

EPIDEMIOLOGY

Chronic venous disease of the legs is one of the most common diseases affecting the general adult population. It comprises a wide spectrum of clinical severity, varying from asymptomatic venous incompetence to varicose veins and, in its gravest form, trophic skin changes and ulceration.

The CEAP classification system introduced in 1994 uses clinical signs (C), aetiology (E), anatomy (A) and pathophysiology (P) to classify severity of disease. The clinical signs are categorized into 7 classes:

CEAP Clinical Classification	
Class 0	No visible or palpable signs of venous disease
1	Telangiectasia, reticular veins, malleolar flare
2	varicose veins
3	oedema without skin changes
4	skin changes: pigmentation, venous eczema, lipodermatosclerosis
5	skin changes with healed ulceration
6	skin changes with active ulceration

Chronic Venous Disease refers to the full spectrum C₀-C₆, while the term Chronic Venous Insufficiency (CVI) refers to the more severe manifestations C₄-C₆.

Prevalence

The exact prevalence of venous disease is difficult to determine.

The best estimate on current data suggests that over half the adult

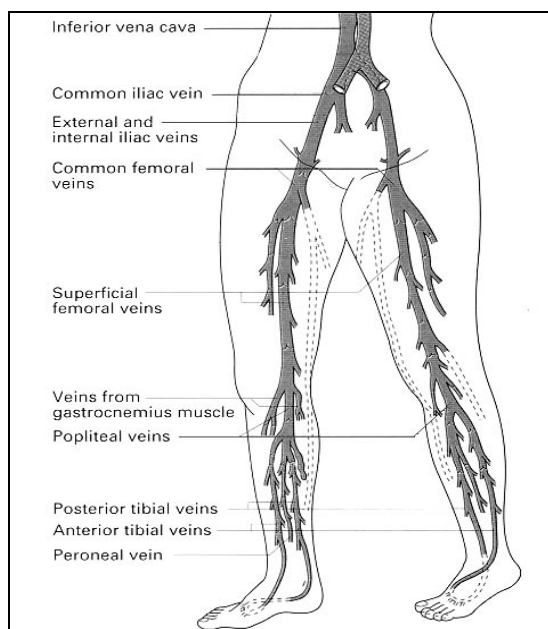
population have stigmata of venous disease, but only 10-25% have varicose veins.

Risk Factors

Increasing age and pregnancy are the strongest risk factors for developing varicose veins. Family history, obesity, prolonged standing, Caucasian race and diet poor in fibre have been proposed as risk factors, but more evidence is required.

