High Level Overview:

Venous Anatomy of Lower Extremities

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What does this anatomy lecture have to do with visually-guided sclerotherapy (VGS)?
Anatomy of a Vein

Venous valves are bicuspid (two) flap like structures made of elastic tissue. The valves function to keep blood moving in one direction.
Normal Flow
Flow Dynamics

Deep Veins
Perforating veins
Large Superficial veins
Tributary veins
Reticular veins
Venules
Capillaries

http://www.biosbcc.net/doohan/sample/htm/vessels.htm
What makes up the venous system?

- **Deep venous system**: the channel through which 90% of venous blood is pumped out of the legs
- **Superficial venous system**: the collecting system of veins
- **Perforating veins**: the conduits for blood to travel from the superficial to the deep veins
- **Musculovenous pump**: Contraction of foot and leg muscles pumps the blood through one-way valves up and out of the legs
Deep and Superficial System Location and Communication

http://www.phlebology.org/pdfs/Ch1_pp1-4.pdf
Deep System Basics
Deep System

Common Femoral Vein

Deep Femoral Vein

Femoral Vein

Popliteal Vein

Posterior Tibial Vein

Peroneal Vein

Anterior Tibial Vein

Superficial System Basics
Great Saphenous Vein

Saphenofemoral Junction (SFJ)

Great saphenous vein

Medial malleolus

Dorsal venous arch

http://www.phlebology.org/pdfs/Ch1_pp1-4.pdf
Small Saphenous Vein

- Saphenopopliteal junction
- Small saphenous vein
- Lateral malleolus

What connects the Superficial and Deep Systems?
Nerves of Phlebologic Interest
Nerves

The **Saphenous nerve** is the largest and longest branch of the femoral nerve and supplies the skin over the medial side of the leg.

The **sural nerve** runs with the small saphenous vein on the posterior leg just lateral to the Achilles tendon.

Bergan, JJ (2007), The Vein Book, Chapter 35, pp 315-321
How does the blood get back to the heart?
Muscular Pumps

• Normal venous return requires a “pump”

• Muscle action send blood up the veins of the leg and competent valves prevent reflux/retrograde blood flow

• There are three muscular pumps in the legs
  • Foot
  • Calf
  • Thigh
Calf Muscle Pump

Skin

Bone

Perforating vein

Muscle belly

Superficial vein

Fascia

Deep vein
Calf muscle pump

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What happens when the venous system is broken?
Reflux

Venous reflux is considered to be significant if retrograde flow lasts more than 0.5 seconds in superficial veins

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Reflux: How does it contribute to Varicose Veins?
Where does Visually-Guided Sclerotherapy fit in?
Vein branching leading to the saphenous truncal veins include:

- Telangiectasias (also known as telangiectatic or spider veins)
  - Are flat red vessels on the skin’s surface
  - 0.1 mm – 1 mm in diameter
- Venulectasias (venules)
  - Are bluish vessels which may be distended above the skin
  - 1 – 2 mm in diameter
- Reticular veins (also known as feeder veins)
  - Have a cyanotic hue
  - 2 – 4 mm in diameter
  - Associated with telangiectasias
- Varicose veins
  - Have incompetent valves with increased venous pressure leading to progressive dilation and tortuosity of the vein walls
  1. Primary varicose veins – likely due to multiple factors such as hereditary, female sex hormones, obesity, pregnancy, or long episodes of standing (hydrostatic force)
  2. Secondary varicose veins (less common) – involves trauma, congenital absence of valves in vein walls, or obstruction
Lateral Subdermal Plexus

Goldman et al: Sclerotherapy 4e © 2007 Elsevier Inc
Telangiectasias
Reticular Veins
Varicose Veins
Thank you!