Varicose Veins

Description

The term varicose derives from the Latin 'varix', which means twisted. A varicose vein is usually tortuous and dilated.

Under normal circumstances, blood collected from superficial venous capillaries is directed upward and inward via one-way valves into superficial veins. These in turn drain via perforator veins, which pass through muscle fascia into deeper veins buried under the fascia. Leakage in a valve causes retrograde flow back into the vein. Unlike deep veins which are thick-walled and confined by fascia, superficial veins cannot withstand high pressure and eventually become dilated and tortuous. The failure of one valve puts pressure on its neighbours and may result in retrograde flow - and hence varicosity - of the entire local superficial venous network\(^1,2\).

The superficial veins in the legs are normally involved, as these are most likely to come under hydrostatic pressure due to gravity.

Other pathological processes may also be involved, such as an inherent weakness of the vein wall. The influence of genetics has been confirmed by twin studies and genetic studies\(^3\).

Pregnancy brings its own problems, with hormonal factors increasing the pliability of the venous walls and the valves themselves. In later pregnancy, there is expansion of the circulating blood volume and this is compounded by pressure on the inferior vena cava from the growing uterus. Pelvic vein reflux is known to contribute to the development of primary and recurrent varicose veins in pregnancy\(^4\).

Another mechanism that sometimes comes into play is obstruction to venous outflow. This can be either intravascular, as in deep vein thrombosis (DVT), or extravascular from trauma or compression from surrounding structures such as tumours or a cirrhotic liver.

Epidemiology

Varicose veins are extremely common. Prevalence studies vary but prevalence data vary; however, it is thought they are found in about 10-20% of men and 25-33% of women\(^5\).
Commissioning data showed that 30,000 to 35,000 surgical or endovenous interventions were performed for varicose veins or venous ulceration in the NHS in England in 2012. There was greater than 90-fold variation (5 to 430 procedures per 100,000 population) observed between different clinical commissioning group (CCG) areas.

Risk factors
- Pregnancy
- Obesity
- Older age (>65 years)

Presentation

History
It is important to establish at the initial consultation why the patient has presented. Patients with cosmetic concerns present less often than they used to, but are still occasionally seen with asymptomatic but unsightly tortuous veins or thread veins.

Commonly, patients will present with chronic sequelae such as itching, discomfort and heaviness of the legs, night cramps, oedema, burning sensations, paraesthesiae, exercise intolerance, or restless legs. Subjective symptoms are usually more severe in the early stages of the condition, less severe in middle stages and worse in latter years. The pain associated with larger varicose veins is usually described as a dull ache that is worse after prolonged standing. Aggravating factors may include pregnancy, exogenous hormones, menstruation and, occasionally, sexual intercourse.

Apart from the presenting symptoms, the history should include:
- History of previous venous problems, any visible abnormal veins and any history of varicosities in pregnancy.
- Any risk factors such as family history of varicose veins, a job which involves prolonged standing, past history of trauma.
- History of oedema, date of onset, any risk factors, any variation throughout the day, degree of induration and location.
- History of any previous hospital assessments or treatment.
- History of any previous episodes of superficial or deep vein thrombosis or thrombophlebitis.
- History of bleeding from varicose veins.
- History of any cardiovascular comorbidity.

Examination

A complete examination should include a general assessment of the patient's cardiovascular status and abdominal examination to exclude secondary causes, such as tumours which could be causing external venous compression.

To map the areas of varicosity, examine the patient with them standing in the first instance. To confirm that a swelling is a varicose vein, gently press over the area. The vein will empty and then refill.

Attempt to identify which vein the varicosities drain into. Varicosities of the short saphenous vein are normally seen below the knee and are distributed posterolaterally. Long saphenous vein varicosities may run the whole length of the leg and are distributed more medially.

Inspect the skin for changes suggestive of chronic venous insufficiency. These may include ulcers, lipodermatitis, pigmentation, telangiectasia or eczema.

Once you have finished the inspection, ask the patient to lie down, and identify the saphenofemoral junction. One good way to do this is by locating the femoral artery, which lies between the anterior superior iliac spine and the symphisis pubis, by feeling for the pulse. The vein is medial to the artery and the saphenofemoral junction about two fingers' breadth below the inguinal ligament.

Ask the patient to stand and tap the varicosity lower down the leg. A fluid thrill felt at the level of the valve indicates that it is incompetent.

