

SPECTRUM

VASCULAR & GENERAL SURGERY

血管外科与综合外科

FARRER PARK

HOSPITAL

FRONTLINE

VASCULAR CARE

2026

Chronic Venous Disease

Essentials: Diagnosis and

Modern Management



Dr. Tay Jia Sheng

MBBS (Singapore), M.Med (Surgery), FRCS(Ed (Gen Surg), FAMS

MCR No. M11772B

Vascular, Endovascular & General Surgeon



COMFORT. FAIRNESS. VALUE

1

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

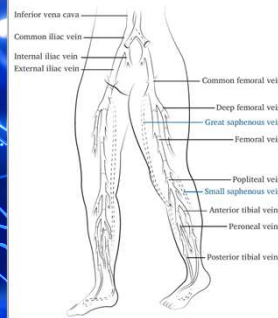
• Skin changes

• Venous ulcers

Chronic Venous Disease: Diagnosis and Modern Management | PVC 2026

2

2



Inferior vena cava

Common iliac vein

Internal iliac vein

External iliac vein

Common femoral vein

Deep femoral vein

Great saphenous vein

Femoral vein

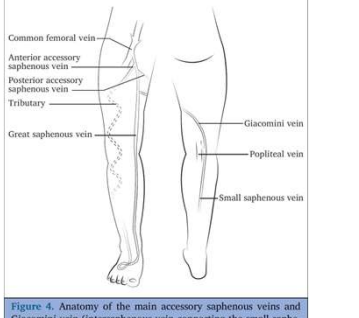
Popliteal vein

Small saphenous vein

Anterior tibial vein*

Peroneal vein*

Posterior tibial vein*



Common femoral vein

Anterior accessory saphenous vein

Posterior accessory saphenous vein

Tributary

Great saphenous vein

Giacomini vein

Popliteal vein

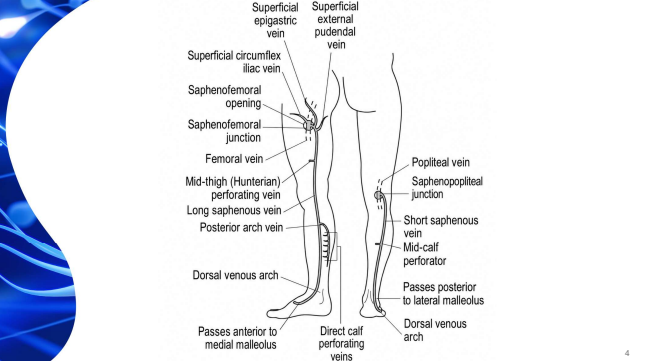
Small saphenous vein

Figure 3. Anatomy of the deep veins and the main superficial veins (great saphenous vein and small saphenous vein) of the lower limbs. *Appears usually as paired veins.

Figure 4. Anatomy of the main accessory saphenous veins and Giacomini vein (intersaphenous vein connecting the small saphenous vein with the great saphenous vein). In the presence of a Giacomini vein, the saphenopopliteal junction may be present or absent.

3

3



Superficial epigastric vein

Superficial external pudendal vein

Superficial circumflex iliac vein

Saphenofemoral opening

Saphenofemoral junction

Femoral vein

Mid-thigh (Hunterian) perforating vein

Long saphenous vein

Posterior arch vein

Dorsal venous arch

Passes anterior to medial malleolus

Direct calf perforating veins

Popliteal vein

Saphenopopliteal junction

Short saphenous vein

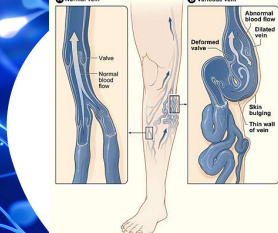
Mid-calf perforator

Passes posterior to lateral malleolus

Dorsal venous arch

4

4



Normal vein

Refluxing vein



• Dilated, tortuous, and prominent veins of the superficial venous system

• Distribution of the long **great** and short **small** saphenous veins

5

5

Prevalence of early stages of CVD is high

Global Prevalence

70.1%

Europe

68.1%

North America

61.7%

Asia

51.9%

Africa

5.5%

Average age

51.8 years

Female predominance

70.7%

clinical stages	C0	C1	C2	C3	C4	C5	C6
Global Prevalence	31.9 %	31.9 %	38.4 %	48.7 %	NA	NA	NA
Europe	19.0 %	28.2 %	21.4 %	18.4 %	NA	NA	NA
North America	21.5 %	19.2 %	18.4 %	13.7 %	NA	NA	NA
Asia	17.5 %	13.4 %	15.8 %	13.6 %	NA	NA	NA
Africa	9.5 %	9.3 %	7.4 %	5.9 %	NA	NA	NA
Australia	2.1 %	2.5 %	1.2 %	0.6 %	NA	NA	NA
South America	0.8 %	1.5 %	0.4 %	0.7 %	NA	NA	NA

