AT THE FOREFRONT
UChicago Medicine

Noninvasive Vascular Imaging: What Different Exams Can Provide and How to Interpret the Data

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Technical Director, UCM Non-Invasive Vascular Laboratory

Vascular Laboratory

We perform 6 different kinds of exams:

- ❑ Peripheral Venous
- ❑ Peripheral Arterial
- ❑ Visceral Vascular (Aortoiliac, Mesenteric, Renal, Liver)
- ❑ Dialysis (Arterio-Venous)
- ❑ Intracranial and Extracranial
- ❑ US Guided Procedures

Exam Description	CPT Code
Arterial	
Arterial Pressures (ABIs/WBIs +digits)	93922
Arterial Segmental Pressures	93923
Duplex Arm Art Image Bilat	93930
Duplex Arm Art Image Unilat	93931
Duplex Leg Art Image Bilat	93925
Duplex Leg Art Image Unilat	93926
Penile Pressure	93799
Cold Immersion Test	93923
Thoracic Outlet Exam	93923
Treadmill Testing	93924
Venous	
Duplex Leg/Arm Vein Image Bilateral	93970
Duplex Leg/Arm Vein Image Unilateral	93971
Duplex Arm Vein Image Bilateral	93970
Duplex Arm Vein Image Unilateral	93971
Visceral	
Renal Duplex: Complete	93975
Renal Duplex; Limited	93976
Mesenteric Complete	93975
Mesenteric Limited	93976
Aortoiliac Duplex: Complete	93978
Aortoiliac Duplex: Limited	93979
AAA Screening Duplex	76706

Exam Description	CPT
Dialysis	
Duplex Scan of Hemodialysis Access	93990
Preop Hemodialysis Exam-Bilateral	93985
Preop Hemodialysis Exam-Unilateral	93986
Carotid/Transcranial	
Extra-cranial Duplex Bilateral	93880
Extra-cranial Duplex Unilateral	93882
Carotid Intima Media Thickness Testing	0126T
Transcranial Doppler; Complete	93886
Transcranial Doppler; Limited	93882
TCD; Emboli Detection w/Bubbles	93893
TCD; Emboli Detection w/o Bubbles	93892
TCD: Vasoreactivity	93890
US Guided	
Duplex Guided Pseudo Injection	36002
RFA EndoV 1st Vein	36475
RFA Ablation 2nd Vein	36476
Laser Ablation 1st Vein	36478
Laser Ablation 2nd Vein	36479
VenaSeal 1st vein	36482

Arterial Exams

1. **Duplex Ultrasound**
2. **Physiological Studies**

Exam Description	CPT Code
Arterial	
Arterial Pressures (ABIs/WBIs +digits)	93922
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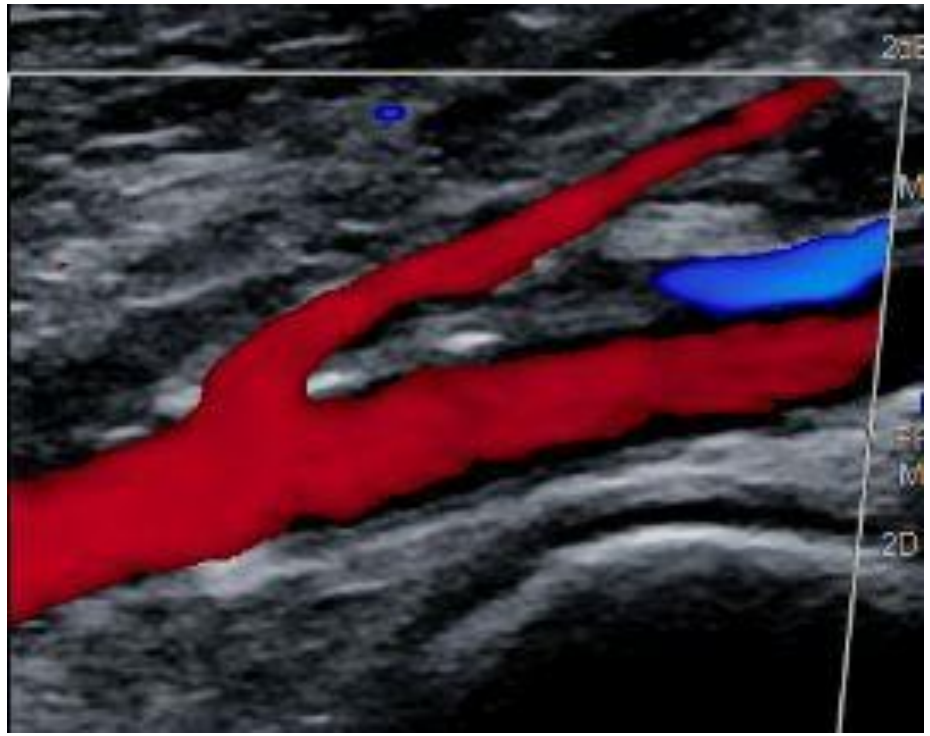
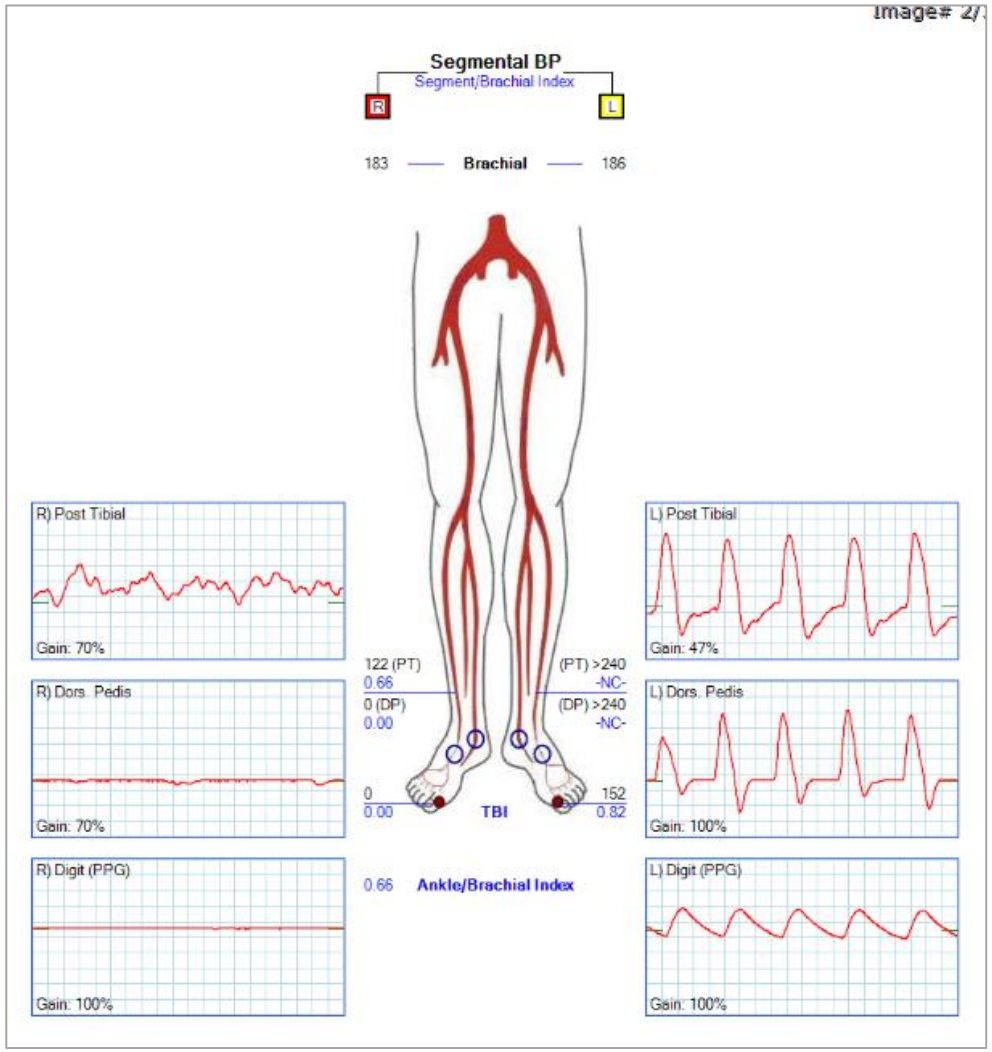
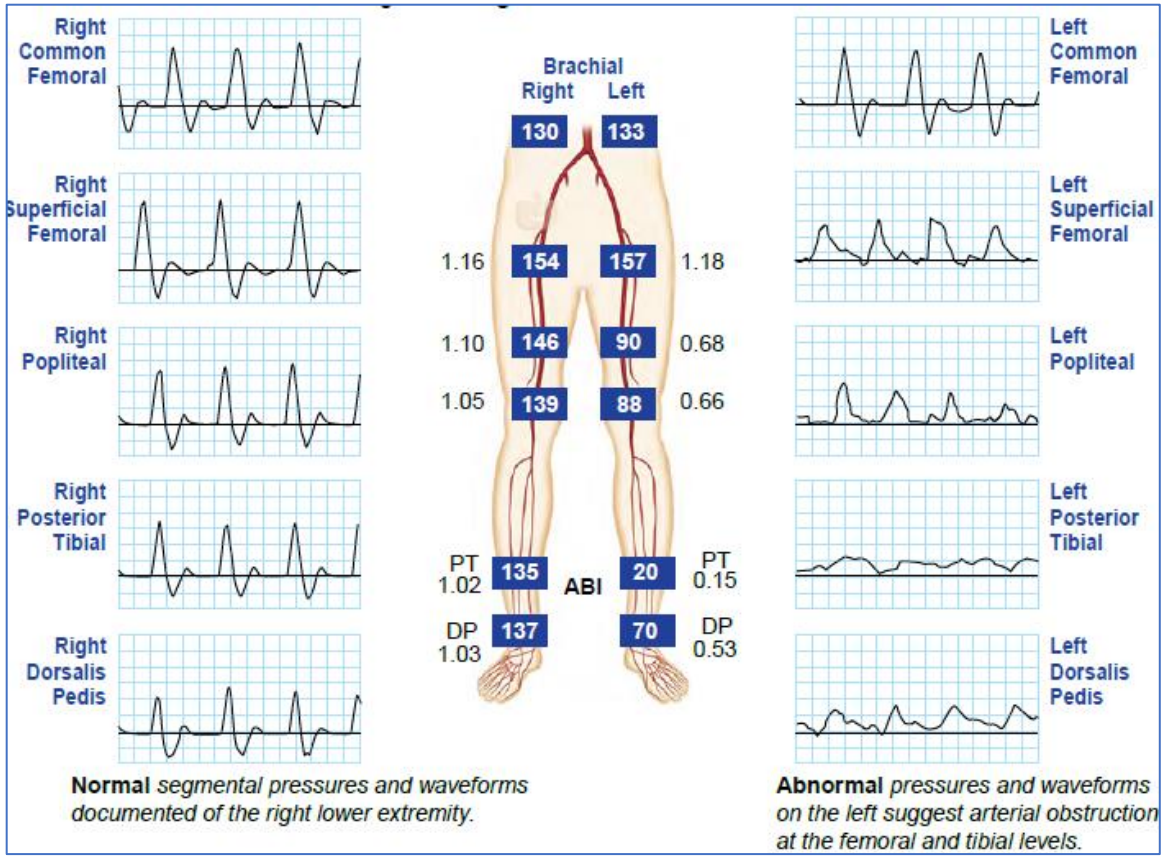


