VARICOSE VEINS
OF
THE LOWER LIMB

Essay

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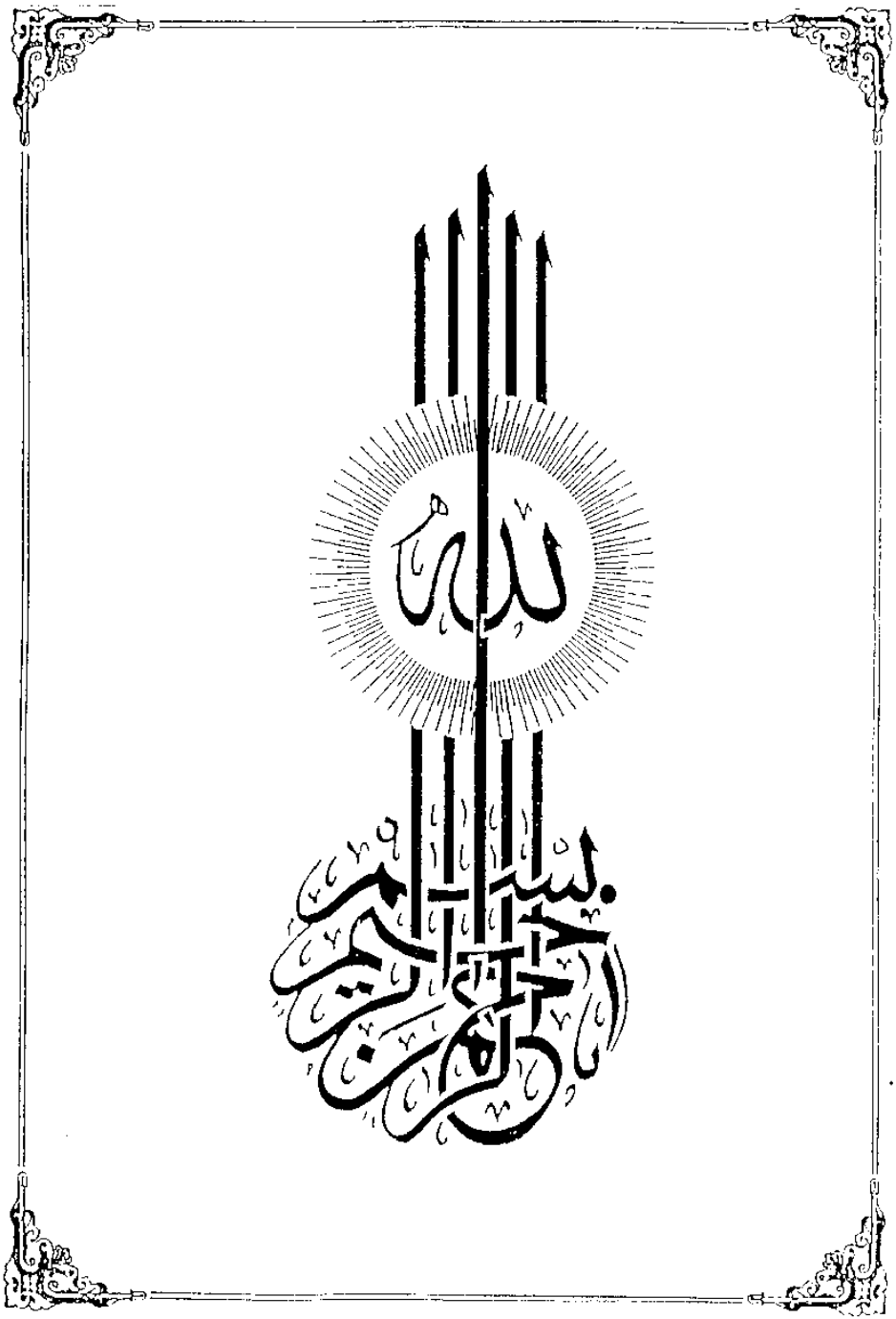

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Embryogenesis of Veins of the lower Extremities:-

In the 4 $\frac{th}{}$ week of development, swellings of the lateral embryonic body wall indicate the limb buds. They are richly vascularised, the arteries being predominently axial (sciatic) and the veins marginal. The anterior marginal veins are termed preaxial and the posterior ones postaxial. They empty independently in the posterior cardinal vein.

In the adult the preaxial (Tibial portion) of the marginal vein disappears, while the postaxial (Fibular portion) persists distally as the lesser saphenous vein and the tibial vein, and is represented proximally by the inferior gluteal vein. The greater saphenous vein develops secondarily from the posterior cardinal vein. In the development of the limb, the proximal segment elongates later than does the distal segment so that the lesser saphenous vein ends proximately at the knee. The upper segment and the buttocks are drained through the greater saphenous vein (Evans, 1912). (After skandalakis, Gray and Rowe 1983)

Surgical Anatomy of the Veins of the lower limb:-

The Anatomy of the arterial system is relatively constant ; that of the venous system is subject to individual variation. (Dodd & cockett, 1976).

