

# BMJ Best Practice

## Varicose veins

The right clinical information, right where it's needed



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## Summary

- ◇ Clinical presentation includes lower extremity pain, fatigue, itching and/or heaviness, which often worsen with prolonged standing, associated with dilated tortuous veins.

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- ◇ Underlying venous insufficiency can be documented by duplex ultrasound.

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- ◇ Symptomatic treatment involves compression stockings.

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- ◇ Open surgical or endovenous therapy are treatment options.

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- ◇ Venous ulceration and bleeding are recognised complications.

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## Definition

Varicose veins are subcutaneous, permanently dilated veins 3 mm or more in diameter when measured in a standing position.[1]

## Epidemiology

Prevalence estimates vary based on population, selection criteria, disease definition, and imaging techniques. Generally, prevalence rates are higher in industrialised countries and in more developed regions.[3] Prevalence of visible varicose veins in the Western population older than 15 years of age is 10% to 15% for men and 20% to 25% in women.[4] Prevalence rates in the US are 15% (range from 7% to 40%) in men and 27.7% (25% to 32%) in women.[5] Visible varicose veins are more prevalent in Hispanic people (26.3%) and less prevalent in Asian people (18.7%).[6]

The prevalence of varicose veins increases with age. In 1 study, 40-year-olds had a prevalence of 22%, 50-year-olds a prevalence of 35%, and 60-year-olds a prevalence of 41%.[7]

A genetic link has been suggested. The risk of varicose veins developing if both parents are affected is 90%; 62% risk if 1 parent is affected and female offspring; 25% risk if 1 parent is affected and male offspring; and if no parent is affected, the risk is 20%.[8]

## Aetiology

Although many factors such as gender, pregnancy, occupation, weight, and race have been implicated as predisposing factors for varicose veins, only a previous episode of deep vein thrombosis and genetic links may be causative factors. The exact primary cause of varicose veins remains elusive.[3] [5]

Venous valve incompetence is the most common aetiology.[9] Because veins work against gravity, their valves work by compartmentalising the blood, leading to better equalisation of pressures throughout the veins and preventing reflux. Blood pools when valves do not function properly, leading to increased pressure and distension of the veins.[10]

Progesterone is believed to lead to passive venous dilation, which may then lead to valvular dysfunction. Oestrogen produces collagen fibre changes and smooth muscle relaxation, which both lead to vein dilation.[3]

## Pathophysiology

The venous system acts as both a reservoir and a conduit in the return of blood to the heart and lungs for oxygenation and re-circulation. Veins are thin-walled and lack the muscular walls of arteries. Therefore, veins require assistance in blood return. This is provided by valves and muscle pumps. When one of these factors is not functioning properly, venous hypertension and insufficiency can ensue, possibly leading to varicose veins.

A normal vein wall has 3 smooth muscle layers that all help to maintain its tone. Varicose veins demonstrate marked proliferation of collagen matrix as well as decreased elastin, leading to distortion and disruption of muscle fibre layers.[5]

# Classification

## **Clinical, Etiological, Anatomical, and Pathophysiological (CEAP) classification for chronic venous disorders[2]**

### 1. Clinical classification

- C0 - no visible or palpable signs of venous disease
- C1 - telangiectasis or reticular vein; veins less than 3 mm
- C2 - varicose veins; veins greater than 3 mm
- C3 - oedema
- C4a - pigmentation or eczema
- C4b - lipodermatosclerosis or atrophie blanche
- C5 - healed venous ulcer
- C6 - active venous ulcer

### 2. Etiology

- Ep - primary
- Es - secondary
- En - no venous cause identified

### 3. Anatomy

- As - superficial veins
- Ap - perforator veins
- Ad - deep veins
- An - no location identified

### 4. Pathophysiology

- Basic CEAP
  - Pr - reflux
  - Po - obstruction
  - Pro - reflux and obstruction
  - Pn - no pathophysiology identified
- Advanced CEAP
  - Same as basic but in addition, 18 named venous segments can locate the pathology

### 5. Level of investigation

- L1 - clinical or Doppler
- L2 - non-invasive (duplex plethysmography)
- L3 - invasive or complex (venography, CT, or MRI)

## Primary prevention

Although no measures have been shown to prevent varicose veins, avoidance of prolonged sitting or standing, weight loss (if applicable), exercise, and intermittent leg elevation may all be helpful. Patients at high risk for varicose veins, such as those with a family history of varicose veins or pregnant women who have symptoms, are advised to wear graduated compression stockings.

