MANAGEMENT OF DISTAL OCCLUSIVE DISEASE BY INFRAPOPLITEAL ANGIOPLASTY

Essay

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Summary

Patients with atherosclerotic disease confined to the infra-popliteal arteries may be asymptomatic due to the excellent collateral network which develops between tibial arteries; one patent tibial artery is often sufficient to keep a patient free from ischemic symptoms

When these patients present with CLI they often have severe, extensive three-vessel disease and only 20–30% have a simple, focal lesion with good distal run-off. Patients are usually elderly with several co-morbidities, such as diabetes and coronary artery disease, which increases the surgical risk.

Recent advances in endovascular interventions have made this minimally invasive approach an important alternative in the treatment of lower extremity occlusive disease. However, despite rapidly evolving endovascular technology, lower-extremity endovascular intervention continues to be one of the most controversial and challenging areas of therapeutic strategy.

As a result of rapid technologic advances that include smaller catheter and balloon profiles, better balloon and guidewire construction, superior imaging equipment, and the introduction of stents,both short- and long-term outcomes of

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Table of abbreviations

ABI	Ankle Brachial Index
ABPI	Ankle Brachial Pressure Index
ARF	Acute Renal Failure
BK	Below Knee
BE	Balloon Expandable
CB	Cutting Balloon Angioplasty
CDTT	Catheter-directed intra-arterial thrombolytic therapy
CHD	Coronary Heart Disease
CLI	Critical Lower Limb Ischemia
CM-ARF	Contrast Media-Acute Renal Failure
CM	Capillary Microscopy
CRF	Chronic Renal Failure
CTO	Chronic Total Occlusions
DM	Diabetes Mellitus
EC	Endothelial Cells
FDA	Food and Drug Administration
Fr	French
GC	Guiding Catheters
ICU	Intensive Care Unit
ID	Internal Diameter
LACI	Laser Angioplasty in Chronic Ischemia
LDF	Laser Doppler Fluxmetry
LEAOD	Lower extremity arterial occlusive disease
MDCT	MultiDetector Computed Tomography

MRA	Magnetic Resonance Angiography
OD	Outer Diameter
OTW	Over The Wire system guidewire
PAD	Peripheral Arterial Disease
PARIS	Peripheral Artery Radiation Investigational Study
PATRIOT	Peripheral Approach to Recanalization in Occluded Totals
PLLA	poly-L-lactic acid
PTA	Percutaneous Transluminal Angioplasty
rtPA	Recombinant tissue plasminogen activator
SCT	Spiral Computed Tomography
SE	Self Expandable
SFA	Superficial Femoral Artery
SIA	Sub Intimal Angioplasty
SLP	Segmental Limb Systolic Pressure Measurements
SMC	Smooth Muscle Cells
TASC	Trans Atlantic Inter-Society Consensus
Tc*p*O2	Trans Cutaneous Oxygen measurement
vs	vessel
VWF	Von Willebrand Factor
VWF	Doppler Velocity Wave Form

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INTRODUCTION

Critical limb ischemia (CLI) is an end-stage manifestation of peripheral artery disease (PAD), and typically describes patients with ischemic rest pain (Rutherford category 4), or patients with ischemic skin lesions, either ulcers or gangrene (Rutherford category 5-6). ***(Norgren et al., 2007)***

Both surgical bypass and endovascular revascularisation are currently accepted modalities for CLI. ***(Dawson & Mills. 2007)***

Distal bypass for limb salvage with autogenous conduit is an excellent option for patients who are good candidates for surgical revascularization. However, prohibitive comorbidities, inadequate conduit, and lack of suitable distal targets for revascularization all conspire to erode the pool of good surgical bypass candidates significantly. ***(Marc et al., 2008)***

In most surgical series, the 3-year bypass patency rates of calf arteries ranged from 40% for prosthetic bypasses to 85% for saphenous vein bypasses. ***(Adam et al., 2005)***

Notably, the clinical results and limb salvage after PTA

are known to be higher than the hemodynamic patency rate and it has been repeatedly shown that healed ischemic lesions do not recur even with restenosis of the dilated vessels. That is, less blood flow is required to keep tissues healed than to achieve healing. Surgical bypass patency, in contrast, always exceeds the limb salvage rate. ***(Bosiers et al., 2006)***

The recently renewed Trans-Atlantic Inter-Society Consensus Document on management of PAD (TASC II) indicates there is increasing evidence to support a recommendation for angioplasty in patients with CLI and Below Knee (BK) artery occlusion where in-line flow to the foot can be reestablished. ***(Norgren et al., 2007)***

AIM OF THE WORK

This study aims to highlight the effect of Infrapopliteal Angioplasty as a line of treatment of distal occlusive disease.

