Efficacy of angioplasty in long multisegmental lower limb occlusive lesions

Thesis

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Karim Shalaby El-Awady

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List of abbreviation

- **ABI** : Ankle brachial index
- **AFS :** Amputation free survival
- **ASA :** acetyl salicylic acid
- **ATA** : Anterior tibial artery
- **AVF** : Arteriovenous fistula
- **BA :** balloon angioplasty
- **BASIL** : By pass versus angioplasty in severe ischaemia of the leg
- **BS :** Bypass surgery
- **BTA :** Below the ankle
- **BTK** : Below the knee
- **CAD** : Coronary artery disease
- **CFA** : Common femoral artery
- **CIA** : Common iliac artery
- **CLI** : Critical limb ischaemia
- **CRP :** C-reactive protein
- **CTA :** Computed tomographic angiography
- **CVD** : Cerebro vascular disease
- **DEBs** : Drug eluting balloons
- **DM** : Diabetus Mellitus
- **DSA** : Digital subtraction angiography

- **EIA** : External iliac artery
- **EPDs** : Embolic protection devices
- **ESRD** : End stage renal disease
- **ET :** Endovascular treatment
- **GENOA :** Genetic Epidemiology Network of Arteriopathy
- **GSV :** Great saphenous vein
- **HDL :** High-density lipoprotein
- **HERS :** Heart and Estrogen/Progestin Replacement Study
- **HRQOL :** Hospital costs and healthrelated quality of life
- **IC** : Intermittent claudication
- **IDL :** Intermediate density lipoprotein
- **ISR :** In stent restenosis
- **LMWH :** Low molecular weight heparin
- **LSR :** Limb salvage rate
- **MRA** : Magentic resonance angiography
- **NO :** Nitric oxide
- **OS :** Overall survival
- **PAD** : Peripheral arterial disease
- **PAOD** : Peripheral arterial occlusive disease
- **PGE :** Prostaglandin

- **PREVENT :** Prevention of Recurrent Venous Thromboembolism
- **PTA** : Percutaneous transluminal angioplasty
- **PTFE** : Polytetrafluoroethylene
- **PVD** : Peripheral vascular disease
- **QOL** : Quality of life
- **RCT :** Randomized controlled trial
- **RI :** Renal insufficiency
- **SD** : Strandard deviation
- **SFA** : Superficial femoral artery
- **SIA :** Subintimal angioplasty
- **SIROCCO :** The Sirolimus Coated Cordis SMART Nitinol Self-Expandable Stent
- **SLI :** Severe leg ischemia
- **SMCs :** Smooth muscle cells
- **TASC** : Transatlantic intersociety consensus
- **US** : Ultrasound
- **VIBRANT :** The Viabahn versus Bare Nitinol Stent Trial
- **VLDL** : Very low-density lipoprotein

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Introduction

Peripheral atherosclerotic disease affects 12%–14% of the general population, and its prevalence increases with age, affecting as many as 20% of patients older than age 75 years ***(Misra, 2012).***

PAD affects 8 to 10 million Americans and is associated with a threefold to sixfold increased risk of cardiovascular morbidity and death compared with individuals without PAD ***(Varu et al., 2010).***

Patients with CLI represent approximately 1% of the total number of patients with PAD, with overall mortality in these patients approaching 50% at 5 years and 70% at 10 years (***Varu et al., 2010).***

Critical limb ischemia is defined as limb pain that occurs at rest, or impending limb loss that is caused by severe compromise of blood flow to the affected extremity. The international consensus on the definition of CLI is the following: any patient with chronic ischemic rest pain, ulcers, or gangrene attributable to objectively proven arterial occlusive disease ***(Varu et al., 2010).***

CLI is usually caused by obstructive atherosclerotic disease; however, CLI can also be caused by atheroembolic or thromboembolic disease, vasculitis, in situ thrombosis related to hypercoagulable states, thromboangiitis obliterans, cystic adventitial disease, popliteal entrapment, or trauma. Regardless of the etiology, the pathophysiology of CLI is a chronic and complex process that affects the macrovascular

and microvascular systems, as well as surrounding tissues ***(Varu et al., 2010).***

Risk factors contributing to PAD are the same as those for atherosclerosis: Smoking - tobacco (tenfold increase in risk for PVD), Diabetes mellitus (two and four times increased risk of PVD), Dyslipidemia, Hypertension, age over 50, gender (male), obesity, or with a family history of vascular disease ***(Becker, 2002).***

The diagnosis is usually made by the typical symptoms. A simple test that can be done is to check the blood pressure in the ankle and compare this to the blood pressure in the arm. This called the ankle brachial pressure index (ABI). If the blood pressure in the ankle is much different to that in the arm that means that arteries of lower limb are affected. CT angiography or arterial duplex can build up a 'map' of the arteries and show where they are narrowed ***(Mazari et al., 2010).***

Once the diagnosis is confirmed, the goals of treating CLI are to relieve ischemic pain, heal ischemic ulcers, prevent limb loss, improve patient function and Quality of Life, and prolong survival. Revascularization could optimally achieve these goals, but the severity of comorbidities, along with durability of the reconstruction in patients with CLI, demands a risk-benefit analysis to determine the optimal therapy ***(Varu et al., 2010).***

For patients able to tolerate surgical procedures, revascularization, including bypass surgery, with or without thromboendarterectomy, as well as endovascular techniques offers the best chance for limb salvage ***(Varu et al., 2010).***

Most of the studies report small numbers of patients who, for usually technical reasons, are not candidates for open surgery. Patients usually are cited as having no distal arterial targets for bypass or no veins for a conduit. The end points of success are typically quite broad and include healing of ischemic ulcers, resolution of rest pain, improvement of the ankle-brachial index, or healing of a minor amputation site ***(Kudo et al., 2005).***

