

# MARY WASHINGTON HEALTHCARE IMAGING SERVICES

## Lower Extremity Venous Insufficiency/ Varicose Vein Protocol

- I. **Patient Preparation:** There is no preparation for this exam.
- II. **Patient Positioning:** The patient should lie supine (on a bed or a stretcher) with their head elevated 30-45 degrees. The patient will be slightly rotated (to the side of the leg being evaluated) with the leg externally rotated and knee slightly bent. The patient remains in the supine position for the patency evaluation of the deep and superficial veins however should stand for the evaluation of reflux. If the patient is unable to stand, then adjust the bed to a reverse Trendelenberg as much as possible.  
  
\*\*For patient safety, if reverse Trendelenberg bed is not available and the patient is unable to stand or comes in with a walker/wheelchair, the exam can be performed with the patient sitting with their legs hanging off the bed closest to the sonographer. If the patient is unable to sit up without assistance, the exam should be performed with the head of the bed tilted up about 30 degrees and it should be documented in the final report that the modifications were made for the reflux testing.
- III. **Equipment:** Imaging and flow analysis performed with Duplex sonography using a linear transducer with a frequency of 5 MHz or higher. A Doppler angle of 60 degrees or less is used when quantitative measurements of venous flow are performed. Occasionally, a lower frequency may be used.
- IV. **Primary Purpose of the Venous Examination**—to determine if the valves are functioning properly in the superficial and deep system. Venous insufficiency and valve function are assessed using accepted criteria. Vein size, patency, and course are determined and documented, as appropriate.
- V. **Lower Extremity Venous Insufficiency Procedure:** The study documents the venous anatomy, any venous thrombosis and the competency of the valves.

### A. Image Protocol:

1. Obtain images following the lower extremity venous DVT protocol. Spontaneous flow should be documented as well as the response to the distal augment. If acute or unknown thrombus is seen, note the location of the thrombus and notify the reading physician. Do not continue with the venous insufficiency protocol without consulting the ordering physician.
2. When evaluating the posterior tibial veins look for any perforating veins that could contribute to venous insufficiency.
3. Obtain dual images of the greater saphenous vein showing compression and diameter measurements in the proximal & mid thigh, at the knee and mid calf.
4. Obtain dual images of the proximal and mid accessory lateral saphenous vein (aka first lateral branch of the saphenous vein) showing compression and diameter measurements. This vein usually courses laterally away from the GSV but occasionally runs parallel to the GSV.

5. Assess the proximal and mid accessory lateral GSV in long for reflux using distal augmentation.
6. Obtain dual images of the lesser saphenous vein showing compression and diameter measurements in the proximal, mid and distal calf.
7. Have the patient stand\*\* on a step stool with the weight on the contralateral leg. Assess for reflux with distal augment in the saphenofemoral junction, GSV in the mid thigh, at the knee and mid calf, saphenopopliteal junction, lesser saphenous vein in distal thigh/proximal calf and mid/distal calf. Note, images of the saphenofemoral and saphenopopliteal junctions **must** be documented.
8. Repeat step #9 for the popliteal, mid femoral and common femoral veins.
9. Repeat step #9 for any suspected areas of reflux or perforators.

\*\*See patient positioning at beginning of protocol for patients unable to stand.

**Assess venous Doppler signals for the following qualities:**

**Augmentation-** Does the venous signal augment with distal compression? What happens after augmentation – does the flow stop, or become retrograde?

**Competence** - does the venous signal stop with valsalva and/or proximal compression?

**Phasic-** Does the flow in the vein change normally with breathing maneuvers?

**Spontaneous-** Is there flow in the vein without physiological maneuvers?

- B. **Annotation Criteria:** The side-right or left and the name of vein should be noted on the image. For reflux testing, the anatomic position of sitting, standing or reverse Trendelenberg should be noted in the report.

**C. Examination Completion**

1. Upon completion of the exam, **an interventional radiologist should be consulted before the patient leaves the vascular lab.**
2. A preliminary reading is sent only if thrombus is seen or the referring physician requests it.

