

Venous Thrombosis

A blood clot within a vein is known as a venous thrombosis, and the most common type of venous thrombosis is a **deep vein thrombosis** (DVT) in the leg.

When this happens, all the tissues drained by the vein can become swollen and painful due to the blood being unable to escape.

A major concern is that someone with venous thrombosis may develop a **pulmonary embolism**. When this happens, part of the clot (an embolus) may break off, travel up the body and through the heart to the lungs, blocking an artery. This is a grave and potentially life-threatening condition and up to one in ten who suffer a serious pulmonary embolism will die if it is not treated.

The incidence of venous thrombosis

In the UK up to one in every 1,000 people are affected by venous thrombosis each year. Many of those affected have pre-existing risk factors such as serious illness or major surgery.

Around 30 per cent of people who have had a venous thrombosis develop further problems within the next ten years, despite treatment. In nearly a third of cases, they develop **post-phlebitic syndrome**.

Venous thrombosis and pregnancy

The risk of venous thrombosis is significantly higher for pregnant women. About one in every 1,000 women develops thrombosis during pregnancy, which is about five times greater than the risk for non-pregnant women of the same age.

In the UK, venous thrombosis and pulmonary embolism are the main cause of death during pregnancy.

Deep vein thrombosis

A deep vein thrombosis (DVT) is a blood clot in the deep veins, usually within the leg, although it can occur elsewhere in the body. These deep veins go through the muscle and cannot be seen beneath the skin.

A DVT can occur in the calf, behind the knee, in the thigh or very high in the leg veins within the pelvis. Most DVT occur in the calf veins, except during pregnancy, when they tend to lie within the thigh and pelvis.

Pulmonary embolism

When someone has a thrombosis such as a DVT in the leg, they are at risk from a pulmonary embolism. When this occurs, part of the clot breaks off (an embolus), travels up the leg, through the right side of the heart and lodges in an artery in the lung (a pulmonary artery).

The blocked artery restricts the blood supply to the lung, causing that part of the lung to die. It also affects the supply of oxygen to the lungs, resulting in breathlessness and pain.

Sometimes, over a period of time, many small particles may break off and cause multiple pulmonary emboli.

Post-phlebitic syndrome

Deep vein thrombosis may damage the valves in the deep veins, causing long-term complications such as *post-phlebitic syndrome*.

Normally the valves in the deep veins prevent blood from travelling back down the leg. In post-phlebitic syndrome, damage to valves higher in the leg causes increased pressure in the veins of the lower calf and ankle.

Risk factors for venous thrombosis

The main risk factors for venous thrombosis include:

- Increasing age
- Immobility
- Heart attack or stroke
- A recent operation especially on hips or knees
- Previous deep vein thrombosis
- Previous deep vein thrombosis in the family
- Cancer and its treatment
- Pregnancy
- The use of the combined oral contraceptive pill and hormone replacement therapy
- Known thrombophilia*
- Long-distance travel

When an individual has a venous thrombosis, it is usually because more than one risk factor is present at any one time. This is known as the *multi-hit hypothesis*.

For example, someone may have been born with an **inherited thrombophilia**, but will not have a thrombosis until other risk factors are present which increase the risk.

Symptoms of deep vein thrombosis

Some people with DVT may not have any obvious symptoms. The most common symptoms include pain, tenderness and swelling of the leg, usually in the calf. Sometimes this is accompanied by discolouration, where the leg may be pale, blue, or a reddish purple colour. This is a less common symptom.

If thrombosis occurs in the thigh veins, which is common during pregnancy, the whole leg may be swollen.

Symptoms of pulmonary embolism

The main symptoms of pulmonary embolism are shortness of breath and chest pain. The symptoms of deep vein thrombosis may also be present.

Symptoms of post-phlebitic syndrome

The symptoms of post-phlebitic syndrome include swelling of the ankle and leg and a heavy ache in the calf and ankle. This is particularly noticeable after standing or walking and tends to get better by resting the leg in an elevated position.

In the long term there is also a small risk of venous ulceration.

Diagnosis of deep vein thrombosis

If a DVT is suspected, two different sets of tests are used to make a diagnosis.

The first is a simple blood test, called a *D-dimer* test. This measures the activity of the clot breakdown system in the blood. When a clot occurs, this system starts automatically. Therefore when the test is negative, it is unlikely that a clot is present.

