Understanding Varicose Veins

Professor Bruce Campbell

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IMPORTANT NOTICE
This book is intended not as a substitute for personal medical advice but as a supplement to that advice for the patient who wishes to understand more about his or her condition.

Before taking any form of treatment
YOU SHOULD ALWAYS CONSULT YOUR MEDICAL PRACTITIONER.

In particular (without limit) you should note that advances in medical science occur rapidly and some information about drugs and treatment contained in this booklet may very soon be out of date.

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**About the author**

**Professor Bruce Campbell** is a consultant vascular surgeon in Exeter, with wide experience in treating diseases of the arteries and veins, and a particular interest in varicose veins. He has been involved in organising vascular surgery nationally and is well known for his writing and lecturing on vascular disease.

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**Introduction**

**What are varicose veins?**

Varicose veins are very common. They are the lumpy, raised, blue veins that we see on the legs of people wearing shorts, bathing costumes or skirts. Many more people hide their varicose veins by always wearing trousers or thick tights, because they are embarrassed about their appearance.

The veins that become varicose are the ones just under the skin – not the important deeper veins, which carry most of the blood and which can sometimes be affected by dangerous thrombosis (formation of a blood clot). This means that, if varicose veins are troublesome, they can be removed by an operation or sealed off by injection treatment (sclerotherapy).

The demand for varicose vein treatment is huge: more than 50,000 operations are done each year on the National Health Service in England and Wales. Most people with varicose veins never develop serious medical problems (such as ulcers). This means that waiting lists for varicose vein treatment are often long and in many localities the NHS will not fund treatment for people whose varicose veins are not causing problems.
**What varicose veins are not**
Veins can be seen forming a pattern under the skin of the legs, particularly in people with pale skin. These are the normal veins that everyone has beneath the skin, but that show up more easily in some people than others. They are not varicose veins unless they become widened, tortuous and bulging.

Spider veins, flare veins and other tiny red or blue veins are also common on the skin of the legs, particularly with increasing age (although a few people develop them when they are young). These are not the same as varicose veins and do not mean that varicose veins are more likely to develop.

**Words used to describe obvious leg veins**
Different words have been used to describe and classify the various kinds of veins that can be seen in the legs. There is no universally accepted classification, but the one that is probably best describes:

- ‘varicose veins’ (wider than four millimetres or mm)
- ‘reticular veins’ (less than four millimetres wide)
- ‘telangiectases’ (little veins in the skin less than one millimetre wide – the ones more often called spider veins or flare veins).

There is a system called the Basle classification, which describes ‘trunk varices’, ‘reticular varices’ and ‘hyphen-webs’, but doctors do not usually use these terms.

**The problems caused by varicose veins**
Varicose veins often cause no trouble at all. The most usual problem is concern about their appearance: they become prominent on standing because they fill with blood under pressure, but become flat on lying down.

Especially after prolonged standing they can cause feelings of heaviness, aching, itching and discomfort. Sometimes varicose veins cause ankle swelling (but other causes are much more common).

In a few people varicose veins eventually lead to eczema and darkening of the skin at the ankle, because of the high blood pressure in the veins there.
Ulcers can then form in the damaged skin. The prospect of ulcers worries a lot of people, but ulcers only ever affect a very small proportion of those with varicose veins, and there are almost always warning signs first. There is no special reason for people with varicose veins and healthy skin to worry about ulceration.

Varicose veins also cause concern about the possibility of clotting or ‘thrombosis’, but there is little reason for this. The kind of thrombosis that can be dangerous is in the deep veins of the legs – not in the ones under the skin that form varicose veins. Deep vein thrombosis sometimes causes blood clots to pass to the lungs (pulmonary embolism) or leads to permanent leg swelling – this is discussed later in the book.

Varicose veins can be affected by thrombophlebitis (they become hard and inflamed), but it is very unusual for this to lead to serious deep vein thrombosis.

Other problems such as bleeding are very rare, and affect only a minute number of people with varicose veins.

It is worth repeating that varicose veins seldom cause serious medical problems of any kind.

**Treatments for varicose veins**

As most varicose veins do not cause serious problems, treatment is seldom essential. Aching and heaviness can often be controlled by support stockings or tights. Smaller varicose veins can be dealt with by injections (sclerotherapy) which seal off the veins and make them disappear. Larger ones have traditionally been treated by surgery for a good long-term result, but foam sclerotherapy may also be a reasonable option.

Nowadays specialists investigate the blood flow in the veins by ultrasound. This identifies exactly which veins have valves that are not working properly, and allows for more precise planning of treatment than was possible before. Well-planned and thorough treatment is more likely to provide long-term freedom from varicose veins.

The only reason for considering treatment by injections or surgery is if varicose veins are causing sufficient trouble. For some people, their appearance may be so unacceptable that they want to be rid of their veins for cosmetic reasons alone. In general, discomfort, or a combination of discomfort and cosmetic embarrassment, is the most common reason for people requesting treatment. Fear that varicose veins might get worse, or that ulcers might develop in healthy skin, is not a good reason on its own for having something done.

This book explains how varicose veins can cause trouble, and describes the pros and cons of the different kinds of treatment. A number of different methods for treating varicose veins have become available in recent years and this has made both discussion and the choice of treatment more complex.
All about varicose veins

Arteries, capillaries and veins
Before talking about varicose veins, it is very important to understand the difference between arteries and veins, and to know something about the normal veins of the legs.

Arteries, capillaries and veins are the tubes that carry blood around the body: they can all be called ‘blood vessels’. They are all part of ‘the circulation’.

