Fascial Relationships of the Long Saphenous Vein

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The long saphenous vein runs constantly in a deep plane of the hypodermis, lying directly above the muscular fascia (Figure 1). It is covered for its full length by a connective lamina that descends from the inguinal ligament to the ankle in the hypodermis of the medial thigh and leg. This lamina, which is formed by the interlacing of the hypodermal connective sheets, until now has been only partially described, and it is called the “saphenous fascia” to distinguish it from similar structures present in other regions of the human body.

After having arched over the long saphenous vein, this hypodermic fascia fuses with the muscular fascia, thus delimiting a flat, fatty, continuous space from the groin to the ankle (Figure 2A). This space could be considered the “saphenous compartment,” because it is clearly circumscribed and is occupied only by the saphenous vein and nerve (Figure 1).

The interfascial path of the long saphenous vein is easy detected by ultrasonography by its characteristic “Egyptian eye” shape (Figure 2A). In turn, the saphenous tributaries run in a more superficial plane of the hypodermis (Figure 2B), devoid of any hyperechogenic fascial sheathing and surrounded only by loose adipose tissue (Figure 2C).

Stereomicroscopy of cross-sectioned specimens evidences 2 thick strands originating from the outer adventitia of the long saphenous vein and anchoring it to the opposite faces of the compartment (Figure 3A). These strands are also easily recognized by ultrasonography because of their hyperechogenicity (Figure 3B). Furthermore, they are composed of interwoven connective fibers emerging directly from the saphenous adventitia (Figure 3C). The evaluation of serially sectioned specimens reveals that these strands form 2 continuous laminae. Such a double-laminar “ligament” can also be evidenced during anatomic or surgical preparations, in particular if care is taken to preserve the planar arrangement of the connective framework of the hypodermis.

The double fascial sheathing of the long saphenous vein has not been completely described. In fact, the present work describes for the first time the laminar ligament that anchors the saphenous vein. These anatomic findings may have an important role both in daily clinical practice and in the physiopathology of the varicose disease. First, the interfascial path of the long saphenous vein, easily detected by ultrasonography (“saphenous eye” sign), represents the main marker for its correct identification, allowing discrimination of the large tributary veins ascending along a parallel path. Second, stretching of the wall of the saphenous compartment as a result of muscular contraction would modify the saphenous vein caliber and consequently modulate the blood flow within it, as happens in the deep veins. Finally, the saphenous fascia would preserve the saphenous vein from excessive pathological dilatation, as a sort of mechanical shield. These anatomic findings could also explain why greater dilatation and tortuosity occur in the saphenous tributaries in primary varicosis.

References


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2547
Figure 1. Stereomicroscopy of a cross section of medial thigh hypodermis taken during necroscopy showing fascia and compartment of long saphenous vein. Inset: A correlated transverse echotomograph of medial thigh hypodermis. * indicates long saphenous vein; arrowheads, saphenous fascia; MF, muscular fascia; D, dermis; and arrow, saphenous nerve.

Figure 2. A, Typical ultrasonographic shape of saphenous "eye." B, Transverse ultrasonography of medial thigh hypodermis showing different planar topography of saphenous vein (below saphenous fascia) and 1 tributary vessel. C, Typical ultrasonographic aspect of a saphenous tributary vein that is surrounded only by hypoechoic loose adipose tissue. * indicates long saphenous vein; arrowheads, saphenous fascia; MF, muscular fascia; arrows, tributary vein; and D, dermis.
Figure 3. Ligament of long saphenous vein. A, Stereomicroscopy of a cross section of medial thigh hypodermis obtained from a frozen cadaver. Long saphenous vein adventitia (A) is connected to muscular fascia (MF) by a thick strand (arrow). M indicates muscular compartment. B, High-resolution transverse sonography of medial thigh hypodermis. Two parts of saphenous ligament (arrows) connect saphenous vein wall to muscular and saphenous fasciae. C, Scanning electron micrograph of saphenous ligament obtained after alkali digestion. Saphenous ligament (arrow) is composed of a thick bundle of collagen fibers merging from adventitia (A) of long saphenous vein.
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