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CIRCULATION

of the veins of the legs

Patient information sheet

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The blood circulation in the leg is made up of arteries (taking blood from the heart to the leg), veins (taking blood from the leg back to the heart) and capillaries which are the very fine vessels between the veins and the arteries. Arterial flow is generated by the heart which acts as a pump. The venous flow is generated by the calf muscles, valves and low pressure in the abdomen and the chest.

■ THERE ARE TWO SYSTEMS OF VEINS IN THE LEG:

1. The **deep system** runs through the muscles of the thigh and calf and carries **virtually all** of the blood out of the leg back to the heart. It never becomes varicose.
2. The **superficial system** which lies between the muscles and the skin. These are the veins you can see. They carry less than 2% of the blood out of the leg and back to the heart and one can remove as many superficial veins as required without any compromise to venous flow from the leg. It is the system which can become varicose.

Both the deep and the superficial veins have valves which should only allow flow out of the leg back to the heart. They are “one way valves” so when you stand up, the valves should prevent the blood from flowing back down into the leg. Venous flow relies on valves to carry blood back to the heart. The calf muscle acts as a pump for the deep system, but return of blood in the superficial system is passive, there is no pump.

Varicose veins develop when the valves in the **superficial system** stop working, allowing blood to flow down the leg. This places high hydrostatic pressure on veins below. Generally, it is one or more of the “axial” veins (great saphenous vein, small saphenous vein and the anterior accessory saphenous vein) where the valves fail. The axial veins themselves are often not varicose. However, the tributaries (branches) of the axial veins are not designed to take the high-pressure and therefore they dilate, and they lengthen, but because they have to fit in to the same space, they become tortuous. This leads to the definition of a varicose vein:

■ A VARICOSE VEIN IS A SUPERFICIAL VEIN WHICH HAS BECOME DILATED AND TORTUOUS.

Before treating the varicose veins, one needs to know which axial vein or veins are responsible for the varicose veins. This is done by performing a venous duplex scan. It is an ultrasound scan similar to the one used in obstetrics.

Treatment of varicose veins relies on either removing the vein or blocking it off so that there is no longer any transmission of the hydrostatic pressure.

It needs to be done in two steps:

1. The **first step** is to manage the axial vein which is feeding the varicose veins (either the great, or small saphenous veins, or the anterior accessory saphenous vein, sometimes more than one, sometimes it is related to pelvic veins or perforators). These veins are generally quite large and difficult to block off. Treatment of the axial veins requires much greater “energy” than treatment of the varicose veins. In the past, the axial vein which was responsible for the varicose veins was physically removed. This was called “stripping” and is not usually performed anymore. These days, the veins can be closed using heat called thermal ablation (such as endovenous radiofrequency or endovenous laser) or glue (cyanoacrylate).
2. The **second step** is to manage the actual varicose veins themselves. This can be done by removing the vein (avulsions) or by injecting the vein with a solution that irritates it (sclerotherapy) and causes it to go into spasm and then heal like a thread of scar tissue (sclerosis)

