Ein-Shams University
Faculty of Medicine
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ACUTE ARTERIAL ISCHAEMIA OF THE LOWER LIMB

ESSAY

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BY

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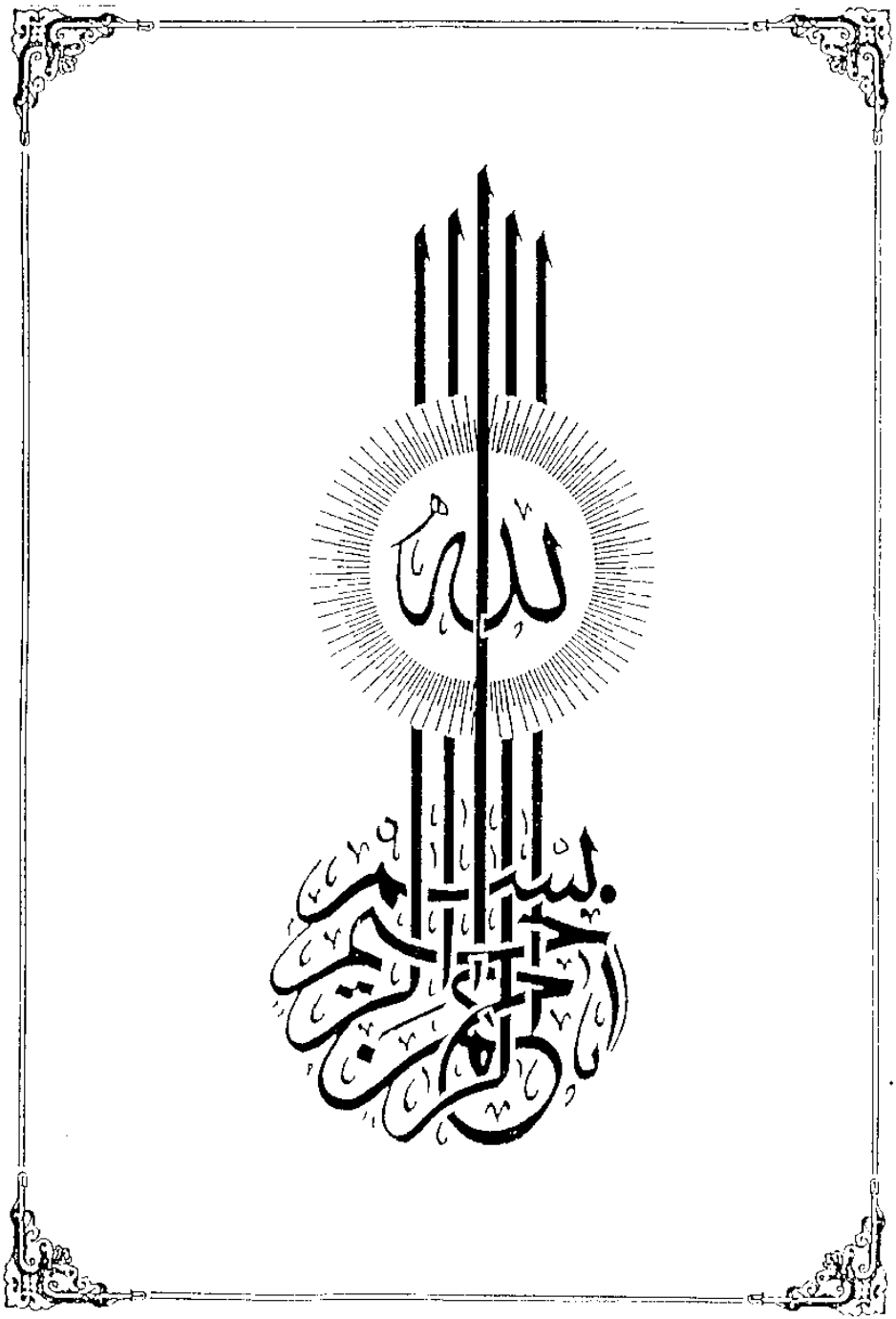

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PART I

ANATOMY

ARTERIES OF THE LOWER LIMB

The Embriology of the Arteries of the Lower Limb:-

The original artery to the lower limb is the sciatic (ischiadic), a branch given off from that part of the umbilical artery which will later become the internal iliac or hypogastric. It grows down the flexor aspect of the limb to feed the developing foot. A little later the femoral artery arises form the external iliac and grows down the dorsal surface of the thigh, but passes through the developing musculature to the ventral aspect, where it eventually establishes connections with and takes over the lower part of the sciatic artery. Parts of the original sciatic stem then disappear, an uppermost part persisting as the inferior gluteal artery, an intermediate part as the popliteal, and a lower part, having lost its connection with the digital vessels, as the peroneal. This method of development obviously explains the very occasional persistence of a sciatic artery (ischiadic artery) as the main stem to the leg and foot; in such cases the artery is a contin-

uation of a large inferior gluteal, and the femoral artery may or may not have a connection to the popliteal, (Hollinshead, 1958). (Fig. 1).

