Chronic venous insufficiency

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2016

- Definition
- Causes
- Presentation
- Pathogenesis
- Workup
- Treatment

definition

- Disease of lower limb veins in which venous return is impaired over years, by reflux, obstruction, or calf muscle pump failure.

Epidemiology

- 50 % population
- Ulcer occur in 1%
- 50% ulcer more than 12 months, 72 % are recurrent
- Affect quality of life

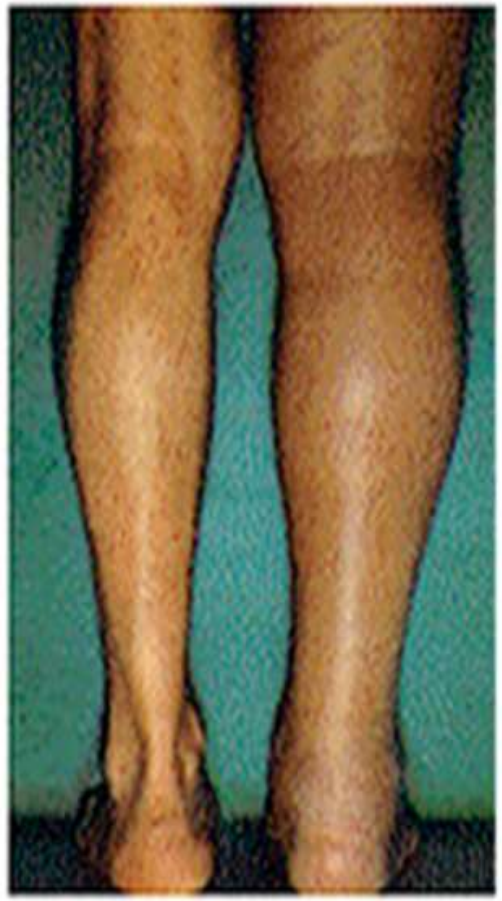
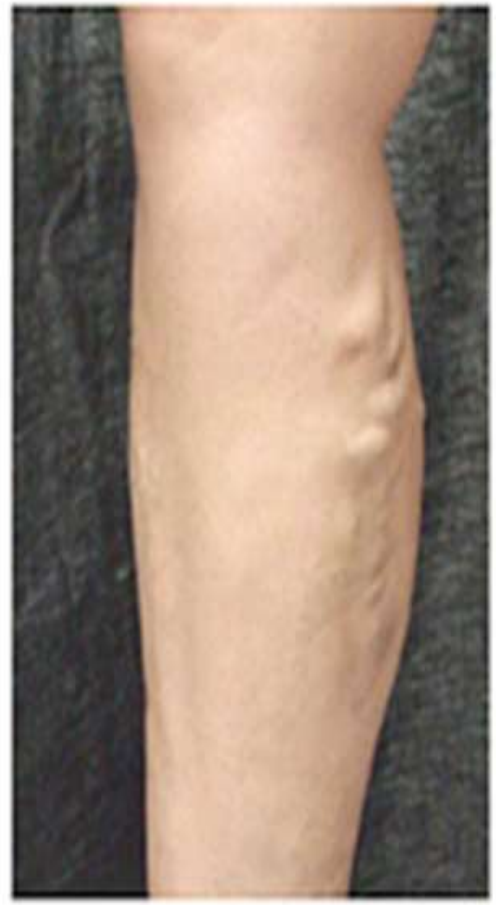
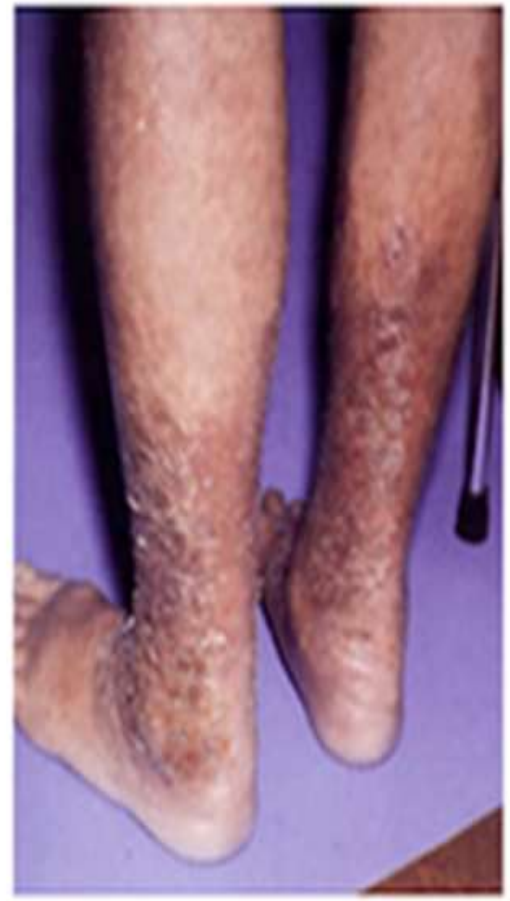
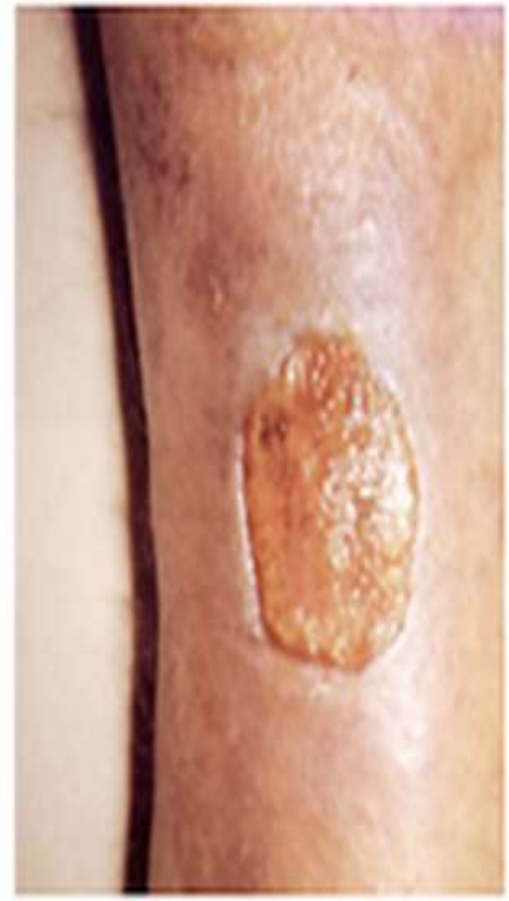
Nelsen, O. Bergqvist, venous and non-venous leg ulcer:clinical history, Br J surg 1994
Callam MJ. Epidemiology of varicose vein. Br J Surg 1994

causes

- Superficial venous reflux
- Deep venous reflux and occlusion- primary, secondary
- Perforator venous reflux

Clinical features

- Swelling
- Skin changes: eczema, pigmentation, hypopigmentation, lipodermatoclerosis
- Ulceration
- Varicose vein
- Pain

