INTRODUCTION

Acute limb ischemia (ALI) is defined as an acute reduce in arterial perfusion (<14 days) that threatens limb integrity and viability. ALI may result from embolic or thrombotic arterial obstruction, which in flip effects in extreme hypoperfusion to the distal limb ***(Hynes et al., 2012).***

(ALI) may be the first manifestation of arterial disease in a previously asymptomatic patient or may occur as an acute event that causes symptomatic deterioration in a patient with antecedent lower extremity periphery artery disease (PAD) and intermittent claudication. The incidence of this condition is approximately 1.5 cases per 10,000 persons per year **(Norgren Letal., 2007).**

ALI patients are not medically optimized and present with advanced disease states contributing to considerablely higher postoperative complications and limb loss. Operative interventions for patients with ALI include open surgical repair (OSR), endovascular revascularization (ER), and hybrid revascularization (HyR) with combinations of both open surgery and endovascular approaches. Systemic anticoagulation and emergent open surgical intervention was

the conventional treatment of acute limb ischemia***(Javid et al., 2008)***.

In initial trials an endovascular option for the treatment of ALI was equal to conventional surgery lower regarding limb loss and mortality **,**However, endovascular therapy has been associated with a longer time to restore arterial flow, hemorrhagic complications, and lower rates of technical success compared with OSR ***(Baril et al., 2014)***.

Recently, with the development of advanced thrombolysis techniques and new pharmacologic agents has helped achieve a more complete and faster clot resolution while shortening the duration of lysis***(Baril et al., 2014)***.

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The clinical presentation is considered to be acute if it occurs within 2 weeks after symptom onset. Symptoms develop over a period of hours to days and range from new or worsening intermittent claudication to pain in the foot or leg

when the patient is at rest, paresthesias, muscle weak- ness, and paralysis of the affected limb. Physical findings may include an absence of pulses distal to the occlusion, cool and pale or mottled skin, reduced sensation, and decreased strength.**((Lyden SP, etal, 2001**). The 30-day mortality and amputation rates are 15% and may be up to 25%.4 **(Lyden SP etal., 2001**).

Leg symptoms in ALI relate primarily to pain or limb function. The abruptness and time of onset of the pain, its location and intensity, as well as change in severity over time should all be explored. **(Lyden SP etal., 2001**).

The duration and intensity of the pain and presence of motor or sensory changes are very important in clinical decision making and urgency of revascularization (**Lyden SPet**al., **2001**).

Outcomes and prognosis of ALI largely depend on the rapid diagnosis and initiation of appropriate and effective therapy. In this review, the diagnosis and treatment of ALI will be discussed.

AIM OF THE WORK

This is a prospective non randomized cohort study, which is a single arm clinical study to determine primary patency of lower limb arterial tree following hybrid revascularization for patients diagnosed as acute on chronic arterial insufficiency during six months follow up.

Chapter 1

SURGICAL ANATOMY AND EXPOSURE

Femoral region Surgical anatomy

The femoral artery is the principal channel supplying blood to the lower limb ***(Beirne et al., 2008).***

Inguinal ligament is The boundary mark between the external iliac artery and femoral artery. Just medial to midpoint of inguinal ligament is the artery location. The femoral vasculature is bounded laterally by iliopsoas muscles, medially by reflected fibers of inguinal ligament (forming the lacunar ligament) and posteriorly by superior pubic ramus **,** figure (1). ***(Beirne et al., 2008)*** **.**

Inside the abdominal wall, the external iliac artery divide into two small branches(inferior epigastric artery and deep circumflex iliac artery***)*** that run in a plane between the fascia transversalis and peritoneum ***(Beirne et al., 2008).***

In approximately thirty percent of the population have an abnormal obturator artery that arises from inferior epigastric artery instead of internal iliac artery. This aberrant vessel descends across the pectinate line adjacent to lacunar ligament (in only 3% of patients) and it might be injured during graft tunneling at this position ***(Baril et al., 2010)***.

