Teaching Hands-on Skills to Vascular Surgery Residents & Fellows

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Laboratory Organization, Management & Training
DISCLOSURE

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No Relevant Financial Relationship Reported
Why Hands-on Skills in Duplex Ultrasound is Necessary For a Vascular Surgeon Trainee

- Noninvasive vascular testing is a cornerstone of vascular patient care

- The Society for Vascular Surgery has mandated experience in performing and interpreting vascular lab testing to be part of training.

- The emergence of endovascular therapy has expanded screening, procedural, & surveillance applications

- The American Board of Surgery requires passing the PVI examination for certification as a vascular surgeon
Trainee Curriculum for Vascular Laboratory
Hands-on Skills & Test Interpretation

- Essential Components -

- Faculty mentor with hands-on skills in duplex ultrasound
- Faculty mentors for test interpretation and dictation proficiency
- Technologist mentor for instrumentation and imaging assistance
- Duplex scanner in the Vascular Surgery Clinic and operating room
- Assigned vascular laboratory education time early in training
- Annual Education Milestone review of vascular laboratory interpretation and hand-on skills
Recommended Textbooks and Journal Issues
Duplex Ultrasound Instrumentation Controls

1. 2-D imaging
2. Depth
3. Gain adjustment
4. Color flow
5. Pulsed Doppler
An Initial Hands-on Scanning Skill
Ultrasound-Guided Vascular Access

Long-axis “in-plane” view

Linear Array Transducer

Transverse “out-of-plane” view
Ultrasound-Guided *Central Venous Access*

Ultrasound-capable CVC simulator (Simulab CentralLineMan)
Ultrasound-Guided *Central Venous Access*

- Simulation Training

Transverse

Anatomy

Where is the needle tip?

Longitudinal
Duplex-Guided Vascular Access (faculty mentored in the operating room)

- Real-time vessel imaging
  - IJ catheter placement
  - Micropuncture catheter assess of common femoral artery cannulation
  - Saphenous vein endovenous ablation
Hands-on Vascular Clinic Skills

**Indirect physiologic testing**
- CW hand-held Doppler
- Artery and venous flow assessment
- Measurement of ABI

**Venous duplex imaging**
- Compression ultrasound for DVT
- CFV thrombus after GSV ablation
Advanced Hands-on Scanning Skills

- AAA sac measurement

- Femoral false aneurysm thrombin injection
Vascular Laboratory Education Milestones

**Level 1:** Demonstrates basic knowledge in vascular anatomy and physiology expected of a medical school graduate. Understand basic ultrasound physics and instrumentation.

**Level 2:** Demonstrates knowledge in testing protocols and interpretation in peripheral arterial and venous testing areas. Has acquired hand-on skills with duplex ultrasound for artery and venous catheter access.

**Level 3:** Interprets vascular testing in all areas. Has hands-on skills for operative planning & patient evaluation in the ER, ICU, and vascular clinic.

*Level 4:* Meets prerequisites for RPVI credential (>500 interpretations). Demonstrates hand-on skills for the diagnosis and management of common vascular conditions (dialysis access, endovenous ablation, intraoperative duplex imaging)

**Level 5:** Demonstrates advanced interpretation skills for uncommon vascular conditions. Teaches test interpretation and hand-on skills to other learners. Has PVI credential and interpretation skills for accredited vascular laboratory medical staff.
Common Hands-on Duplex Testing in My Clinic

- Vein mapping for dialysis access fistula - anatomic variants of basilica vein and radial artery origin

- Dialysis access volume flow estimate from brachial artery

- Venous reflux testing of the saphenous and deep veins (new pt with varicose veins)

- Venous TOS evaluation

- AAA sac measurement - prior to and after EVAR

- “Selected patients”: graft imaging - distal anastomosis; angioplasty site

- Confirmation of high grade ICA stenosis in asymptomatic patient
Vascular Laboratory Education Programs for Resident Education

- Vascular laboratory operations and instrumentation
- Extracranial cerebrovascular testing - carotid duplex ultrasound, TCD
- Peripheral venous - deep vein thrombosis detection
- Peripheral venous - lower limb venous insufficiency diagnosis
- Peripheral arterial
  - indirect physiologic testing of upper and lower limbs
- - duplex testing of native arteries, bypass grafts, and angioplasty
- Abdominal vascular duplex US of abdominal aorta and iliac arteries
- Abdominal vascular duplex US of renal and mesenteric arteries
- Preoperative vessel mapping – upper & lower limb vein mapping, dialysis access planning
- Vascular laboratory quality assurance and accreditation
- *Attend a multi-day vascular laboratory interpretation review course*
Mahalo