



# CHRONIC VENOUS DISEASE: ESSENTIALS & MODERN MANAGEMENT

## FRONTLINE VASCULAR CARE ESSENTIALS FOR MEDICAL PROFESSIONALS

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COMFORT · FAIRNESS · VALUE

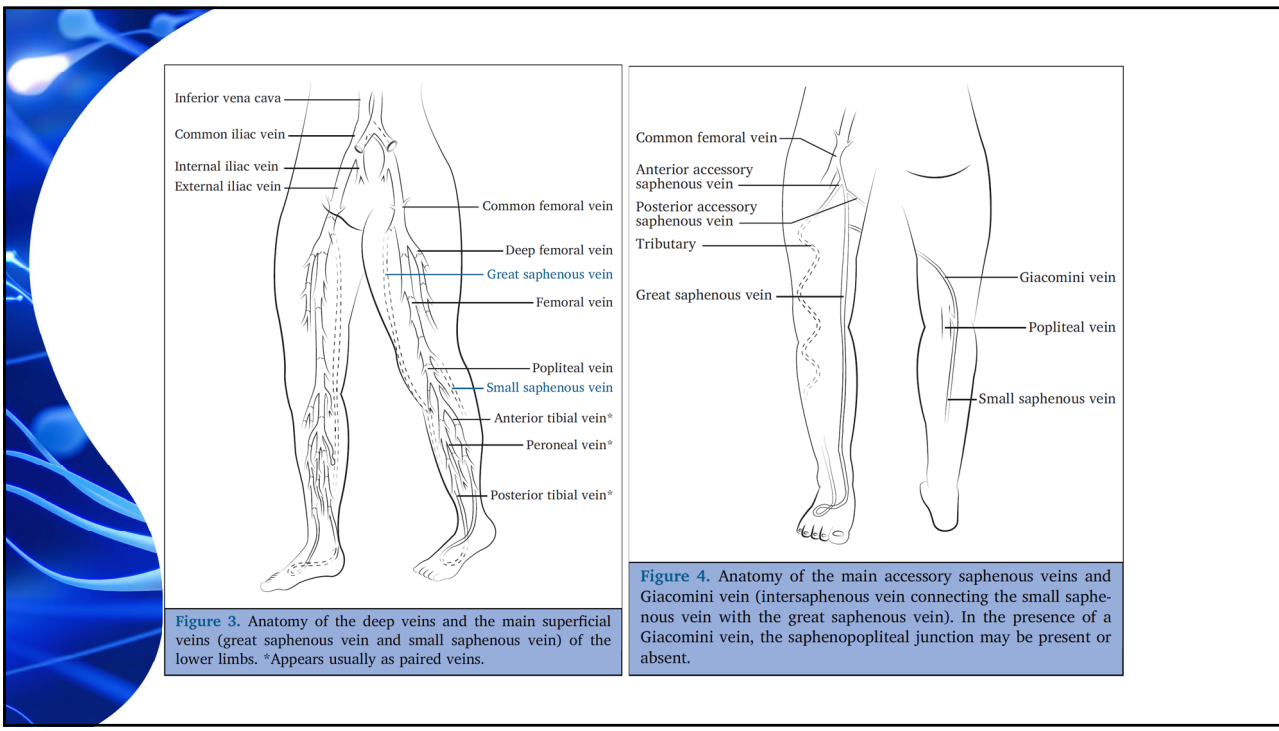
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# CHRONIC VENOUS DISEASE

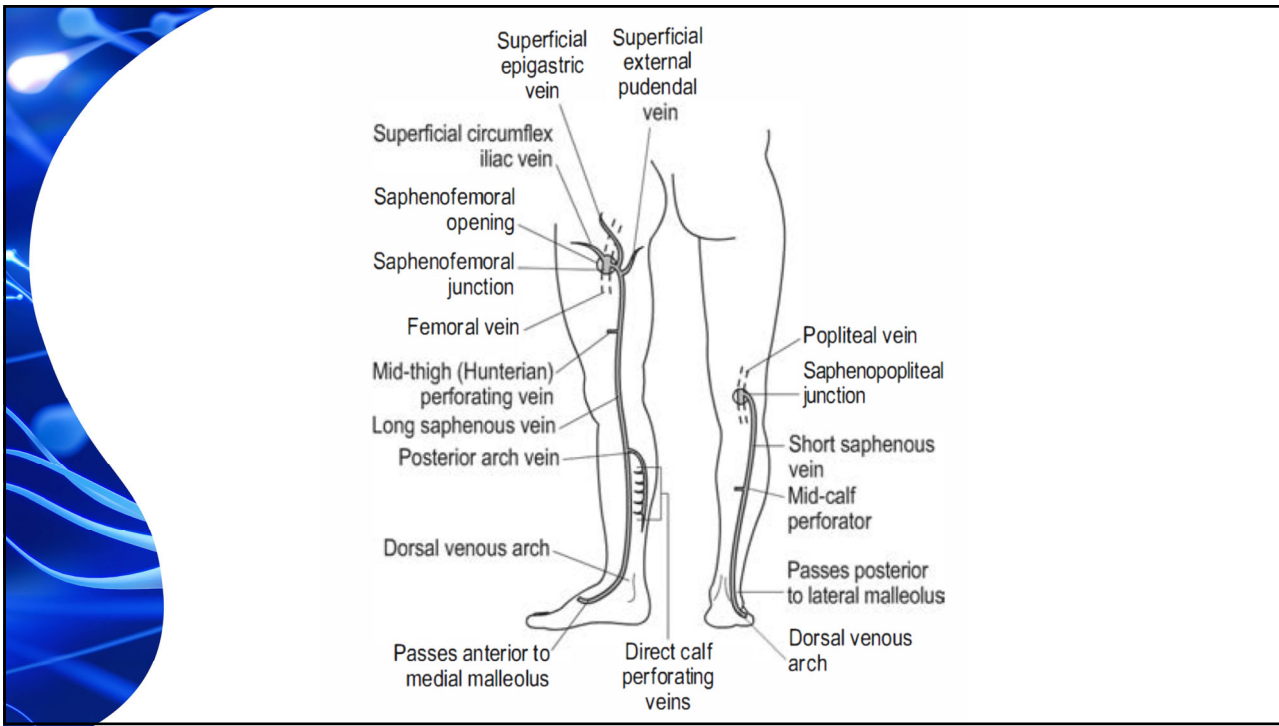
VEIN-TERM Transatlantic Interdisciplinary Consensus:

- Chronic venous disease (CVD) is defined as:
  - any morphological and functional abnormalities of the venous system of long duration manifest either by symptoms and/or signs indicating the need for investigation and/or care
- Chronic venous insufficiency (CVI) is reserved for:
  - Advanced CVD – C3-C6
    - Edema
    - Skin changes
    - Venous ulcers