CVD: Chronic Venous Disease Adapted from: Hagström ME, et al. *Journal of Vascular Medicine and Biology*. 2010;22(5):379-385. Sabin R, et al. *Global Burden of Disease*. 2017;2(1):601-670. Not for available data

Chronic Venous Disease: Diagnosis and Modern Management | PVC 2026

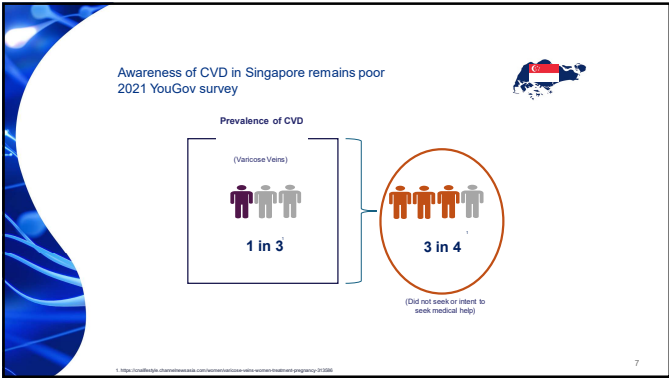
6

6

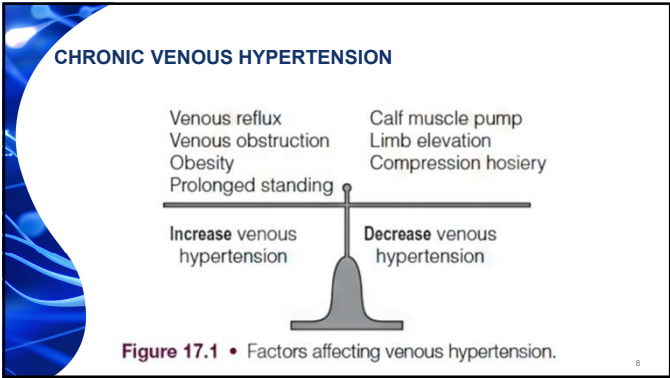
HTTPS://SPECTRUM-SURGERY.COM

DR. TAY JIA SHENG

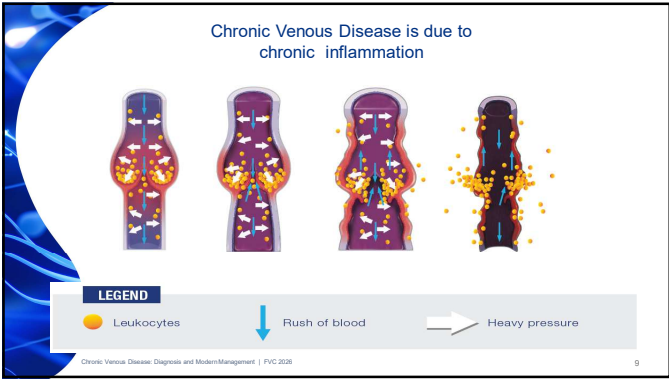
1



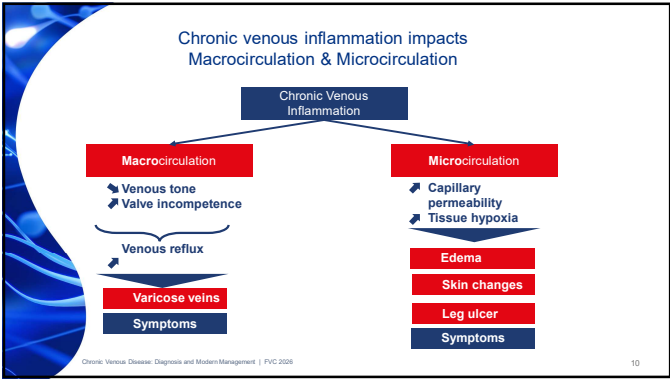
7



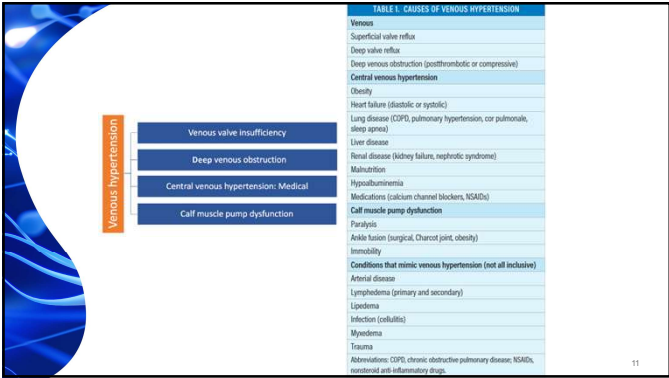
8



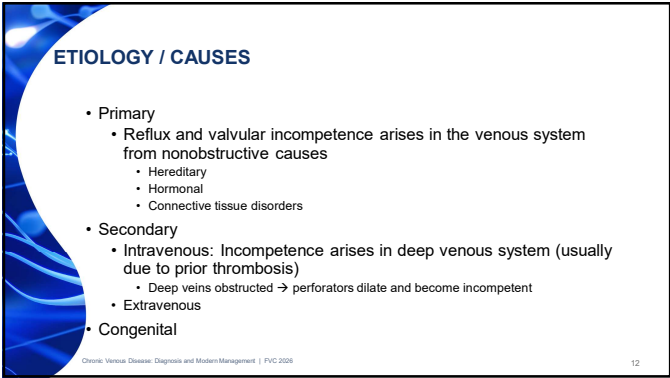
9



10



11



12

Box 17.1 • CEAP classification

Clinical classification

C0: no visible or palpable signs of venous disease

C1: telangiectasias or reticular veins

C2: varicose veins

C3: oedema

C4a: pigmentation or eczema

C4b: lipodermatosclerosis or atrophie blanche

C5: healed venous ulcer

C6: active venous ulcer

C6r: recurrent active venous ulcer

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

(S: secondary (post thrombotic))

(S: no venous cause identified)

Anatomical classification

A0: no anatomic location identified

A1: perforator veins

A2: deep veins

A3: no venous location identified

Pathophysiological classification

P0: reflux

P1: obstruction

P2: reflux and obstruction

P3: no venous pathophysiology identifiable

13

CEAP Classification System and Reporting Standard

Revision 2020

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

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

Copyright © 2020 by the Society for Vascular Surgery®

@JVascSurg

@TheJVascSurg

14

Table IV. The 2020 revision of CEAP: Summary of etiologic (E) classification

E class	Description
E ₀	Primary
E ₁	Secondary
E _{1a}	Secondary – intravenous
E _{1se}	Secondary – extravenous
E ₂	Congenital
E _n	No cause identified