The proximal femoral artery and vein are wrapped by a fibrous covering called the femoral sheath ***(Beirne et al., 2008)***.

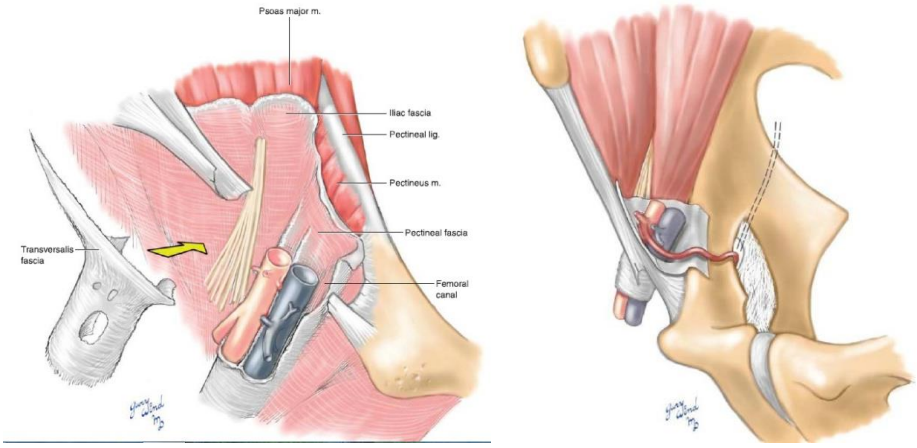

Figure (1): Anatomy of Inguinal canal ***(Netter et al., 2014).***

The course of the vessels in the proximal third of the thigh lies within another triangular space defined by muscular boundaries (Scarpa's triangle). The lateral margin of the triangle is formed by the Sartorius muscle, the medial margin by adductor longus, and the cephalad base of triangle by the inguinal ligament ***(Beirne et al., 2008).***

The fascia lata forms the anterior roof over the femoral triangle and attaches to the inguinal ligament. It is breached by an oval opening (fossa ovalis) through which lymphatics and great saphenous vein pass. The fossa ovalis is covered by the cribriform fascia, which supports one of the two groups of superficial subinguinal lymph nodes. The more cephalad group of nodes lies parallel to inguinal ligament. These nodes are in the path of the anterior exposure procedure of femoral vessels,

and the rich plexus of lymphatics surrounding the nodes increases the risk of postoperative lymphocele in that ***(Beirne et al., 2008)***, figure (2).

The common femoral artery gives the deep external pudendal artery before bifurcating into superficial femoral and profunda femoris arteries. It ends into four perforating branches piercing the adductor magnus and brevis muscles ***(Beirne et al., 2008)***.