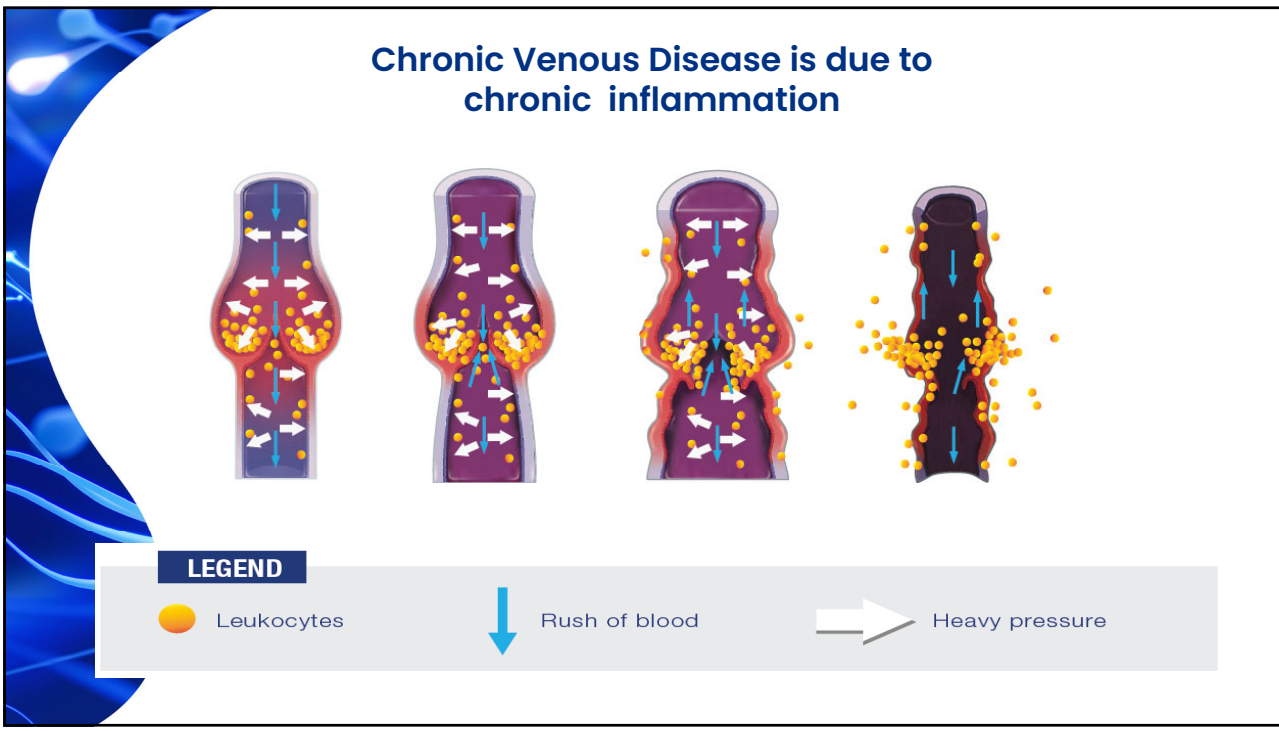
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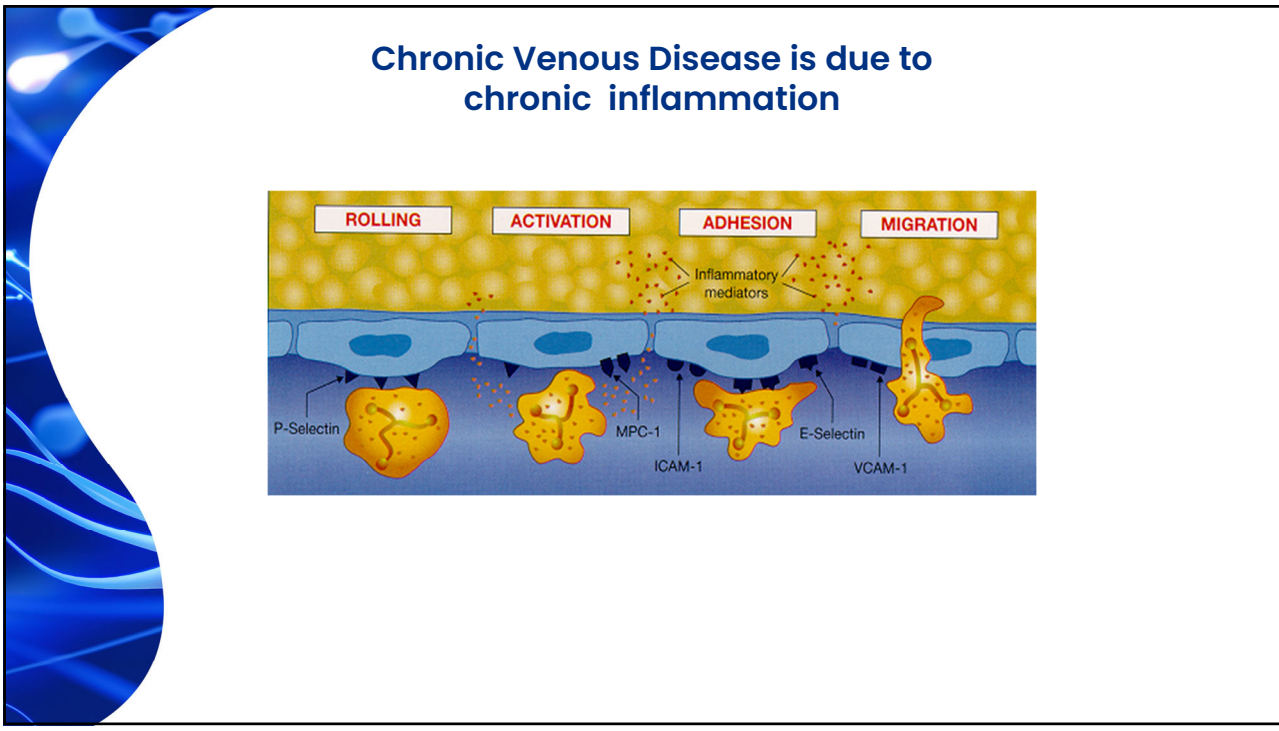
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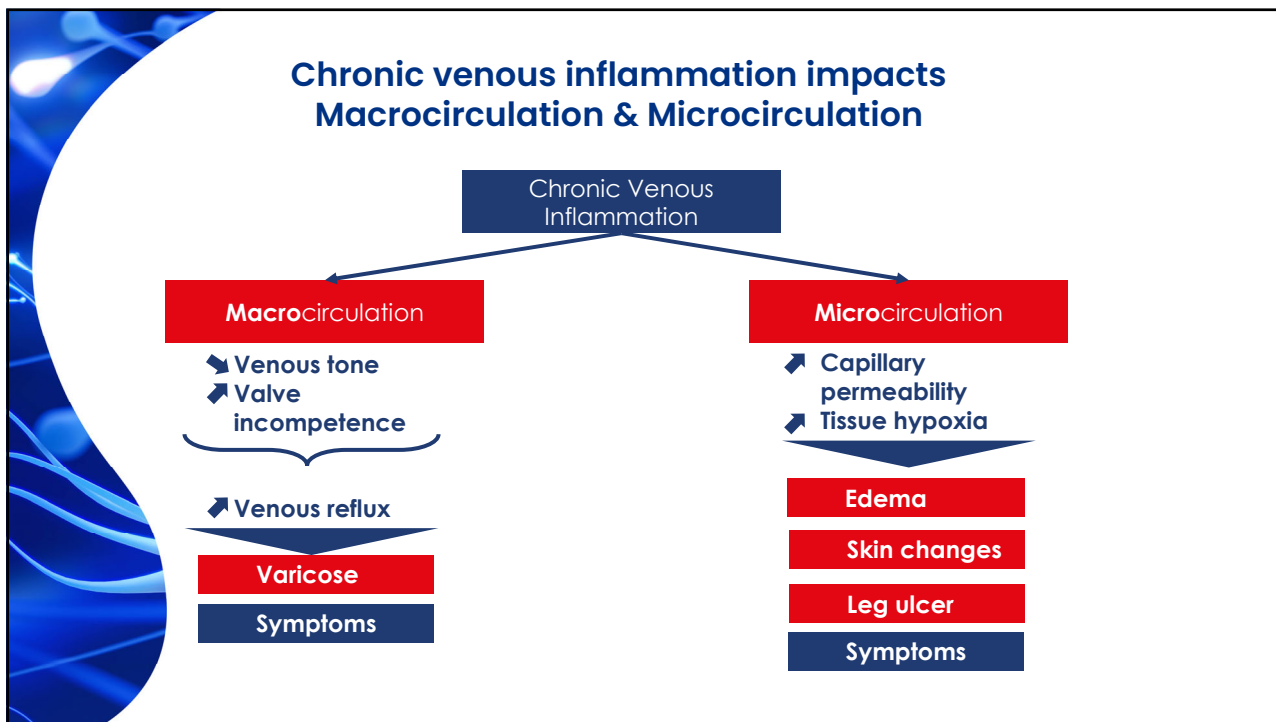
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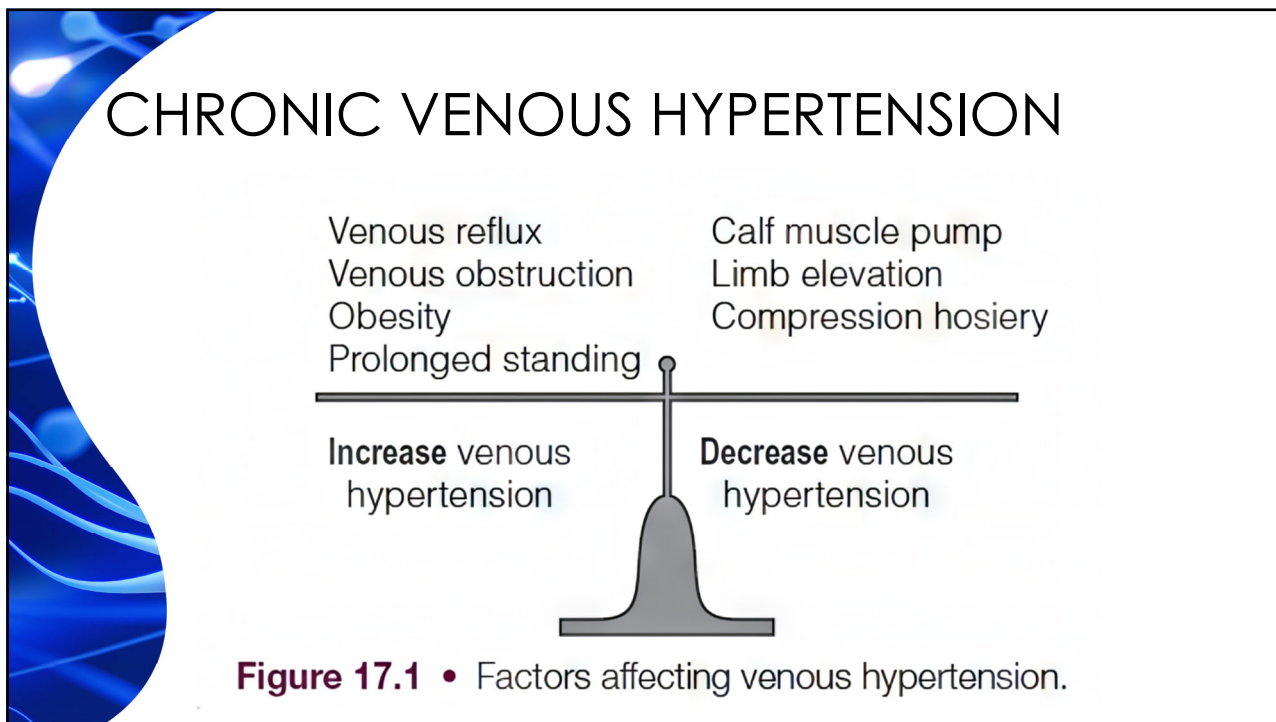


