2024 MID-ATLANTIC CONFERENCE

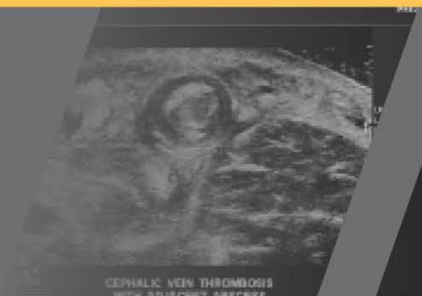
12th ANNUAL CURRENT CONCEPTS IN

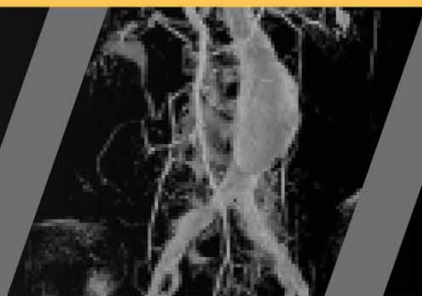
VASCULAR THERAPIES

2024

Hilton Virginia Beach Oceanfront
Virginia Beach, Virginia

APRIL 18-20





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Who, What, When, Where and Why of Superficial Venous Disease

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Sentara Vascular Specialists

Spoiler: **No DVT or PE**

Who, What, When, Where and Why of Superficial Venous Disease

- Estimated that 30 million people in the U.S. are affected with varicose veins & symptomatic chronic venous insufficiency
- 30% of adult U.S. population afflicted – but only 10% correctly diagnosed or seek care
- Approximately 2 million new cases per year
- The basic abnormality underlying the constellation of signs and symptoms known as “Chronic Venous Insufficiency” is an

Elevation of Venous Pressure

“Venous Hypertension”

WHO

Case Scenario

- 40 yo F presents to clinic with a 1 year history of R leg swelling that is worse at the end of the day and better in the morning. She works as a nurse and is on her feet all day. She has also noticed varicose veins on her leg that are large and pruritic. She has no significant medical problems, has never had surgery, and is a nonsmoker.

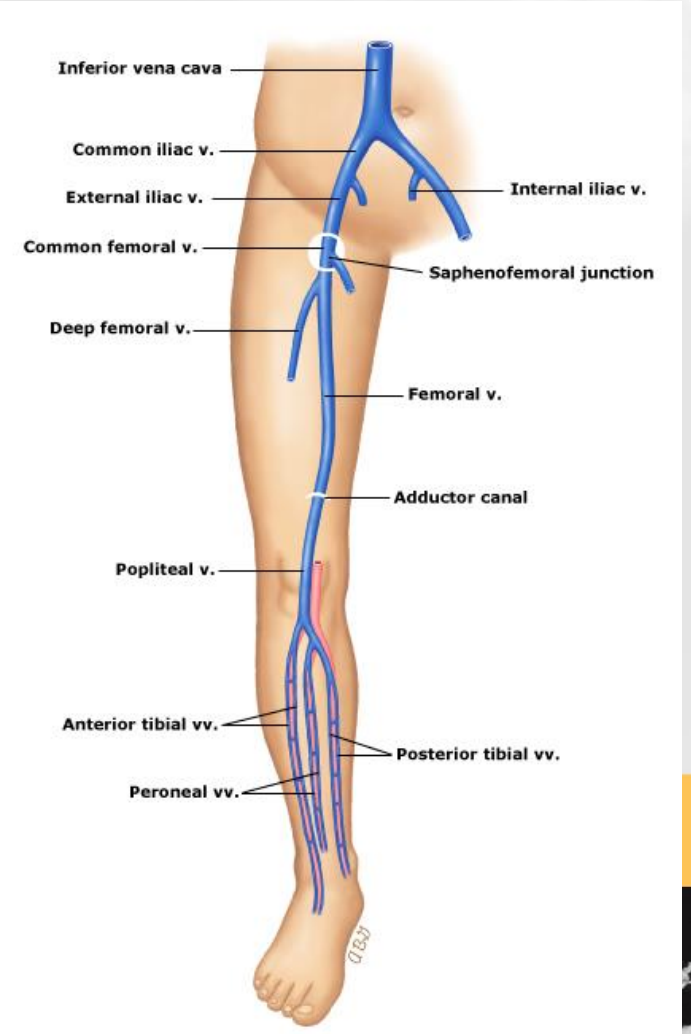
Case Scenario

- Focused H/P
  - *Recent weight gain? Pregnancy? Prior VTE? FH clotting d/o?*
    - No wt gain or clots, 4 prior pregnancies
  - *Exam heart, lungs, abd, extremities for edema, lipodermatosclerosis, varicosities, wounds, and peripheral pulses*
    - R leg has 1+ pretibialedema that spares the foot w/o skin discoloration or thickening.
    - Large serpiginous varicosities on the anterior and medial leg with palpable pedal pulses