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2020

15

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

A class	Superficial	Deep	Description
A ₀	0	0	No telangiectasias
A ₁	1	1	Reticular veins
A ₂	2	2	Small saphenous vein above knee
A ₃	3	3	Great saphenous vein below knee
A ₄	4	4	Small saphenous vein
A ₅	5	5	Anterior accessory saphenous vein
A ₆	6	6	Posterior accessory saphenous vein
A ₇	7	7	Deep femoral vein
A ₈	8	8	Deep femoral vein
A ₉	9	9	Deep femoral vein
A ₁₀	10	10	Deep femoral vein
A ₁₁	11	11	Deep femoral vein
A ₁₂	12	12	Deep femoral vein
A ₁₃	13	13	Deep femoral vein
A ₁₄	14	14	Deep femoral vein
A ₁₅	15	15	Deep femoral vein
A ₁₆	16	16	Deep femoral vein
A ₁₇	17	17	Deep femoral vein
A ₁₈	18	18	Deep femoral vein
A ₁₉	19	19	Deep femoral vein
A ₂₀	20	20	Deep femoral vein
A ₂₁	21	21	Deep femoral vein
A ₂₂	22	22	Deep femoral vein
A ₂₃	23	23	Deep femoral vein
A ₂₄	24	24	Deep femoral vein
A ₂₅	25	25	Deep femoral vein
A ₂₆	26	26	Deep femoral vein
A ₂₇	27	27	Deep femoral vein
A ₂₈	28	28	Deep femoral vein
A ₂₉	29	29	Deep femoral vein
A ₃₀	30	30	Deep femoral vein
A ₃₁	31	31	Deep femoral vein
A ₃₂	32	32	Deep femoral vein
A ₃₃	33	33	Deep femoral vein
A ₃₄	34	34	Deep femoral vein
A ₃₅	35	35	Deep femoral vein
A ₃₆	36	36	Deep femoral vein
A ₃₇	37	37	Deep femoral vein
A ₃₈	38	38	Deep femoral vein
A ₃₉	39	39	Deep femoral vein
A ₄₀	40	40	Deep femoral vein
A ₄₁	41	41	Deep femoral vein
A ₄₂	42	42	Deep femoral vein
A ₄₃	43	43	Deep femoral vein
A ₄₄	44	44	Deep femoral vein
A ₄₅	45	45	Deep femoral vein
A ₄₆	46	46	Deep femoral vein
A ₄₇	47	47	Deep femoral vein
A ₄₈	48	48	Deep femoral vein
A ₄₉	49	49	Deep femoral vein
A ₅₀	50	50	Deep femoral vein
A ₅₁	51	51	Deep femoral vein
A ₅₂	52	52	Deep femoral vein
A ₅₃	53	53	Deep femoral vein
A ₅₄	54	54	Deep femoral vein
A ₅₅	55	55	Deep femoral vein
A ₅₆	56	56	Deep femoral vein
A ₅₇	57	57	Deep femoral vein
A ₅₈	58	58	Deep femoral vein
A ₅₉	59	59	Deep femoral vein
A ₆₀	60	60	Deep femoral vein
A ₆₁	61	61	Deep femoral vein
A ₆₂	62	62	Deep femoral vein
A ₆₃	63	63	Deep femoral vein
A ₆₄	64	64	Deep femoral vein
A ₆₅	65	65	Deep femoral vein
A ₆₆	66	66	Deep femoral vein
A ₆₇	67	67	Deep femoral vein
A ₆₈	68	68	Deep femoral vein
A ₆₉	69	69	Deep femoral vein
A ₇₀	70	70	Deep femoral vein
A ₇₁	71	71	Deep femoral vein
A ₇₂	72	72	Deep femoral vein
A ₇₃	73	73	Deep femoral vein
A ₇₄	74	74	Deep femoral vein
A ₇₅	75	75	Deep femoral vein
A ₇₆	76	76	Deep femoral vein
A ₇₇	77	77	Deep femoral vein
A ₇₈	78	78	Deep femoral vein
A ₇₉	79	79	Deep femoral vein
A ₈₀	80	80	Deep femoral vein
A ₈₁	81	81	Deep femoral vein
A ₈₂	82	82	Deep femoral vein
A ₈₃	83	83	Deep femoral vein
A ₈₄	84	84	Deep femoral vein
A ₈₅	85	85	Deep femoral vein
A ₈₆	86	86	Deep femoral vein
A ₈₇	87	87	Deep femoral vein
A ₈₈	88	88	Deep femoral vein
A ₈₉	89	89	Deep femoral vein
A ₉₀	90	90	Deep femoral vein
A ₉₁	91	91	Deep femoral vein
A ₉₂	92	92	Deep femoral vein
A ₉₃	93	93	Deep femoral vein
A ₉₄	94	94	Deep femoral vein
A ₉₅	95	95	Deep femoral vein
A ₉₆	96	96	Deep femoral vein
A ₉₇	97	97	Deep femoral vein
A ₉₈	98	98	Deep femoral vein
A ₉₉	99	99	Deep femoral vein
A ₁₀₀	100	100	Deep femoral vein

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2020

16

Table VI. The 2020 revision of CEAP: Summary of pathophysiological (P) classification

P class	Description
P _r	Reflux
P _o	Obstruction
P _{ro}	Reflux and obstruction
P _n	No pathophysiology identified

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

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2020

17

HISTORY

• HASTI symptoms:

• Heaviness

• Aching

• Swelling

• Throbbing

• Itching

• Pain

• Burning

• Throbbing

• Cramping

• Aching

• ? Venous claudication

Heaviness

Swelling

Itching

Aching

Throbbing

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2020

18

HISTORY

- Leg fatigue
- Rash / Ulcers
- Varicosities
- NO SYMPTOMS

- Differentiate from orthopaedic & arterial disorders
- Abdominal mass?
- Prior abdominal/pelvic surgery