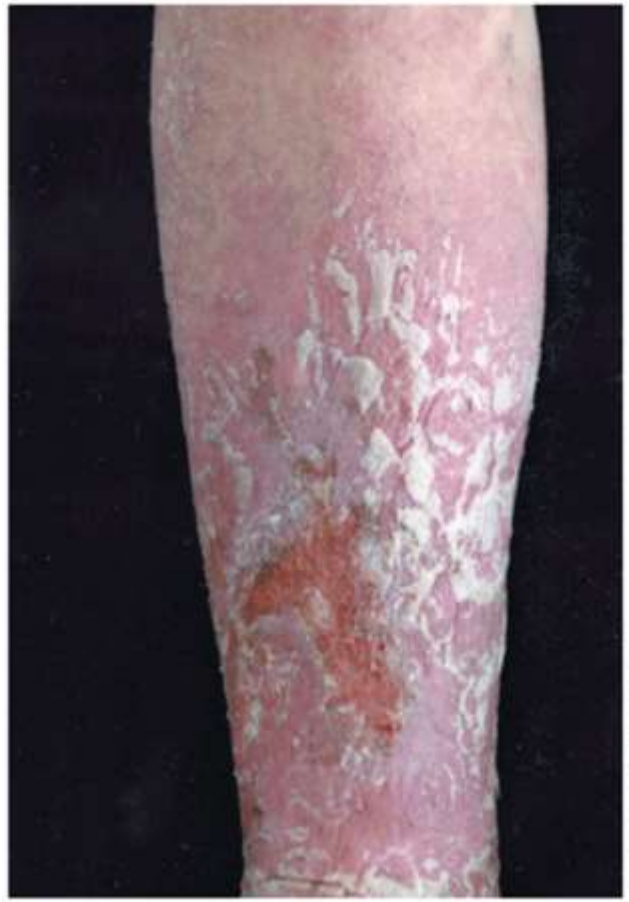


FIGURE 2: Erythema and scaling arround the ulcer characterizing eczema

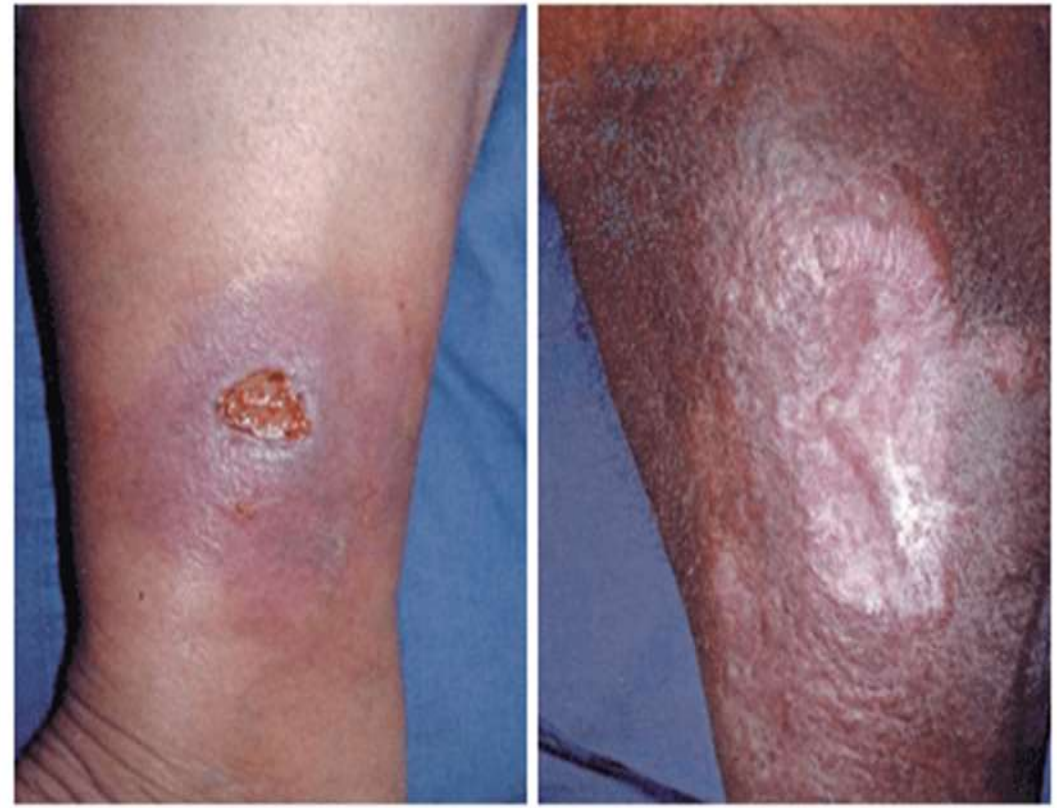
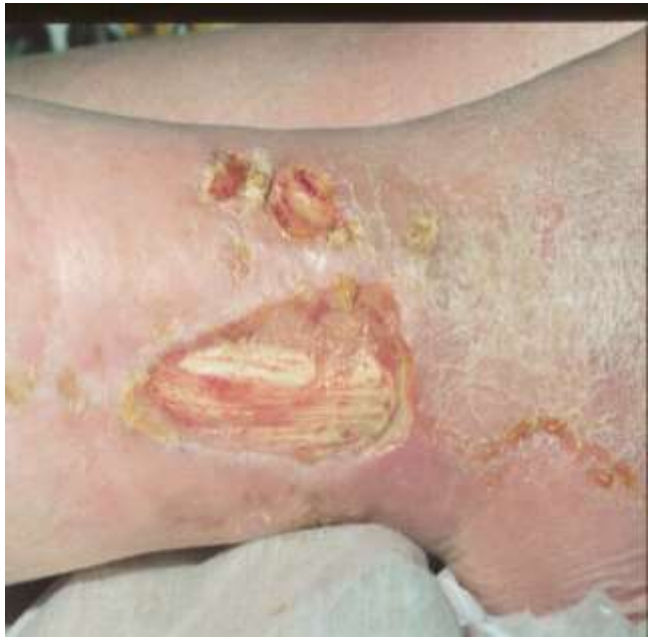
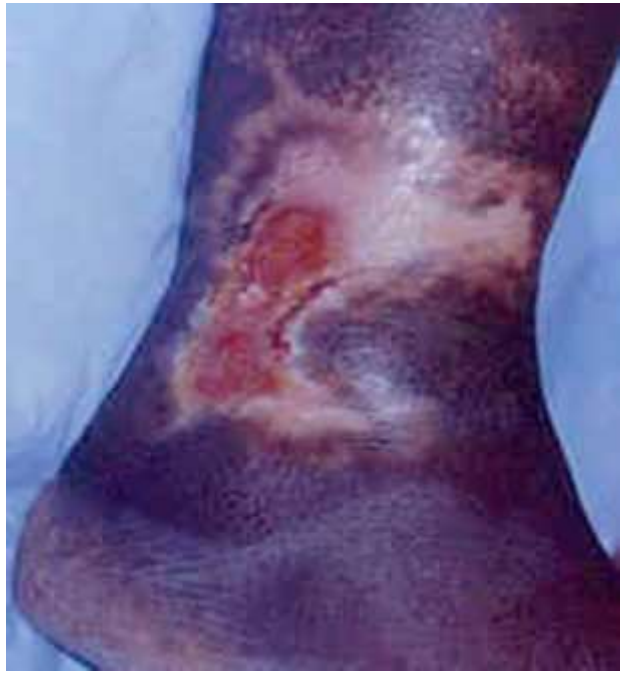
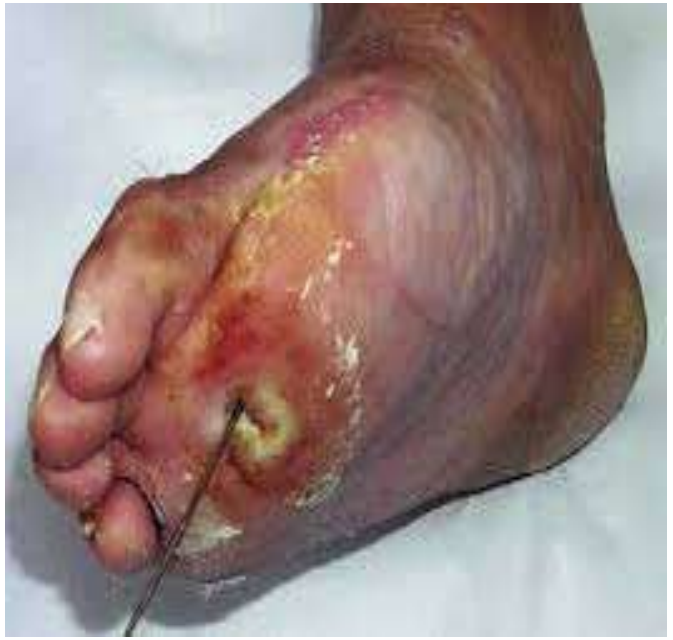


FIGURE 3: Acute lipodermatosclerosis on the left, chronic lipodermatosclerosis on the right

Ulcer ? Ischemic or venous or neurogenic







- Medial Malleolus
- Shallow
- Irregular borders
- Base with granulation tissue
- Surrounding white scar (atrophie blanche)
- Surrounding hemosiderin deposition
- Surrounding Edema

Table 1. **Clinical Aspects of the Most Common Types of Ulcers of the Lower Limbs***

