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Deep vein thrombosis (DVT)

Veins are blood vessels that carry blood back to the heart from all parts of the body. Deep veins pass through the centre of the leg and are surrounded by a layer of muscle. Deep vein thrombosis (DVT for short) is a blood clot that forms in a deep vein in the body. It occurs most often in the deep veins of the lower leg (calf vein) or thigh and occasionally in other deep veins, such as the arm or pelvis. Blood clots that develop in a vein are medically referred to as venous thrombosis.

Causes

Blood usually flows unhindered, however if it becomes stagnant there is a potential for it to clot. This can be caused through immobility due to illness, injury or major surgery.

When a person is inactive, blood tends to collect in the lower parts of the body, often in the lower legs; this is explained by gravity. Generally once the person starts to move again, blood will start to flow and move evenly throughout the body.

DVTs during long journeys

DVT risk increases during any type of long journey but is most common during flying. The exact reason for an increased risk of DVT while flying is not known. It is most likely to be due to the long period of immobility in a cramped space, cramped seating may cause pressure points on the legs that slow blood flow, and this can increase the tendency for a clot to form. There are suggestions that the reduced cabin pressure plays a role.

Another reason is that alcoholic drinks are readily available during long journeys (especially flights). Alcohol has a diuretic tendency causing the person to pass more urine which can lead to dehydration. With dehydration, the blood becomes thicker than usual and, therefore, more prone to clotting. People are advised to drink more non-alcoholic drinks to prevent clots and if drinking alcohol, alternating alcoholic drinks with non-alcoholic drinks.

Symptoms of DVT may develop hours, days, or in some cases several months after the flight. This is not the same as mild ankle swelling experienced by many during long flights.

Hospitalisation

Because DVT is more likely to happen when the person is unwell or inactive, hospital patients are at a higher risk of developing blood clots. The risk of developing DVT depends on the type of treatment. There is a higher risk of DVT in certain situations including operations that takes longer than 90 minutes (60 minutes if the operation is on the leg, hip or abdomen) and in situations where the patient is confined to a bed or armchair or unable to walk. Patients deemed at risk of clots during hospitalisation may be given preventative treatment.

Injuries can result in DVT

If the wall of a blood vessel is damaged, it may become narrowed or blocked, which can result in the formation of a blood clot. Blood vessels can be damaged by injuries such as broken bones or muscle damage. Blood vessel damage can occur during surgery, particularly in operations on the lower half of the body.

Medical and genetic conditions

Risk of DVT is increased with conditions that cause blood to clot more easily than normal. These conditions include:

- cancer (chemotherapy and radiotherapy can increase this risk further)
- heart and lung disease
- inflammatory conditions such as rheumatoid arthritis
- infectious diseases such as septicaemia
- thrombophilia (a genetic condition that makes blood more likely to clot)
- inherited conditions such as factor V Leiden
- polycythaemia (increased numbers of red blood cells)
- disseminated intravascular coagulation (DIC), a medical condition in which blood clotting occurs inappropriately, usually caused by a serious infection or organ failure

Pregnancy

Pregnancy causes blood to clot more easily as the body prepares for childbirth thus preventing excess blood loss during childbirth. Approximately 1 in 1,000 pregnant women develop DVT during their pregnancy with older and obese women more at risk.

Contraceptive pill and hormone replacement therapy (HRT)

The combined contraceptive pill and hormone replacement therapy (HRT) both contain the female hormone oestrogen. Oestrogen can cause the blood to clot more easily, increasing the risk of developing a clot. However, the increased risk is very low. The progestogen-only contraceptive pill does not increase the risk of DVT and is often prescribed for women who are at increased risk of DVT (eg) older women, obese women and previous history of DVT. Women taking progestogen only pills must remember that this type of pill must be taken within the same three hour period daily (eg) Noriday®, Cerazette®

Other risk factors

Other risk factors for DVT include smoking; being overweight or obese; being over 60 with restricted mobility; a previous history of deep vein thrombosis or pulmonary embolism (PE)**;** paralysis from a spinal cord injury and a history of heart attack, stroke, or congestive heart failure

How common are DVTs?

DVT is more common in the elderly, but healthy young people can develop it as well. Some people are born without vital 'blood thinning' substances and are therefore always more susceptible to blood clots. Venous thromboembolism (VTE) affects 1 to 2 per 1000 people in the general population each year, usually as DVT of the leg or pulmonary embolism (PE). The incidence increases from 1 in 10,000 for individuals younger than 40 years to 1 in 100 for those older than 60 years. It is estimated that about 1 in 10 people with an untreated DVT develop a PE large enough to cause respiratory symptoms or death.