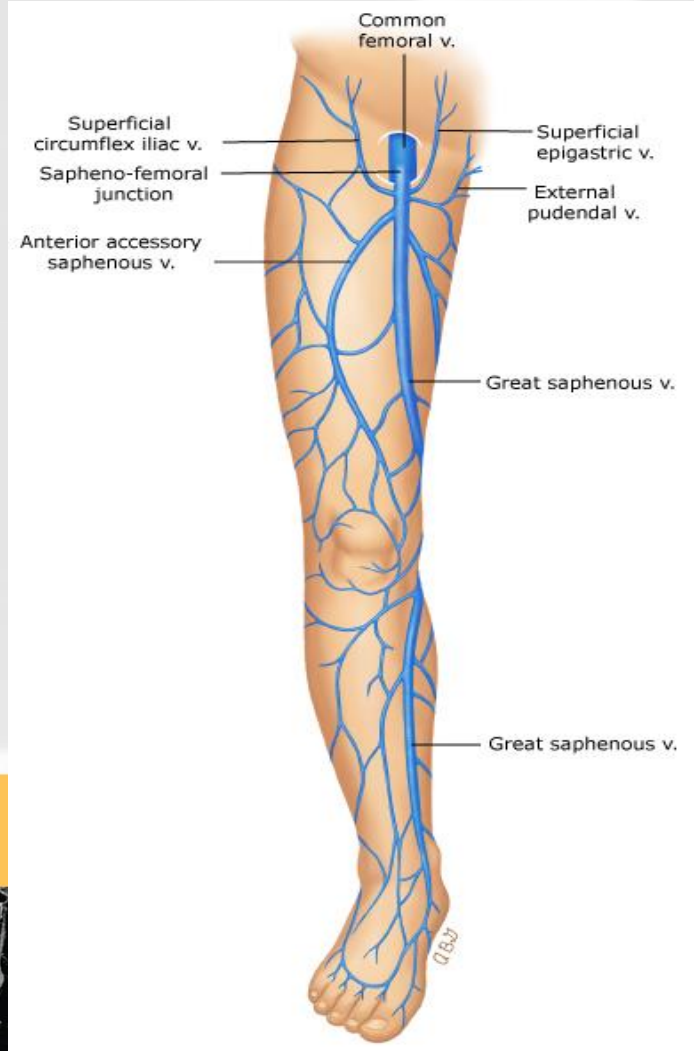
WHAT

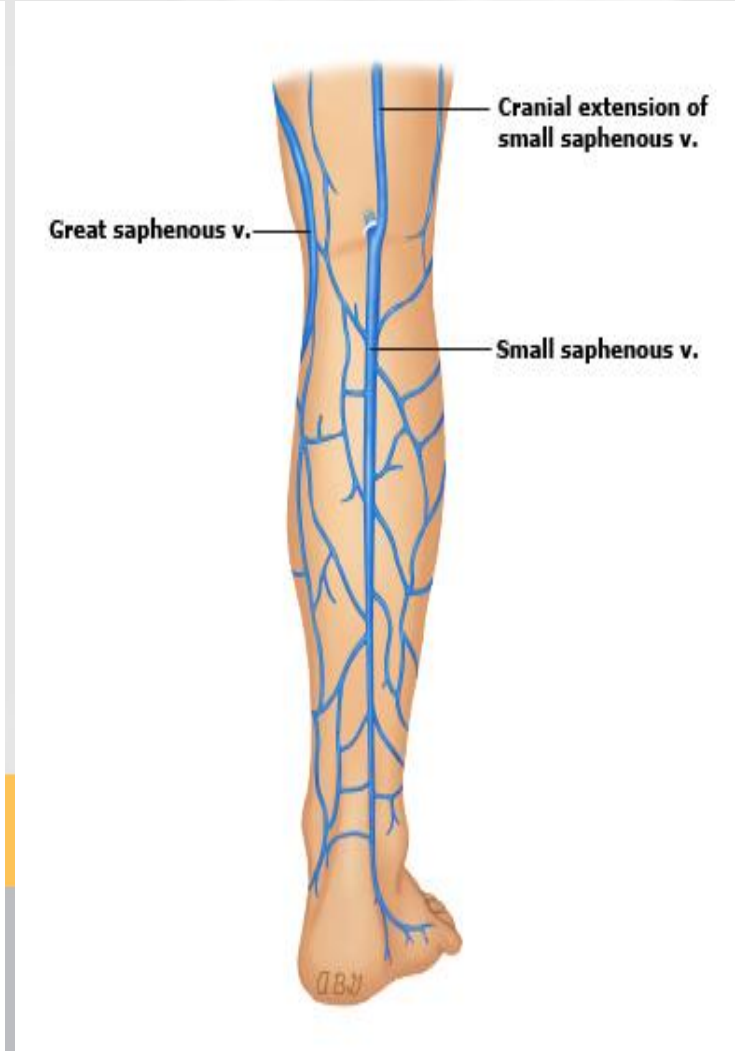
Venous Anatomy

Deep System

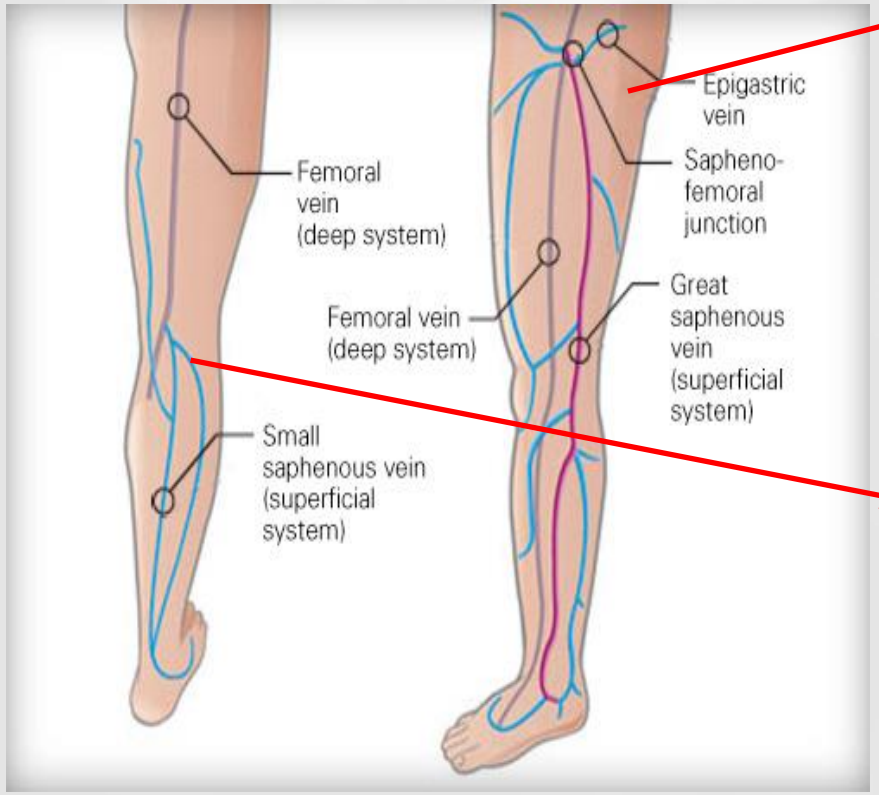


Superficial System



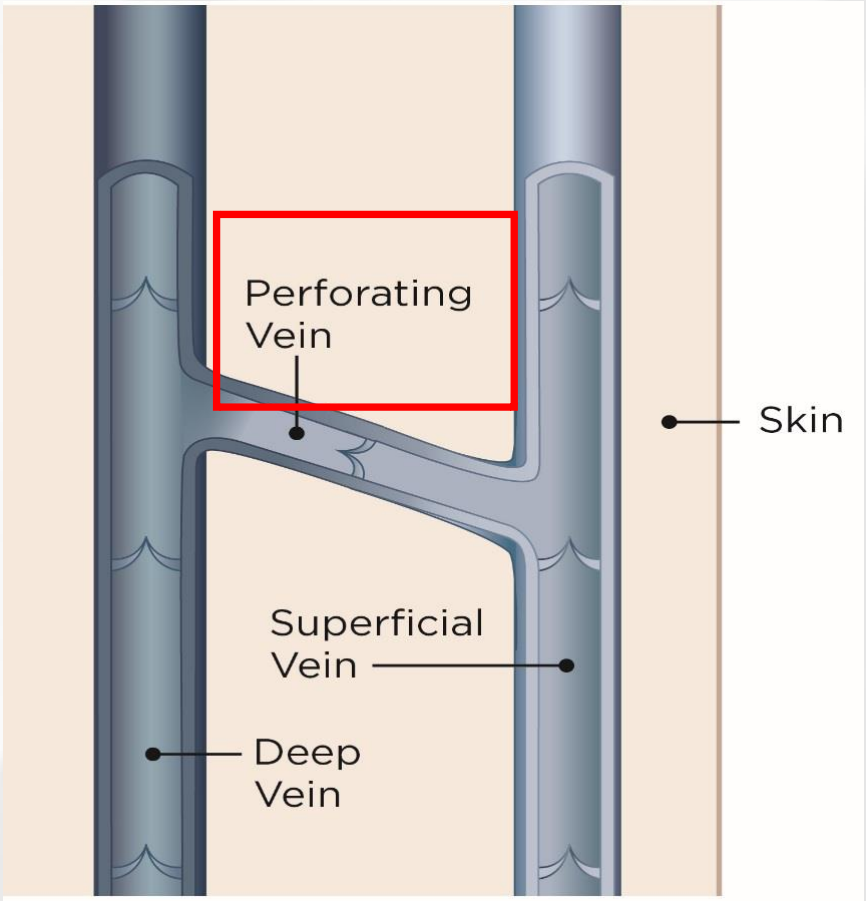


Venous Anatomy – communication



SFJ

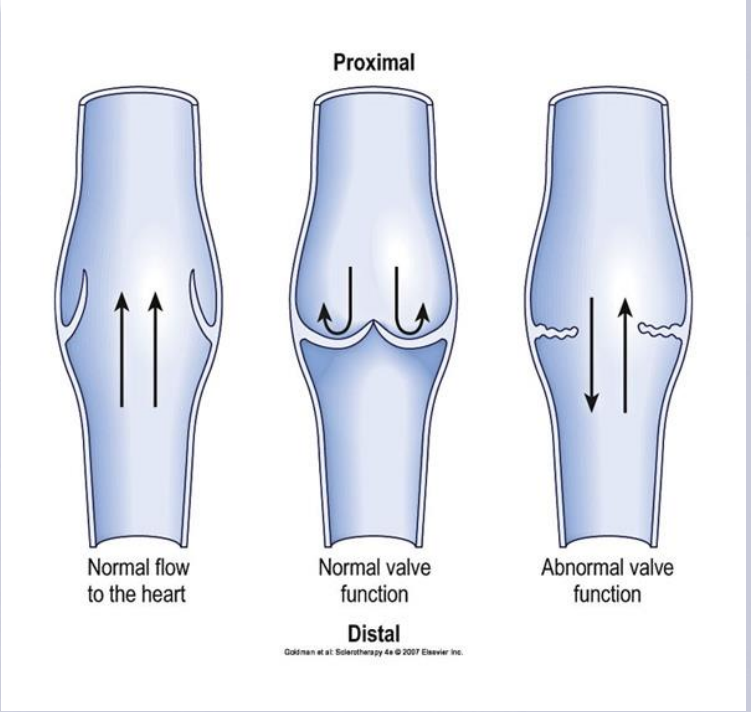
SPJ



Vein anatomy and function

- Vein valves
