

## **Leg Veins**

### **Normal circulation**

In a healthy individual, blood leaves the heart and is pumped through the arteries to reach the organs of the body. Blood flowing through the arteries provides oxygen and nutrition to the body. Nutrients and oxygen leave the circulation to reach the tissues via small vessels called 'capillaries'. Therefore arteries are responsible for the 'supply' aspect of blood circulation.

Unwanted waste material and fluid from tissues is then collected in small vessels called 'venules'. Multiple venules join to form veins. Veins have the task of taking the blood back to the heart so it can eventually go through the lungs to get more oxygen. Therefore veins are responsible for the 'drainage' aspect of circulation. Once oxygenated in the lungs, blood flows from the lung back to the heart and the cycle continues.

### **Healthy veins**

Normal healthy veins act as a 'one-way pipe' for blood to flow back to the heart. While the heart acts as a pump for arteries, veins rely on muscle contraction as a pump. For example, blood has to be pumped up against gravity in the leg veins. To pump the blood up the leg veins, the foot, calf and thigh muscles have to contract. Walking, swimming, running and other leg exercises involve muscle contraction and provide a good pump for leg veins.

There are one-way valves every few centimetres in the leg veins. In healthy veins, these valves allow the one-way flow of blood back to the heart. Following a muscle contraction, blood is pumped up the vein through the valves. Valve cusps open to let the blood get through during the muscle contraction. When the muscles relax, blood rushes back down towards the valve due to gravity. In healthy veins, valve cusps close tightly to prevent backflow during muscle relaxation. With the next contraction, blood will go further up in the vein until it eventually reaches the heart.

### **Abnormal veins**

Abnormal veins have weak walls. Valves in abnormal veins do not close properly resulting in backflow or 'reflux' in the affected vein. Blood in these veins leaks through the abnormal valves and flows in the opposite direction due to gravity. In abnormal leg veins, blood flows back towards the feet rather than going back to the heart. With no leg movement, blood will not flow up the veins and will sit in the veins, stagnant, and eventually leak out.

### **Varicose veins**

Abnormal veins accumulate too much blood and eventually bulge out as 'varicose' veins. Excess blood is forced back into capillaries which enlarge to form 'spider veins'. So spider veins may be indicative of underlying 'feeding' varicose veins.

Varicose veins may have no symptoms at all but symptoms can include aches and pains in the lower limbs, heaviness, and burning, throbbing, cramping and restless legs. Symptoms are often worse at the end of the day and after prolonged standing but better by the next morning when patients wake up.

### **Risk Factors**

Risk factors for developing varicose veins include aging, standing occupations, obesity, lack of mobility, previous blood clots (venous thrombosis) and leg injury. A definitive cause is not known, however a strong family history of varicose veins is a common finding. Varicose veins and spider veins in women worsen with hormone fluctuations during puberty, pregnancy, menopause and with the use of birth control pills.

## **Long-term Problems**

In time, fluid collects around the ankles causing ankle swelling. As matters get worse, blood leaks out from the veins causing pigmentation, venous eczema and eventually extensive scarring. Ultimately, skin can break down causing leg ulceration.

In rare cases, ulcers can turn cancerous over time. Stagnant blood in varicose veins can clot (superficial thrombophlebitis, STP). Such clots can enter the deep veins (deep vein thrombosis, DVT). Clots can travel to the lungs in rare cases causing pulmonary embolism (PE) which is a life threatening condition.

## **How are leg veins diagnosed?**

Ultrasound investigations (venous mapping) can accurately assess normal and abnormal veins to help determine the cause, severity and extent of the problem. Deep vein thrombosis (DVT) scans and blood tests may also be required if the individual has a personal or family history of blood clots. These investigations are required to determine the most appropriate course of treatment.

## **How are leg veins treated?**

### **General measures**

People with varicose veins should avoid prolonged standing. Occupations such as hairdressing or factory work that require prolonged periods of standing should be avoided. Walking and exercise are good for the blood flow in the veins. Graduated compression stockings should be worn during long-haul flights and when standing for prolonged periods.

### **Surgery**

Surgery was historically the only method to treat varicose veins. It is now mostly reserved for advanced cases where the less invasive methods may not be suitable. It may involve pulling out the saphenous trunk (stripping), removal of branch veins through multiple cuts (avulsions) and tying off the ends of the vein (ligation). It is usually performed in a hospital under general anaesthesia and may require a few days off work.

### **Endovenous laser ablation (EVLA) and Radiofrequency ablation (RFA)**

EVLA and RFA are minimally invasive procedures to treat saphenous veins. Saphenous veins are considered 'trunks' and other superficial veins are considered tributaries (branches). These procedures involve insertion of a laser or radiofrequency fibre in the saphenous vein near the ankles or the knees. The fibre is then advanced in the vein to reach the highest part. As the device is activated, the fibre is retracted while ablating (closing off) the saphenous vein. This procedure is performed under ultrasound guidance and does not require general anaesthesia. The down-time is minimal and most people go back to work the next day.

### **Ultrasound guided sclerotherapy (UGS)**

Following the treatment of saphenous veins, UGS is performed to treat the remaining tributaries (branch veins) and visible varicose veins. Deeper underlying veins are identified on ultrasound and injected with a foam sclerosant. Foam sclerosants are specific drugs designed to close off blood vessels. This procedure is performed in the doctor's office and does not require general anaesthesia. UGS requires no down-time.

### **Ambulatory phlebectomy (AP)**

AP is a less invasive form of surgery to remove visible varicose veins. It is performed in the doctor's office under local anaesthetic. Small incisions are made in the skin and veins are pulled out using small hooks. AP is an alternative treatment to UGS.

**Sclerotherapy**

This procedure involves injection of a sclerosant into abnormal veins using a fine needle. Sclerotherapy is reserved for treating small visible varicose veins and spider veins. This procedure is performed in the doctor's office and usually causes minimal discomfort. Sclerotherapy is considered the gold standard in the treatment of spider veins.

**Vascular lasers & intense pulse light (IPL)**

These methods are best used to treat birthmarks (port-wine stains) or small capillaries on the face. Vascular laser treatment and IPL should not be used to treat leg veins as these methods do not address the underlying problems.