DEEP VENOUS VALVES
WHEN AND WHERE DO WE NEED THEM?

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• It is widely accepted that venous valves play an important role in reducing the pressure applied to the veins under dynamic load conditions, such as the act of standing up. This understanding is, however, qualitative and not quantitative.

The role of venous valves in pressure shielding
Constantinos Zervides, Andrew J Narracott, Patricia V Lawford, and David R Hose
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WHERE ARE THE DEEP VALVES?

- INTERNAL JUGULAR
- SUBCLAVIAN, AXILLARY, UPPER ARM, RADIAL, ULNAR
- GONADAL VEINS
- LOWER EXTREMITIES
LOWER EXTREMITIES

• 6-7 VALVES ABOVE THE KNEE
• ~ 100 VALVES IN THE CALF
• CALF MUSCLE PUMP AND FOOT PUMP
The leg has 3 muscular pumps (muscle groups that can push blood out of your leg toward the heart): the foot pump, the calf muscle pump, and the thigh pump.
The foot pump “primes” the system or fills the lower leg veins, the calf muscle pump generates most of the push to drive the blood out of the lower leg and through the veins.
In a normal person, an intact calf muscle pump is efficient – forcing about 70% of the blood out of the calf as we walk.
In a normal system, when the calf muscle contracts or moves it produces a lot of force which pushes blood through the veins, up against gravity and back towards the heart. When the muscle relaxes and the veins lying within open up, it creates a gradient (less pressure within in comparison to the other veins) which draws the blood from the superficial system into the deep system to help with venous blood movement.
REFLUX = VENOUS HYPERTENSION
1 Sapheno-femoral junction

Profunda valve
Femoral valves

1 Popliteal or gate-keeper

1 Short-saphenous

100 tibial and gastroc valves
Distribution and prevalence of reflux in the superficial and deep venous system in the general population – results from the Bonn Vein Study, Germany


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For the left leg, a tendency towards more pathologic refluxes in the deep venous system can be seen resulting from a slightly higher prevalence in the left FV.
The prevalence of reflux in the superficial venous system markedly increases with age. This increase is stronger in women than in men. 

**In the deep venous system**, no clear changes with age in reflux prevalence can be observed in either sex.
• Higher body mass index (BMI) did not constantly increase the prevalence of reflux in the deep venous system.

• In contrary, participants with BMI >30 showed a higher reflux prevalence in the saphenous veins.
Point 4

• It is noticeable that women show more reflux in superficial veins while the prevalence in deep veins is higher in men.
We saw a higher prevalence of reflux for the FV in the left leg. The higher prevalence for the left leg, is probably associated with May-Thurner syndrome with compression of the left common iliac vein by the right common iliac artery causing more frequent thromboses in the left leg.
Reflux prevalence is associated with gender, age, and the clinical stage measured by the CEAP classification.
BOTTOM LINE

• VENOUS INSUFFICIENCY IS THE MOST COMMON DISORDER IN VASCULAR MEDICINE.
In patients with severe CVI, venous valvular reflux involves deep vein as an isolated abnormality in less than 10%, but is associated with superficial reflux or/and perforator incompetence in 46%. The most common etiology in DVR is post-thrombotic syndrome accounting for an estimated 60-85% of patients with CVI. Primary reflux is the result of structural abnormalities in the vein wall and the valve itself. A very rare cause of reflux is the absence of valves secondary to agenesis. In addition primary reflux is difficult to identify from secondary deep reflux.

The prevalence of primary valvular reflux in patients with DVT is significantly higher than expected. Reflux may be considered as a novel risk factor for DVT. Two-thirds of patients with DVT have pre-existent primary chronic venous disease, which is likely to contribute to post-thrombotic morbidity.
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