  - *Often site of clot*
  - *Keep veins from pooling in lower extremities*
  - *Keeps blood moving from SV system to DV*

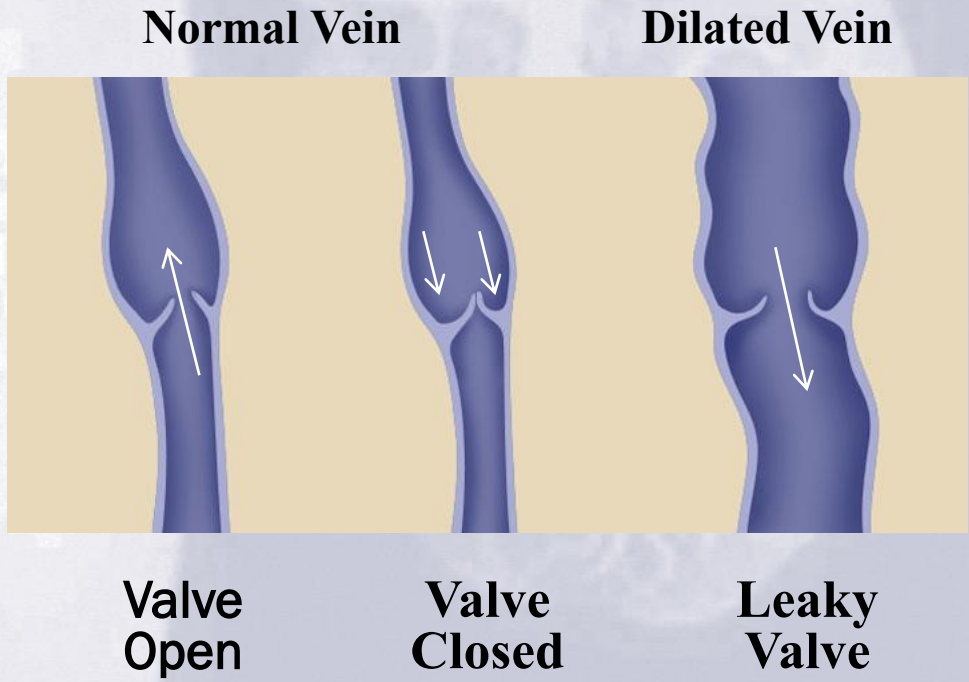
- Effective venous return from the lower extremities requires the interaction of the heart, a pressure gradient, the peripheral muscle pumps of the leg, and competent venous valves