## Secondary prevention

Prolonged standing, especially in one place, should be avoided. If unavoidable, compression stockings should be worn. If there is continued evidence of reflux (i.e., deep system insufficiency), compression stockings should be worn during the day. The use of compression stockings at night is unnecessary. If obese, patients should be advised to lose weight.

## Case history

### Case history #1

A 45-year-old woman presents with complaints of heaviness and fatigue in her legs. She does not experience the symptoms when she first awakens, but they become more noticeable and prominent as the day progresses and with prolonged standing. When she is standing for most of the day she notes swelling in both legs. The symptoms are concentrated over her medial calf, where she has prominent tortuous veins. She first noted dilated veins about 20 years ago when she was pregnant. Initially they did not cause her any discomfort but they have progressively enlarged and over the past 10 years have become increasingly painful. She recalls that her mother had similar veins in her legs.

### Other presentations

Patients may also present with thrombophlebitis, bleeding, and venous ulceration. Thrombophlebitis presents as severe pain and erythema, hyperpigmentation, and hardening of the vein.

## Step-by-step diagnostic approach

The history and physical examination are key components for the diagnosis of varicose veins. This is complemented by ultrasonography to assess for reflux, not only in the varicosities but also in the truncal veins.

### History

Patients may present with varied symptoms, and some may even be asymptomatic. Some of the more common symptoms include heaviness or fatigue in the lower extremities and ankle oedema, especially with prolonged standing. Burning and itching of the skin over the veins, restless legs, and leg cramps (usually nocturnal) may also be present. Symptoms are generally worse during pregnancy or menstruation. Patients will often find relief with elevation of the leg. During the evaluation, patients should be questioned regarding previous interventions on their veins as well as history of trauma, DVT, ulcerations, or bleeding from varicosities. Most varicose veins do not progress to complications such as ulceration.<sup>[12]</sup>

### Examination

With the patient standing, the skin is examined visually and by palpation for irregularities and bulges consistent with varicose veins. The extent, size, and location of the dilated veins should be noted, along with skin changes such as haemosiderin depositions, lipodermatosclerosis, and areas of active or healed ulceration. Thrombophlebitis presents as severe pain, erythema (and superficial pigmentation), and vein induration. Hyperpigmentation, lipodermatosclerosis (area of induration because of fibrosis of subcutaneous fat), or ulcers are indicative of long-standing venous insufficiency.

[Fig-1]

[Fig-2]

## **Imaging**

Duplex ultrasound imaging uses B mode imaging and Doppler assessment to diagnose venous insufficiency by evaluating valvular function in various segments of the truncal veins as well as in the varicosities. B mode imaging is used to rule out DVT and persistent obstruction in the venous system.

## **Risk factors**

### **Strong**

#### **increasing age**

- Prevalence increases with age.<sup>[7]</sup>

#### **FHx**

- One of the most important risk factors for developing varicose veins. Studies in both the US and France have shown that a FHx of varicose veins in an immediate family member increases the risk of developing varicose veins.<sup>[11]</sup>

#### **female gender**

- Majority of studies have demonstrated a greater prevalence in women than in men.

#### **increasing numbers of births**

- Pregnancy increases both total body fluid and intra-abdominal pressure, which may cause venous distension. In addition, the increase in oestrogen, progesterone, and relaxin increases vein capacitance by increasing venous relaxation.<sup>[11]</sup>

#### **DVT**

- May cause valvular damage and dysfunction in the deep veins, leading to increased pressure in tributaries with subsequent distension and varicose vein formation.

### **Weak**

#### **occupation with prolonged standing**

- Occupations with prolonged standing are thought to predispose to venous insufficiency.<sup>[5]</sup>

#### **obesity**

- Appears to be a positive risk factor, more in women than in men.<sup>[5]</sup>

## **History & examination factors**

### **Key diagnostic factors**

#### **presence of risk factors (common)**

- Key risk factors include increasing age, FHx, female gender, increasing numbers of births, and DVT.

#### **dilated tortuous veins (common)**



- With the patient standing, the skin is examined visually and by palpation for irregularities and bulges consistent with varicose veins.

[Fig-1]

The extent, size, and location of the dilated veins should be noted.

## **Other diagnostic factors**

### **leg fatigue or aching with prolonged standing (common)**

- Not present at beginning of day, improves with elevation.

### **leg cramps (common)**

- Usually nocturnal. May be related to varicose veins and thus may improve with treatment; however, can be multi-factorial in aetiology.

### **restless legs (common)**

- Characterised by a compulsive urge to move the legs.