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2026

19

19

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

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2026

20

20

SYNDROMES ASSOCIATED WITH VARICOSE VEINS

- Klippel-Trenaunay-Weber syndrome
 - Vascular malformations / Varicose veins in unusual position, classically over lateral aspect of thigh
- Port-wine stains
- Bony/soft-tissue hypertrophy of limb
- Peripheral edema as deep venous system may be abnormal



Chronic Venous Disease: Diagnosis and Modern Management | FVC 2026

21

21

Syndromes associated with varicose veins

- Parkes-Weber syndrome
 - Multiple arteriovenous fistulae with risk of cardiac failure
 - Limb hypertrophy



Chronic Venous Disease: Diagnosis and Modern Management | FVC 2026

22

22

PHYSICAL EXAMINATION

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

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2026

23

23

	Performed completely	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			

Chronic Venous Disease: Diagnosis and Modern Management | FVC 2026

24

24



25



26



27



28



29



30



31



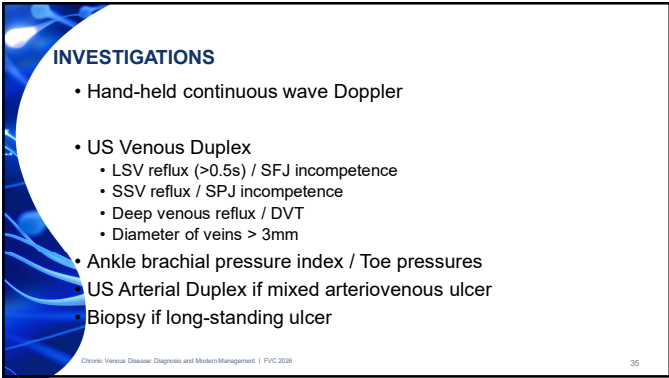
32



33



34



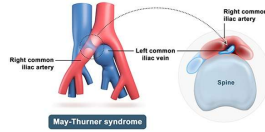
35



36

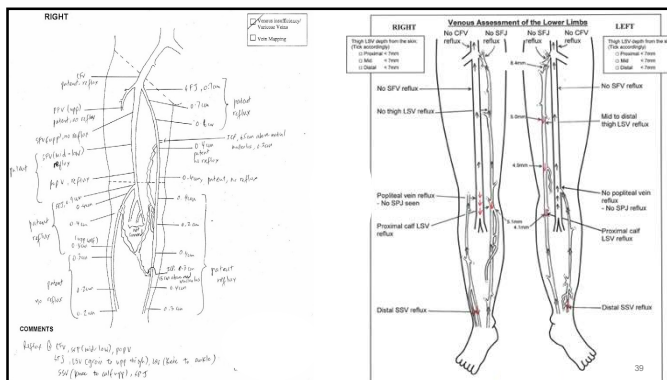
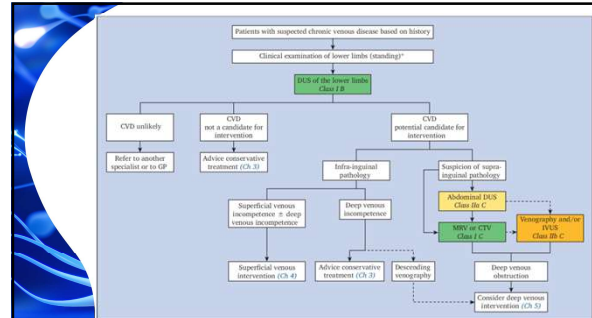
INVESTIGATIONS

- 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?



Chronic Venous Disease: Diagnosis and Modern Management | FVC 2020

37







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 tight sleeve that maximizes the effect of every muscle movement — big and small, moving and resting — to optimize venous return.⁴³

A compression system designed with materials that work together to create a tight 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



43

Table 7. Contraindications to compression treatment (modified with permission from Rabe et al., 2020⁴⁴)

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 necrosis⁴⁵

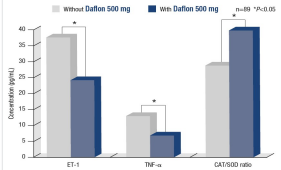
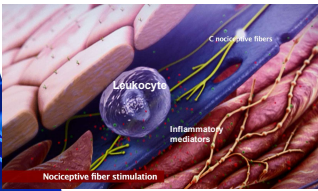
ABI = ankle brachial index; NYHA = New York Heart Association; NYHA Class IV: fatigue, palpitations, dyspnoea and/or angina at rest; NYHA Class III: ordinary physical activity causes undue fatigue, palpitations, dyspnoea and/or angina - comfortable at rest.