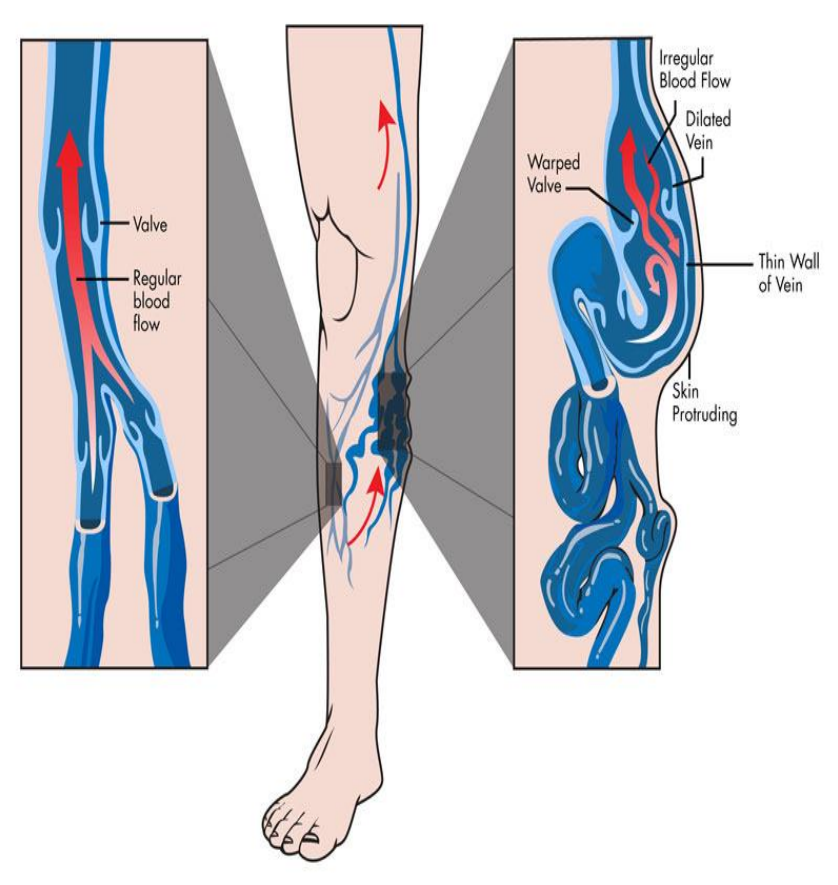
Chronic Venous Insufficiency

- **Venous wall and/or valves in the leg veins are not working effectively, making it difficult for blood to return to the heart from the legs→ CVI**

- Valve damage may occur as the result of aging, extended sitting or standing or a combination of aging and reduced mobility