### **haemosiderin deposition (common)**

- Usually only seen if there is truncal chronic venous insufficiency associated with the varicose veins.

### **corona phlebectatica (common)**

- Multiple fine vein branches that suggest underlying chronic venous insufficiency.

### **itching (uncommon)**

- Occurs with prolonged standing or exercise.

### **lipodermatosclerosis (uncommon)**

- Usually only seen if there is truncal chronic venous insufficiency associated with the varicose veins.

### **ankle swelling (uncommon)**

- Detectable in affected leg with prolonged standing.

### **ulceration (uncommon)**

- Varicose ulcers are indicative of long-standing venous insufficiency; however, most varicose veins do not progress to complications such as ulceration.[12]

### **bleeding from varices (uncommon)**

- Patients should be asked about bleeding from the varices; however, most varicose veins do not progress to complications such as haemorrhage.[12]

## Diagnostic tests

### 1st test to order

| Test   | Result  |
|--|---|
| <b>duplex ultrasound</b> <ul style="list-style-type: none"> <li>Reflux is roughly defined as valve closure &gt;0.5 second in the superficial system and &gt;1.0 second in the deep system. For best sensitivity, reflux should be measured with the patient standing and with the leg in external rotation. With duplex ultrasound, specific segments affected by reflux can be delineated as superficial and deep truncal veins, perforators, and tributaries can all be visualised. Proximal venous reflux can be detected through use of a Valsalva manoeuvre, while more distal reflux can be elicited by compressing the leg above the Doppler to see if blood is forced back towards the feet. If a great saphenous vein is &gt;6 mm in diameter, reflux is likely to be present. However, reflux in a perforator vein &lt;4 mm in diameter is not considered significant.<sup>[13]</sup> Duplex ultrasound can be performed not only to assess for valve closure time but also to rule out deep vein thrombosis.</li> </ul> | <b>assesses for reversed flow; roughly, valve closure time &gt;0.5 second is indicative of reflux, while valve closure time &gt;1.0 second is indicative of reflux in the deep system</b> |

## Differential diagnosis

| Condition              | Differentiating signs / symptoms  | Differentiating tests   |
|------------------------|---|---|
| <b>Telangiectasias</b> | <ul style="list-style-type: none"> <li>Also known as spider veins. These are small veins that generally do not cause any symptoms but are mainly a cosmetic concern.</li> </ul> | <ul style="list-style-type: none"> <li>Veins are smaller in size (&lt;1 mm). No evidence of reflux on duplex examination.</li> </ul>          |
| <b>Reticular veins</b> | <ul style="list-style-type: none"> <li>Permanently dilated intradermal veins. May be tortuous. Usually asymptomatic.</li> </ul>   | <ul style="list-style-type: none"> <li>Veins range between 1 mm and 3 mm in diameter. No evidence of reflux on duplex examination.</li> </ul> |

## Diagnostic criteria

### Clinical, Etiological, Anatomical, and Pathophysiological (CEAP) criteria<sup>[1]</sup>

Varicose veins are 3 mm or more in diameter in the upright position. Ultrasound shows reversed flow. Valve closure time >0.5 second in the superficial system is indicative of reflux. Valve closure time >1.0 second is indicative of reflux in the deep system.

## Step-by-step treatment approach

Following initial diagnosis of varicose veins, the patient can be offered compression stockings to help manage symptoms.<sup>1</sup>[\[C\]Evidence](#) Patients should also be counselled on lifestyle modifications including weight loss, leg elevation, and exercise.<sup>[14]</sup> Use of compression stockings can also help the physician and patient to determine whether symptoms are truly related to varicosities.

Evidence-based clinical practice guidelines from the American Venous Forum suggest compression therapy for patients with symptomatic varicose veins. However, they recommend against compression therapy as the primary treatment if the patient is a candidate for saphenous vein ablation. They also recommend compression therapy as the primary treatment to aid healing of venous ulceration.<sup>[15]</sup>

If compression stockings provide some degree of relief, surgical options should be discussed with the patient. Surgical treatment options vary depending on the location of primary disease. If compression stockings provide no relief of the patient's complaints and symptoms, other aetiologies should be considered, and these will vary with the particular constellation of symptoms. If surgical therapy is decided and performed, in order to decrease the recurrence of venous ulcers, the American Venous Forum recommend compression therapy in addition to ablation of the incompetent superficial veins.<sup>[15]</sup>

### Tributary insufficiency

If the patient only has varicosities (insufficiency of tributaries) without major venous trunk reflux, phlebectomy of affected veins either via stab avulsion,<sup>2</sup>[\[B\]Evidence](#) mechanical approach,<sup>3</sup>[\[C\]Evidence](#) or foam sclerotherapy of the affected veins, is all that is necessary. Phlebectomy can be achieved via small incisions with removal of the veins, or by use of a mechanical device with a rotational blade that breaks down the vein and a suction device that removes the pieces. Patients need to be counselled that although current varicosities will be treated and removed, they will very likely develop new varicosities in other veins in the future.