The arteries
As the heart pumps, it sends blood around the body through the arteries. The arteries branch into smaller and smaller vessels, until the blood flows into capillaries. The walls of capillaries are only one cell thick, so that oxygen, glucose and other substances can pass through them to nourish the tissues. The waste materials of metabolism, such as carbon dioxide and lactic acid, filter in the opposite direction into the capillaries. A network of capillaries runs close to the cells in every part of the body, delivering nutrients and taking away waste products in the bloodstream.
The veins
Capillaries join to form slightly larger vessels (venules, or tiny veins) and these in turn join up to form veins. As more tributaries join each main vein, so it gets wider, and eventually blood returns to the heart through the two largest veins – the superior vena cava from the upper part of the body, and the inferior vena cava carrying blood from the legs, pelvis and abdomen.

Small veins, joining a larger one, are called tributaries (rather than branches) because blood is flowing up them into the larger vein – like water in the tributaries of a large river.

The blood flowing through the veins is darker than the blood in arteries, because it has less oxygen in it. In contrast to blood flow in arteries, the flow in veins is slower and is not pulsatile. In the leg veins, activity of the leg muscles is important in helping to pump blood back to the heart. One-way valves in the veins make the blood flow towards the heart. The valves are particularly important in veins of the legs, because blood could otherwise flow the wrong way (downwards) when we are standing up.

Diseases of arteries and veins
The common diseases affecting arteries and veins are quite different. ‘Atherosclerosis’ narrows and blocks arteries, causing heart attacks, strokes and gangrene, but it does not cause problems in the veins. Varicose veins have nothing to do with heart attacks, strokes or amputation of the leg. ‘Thrombosis’ means clotting of blood in a blood vessel and can occur in either veins or arteries, but the causes and effects are different.

Thrombosis in the deep veins of the legs can be dangerous (see ‘Thrombosis, phlebitis and bleeding’, page 28), but these veins are different from those forming varicose veins.

The deep and superficial veins of the legs
The veins of the legs are divided into two systems – the deep veins and the superficial veins. The two systems are linked periodically by perforating veins. A superficial vein can become varicose because a perforating vein is allowing blood to flow the wrong way (outwards).
fascia surrounding the muscles) and the superficial veins (which run in the layer of fat just beneath the skin). The superficial veins are the ones that you can see (for example, on your foot or around the ankle) and they are the ones that can become varicose.

It is essential to keep in mind these two different systems – deep and superficial – in order to understand varicose veins and their treatment.

Perforating veins
In a number of places in the leg, the superficial and deep veins are linked by perforating veins (or ‘perforators’). They are called perforators because they perforate the leathery fascial layer surrounding the muscles of the legs. Normally their valves should allow blood to flow only inwards – from the superficial veins to the deep veins. If the valves stop working properly, then blood is pushed out into the superficial veins when the muscles contract: this is one reason for high pressure in the superficial veins, and can be a cause of varicose veins.

Valves in the veins
All the leg veins have delicate valves inside them, which should allow the blood to flow only upwards (towards the heart), or from the superficial veins to the deep ones through the perforating veins. The valves protect against the head of pressure that would otherwise exist in the veins of the legs on standing. If there were no valves, there would be a pressure in the veins at the ankle equivalent to the height of the column of blood all the way up to the heart. It is this head of pressure that causes symptoms and damage when the valves stop working properly, as they often do in varicose veins. A valve occurs every five to ten centimetres in the main superficial veins of the legs.

The muscle pump
When blood is pumped into the arteries by the heart, it is pushed forwards under high pressure. Only a little of this pressure is left after blood has filtered through the capillaries, to push it through the veins, and the action of the muscles provides a pumping action that helps to push the blood up through the veins. This ‘muscle pump’ is particularly important in the legs, because when we are standing blood has to travel a long way ‘uphill’ to get back to the heart.

The deep veins lie within and between the muscles of the calf and thigh. All the muscles are surrounded by a firm leathery layer of ‘fascia’, so as they contract...
and relax blood is forced up the deep veins. Normally, the valves in the veins make sure that blood flows only upwards in the deep and superficial veins, and inwards through the perforating veins.

If the valves stop working, then the muscle pump cannot do its job properly. Damaged valves in the deep veins mean that blood is not pumped upwards, and this can be particularly harmful if the veins at knee level are affected. Failure of valves in the perforating veins allows blood to be pushed out under high pressure into the superficial veins, which can lead to varicose veins.

**Soldiers and the muscle pump**

Soldiers give us two good examples about how the muscle pump can be helped to work. Have you noticed how soldiers standing to attention for a long time will sway to and fro just slightly? They have been taught to contract and relax their calf muscles so that blood is pumped up their legs, rather than pooling in the calf veins. Particularly on a hot day, when all the veins are wide and dilated, pooling of blood in the leg veins can occasionally make them faint if they do not do this.

The other military lesson about the muscle pump is provided by the puttees that soldiers used to wear, wrapped tightly around their ankles and calves. These formed a firm layer around the whole lower leg (rather like the fascia around the muscles and deep veins) and probably helped the muscle pump to squeeze blood up through the veins during long marches.

**Which veins become varicose?**

**The long saphenous vein**

This vein and its tributaries are the ones that most often form varicose veins. The long saphenous vein (LSV) is formed from tributaries in the foot, and is visible in many people when they stand, as the vein just in front of the bone on the inner side of the ankle. It runs up the inner side of the calf and the thigh, and at the groin dives to join the main deep vein (the femoral vein).

**The short saphenous vein**

This is the other main vein under the skin of the leg, the tributaries of which can become varicose, but it is affected much less often than the LSV. The short saphenous vein (SSV) starts just behind the bone on