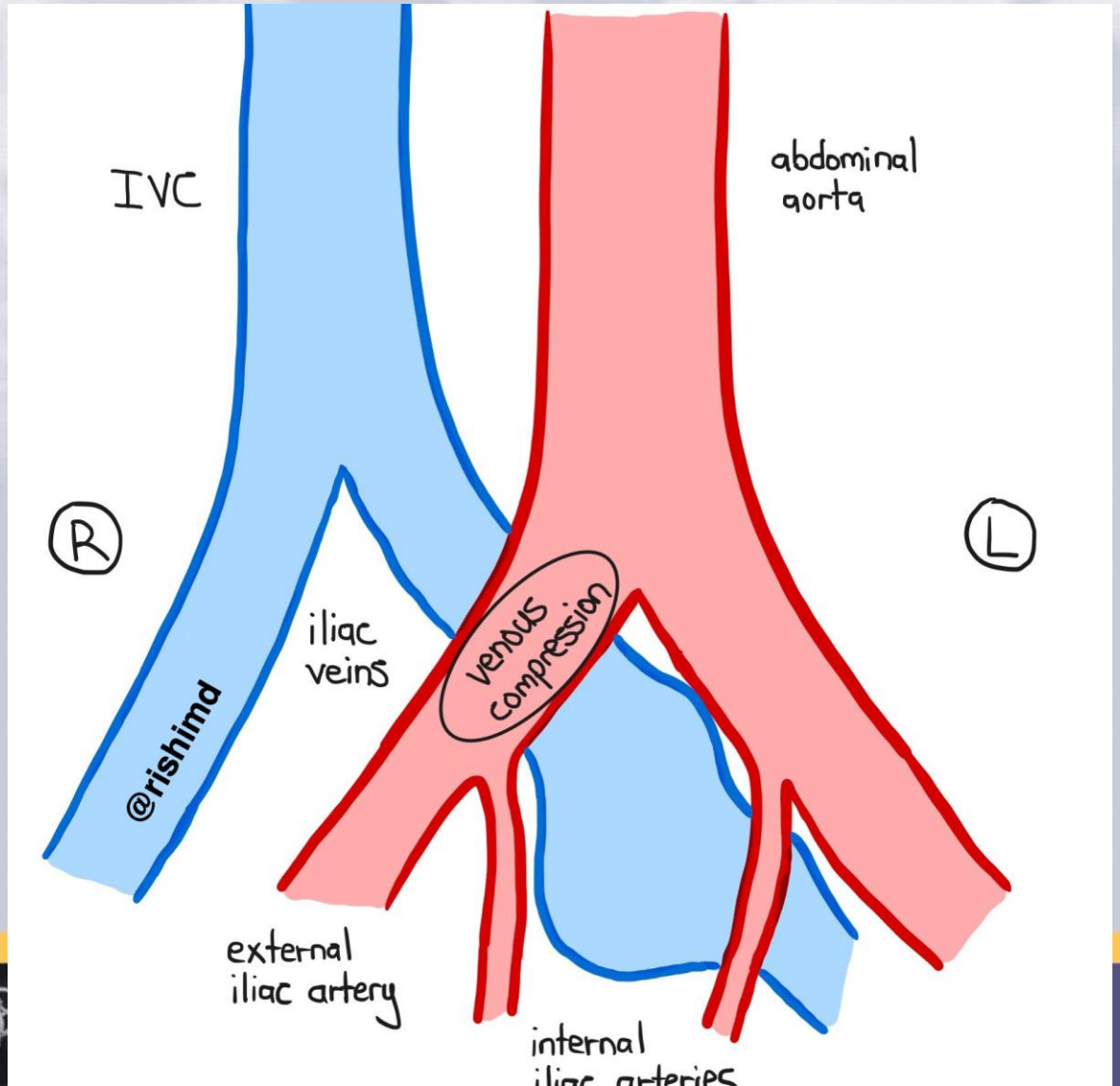
Compensation → Varicose Veins



May-Thurner Syndrome

- L CIV compression by the R CIA (or opposite if the patient has situs)
- Very common, mostly physiologic
- Unilateral symptoms, or post partum varicose veins in LLE are common question stems
- Duplex will show reflux, CT will show compression or venous distension, but IVUS remains the best option for clinical diagnosis
- Minimally symptomatic patients treat conservatively (usually post partum patients, as it more frequently resolves)
- Stenting of the L CIV is the standard of care
- **5th vertebral body**

May-Thurner Syndrome



Imaging

- Duplex Ultrasound: Deep/superficial systems, great for most venous pathologies, DVT/PE/Reflux etc. Gold standard
- Plethysmography: physiologic measurement of venous volume. Great for reflux diseases. **Measures calf muscle pump efficiency**
- CT/MR Venography: Congenital abnormalities, abdominal venous diseases, cancers, compression, etc. Good diagnostic choice for further workup of disease
- Venography: Indicated for complex obstructive vs mixed diseases for workup, or any kind of intervention that is nonsurgical
- IVUS: Best for assessing size and compression during intervention/workup. Frequently referenced for questions

Table 3. Relative Value of Noninvasive Testing Modalities in CVI Based on Clinical Indication

	Duplex	APG	MRV/CTV
To establish a diagnosis	+++	++	++
To assess severity	+/–	+++	+/–
To determine anatomy	+++	–	+++
To determine hemodynamic significance	–	+++	–

APG indicates air plethysmography; CTV, computed tomography venography; and MRV, magnetic resonance venography.

Reflux (insufficiency) testing

- To evaluate deep and superficial venous systems for valvular incompetence
- Indications
  - *Venous ulcers*
  - *Varicose veins*
  - *Heaviness/swelling*
  - *Pain/discoloration (lipodermatosclerosis)*

Reflux (insufficiency) testing

- Technique
- Standing, leg externally rotated, weight shifted to contralateral leg
- Look at SFJ, SPJ, terminal valve (incompetent?)
- BP cuffs placed on thigh, calf, above ankle
- Cuffs serially inflated to include venous flow → rapidly deflate to assess reflux with the pulsed doppler
- Reflux time >0.5 sec is pathologic
- Velocity and peak flow at the peak of reflux correlate better with clinical severity than time

WHAT (STAGING)

Table 1. CEAP classification of chronic venous disease

Clinical Classification (C)	
C_0	No visible/palpable signs of venous disease
C_1	Telangiectasias or reticular veins
C_2	Varicose veins
C_3	Edema
C_{4a}	Pigmentation and/or eczema
C_{4b}	Lipodermatosclerosis and/or atrophy
C_5	Healed venous ulcer
C_6	Open venous ulcer
	Subscript
A	Asymptomatic
S	Symptomatic

Etiologic Classification (E)	
E_c	Congenital
E_p	Primary
E_s	Secondary (postthrombotic)
E_n	No venous etiology identified
Anatomic Classification (A)	
A_s	Superficial veins
A_p	Perforator veins
A_d	Deep veins
A_n	No venous location identified
Pathophysiologic Classification (P)	
P_r	Reflux
P_o	Obstruction
$P_{r,o}$	Reflux and obstruction
P_n	No venous pathophysiology identifiable

Source: Adapted from the 2011 Clinical Guidelines of the Society for Vascular Surgery and American Venous Forum (J Vasc Surg. 2011;53:2S-48S)

WHEN (DO WE TREAT?)
WHY?

CVI

- Treatment: Initial is compression stocking (elastic)
- **Venous reflux times and sizes, general:**
  - *Superficial: >0.5sec [and deep femoral and tibial]*
  - *Deep: >1sec [Fem/Pop]*
  - *Perforator: 3.5mm in size, >0.5sec (.350 is also an accepted cutoff)*
    - **Pathologic Perforator: must be next to an active ulcer**
- Venous Claudication: Pain, discomfort, difficulty with ambulation, **improves with elevation**

CVI

- Wounds: Form from skin breakdown due to elevated pressure crushing capillary bed with affiliated cellular cascade for continued breakdown of normal tissue (there is a genetic component as well to a lesser extent)
- Compression is the mainstay of treatment:
  - *Unna boots: inelastic compression. Zinc calamine is for skin moisturizing, not primarily antimicrobial effect. Primary function is compression*
  - *For weeping wounds, do not use unna boots*
  - *Do not use if ABI <0.5*
- Debridement: Best answer for frankly necrotic or non salvageable tissue, abscess, etc.
- Open surgery: Venous bypasses are indicated for refractory wounds or for wounds that have progressed to risk limb loss
  - *Palma procedure: GSV crossover*

CVI

- Ulcer treatment
  - *Long term compression is only local wound care that increases rate of venous ulcer healing.*
  - *Topical silver: inconsistent benefit, can induce bacterial resistance*
  - *Hyperbaric O2: poorly studied, non consistent healing rates*
  - *Topical steroids: only for stasis dermatitis; can induce contact sensitization*