Anatomy of Lower Limb Arterial System

Femoral Artery

The common femoral artery is the continuation of the external iliac artery. It begins at the level of the inguinal ligament and ends when it originates the arteria profunda femoris. The continuation of the common femoral artery is then called the superficial femoral artery. The superficial femoral artery extends down the leg, where it passes through the adductor canal originating the popliteal artery. The femoral nerve (most lateral), the common femoral artery (in the centre), and the common femoral vein (most medial) have a constant relationship when they pass under the inguinal ligament and reach the inguinal compartment, surrounded by muscles forming a bundle. ***(Williams et al., 1999)***

Branches

- Superficial epigastric artery
- Superficial circumflex iliac artery
- Superficial external pudendal artery
- Deep external pudendal artery

- Arteria profunda femoris
- Superficial femoral artery
- Muscular branches
- Descending genicular arteries. ***(Williams et al., 1999)***

Popliteal Artery

It is critical to understand the anatomy of the popliteal fossa when performing percutaneous popliteal artery access to prevent the creation of an arteriovenous fistula in percutaneous posterior access to puncture of the popliteal vein. ***(Jenkins, 2008)***

The popliteal artery, vein, and sciatic nerve are encased in a common sheath, which courses upwards along the diagonal of the popliteal fossa. These structures usually remain superficial in location well above the level of the joint space. The semitendinous muscle is seen anterior to the artery. ***(Jenkins, 2008)***

The popliteal artery, which is the continuation of the femoral artery, crosses the popliteal fossa. From the opening in adductor magnus it descends laterally to the intercondylar fossa, where it divides into the anterior and posterior tibial arteries. The artery is relatively tightened at the adductor magnus hiatus and again distally by the fascia related to soleus. It is therefore vulnerable to

traction during knee injuries, e.g. dislocation**.** ***(Valentine & Wind, 2003)***

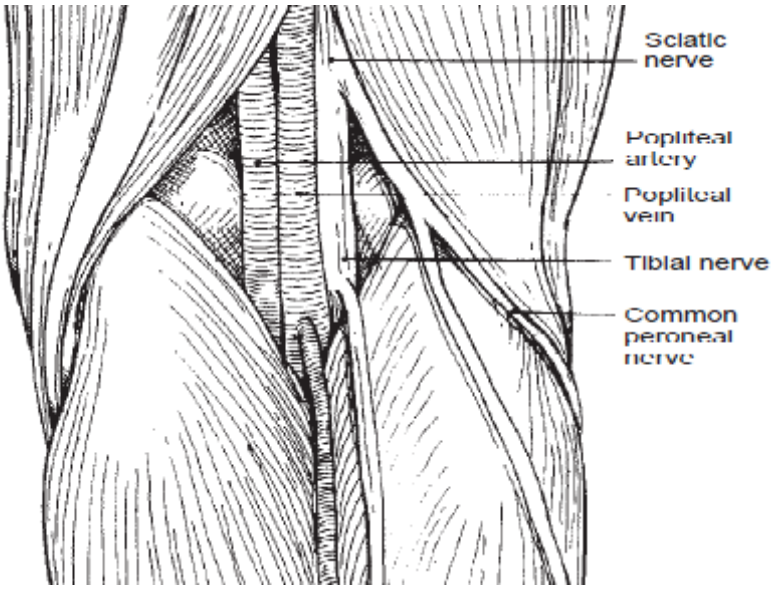

Figure (1) The popliteal fossa. ***(Jenkins, 2008)***

Branches

- Cutaneous branches
- Superior muscular branches
- Sural arteries
- Superior genicular arteries
- Middle genicular artery
- Inferior genicular arteries. ***(Uflacker,2007)***