Signs and symptoms

Only about half of the people who have DVT have signs and symptoms. The symptoms of DVT are related to the inability of blood to return to the heart thus causing a backup of blood in the leg. Symptoms include:

- Swelling of the leg or along a vein in the leg
- Pain or tenderness in the leg (may only be felt when standing or walking)
- Increased warmth in the area of the clot
- Redness or discoloured skin on the leg
- Pain may be made worse by bending your foot upward towards the knee

A DVT usually (although not always) affects one leg. The symptoms can be confused with an infection or cellulitis (skin infection) on the leg.

Complications of DVT

Complications can arise when a piece of the blood clot breaks off and travels through the bloodstream. The loose clot is called an embolus. It can travel through the bloodstream to the lungs where it can block blood flow. This condition is called pulmonary embolism or PE. DVT and PE together are known as venous thromboembolism (VTE).

PE is a very serious condition. It can damage the lungs and other organs in the body and may even cause death. Blood clots in the thighs are more likely to break off and cause PE than blood clots in the lower legs or other parts of the body. Blood clots also can form in veins closer to the skin's surface; these clots do not break off and cause PE.

Symptoms of PE include unexplained shortness of breath; chest pain with deep breathing; coughing up blood; rapid breathing or fast heart rate and severe light headedness

Some people are unaware of a deep vein clot until they have signs and symptoms of PE. Both DVT and PE can cause serious, life-threatening problems if not treated.

Diagnosis

Diagnosis of DVT is based on medical history, a physical exam and blood tests.

Ultrasound
Ultrasound is the most common test for diagnosing deep vein blood clots. Ultrasound uses high-frequency sound waves to determine blood flow through the arteries and veins in the affected leg(s). Ultrasound can detect the location and size of a clot if one is present. Ultrasounds can be compared over time to see whether a clot has grown or resolved. Ultrasound is better at finding veins above the knee compared to the veins below it.

D-dimer test
This is a blood test used to determine if a blood clot exists. D-dimer is a chemical that is produced when a blood clot in the body gradually dissolves. The test is used as a positive or negative indicator. If the result is negative, then no blood clot exists.

If the D-dimer test is positive, it does not necessarily mean that a DVT is present since many situations will have an expected positive result for example, surgery, a fall, or pregnancy. For this reason, D-dimer testing must be used selectively. There are other blood tests used to check for an increased chance of blood clotting such as activated protein C resistance, antithrombin III levels and protein C and protein S levels.

Treatment

Anticoagulation medication prevents further clots and prevents them from forming an embolus that can travel to the lung. While they referred to as "blood-thinning" medicines, anticoagulants do not actually thin the blood. They alter chemicals within it, to prevent clots forming.

There are two different types of anticoagulants used to treat DVT. These are heparin and warfarin. Heparin is usually prescribed initially as it works immediately to prevent further clotting. After this initial treatment the patient may then be prescribed warfarin to prevent another blood clot forming.

Heparin

Heparin is available in two different forms. These are standard (unfractioned) heparin and low molecular weight heparin (LMWH).

LMWH contains smaller molecules than standard heparin meaning it is more reliable so the patient will not have to stay in hospital and be monitored. Both standard and LMWH can have side effects; these include skin rashes and other allergic reactions, bleeding, bruising and weakening of the bones (if taken for a long time). LMWH is most frequently used because it is easier to use (generally given by subcutaneous injection) and has fewer side effects.

Warfarin

Warfarin is taken as a tablet. The patient may need to take it after an initial heparin treatment to prevent further blood clots forming. After a DVT, warfarin may need to be taken for 3 to 6 months or even longer and sometimes for life.

Warfarin is described as a blood thinner however this is not an accurate description. Warfarin does not actually thin the blood or make it less viscous. The blood needs vitamin K to be able to clot. Warfarin acts by reducing the production of vitamin K in the liver. It works indirectly so has no effect on clots already formed. It is used to prevent rather than treat clots. Therefore it is ineffective in treating clots that have already formed. It takes about 24 hours to exert its effect. The dose of warfarin is determined by measurement of the International Normalised Ratio (INR). This is a ratio of the patient's prothrombin time to an international standard. Put simply, this test measures the clotting tendency of blood as compared to an international standard.

As with standard heparin, the effects of warfarin varies from person to person, and close monitoring with frequent blood tests determine the correct dosage. When starting warfarin, 2 to 3 blood tests a week are needed until the regular dose is decided. After this, a blood test may only be needed every four weeks at the warfarin clinic.