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## VARICOSE VEINS

- Dilated, tortuous, and prominent veins of the superficial venous system
- Distribution of the long **great** and short **small** saphenous veins

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Venous hypertension

- Venous valve insufficiency
- Deep venous obstruction
- Central venous hypertension: Medical
- Calf muscle pump dysfunction

TABLE 1. CAUSES OF VENOUS HYPERTENSION
<b>Venous</b>
Superficial valve reflux
Deep valve reflux
Deep venous obstruction (postthrombotic or compressive)
<b>Central venous hypertension</b>
Obesity
Heart failure (diastolic or systolic)
Lung disease (COPD, pulmonary hypertension, cor pulmonale, sleep apnea)
Liver disease
Renal disease (kidney failure, nephrotic syndrome)
Malnutrition
Hypoalbuminemia
Medications (calcium channel blockers, NSAIDs)
<b>Calf muscle pump dysfunction</b>
Paralysis
Ankle fusion (surgical, Charcot joint, obesity)
Immobility
<b>Conditions that mimic venous hypertension (not all inclusive)</b>
Arterial disease
Lymphedema (primary and secondary)
Lipedema
Infection (cellulitis)
Myxedema
Trauma
<small>Abbreviations: COPD, chronic obstructive pulmonary disease; NSAIDs, nonsteroid anti-inflammatory drugs.</small>

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# ETIOLOGY / CAUSES

- Primary
  - Reflux and valvular incompetence arises in the venous system from nonobstructive causes
    - Hereditary
    - Hormonal
    - Connective tissue disorders
- Secondary
  - Intravenous: Incompetence arises in deep venous system (usually due to prior thrombosis)
    - Deep veins obstructed → perforators dilate and become incompetent
  - Extravenous
- Congenital

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**Box 17.1 • CEAP classification**

**Clinical classification**  
 C0: no visible or palpable signs of venous disease  
 C1: telangiectasies or reticular veins  
 C2: varicose veins  
 C3: oedema  
 C4a: pigmentation or eczema  
 C4b: lipodermatosclerosis or atrophie blanche  
 C5: healed venous ulcer

**S: symptomatic, including ache, pain, tightness, skin irritation, heaviness and muscle cramps, and other complaints attributable to venous dysfunction**

**Anatomical classification**  
 As: superficial veins  
 Ap: perforator veins  
 Ad: deep veins  
 An: no venous location identified

**Pathophysiological classification**  
 Pr: reflux  
 Po: obstruction  
 Pr,o: reflux and obstruction  
 Pn: no venous pathophysiology identifiable

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### CEAP Classification System and Reporting Standard Revision 2020

**C** (Clinical Manifestations), **E** (Etiology), **A** (Anatomic Distribution), **P** (Pathophysiology)

<b>C0</b>	No visible or palpable signs of venous disease
<b>C1</b>	Telangiectasias or reticular veins
<b>C2</b>	Varicose veins
C2r	Recurrent varicose veins
<b>C3</b>	Edema
<b>C4</b>	Changes in skin and subcutaneous tissue secondary to chronic venous disease
C4a	Pigmentation or eczema
C4b	Lipodermatosclerosis or atrophie blanche
C4c	Corona phlebectatica
<b>C5</b>	Healed
<b>C6</b>	Active venous ulcer
C6r	Recurrent active venous ulcer

**JVS-VL** Journal of Vascular Surgery Venous and Lymphatic Disorders  
 Lurie et al. *J Vasc Surg Venous Lymphat Disord*, May 2020  
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**Table IV.** The 2020 revision of CEAP: Summary of etiologic (E) classification

E class	Description
E <sub>p</sub>	Primary
E <sub>s</sub>	Secondary
E <sub>si</sub>	Secondary – intravenous
E <sub>se</sub>	Secondary – extravenous
E <sub>c</sub>	Congenital
E <sub>n</sub>	No cause identified

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**Table V.** The 2020 revision of CEAP: Summary of anatomic (A) classification

A class		Description	
A <sub>s</sub>	Superficial		
	<i>Old</i>	<i>New<sup>a</sup></i>	<i>Description</i>
	1.	Tel	Telangiectasia
	1.	Ret	Reticular veins
	2.	GSVa	Great saphenous vein above knee
	3.	GSVb	Great saphenous vein below knee
	4.	SSV	Small saphenous vein
A <sub>d</sub>	Deep		
	<i>Old</i>	<i>New<sup>a</sup></i>	<i>Description</i>
	6.	IVC	Inferior vena cava
	7.	CIV	Common iliac vein
	8.	IIV	Internal iliac vein
	9.	EIV	External iliac vein
	10.	PELV	Pelvic veins
A <sub>p</sub>	Perforator		
	<i>Old</i>	<i>New<sup>a</sup></i>	<i>Description</i>
	17.	TPV	Thigh perforator vein
	18.	CPV	Calf perforator vein
	A <sub>n</sub>	No venous anatomic location identified	

<sup>a</sup>New specific anatomic location(s) to be reported under each P (pathophysiologic) class to identify anatomic location(s) corresponding to P class.

