When examining a lump in the popliteal region, let these possibilities pass through your mind:
the vein—varicosities of the short saphenous vein in the roof of the fossa.
the artery—popliteal aneurysm.
the lymph nodes—infection secondary to suppuration in the foot.
the soft tissues—lipoma, sarcoma.
the knee joint—joint effusion.
the tendons—enlarged bursae, especially those beneath semimembranosus and the heads of gastrocnemius.

THE ARTERIES OF THE LOWER LIMB

The femoral artery is the distal continuation of the external iliac artery beyond the inguinal ligament. It traverses the femoral triangle and the adductor canal of Hunter then terminates a hand’s-breadth above the adductor tubercle by passing through the hiatus in adductor magnus to become the popliteal artery (Figs. 141, 144).
Throughout its course the femoral artery is accompanied by its vein, which lies first on the medial side of the artery and then passes posteriorly to it at the apex of the femoral triangle.

Branches. In the groin, the femoral artery gives off:
1. The superficial circumflex iliac artery.
2. The superficial inferior epigastric artery.
3. The superficial external pudendal artery.

These three vessels are encountered in the groin incision for repair of an inguinal hernia.

The profunda femoris arises from the femoral artery 2 inches distal to the inguinal ligament. It is conventional to call the femoral artery above this branch the common femoral, and below it, the superficial femoral artery.

The profunda passes deep to adductor longus and gives off medial and lateral circumflex branches and 4 perforating branches. These are important both as the source of blood supply to the great muscles of the thigh and as collateral channels which link the rich arterial anastomoses around the hip and the knee.

CLINICAL FEATURES

1. Recapitulate the surface markings of the femoral artery—the upper two-thirds of a line connecting the mid-inguinal point with the
adductor tubercle, the hip being held somewhat flexed and externally rotated (Fig. 122).

The femoral artery in the upper 4 inches of its course lies in the femoral triangle where it is quite superficial and, in consequence, easily injured. A laceration of the femoral artery at this site is an occupational hazard of butchers and bullfighters.

2. The femoral artery at the groin is readily punctured by a hypodermic needle and is the most convenient site from which to obtain arterial blood samples. Arteriography of the peripheral leg vessels is also easily performed at this point.

3. Arteriosclerotic changes, with consequent arterial occlusion, frequently commence at the lower end of the femoral artery. Collateral circulation is maintained via anastomoses between the branches of profunda femoris and the popliteal artery. If degenerative changes are slight above and below the femoral block, it is now possible to by-pass the occluded segment by means of a graft between the common femoral and popliteal arteries.

The popliteal artery continues on from the femoral artery at the adductor hiatus and terminates at the lower border of the popliteus muscle. It lies deep within the popliteal fossa (see above), being covered superficially by the popliteal vein and, more superficially still, crossed by the medial popliteal nerve.

The popliteal artery gives off muscular branches, geniculate branches (to the knee joint) and terminal branches, the anterior and posterior tibial arteries.

CLINICAL FEATURES

1. Aneurysm of the popliteal artery, once common, is now rare. Its frequency in former days was associated with the repeated traumata of horse-riding and the wearing of high riding-boots—usually in syphilis.

Pressure of the aneurysm on the adjacent vein may cause venous thrombosis and peripheral oedema; pressure on the medial popliteal nerve may cause severe pain in the leg.

2. The popliteal artery is exposed by deep dissection in the mid-line within the popliteal fossa, care being taken not to injure the more superficial vein and nerve.

The posterior tibial artery is the larger of the terminal branches of the popliteal artery. It descends deep to soleus, where it can be exposed by splitting gastrocnemius and soleus in the mid-line, then
becomes superficial in the lower third of the leg and passes behind the medial malleolus between the tendons of flexor digitorum longus and flexor hallucis longus.

Below the ankle, the posterior tibial artery divides into the medial and lateral plantar arteries which constitute the principal blood supply to the foot.

As well as branches to muscles and skin and a large nutrient branch to the tibia, the posterior tibial artery gives off the peroneal artery about 1½ inches from its origin. The peroneal artery runs down the posterior aspect of the fibula, close to the medial margin of the bone, supplying adjacent muscles and giving a nutrient branch to the fibula. Above the ankle it gives off its perforating branch which pierces the interosseous membrane, descends over the lateral malleolus and anastomoses with the arteries of the dorsum of the foot.

The anterior tibial artery arises at the bifurcation of the popliteal artery. It passes forwards between the tibia and fibula over the upper margin of the interosseous membrane and descends on this structure in the anterior compartment of the leg.

At first deeply buried, it becomes superficial just above the ankle between the tendons of extensor hallucis longus and tibialis anterior, being crossed superficially by the former immediately proximal to the line of the ankle joint.

The artery continues over the dorsum of the foot as the dorsalis pedis; this gives off the arcuate artery which, in turn, supplies cutaneous branches to the backs of the toes. Dorsalis pedis itself plunges between the 1st and 2nd metatarsals to join the lateral plantar artery in the formation of the plantar arch, from which branches run forwards to supply the plantar aspects of the toes.

