

Vascular US Protocol: Lower Extremity Vein Mapping and Reflux Evaluation

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Last Review Date: [Link to Last Review Date Table](#)

List of Required Images

Lower Extremity: Bilateral, Right, or Left

- **Transverse:** Dual side-by-side grayscale images without and with compression at each of these levels
 - Common femoral vein
 - Junction of the common femoral vein with the great saphenous vein
 - Proximal deep femoral vein
 - Proximal femoral vein (can be on same image as proximal DFV or separate)
 - Mid femoral vein
 - Distal femoral vein
 - Popliteal vein
 - Peroneal vein
 - Posterior tibial vein
 - GSV prox
 - SSV prox
 - Contralateral common femoral vein
- **Sagittal images with and without color Doppler**
 - Common femoral vein
 - Junction of the common femoral vein with the great saphenous vein
 - Proximal deep femoral vein
 - Proximal femoral vein (can be on same image as the proximal DFV or separate)
 - Mid femoral vein
 - Distal femoral vein
 - Popliteal vein
 - Peroneal vein
 - Posterior tibial vein
- **Sagittal spectral Doppler images**
 - Contralateral Common femoral vein
 - Ipsilateral common femoral vein
 - Saphenofemoral junction
 - Femoral vein mid
 - Popliteal vein
- **Deep Veins for reflux:** Color/spectral Doppler with Valsalva maneuver. Include reflux time, if positive.
 - Sagittal CFV
 - Sagittal FV Mid
 - Sagittal POPV
- **Superficial Thigh Veins for reflux:** Color/spectral Doppler with Valsalva maneuver. Include reflux time, if positive.

- Sagittal and trans images with AP vessel measurement
 - SFJ
 - GSV prox, mid and distal thigh
 - AASV, if seen
- **Superficial Calf Veins for reflux** using distal compression. Include reflux time, if positive.
 - Sagittal and trans images with AP and width vessel measurements.
 - GSV calf prox, mid and distal
 - SPJ, if seen
 - SSV prox calf and any segment dilated or associated with perforators
 - Vein of Giacomini, if seen
- **Perforators:** For patient with active ulcers
 - Evaluate for associated incompetent perforators or visibly dilated greater than 0.35 cm.
 - Use color/spectral Doppler to evaluate for reflux with distal compression.
 - Measure diameter.
 - Document site and any positive reflux >0.5 cm/s.
 - Note site on ultrasound worksheet.
- **Varicose Veins**
 - Document any varicosities using gray scale, color, or cine.
 - Note site on ultrasound worksheet.

For general pathology, use the [Pathology Protocol](#).

Additional Images for Anatomy and Vascular-Specific Pathology

- If reflux negative in the supine position, perform upright exam of the SFJ and Prox GSV
- For focal symptoms of the calf, evaluate the gastrocnemius veins.
- Additional images documenting thrombus.
 - Show thrombus in transverse with compression using gray-scale
 - Show thrombus in longitudinal plane showing echogenicity and extent of thrombus
 - Show thrombus in longitudinal using color Doppler to demonstrate complete vs. partial occlusion and with spectral Doppler proximal to, within, and distal to the thrombus.
- If thrombus extends centrally into pelvis, evaluate the common iliac vein, external iliac vein, and IVC.
- If continuous flow with flat waveform is observed on the symptomatic side, evaluate the external iliac vein, common iliac vein, and IVC.
- For superficial vein thrombus, document the distance between the thrombus and the junction with the deep vein. Less than or greater than 5 cm is the critical distance.
- Anatomical variations such as duplications should be noted.

Specific Considerations for Lower Extremity Vein Mapping and Reflux Evaluation

- “Proximal” and “distal” refer to the relative distance from the attached end of the limb per Gray’s Anatomy. For example, the proximal femoral vein is closer to the hip and the distal femoral vein is closer to the knee.



- **Compression Ultrasound:**
 - Performed using gray scale. Venous compression is applied in the transverse plane with adequate pressure on the skin to completely obliterate the normal vein lumen. Compressions should be performed in real time every 1-2 cm along the entirety of the vessels. Note any section longer than 2 cm, where compression is technically limited or could not be directly visualized.
 - If compression is difficult to demonstrate clearly on still images, consider either placing arrow or calipers at the site of the compressed vessel or recording a cine demonstrating the compression.
- For Spectral Doppler: Set the scale so that the waveform fills approximately 75% of the box.

Common Indications for Lower Extremity Vein Mapping and Reflux Evaluation

- Venous ulcers • Visible varicose veins • Pre-op evaluation for venous insufficiency • Feeling of heaviness in lower extremity • Pain, edema, or discoloration