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**Table VI.** The 2020 revision of CEAP: Summary of patho-physiologic (P) classification

P class	Description
P <sub>r</sub>	Reflux
P <sub>o</sub>	Obstruction
P <sub>r,o</sub>	Reflux and obstruction
P <sub>n</sub>	No pathophysiology identified

**\*\*Advanced** New abbreviations for specific A anatomic location(s) to be reported under each P Pathophysiologic class to identify anatomic location(s) corresponding to P class.

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## HISTORY

- HASTI symptoms:
  - Heaviness
  - Achiness
  - Swelling
  - Throbbing
  - Itching
- Pain
  - Burning
  - Throbbing
  - Cramping
  - Aching
  - ? Venous claudication



Heaviness



Swelling



Itching



Achiness



Throbbing

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## HISTORY

- Leg fatigue
- Rash / Ulcers
- Varicosities
- NO SYMPTOMS
- Differentiate from orthopaedic & arterial disorders
- Abdominal mass?
- Prior abdominal/pelvic surgery

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## HISTORY

- Early onset may suggest a congenital abnormality such as Klippel-Trenaunay syndrome
- Occupation
- Prior DVT, immobilization, thrombophlebitis, bleeding episodes
- Family history present in over 1/3 of patients.
- Previous VV surgery and result (20% recurrent)
- OCP use
- Hypercoagulability
- Any arterial disease / intermittent claudication / tissue loss → cannot use Grade 2 compression stockings

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## PHYSICAL EXAMINATION

- Distribution of VV
  - GSV
  - SSV
- Haemorrhage
- Thrombophlebitis
- Skin discolouration
- Eczematous changes
- Lipodermatosclerosis
- Ulceration

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	Performed competently	Performed but NOT fully competent	Not Performed or incompetent
1. Wash your hands			
2. Introduce yourself to the patient and explain what you are about to do			
3. Expose the patient and stand the patient up			
4. Inspect bilateral lower limbs, looking for any scars, swelling, venous ulcers, pigmentation and varicose veins.			
5. Look at back of legs for distribution of ssv			
6. Palpate for tenderness, temperature and evidence of perforator defects of varicose veins			
7. Examine for pedal edema			
8. Palpate for SFJ and saphena varix			
9. Cough impulse for SFJ			
10. Tap test at SFJ			
11. Tourniquet test			
12. Trendelenburg test if SFJ incompetent			
13. Perthes test			
14. Palpate for lower limbs' pulses			
15. Auscultate over veins			
16. Thank the patient and cover up			
17. Request to complete the exam with an abdominal, external genitalia and Doppler assessment over SFJ/ SPJ			

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## C1

**Telangiectasia = less than 1mm veins seen on skin surface of the skin; tree branches with short, jagged lines.**

**Reticular veins = 1-3 mm diameter dilated veins, flatter and less twisted than telangiectasia**



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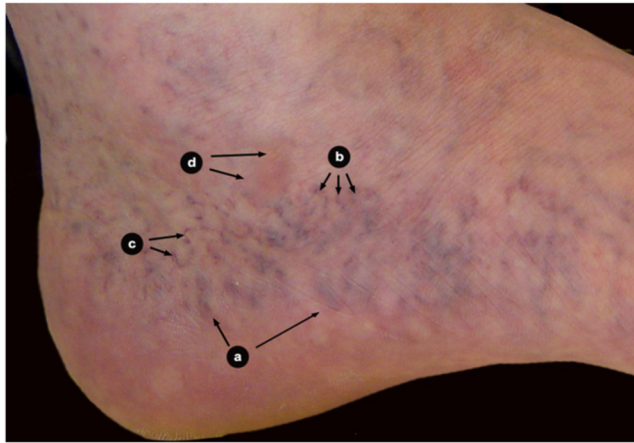


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## C4c CORONA PHLEBECTATICA



**Fig. 5.** The 4 components of corona phlebectatica together (clinical aspect). a=venous cups (veins) b=blue telangiectases (intradermal veinules). c=red telangiectases (superficial veinules) d=stasis spots (capillaries). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

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## SUPERFICIAL THROMBOPHLEBITIS



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### C5 HEALED ULCER



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### C6 VENOUS ULCERATION



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MIXED ARTERIOVENOUS ULCER  
PHLEBOLYMPHEDEMA

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## INVESTIGATIONS

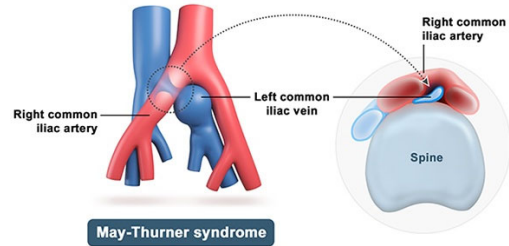
- Hand-held Doppler
- US Venous Duplex
  - LSV reflux (>0.5s) / SFJ incompetence
  - SSV reflux / SPJ incompetence
  - Deep venous reflux / DVT
  - Diameter of veins > 3mm
- Ankle brachial pressure index / Toe pressures
- US Arterial Duplex if mixed arteriovenous ulcer
- Biopsy if long-standing ulcer

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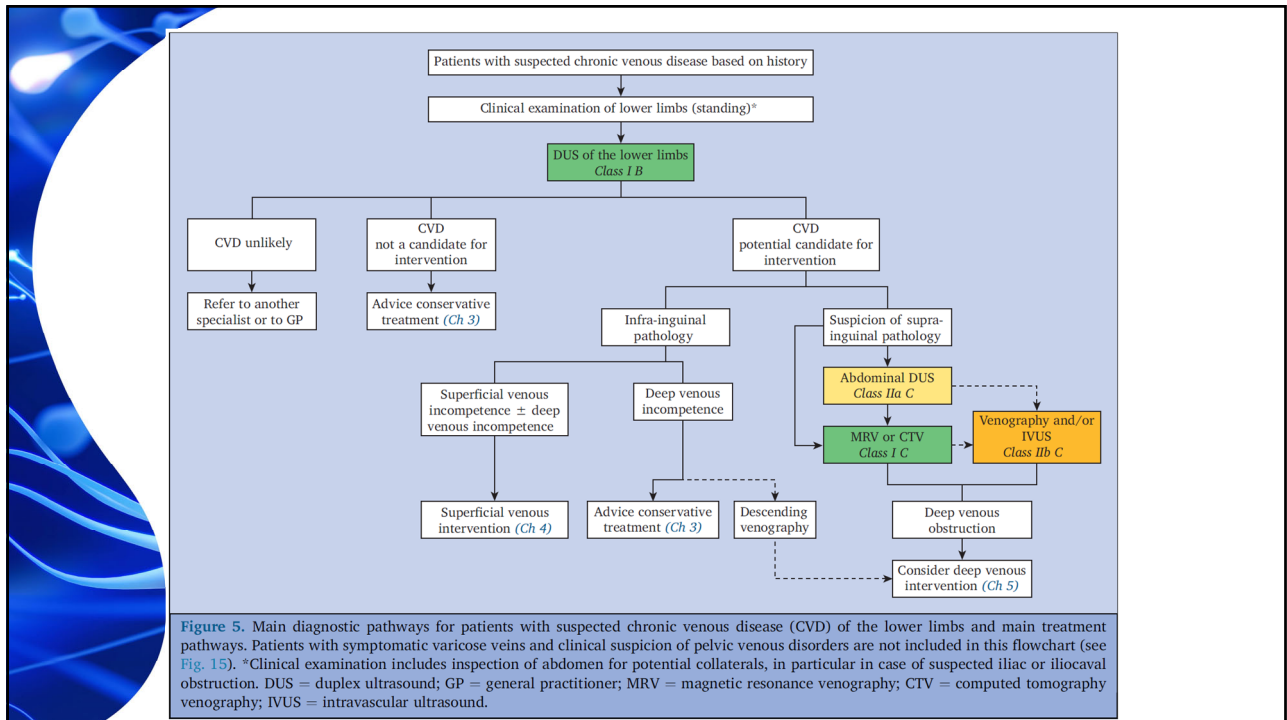


# INVESTIGATIONS

- Abdominal US / CTV / MRV for suprainguinal pathology
  - History: previous extensive DVT, VTE
  - Clinical findings: C3 – C6, abdominal wall collaterals
  - Duplex ultrasound findings: absence of phasic flow in common femoral vein, post-thrombotic fibrosis
- May-Thurner?
- Cancer?
- Baby?