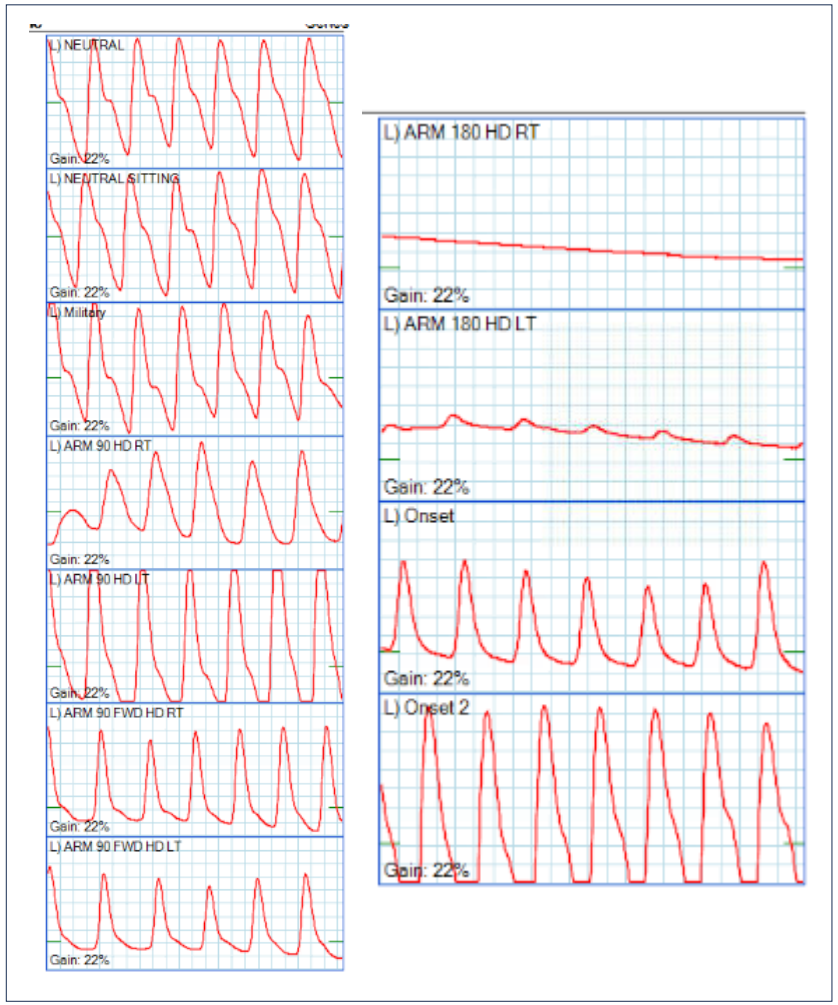


Physiologic Arterial Exams

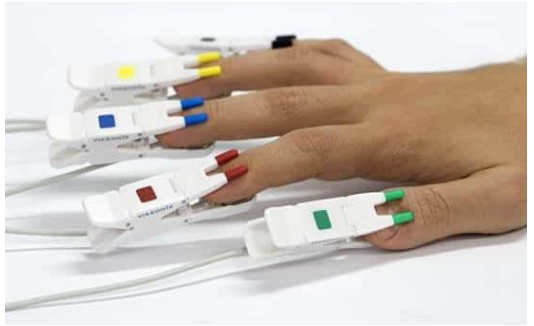
Arterial Segmental Pressures



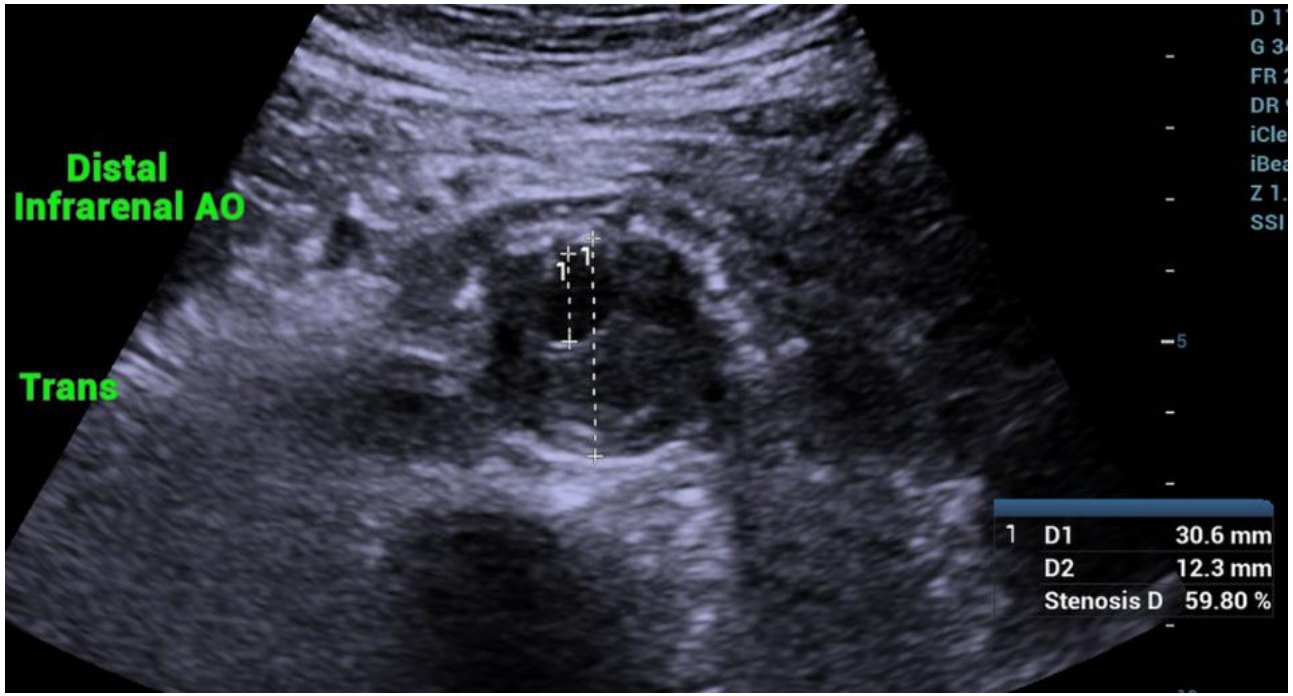
Thoracic Outlet(TOS testing)



Cold Immersion Testing (Raynaud's)



US findings may prompt additional testing



- Consider complications
  - Emboli from an AAA? (blue-toe syndrome)

Hemodialysis Access Studies

Group 6 (5 Codes)

Group 6 Paragraph

Hemodialysis Access Studies

93985	DUPLEX SCAN OF ARTERIAL INFLOW AND VENOUS OUTFLOW FOR PREOPERATIVE VESSEL ASSESSMENT PRIOR TO BILATERAL STUDY
93986	DUPLEX SCAN OF ARTERIAL INFLOW AND VENOUS OUTFLOW FOR PREOPERATIVE VESSEL ASSESSMENT PRIOR TO UNILATERAL STUDY
93986	DUPLEX SCAN OF ARTERIAL INFLOW AND VENOUS OUTFLOW FOR PREOPERATIVE VESSEL ASSESSMENT PRIOR TO CREATION OF HEMODIALYSIS ACCESS; COMPLETE UNILATERAL STUDY
93990	DUPLEX SCAN OF HEMODIALYSIS ACCESS (INCLUDING ARTERIAL INFLOW, BODY OF ACCESS AND VENOUS OUTFLOW)

Group 6 (139 Codes)