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



44

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.

45

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	
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	

Weak in view of the possibility of inducing agranulocytosis

46

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

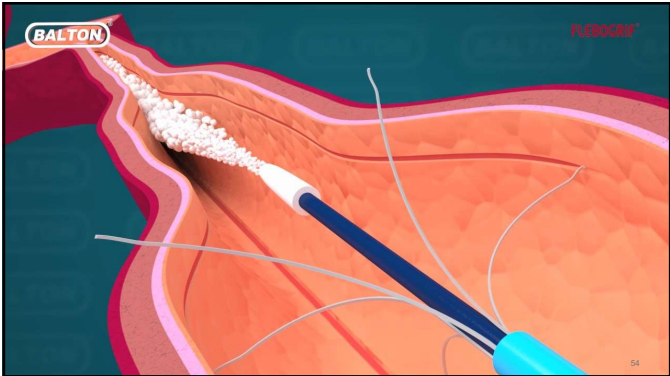
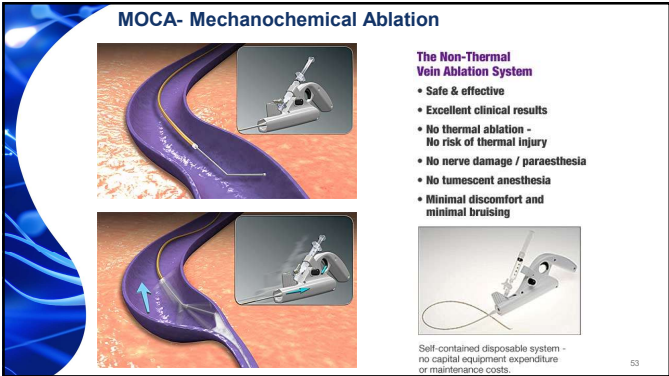
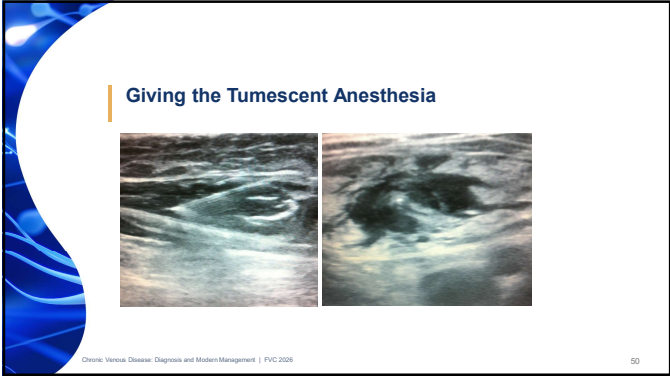
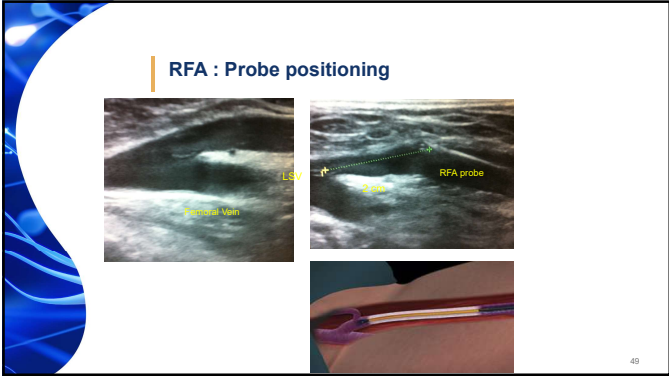
47

TREATMENT OPTIONS

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



48



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.



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

Medtronic

55

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



56

TREATMENT OPTIONS

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



57

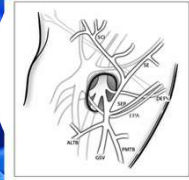


Figure 1. The classic appearance of the saphenofemoral junction (original drawing by Emma Wong and electronically processed into digital image by Andrea Thompson).

