

## LECTURE 22 BLOOD VESSELS of LOWER LIMB & SPINAL CORD

### VESSELS OF LOWER LIMB

Remember that the ABDOMINAL AORTA divides at the level of L4 into RIGHT and LEFT COMMON ILIAC ARTERIES. These then divide in their turn at the junction between L5 and S1 into external and internal iliac arteries.

SKETCH: branches of femoral artery, anterior view, right thigh;  
(Crouch, 1978; Moore, 1985)

INTERNAL ILIAC supplies the viscera, walls of the pelvis, the perineum and some gluteal mm. via the superior and inferior gluteal aa.

EXTERNAL ILIAC ARTERY supplies the lower limb. As it crosses the inguinal ligament into the FEMORAL TRIANGLE, it changes its name to the FEMORAL ARTERY. It gives off the profunda femoris a. in the femoral triangle (supplying muscles of the thigh).

PROFUNDA FEMORIS gives rise to medial and lateral circumflex aa., which supply the hip joint, and 3 or 4 perforating aa., so called because they perforate adductor magnus to reach the back of the thigh.

The lateral circumflex has an ascending branch which supplies the head and neck of the femur (and anastomoses with the medial circumflex); a descending branch, which joins the genicular anastomosis laterally; and the smallest, transverse branch which joins the cruciate anastomosis (1st perforating, inferior gluteal, transverse branches of medial and lateral circumflex).

FEMORAL a. proper continues down the front and medial side of the thigh. It gives off the descending genicular a. which joins the genicular anastomosis medially. 2/3 the way down the thigh, it passes through an opening in the ADDUCTOR MAGNUS to reach the popliteal fossa, and becomes the popliteal a.

sketch branches femoral, popliteal, post. tibial artery, right leg  
posterior view  
(Crouch, 1978; Moore, 1985)

POPLITEAL artery gives rise to muscular branches (to adductor magnus and hamstrings) and to superior, middle and inferior genicular arteries. The middle is a small branch supplying the cruciate ligg., (penetrates oblique popliteal lig.) while the superior and inferior genicular aa. form an anastomosis around the knee, bypassing the popliteal artery.

**Popliteal a** splits into the anterior and posterior tibial arteries.

**Anterior tibial a.** continues as the dorsalis pedis at the ankle, which gives rise to **tarsal** and **arcuate** branches (forming a kind of dorsal arterial arch) as well as the first dorsal metatarsal artery and the deep branch of dorsalis pedis, which joins the lateral plantar artery to form the **plantar arch**.

**Posterior tibial a.** gives off the peroneal artery and then gives rise to the medial and lateral plantar arteries deep to the flexor retinaculum.

## VEINS

As in the upper limb, there are SUPERFICIAL and DEEP veins, linked by perforating veins. Both the superficial and deep veins have valves. In the lower limb, most of the blood is returned by the deep veins, in contrast to the upper limb where most blood is returned by superficial veins.

In the upright position, venous return from the lower limbs depends almost entirely on muscular activity, especially on contraction of the calf muscles, whose efficiency is increased by the tight sleeve of deep fascia around the muscles.

There are perforating (or communicating) veins which connect the deep to the superficial veins. The valves in the perforating veins of the leg allow flow into the deep veins: during muscular activity the deep veins carry almost all the blood. If these valves in the perforating veins become incompetent, blood leaks back from the deep veins into the superficial ones, resulting in dilation, gradual degeneration, and 'varicose veins.' Valves in the perforating veins of the foot direct blood from deep to superficial veins.

The superficial veins are the great saphenous and the small saphenous vein, while the deep veins accompany the arteries and their branches, and have similar names - the posterior tibial and anterior tibial, the popliteal, and the femoral. The great saphenous vein arises at the medial end of the dorsal venous arch of the foot, runs in front of the medial malleolus and up the medial aspect of the leg to the femoral vein (passes through cribriform fascia to reach femoral triangle). The small saphenous vein arises behind the lateral malleolus, and then runs up the middle of the back of the leg, ending in the popliteal vein (Gardner et al., 1986) p.200.

## **BLOOD SUPPLY of SPINAL CORD**

Arterial supply. The cord has three major arteries which run down its length: two posterior spinal aa. which lie in the region of the posterolateral sulci, and an anterior spinal a. which lies in the anterior median fissure. These three arteries anastomose around the circumference of the spinal cord and supply it with blood

(Mettler, 1948) p 34,35

The **anterior spinal** a. is by far the most important, because it supplies about the anterior 2/3 of the spinal cord, including almost all of the grey matter. It is derived from a descending branch from each vertebral a.

The **posterior spinal** aa. arise from the vertebral or the post inf. cerebellar a (PICA) on the posterolateral aspect of the medulla.

Both receive contributions from **radicular** aa down the whole length of the cord.

These radicular aa enter via the intervertebral foramen and pass along the dorsal and ventral roots, so that probably only the upper third of the cord has a significant supply from the vertebral a. The radicular aa. are derived in turn from the **vertebral, ascending cervical, posterior intercostal (from costocervical trunk), and lumbar aa.**

The radicular contributions are mostly small for the anterior spinal artery, and may not enter each IVF, so that blood supply is dependent on four to ten which are large: often one for the cervical cord, two for the thoracic, and one for the lumbar cord. (Hughes, Pathology of the Spinal Cord p39).

One of these is often particularly large, the **artery of Adamciewicz** which may be lower thoracic or upper lumbar (Gray 36 896b) and is usually on the left. In contrast, the posterior spinal aa. receive 30-40 radicular tributaries, none as large as the few anterior branches.

**Veins of the spinal cord** are located in the pia, where they form a plexus. They

drain into the *internal vertebral venous plexuses*, which lie within the vertebral canal between the dura and the vertebrae; there is an *anterior internal plexus* and a *posterior internal plexus*. These drain in turn into the *intervertebral veins*, which accompany the spinal nerves through the intervertebral foramina and end in vertebral, posterior intercostal and lumbar veins.

## References

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