Failure of phlebectomies is the result of inadequate varicose vein removal at time of operation. If compression stockings provide no relief of the patient's complaints and symptoms, other aetiologies should be considered, and these will vary with the particular constellation of symptoms. Treatment for failure is repeated phlebectomy or injection sclerotherapy.<sup>4</sup>[\[B\]Evidence](#)

### Superficial axial system insufficiency

If the superficial axial system (i.e., the great saphenous vein [GSV] and the small saphenous vein [SSV]) is also involved, the patient will require treatment of the axial system. The treatment approach for axial veins may be:

- Stripping and ligation<sup>5</sup>[\[B\]Evidence](#)
- Radiofrequency ablation (RFA)<sup>6</sup>[\[B\]Evidence](#)
- Endovenous laser therapy<sup>[16]</sup> <sup>7</sup>[\[C\]Evidence](#)
- Foam sclerotherapy.<sup>[17]</sup> <sup>[18]</sup>

In general, any of these methods can be used on most patients; however, there has been increasing use of non-invasive methods, especially RFA and endovenous laser, as these have been shown to be just as effective but with decreased postoperative pain and recovery time.<sup>[15]</sup> <sup>[19]</sup> <sup>[20]</sup> <sup>[21]</sup> <sup>[22]</sup> <sup>[23]</sup> <sup>[24]</sup> <sup>[25]</sup> <sup>[26]</sup> Choice of laser for endovenous laser ablation was looked at in a randomised controlled trial which compared use of a 1470-nm wavelength fibre with a 940-nm wavelength fibre. Patients in the 1470-nm

laser group reported improved postoperative pain and a reduction in use of analgesia in the first week after surgery. However, treatment success and adverse event rates were similar in both groups.[27]

Five-year results of a randomised clinical trial of conventional surgery, endovenous laser ablation, and ultrasound-guided foam sclerotherapy found that endovenous laser ablation and conventional surgery were more effective than foam sclerotherapy.[26]

A potential complication of endovenous laser ablation is the occurrence of postoperative thrombosis of the femoral or popliteal vein adjacent to the treated GSV or SSV, or endothermal heat-induced thrombosis (EHIT). The patient should undergo a duplex examination within 24 to 72 hours after an endovenous approach (i.e., endovenous laser or RFA) to ensure that there is complete venous ablation and absence of EHIT.[28]

Patients may still require treatment of tributary varicosities, especially if the indication for treatment is cosmetic. Five-year follow-up of a trial comparing stripping and ligation with endovenous laser ablation found higher varicose vein recurrence rate at the saphenofemoral junction after laser treatment, compared with surgery. No differences were found in the relief of venous symptoms; Clinical, Etiological, Anatomical, and Pathophysiological (CEAP) staging; or general quality of life between the groups.[29]

Failure after RFA or endovenous laser can be treated with repeat endovenous approach, foam sclerotherapy, or stripping and ligation.

Failure after stripping and ligation may be the result of a duplicate system, which can be treated via repeat stripping and ligation or one of the endovenous approaches.

## Perforating veins

Clinical practice guidelines from the Society for Vascular Surgery and the American Venous Forum recommend the treatment of perforating veins with reflux when located near healed or active venous ulcers (CEAP class 5-6). These guidelines also recommend against perforator treatment in CEAP class 1 to 2 patients. The value of perforator treatment in CEAP class 3 to 4 disease remains unclear.[30] Subfascial endoscopic perforator surgery (SEPS), open perforator surgery, sclerotherapy, and thermal ablation have all been used for perforator closure. Treatment of perforators in CEAP class 3 to 4 disease in patients with venous ulcers should be considered after superficial reflux treatment and compression have failed. The success of thermoablation procedures is around 60% to 80%, with better occlusion rates with repeated therapy. Ultrasound-guided foam sclerotherapy has a lower thrombosis rate, but may be easier to perform for varicosities located near the ulcer bed in addition to the feeding perforator. Successful closure of pathological perforators using these techniques may improve ulcer healing and decrease recurrence.[31]

## Deep vein insufficiency

If the patient has deep system insufficiency giving rise to varicosities without evidence of superficial system insufficiency, treatment of the varicosities may be performed; however, compression stockings will be necessary for long-term control. Patients with deep system insufficiency should be counselled that they may not have complete symptomatic relief through treatment of the varicosities, but can expect at least partial relief of their symptoms.