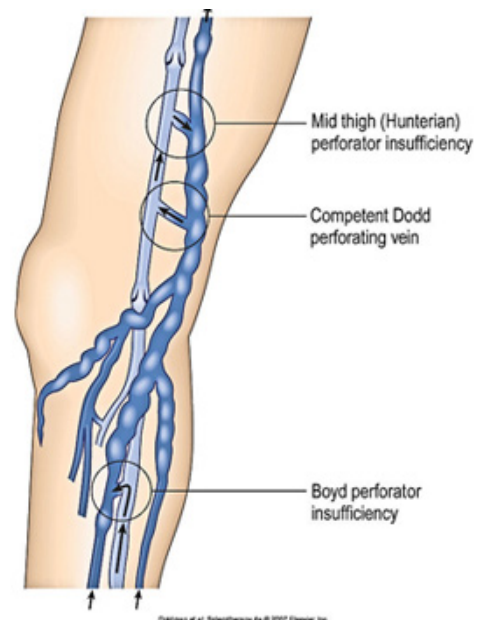
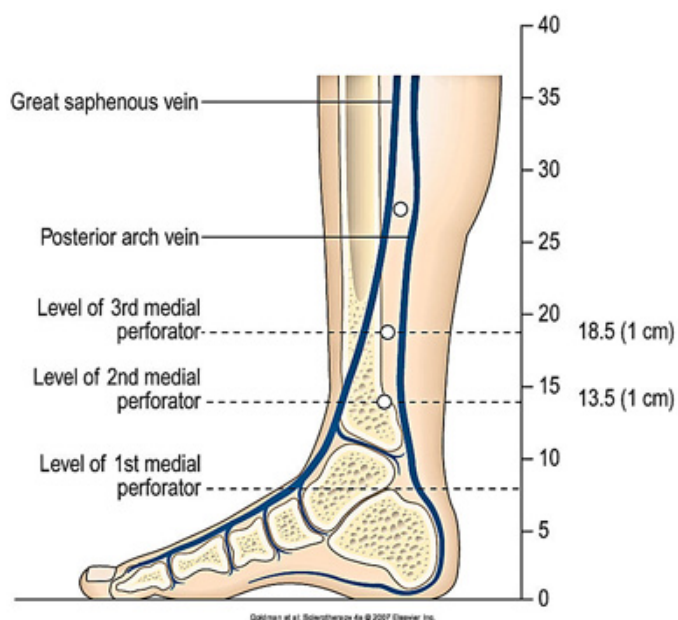
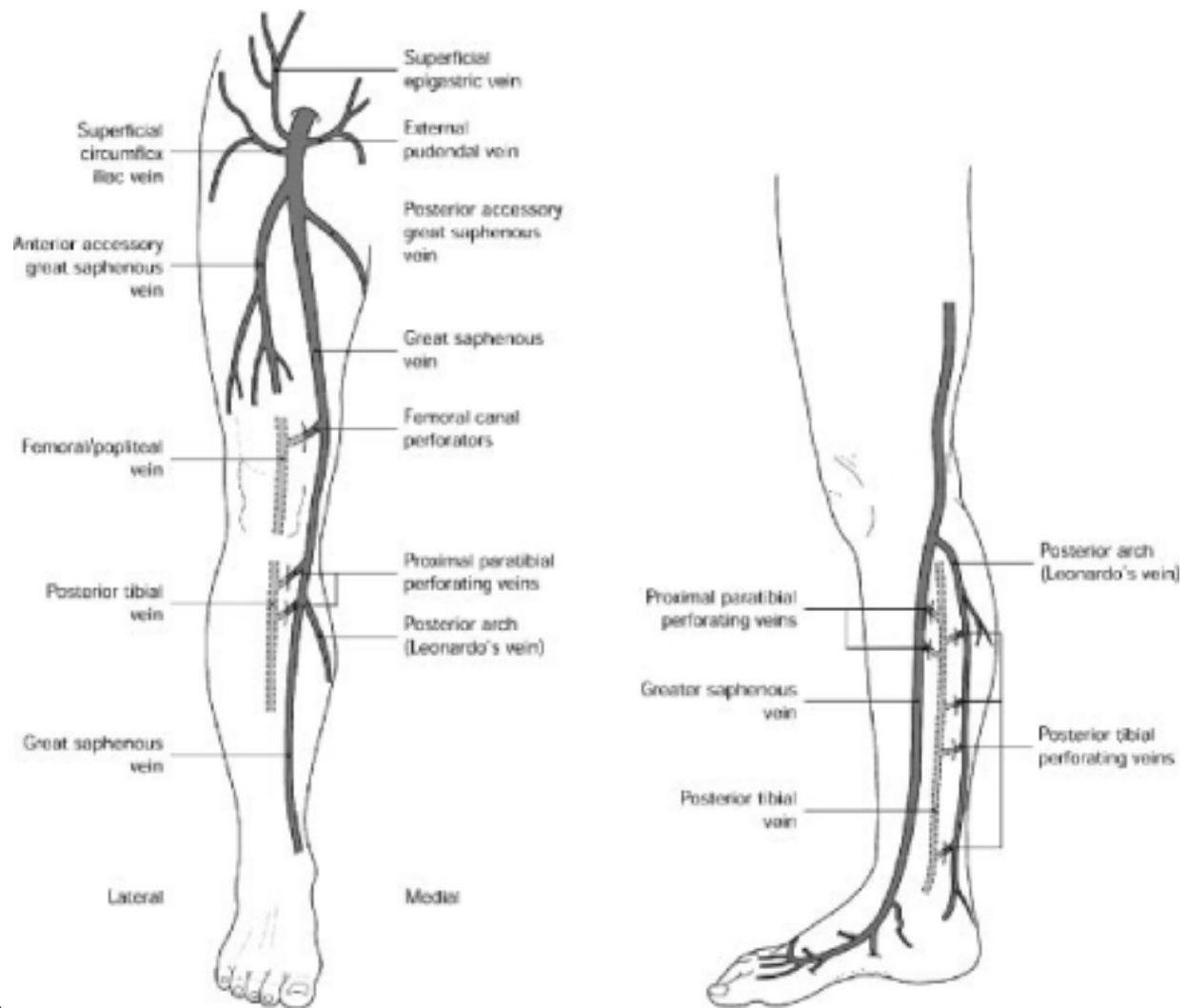
## Varicose Vein / Venous Insufficiency