The veins of the extremity will be considered under the following headings :-

1. The structure of the vein wall
2. The Peripheral veins .
   (A) The superficial veins .
   (B) The Deep veins (inter & in tramuscular)
   (C) The valves of these veins.
   (D) The perforating Veins.

* Structure of the Vein wall:

The walls of the veins, like those of the arteries, are composed of three coats, the external or adventitia, the middle or media and the internal or intima. The external coat consists mainly of collagen fibres. In the large veins it contains bundles of longitudinal, smooth muscle. The adventitia contains tiny blood vessels (Vasa Vasorium) and sympathetic nerve fibrils. The middle muscular coat varies considerably between veins of different calibre. In Venules (0.2- 1mm diameter), it is thin and composed mainly of smooth muscle. In the small and medium sized veins (1-9mm diameter), it consists of connective tissue with circular smooth muscle fibres. Muscle fibres are well developed in the main superficial veins of the leg, the

long and short saphenous, which have considerable contractile power. The media is less well developed in the tributaries of these veins, which are consequently more liable to dilate and become tortuous and varicose in response to sustained high intravascular pressure.

In the large veins, which include the upper femoral and the iliac veins, the smooth muscle is much reduced and in the inferior vena cava is entirely lacking.

The intima consists of endothelial cells which, in the medium sized and large veins, is supported on a subendothelial layer of connective tissue. An internal elastic lamina is present in the subendothelial layer of larger veins. Veins Possess valves which direct blood flow towards the heart. Most valves have two leaflets consisting of folds of the intima reinforced centrally with connective tissue; the free edge of the leaflets lie in the direction of blood flow.

The Superficial Venous System :-

The superficial veins lie in the subcutaneous fat where they are observable in 3 strata. First, the thin-walled subcuticular venules, which form a considerable plexus under the skin. In varicosis, venules in the

skin became visible. These venules join to make a network of larger subcutaneous veins of moderate size, and are the veins which form most of the prominent superficial varices following incompetence of the long and short saphenous veins which lie on the deep fascia.

Drainage from the Toes and Foot :-

Each toe has 4 digital veins, 2 dorsal and 2 plantar. The dorsal digital veins join in the toe cleft to form the dorsal metatarsal veins which unite to form a dorsal venous arch. The dorsal arch is linked with medial and lateral marginal veins which run along the inner and outer borders of the foot. Ultimately the medial part of the dorsal venous arch is continued upwards as the long saphenous vein. The lateral marginal vein communicates with the short saphenous vein by way of the venous plexus behind and below the medial malleolus .

The plantar digital veins from the 4 deep metatarsal veins unite to form the deep plantar venous arch.

The dorsal and plantar digital and metatarsal veins communicates with each other freely at the roots of the toes between the metatarsal bones. The plantar digital veins also communicate with the adjacent superficial vessels in the sole of the foot to form a plantar

subcutaneous venous arch which has numerous connections extending backwards to the veins of the heel, and by twigs to the lateral and medial marginal veins.

The numerous perforating veins of the foot are valved in such a way that most venous drainage from the dorsum passes to the long and short saphenous veins at the ankle and from the plantar surface to the posterior tibial veins (Fegan and Pegum 1968) .

The Heel :-

Beneath the skin of the heel there is a considerable venous plexus, which communicates by many small channels with the deep and superficial veins of the sole, and with the dorsal and plantar cutaneous veins.

The long saphenous Vein:

It's the longest vein in the body. It is formed by the union of veins from the inner part of the foot and the medial marginal vein and runs upward for 1-1.25 inchs in front of the medial malleolus. It ascends the anteromedial part of the leg and thigh to end in the common femoral vein by going through the foramen ovale. Its last centimetres lie within a prolongation of the femoral sheath. At the ankle its position is fairly constant, lying in the groove between the

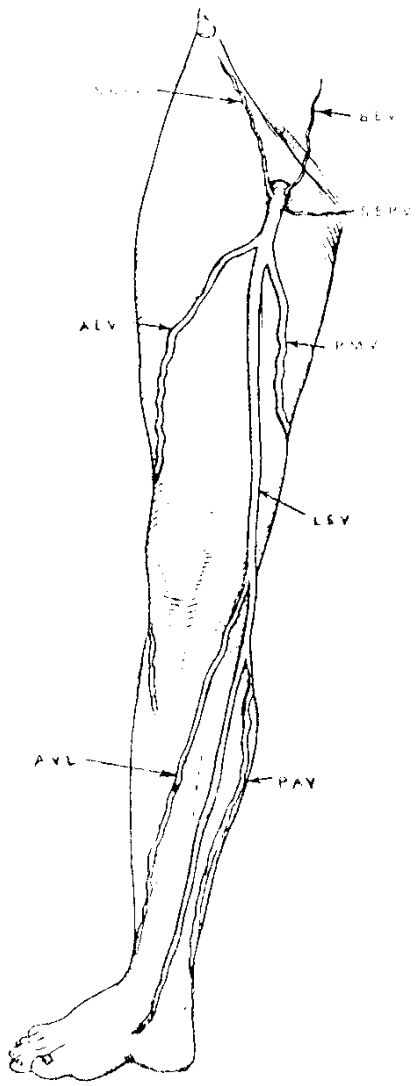

Fig. (1) The internal saphenous vein with its tributaries.