In patients with co-existent superficial and segmental deep venous reflux, superficial venous surgery alone corrects the deep venous insufficiency in almost 50% of limbs, and is associated with ulcer healing

in 77% of limbs at 12 months. This finding suggests an extended role for superficial venous surgery in the management of patients with complicated venous disease.<sup>[32]</sup>

## Treatment details overview

Consult your local pharmaceutical database for comprehensive drug information including contraindications, drug interactions, and alternative dosing. ( see [Disclaimer](#) )

| Ongoing ( summary )  |                |  |
|--|----------------|--|
| Patient group  | Tx line        | Treatment  |
| <b>symptomatic superficial vein insufficiency, no evidence of peripheral vascular disease</b>  | <b>1st</b>     | <b>graduated compression stockings</b>           |
| <ul style="list-style-type: none"> <li>■ tributary insufficiency, compression stockings contraindicated, not fully effective, or not tolerated</li> </ul>                | <b>plus</b>    | <b>phlebectomy or sclerotherapy</b>              |
| <ul style="list-style-type: none"> <li>■ superficial axial system insufficiency, compression stockings contraindicated, not fully effective, or not tolerated</li> </ul> | <b>plus</b>    | <b>ablative procedures</b>                       |
| <ul style="list-style-type: none"> <li>■ superficial axial system insufficiency, compression stockings contraindicated, not fully effective, or not tolerated</li> </ul> | <b>adjunct</b> | <b>phlebectomy or sclerotherapy</b>              |
| <ul style="list-style-type: none"> <li>■ perforator veins with reflux located near healed or active venous ulcers</li> </ul>   | <b>adjunct</b> | <b>perforator surgery or ablative procedures</b> |
| <b>deep vein insufficiency without superficial system insufficiency</b>  | <b>1st</b>     | <b>phlebectomy and compression stockings</b>     |

# Treatment options

## Ongoing

| Patient group   | Tx line | Treatment   |
|---|---------|---|
| <p><b>symptomatic superficial vein insufficiency, no evidence of peripheral vascular disease</b></p>                  | 1st     | <p><b>graduated compression stockings</b></p> <ul style="list-style-type: none"> <li>» The goal of treatment is control of symptoms. The stockings do not reverse or cure varicose veins.<sup>1</sup><a href="#">[C]Evidence</a></li> <li>» Different levels of compression are used for varying symptoms. More severe symptoms are treated with greater compression (30 mmHg to 40 mmHg). The external compression decreases interstitial and superficial venous pressure as well as improving venous return.<sup>[33]</sup></li> <li>» Should not be used in patients with significant concurrent peripheral arterial disease.</li> <li>» Failure to control symptoms with compression stockings is one indication for operative intervention.</li> <li>» Compliance with compression stockings tends to be low, at 37% in one study,<sup>[33]</sup> secondary to cosmesis and discomfort, especially in warm weather.</li> <li>» Patients should also be counselled on lifestyle modifications including weight loss, leg elevation, and exercise.<sup>[14]</sup></li> </ul> |
| <p>■ <b>tributary insufficiency, compression stockings contraindicated, not fully effective, or not tolerated</b></p> | plus    | <p><b>phlebectomy or sclerotherapy</b></p> <ul style="list-style-type: none"> <li>» Phlebectomy may be achieved by stab avulsion of portions of varicose vein, through small stab incisions not requiring suture closure,<sup>2</sup><a href="#">[B]Evidence</a> or by mechanical avulsion using a special device that aspirates, cuts (morcellates), and removes varices.<sup>3</sup><a href="#">[C]Evidence</a> This latter technique can remove large clusters of varices with few incisions.</li> <li>» Sclerotherapy involves injection of a liquid solution such as sodium chloride or sodium tetradecyl sulfate<sup>4</sup><a href="#">[B]Evidence</a> into small veins, followed by compression.</li> <li>» Complications include haematoma, DVT, infection, and poor cosmetic outcome.</li> </ul>  |

## Ongoing

## Patient group

## Tx line

## Treatment

- superficial axial system insufficiency, compression stockings contraindicated, not fully effective, or not tolerated

plus

» Patients should also be counselled on lifestyle modifications including weight loss, leg elevation, and exercise.<sup>[14]</sup>

## Primary options

» stab avulsion

OR

## Primary options

» mechanical avulsion

OR

## Primary options

» sclerotherapy

## ablative procedures

» Stripping and ligation: the main goal of treatment is to permanently remove the varicose vein.<sup>5[B]Evidence</sup> It is performed when the greater saphenous vein (GSV) or small saphenous vein (SSV) has reflux that gives rise to the varicose veins. Complications include bleeding, infection, saphenous nerve injury, and neovascularisation.