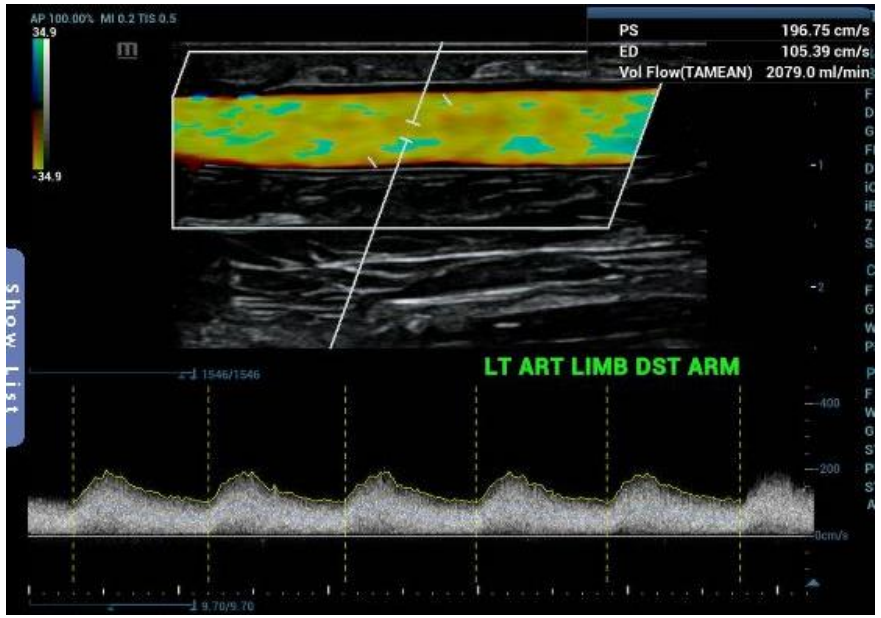
Group 6 Paragraph

Vein Mapping for Dialysis Access (93970, 93971, 93985, 93986)

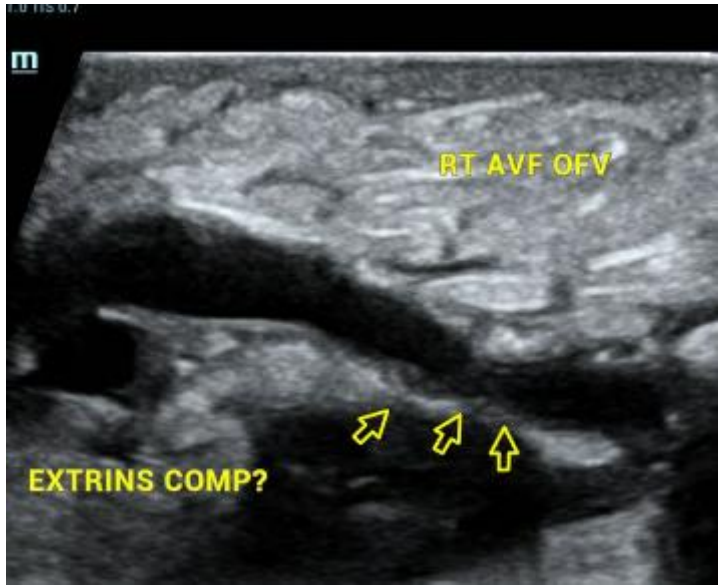
List ICD-10 code Z01.818 (Encounter for other preprocedural examination) as the primary diagnosis. The secondary diagnoses should identify the reason for the study and/or findings.

Hemodialysis Access Studies-Post-op Evaluations (AVF/AVGs)

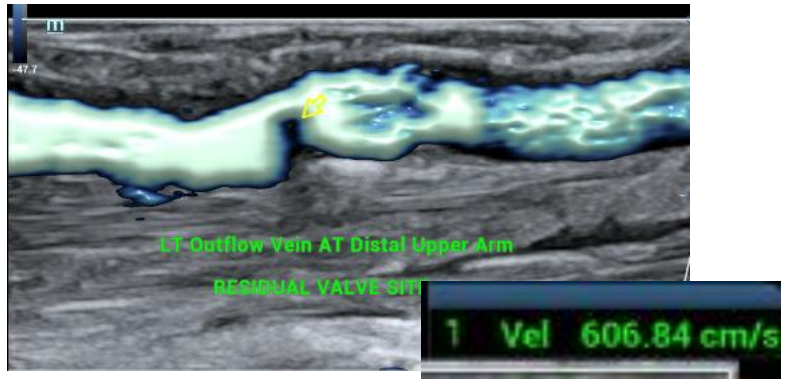
- Patency/Volume Flow

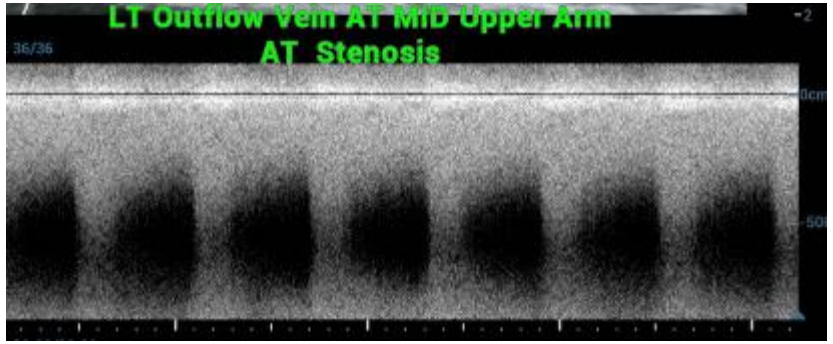


- Incidental Findings



- Stenosis (anastomotic v outflow)





93990	DUPLEX SCAN OF HEMODIALYSIS ACCESS (INCLUDING ARTERIAL INFLOW, BODY OF ACCESS AND VENOUS OUTFLOW)

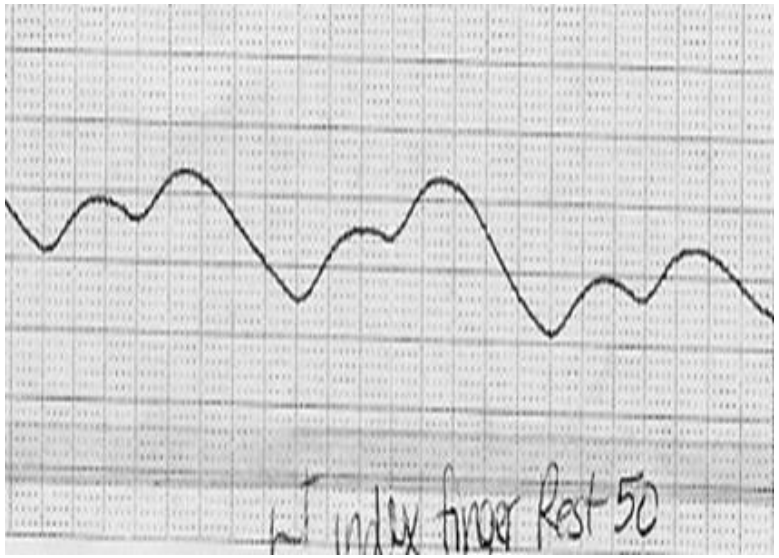
Hemodialysis Access Studies- Analysis for Steal

Case Study: 57 year old female with left brachiocephalic AVF complaining of left hand numbness post AVF surgery

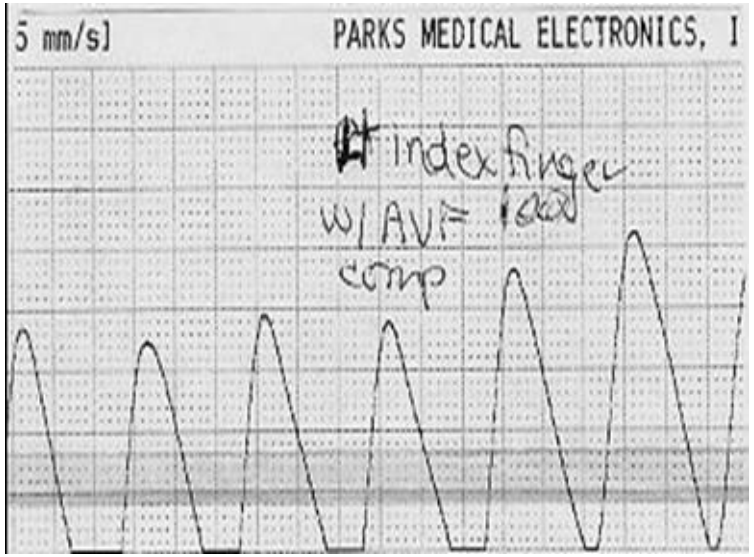
Pre-op DBI: 0.99

Right Brachial: 102 mmHg (highest)

-PPG at rest 50 mmHg (0.49)



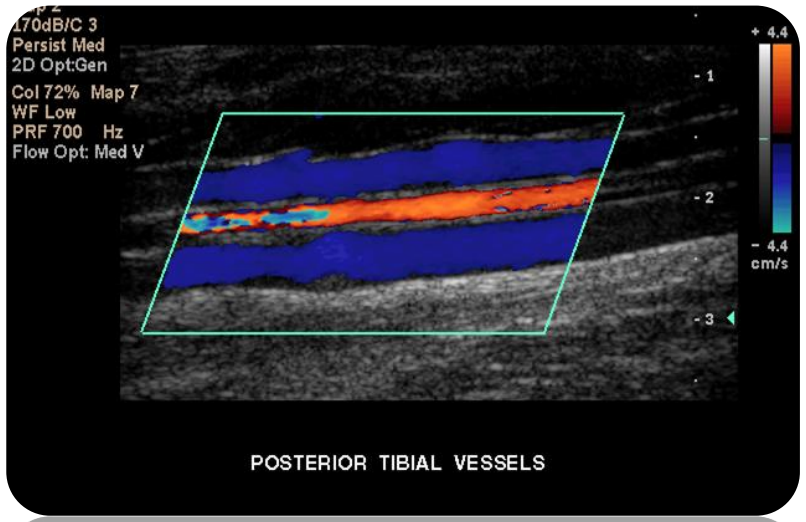
-Repeat PPG with AVF compression 100 mmHg (0.98)