S.c.i.v = superficial circumflex iliac vein.
S.E.V. = superficial epigastric vein
S.E.P.V = superficial external pudic vein.
P.M.V. = Postero-medial vein.
L.S.V. = Long saphenous vein.
P.A.V. = Posterior arch vein.
A.V.L. = Anterior vein of leg.
A.L.V. = Antero-lateral vein of thigh.

medial malleolus and the tendon of tibialis anterior. It extends obliquely backwards over the subcutaneous medial surface of the lower one-fourth of the tibia and along the medial border of this to the medial condyle of the femur and over the posteromedial aspect of the thigh and into the foramen ovale to join the common femoral vein.It's occasionally duplicated from the knee to the groin.

The landmark of the saphenofemoral junction:

A reliable surface marking is 1-1.25 inches (2.5-3.5cm) below and lateral to the pubic tubercle or it is one cm. below and 4 cm lateral to the pubic tubercle and 2.5 cm below the inguinal ligament (Royle , 1981) . The relation of the long saphenous vein to the deep fascia is of surgical imprtance. In the lower two-thirds of the leg and the upper two-thirds of the thigh the vein lies on and is closely applied to the deep fascia. As it crosses the knee joint it becomes more superficial and is often subcuticular.

Structures accompanging the long saph. Vein :-

1. In the foot and leg:-

   The saphenous nerve lies close beside the vein. The nerve approaches the vein below the knee after peircing the fibromuscular roof of the adductor canal

and going between the sartorius and gracilis muscles. The nerve is closely applied to the vein in lower two-thirds of the leg .

2. At the Knee :-

The saphenous branch of the descending genicular artery accompanies the long sephenous vein .

3. In the thigh :-

Twigs of the medial femoral cutaneous nerve run in the vicinity of the vein, although they are not closely applied to it. Throughout its length the long saphenous vein is accompanied by lymphatic trunks draining the dorsum of the foot and the anterior and medial aspects of the leg and thigh. These end in the superficial group of inguinal lymph nodes.

Tributaries and communications of the long saph. Vein:

1. Below the ankle :-

The vein is fed by the medial marginal vein.

2. In the leg:-

It has few tributaries. There's a constant connection between it and the three ankle perforating veins , and there may be one or two small tributaries from the anterior aspect of the leg joining it in its lower third. Occasionally there's a small connection

with the venous arch joning the internal ankle perforating veins. There's a free anastomosis between a tributary or tributaries of the short saphenous vein and the venous arch connecting the internal ankle perforating vein, by a vein running behind the tendo achilles. By this means the long and short saphenous systen are connected in the lower third of the leg.

3. Around the Knee:-

It receives 3 large vesseles or groups of vesseles. These are :-

(1) A calf group :-

Veins drain an area of the calf posteriorly and connect with (and may occasionally replace), the short saphenous system behind the knee joint ;

(2) The Anterior Vein of the leg:

It winds up diagonally from the dorsum of the foot, ankle and anterior surface of the leg to join below the knee. It also links occasionally with a perforating vein at the middle of the anterior tibial compartment of the leg

(3) The posteriorarch Vein :

It arises behind the mallelus. It's large and constant and is formed by the union of the venous arches which connect the three ankle perforating veings. Above the upper perforating vein it passes

up the medial surface of the leg to join the long saphenous vein at the inner aspect of the knee. Just below this junction it connects with the calf group of veins and therefor indirectly with the short saphenous system, and at the same level there's usually a perforating vein which joins it to the posterior tibial vein.

4. In the thigh:-

Several small tributaries are received but the two largest are the posteromedial and anterolateral veins which join it close to its termination.

(1) The posteromedial vein :-

It's of considerable size and is formed in part by a small vein which arises from the short saphenous vein just before it enters the popliteal vein in the popliteal fossa. This vein runs up the posterior aspect of the thigh under the deep jascia. It pierces this at the medial aspect of the thigh and passes subcutaneosly diagonally upwards on the deep fascia to join the long saphenous vein between its upper third and its termination.

The point of connection is variable and the posteromedial vein may occasionally enter the femoral vein independently just below the saphenofemoral junction.

It's the main channel for drainage of the short saphenous vein in the 15% cases in which the latter jails to join the popliteal vein.

(2) The Anterolateral vein :

It drains the anterolateral surface of the thigh. It curves diagonally upwards from the outer side of the leg, knee and thigh to join the long saphencus vein in its terminal few centimetres. It lies in the superficial of subcutaneous tissue and is therefor more superficial than the long saphenous and its posteromedial tributary, both of which are deeper and less often visible when varicose.

5. Terminal tributaries of the long saphenous vein:-

As well as the posteromedial and the anterolateral vein, there are several other tributaries joing the termination of the long saphenous vein which are :-

(A) The superficual external pudendal.

(B) The deep external pudendal.

(C) The superficial epigastric vein.

(D) The superficial circumflex iliac vein.

A) The superficial external pudendal vein :-

Like the deep external pudendal vein, it drains the perineum, upper inner thigh and external genitalia, running horizontally outwards from these area