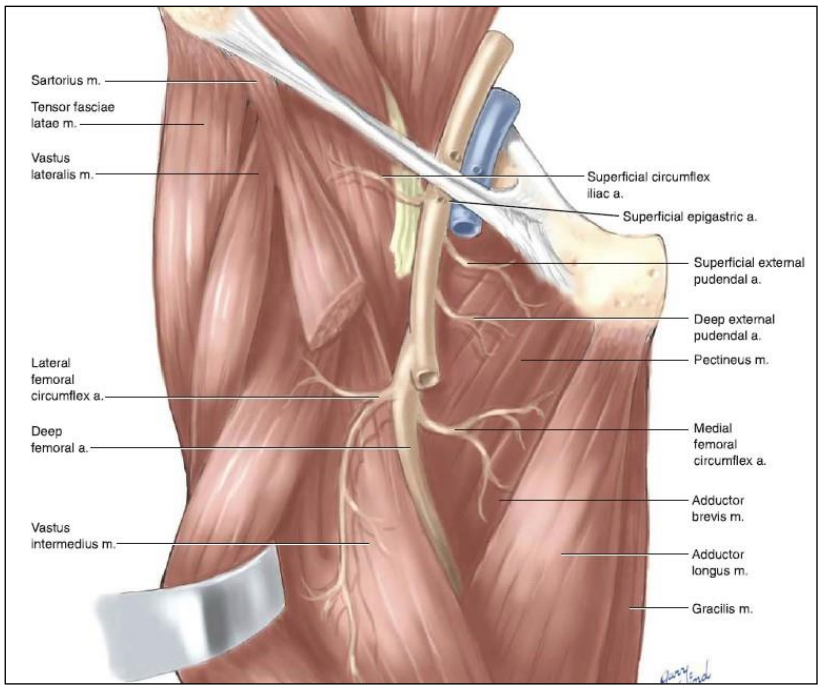

Figure (2): Anatomy of CFA and femoral triangle ***(Netter et al., 2014).***

The superficial branches of the femoral artery arise just distal to the inguinal ligament and penetrate both the femoral sheath and fascia lata to reach the subcutaneous tissue of the lower abdomen and upper thigh. These branches are superficial

external pudendal, superficial circumflex iliac and superficial epigastric arteries. The superficial external pudendal artery crosses the femoral vein adjacent to saphenofemoral junction. The superficial epigastric artery is well known to support an axial lower abdominal flap ***(Beirne et al., 2008).***

The deep femoral artery arises about five centimeters below the inguinal ligament from the posterolateral portion of the common femoral artery ***(Beirne et al., 2008)***.

Shortly after its origin, the profunda femoris artery gives off the lateral and medial circumflex femoral arteries. The origin the deep femoral artery is crossed by the lateral circumflex femoral vein ***(Beirne et al., 2008),*** figure (3).

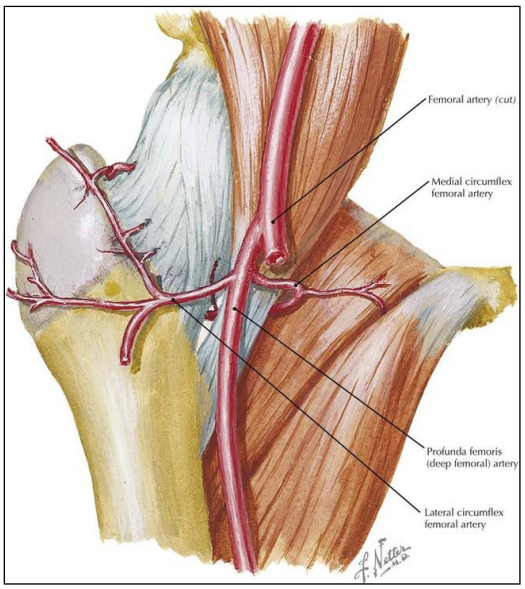

Figure (3): Anatomy of Profunda femoris ***(Netter et al., 2014).***

Deep to the pectineus muscle lays the obturator foramen, covered by dense membrane. Within the obturator foramen, the obturator externus has its broad origin from the lower part of the membrane, and the obturator nerve and vessels pass from pelvis to thigh through a more cephalad part of the canal. The obturator membrane forms an alternative route for bypass grafts to femoral artery ***(Baril et al., 2010)***.

The superficial femoral artery traverses the thigh through the adductor canal (Hunter's canal) between the quadriceps and adductor muscles ***(Beirne et al., 2008)***.

Near the adductor hiatus, the superficial femoral artery gives off the highest genicular artery that may assume importance as a collateral channel for femoral occlusive diseases ***(Beirne et al., 2008).***

Anatomy of lower limb (LL) arterial system is illustrated at figure (4).