Long term results of compression therapy alone versus compression plus surgery in chronic venous ulceration (ESCHAR): randomised controlled trial

Manjit S Gohel [1], Jamie R Barwell, Maxine Taylor, Terry Chant, Chris Foy, Jonothan J Earnshaw, Brian P Heather, David C Mitchell, Mark R Whyman, Keith R Poskitt

Affiliations + expand

PMID: 17545185 PMCID: PMC1914523 DOI: 10.1136/bmj.39216.542442.BE

- 500 patients with open or healed ulcers and CVI
- Primary outcomes were ulcer healing and ulcer recurrence. The secondary outcome was ulcer free time.
- Longer time “ulcer free”

ESCHAR TRIAL

- Healing rates at 3 years
  - 89% C, 93% C+S
- Ulcer recurrence at 4 years
  - 56% for C, 31% C+S
- Isolated superficial reflux, recurrence at 4 years
  - 51% for C, 27% C+S
- Superficial and segmental deep reflux, recurrence at 3 years
  - 52% for C, 24% for C+S
- Superficial and total deep reflux, recurrence at 3 years
  - 46% for C and 32% for C+S
- Ulcer free time after 3 years
  - 78% for C and 71% for C+S

Other times to treat?

- Symptomatic and attributable to GSV/SSV
  - *Painful axial varicose veins*
  - *Recurrent phlebitis/thrombophlebitis*
  - *Venous hemorrhage*
- Failure of conservative therapy – no one ever died from a varicose vein

Other players

- Perforators that are pathologic
  - *At least 3.5mm in diameter and in the direct vicinity of the ulcer*
  - *Blood flow will likely be directed from the deep venous system to the superficial system via the perforator veins.*
- Small saphenous v insufficiency can cause ulcers but these are usually on lateral malleolus and in presence of GSV insufficiency
- Insufficient anterior thigh accessory saphenous can cause pain and varicose veins but not ulcers or significant skin changes

WHERE/HOW

CVI

- Common Procedures:
  - *Stripping: good for removing portions of damaged veins*
  - *Ablation:*
    - Laser
    - Radiofrequency
    - Foam
    - Glue
  - *Stab Phlebectomy: removes symptomatic varicose veins*
  - *Sclerotherapy: Telangiectasias. Can cause hyper pigmentation on the skin. Foam sclerotherapy and PFO → stroke, inject slowly*
  - *Ligation: Either for refractory disease (GSV) or for anatomically poor Ablation candidates.*

Ablation

- Leave vein *in situ*; change hemodynamics by stopping flow
- Energy sources available for heat with shallow penetration:- *Radiofrequency ablation (RFA)-Endovenouslaser (EVLT)*- Steam Vein Sclerosis (SVS) –not really used…
- *Mechanical/Chemical Ablation (Clarivein)*
- Cyanoacrylate (Venaseal)
- Microfoam(polidocanol)

Saphenous Vein Intervention:

- *Ablation: GSV access at upper calf or lower thigh*
  - ➢RFA vs EVLT → heat
    - *Sound vs light as source*
  - ➢RFA: earlier ambulation and decreased bruising compared to high ligation and stripping
  - ➢Some evidence there is less bruising with RFA than EVLA; no data suggests earlier return to work or ambulation. No earlier ambulation/work EVLA over HL and stripping
  - ➢RFA and EVLA both associated with low rates of DVT and EHIT; no trials show one has higher rate of thrombus over the other

Saphenous Vein Intervention:

- Ablation (limitations):
  - *Superficial venous reflux.*
  - *Risk of EHIT.*
  - *Contraindicated in acute DVT/STP.*
  - *Below knee saphenous nerve damage.*
  - *12mm diameter cutoff*
  - *<1cm below the skin*
  - *tortuosity*
  - *Short segment disease is not a candidate*

Adhesive ablation: Venaseal (Cyanoacrylate)

- Can treat below the knee
- VeClose
  - *94.6% closure rate at 4 years*
- Noninferiority compared to RFA

Adhesive ablation: Varithena (polidocanol foam)

Appearance

88%

Clinically meaningful improvement in appearance at 1 year[3]

Symptom Relief

86%

Clinically meaningful improvement in symptoms at 1 year[3]

Retreatment

3.4%

of truncal veins required retreatment[2]

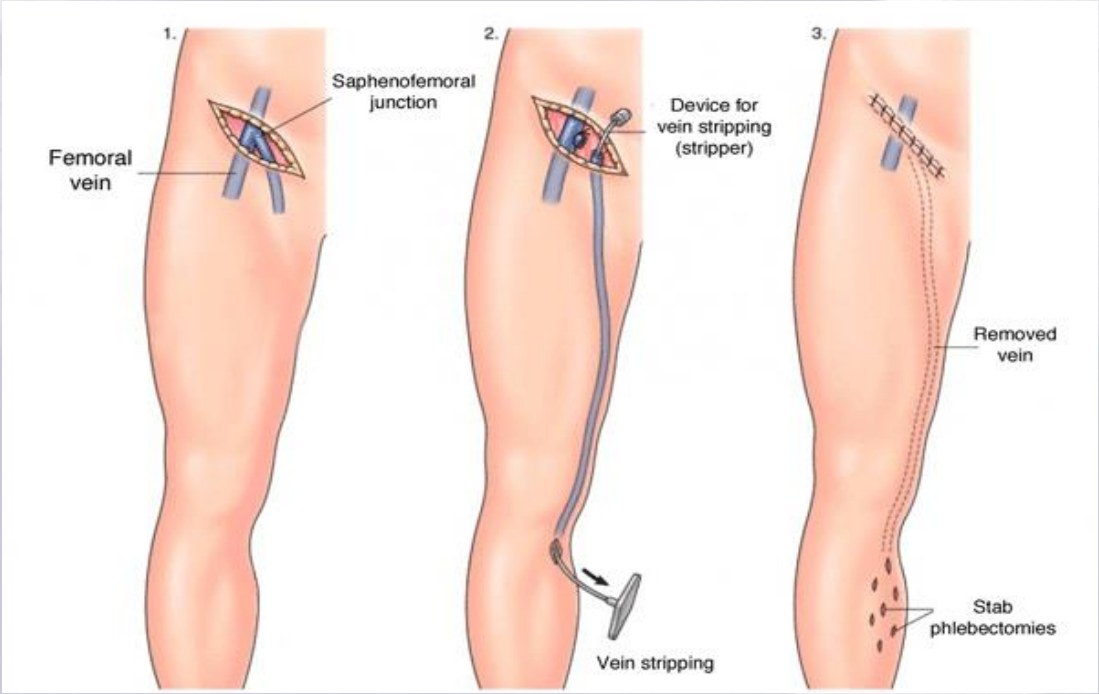
VANISH-1 and VANISH-2 clinical evidence

Saphenous Vein Intervention:

- Vein stripping
  - *Invasive*
  - *Painful*
  - *Recovery period*
  - *Cosmetic result varies*
  - *Recurrence*
- Reflux from pelvic/abdominal veins-PerrinM, LabropoulosN, LeonLR. Presentation of the patient with recurrent varices after surgery (REVAS). J Vasc Surg. 2006;43:27–34
- •Dwerryhouse. -10% recurrence rate-6% reoperation at 5 years

Saphenous Vein Intervention:

- Vein stripping

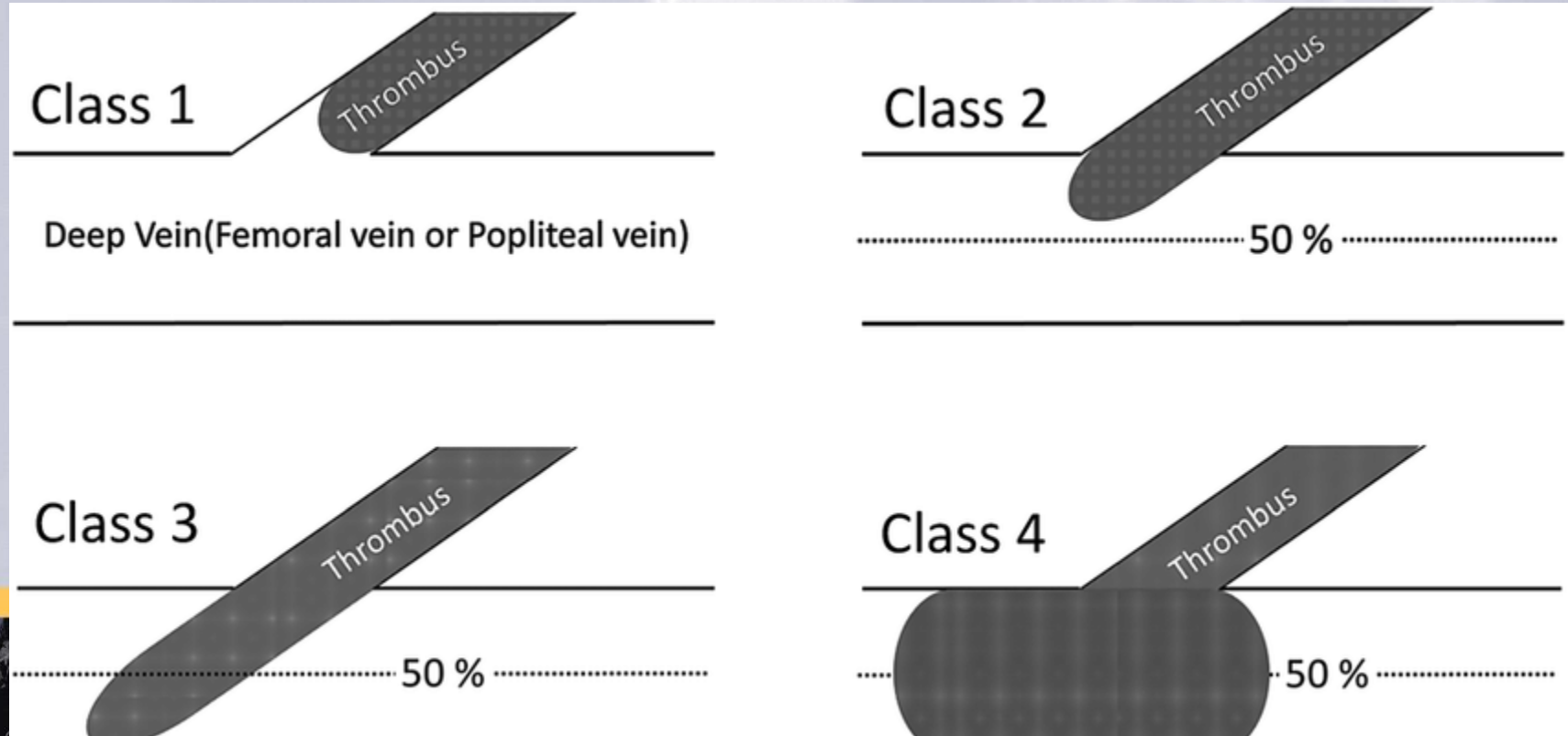


EHIT

2CM from the SFJ!!!!

Table. Classes of Endothermal Heat Induced Thrombosis

I	Thrombosis to the level of the saphenofemoral junction
II	Extension into the deep venous system; cross-sectional area of 50% or less
III	Extension into the deep venous system; cross-sectional area of greater than 50%
IV	Occlusion of the femoral or popliteal vein



Classification and Treatment of Endothermal Heat Induced Thrombosis

Recommendations from the American Venous Forum (AVF) and the Society for Vascular Surgery (SVS)