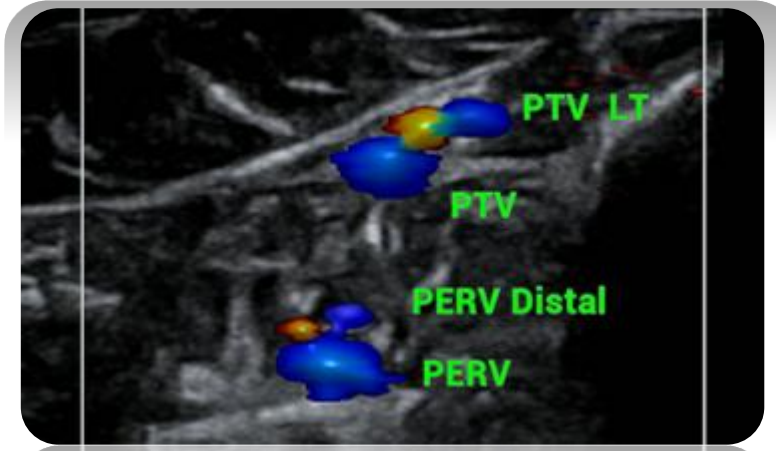


Analysis for Steal-Order arterial pressure exam (93922)

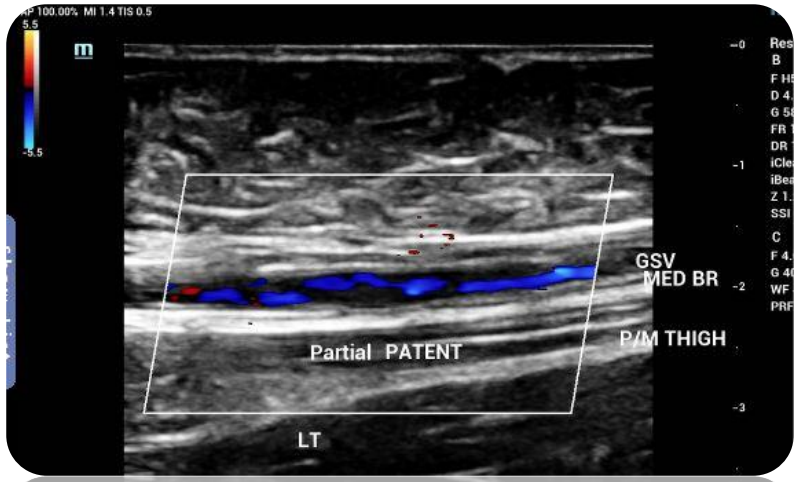
Venous: r/o DVT

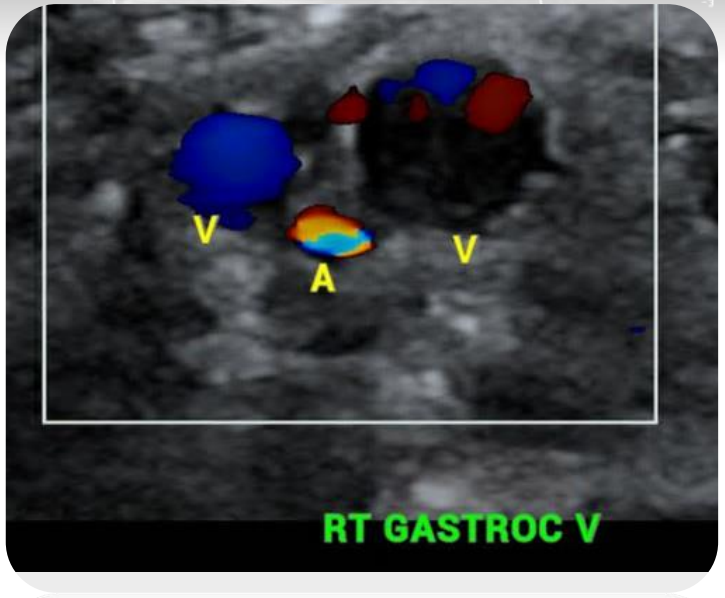
(None) Normal



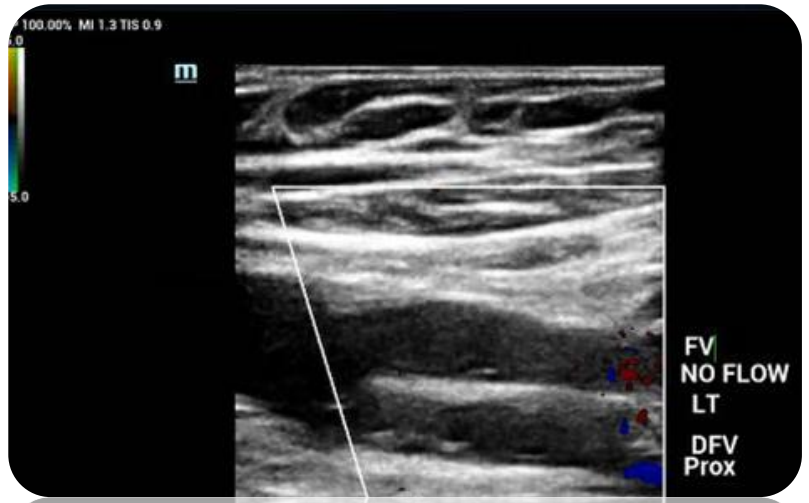


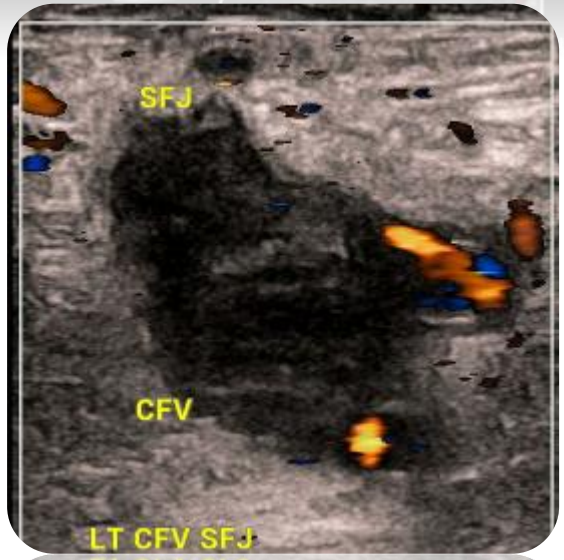
Partially Occlusive





Totally Occlusive





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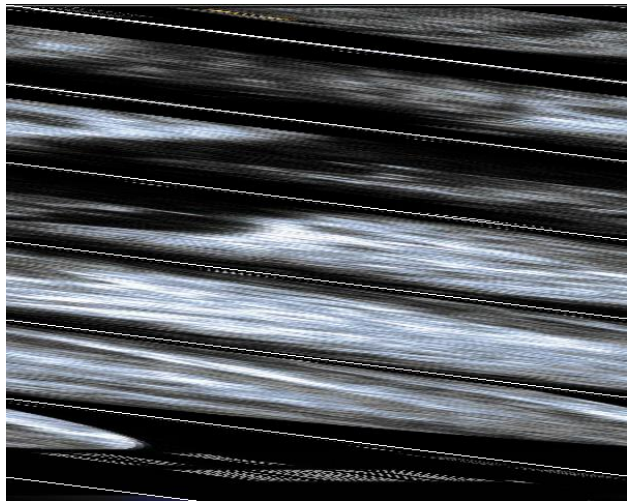
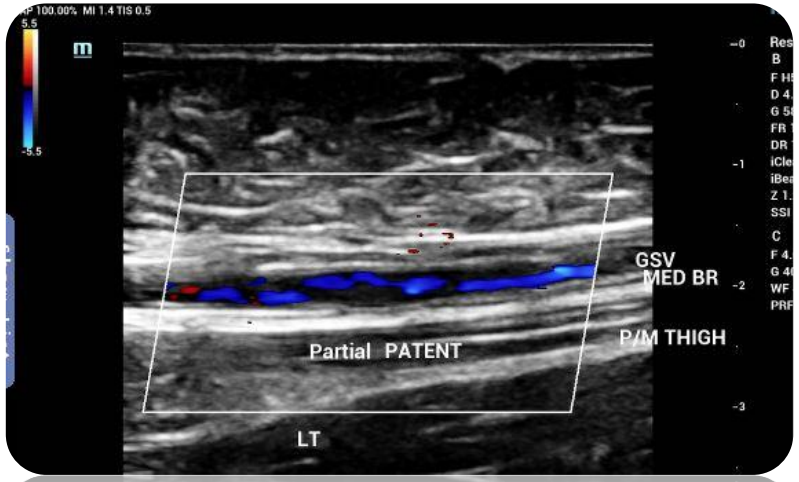
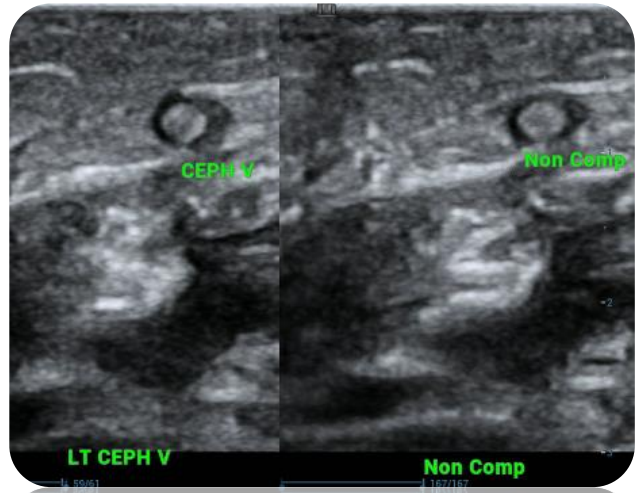
Venous: DVT and Chronicity of Thrombus