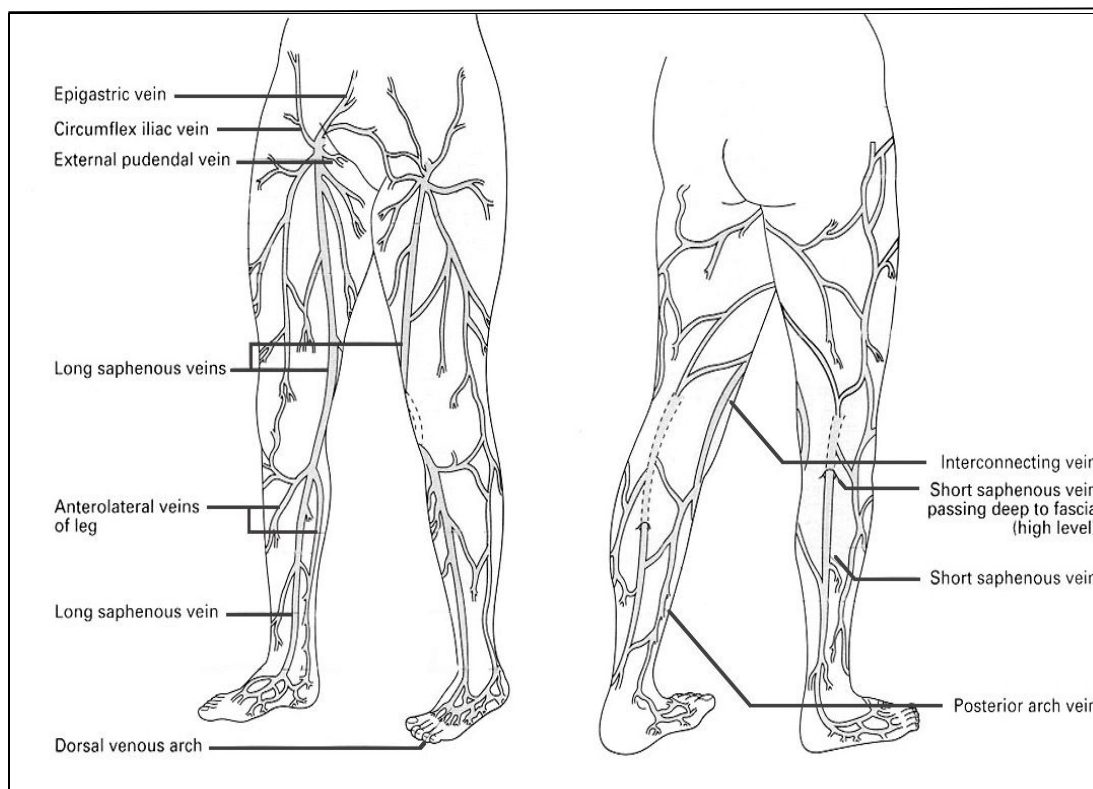
ANATOMY

The veins of the lower limbs are part of a complex pumping mechanism, which returns venous blood to the heart. Some form of failure of this mechanism accounts for nearly all venous disorders in the lower limbs.



Deep Venous System

Veins are specifically designed to allow flow in only one direction. This is achieved by the presence of numerous valves, which prevent reflux. Valves



Superficial Venous System

are only absent in the common iliac veins, the vena cava, the portal system and the cranial sinuses. Valve integrity depends on the wall having sufficient strength to prevent dilatation.

The venous system is divided into deep (deep to the deep fascia) and superficial (superficial to the deep fascia) veins.

The great saphenous and short saphenous systems comprise the superficial system. Communicating veins connect the superficial systems.

Many perforating veins connect the deep and superficial systems. Perforators are either direct perforators draining directly to the deep axial veins or indirect perforators draining to the venous sinusoids in the calf muscles. Some direct perforators drain small skin venules to the deep system and occur typically on the medial supramalleolar region of the lower leg.

PATHOPHYSIOLOGY

Muscle and fascia encase the deep veins. The axial veins lie between groups of muscles, and large venous sinusoids are situated within the calf muscles. When the calf muscles contract the veins are compressed. The blood can only move up the leg as the valves prevent retrograde flow down or out through the perforators. As the calf muscles relax the veins re-expand 'sucking' blood into the now no longer compressed, dilating veins. This blood can only fill from the muscle bed, more distal veins and the superficial veins. Blood is prevented from refluxing by the competent

Causes of Venous Hypertension

Reflux (90%)

- 1) Superficial
- 2) Deep
 - Post DVT with recanalization
 - 1^o valvular incompetence
 - congenital valvular atresia

Obstruction (10%)

Iliofemoral vein area
Superficial femoral vein area
Varied locations

venous valves. Incompetent valves result in reflux and **venous hypertension**. It is the venous hypertension that causes the clinical manifestations.

Venous insufficiency (causing hypertension) can occur in the following circumstances:

- i. Venous pump overwhelmed by massive downflow in incompetent superficial veins (varicose veins)
- ii. Deep vein thrombosis with resultant:
 - Damage to pumping units
 - Obstruction to deep veins
 - Reflux from damaged valves
 - Reflux from over expanded veins acting as collaterals
- iii. Deep veins obstructed by external pressure
- iv. Inborn deficiency of valves or inherent weakness in vein walls
- v. Prolonged inactivity of muscles in a dependant position
- vi. Muscle dysfunction / paralysis
- vii. Skeletal problems, arthritis, injury

Venous insufficiency is classified as primary or secondary.

Primary insufficiency is when no underlying aetiologic mechanism can be identified. The current theory is that an inherently weak vein wall leads to vein dilatation and separation of valve cusps, leading to valvular incompetence.