THE VEINS OF THE LOWER LIMB

The veins of the lower limb are divided into the deep and superficial groups according to their relationship to the investing deep fascia of the leg. The deep veins accompany the corresponding major arteries. The superficial veins are the long and short saphenous veins and their tributaries (Fig. 146).

The short saphenous vein commences at the ankle behind the lateral malleolus where it drains the lateral side of the dorsal venous plexus of the foot. It courses over the back of the calf, perforates the deep fascia over the popliteal fossa and terminates in the popliteal vein. One or
more branches run upwards and medially from it to join the long saphenous vein.

The long saphenous vein drains the medial part of the venous plexus on the dorsum of the foot and passes upwards immediately in front of the medial malleolus (Fig. 123); here branches of the saphenous nerve lie in front of and behind the vein. The vein then ascends over the posterior parts of the medial condyles of the tibia and femur to the groin where it pierces the deep fascia at the saphenous opening, an inch below the inguinal ligament, to enter the femoral vein.

The long saphenous vein is joined by one or more branches from the short saphenous, and by the lateral accessory vein which usually enters the main vein at the mid-thigh, although it may not do so until the saphenous opening is reached.
At the groin a number of tributaries from the lower abdominal wall, thigh and scrotum enter the saphenous vein; these tributaries are variable in number and arrangement but usually comprise (Fig. 146):

1. The superficial epigastric vein.
2. The superficial circumflex iliac vein.
3. The superficial external pudendal vein.

The superficial epigastric vein communicates with the lateral thoracic tributary of the axillary vein via the thoraco-epigastric vein. This dilates (and may become readily visible coursing over the trunk), following obstruction of the inferior vena cava. The long saphenous vein communicates with the deep venous system not only at the groin but also at a number of points along its course through perforating veins; one is usually present a hand’s-breadth above, another a hand’s-breadth below the knee.

The skin of the medial aspect of the leg is drained to the deep veins by (usually) 2 direct perforating veins which pierce the deep fascia behind the long saphenous vein.

**Clinical Features**

1. We have already noted (under surface anatomy of the lower limb) the great importance of the constant position of the long saphenous vein lying immediately in front of the medial malleolus. Knowledge that a vein must be present at this site, even if not visible in an obese or collapsed patient, may be life-saving when urgent transfusion is required. Occasionally the immediately adjacent saphenous nerve is caught up by a ligature during this procedure—the patient, if conscious, will complain bitterly of pain if this is done.

2. The saphenous veins frequently become dilated, incompetent and varicose. Usually this is idiopathic but may result from the increased venous pressure caused by more proximal venous obstruction (a pelvic tumour or the pregnant uterus, for example) or may be secondary to obstruction of the deep venous pathway of the leg by thrombosis.

3. Stagnation of blood in the skin of the lower limb may result from venous thrombosis or valve incompetence; the skin, in consequence, is poorly nourished and easily breaks down into a varicose ulcer if subjected to even minor trauma. This is especially liable to occur over the subcutaneous antero-medial surface of the tibia where the cutaneous blood supply is least generous.

4. In operating upon varicose veins it is important that all tributaries at the groin are ligated as well as the main saphenous trunk; if one
tributary escapes, it in turn becomes dilated and produces recurrence of the varices.

THE COURSE AND DISTRIBUTION OF THE PRINCIPAL NERVES OF THE LOWER LIMB

The nerves of the lower limb are derived from the lumbar and sacral plexuses.

The Lumbar Plexus

The lumbar plexus originates from the anterior primary rami of L1-4. The trunks of the plexus traverse psoas major and emerge from its lateral border. There are two exceptions: the obturator nerve appears at the medial border of psoas tendon, and the genito-femoral nerve emerges on the anterior aspect of the muscle.

The principal branches of the plexus are the femoral nerve and the obturator nerve.

The femoral nerve (L2-4) passes through the substance of psoas then under the inguinal ligament a finger's-breadth lateral to the femoral artery, to break up into its terminal branches after a course in lower limb of only some 2 inches.

Its branches are:
- muscular—to the anterior compartment of the thigh (quadriceps, sartorius and pectineus).
- cutaneous—the medial and intermediate cutaneous nerves of the thigh and the saphenous nerve, which traverses the adductor canal to supply the skin of the medial side of the leg and ankle.
- articular—to the hip and knee joints.

The femoral nerve itself supplies the skin of the medial and anterior aspects of the thigh via its medial and lateral cutaneous branches, but the lateral aspect is supplied by the lateral cutaneous nerve of the thigh. This arises directly from the lumbar plexus and enters the thigh usually by passing deep to the inguinal ligament. Occasionally the nerve pierces the ligament and may then be pressed upon by it with resultant pain and anaesthesia over the upper outer thigh (meralgia paraesthetica). This is relieved by dividing the deeper fasciculus of the inguinal ligament where the nerve passes over it.

The obturator nerve (L2-4) emerges from the medial aspect of the psoas and runs downwards and forwards, deep to the internal iliac