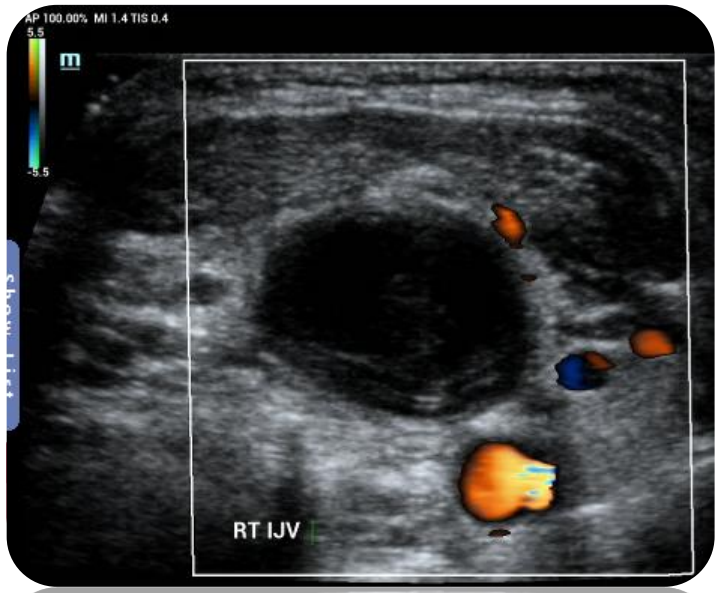
Chronic

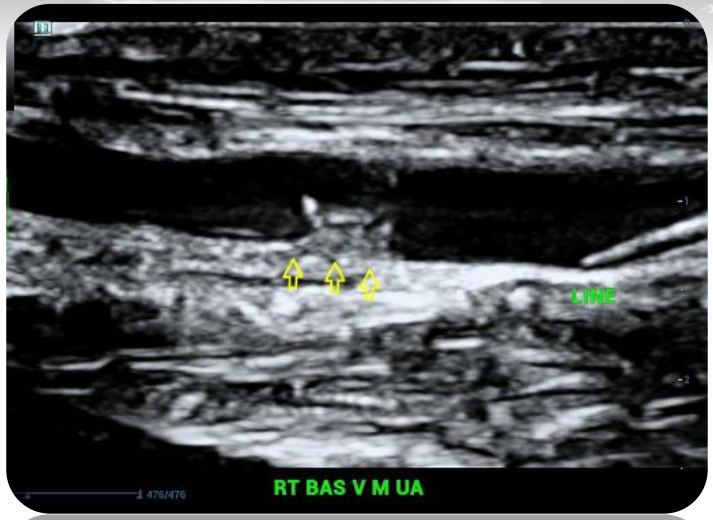
Indeterminate Aged

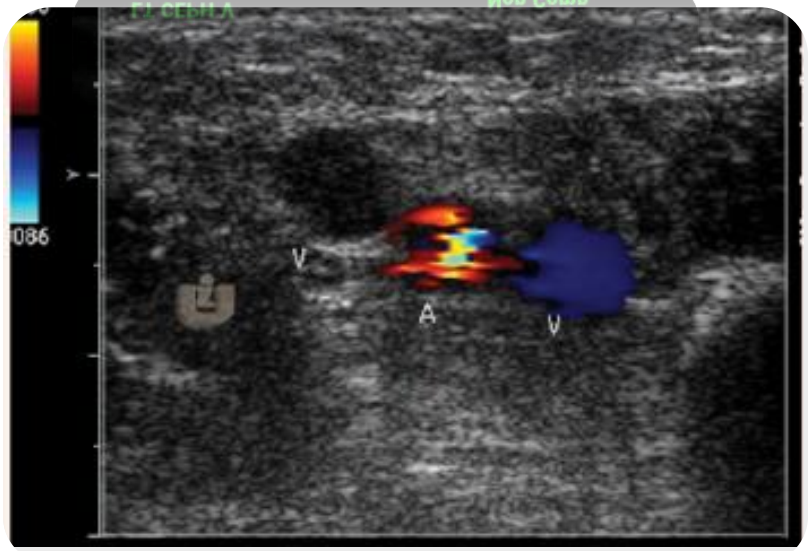








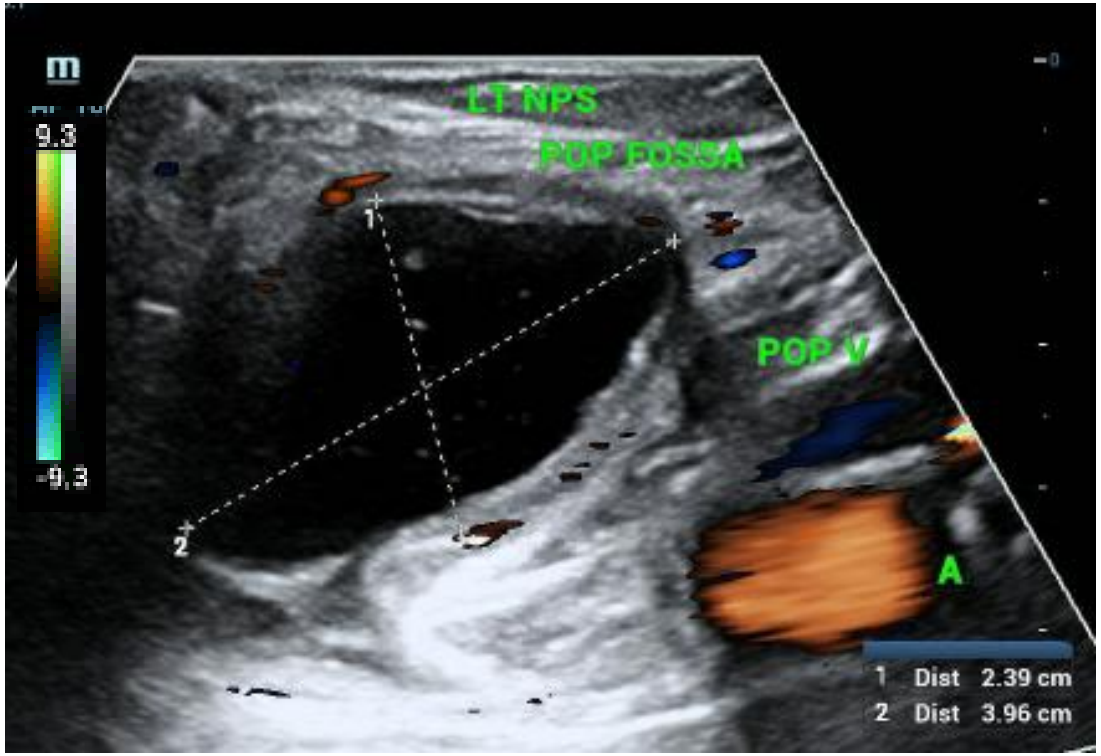




Incidental Findings Peripheral Venous Exams

Edema

Popliteal Cysts



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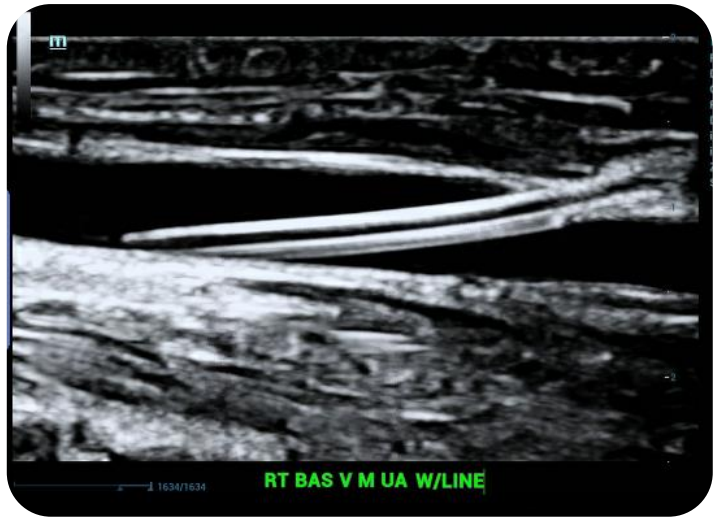
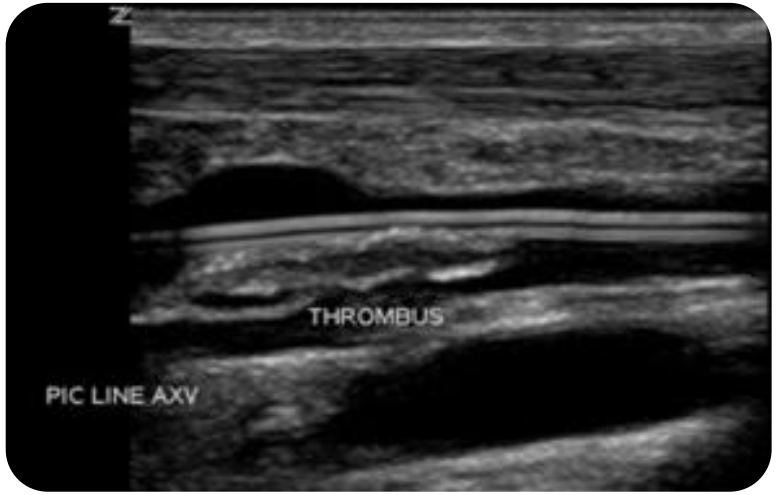
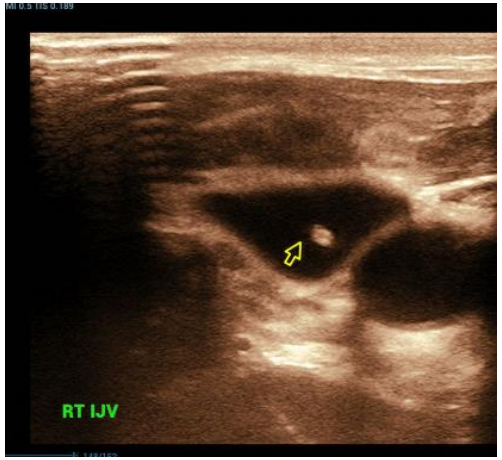
Other Pathology and Incidental Findings