Wound Type	General Information	Pathophysiology	Clinical Features	Therapy
Venous ulcers	Most common type of leg ulcers; women affected more than men; often elderly	Venous hypertension	Presence of varicosities; ulcer located in the gaiter area; shallow, painful, granulation tissue and fibrin present. Associated findings include edema, venous dermatitis, and LDS	Leg elevation, compression therapy, aspirin, pentoxifylline, tissue-engineered skin, growth factors
Arterial ulcers	Elderly patients with history of cardiac or cerebrovascular disease; leg claudication, impotence, pain in distal foot. Concomitant with venous disease in up to 25% of cases	Tissue ischemia	Ulcers are commonly deep, located over bony prominences, round or punched out with sharply demarcated borders, yellow base, or necrosis; exposure of tendons. Associated findings include abnormal pedal pulses, cool limbs, femoral bruit, and prolonged venous filling time	Revascularization, antiplatelet and other rheologic agents, address risk factors
Neuropathic ulcers	Most common cause of foot ulcers, most commonly due to diabetes	Trauma, prolonged pressure	Usually plantar aspect of feet in patients with diabetes, neurologic disorders, or Hansen disease	Off loading; topically applied growth factors; tissue-engineered skin
Pressure ulcers	Usually bed-ridden patients; monoplegia	Tissue ischemia and necrosis secondary to prolonged pressure	Located over bony prominences in patients with limited mobility; risk factors include excessive moisture and altered mental status	Off loading; adequate nutrition, reduction of excessive moisture, sheer, and friction

* LDS = lipodermatosclerosis.

pathogenesis

- Venous hypertension
- Fibrin cuff hypothesis
- White cell trapping hypothesis

CEAP classification

Clinical*
- C_0 - No clinical signs
- C_1 - Small varicose veins
- C_2 - Large varicose veins
- C_3 - Edema
- C_4 - Skin changes without ulceration
- C_5 - Skin changes with healed ulceration
- C_6 - Skin changes with active ulceration

Etiology*
- E_C - Congenital
- E_P - Primary
- E_S - Secondary (usually due to prior DVT)

Anatomy*
- A_S - Superficial veins
- A_D - Deep veins
- A_P - Perforating veins

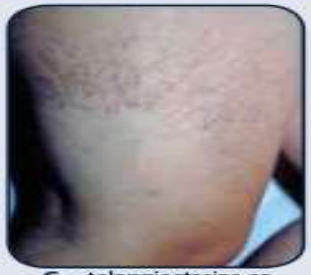
Pathophysiology*
- P_R - Reflux
- P_O - Obstruction

"Early application of compression should be performed to correct swelling and progressive scarring and to initiate the healing process by improving the venous microcirculation."

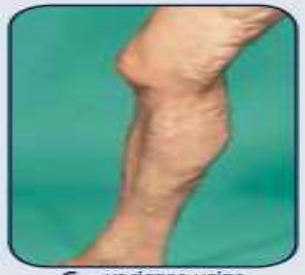
Kistner R. Specific Steps to Effective Management of Venous Ulceration. Supplement to Wounds June 2010.

*Fronek HS, Bergan JJ, et al. The Fundamentals of Phlebology: Venous Disease for Clinicians. 2004. pg 151.

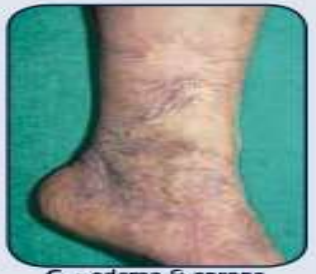
Clinical Classifications with examples



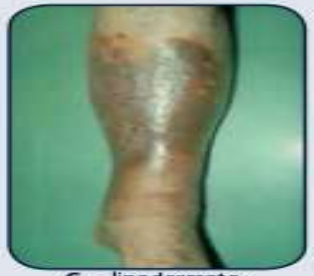
C_1 - telangiectasias or reticular veins



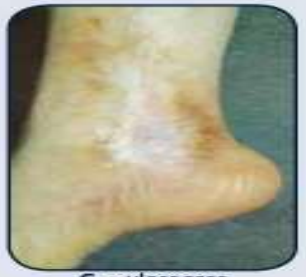
C_2 - varicose veins



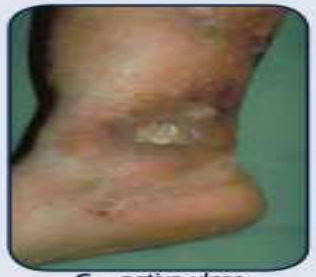
C_3 - edema & corona



C_4 - lipodermato-sclerosis and eczema



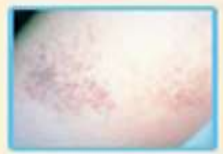
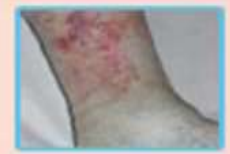
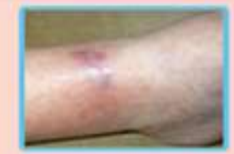
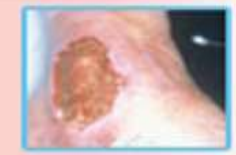
C_5 - ulcer scar



C_6 - active ulcer

International Consensus
CEAP

Symptoms | **Clinical signs**

C0S	C1	C2	C3	C4	C5	C6
						
Heavy legs, pains in the legs, pruritus... But no clinical or palpable signs of venous disease ▸ read more	Telangiectasia or reticular veins ▸ read more	Visible and palpable varicose veins ▸ read more	Venous oedema (without trophic changes) ▸ read more	Trophic changes of venous origin : atrophie blanche, pigmented purpuric dermatitis, varicose eczema ▸ read more	healed ulcer with trophic changes ▸ read more	Presence of one or more active venous leg ulcers, often accompanied by trophic changes ▸ read more

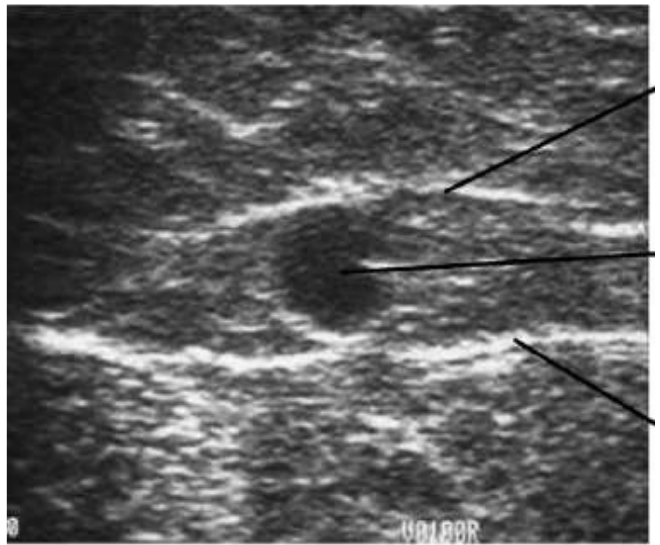
C0 - C6 : description of the progression of the disease on the basis of the clinical signs present
C : clinical signs E : etiological classification A : anatomical distribution P : pathophysiological dysfunction