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# COMPRESSION STOCKINGS

- Action:
  - Remedies impaired calf muscle pump
  - Reduces venous reflux
  - Improves venous outflow
- Provides a gradient of pressure
  - highest at the ankle, decreasing upwards
  - 70% reduction just below knee
- Beneficial effect lasts only as long as they are worn
- Compliance is a major problem



Compression Class	Pressure
1	18-21 mmHg
2	23-32 mmHg
3	34-46 mmHg
4	>49 mmHg

- **C1-C2: At least 15 mmHg at ankle**
- **C3-C6: 20-40 mmHg**

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# TRIVIA!

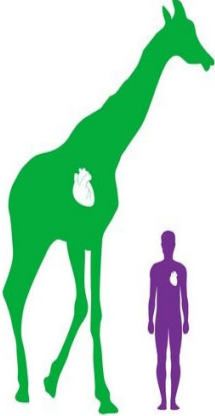
## What Giraffes Can Teach Us About Compression Therapy

**Giraffes do not suffer from edema — even though the distance between a giraffe’s heart and feet is twice that of humans. Why?**

Because a giraffe’s skin is extremely tough, fibrous and non-elastic, it creates a rigid sleeve that maximizes the effect of every muscle movement — big and small, moving and resting — to optimize venous return.<sup>1,2</sup>

A compression system designed with materials that work together to create a rigid sleeve, much like giraffe skin, to consistently provide the right amount to compression to reduce edema and optimize venous return, define an ideal compression system.

**Compression therapy mimics the giraffe’s skin**

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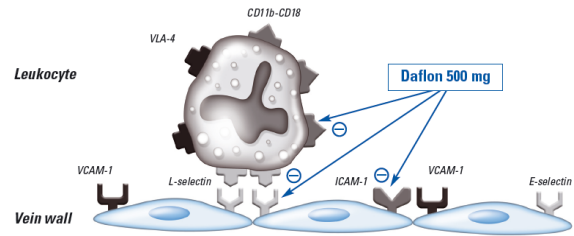
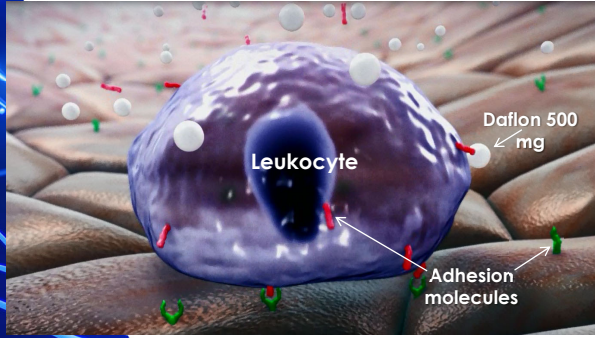
Table 7. Contraindications to compression treatment (modified with permission from Rabe <i>et al.</i> , 2020 <sup>74</sup> )
Severe lower extremity atherosclerotic disease with ABI < 0.6 and/or ankle pressure < 60 mmHg
Extra-anatomic or superficially tunneled arterial bypass at the site of intended compression
Severe heart failure, NYHA Class IV
Heart failure NYHA Class III and routine application of compression devices without clinical and haemodynamic monitoring
Confirmed allergy to compression material
Severe diabetic neuropathy with sensory loss or microangiopathy with the risk of skin necrosis*

ABI = ankle brachial index; NYHA = New York Heart Association; NYHA Class IV: fatigue, palpitations, dyspnoea and/or angina at rest; NYHA Class III: ordinary physical activity causes undue fatigue, palpitations, dyspnoea and/or angina - comfortable at rest.

\* May not apply to inelastic compression exerting low levels of sustained compression pressure (modified compression).

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### DAFLON INHIBITS THE EXPRESSION OF ADHESION MOLECULES ON THE SURFACE OF LEUKOCYTES

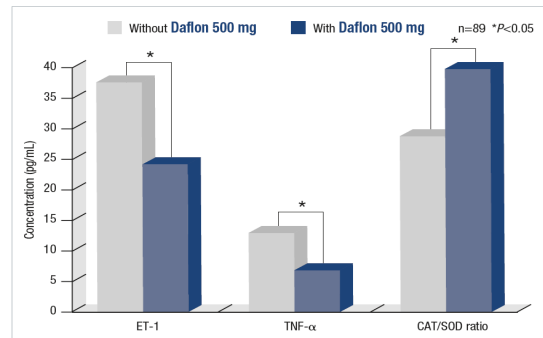
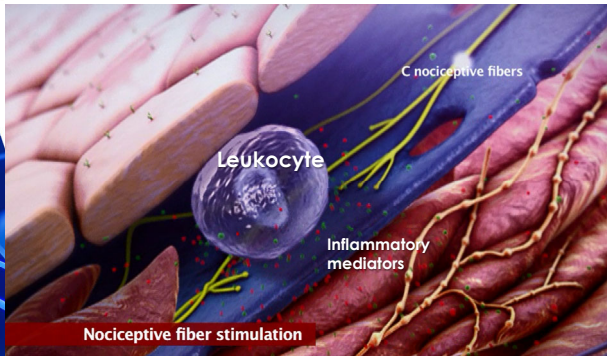


By inhibiting the expression of adhesion molecules, Daflon breaks the vicious circle of inflammation in chronic venous disease

Sharma SS, Porter DA, Scurr JH, Coleridge-Smith PD. Effect of oral micronized purified flavonoid fraction treatment on leukocyte adhesion molecule expression in patients with chronic venous disease: a randomized trial. *J Vasc Surg.* 2000 Mar;31(3):456-61.

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### DAFLON REDUCES INFLAMMATORY MARKERS AND RESTORES THE ANTIOXIDANT IMBALANCE



By reducing inflammatory markers concentration, Daflon reduces the stimulation of C-nociceptive fibers and therefore pain.

Wojcicka A, Kozka M, Urbaneck T, Stepniowski M, Kucharzewski M. Effect of micronized purified flavonoid fraction therapy on endothelin-1 and TNF-α levels in relation to antioxidant enzyme balance in the peripheral blood of women with varicose veins. *Curr Vasc Pharmacol.* 2015;13(6):801-808.

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## MPFF has the highest number of strong recommendations for the improvement of symptoms, signs, and quality of life in CVD

Strength of recommendations based on magnitude of effects on individual symptoms or signs vs side effects

	MPFF	Ruscus	Oxerutins	HCSE	Calcium dobesilate
Pain	Strong	Strong	Strong	Strong	Weak in view of the possibility of inducing agranulocytosis
Heaviness	Strong	Strong	Strong	-	
Feeling of swelling	Strong	Strong	-	-	
Functional discomfort	Strong	-	-	-	
Cramps	Strong	Weak	Strong	Strong	
Leg redness	Strong	-	-	-	
Skin changes	Strong	-	-	-	
Edema	Strong	Strong	Weak	Strong	
Quality of life	Strong	-	-	-	
Paresthesia	Weak	Strong	-	-	
Burning	Weak	-	-	-	
Leg fatigue	-	Strong	-	-	
Pruritus	-	Weak	-	Strong	

Marzocchi A, Kakki S, Baekgaard N et al. Int Angiol 2018, June;37(3):232-254

## MPFF has the highest number of evidence in grade A/B for the improvement of symptoms, signs, and quality of life in CVD

Grade A or B levels of evidence for the effects of the main VADs on individual symptoms, signs, and QoL