Side effects of warfarin
Bleeding is the most important complication of warfarin. Other possible side effects include nausea, vomiting, diarrhoea, rash and skin necrosis (usually occurs on days 3 to 8 of therapy). Skin necrosis is an extremely rare side effect of warfarin however if it occurs treatment must be obtained immediately. Skin necrosis is basically death of skin tissue and usually starts with red skin. Other possible side effects include alopecia (hair loss) and purple toe syndrome. Purple toe syndrome is a rare condition caused by warfarin that can occur in the first few weeks of warfarin treatment and is caused by deposits of cholesterol collecting in the toes. Usually the big toe only is affected and it is characterised by a blueish or purple colour and sometimes pain. Warfarin may need to be stopped if it occurs. Jaundice (yellowing of skin and whites of eyes) is a sign of liver problems so must be investigated immediately if taking warfarin.

Precautions when taking warfarin
Warfarin should be taken at the same time each day. This ensures accuracy of INR results. Over the counter (OTC) drugs should be used in caution. Aspirin and NSAIDs (ibuprofen) should be avoided as they increase risk of bleeding. Paracetamol is safe to take as a painkiller while taking warfarin. Significant changes in intake of food high in Vitamin K (e.g. liver, green leafy vegetables) affects the action of warfarin and more frequent monitoring may be required. Alcohol consumption below 2 units per day (one drink per day) has no effect on the INR but going above this level can affect INR. Weight reducing diets can affect INR level so it must be monitored more closely if losing weight. Avoid drinking cranberry juice as it can affect warfarin levels. Warfarin is not recommended for pregnant women. If clot prevention is needed during pregnancy, heparin will be used.

Bleeding is the most common side effect of warfarin. It more often occurs in the first month of treatment and is more common in patients over 65. Signs of bleeding to watch out for include excessive bruising, bleeding gums, nose bleeds, blood in urine, blood in stools (can be characterised by red or black stools), coughing up blood, excessively heavy periods and severe headaches. Patients must get immediate medical attention if they are unable to stop bleeding, are involved in an accident or get a significant blow to the head. If a nose bleed occurs while taking warfarin, lean your head forward and pinch below the bridge of your nose firmly for ten minutes. If a nose bleed lasts for more than 15 minutes or you are having regular nose bleeds, you should get immediate medical attention. Patients should carry anticoagulant booklets for the recording of INR results and anticoagulation dose. These are available from the warfarin clinic or your doctor's surgery. Contact sport like Gaelic football or rugby is best avoided when taking warfarin. Use a soft tooth brush to avoid bleeding of the gums. Take extra care when shaving, an electric razor is preferable when using warfarin.

Compression stockings

Compression stockings (also called support stockings) can reduce the risk of recurrent DVTs. Compression stockings should be worn daily, usually for at least two years. The best type of stockings is grade 3 strength elastic compression hosiery. Compression stockings are not as comfortable as regular socks or tights. Some people find that they cannot tolerate grade 3 stockings, and so grade 2 stockings can be used instead.

A compression stocking should be fitted professionally after an assessment and accurate measurement. Do not buy over-the-counter support stockings or flight socks that may be the wrong class or size and which may potentially cause more damage. In Whelehans pharmacy, we can measure you for compression stockings. Compression stockings need changing every 3 - 6 months. They can be taken off

before going to bed.

Prevention

Lifestyle changes to prevent DVTs include stopping smoking, losing weight overweight and regular exercise such as walking to improve the circulation in your legs. While aspirin is used to prevent other types of clots such as heart attacks and strokes, there is no evidence to show that taking aspirin reduces the risk of developing DVT

Wear compression stockings during and after a DVT and especially on long journeys. They will improve blood flow in the legs and reduce risk for complications of blood clots.

Raising the leg is useful as it helps to relieve the pressure in the veins of the calf and stops blood and fluid pooling in the calf itself. When raising legs, ensure that the foot is higher than the hip. This helps the returning blood flow from the calf. Putting a cushion underneath the leg while lying down will help raise leg above the level of your hip.

There are some precautions to prevent DVT during a long journey such as a long haul flight. Exercises such as pressing the balls of the feet hard against the floor, or regularly bending and straightening legs, feet and toes during the journey can help. Walking up and down the cabin at certain intervals during a flight (or stopping to walk outside a car during a long road-trip) can reduce DVT risk. It is important not to get dehydrated during a long journey. Drink plenty of water or juice but avoid alcohol, tea and coffee as these have a dehydrating effect. Avoid crossing legs during a long journey as this constricts veins and slows circulation. It is also recommended to avoid sleeping tablets as these can result in a deep sleep causing immobility for a long time. Elastic compression stockings can improve circulation and help lower risk of DVT, especially for long haul flights. Compression stockings such as Scholl® flight Socks are available in many pharmacies.

References

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