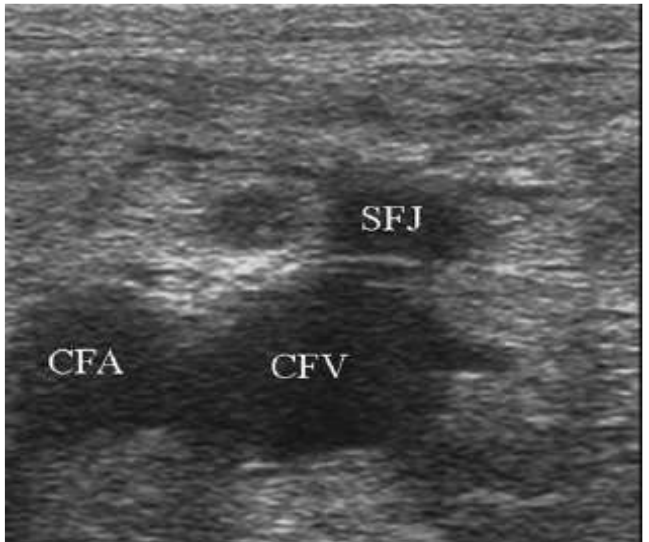
URGO MEDICAL

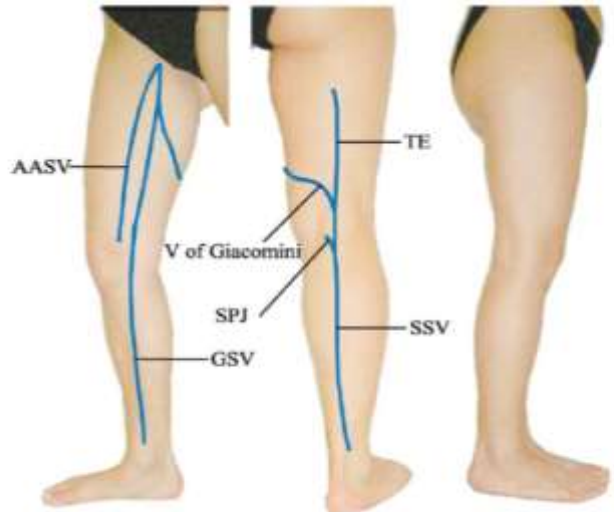
investigation

Coleridge-smith et al. Duplex ultrasound investigation of vein in CVL of lower limb. Eur J Vasc 2006

- Doppler ultrasound
- Non- invasive
- Venous Reflux : retrograde flow lasting more than 0.5 sec
- in CVI, sup vein reflux present in 90%, 70-80 % in GSV







Management

- Conservative management
- Compression stocking
- Limb elevation
- Medication: Daflon
- Open surgery
- Ligation, stripping and multiple stab avulsion
- Venous bypass surgery for deep vein occlusion
- Endovenous surgery

-EVLA

-RFA

-Foam sclerotherapy

-mechano-sclerosant ablation

-cryoablation

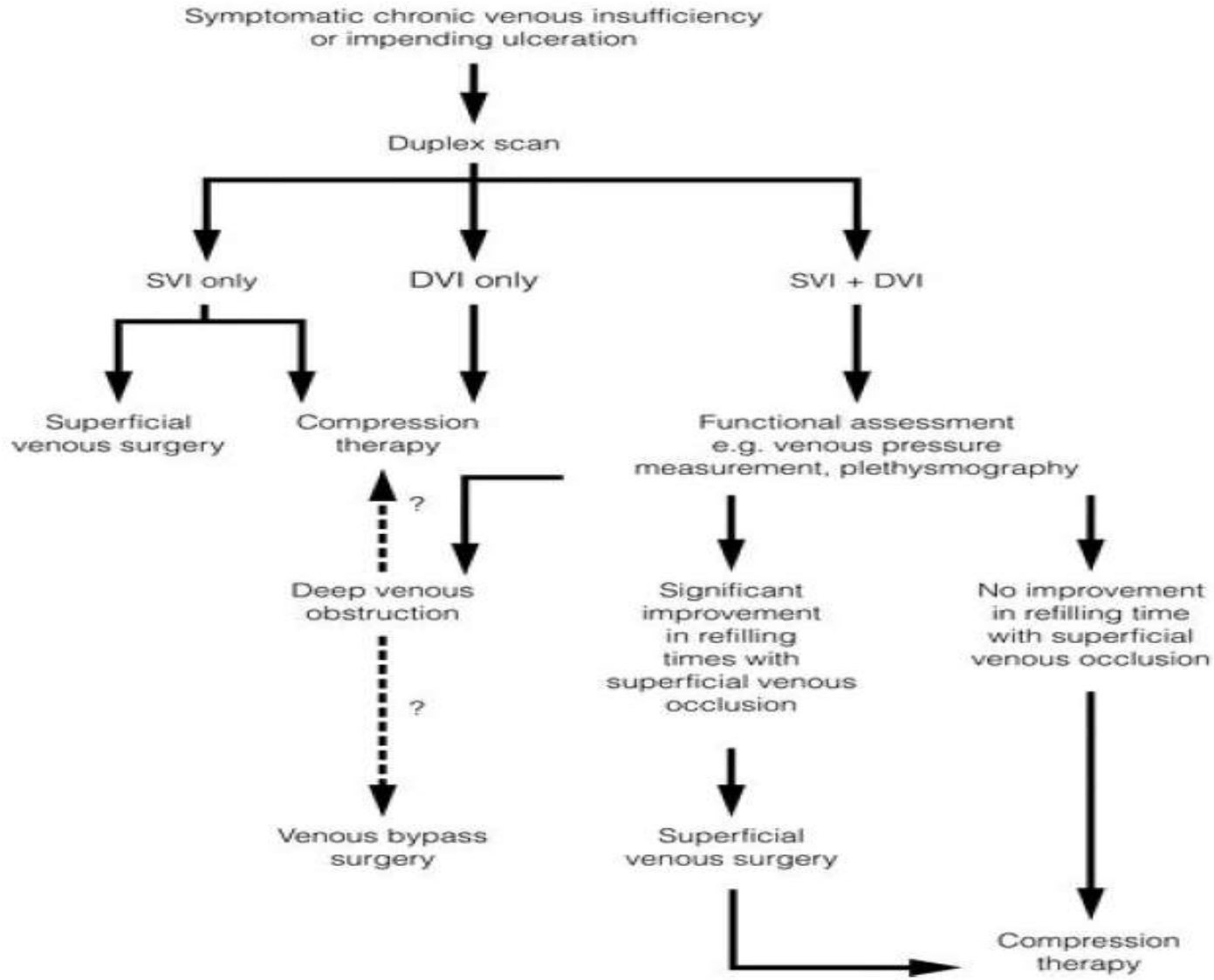


FIGURE 18.4 Flow diagram for the management of chronic venous insufficiency. DVI, deep venous incompetence; SVI, superficial venous incompetence.

Elevation of lower limb

- Reduce edema, decrease exudate, improve skin healing

Alexander house Group, consensus paper venous ulcer J Dermatol Surg oncol 1992

Compression therapy

- Symptomatic relief, promote ulcer healing, and prevent ulcer recurrence
- Non-invasive
- SVS recomendation : primary therapy to aid in healing of venous ulcer (GRADE 1B), adjuvant therapy to superficial vein ablation to prevent ulcer recurrence (GRADE 1A)

Meta-analysis by Amsler et al in 8 RCT

- The healing of venous leg ulcer:
- Compression more effective than no compression
- Elastic compression more effective than non-elastic
- Multilayereed high compression is more effective than single layer
- No different between 4-layers and other high compression multi-layered systems

O’Meara, S. Cullum, Compression for venous leg ulcers. Cochrane Database SystRev 2009

Class	Pressure at ankle (mmHg)	Indications
I	< 25	Mild varicosis, venous thrombosis prophylaxis
II	25–35	Marked varicose veins, oedema, chronic venous insufficiency
III	35–45	Chronic venous insufficiency, lymphoedema, following venous ulceration to prevent recurrence
IV	45–60	Severe lymphoedema and chronic venous insufficiency

pharmacotherapy

- Purified flavonoid fraction (DAFLON) commonly used in Malaysia
- Venoactive drug
- Reduce edema, restless leg, and increase healing process of venous ulcer
- SVS guideline: as adjuvant therapy to compression to accelerate ulcer healing (GRADE 2B)

Meta-analysis of 5 RCT by Coleridge-Smith et al

Table 2 Randomized, double-blind, placebo-controlled studies on the use of flavonoids for the treatment of CVD performed during the last 20 years (1992–2012)