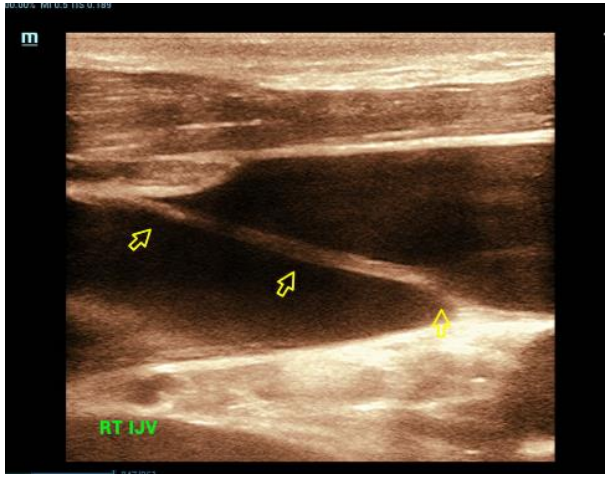
Catheter related thrombus





Fibrin sheath





Venous extrinsic compression

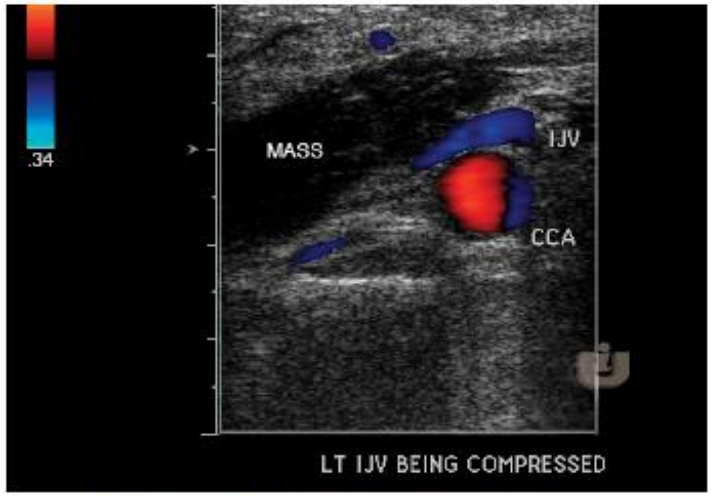


Fig. 33-30: *Extrinsic compression of the vein suspected-transverse view*

Fig. 33-31: *Venous compression confirmed by spectral Doppler (continuous flow/lacks pulsatility)*

Peripheral Venous Exams

CVI Protocols Differ

Venous	
Duplex Leg/Arm Vein Image Bilateral	93970
Duplex Leg/Arm Vein Image Unilateral	93971

Minimum of……

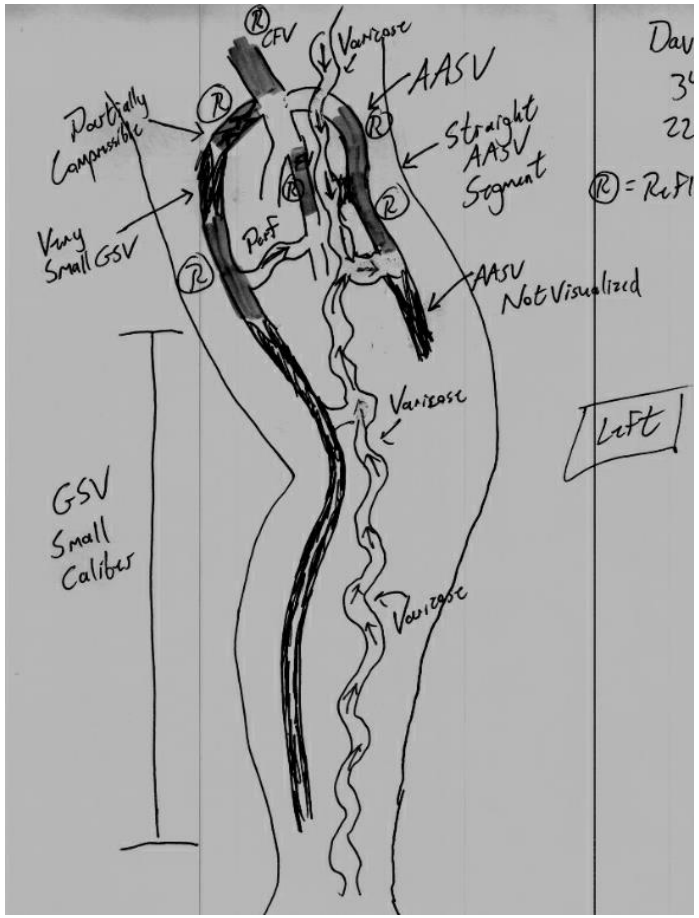
DVT

11 images per limb

CVI

46 images per limb=

92 images for a bilateral exam



Partially compressible right GSV proximal thigh, GSV distal thigh, GSV proximal calf and GSV distal calf veins.

Reflux noted within the right common femoral (4290 milliseconds), deep femoral (2379 milliseconds), mid femoral (3488 milliseconds), popliteal (1643 milliseconds), and peroneal veins.

Partially compressible right great saphenous vein from the proximal thigh to the knee level where previous venous ablation was performed; significant reflux noted throughout this segment.

There is a partially compressible large venous tributary arising off the mid thigh GSV.

There is a short segment at the level of the knee where the GSV is not clearly identified, therefore, making this vein not continuous from the groin to ankle, just distal to this segment the true GSV measures 4.4mm. There is a large varicosity (7.7mm) that arises off the GSV at this level which is partially compressible with 2.78 milliseconds of reflux noted.

The GSV becomes smaller in caliber at the proximal calf measuring 3.2mm with 998milliseconds of reflux noted at this area. Just distal to this smaller area there are two large tributaries that arise off the GSV; one tributary courses posterior and laterally with reflux (1470milliseconds) the other tributary courses anteriorly with reflux (998 milliseconds). Both of these tributaries are partially compressible.

Normal compressibility of the right proximal to distal calf GSV with reflux noted from the proximal to distal calf; no reflux at the level of the ankle.

There is a large tortuous varicose vein that courses from the proximal calf to the ankle at the area of the ulcer. This large varicosity has significant reflux (1350 milliseconds) and measures 10.2mm in diameter at the ankle just above the ulcer. This varicosity appears to arise off the gastrocnemius veins at the proximal calf level. Reflux is demonstrated in the right gastrocnemius veins (1343 milliseconds).

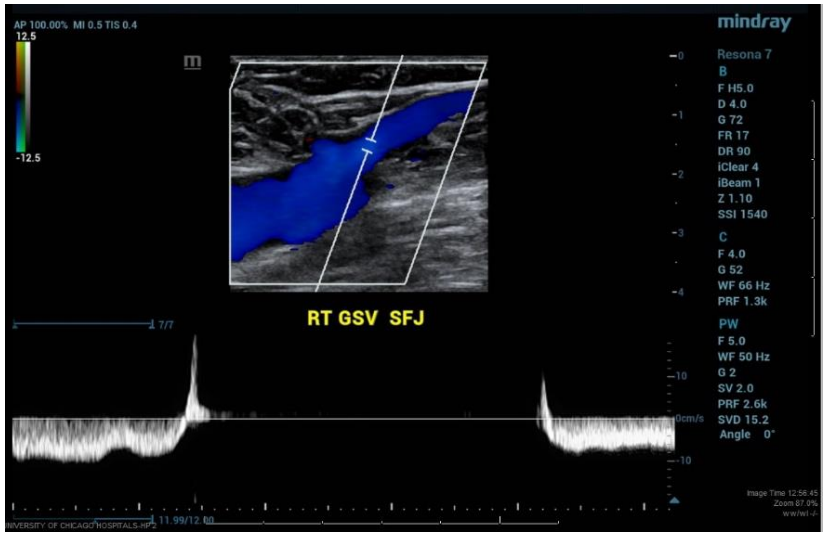
The right SSV extends into the distal thigh, therefore no saphenopopliteal junction noted. The right SSV has significant reflux from the distal thigh to the mid calf levels. There are varicosities arising off the SSV with 1088 milliseconds of reflux noted.

Evidence of a perforator measuring 3.4mm with 615 milliseconds of reflux noted.