Two tests have classically been used to assess valvular competency (Trendelenburg's test) and deep venous patency (Perthes' test). They have been superseded to a large extent by other non-invasive investigations (see 'Investigations', below) but may still be relevant in a primary care setting. The Royal College of Surgeons in England expects its membership candidates to abandon Trendelenburg's, Perthes' and tap testing in favour of hand-held Doppler assessment but that they should understand the principles behind the techniques.

Trendelenburg's test
This can sometimes distinguish patients with superficial venous reflux from those with incompetent deep venous valves. The patient should lie flat with the leg elevated, allowing the veins to empty. A tourniquet is applied to the thigh at the saphenous opening. If the valve is competent, the vein should fill from below. If the valve is incompetent, the vein will fill from above on removal of the tourniquet. This can be repeated at various levels, until the location of an incompetent valve is located.

Perthes' manoeuvre
This manoeuvre is used to distinguish antegrade flow from retrograde flow in superficial varicosities. Antegrade flow is an indicator of collateral flow around a deep venous obstruction. A tourniquet is applied to a varicose leg in such a way that the superficial veins are compressed without pressure being applied to the deep vessels. The patient is then asked to stand repeatedly on tiptoe, activating the calf muscles. Normally this would empty the varicosities but, in the presence of deep vein obstruction, they would paradoxically become congested.

Differential diagnosis
Infections

Osler-Weber-Rendu syndrome
Cellulitis
Superficial phlebitis
DVT

Investigations

Imaging
Duplex ultrasound is the preferred modality. It uses a combination of Doppler and conventional ultrasound. It gives more detailed information than a hand-held Doppler and is better at confirming the diagnosis and the pattern of venous disease. This helps to determine the most appropriate treatment option[5].

Colour-flow imaging, sometimes called triplex ultrasonography, is a further refinement in which Doppler information is translated into colour images. It is a highly sensitive technique which can demonstrate minor valve leakages and incompetence in small perforator veins[10].

Physiological tests of venous function[11]
These may be helpful as an adjunct to imaging in complex cases:

- Venous refilling time - the time necessary for the lower leg to fill with blood after it has been maximally emptied by the calf-muscle pump.
- Maximum venous outflow - the time taken for a leg distended by a tourniquet to empty. It is a measure of possible venous obstruction.
- Muscle pump ejection fraction - used to detect failure of the muscle pump to expel blood from the lower leg.

Associated diseases

- DVT; any condition causing calf-muscle pump failure (eg, neuromuscular disease, muscle wasting conditions)[5, 12].
- Arterial disease - one study found that varicose veins are a risk factor for arterial disease (but not hypertension)[13].
- Thrombophilia - another study found that patients with this condition had a higher incidence of varicose veins than those who did not[14].

Staging[15]
Various classification systems have been used, the original being the CEAP (Clinical picture, Etiology, Anatomical distribution and Pathophysiology) classification, devised by the Consensus Committee of the American Venous Forum. This included such features as the number and extent of varicosities, the presence of skin changes and the disabling effect of any symptoms. The original system was published in 1994 and has been updated over time.

Management[5]

Primary care
It is important to determine why the patient is presenting for treatment. One third of patients have symptoms unrelated to varicose veins, or may simply be seeking advice about possible complications or deterioration.

Lifestyle changes
The evidence base addressing the issue of lifestyle changes such as weight loss and exercise is limited but they are most likely to be of benefit in preventing the initial development of varicosities and their complications, rather than reversing the disease process once it is established (see 'Prevention', below). Patients should be advised to avoid prolonged standing and to keep the leg(s) elevated when possible.

Compression stockings[16]
The National Institute for Health and Care Excellence (NICE) does not recommend treatment with compression stockings unless interventional treatment is not appropriate. If compression stockings are to be used, it is important to exclude arterial disease before prescribing them, by measuring the ankle-brachial pressure index (ABPI) using a Doppler. Class 1 (light) or class 2 (medium) below-knee stockings are usually sufficient, the choice depending on the severity of the varicosities and the tolerability of the compression. Thigh-length stockings may be beneficial if the varicosities extend above the knee. Open-toed stockings may be appropriate for people who have problems with their feet, such as arthritis or fungal infection of the toes. They should be taken off at night and replaced every three to six months. Patients should be made aware that stockings may not prevent new varicosities from developing or existing ones from getting worse. The evidence base supporting their use during pregnancy is weaker but some women may find them helpful in controlling symptoms.

If compression stockings are offered after interventional treatments, they should not be worn for longer than seven days.