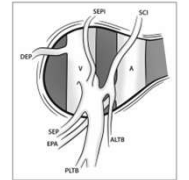


Figure 2. An anatomical variation showing SCI and ALTb in isolation as a confluence of veins draining into the GSV (original drawing by Emma Wong and electronically processed into digital image by Andrea Thompson).

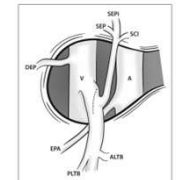


Figure 3. An anatomical variation showing SCI, SEP and SEP as a confluence of tributaries draining into the GSV (original drawing by Emma Wong and electronically processed into digital image by Andrea Thompson).

Abbreviations: SCI: superficial circumflex iliac; SE: Superficial Epigastric; SEP: superficial external pudendal; GSP: deep external pudendal; EPA: external pudendal artery; ALTb: anterolateral thigh branch; PHTb: posterolateral thigh branch; GSV: great saphenous vein.

58



59



60

HTTPS://SPECTRUM-SURGERY.COM

DR. TAY JIA SHENG

10

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



61



62

TREATMENT OPTIONS

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



63

COMPLICATIONS OF SURGERY

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



64

CLINICAL VIGNETTE

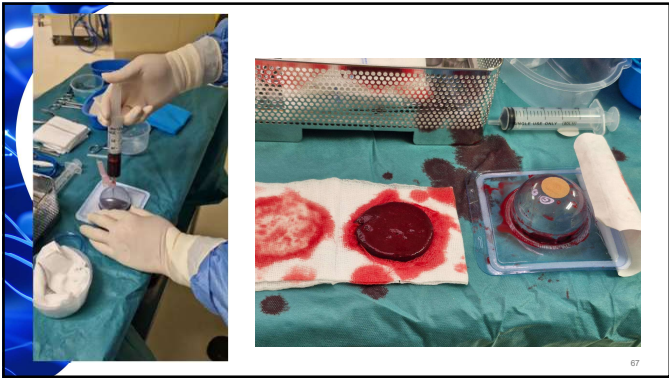


65

MIXED ARTERIOVENOUS ULCER
PHLEBOLYMPHEDEMA



66



67



68



69



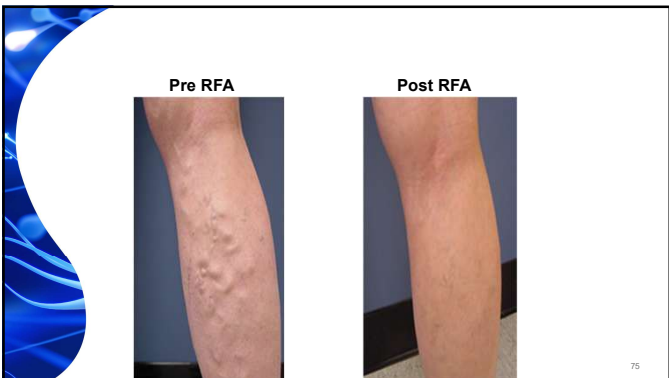
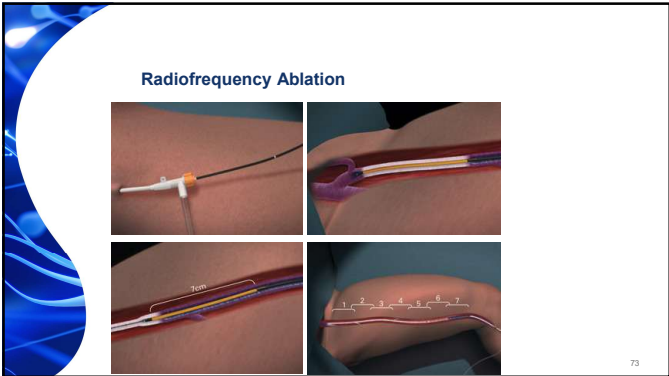
70



71



72



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
- ABPI / TP
- US Arterial Duplex
- Biopsy if long-standing ulcer
- Abdominal US / CTV / MRV for suprainguinal pathology

77

Treatment Options

- Endovenous Thermal Ablation – gold standard now
 - Radiofrequency Ablation (RFA)
 - Endovenous Laser Therapy (EVLT)
- Injection sclerotherapy (US guided)
 - Foam sclerosant superior to liquid
- Non-Thermal, Non-Tumescent Ablation
 - Mechanochemical Ablation (MOCA) – ClariVein, Flebogrif
 - Non-Sclerosant / Cyanoacrylate-based - Venaseal

78