### Image Summary

1. Patient information screen with tech initials and patient history
2. Trans dual screen CFV with compression
3. Long CFV distal augmentation with color/spectral Doppler
4. Long proximal GSV proximal compression with color/spectral Doppler
5. Trans dual screen proximal Femoral vein with compression
6. Trans dual screen mid Femoral vein with compression
7. Long mid Femoral vein distal augment with color/spectral Doppler
8. Trans dual screen distal Femoral vein with compression
9. Trans dual screen POP with compression
10. Long POP distal augmentation with color/spectral Doppler
11. Trans dual screen Posterior Tibial veins with compression
12. Long Posterior Tibial with color
13. Trans dual screen Peroneal veins with compression
14. Long Peroneal veins with color
15. Trans dual screen GSV proximal thigh with compression and measure AP diameter
16. Trans dual screen GSV mid thigh with compression and measure AP diameter
17. Trans dual screen GSV at knee with compression and measure AP diameter
18. Trans dual screen GSV mid calf with compression and measure AP diameter
19. Trans dual screen proximal Accessory Lateral GSV (aka First Lateral branch of GSV) with compression and measure AP diameter
20. Long proximal Accessory Lateral GSV distal augment with color/spectral Doppler
21. Trans dual screen mid Accessory Lateral GSV with compression and measure AP diameter
22. Long mid Accessory Lateral GSV with spectral Doppler and Distal augment
23. Trans dual screen lesser saphenous proximal calf with compression and measure AP diameter
24. Trans dual screen lesser saphenous mid calf with compression and measure AP diameter
25. Trans dual screen lesser saphenous distal calf with compression and measure AP diameter
26. Standing, sitting or reverse Trendelberg(RT) popliteal vein with spectral Doppler & distal augment
27. Standing, sitting, or RT mid femoral vein with Spectral Doppler and distal augment
28. Standing, sitting, or RT common femoral vein with Spectral Doppler and Distal augment
29. Standing, sitting or RT GSV in mid thigh with spectral Doppler and distal augment
30. Standing, sitting or RT GSV at the knee with spectral Doppler and distal augment
31. Standing, sitting or RT GSV in mid calf with spectral Doppler and distal augment
32. Standing, sitting or RT sapheno-femoral junction with spectral Doppler and distal augment
33. Standing, sitting or RT lesser saphenous vein in distal thigh/proximal calf with spectral Doppler and distal augment
34. Standing, sitting or RT lesser saphenous vein in mid/distal calf with spectral Doppler and distal augment
35. Standing, sitting, or RT sapheno-popliteal junction with spectral Doppler and distal augment
36. Standing, sitting, or RT suspected areas of reflux or perforators.

**\*The transverse dual screen images should be taken with the AP diameter on the left and compression image on the right. For a Unilateral venous contralateral CFV images are required.**

**THE PATIENT SHOULD STAND TO ASSESS FOR REFLUX IN THE SUPERFICIAL VEINS. IF THAT IS NOT POSSIBLE, ADJUST THE BED TO A REVERSE TRENDELENBERG AS MUCH AS POSSIBLE.**



**References:**

- 1) Introduction to Vascular Ultrasonography, 5<sup>th</sup> Edition; Zweibel, Pellerito, Philadelphia Noninvasive Diagnosis of Vascular Disease, Hershey, Appleton Davies, Inc.
- 2) Practical noninvasive Vascular Diagnosis, Kempczinski, Yearbook Publishers, Chicago, IL.
- 3) Introduction to Vascular Ultrasonography, second edition, "B-mode evaluation of peripheral arteries and veins", Talbot, Grune & Stratton, Inc.
- 4) Ultrasound Atlas of Vascular Diseases; Krebs, Giyanani, Eisenberg, Appleton and Lange, Stamford, CT
- 5) Vascular Diagnosis, Mansour, M. Ashraf and Nicos Labropoulos
- 6) Guidelines for Treatment of Lower Extremity Deep vein Thrombosis Journal of Interventional Radiology 2006; 17:435-448
- 7) Chronic venous insufficiency, Diagnosis & Treatment Jeffrey R. Ballard, John J. Bergan
- 8) Best Practices In Sonography Lower Extremity Venous Evaluation (Chronic Disease) Mira L. Katz, Ph.D., R.V.T., University of North Carolina at Chapel Hill. Images provided by Cindy Owen, RDMS

[Rev 8/13]