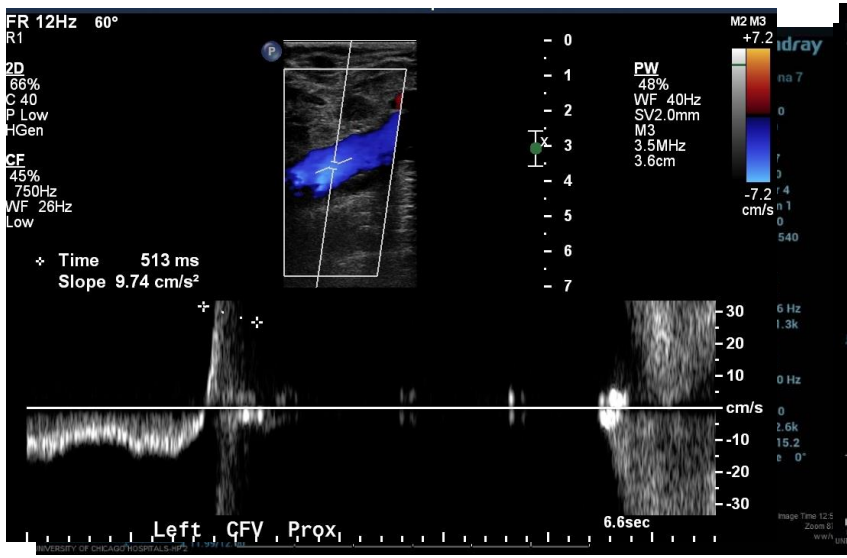
Venous Reflux- Diagnostic Criteria

	Deep			
	Thigh	Calf	Superficial	Perforator
Normal	<1 sec	<0.5 sec	<0.5 sec	<0.5 sec
Abnormal	>1 sec	>0.5 sec	>0.5 sec	>0.5 sec

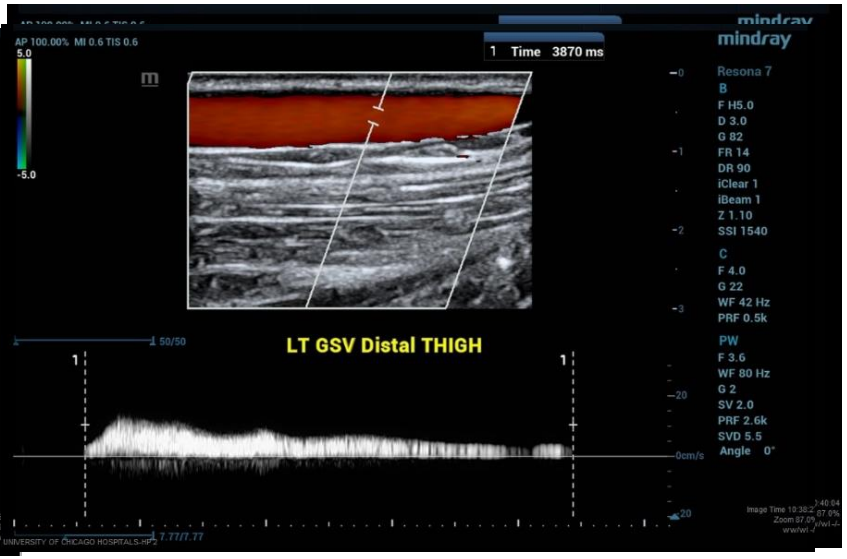
Normal Valve Closure
+ No Reflux



Not Reflux!



Significant Reflux



Non-Invasive Vascular Screening Exams

AAA Screening

Recommendation Summary

Population	Recommendation	Grade
Men aged 65 to 75 years who have ever smoked	The USPSTF recommends 1-time screening for abdominal aortic aneurysm (AAA) with ultrasonography in men aged 65 to 75 years who have ever smoked.	B
Men aged 65 to 75 years who have never smoked	The USPSTF recommends that clinicians selectively offer screening for AAA with ultrasonography in men aged 65 to 75 years who have never smoked rather than routinely screening all men in this group. Evidence indicates that the net benefit of screening all men in this group is small. In determining whether this service is appropriate in individual cases, patients and clinicians should consider the balance of benefits and harms on the basis of evidence relevant to the patient's medical history, family history, other risk factors, and personal values.	C
Women who have never smoked	The USPSTF recommends against routine screening for AAA with ultrasonography in women who have never smoked and have no family history of AAA.	D
Women aged 65 to 75 years who have ever smoked	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for AAA with ultrasonography in women aged 65 to 75 years who have ever smoked or have a family history of AAA.	I

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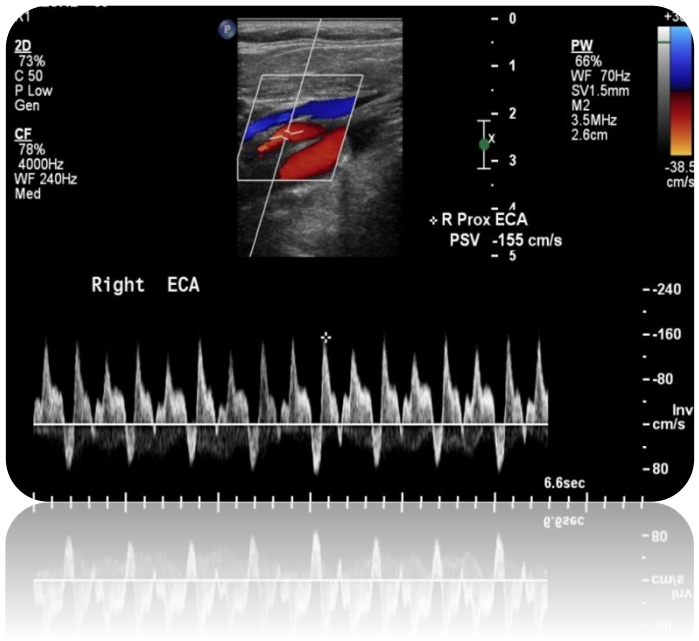
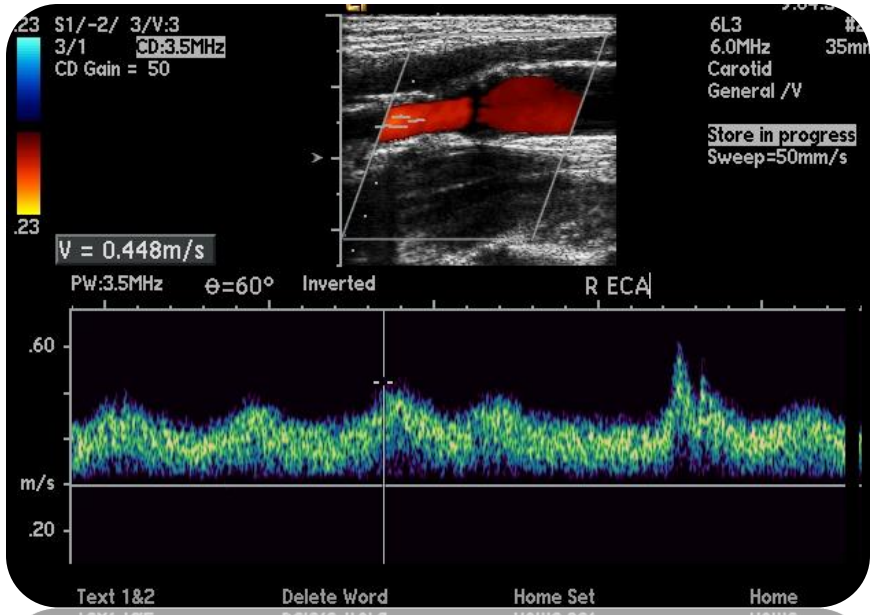
Interpretation in the Setting of Cardiac Devices

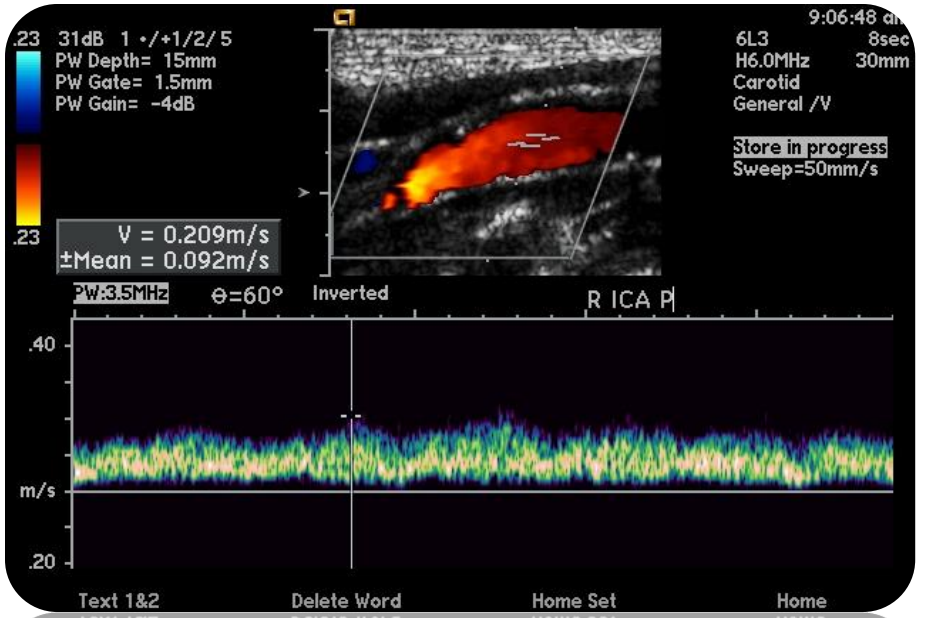
Special Interpretation Considerations: Aortic Balloon Pump