Reference	Study design	Patients	Study arms	Length of treatment	Main findings
Rabe *et al.* (2011)[48]	Multicentre, randomized, double-blind, placebo-controlled	Adults with CEAP grade 3–4a CVD	720 mg AS195/day ($n = 126$) versus placebo ($n = 122$)	12 weeks	Significant, clinically relevant decrease in limb volume and significant decrease in pain in legs at week 12 for AS195 versus placebo, but no other significant differences; tolerability similar to placebo
Kalus *et al.* (2004)[49]	Randomized, double-blind, placebo-controlled crossover	Adults with CVI stage I (no skin complications) or II (skin complications but no oedema)	AS195 360 mg/day × 4 weeks, followed by placebo for 6 weeks ($n = 36$) versus placebo for 4 weeks followed by AS195 360 mg/day × 6 weeks ($n = 35$)	6 weeks	Significantly increased microvascular flow, increased blood oxygen, decreased ankle circumference and decreased calf circumference at 6 weeks for AS195 versus placebo
Petruzellis *et al.* (2002)[96]	Randomized, double-blind, placebo-controlled	Adults with CVI stage I (no skin complications) or II (skin complications but no oedema	Oxyrutins dosed according to level of CVI ($n = 40$) versus placebo ($n = 20$)	4 weeks	Significant change in venous capacity, light reflection rheography and liquid crystal thermography at week 2 and week 4 in the oxyrutins group but not in the placebo group
Danielsson *et al.* (2002)[97]	Randomized, double-blind, placebo-controlled	Adults with symptomatic CVD	MPFF 500 mg twice daily for 60 days ($n = 51$) versus placebo ($n = 50$)	60 days	Significantly reduced ultrasonic reflux time in patients with oedema for MPFF versus placebo, but finding did not correlate with changes in clinical symptoms and no significant difference in global symptom score
Kiesewetter *et al.* (2000)[42] [in German]	Multicentre, randomized, double-blind, placebo-controlled	Adults with CVI stage I (no skin complications) or II (skin complications but no oedema)	Placebo ($n = 87$) versus 360 or 720 mg AS195/day ($n = 170$)	12 weeks	Significant difference in lower leg volume as measured by water displacement plethysmography and by circumference and improvement in some subjective scores for AS195 versus placebo at week 12; treatment well tolerated
Arcangeli *et al.* (2000)[98]	Randomized, double-blind, placebo-controlled	Adults with CVI and varicose veins in the leg	100 mg pycnogenol 3 × /day ($n = 20$) versus placebo ($n = 20$)	2 months	Significantly lower subcutaneous oedema, pain and leg heaviness in the pyconogenol but not in the placebo group, but no effects on venous blood flow in either group
Guilhou *et al.* (1997)[99]	Randomized, double-blind, placebo-controlled	Adults with venous ulcer	Compression stockings + 450 mg MPFF 2 × /day ($n = 53$) versus compression stockings + placebo ($n = 52$)	2 months	Significantly higher rate of complete ulcer healing, lower duration of healing, and less leg heaviness but not other assessments symptoms in the MPFF group versus the placebo group
Unkauf *et al.* (1996)[100]	Multicentre, randomized, double-blind, placebo-controlled	Women with stage II CVI (skin complications but no oedema)	500 mg oxyrutins 2 × /day + compression stockings ($n = 64$) versus placebo + compression stockings ($n = 56$)	12 weeks	Significant improvement in oedema as measured by leg volume with oxyrutins versus placebo that continued for at least 6 weeks after end of treatment
MacLennan *et al.* (1994)[101]	Multi-centre, randomized, double-blind, placebo-controlled	Adults >65 years of age with CVI or varicose veins	*O*-(β-hydroxyethyl)-rutosides (varying doses) ($n = 52$) versus placebo ($n = 52$)	6 months	Significantly lower total symptom score, leg cramps, heavy legs, restless legs, calf circumference, pitting oedema of the legs and eczema of the leg for *O*-(β-hydroxyethyl)-rutosides versus placebo
Dominguez *et al.* (1992)[102]	Randomized, double-blind, placebo-controlled	Adults with CVI of the lower limbs including varicose veins, ankle swelling, local pain in the legs, and leg heaviness	200 mg hidrosmin 3 × /day ($n = 30$) versus placebo ($n = 27$)	45 days	Significantly improvement in pain, leg heaviness and visual assessment of swelling for hidrosmin versus placebo

What surgery ??

- REACTIV trial,

-pts randomized to surgery or compression stocking group, showed surgical group experienced greater symptoms relief and quality of life

- ESCHAR venous ulcer trial

-showed superficial venous surgery reduce risk of recurrent ulcer.

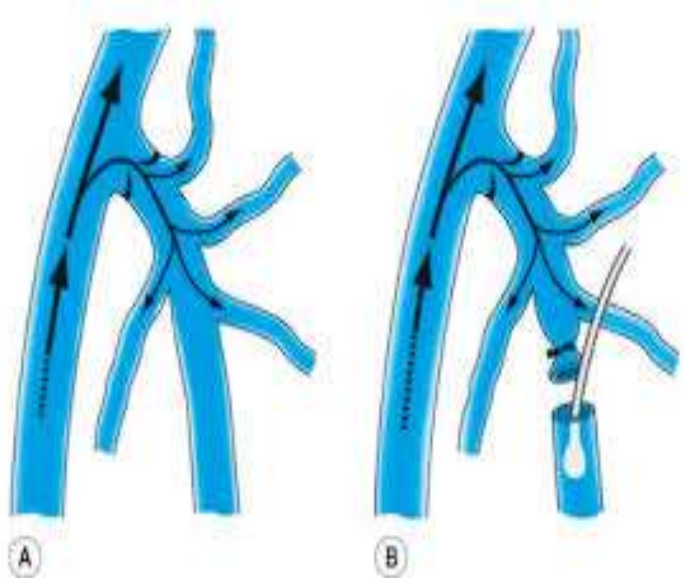
However, recurrence is common after traditional surgery, with 11 years Follow up, recurrence up to 62%

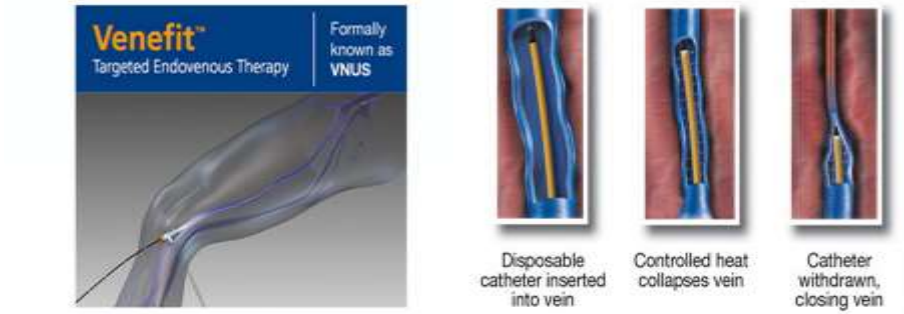
Stripping the long saphenous vein is recommended reduced the risk of reoperation by 60% after 11 years, although it did not reduce the rate of visible recurrent veins.

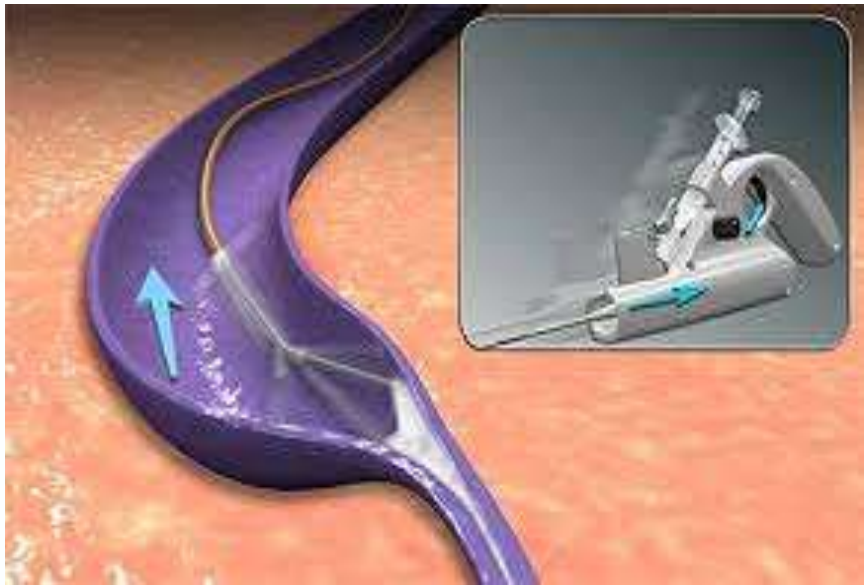
(winterborn, causes of varicose vein recurrence: late result of a randomised controlled trial of stripping of long saphenous vein)

Superficial venous intervention

- HSFL , stripping and MSA
- Endovascular : RFA, Endovascular laser ablation, mechano-chemical (Clarivein), cryoablation
- Sclerosant therapy







A Randomized Trial Comparing Treatments for Varicose Veins (CLASS TRIAL)

BACKGROUND

Ultrasound-guided foam sclerotherapy and endovenous laser ablation are widely used alternatives to surgery for the treatment of varicose veins, but their comparative effectiveness and safety remain uncertain.