Symptom/sign	MPFF	Ruscus	Oxerutins	HCSE	Calcium dobesilate
Pain (NNT)	A (4.2)	A (5)	B	A (5.1)	B (1.4)
SMD	-0.25	-0.80	-1.07		
Heaviness (NNT)	A (2.9)	A (2.4)	B (17)		A (1)
SMD	-0.80	-1.23	-1.00		
Feeling of swelling (NNT)	A (3.1)	A (4)			
SMD	-0.99	-2.27			
Functional discomfort (NNT)	A (3.0)				B (4)
SMD	-0.87				
Leg fatigue (NNT)	NS	B			
SMD		-1.16			
Cramps (NNT)	B (4.8)	B/C	B		
SMD	-0.46		-1.7		
Paresthesia (NNT)	B/C (3.5)	A (1.8)			B (2)
SMD	-0.11	-0.88			
Burning (NNT)	B/C	NS			
SMD	-0.46				
Pruritus/itching (NNT)		B/C	A (6.1)		
Tightness (NNT)	NS				
Restless legs (NNT)	NS				
Leg redness (NNT)	B (3.6)				
SMD	-0.32				
Skin changes (NNT)	A (1.8)				
Ankle circumference (NNT)	B	A	NS	A (4)	
SMD	-0.59	-0.74			
Foot or leg Volume (NNT)	NS	A	NS	A (4)	A
SMD		-0.61		-0.34	-11.4
Quality of life	A				NS
SMD	-0.21				

Marzocchi A, Kakki S, Baekgaard N et al. Int Angiol 2018, June;37(3):232-254

## MPFF has the highest level of evidence among VADs for the healing of leg ulcers (grade A)

*Grade A or B levels of evidence for the effects of the main medications on the healing of leg ulcers*

	MPFF	Pentoxifylline	Sulodexide	Hydroxyethyl rutosides
Healing of leg ulcers	Grade A	Grade A	Grade A	Grade B

⊗ No available data for Ruscus, HCSE or calcium dobesilate

Kakkar A, Kakkar S, Baekgaard N et al. Int Angiol 2018, June;37(3):232-254

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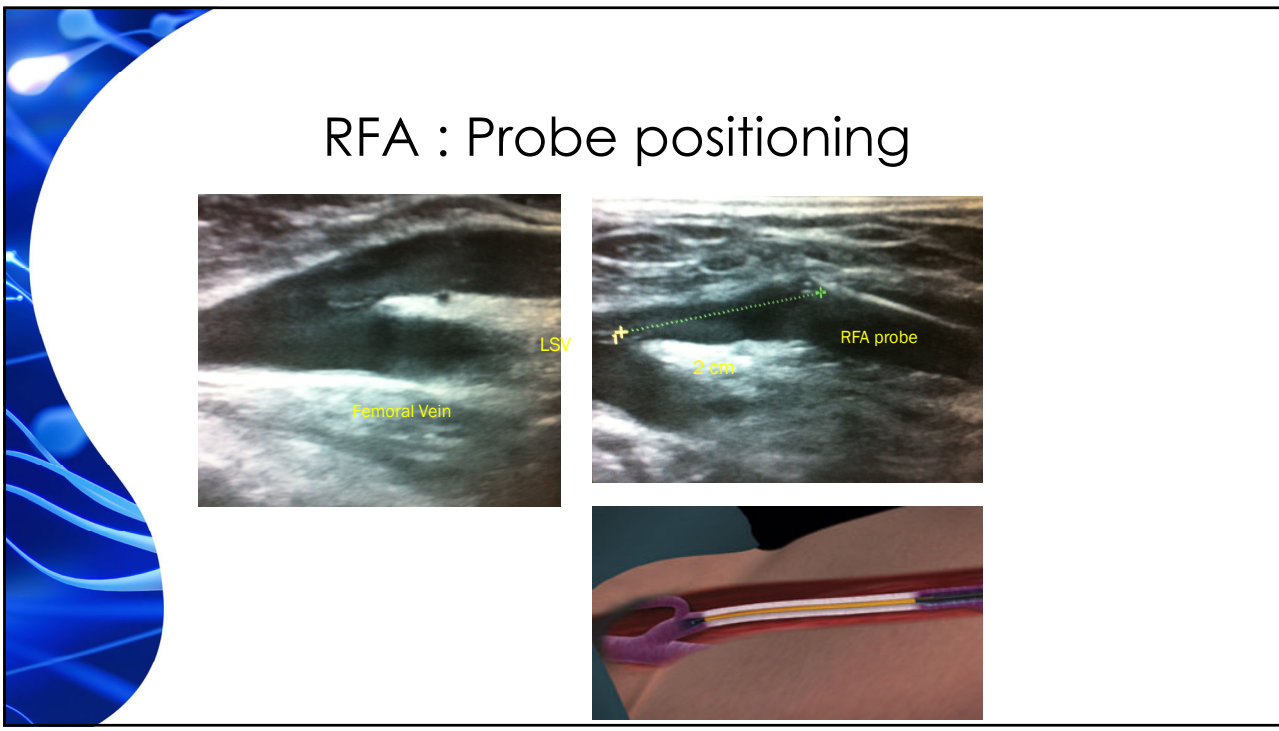
## TREATMENT OPTIONS

- Endovenous Thermal Ablation – gold standard
  - Radiofrequency Ablation (RFA)
  - Endovenous Laser Therapy (EVLT)

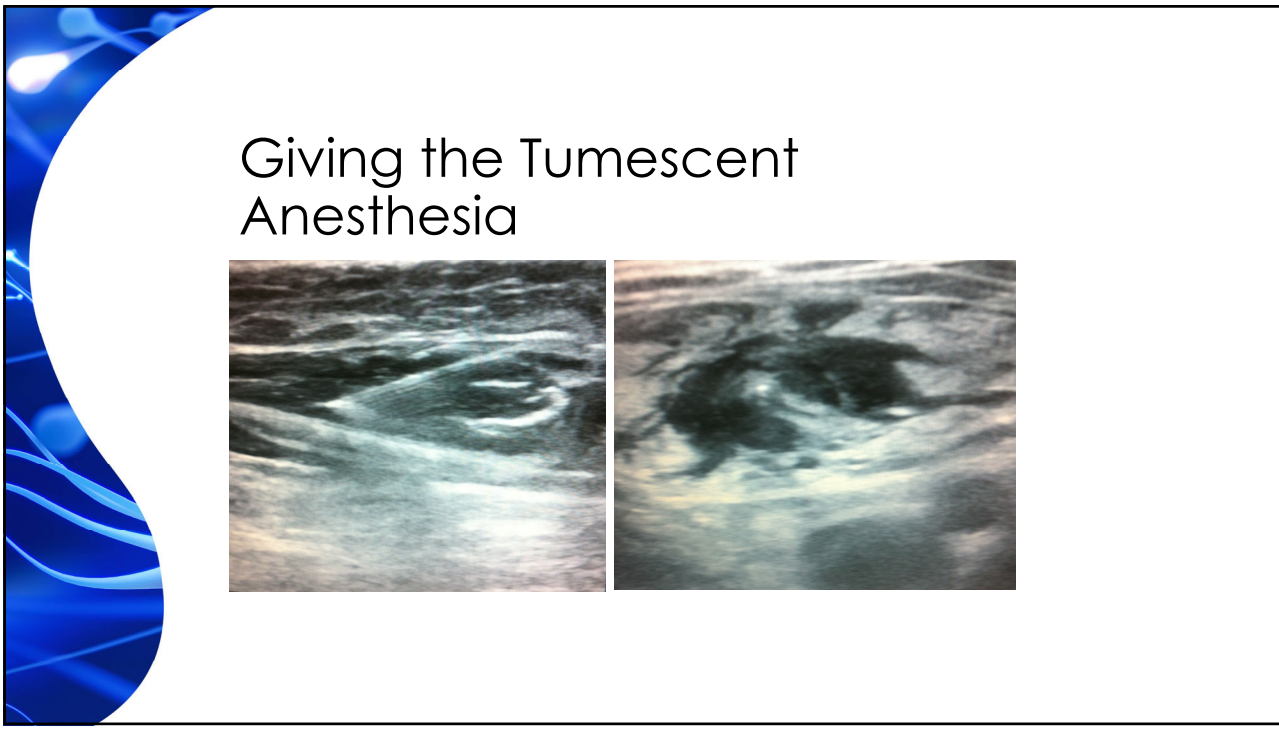




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## TREATMENT OPTIONS

- Non-Thermal, Non-Tumescent Ablation
  - MechanicO Chemical Ablation (MOCA) – Clarivein, Fleibogrif
  - Non-Sclerosant / Cyanoacrylate-based - Venaseal