However the clot breakdown system can also be activated by other conditions, such as a heart attack, stroke or chest infection.

If the D-dimer test is positive, a further test is carried out to confirm that a DVT is present. This involves detecting the clot through imaging, either by using *ultrasound* or by performing a *venogram*.

Ultrasound scan

A Doppler ultrasound scan can detect a clot with reasonable accuracy, especially if it is behind the knee or in the thigh. However it is not reliable for detecting a thrombosis in the calf.

Venogram

A venogram is currently the 'gold standard' for routine diagnosis of DVT. Radio-opaque dye is injected into a vein in the foot and travels up through the leg veins. The dye is then visualised using X-ray imaging. If there is a thrombosis the dye will not flow through the vein and will appear as a gap in the pattern of dye.

*The term thrombophilia covers a range of conditions that result in an individual having 'sticky blood', and thus an increased risk of thrombosis. Thrombophilia can be either inherited at birth or acquired during life.

Magnetic Resonance Imaging

Safer and more accurate methods are constantly being devised. One recently developed technique, Magnetic Resonance Direct Thrombus Imaging (MRDTI), provides a very accurate picture of the clot.

MRDTI uses magnetic resonance imaging to detect a venous thrombosis, without the need to use dye or X-rays.

Diagnosis of pulmonary embolism

If a pulmonary embolism is suspected, diagnosis involves the same combination of tests as for a deep vein thrombosis.

A *D-dimer* test is given and if negative, it is unlikely that a pulmonary embolism is present.

If the D-dimer test is positive, a further test is carried out to image the pulmonary embolism. This is usually either a *ventilation/perfusion* scan or a *CT pulmonary angiogram*.

Ventilation/perfusion scan

A *ventilation/perfusion* scan uses small amounts of radioactive materials to image the lungs. If a pulmonary embolism is present, this will show up as a missing area on the perfusion scan.

The ventilation scan measures how much of the lung is being aerated. If there is a pulmonary embolism, there will be an area of lung that is aerated but has no blood flowing through it.

CT angiogram

In a *CT angiogram*, dye is injected into the bloodstream. The chest is imaged using *Computerised Tomography* (CT). If a pulmonary embolism is present, this will show up as an area where there is no dye.

Treatment of venous thrombosis

If someone has a deep vein thrombosis and/or a pulmonary embolism, treatment will be given in the form of anticoagulant drugs. These aim to prevent the clot growing any larger and to prevent or stop an embolism.

Currently there are two main forms of anticoagulation: *heparin* and *warfarin*.

Heparin

Heparin is given first, as it provides immediate anticoagulation. Heparin is often given before an imaging test is performed, as it is vital to provide treatment without delay.

Heparin can be given intravenously and subcutaneously by injection, but not by mouth. The advantage of using heparin is that it has an immediate anticoagulant effect.

Unfractionated or standard heparin includes a number of different sized molecules. This means that the same dose of heparin produces a different effect in different individuals. It therefore requires monitoring.

Low molecular weight heparin is a type of heparin that has been purified and the small molecules selected. These smaller molecules have a specific anticoagulant action, and produce a longer lasting and more reliable result.

Because of these advantages and a lower incidence of side effects, most doctors now give low molecular weight heparin.

Warfarin

Warfarin is usually given at a later date, for a period of three to six months or longer, and it can be taken orally. After the first treatment it takes at least three days to reach adequate anticoagulation levels.

A major problem with warfarin is that each individual requires a different dose to achieve the required blood thinness levels. Also its effects are altered by how well someone's liver functions, their diet and other medication being taken. This means that people taking warfarin need to regularly attend an anticoagulant clinic, to have their blood thinness levels checked.

Other anticoagulants

Some individuals have an adverse reaction to warfarin and are given other anticoagulant drugs that have a similar effect, such as phenindione.

Prevention of venous thrombosis

The risk of venous thrombosis is generally low unless more than one risk factor is present. Prevention therefore tends to focus on individuals with an increased or high risk, for example those with a thrombophilia or a family history of venous thrombosis.

Thromboprophylaxis

Thromboprophylaxis is the practice of giving small doses of anticoagulants to individuals with an increased risk of venous thrombosis, in situations that further increase the risk.

For example patients undergoing hip and knee surgery, who have a high risk of deep vein thrombosis, are given small doses of anticoagulants around the time of the operation and afterwards.

More advice on healthy living can be found at www.dh.gov.uk

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