SHORT BYPASSES FOR INFRAPOPLITEAL ARTERIAL RECONSTRUCTION

Essay

Submitted for the Complete Fulfillment of the
Requirements of M.Sc. Degree in
General Surgery

By

Haitham Ahmad Abd El- Aziz El-Dmarany
(M.B., B.Ch.)

Under the Supervision of

Prof. Dr. **Ezz Eldin Korashi**
Professor of General & Vascular Surgery,
Faculty of Medicine, Cairo University

Ass.Prof. Dr. **Ahmad Hosam Eldin Helmy**
Professor of General Surgery,
Faculty of Medicine, Cairo University

Ass.Prof. Dr. **Aymen Mohamad Atef El-Samadoni**
Ass.Professor of General & Vascular Surgery,
Faculty of Medicine, Cairo University

Faculty of Medicine
Cairo University

2008

بسم الله الرحمن الرحيم

"ويسئلونك عن الروح قل الروح من أمر ربي
وما أوتيتم من العلم إلا قليلا"

صدق الله العظيم
(الآية: ٨٥، سورة الإسراء)

ACKNOWLEDGEMENT

"First of all, I am deeply thankful to GOD by the grace of whom this work was possible"

It is my pleasure to express my deepest gratitude and sincere thanks to Prof. Dr. ***Ezz Eldin Korashy,*** *Professor of General and vascular Surgery, Faculty of Medicine, Cairo University, for his generous concern, sincere supervision, valuable suggestions and cooperation, continuous advise and support saving no effort or time in reading each word in this work. To him I will always be grateful.*

*My deepest gratitude, appreciation and thanks to Ass.Prof. Dr.****Ahmad Hosam Eldin Helmy ,*** *Professor of General Surgery, Faculty of Medicine, Cairo University, for his sincere supervision, cooperation, continuous support throughout this work.*

The credit of bringing this work to light goes to ASS.Prof. Dr. ***Ayman El-Samadoni,*** *Professor of General and Vascular Surgery, Faculty of Medicine, Cairo University. His continued help and guidance made it possible to bring this work to its final shape. No words can express my feelings towards him I have been most fortunate in having his continued guidance in supervising every section in this work. His constant encouragement and valuable advises were indispensable. I am definitely indebted to him more than I can express.*

Finally, I should thank my senior staff, my colleagues at the General Surgery Department, Faculty of Medicine, Cairo University, who helped me a lot throughout this work.

Haitham A. A. Eldmarany,

2008

To My Family

List of Abbreviations

3D	:	Three-dimensional
ABI	:	Ankle brachial index
ABPI	:	Ankle brachial pressure index
ACD	:	Absolute claudication distance
ACT	:	Activated clotting time
ADA	:	American Diabetic Association
AFB	:	Aorto-femoral bypass
AHA	:	American Heart Association
ARF	:	Acute renal failure
CABG	:	Coronary artery bypass graft
CE-MRA	:	Contrast enhanced magnetic resonance angiography
CFA	:	Common femoral artery
CIA	:	Common iliac artery
CLI	:	Critical limb ischaemia
CRP	:	C-reactive protein
CT	:	Computed tomography
CTA	:	Computed tomographic angiography
CW	:	Continuous-wave
FDA	:	Food and drug administration
GI	:	Gastrointestinal
HDL	:	High density lipoproteins
Hgb	:	Haemoglobin
HgbA1C	:	Glycosylated hemoglobin level
HLA	:	Human leucocytic antigen
HMG-CoA	:	Hydroxy methylglutaryl coenzyme-A
ICU	:	Intensive care unit
IMA	:	Inferior mesenteric artery
IVUs	:	Intravascular ultrasound
LDL	:	Low density lipoproteins
MI	:	Myocardial infarction
MRA	:	Magnetic resonance angiography

MRI	:	Magnetic resonance imaging
m-RNA	:	Messenger RNA
NIH	:	National Institutes of Health
PAD	:	Peripheral arterial disease
PAOD	:	Peripheral arterial occlusive disease
PCT	:	Placebo-controlled trial
PTA	:	Percutaneous transluminal angioplasty
PTFE	:	Polytetrafluoroethylene
PVD	:	Peripheral vascular disease
RBC	:	Red blood cell
RCT	:	Randomized controlled trial
SFA	:	Superficial femoral artery
TASC	:	Trans-Atlantic inter-society consensus
$TCPO_2$	:	Transcutaneous oxygen tension