METHODS

In a randomized trial involving 798 participants with primary varicose veins at 11 centers in the United Kingdom, we compared the outcomes of foam, laser, and surgical treatments. Primary outcomes at 6 months were disease-specific quality of life and generic quality of life, as measured on several scales. Secondary outcomes included complications and measures of clinical success.

RESULTS

After adjustment for baseline scores and other covariates, the mean disease-specific quality of life was slightly worse after treatment with foam than after surgery ($P=0.006$) but was similar in the laser and surgery groups. There were no significant differences between the surgery group and the foam or the laser group in measures of generic quality of life. The frequency of procedural complications was similar in the foam group (6%) and the surgery group (7%) but was lower in the laser group (1%) than in the surgery group ($P<0.001$); the frequency of serious adverse events (approximately 3%) was similar among the groups. Measures of clinical success were similar among the groups, but successful ablation of the main trunks of the saphenous vein was less common in the foam group than in the surgery group ($P<0.001$).

CONCLUSIONS

Quality-of-life measures were generally similar among the study groups, with the exception of a slightly worse disease-specific quality of life in the foam group than in the surgery group. All treatments had similar clinical efficacy, but complications were less frequent after laser treatment and ablation rates were lower after foam treatment. (Funded by the Health Technology Assessment Programme of

Table 3. Estimates of the Success of Ablation of the Great Saphenous Vein According to Treatment Group.*

Variable	Laser Group	Foam Group	Surgery Group	Surgery vs. Foam†	Surgery vs. Laser‡	Laser vs. Foam§
					odds ratio (95% CI)	
At 6 wk						
No. of patients	153	205	192			
Complete success — no. (%)	127 (83.0)	112 (54.6)	162 (84.4)			
Partial success without reflux — no. (%)	13 (8.5)	47 (22.9)	12 (6.3)			
Partial success with reflux — no. (%)	10 (6.5)	9 (4.4)	9 (4.7)			
Failure — no. (%)	3 (2.0)	37 (18.0)	9 (4.7)	5.1 (3.1–8.5)¶	1.2 (0.6–2.3)	3.1 (1.8–5.4)¶
At 6 mo						
No. of patients	141	182	173			
Complete success — no. (%)	116 (82.3)	79 (43.4)	135 (78.0)			
Partial success without reflux — no. (%)	13 (9.2)	35 (19.2)	4 (2.3)			
Partial success with reflux — no. (%)	3 (2.1)	9 (4.9)	20 (11.6)			
Failure — no. (%)	9 (6.4)	59 (32.4)	14 (8.1)	4.9 (3.1–7.9)¶	0.8 (0.4–1.5)	4.8 (2.8–8.5)¶

Table 4. Serious Adverse Events and Other Complications According to Treatment Group.*

Event	Laser Group	Foam Group	Surgery Group
	number/total number (percent)		
Serious adverse events overall	7/210 (3.3)	11/286 (3.8)	10/289 (3.5)
Serious adverse events related to treatment	2/210 (1.0)	3/286 (1.0)	4/289 (1.4)
Other complications			
Any procedural complication during treatment	2/205 (1.0)	17/275 (6.2)†	19/267 (7.1)†
Any complication at 6 wk	103/193 (53.4)	219/265 (82.6)†	168/251 (66.9)‡
Any complication at 6 mo	89/183 (48.6)	144/251 (57.4)§	109/236 (46.2)
Numbness at 6 wk	22/193 (11.4)¶	15/265 (5.7)	45/251 (17.9)‖
Numbness at 6 mo	17/183 (9.2)¶	10/251 (4.0)	37/236 (15.6)‖
Persistent bruising at 6 wk	10/193 (5.2)	49/265 (18.5)†	32/251 (12.7)‡
Persistent bruising at 6 mo	25/183 (13.6)	38/251 (15.2)	40/236 (17.0)
Persistent tenderness and discomfort at 6 wk	41/193 (21.2)	122/265 (46.0)†	79/251 (31.5)†¶
Skin loss or ulceration at 6 wk	0/193	2/265 (0.8)	1/251 (0.4)
Skin loss or ulceration at 6 mo	1/183 (0.6)	2/251 (0.8)	0/236
Lumpiness at 6 wk	36/193 (18.7)	171/265 (64.5)†**	83/251 (33.1)‡
Lumpiness at 6 mo	25/183 (13.6)§	67/251 (26.6)‡**	17/236 (7.2)‡
Development of thread vein at 6 wk	10/193 (5.2)	27/265 (10.2)‡	21/251 (8.4)
Development of thread vein at 6 mo	24/183 (13.2)	34/251 (13.6)	26/236 (11.0)
Skin staining at 6 wk	18/193 (9.3)	105/265 (39.6)†**	20/251 (8.0)
Skin staining at 6 mo	32/183 (17.4)§	92/251 (36.6)†**	24/236 (10.2)

* The comparison between the foam group and the surgery group includes participants from strata A and B; the comparison between the surgery group and the laser group includes participants from stratum A only. The post hoc analysis of the laser group versus the foam group includes participants from stratum A only; 31% of the patients in the laser group also underwent foam treatment of varicosities. Thread veins are small clusters of blue or red veins.

† $P<0.001$ for the comparison with the laser group.

‡ $P<0.05$ for the comparison with the laser group.

§ $P<0.05$ for the comparison with the surgery group.

¶ $P<0.05$ for the comparison with the foam group.

‖ $P<0.001$ for the comparison with the foam group.

** $P<0.001$ for the comparison with the surgery group.

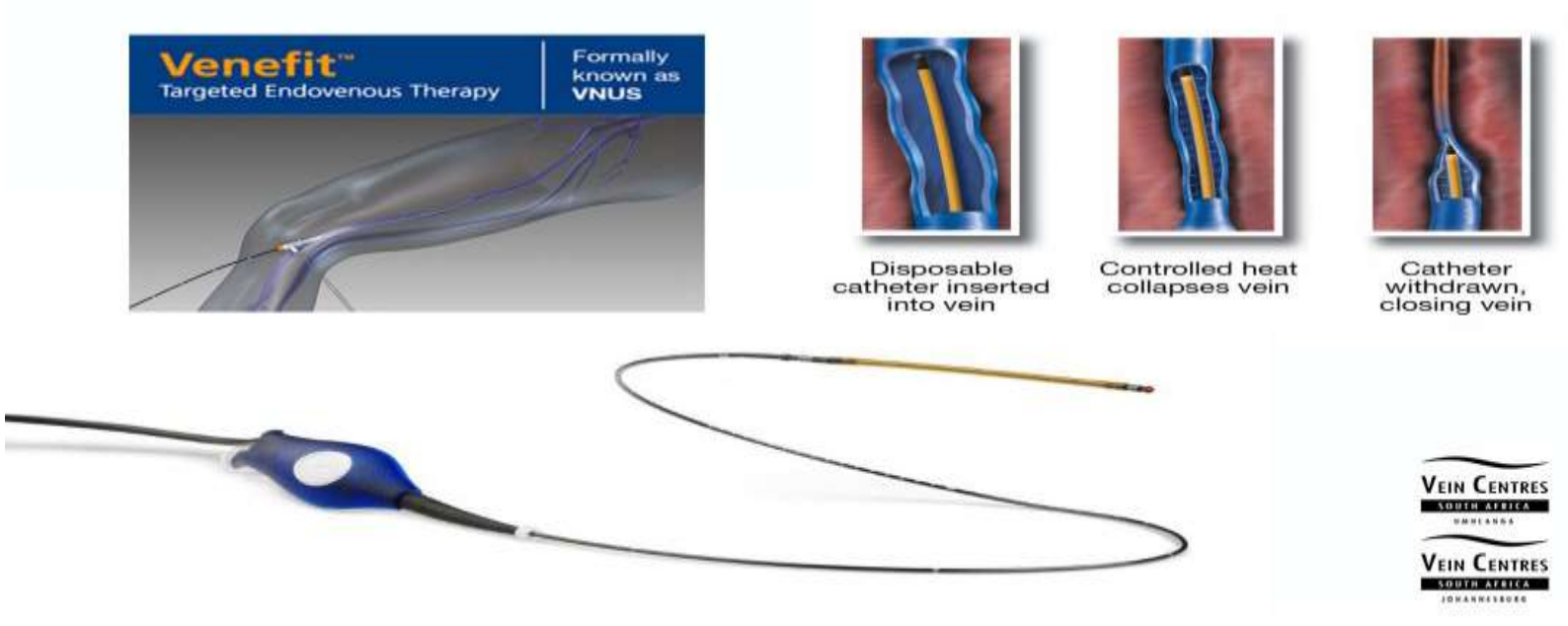
- 6 wk and 6 months occlusion rate are similar in EVLA group and surgery group, but lower in sclerosant therapy group
- Early complication after RFA, EVLA, and UGFS (pain, bruising, and return to normal activity) better than surgery.
- RFA, EVLA, Mechanochemical ablation, sclerotherapy injection can done in outpatient clinic setting, without GA/ regional block
- Although sclerotherapy have lower occlusion rate than other method, but benefit including useful for almost any vein, inexpensive, fast, no require GA/regional block
- SVS guideline in treatment of incompetent saphenous vein: GRADE 1B for endovascular thermal ablation, 2B for open surgery (HSVL and stripping), 2C for sclerosant therapy
- But sclerosant therapy useful for tributaries or reticular vein (Grade 1B)