» Radiofrequency ablation (RFA): generally performed on the GSV or SSV.<sup>6[B]Evidence</sup> Special probes are available for use in perforator veins if needed. The vein is accessed under ultrasound guidance. In the case of the GSV, the RFA probe is passed up to just below the epigastric vein, remaining below the saphenofemoral junction (SFJ). It is slowly withdrawn while energy from radiofrequency causes closure of the vein. Patients may still require phlebectomies for varicosities. Complications include endothermal heat-induced thrombosis (EHIT), phlebitis, thermal skin injury, and paraesthesias. These occur infrequently.

» Endovenous laser therapy (EVLT): generally performed on the GSV or SSV but may be possible in branch varicosities as well.<sup>7[C]Evidence</sup> The vein is accessed under ultrasound guidance. In the case of the GSV, the laser probe is passed up to just below the epigastric vein, remaining below the SFJ. The fibre is slowly withdrawn while the laser is on, causing thrombosis and destruction of the vein. Patients may still require phlebectomies for varicosities. Complications include EHIT,

## Ongoing

## Patient group

## Tx line

## Treatment

phlebitis, thermal skin injury, and paraesthesias. These occur infrequently.[34]

» Foam sclerotherapy: involves injection of liquid solution such as sodium tetradecyl sulfate or polidocanol that is foamed with air and then injected into varicose vein under ultrasound guidance. Complications include pigmentation, headaches, and visual changes. It has a higher recurrence rate than RFA, EVLT, or surgery.[23] [35] [36]

» The patient should undergo a duplex examination within 24 to 72 hours after an endovenous approach (i.e., endovenous laser or RFA) to ensure that there is no propagation of thrombus.

» Patients should also be counselled on lifestyle modifications including weight loss, leg elevation, and exercise.[14]

## Primary options

» stripping and ligation

OR

## Primary options

» radiofrequency ablation (RFA)

OR

## Primary options

» endovenous laser

OR

## Primary options

» foamed sclerotherapy

■ **superficial axial system insufficiency, compression stockings contraindicated, not fully effective, or not tolerated**

**adjunct**

**phlebectomy or sclerotherapy**

» Phlebectomy may be achieved by stab avulsion of portions of varicose vein, through small stab incisions not requiring suture closure,2[B]Evidence or by mechanical avulsion using a special device that aspirates, cuts (morcellates), and removes varices.3[C]Evidence This latter technique can remove large clusters of varices with few incisions.

» Failure requires repeat phlebectomies or sclerotherapy.



## Ongoing

## Patient group

## Tx line

## Treatment

- perforator veins with reflux located near healed or active venous ulcers

## adjunct

- » Sclerotherapy involves injection of a liquid solution such as sodium chloride or sodium tetradecyl sulfate<sup>4[B]</sup>[Evidence](#) into small veins, followed by compression.
- » Complications include haematoma, DVT, infection, and poor cosmetic outcome.
- » Patients should also be counselled on lifestyle modifications including weight loss, leg elevation, and exercise.<sup>[14]</sup>

## Primary options

- » stab avulsion

## OR

## Primary options

- » mechanical avulsion

## OR

## Primary options

- » sclerotherapy

## perforator surgery or ablative procedures

- » Clinical practice guidelines from the Society for Vascular Surgery and the American Venous Forum recommend the treatment of perforating veins with reflux when located near healed or active venous ulcers (Clinical, Etiological, Anatomical, and Pathophysiological [CEAP] class 5-6).<sup>[30]</sup> Subfascial endoscopic perforator surgery (SEPS), open perforator surgery, sclerotherapy, and thermal ablation have all been used for perforator closure.