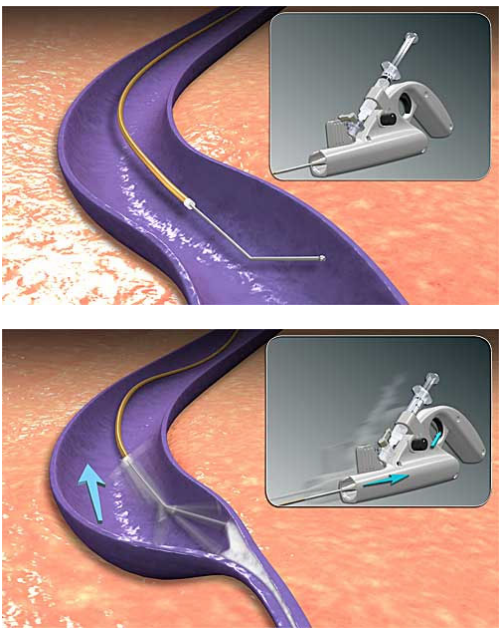
**FLEBOGRIF®**  
Set for varicose veins treatment



**VenaSeal™ Closure System**  
A NEW TREATMENT PARADIGM

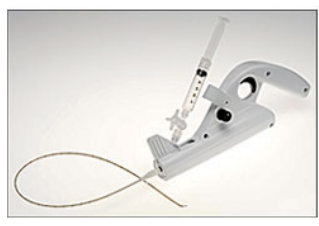
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## MOCA- MechanicO Chemical Ablation



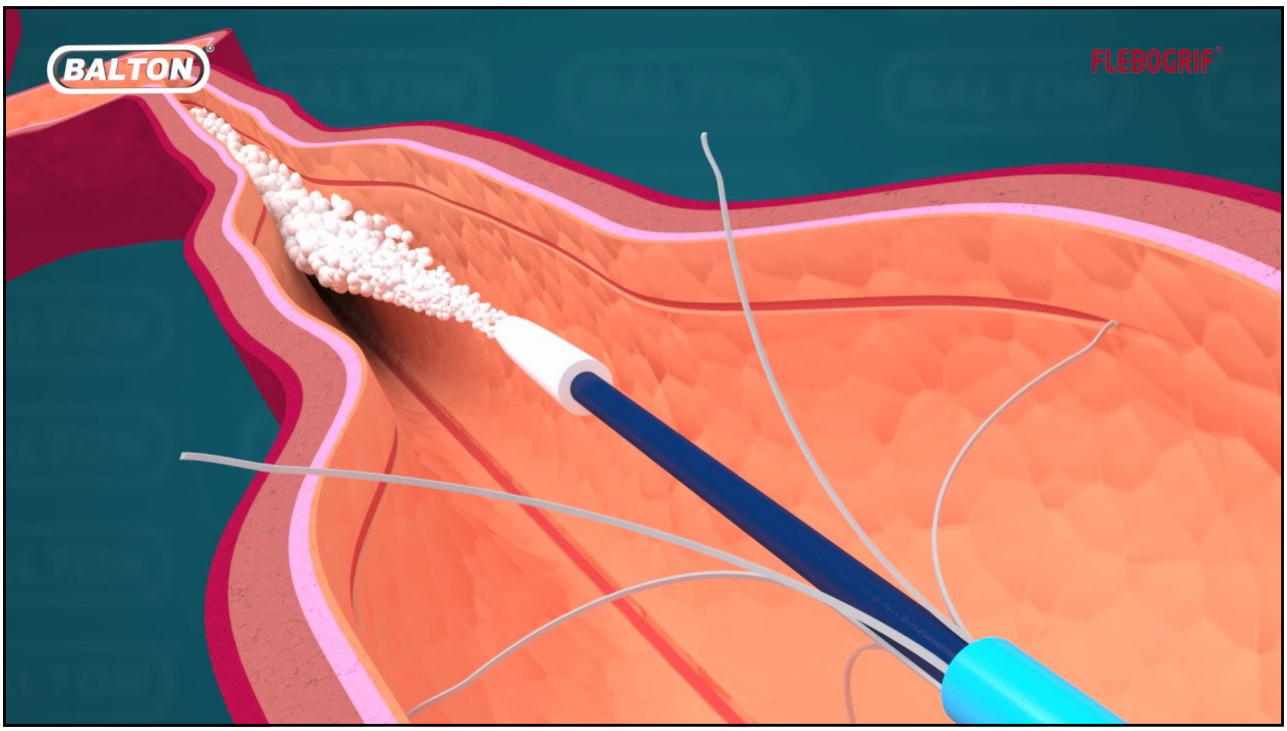
**The Non-Thermal Vein Ablation System**

- Safe & effective
- Excellent clinical results
- No thermal ablation - No risk of thermal injury
- No nerve damage / paraesthesia
- No tumescent anesthesia
- Minimal discomfort and minimal bruising



Self-contained disposable system - no capital equipment expenditure or maintenance costs.




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**VENASEAL™ CLOSURE SYSTEM**  
 CYANOACRYLATE ADHESIVE TO CLOSE THE DISEASED VEIN  
 SAFELY AND EFFECTIVELY

- Proprietary catheter engineered to be inert to adhesive – “doesn’t stick”
- Proprietary dispenser assembly designed to deliver a precise amount of adhesive in 3 sec.

8 Proebstle, T et al., The european multicenter cohort study on cyanoacrylate embolization of refluxing great saphenous veins. JVS: Venous and Lymphatic Disorders 2014; Accepted for publication.

DC00003906

**Medtronic**

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## VENASEAL

- Closure rates comparable to current endothermal treatments
- No use of tumescent anaesthesia
- No risk of thermal injury
- Postprocedure compression stockings generally not required
- Rapid return to normal activity
- Recurrence
- 5% at 5 years
- 10% recurrence at 10 years



The image shows the Venaseal laser treatment system. It includes a blue handheld laser applicator with a white handle and a blue laser fiber. A small vial of adhesive is also visible. The device is used for minimally invasive vein closure.