The clinical outcomes achieved with Percutaneous Transluminal Angioplasty are typically compared with the expected results after bypass. The conclusions are fairly consistent. Each report usually concedes that although outcomes are not as good as those with surgical bypass, they are usually better than expected and are certainly better than doing nothing ***(Cvetanovski et al., 2009).***

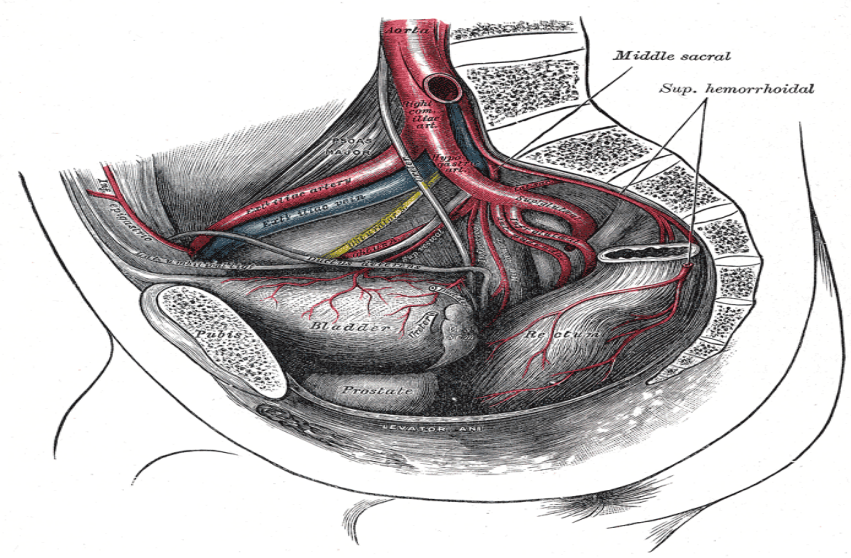
In summarizing the reported data, limb salvage and, more commonly "clinical success rates" ranged from 55% to 90%. It is interesting to note that in essentially every report, historical controls are implied ***(Clair et al., 2005).***

Aim of The Work

The aim of this study is to outline the efficacy of angioplasty in long multisegmental lower limb occlusive lesions in patients unsuitable for surgery either due to poor distal run off, or patients with poor general condition.

The Common Iliac Arteries

The abdominal aorta divides, on the left side of the body of the fourth lumbar vertebra, into the two common iliac arteries (Fig. 1-1). Each is about 5 cm. in length. They diverge from the termination of the aorta, pass downward and lateralward, and divide, opposite the intervertebral fibrocartilage between the last lumbar vertebra and the sacrum, into two branches, the external iliac and hypogastric arteries; the former supplies the lower extremity; the latter, the viscera and parietes of the pelvis ***(lewis, 2000).***



(Fig. 1-1) The arteries of the pelvis *(lewis, 2000).*

The right common iliac artery is somewhat longer than the left, and passes more obliquely across the body of the last lumbar vertebra. ***(lewis, 2000).***

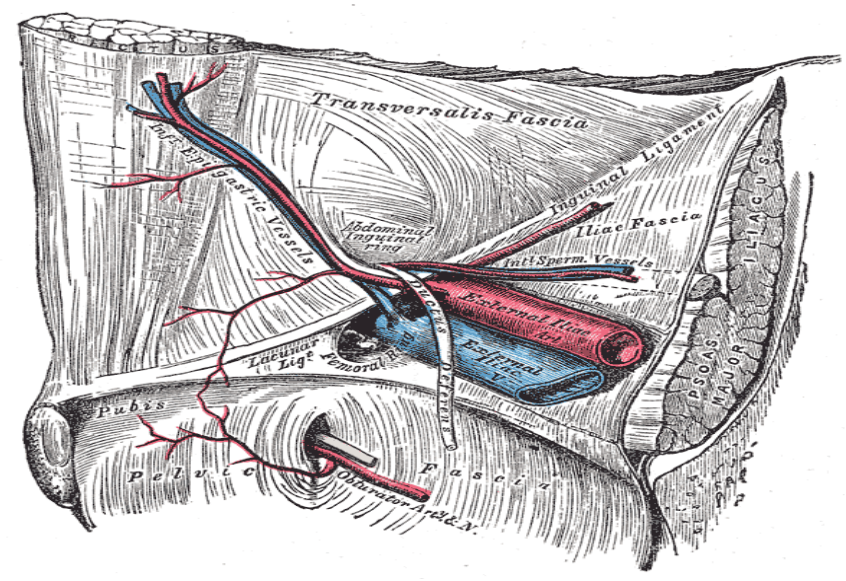
Branches : The common iliac arteries give off small branches to the peritoneum, Psoas major, ureters, and the surrounding areolar tissue, and occasionally give origin to the iliolumbar, or accessory renal arteries ***(lewis, 2000).***

The External Iliac Artery

The **external iliac artery** is larger than the hypogastric, and passes obliquely downward and lateralward along the medial border of the Psoas major, from the bifurcation of the common iliac to a point beneath the inguinal ligament, midway between the anterior superior spine of the ilium and the symphysis pubis, where it enters the thigh and becomes the femoral artery ***(lewis, 2000).***

Branches : Besides several small branches to the Psoas major and the neighboring lymph glands, the external iliac gives off two branches of considerable size:

The **inferior epigastric artery** (*a. epigastrica inferior; deep epigastric artery*) (Fig. 1-2) *arises* from the external iliac, immediately above the inguinal ligament. It finally divides into numerous branches, which anastomose, above the umbilicus, with the superior epigastric branch of the internal mammary and with the lower intercostal arteries ***(lewis, 2000).***



(Fig. 1-2) Branches of external iliac artery ***(lewis, 2000).***