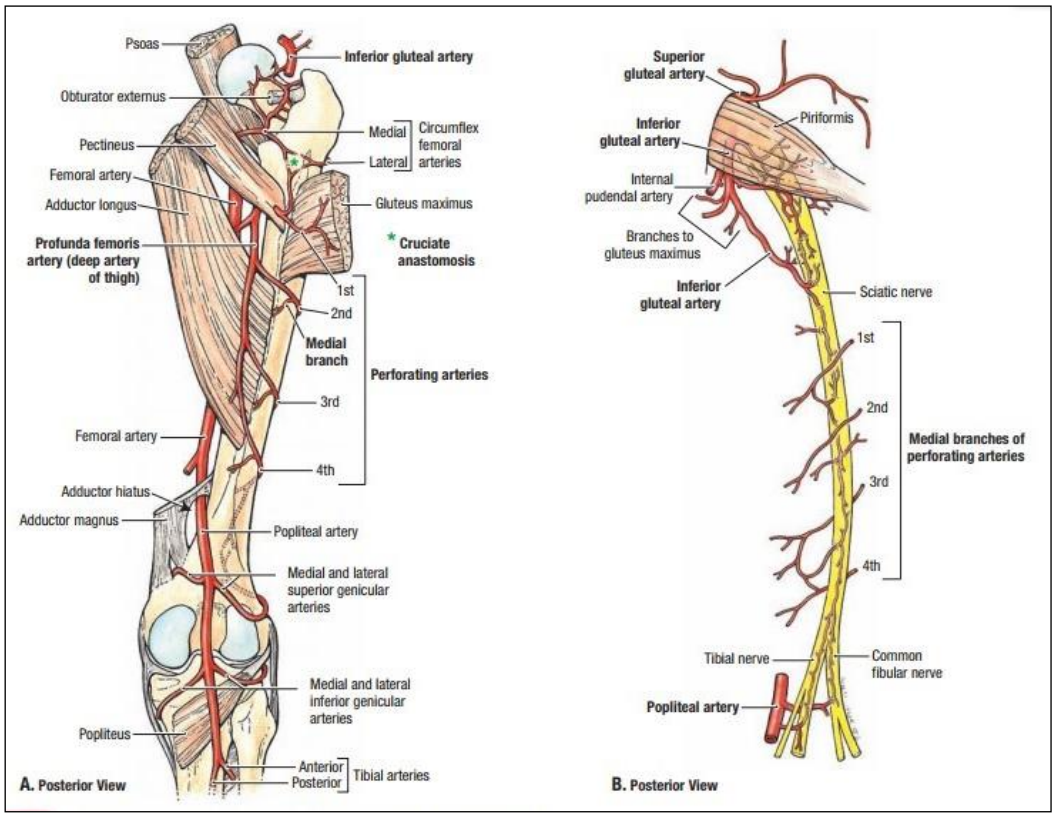

Figure (4): Anatomy of Lower Limb arterial system (Posterior view of thigh) ***(Agur et al., 2013).***

Surgical anatomy of popliteal artery:

The popliteal artery is a short yet a major arterial conduit of the leg situated between the adductor hiatus and popliteus muscle posterior to the knee joint ***(Drake et al., 2015).***

The popliteal vessels are enclosed within a firm connective tissue sheath to which the tibial nerve is loosely attached ***(Drake et al., 2015).***

There is a network of popliteal branches around the knee that makes important collateral connections proximally and

distally. It consists of paired superior and inferior genicular arteries and a middle genicular artery ***(Drake et al., 2015).***

The short distal segment of the popliteal artery lies between the heads of the gastrocnemius and popliteus muscles, figure (5). There are no major branches from this segment, and it is approachable from both the medial and lateral sides of the leg. The popliteal artery disappears through a hiatus in the origin of the soleus muscle ***(Drake et al., 2015).***

The path of popliteal vessels behind the knee can be visualized by mobilizing the posteromedial thigh muscles and the medial head of gastrocnemius ***(Drake et al., 2015).***