Complication of open surgery

- Bleeding, bruising
- Thromboembolic event, 0.5-5.3% (DVT)
- Nerve injury, risk of saphenous nerve injury after stripping < 10%, 39% if stripping done till ankle level
- Sensory abnormal , 40%
- Recurrence (REVAS) reported 6.6% to 37% at 2 yrs, 51% at 5 years.

Complication of RFA/ EVLA

- Bleeding/ bruises
- Thromboembolic event , 1 % (DVT)
- Skin burn, - use of tumescent, avoid less than 1cm distance from skin
- Nerve injury- less than surgical group, can reduce by use of tumescent



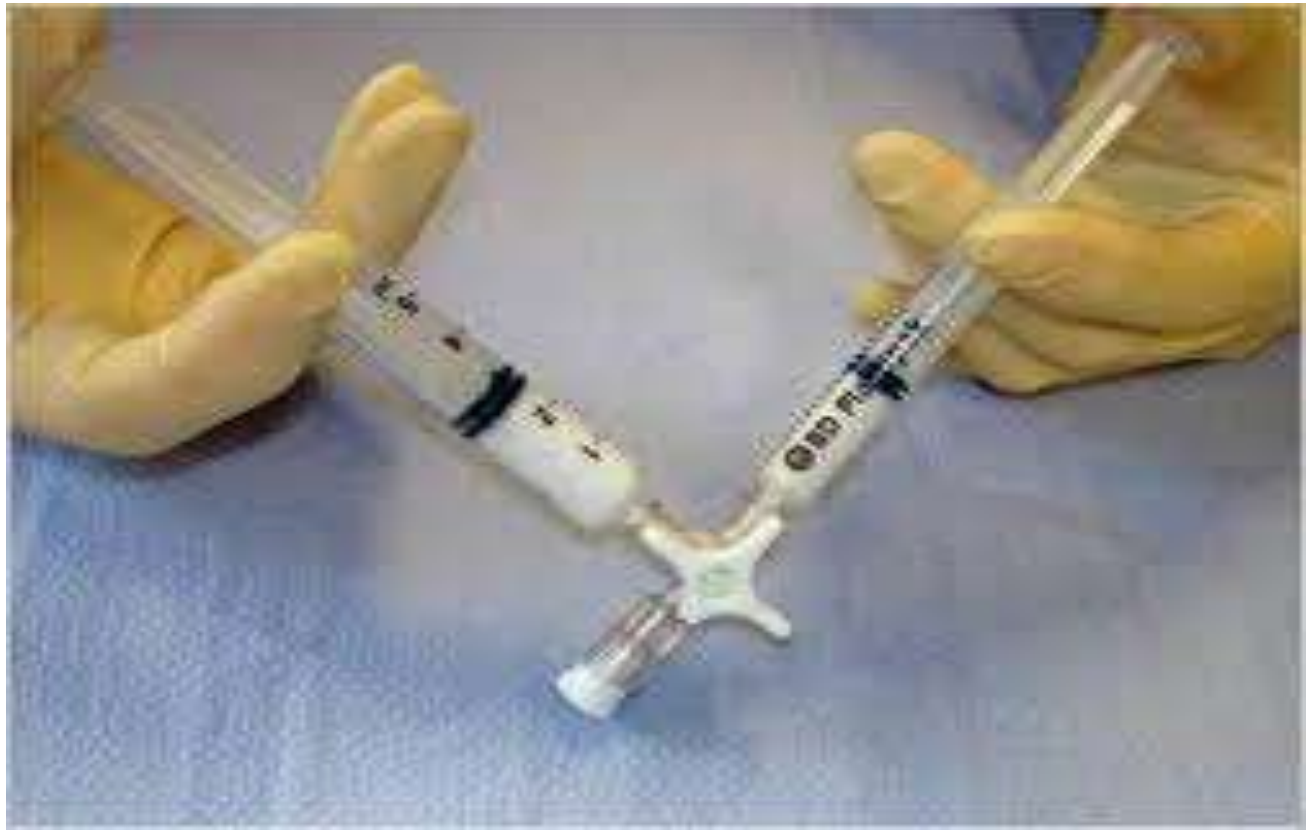
Patient selection in endovascular thermal ablation

- Inapproprate vein size (< 2mm, > 15mm for RFA)
- History of thrombophlebitis resulting partially obstructed saphenous vein
- Uncommon of tortuous GSV
- Varicose vein located immediately under skin
- Aneurysmal dilation of SFJ

Complication of sclerosant injection

- Thrombophlebitis
- Thromboembolic event, 1% (DVT)
- Skin pigmentation
- Neurological deficit/ stroke, rare
- TIA, 1%

Foam sclerotherapy



Why??

- Foam sclerosant is superior than liquid sclerosant in treatment of truncal veins(GSV/SSv) in term of ablation rate
- There is evidence that 3% polidocanol foam is no more effective than 1% polidocanol foam.
- The optimum ratio of gas to liquid is 4:1

Coleridge Smith, foam and liquidsclerotherapy for varicose vein. 2009

Pathological venous perforator

- Reflux > 500ms
- Size > 3.5mm
- At the area of ulceration

- SVS suggest treatment for pathological perforator in C5-6 (GRADE 2B), no selective treatment in C2(GRADE 1B)

Deep vein system

- Deep venous valvular incompetence

-valvular repair, external support of vein wall (dacron cuff)

- Deep venous obstruction
- Venous bypass, or endovascular treatment
- Only reserve for patient with persistent symptoms more than 4 years

Further reading:

- Society of vascular surgery , clinical guidelines in care of varicose vein and associated chronic venous disease, 2011

SUMMARY OF GUIDELINES FOR MANAGEMENT OF PATIENTS WITH VARICOSE VEINS AND ASSOCIATED CHRONIC VENOUS DISEASES

Guideline No.	*Guideline title*	*GRADE of recommendation*	*Level of evidence*
		1. Strong 2. Weak	A. High quality B Moderate quality C. Low or very low quality
	1. Clinical examination		
1.1	For clinical examination of the lower limbs for chronic venous disease, we recommend inspection (telangiectasia, varicosity, edema, skin discoloration, corona phlebectatica, lipodermatosclerosis, ulcer), palpation (cord, varicosity, tenderness, induration, reflux, pulses, thrill, groin or abdominal masses), auscultation (bruit), and examination of ankle mobility. Patients should be asked for symptoms of chronic venous disease, which may include tingling, aching, burning, pain, muscle cramps, swelling, sensations of throbbing or heaviness, itching skin, restless legs, leg tiredness, and fatigue.	1	A
	2. Duplex scanning		
2.1	We recommend that in patients with chronic venous disease, a complete history and detailed physical examination are complemented by duplex scanning of the deep and superficial veins. The test is safe, noninvasive, cost-effective, and reliable.	1	A
2.2	We recommend that the four components of a complete duplex scanning examination for chronic venous disease should be visualization, compressibility, venous flow, including measurement of duration of reflux, and augmentation.	1	A
2.3	We recommend that reflux to confirm valvular incompetence in the upright position of the patients be elicited in one of two ways: either with increased intra-abdominal pressure using a Valsalva maneuver to assess the common femoral vein and the saphenofemoral junction, or for the more distal veins, use of manual or cuff compression and release of the limb distal to the point of examination.	1	A
2.4	We recommend a cutoff value of 1 second for abnormally reversed flow (reflux) in the femoral and popliteal veins and of 500 ms for the great saphenous vein, the small saphenous vein, the tibial, deep femoral, and the perforating veins.	1	B