## Primary options

- » subfascial endoscopic perforator surgery (SEPS)

## OR

## Primary options

- » open perforator surgery:

## OR

## Primary options

- » sclerotherapy:

## OR

## Ongoing

## Patient group

## Tx line

## Treatment

## Primary options

» thermal ablation:

deep vein insufficiency without  
superficial system insufficiency

1st

## phlebectomy and compression stockings

» Phlebectomy may be achieved by stab avulsion of portions of varicose vein, through small stab incisions not requiring suture closure,<sup>2[B]Evidence</sup> or by mechanical avulsion using a special device that aspirates, cuts (morcellates), and removes varices.<sup>3[C]Evidence</sup> This latter technique can remove large clusters of varices with few incisions.

» Failure requires repeat phlebectomies.

» Different levels of compression are used for varying symptoms. More severe symptoms are treated with greater compression (30 mmHg to 40 mmHg). The external compression decreases interstitial and superficial venous pressure as well as improving venous return.<sup>[33]</sup>

» Patients should also be counselled on lifestyle modifications including weight loss, leg elevation, and exercise.<sup>[14]</sup>

## Primary options

» stab avulsion

-or-

» mechanical avulsion

--AND--

» graduated compression stockings

## Recommendations

### Monitoring

Following stripping and ligation, the patient requires repeat duplex only if symptoms recur.

Following endovenous approach (endovenous laser or RFA), the patient requires a duplex examination within 48 to 72 hours of the operation, and again at 3 and 6 months. After that, re-examination is dictated by the recurrence of symptoms.

### Patient instructions

Following endovenous ablation, patients should be advised to wear compression stockings 24 hours per day for 1 to 3 days, and then during the day for 1 to 2 weeks.<sup>[38]</sup> Postoperatively, patients can return to normal activities; however, they should avoid strenuous leg activity such as running, weighted leg exercises, or cycling for 1 week.

## Complications

| Complications  | Timeframe        | Likelihood    |
|--|------------------|---------------|
| <b>chronic venous insufficiency</b>  | <b>long term</b> | <b>medium</b> |
| Increased dilation of venous system leading to axial system reflux.  |                  |               |
| <b>haemorrhage</b>   | <b>long term</b> | <b>low</b>    |
| Erosion of varices can lead to bleeding that may require surgical intervention.  |                  |               |
| <b>venous ulceration</b>   | <b>long term</b> | <b>low</b>    |
| Increased dilation of the venous system and increased pressure may lead to venous hypertension. Treatment of the superficial axial system, if involved, will help. Perforator incompetence may also contribute to ulceration, but the benefit of treating incompetent perforating veins is less clear. <sup>[30]</sup> |                  |               |
| <b>lipodermatosclerosis</b>  | <b>long term</b> | <b>low</b>    |
| Secondary to changes in the microcirculatory system. Capillaries become elongated, fibrotic, and leaky.  |                  |               |
| <b>haemosiderin deposition</b>   | <b>long term</b> | <b>low</b>    |
| Secondary to changes in the microcirculatory system. Capillaries become elongated, fibrotic, and leaky.<br><a href="#">[Fig-2]</a>   |                  |               |

## Prognosis

Although there are small variations in overall efficacy depending on the type of intervention, generally resolution of symptoms occurs in >95% of patients. However, patients need to be counselled that new varicosities will very likely occur with time.<sup>[37]</sup>

# Diagnostic guidelines

## Europe

### Varicose veins: diagnosis and management

**Published by:** National Institute for Health and Care Excellence

**Last published:** 2013

**Summary:** Evidence-based advice on the diagnosis of varicose veins in adults aged 18 years and over.

# Treatment guidelines

## Europe

### Endovenous mechanochemical ablation for varicose veins

**Published by:** National Institute for Health and Care Excellence

**Last published:** 2016

**Summary:** Recommendations on the safety and efficacy of endovenous mechanochemical ablation for varicose veins.

### Varicose veins: diagnosis and management

**Published by:** National Institute for Health and Care Excellence

**Last published:** 2013

**Summary:** Evidence-based advice on the management of varicose veins in adults aged 18 years and over.

### Ultrasound-guided foam sclerotherapy for varicose veins

**Published by:** National Institute for Health and Care Excellence

**Last published:** 2013

### Randomised clinical trial, observational study and assessment of cost-effectiveness of the treatment of varicose veins (REACTIV trial)