Secondary insufficiency occurs when an obvious cause (mostly DVT) leads to destruction or dysfunction of venous valves.

SYMPTOMS

Patients with truncal varicosities may have symptoms that can be attributed directly to the varicose veins. There is no association between reticular veins or telangiectasia and symptoms in the legs.

Symptoms are variable and non-specific and include aching, throbbing, itching, leg fatigue, heaviness and swelling. Most patients are asymptomatic. Symptoms are usually worse at the end of the day and are alleviated by elevation. The correlation between symptoms and the presence of varicose veins is very poor.

Complications will aggravate the symptoms as well as result in symptoms specific to the complication.

COMPLICATIONS

1. Complications of the varicosities:

The most common is thrombophlebitis. This is a sudden onset of thrombosis in the dilated superficial varicosities associated with a varying degree of inflammation. This may be quite localised or widespread extending over the course of a few days to involve all the varicose veins. Rarely the thrombosis may extend to the sapheno-femoral junction with the potential for pulmonary embolism.

Occasionally a varicosity may rupture and bleed, either from trauma or spontaneously.

2. Complications of the incompetence and venous hypertension:

Venous hypertension may result in varying degrees of oedema, skin hyperpigmentation, itching, eczema, lipodermatosclerosis, and finally breakdown of the skin with ulceration.

CLINICAL ASSESSMENT

History

A careful history is, as always, important.

- Onset in childhood suggests a congenital disorder.
- Previous deep vein thrombosis or limb fracture may point to deep venous incompetence.
- The reason for seeking advice. The patient may have no symptoms and only be seeking reassurance regarding complications and the risk of embolisation.
- Many patients have symptoms that they attribute to varicose veins but which bear no such relationship. Rest and elevation and graduated elastic compression stockings will usually relieve symptoms. Be wary of attributing symptoms to the varicose veins if there is no relief with these measures.

Examination

The patient should be examined in a standing position in a warm room, with good light. Inspection and palpation are essential parts of the examination, and auscultation (bruit) is particularly helpful in those with vascular malformation and arterio-venous fistula. Peripheral pulse status and ankle mobility should also be documented.

The following questions should be answered:

- Are there varicose veins present?***
 - submalleolar flare is a fan-shaped pattern of small intradermal veins located around the ankle or dorsum of the foot.
 - telangiectasia are dilated intradermal venules < 1mm in size
 - reticular veins are dilated, non palpable, subdermal veins < 3 mm
 - varicose veins are dilated, palpable subcutaneous veins > 3 mm
- Do the veins fall in the great or the short saphenous vein distribution or is this uncertain? Is another and unusual source possible ?***
 - GSV: medial calf and thigh
 - SSV: posterolateral calf
 - Pelvic source: upper medial thigh, labia
- Are there other features of venous hypertension?***
 - pigmentation (haemosiderin staining)
 - eczema
 - oedema
 - atrophie blanche (smooth, ivory-white plaque stippled with telangiectasia and surrounded by hyperpigmentation)
 - lipodermatosclerosis
 - ulceration

Hand held doppler ultrasound is useful for demonstrating reflux in the groin and in the popliteal fossa. Place the probe over the SFJ or SPJ - squeeze the calf then let go while listening. Flow will be heard when compressing the calf. There should be no or minimal flow on relaxation. Any reflux lasting > 0.5 seconds is significant.

Clinical tests like Perthes and Trendelenberg test are inaccurate and are no longer recommended.

Special Investigations

Duplex Doppler is the investigation of choice. It is relatively cheap, non-invasive and readily available. Duplex is able to determine both morphological and haemodynamic information.

Indications for intervention	
Symptoms	Complications
General appearance	Superficial thrombophlebitis
Aching pain	External bleeding
Leg heaviness	Ankle hyperpigmentation
Easy leg fatigue	Lipodermatosclerosis
	Venous ulcer

The indications for a duplex doppler include:

- patient with varicose veins prior to any intervention
- patient with C₄-C₆ disease: haemosiderin staining, lipodermatosclerosis, ulcer
- suspected deep venous pathology (DVT or reflux)
- suspected perforator incompetence
- recurrent varicose veins

Conventional and CT venography are reserved for complex cases. Ambulatory venous pressure measurements and plethysmography are usually performed in research settings.