2.4	We recommend a cutoff value of 1 second for abnormally reversed flow (reflux) in the femoral and popliteal veins and of 500 ms for the great saphenous vein, the small saphenous vein, the tibial, deep femoral, and the perforating veins.	1	B
2.5	We recommend that in patients with chronic venous insufficiency, duplex scanning of the perforating veins is performed selectively. We recommend that the definition of "pathologic" perforating veins includes those with an outward flow of duration of ≥500 ms, with a diameter of ≥3.5 mm and a location beneath healed or open venous ulcers (CEAP class C_5-C_6).	1	B
	3. Plethysmography		
3.1	We suggest that venous plethysmography be used selectively for the noninvasive evaluation of the venous system in patients with simple varicose veins (CEAP class C_2).	2	C
3.2	We recommend that venous plethysmography be used for the noninvasive evaluation of the venous system in patients with advanced chronic venous disease if duplex scanning does not provide definitive information on pathophysiology (CEAP class C_3-C_6).	1	B

4.1	We recommend that in patients with varicose veins and more advanced chronic venous disease, computed tomography venography, magnetic resonance venography, ascending and descending contrast venography, and intravascular ultrasonography are used selectively, including but not limited to post-thrombotic syndrome, thrombotic or nonthrombotic iliac vein obstruction (May-Thurner syndrome), pelvic congestion syndrome, nutcracker syndrome, vascular malformations, venous trauma, tumors, and planned open or endovascular venous interventions.	1	B
	5. Laboratory evaluation		
5.1	We recommend that in patients with varicose veins, evaluation for thrombophilia is needed selectively for those with recurrent deep venous thrombosis, thrombosis at a young age, or thrombosis in an unusual site. Laboratory examinations are needed in patients with long-standing venous stasis ulcers and in selected patients who undergo general anesthesia for the treatment of chronic venous disease.	1	B
	6. Classification		
6.1	We recommend that the CEAP classification be used for patients with chronic venous disease. The basic CEAP classification is used for clinical practice, and the full CEAP classification system is used for clinical research.	1	A
6.2	We recommend that primary venous disorders, including simple varicose veins, be differentiated from secondary venous insufficiency and from congenital venous disorders because the three conditions differ in pathophysiology and management.	1	B
	7. Outcome assessment		
7.1	We recommend that the revised Venous Clinical Severity Score is used for assessment of clinical outcome after therapy for varicose veins and more advanced chronic venous disease.	1	B
7.2	We recommend that a quality-of-life assessment is performed with a disease-specific instrument to evaluate patient-reported outcome	1	B

7.3	We recommend duplex scanning for follow-up of patients after venous procedures who have symptoms or recurrence of varicose veins.	1	B
7.4	We recommend reporting procedure-related minor and major complications after therapy.	1	B
	8. Medical therapy		
8.1	We suggest venoactive drugs (diosmin, hesperidin, rutosides, sulodexide, micronized purified flavonoid fraction, or horse chestnut seed extract [aescin]) in addition to compression for patients with pain and swelling due to chronic venous disease, in countries where these drugs are available.	2	B
8.2	We suggest using pentoxifylline or micronized purified flavonoid fraction, if available, in combination with compression, to accelerate healing of venous ulcers.	2	B
	9. Compression therapy		
9.1	We suggest compression therapy using moderate pressure (20 to 30 mm Hg) for patients with symptomatic varicose veins.	2	C
9.2	We recommend against compression therapy as the primary treatment of symptomatic varicose veins in patients who are candidates for saphenous vein ablation.	1	B
9.3	We recommend compression as the primary therapeutic modality for healing venous ulcers.	1	B
9.4	We recommend compression as an adjuvant treatment to superficial vein ablation for the prevention of ulcer recurrence.	1	A
	10. Open venous surgery		
10.1	For treatment of the incompetent great saphenous vein, we suggest high ligation and inversion stripping of the saphenous vein to the level of the knee.	2	B
10.2	To reduce hematoma formation, pain, and swelling, we recommend postoperative compression. The recommended period of compression in C_2 patients is 1 week.	1	B

10.3	For treatment of small saphenous vein incompetence, we recommend high ligation of the vein at the knee crease, about 3 to 5 cm distal to the saphenopopliteal junction, with selective invagination stripping of the incompetent portion of the vein.	1	B
10.4	To decrease recurrence of venous ulcers, we recommend ablation of the incompetent superficial veins in addition to compression therapy.	1	A
10.5	We suggest preservation of the saphenous vein using the ambulatory conservative hemodynamic treatment of varicose veins (CHIVA) technique only selectively in patients with varicose veins, when performed by trained venous interventionists.	2	B
10.6	We suggest preservation of the saphenous vein using the ambulatory selective varicose vein ablation under local anesthesia (ASVAL) procedure only selectively in patients with varicose veins.	2	C
10.7	We recommend ambulatory phlebectomy for treatment of varicose veins, performed with saphenous vein ablation, either during the same procedure or at a later stage. If general anesthesia is required for phlebectomy, we suggest concomitant saphenous ablation.	1	B
10.8	We suggest transilluminated powered phlebectomy using lower oscillation speeds and extended tumescence as an alternative to traditional phlebectomy for extensive varicose veins.	2	C
10.9	For treatment of recurrent varicose veins, we suggest ligation of the saphenous stump, ambulatory phlebectomy, sclerotherapy, or endovenous thermal ablation, depending on the etiology, source, location, and extent of varicosity.	2	C
	11. Endovenous thermal ablation		
11.1	Endovenous thermal ablations (laser and radiofrequency ablations) are safe and effective, and we recommend them for treatment of saphenous incompetence.	1	B
11.2	Because of reduced convalescence and less pain and morbidity, we recommend endovenous thermal ablation of the incompetent saphenous vein over open surgery.	1	B
	12. Sclerotherapy of varicose veins		
12.1	We recommend liquid or foam sclerotherapy for telangiectasia, reticular veins, and varicose veins.	1	B

12.2	For treatment of the incompetent saphenous vein, we recommend endovenous thermal ablation over chemical ablation with foam.	1	B
	13. Treatment of perforating veins		
13.1	We recommend against selective treatment of incompetent perforating veins in patients with simple varicose veins (CEAP class C_2).	1	B
13.2	We suggest treatment of "pathologic" perforating veins that includes those with an outward flow duration of ≥500 ms, with a diameter of ≥3.5 mm, located beneath a healed or open venous ulcer (CEAP class C_5-C_6).	2	B
13.3	For treatment of "pathologic" perforating veins, we suggest subfascial endoscopic perforating vein surgery, ultrasonographically guided sclerotherapy, or thermal ablations.	2	C
	14. Treatment of pelvic varicose veins		
14.1	We recommend noninvasive imaging with transabdominal and/or transvaginal ultrasonography, computed tomography, or magnetic resonance venography in selected patients with symptoms of pelvic congestion syndrome or symptomatic varices in the distribution of the pubis, labia, perineum, or buttocks.	1	C
14.2	We recommend retrograde ovarian and internal iliac venography in patients with pelvic venous disease, confirmed or suspected by noninvasive imaging studies, in whom an intervention is planned.	1	C
14.3	We suggest treatment of pelvic congestion syndrome and pelvic varices with coil embolization, plugs, or transcatheter sclerotherapy, used alone or together.	2	B
14.4	If less invasive treatment is not available or has failed, we suggest surgical ligation and excision of ovarian veins to treat reflux.	2	B

- Thank you