasing number of patients with insufficient internal thoracic artery (ITA) conduit and due to multiplicity of occluded saphenous vein grafts. Many alternative arterial conduits have been discussed according to their biological and surgical characteristics. The superiority of arterial conduits to venous conduits is well documented.

List of abreviations	
BITA	Bilateral Internal Thoracic Artery
CABG	Coronary Artery Bypass Grafting Surgery
CAD	Coronary Artery Disease
CASS	Coronary Artery Surgery Study
COPD	Chronic Obstructive Pulmonary Disease
CPB	Cardiopulmonary Bypass
CX	Circumflex Artery
ECG	Electrocardiography
EF	Ejection Fraction
ET	Endothelin
GEA	Gastroepiploic Artery
HDL	High Density Lipoprotein
ICA	Intercostal Artery
IEA	Inferior Epigastric Artery
IMA	Internal Mammary Artery
IMV	Internal Mammary vein
ITA	Internal Thoracic Artery
LAD	Left Anterior Dessending Artery
LCA	Left Coronary Artery
LDL	Low Density Lipoprotein
LIMA	Left Internal Mammary Artery
LITA	Left Internal Thoracic Artery
NYHA	New York Heart Association
OM	Obtuse Marginal Artery
PDA	Posterior Dessending Artery
PDGF	Platelet Derived Growth Factor
PTCA	Percutaneous Transluminal Coronary Angiography
PTEF	Polytetrafluoroethylen
RA	Radial Artery

RCA	Right Coronary Artery
RGEA	Right Gastroepiploic Artery
RIMA	Right Internal Mammary Artery
RITA	Right Internal Thoracic
SA	Splenic Artery
SAN	Sino Atrial Node
SVG	Saphenous Vein Graft
TXA2	Thromboxane A2

Introduction

INTRODUCTION

Coronary artery disease remains the most common condition suffered by the patients who consult cardiologists and cardiac surgeons, and the practicing cardiac surgeon is confronted with no clinical question more often than "Is coronary bypass indicated in this patient?" [1].

The indications for operative myocardial revascularization have been well delineated and can be viewed as specific anatomic criteria such as left main coronary artery disease, multi-vessel coronary disease, and double-vessel coronary disease with proximal left anterior descending artery (LAD) involvement, and with or without physiological sequelae such as myocardial ischemia, myocardial infarction (MI), and left ventricular dysfunction [2].

Furthermore, an additional subset includes patients undergoing other cardiovascular surgery with coronary artery disease that would otherwise not indicate operative revascularization. In general, only coronary arteries with significant (greater than 70%) stenosis are bypassed, because graft patency is

otherwise severely limited by competitive native coronary flow [3].

Surgery for human atherosclerotic coronary artery disease (CAD) began in 1935, when Beck attached a pedicled graft of pectoralis muscle to the heart in an attempt to provide a new blood supply [4].

In 1951, Vineberg described the implantation of the internal thoracic artery (ITA) directly into the myocardium [5].

In the mid-1950s, Murray reported experimental studies of internal thoracic artery–coronary artery anastomosis [6].

In the late 1950s, Bailey described direct coronary endarterectomies [8].In 1953; Gibbon successfully used cardiopulmonary bypass clinically for intra-cardiac surgery [7]. 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 [11].

In 1961, Senning described a patch angioplasty of a stenotic coronary artery [9]. In 1962, Sohns and Shirey reported the development of coronary angiography, which would subsequently permit guided interventions for distinct coronary stenosis [10].

In 1962, Sabiston reported the first aorto-coronary bypass, but this patient died in the early postoperative period of a cerebro-vascular accident [12].

Garrett and DeBakey are credited by some with performing the first successful aortocoronary bypass in 1964, although this was not reported until 1973 [13]. In 1964, Kolesov in Leningrad performed the first planned anastomosis between the left internal thoracic artery and the left anterior descending artery [14]. In 1968, Favolaro reported the first large series of coronary artery bypass graft patients [15].

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 [16].