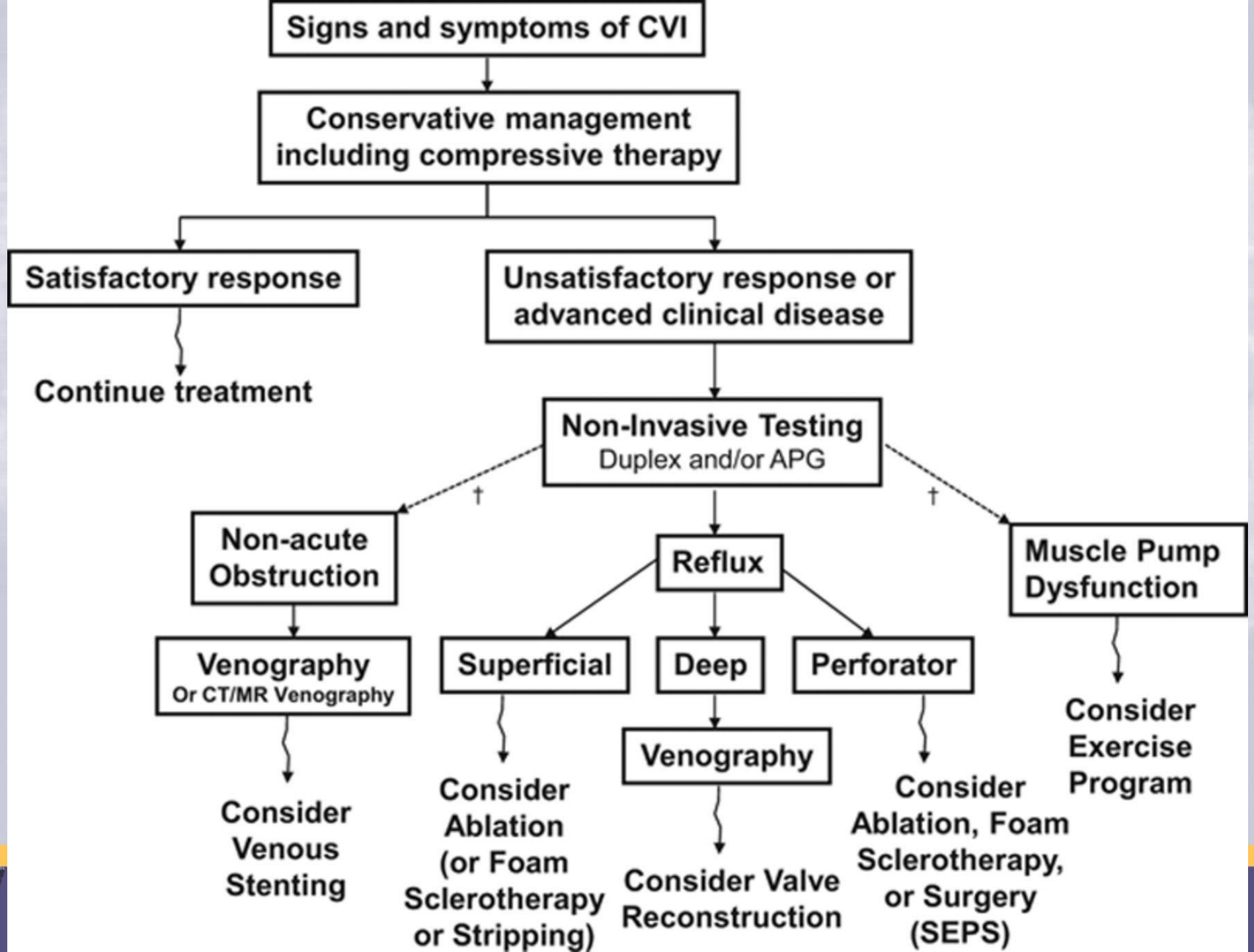
AVF EHIT CLASS	DEFINITION	TREATMENT RECOMMENDATION	STRENGTH OF RECOMMENDATION* AND LEVEL OF EVIDENCE**
I	Thrombus without propagation into deep vein a. Peripheral to superficial epigastric vein b. Central to superficial epigastric vein, up to and including the deep vein junction	No treatment or surveillance.	2C
II	Thrombus propagation into the adjacent deep vein, but comprising <50% of the deep vein lumen	No treatment, weekly surveillance until thrombus resolution. In high risk patients consider antiplatelet therapy vs. anticoagulation. Discontinue treatment following thrombus retraction or resolution	2C
III	Thrombus propagation into the adjacent deep vein but comprising >50% of the deep vein lumen	Therapeutic anticoagulation, weekly surveillance. Discontinue treatment following thrombus retraction or resolution	1B
IV	Occlusive deep vein thrombosis contiguous with the treated superficial vein	Treatment should be individualized, taking into account risks and benefits to patient. Reference may be made to CHEST guidelines for treatment of DVT.	1A

* 1=Strong, 2=Weak. ** A=High, B=Moderate, C= Low to very low

JVS-VL Journal of Vascular Surgery Venous and Lymphatic Disorders

Kabnick et al. *J Vasc Surg Venous Lymphat Disord, January 2021*

LinkedIn @TheJVascSurg @JVascSurg


Signs and symptoms of CVI
Conservative management including compressive therapy
Satisfactory response
Continue treatment
Unsatisfactory response or advanced clinical disease
Non-Invasive Testing
Duplex and/or APG
†
†
Non-acute Obstruction
Venography
Or CT/MR Venography
Consider Venous Stenting
Reflux
Superficial
Deep
Perforator
Consider Ablation (or Foam Sclerotherapy or Stripping)
Venography
Consider Valve Reconstruction
Consider Ablation, Foam Sclerotherapy, or Surgery (SEPS)
Muscle Pump Dysfunction
Consider Exercise Program

Other common causes of swelling?

- Usually bilateral
- Lymphedema
- CHF
- CKD

Case Scenario

- Imaging: RLE venous duplex with reflux examination (insufficiency study)
  - *Results: no DVT, + reflux of GSV from SFJ to ankle with branchling clusters of varicosities*
  - *Lesser saphenous and deep veins are competent*
  - *Vein is superficial to the saphenous fascia*
  - *Size is 12-16mm throughout its course*
- Plan: Knee high compression 20-30mmHg graduated compression stockings and a follow up in 3 mo

Case Scenario

- Patient returns in 3 mo and says the compression stockings help with some swelling but the elastic really irritates the varicose veins of the leg and still has leg aching.
- Options:
  - *RFA?*
  - *EVLT?*
  - *Adhesive ablation?*
  - *Foam sclerotherapy?*
  - *Stripping?*
  - *Ligation?*

Summary

- Compression
- Compression
- Compression
- Surgical management for ulcers