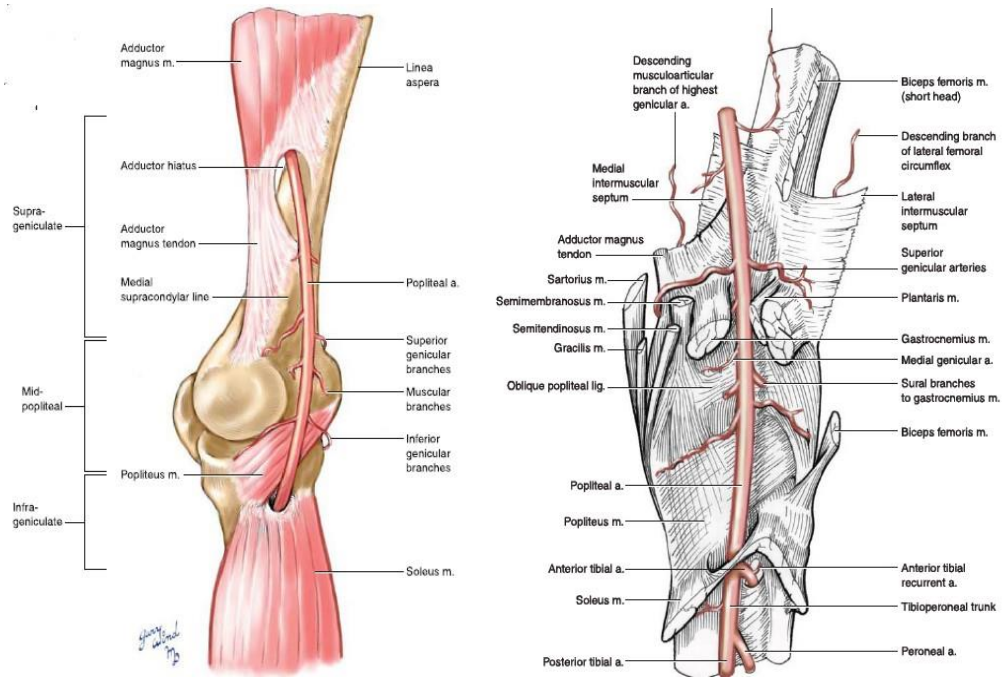

Figure (5): Anatomy of popliteal artery ***(Netter et al., 2014).***

Surgical anatomy of the leg vessels:

The anterior tibia1 artery finds its way through the leg, passing in the interstice between the tibialis anterior and extensor digitorum longus and comes from the split trunk of the popliteal artery until it reaches the foot. It runs below the upper retinaculum and the cranial segment, but above the caudal segment of the lower retinaculum, on the dorsum of the foot, where it passes between the tendon of the extensor digitorwm longus muscle and the extensor hallucis longus becoming the dorsal artery of the foot (arteria dorsalis pedis) ***(Lotti et al., 1990).*** Posterior Tibial Recurrent, Fibular, Muscular, Anterior Medial Malleolar, Anterior Tibial Recurrent, Anterior Lateral Malleolar, are the branches of the anterior tibial artery are: ***(Drake et al., 2015).***

The continuation of the anterior tibial isThe arteria dorsalis pedis which passes forward from the ankle-joint along the tibial side of the dorsum of the foot to the proximal part of the first intermetatarsal space, where it divides into two branches, the first dorsal metatarsal and the deep plantar Recurrent ***(Drake et al., 2015).***

The posterior tibial artery in the lower part of its course is situated midway between the medial malleolus and the medial process of the calcaneal tuberosity and it begins at the lower border of the Popliteus, opposite the interval between the tibia and fibula; it extends obliquely downward, as it descends,

it approaches the tibial side of the leg, lying behind the tibia, in lower part of its course it divides beneath the origin of the Adductor hallucis into the medial and lateral plantar arteries ***(Drake et al., 2015).***

The peroneal artery is located deep on the back of the fibular side of the leg. It *arises* 2.5 cm. below the lower border of the Popliteus, from the posterior tibial aspect, and passes obliquely toward the fibula, and then descends along the medial side of that bone, in a fibrous canal between the Flexor hallucis longus, and Tibialis posterior an or in the it continue. Then it runs behind the tibiofibular syndesmosis and divides into lateral calcaneal branches which ramify on the lateral and posterior surfaces of the calcaneus ***(Drake et al., 2015),*** figure (6).