When to refer
Refer according to local policies, if available; always consider the patient’s general health and comorbidities when assessing appropriateness of referral.
Emergency referral where there is active bleeding from a varicose vein that has eroded the skin.
Urgent referral if there is a history of active bleeding and still a risk of further bleeding. Patients with progressive leg ulcers or painful ulcers despite treatment should also be fast-tracked.
Consider (routine) referral for:
- Primary or recurrent varicose veins which cause symptoms (eg, pain, aching, discomfort, swelling, heaviness, or itching).
- Skin changes of the legs such as pigmentation or eczema, thought to be caused by chronic venous insufficiency.
- Hard, painful veins indicative of superficial venous thrombosis.
- Suspected venous incompetence.
- A venous leg ulcer (a break in the skin below the knee that has not healed within two weeks) - refer within two weeks.
- A healed venous leg ulcer.
- Consider the need for referral in pregnant women, as interventional treatments are unlikely to be a realistic proposition.

Treatment options in secondary care[17]

Although conventional surgery is still performed, NICE recommends that, for confirmed varicose veins with truncal reflux, minimally invasive procedures such as radiofrequency ablation, endovenous laser therapy or foam sclerotherapy should be considered first.

Endothermal ablation
Endothermal (radiofrequency) ablation involves sealing the lumen of the long saphenous vein by delivering radiofrequency energy via a catheter under ultrasound guidance. An alternative is endovenous laser therapy which works by delivering high-intensity laser through a sheathed wire guided into the vein.

Ultrasound-guided foam sclerotherapy
This is recommended if endothermal ablation is unsuitable. It involves imaging-guided injection of sclerosant in foam form. Sodium tetradecyl sulfate is a typical sclerosant and the gas used is usually carbon dioxide or air. It is recommended that incompetent varicose tributaries be treated at the same time.

If foam sclerotherapy is unsuitable, consider conventional surgery.

Avulsion
This is a very old technique in which small incisions are made over each varicosity and that part of the vein is excised using a vein hook or forceps[18].

Stripping
A wire, plastic or metal rod is passed through the lumen of the saphenous vein and pulled until the entire vein is stripped out of the leg. Inversion stripping is a refinement of this method, in which the vein is turned in on itself during removal.

Partial stripping to the knee may cause less neurological trauma than stripping to the ankle. It preserves venous tissue that may subsequently be required for vein grafting techniques (eg, coronary artery bypass graft). It is the current preferred invasive method.

Ambulatory phlebectomy
This can be performed, using local anaesthetic, as an outpatient procedure. Small multiple incisions are made in the skin overlying the vein, which is hooked out and extracted in a piece-meal fashion. The technique is particularly suitable for tortuous veins inaccessible to fine-wire techniques such as laser ablation. Contra-indications are reflux at the saphenofemoral or saphenopopliteal junctions, which must be treated by other means[19].

Injection sclerotherapy
Once used as first-line treatment for new varicosities, this is now being employed less frequently due to concerns about skin staining and ulceration. It is only indicated for below-knee varices and is mainly used for persistent or recurrent veins after surgery. It has largely been replaced by foam sclerotherapy. A Cochrane review concluded that the evidence supported the current place of this treatment, which is usually reserved for recurrent veins after surgery and for thread veins[20].

Complications[21]
- Complications directly relating to varicose veins include haemorrhage and thrombophlebitis.
- Complications relating to the increased pressure arising from chronic venous incompetence (venous hypertension) include venous ulcers, oedema, skin pigmentation, varicose eczema, atrophie blanche (smooth white areas of atrophic scar tissue with telangiectasia) and lipodermatosclerosis (areas of induration arising from fibrosis of subcutaneous fat).
- Potential complications of treatment include DVT and pulmonary embolus, paraesthesiae from injury to the saphenous nerve and the development of haematomas. Skin burns have been known to occur if radiofrequency catheters are placed too near the skin[22].

Prognosis[21]
Untreated, varicose veins tend to become larger over time and patients with significant reflux are prone to develop chronic venous ulceration. Long-term studies of the outcome of surgical treatment have been less than encouraging. 13.5% of varicose vein surgery is for recurrence. Studies suggest a 90-98% occlusion with radiofrequency ablation after two years. The closure rate for endovenous laser treatment after two years was 93.4%. For foam sclerotherapy, the clinical recurrence rate with significant symptoms was 4% at five years.

Prevention

Certain factors such as genetic predisposition, gender and increasing age are unavoidable. There is evidence that weight control acts as a primary preventative measure but only for women. There is insufficient evidence to support potentially avoidable factors such as prolonged sitting or standing, tight undergarments, low-fibre diet, constipation, or smoking.

Further reading & references

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- Radiofrequency ablation of varicose veins; NICE Interventional Procedure Guidance, September 2013
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