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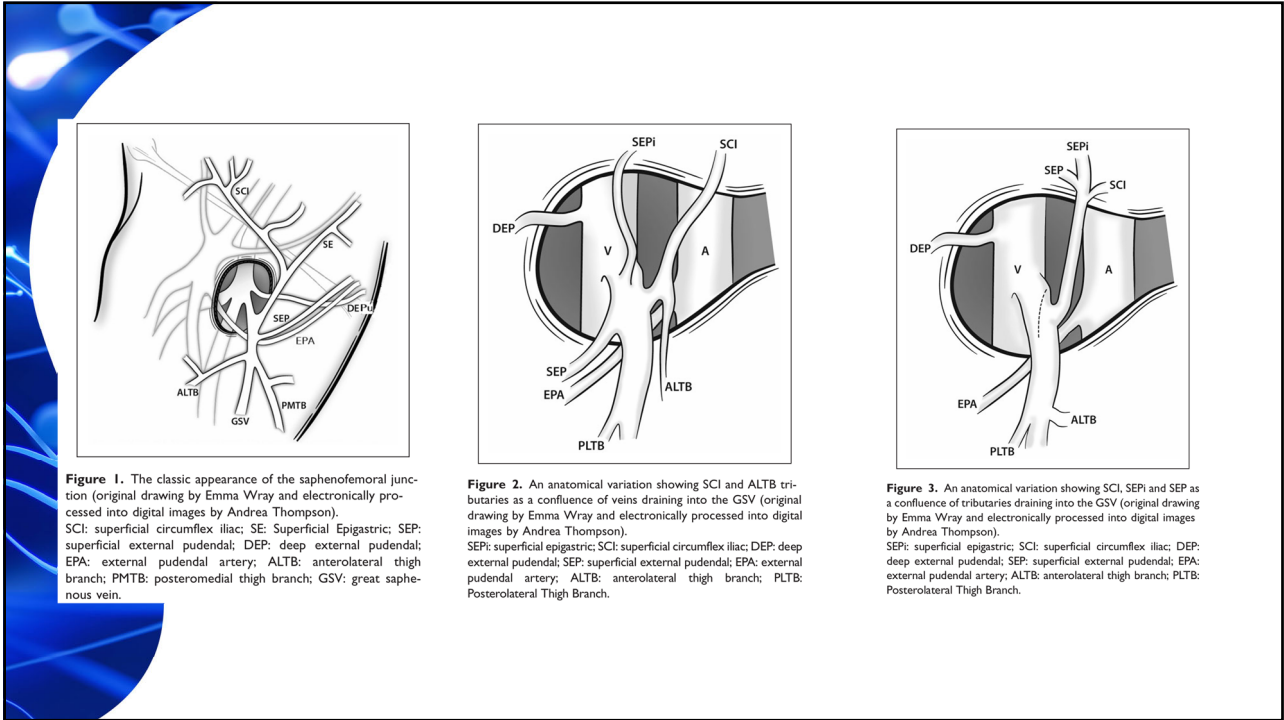
## TREATMENT OPTIONS

- Open Surgery
  - SFJ ligation, LSV stripping, MSA
  - SPJ ligation



The image displays various surgical instruments used for open vein treatment, including a long, thin surgical wire, a pair of forceps, and several small, round surgical clips or sutures.

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# TREATMENT OPTIONS

- Injection sclerotherapy (US guided)
  - Foam sclerosant superior to liquid
  - Postoperative recurrence of veins
  - Below knee varicosities if the GSV and SSV are not involved



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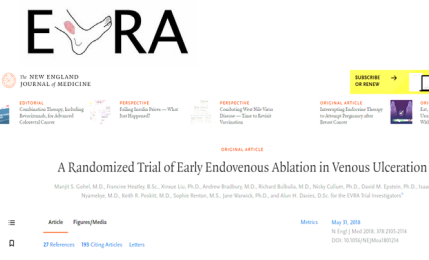
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## TREATMENT OPTIONS

- For patients with venous ulceration,
- Superficial venous ablation results in
  - Reduced risk of recurrent ulceration
  - Shorter ulcer healing time



**NEJM**  
A Randomized Trial of Early Endovenous Ablation in Venous Ulceration




**THE LANCET**  
Comparison of surgery and compression with compression alone in chronic venous ulceration (ESCHAR study): randomised controlled trial

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## COMPLICATIONS OF SURGERY

- Anaesthetic complications
- Wound complications
  - Infection / Cellulitis
  - Hyper/hypopigmentation
  - Scarring
- Bruising/Hematoma
- Phlebitis
- Nerve injury <1%
- DVT
- Recurrence
- Hypersensitivity



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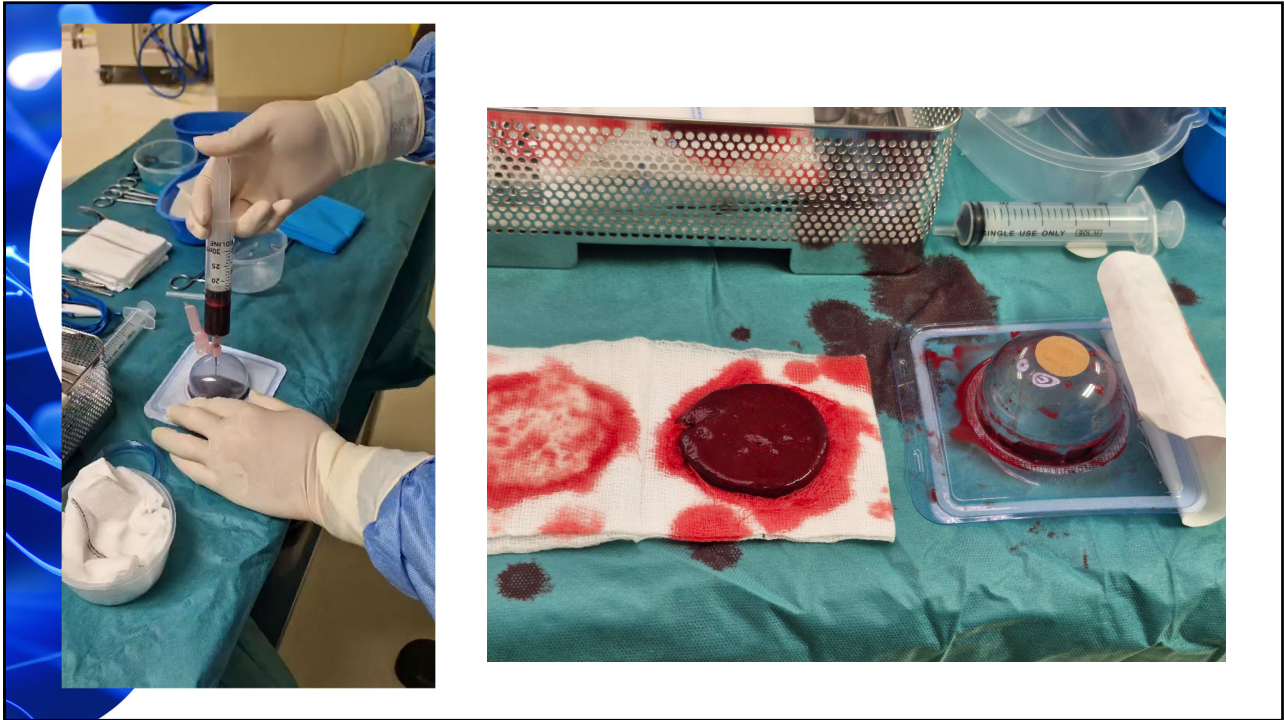
# CLINICAL VIGNETTE

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MIXED ARTERIOVENOUS ULCER  
PHLEBOLYMPHEDEMA

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**Table 1. CEAP Classification - Clinical, Etiologic, Anatomic, Pathophysiologic**

C-Clinical Class	Characteristics*	
0	No clinical findings or symptoms	E-Etiology**
1	Telangiectasia or reticular veins	C Congenital
2	Varicose veins	S Secondary
3	Edema, only due to a venous etiology	P Primary
4	(a) Pigmentation and/or eczema (b) Lipodermatosclerosis, atrophie blanche	A-Anatomy** S Superficial (Great and short saphenous systems as well as any branch varices)
5	Prior ulceration, dermatitis	P Perforator (Veins that communicate between the superficial and deep systems)
6	Active ulceration	D Deep (Calf veins and sinuses, popliteal, femoral, iliac veins and vena cava)
A, S	Subscript: Asymptomatic, Symptomatic	P-Pathophysiology**
Date	Date of investigation	R Reflux
Level	Level of investigation (I, II, III)	O Obstruction R-O Both
		N** No evident disease**


\*Complaints are expected to be related to venous insufficiency and are not classified if another etiology is present (i.e. edema secondary to heart failure).  
\*\*The N subscript indicates no evidence of disease. It is applicable to E, A, and/or P of CEAP.




Class 1:  
Telangiectasia.




Class 2:  
Varicose vein.




Class 3:  
Edema.



Class 4:  
Pigmentation /  
Eczema.



Class 5:  
Healed Ulcer.



Class 6:  
Venous Ulcer.

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## Q&A



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