Introduction:-

Of the three major arterial stems into the lower limb, two of them, the superior and inferior gluteal arteries, pass through the greater sciatic foramen and their distribution is confined largely to the buttock, even though the inferior gluteal at one stage of development was the main stem down the posterior aspect of the thigh and leg. Thus the femoral artery, the continuation of the external iliac, is the chief artery to the free limb. The largest branch of the femoral artery is the profunda femoris, given off in the upper part of the thigh; it runs deeply in the anteromedial portion of the thigh to send branches to the posteriorly lying structures, which after the disappearance of the primitive sciatic artery lack a longitudinally running vessel on their side. After giving off the profunda, the remainder of the femoral artery,

sometimes called the superficial femoral, runs more superficially (but under cover of the sartorius muscle) along the anteromedial side of the thigh, and perforates the tendon of the adductor magnus muscle to reach the popliteal fossa and pass behind the knee; the femoral artery changes its name to popliteal as the vessel passes through the adductor hiatus.

The popliteal artery ends a little below the knee by dividing into the anterior and posterior tibial arteries. The posterior tibial gives off a deep branch, the peroneal artery (corresponding to the anterior interosseous in the forearm) and continues down the calf between the superficial and deep groups of muscles, to pass around the posteromedial aspect of the ankle and help supply especially the more superficial tissues of the sole of the foot. The anterior tibial, corresponding to the posterior interosseous artery in the forearm, passes between the tibia and fibula to run deeply down the front of the leg, and continue onto the dorsum of the foot as the dorsalis pedis artery;

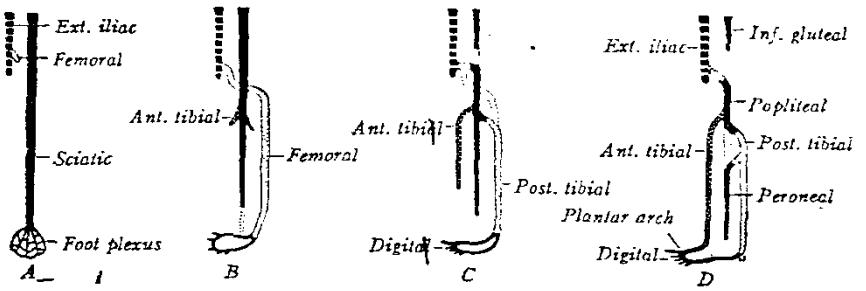

Fig.1-Four stages in the development of the arteries of the lower limb ,(Redrawn from Hollinshead, 1958).

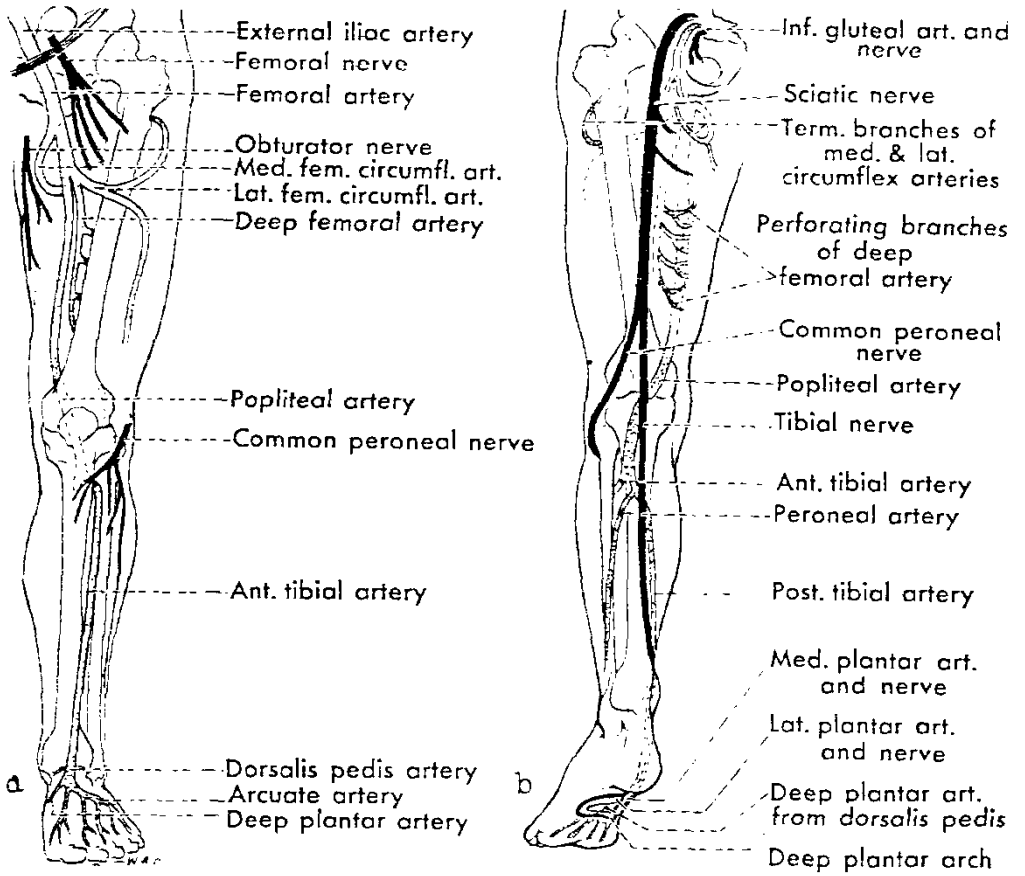

Fig.2-Arteries and nerves of the lower limb, (Redrawn from Hollinshead, 1958).