TREATMENT

Compression

Patients with diffuse varicosities and symptoms of aching are well suited to compression treatment with well-fitted graduated elastic compression

stockings. This modality of treatment can be useful in patients when there is uncertainty whether the symptoms are due to the varicosity. A response to the compression would indicate that surgery could well be beneficial.

European Standard for Compression Hosiery		
Class	Pressure (mmHg)	Recommendation
I	18.4-21.1	varicose veins mild oedema
II	25.2-32.3	moderate/severe varicose veins ulcer prevention gross varices
III	36.5-46.6	post phlebotic limb recurrent ulceration lymphoedema

The class of stocking refers to the amount of pressure exerted at the ankle. Class II stockings are recommended for symptomatic varicose veins.

Patients should put the stockings on prior to getting out of bed in the morning. At initiation of therapy they should be instructed to wear the stockings only for as long as tolerable and to gradually increase the time they wear them.

The biggest problem is non-compliance. Many weak or arthritic elderly patients find it difficult to apply elastic stockings.

A relative contraindication to elastic stockings is concomitant arterial insufficiency.

Sclerotherapy

Many patients with reticular veins or telangiectasia are concerned with the cosmetic appearance. 20% of these have underlying clinically unapparent short or long saphenous incompetence. In the absence of incompetence the reticular veins may be treated with sclerotherapy or avulsions through small stab incisions. The telangiectasias are treated by

microinjections of sclerosant, or laser sclerotherapy. Commonly used sclerosants include detergents like polidocanol and sodium tetradecyl sulphate (STD).

Ultrasound guided foam sclerotherapy can be used to treat truncal varicosities. Sclerosant is mixed with air in a ratio of 1:3 to form a mousse that is injected into the vein. The advantage of this method is that it is an office-based procedure, does not require an anaesthetic and is relatively cheap.

Surgery

Patients with trunk varicosities and confirmed sapheno-femoral or –popliteal incompetence are best treated surgically. Sapheno-femoral or –popliteal disconnection and ligation of all the branches in the region of the junctions deal with the incompetence. The long saphenous vein should be stripped to the level of the knee joint. Failure to do so will result in a higher recurrence rate often secondary to a mid-thigh perforator. The varicosities are avulsed through multiple small stab incisions.

In carefully selected patients the results are good. Most patients can be treated as day or overnight cases and are ambulatory immediately after the operation. Most can return to driving and full activity after 10-14 days.

Serious complications are rare but include deep vein thrombosis and pulmonary embolism. Damage to the saphenous nerve is common in 20-40% but fortunately only temporary neuralgia results. Sural nerve damage may result from popliteal exploration.

Recurrence is unfortunately fairly common. The rate is approximately 10% at 2 years at 60% at 20 years.

Most of the discomfort and pain following an open procedure results

from the groin dissection and stripping. The newer, minimally invasive techniques like endovenous laser and radiofrequency ablation utilize thermal energy to destroy the GSV or SSV. The advantage of these techniques over open surgery is less pain and bruising and quicker return to normal activity and quicker return to work.

TREATMENT OF COMPLICATIONS

Thrombophlebitis

This is an inflammatory response to the thrombus and there is thus no place for antibiotics. Most cases are managed symptomatically with compression stockings, anti-inflammatory drugs and rest. Symptoms may persist for up to 6 weeks.

Definitive venous surgery should be considered; both because recurrence is common if the underlying cause is not dealt with and the inflammatory response is slow to settle with the risk of further extension. Early surgery often results in a quicker recovery and return to activity.

Ulceration

This is covered on the chapter on lower limb ulceration.

Bleeding

Occasionally an injury to a varix or ulceration results in bleeding. This can be profuse but is very easily controlled by elevation and applying pressure with a pad and bandage. It is more common in the elderly with atrophic skin. If the varicosities are extensive with well-defined incompetence, definitive varicose vein surgery or sclerotherapy may be indicated.



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