On most occasions it is hard to measure the velocities and describe waveform patterns

Special Interpretation Considerations: Left Ventricular Assistive Device (LVAD)





On most occasions it is hard to measure the EDV due to barely pulsatile waveform

Limitations of Ultrasound...

bandaging

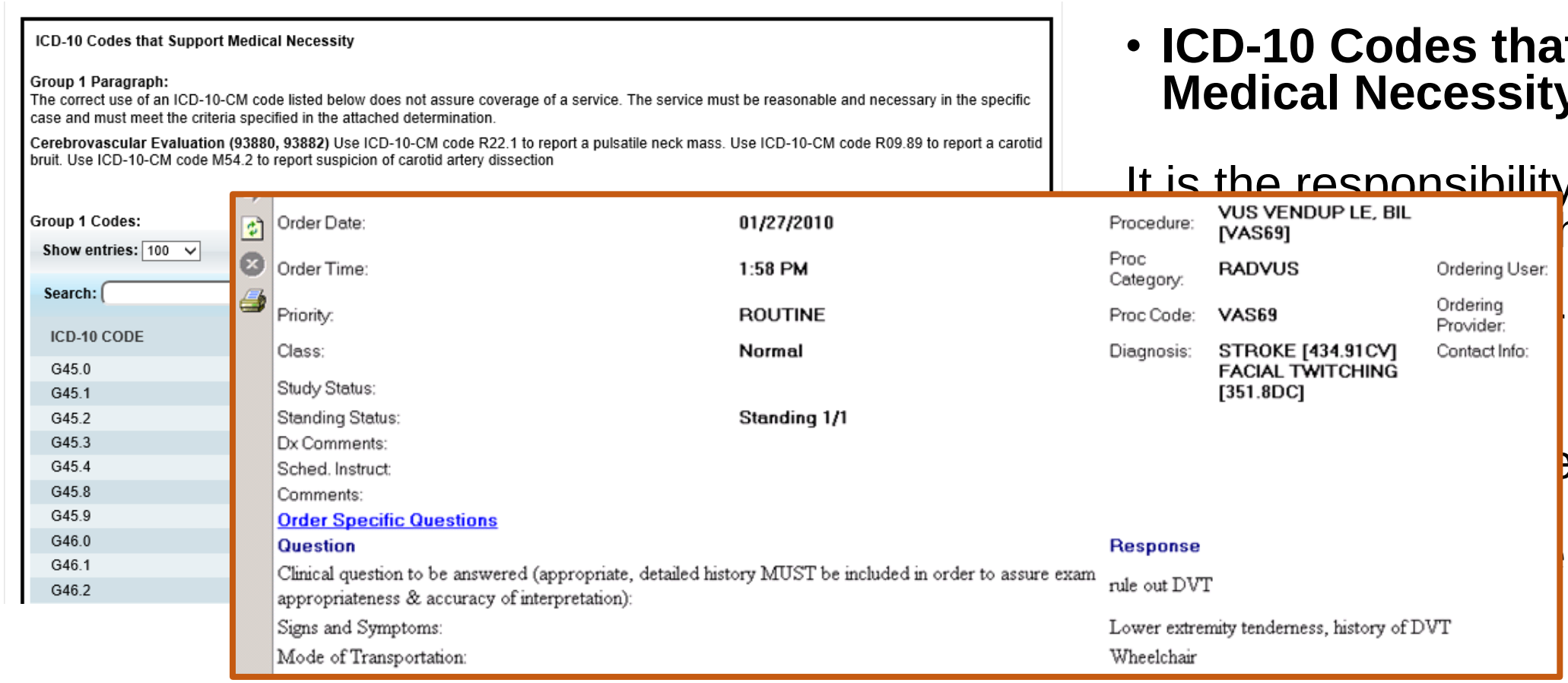
braces/casts

abdominal gas

morbid obesity

Do the ICD-10 Codes Show Medical Necessity for Exam?

- Services provided are appropriate to evaluation and treatment for given symptoms



ICD-10 Codes that Support Medical Necessity

Group 1 Paragraph:
The correct use of an ICD-10-CM code listed below does not assure coverage of a service. The service must be reasonable and necessary in the specific case and must meet the criteria specified in the attached determination.

Cerebrovascular Evaluation (93880, 93882) Use ICD-10-CM code R22.1 to report a pulsatile neck mass. Use ICD-10-CM code R09.89 to report a carotid bruit. Use ICD-10-CM code M54.2 to report suspicion of carotid artery dissection

Group 1 Codes:

Show entries: 100

Search:

ICD-10 CODE
G45.0
G45.1
G45.2
G45.3
G45.4
G45.8
G45.9
G46.0
G46.1
G46.2

Order Date:	01/27/2010	Procedure:	VUS VENDUP LE, BIL [VAS69]	
Order Time:	1:58 PM	Proc Category:	RADVUS	Ordering User:
Priority:	ROUTINE	Proc Code:	VAS69	Ordering Provider:
Class:	Normal	Diagnosis:	STROKE [434.91CV] FACIAL TWITCHING [351.8DC]	Contact Info:
Study Status:				
Standing Status:	Standing 1/1			
Dx Comments:				
Sched. Instruct:				
Comments:				

Order Specific Questions

Question	Response
Clinical question to be answered (appropriate, detailed history MUST be included in order to assure exam appropriateness & accuracy of interpretation):	rule out DVT
Signs and Symptoms:	Lower extremity tenderness, history of DVT
Mode of Transportation:	Wheelchair

- **ICD-10 Codes that Support Medical Necessity**

It is the responsibility of the
he highest
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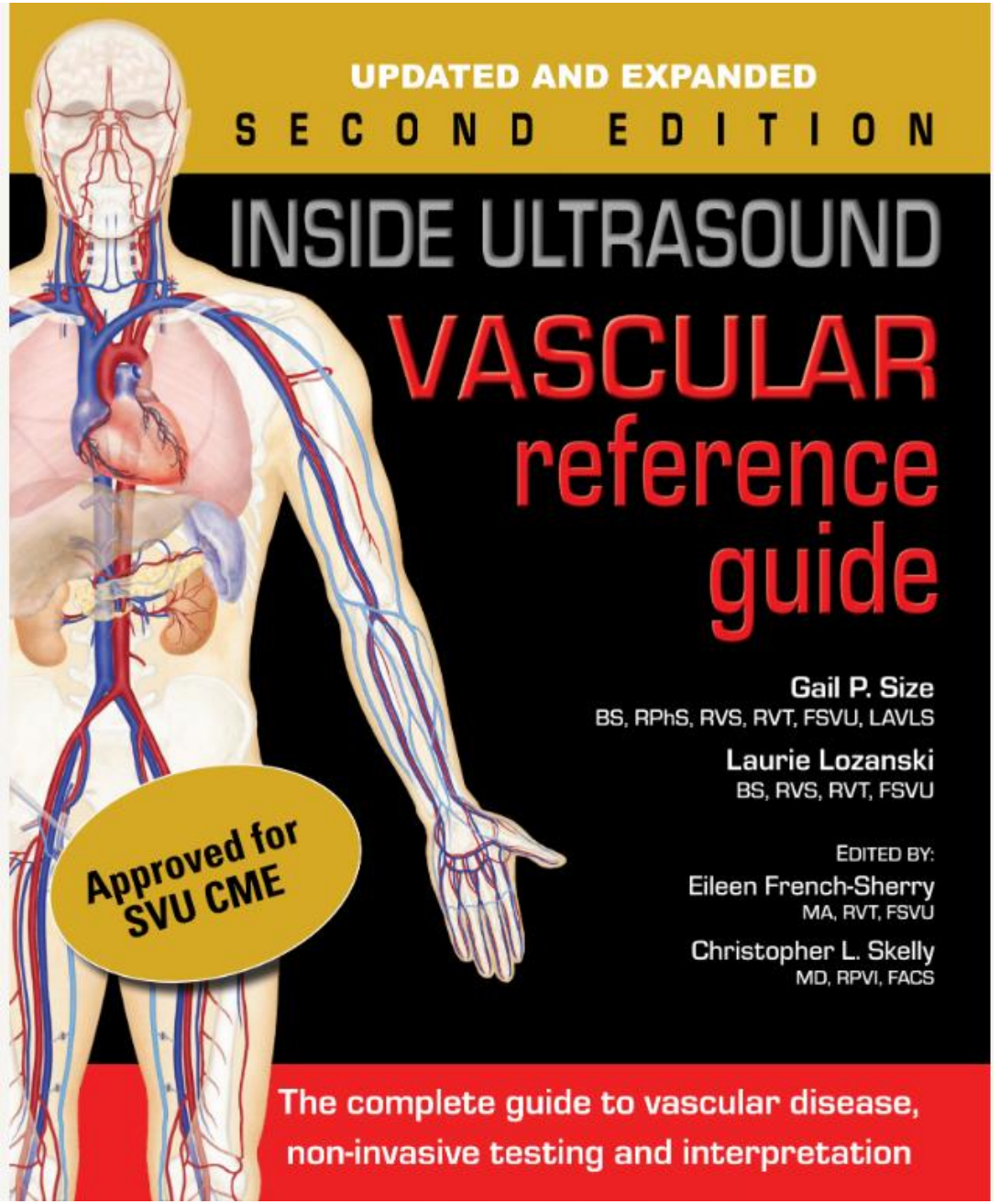
UPDATED AND EXPANDED
SECOND EDITION
INSIDE ULTRASOUND
VASCULAR
reference
guide
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The complete guide to vascular disease, non-invasive testing and interpretation