List of Figures

ABSTRACT

The popliteal and infrapopliteal arteries are among the most common sites of chronic obliterative atherosclerosis in patients with symptomatic occlusive disease of the lower extremities, especially diabetic patients. Treatment of patients with PAD has 2 goals. The first and foremost goal is to reduce the risk of vascular events (myocardial infarction, stroke, vascular death) that occur at a high rate in patients with PAD. About 30% of patients with PAD will die within 5 years, and death usually is due to an ischaemic coronary event. The second goal of treatment is to improve symptoms in those patients with claudication and limb salvage in patients with critical limb ischaemia. Critical limb is ischaemia usually mandates evaluation with angiography with consequent endovascular and/or surgical revascularization to prevent limb loss. In terms of indications for surgical intervention, ischaemic pain at rest and actual tissue necrosis, including ischaemic ulcerations or frank digital gangrene, are well accepted hallmarks of advanced ischaemia and threatened limb loss. Without treatment, most limbs with these symptoms experience disease progression and require major amputation.

Currently, excellent early and late results of direct infrapopliteal arterial reconstructions can be anticipated. Endovascular therapies may be a valuable treatment modality in some patients with popliteal and or infrapopliteal occlusive disease, however, patient selection is paramount. When the determination has been made that the ischaemia is significant enough to warrant intervention, the role played by endovascular intervention depends on an understanding of its benefits and its risks and how they would compare with other treatment options.

Although the availability of these numerous alternative therapies is beneficial, enabling the surgeon to select a procedure appropriate to the individual anatomy and risk status of each patient, decision making is often complex and difficult. Substantial differences in reported early and late results of alternative methods have contributed to the confusion. Indeed, the optimal method of management of popliteal and or infrapopliteal disease represents one of the most controversial areas of contemporary vascular practice.

Keywords:

- Popliteal and /or infrapoplitael
- Occlusive diseases
- short bypasses

CONTENTS

INTRODUCTION

INTRODUCTION

Obstructing plaques caused by atherosclerotic occlusive disease commonly occur in the popliteal and infrapopliteal arteries. Atherosclerotic plaques may induce symptoms either by obstructing blood flow or by breaking apart and embolizing atherosclerotic and/or thrombotic debris to more distal blood vessels. If the plaques are large enough to impinge on the arterial lumen, reduction of blood flow to the extremities occurs. Several risk factors exist for development of the atherosclerotic lesions, and recognition of these factors enables physicians to prescribe non-operative treatment that may alleviate symptoms as well as prolong life. **(Baker, 2001)**

The popliteal and infrapoliteal arteries are among the common sites of chronic obliterative atherosclerosis in patients with symptomatic occlusive disease of the lower extremities .

(DeBakey et al., 1985)

Since the introduction of the initial reconstructive methods of thrombo-endarterectomy and homograft replacement in the late 1940s and early 1950s, great progress has been achieved in the surgical management of arterial occlusive diseases . Currently, a variety of methods exist for accurate evaluation of the extent and hemodynamic severity of the disease process. In addition, improvements in the preoperative assessment of patient s risk have helped clarify the decision about the optimal management in individual patients. Advances in surgical techniques, intraoperative management, and postoperative care all have contributed to a steady reduction in

perioperative morbidity and mortality and to excellent long-term results. Indications for operation have become fairly well accepted and standardized, and various operative approaches and methods of revascularization are available for use in different clinical circumstances. With proper patient selection and a carefully performed appropriate operative procedure, a favorable outcome may be anticipated at low risk to the patient, making surgical management of popliteal and infrapopliteal arterial occlussive diseases one of the most important areas of vascular surgical practice today.

(Brewster, 1997)

Surgical treatment of popliteal and infrapopliteal arterial occlusive diseases today is well standardized, and the outcomes are quite good. With the additional techniques of percutaneous transluminal angioplasty (PTA) and stenting, more alternatives are now available for treatment of atherosclerotic occlusive disease in these vessels **(Criqui, 1985)**. This study reviews the risk factors for development of various occlusive diseases of the popliteal and infrapopliteal arteries and describes the natural history, diagnosis, and open surgical treatment of these diseases using short bypasses.

AIM OF THE WORK

The aim of the work is to discuss the indications , cnontraindications , and the operative techniques required for successful performance of a short bypasse for reconstruction of various occlusive diseases affecting the popliteal and infrapopliteal arterial tree

Etiology of popliteal and infrapopliteal occlusive diseases