the dorsalis pedis artery behaves like the radial artery in the hand, sending its main branch between the first and second metatarsal bones to reach the main contributor to the plantar (deep plantar) arch, (Hollinshead, 1958).(Fig. 2).

THE FEMORAL ARTERY

The femoral artery is the continuation of the external iliac. It begins behind the inguinal ligament, midway between the anterior superior iliac spine and symphysis pubis, and passes down the front and medial side of the thigh. It ends at the junction of middle and inferior thirds of the thigh, where it passes through an opening in adductor magnus to become the popliteal. Above the femoral artery is in the femoral triangle, below in the adductor (subsartorial) conal. The first 3 or 4 cm of the vessel are enclosed, with the femoral vein, in the femoral sheath (Williams and Warwick, 1980).

FEMORAL SHEATH. Within the lacuna vasorum, and

for about 4 cm distal to it, the femoral vessels are provided with a membranous investment known as the femoral sheath. This sheath is a sleevelike prolongation of the fascial envelopment of the abdomen which passes downward into the thigh behind the inguinal ligament. Lateral to the lacuna vasorum, mainly over the iliopsoas muscle, the transversalis and iliac fasciae are attached firmly to the inguinal ligament. Opposite the vessels, the fascial layers are carried into the thigh to form the femoral sheath. The anterior wall of the sheath is thin and continuous with the transversalis fascia lining the deep surface of the anterior abdominal wall; the posterior wall is constituted partly by the iliac fascia, which is prolonged downward over the iliopsoas muscle, and partly the pubic portion of the fascia lata covering the pectineus muscle. The sheath extends downward as far as the origin of the profunda artery, where it fuses with the outer coats of the femoral vessels. Two septa from the femoral sheath divide the lacuna vasorum into arterial, venous,

and lymphatic compartments.

The medial compartment is the femoral canal, the entrance of which, the femoral (crural) ring, is an aperture bounded anteriorly by the anterior femoral sheath, posteriorly by the pectineus muscle and the subjacent pubic ramus, laterally by the femoral vein, and medially by the sharp lateral margin of the transversus abdominis insertion into the pubic bone (Cooper's ligament). The inguinal and lacunar ligaments are more superficial structures and do help to limit the size of a femoral hernia. However, they are not the true margins of the femoral ring, as is so frequently stated. The femoral ring (anulus femoralis) is occluded by a fascial septum (septum femorale), and is a weak area in the fascial envelope of the abdomen.
It is important surgically because it allows the passage of femoral hernia into the thigh.

FEMORAL TRIGONE (OF SCARPA). The femoral trigone is a triangular space lying immediately distal

to the inguinal ligament. This ligament forms the base of the trigone. The oblique lateral boundary is the medial margin of the sartorius muscle, and the medial boundary is the medial border of the adductor longus muscle. The roof consists of the fascia lata, which completely cover the space anteriorly. The floor is made up of two inclined planes, which form a well-marked median groove at their junction. The laterally inclined plane consists of the iliopsoas muscle invested by a thin layer of fascia. The adductor longus and pectineus muscles, both of which are invested with fascia lata, form the medial plane. The most important contents of the prismatic space, included between the fascial roof and floor of the femoral trigone, are the femoral vessels and nerve and their large branches. These structures, the termination of the great saphenous vein, and the deep subinguinal lymph vessels and glands are embedded in a quantity of loose fatty tissue. The efferents from the popliteal gland end in this deep group which sends its efferent

trunks to the external iliac lymph nodes. This space communicates with the abdomen through the lacuna vasorum.

ADDUCTOR CANAL (OF HUNTER) AND ITS CONTENTS.

The adductor canal is an intermuscular space on the medial aspect of the middle third of the thigh which contains the femoral vessels and the saphenous nerve. The lateral wall is formed by the vastus medialis muscle, and the posterior wall by the adductor longus muscle proximally and the adductor magnus muscle distally. The roof of the canal is a layer of deep fascia running from the adductor longus and magnus muscles to the vastus medialis muscle. The sartorius muscle covers the space. The canal runs from the apex of the femoral triangle to the tendinous hiatus in the adductor magnus muscle, through which the femoral vessels enter the popliteal fossa.

The femoral artery is bound closely by connective tissue to the femoral vein, which at first lies posterior to and then slightly to the lateral side of the