**Published by:** Health Technology Assessment NHS R&D HTA Programme

**Last published:** 2006

## Evidence scores

1. Symptom improvement in varicose veins: there is poor-quality evidence that is unable to show whether compression stockings are more effective than no treatment at improving symptom scores at 4 weeks.  
**Evidence level C:** Poor quality observational (cohort) studies or methodologically flawed randomized controlled trials (RCTs) of <200 participants.
2. Symptom improvement and recurrence rates: there is medium-quality evidence to suggest that conventional surgery with avulsion is more effective than ligation plus sclerotherapy at improving cosmetic appearances of varicose veins, as judged both by surgeons and participants at 3 years. However, the poor-quality evidence available does not show whether avulsion is more effective than powered phlebectomy at reducing pain at 8 days or at improving cosmetic appearance at 6 weeks. It is also not shown, in the poor-quality evidence available, whether avulsion is more effective than sclerotherapy at reducing recurrence rates.  
**Evidence level B:** Randomized controlled trials (RCTs) of <200 participants, methodologically flawed RCTs of >200 participants, methodologically flawed systematic reviews (SRs) or good quality observational (cohort) studies.
3. Symptom improvement: there is poor-quality evidence that does not demonstrate whether powered phlebectomy is more effective at reducing pain at 8 days, or at improving cosmetic appearance at 6 weeks, than avulsion following ligation.  
**Evidence level C:** Poor quality observational (cohort) studies or methodologically flawed randomized controlled trials (RCTs) of <200 participants.
4. Symptom improvement: there is medium-quality evidence to suggest that sodium tetradecyl sulfate is more effective at 6 to 24 months than compression stockings at improving symptoms and cosmetic appearance of varicose veins in pregnant women with primary or recurrent varicose veins. When injection sclerotherapy is compared to no treatment or conservative treatment, there is poor-quality evidence to suggest that sclerotherapy may be more effective at reducing the proportion of people reporting aching and cosmetic concerns, but it is not known if it is more effective at reducing heaviness, itching, or swelling at 1 year.  
**Evidence level B:** Randomized controlled trials (RCTs) of <200 participants, methodologically flawed RCTs of >200 participants, methodologically flawed systematic reviews (SRs) or good quality observational (cohort) studies.
5. Symptom improvement: there is medium-quality evidence to suggest that stripping plus ligation is more effective than sclerotherapy plus ligation at improving cosmetic appearances, as judged by both surgeon and participant at 3 years.  
**Evidence level B:** Randomized controlled trials (RCTs) of <200 participants, methodologically flawed RCTs of >200 participants, methodologically flawed systematic reviews (SRs) or good quality observational (cohort) studies.

6. Recurrence rates: there is medium-quality evidence to suggest that radiofrequency ablation and stripping seem to be equally effective at reducing clinical detection of recurrence of varicose veins.  
**Evidence level B:** Randomized controlled trials (RCTs) of <200 participants, methodologically flawed RCTs of >200 participants, methodologically flawed systematic reviews (SRs) or good quality observational (cohort) studies.

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7. Symptom improvement: there is poor-quality evidence, in which no clinically important results have been found, about the efficacy of endovenous laser compared with no treatment (watchful waiting) in people with varicose veins.  
**Evidence level C:** Poor quality observational (cohort) studies or methodologically flawed randomized controlled trials (RCTs) of <200 participants.

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## Key articles

- Eklof B, Rutherford RB, Bergan JJ, et al. Revision of the CEAP classification for chronic venous disorders: consensus statement. *J Vasc Surg.* 2004;40:1248-1252. [Abstract](#)
- Khilnani NM, Grassi CJ, Kundu S, et al. Multi-society consensus quality improvement guidelines for the treatment of lower-extremity superficial venous insufficiency with endovenous thermal ablation from the Society of Interventional Radiology, Cardiovascular Interventional Radiological Society of Europe, American College of Phlebology and Canadian Interventional Radiology Association. *J Vasc Interv Radiol.* 2010;21:14-31. [Full text](#) [Abstract](#)
- van der Velden SK, Biemans AA, De Maeseneer MG, et al. Five-year results of a randomized clinical trial of conventional surgery, endovenous laser ablation and ultrasound-guided foam sclerotherapy in patients with great saphenous varicose veins. *Br J Surg.* 2015;102:1184-1194. [Abstract](#)

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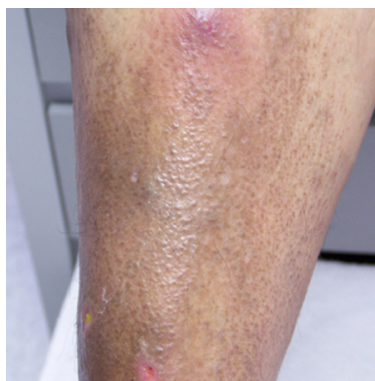
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## Images



*Figure 1: Varicose veins*

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*Figure 2: Haemosiderin deposition*

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