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- blood stained sputum

What causes blood clots?

There are many situations which can increase the risk of unwanted blood clots. These include:

- Cigarette smoking
- Overweight/obesity
- Older age
- Past history of blood clot
- Family history of blood clots in the veins (not heart attacks or strokes)
- Immobility
  - Hospitalisation for serious medical or surgical illness
  - patients with paralysis
  - Major surgery (particularly chest, abdominal, pelvic or hip and knee surgery)
  - immobility of a limb in a cast or boot
  - prolonged sitting (long haul flights or other travel)
- Bone fractures
- Foreign material in a large vein (PICC lines, central venous catheters, infuser ports)
- Oestrogen and other hormones
  - Contraceptive/birth control pills
  - oestrogen and progestogen pills, patches or rings for contraception or hormone replacement
  - pregnancy including up to 6 weeks after giving birth
- Serious medical conditions
  - Cancer and chemotherapy
  - Kidney disease due to nephrotic syndrome
  - Inflammatory or rheumatological disorders (lupus, rheumatoid arthritis, inflammatory bowel disease)
- Inherited or acquired disorders of excessive clotting ("Thrombophilias")
- Abnormal vein anatomy such as varicose veins or May-Thurner Syndrome

Table 1: Risk factors for thrombosis

What about superficial vein clots?

Occasionally clots can develop in superficial veins, often if they are enlarged as in varicose veins. This causes pain and sometimes redness along the vein, and the vein itself feels hardened and tender. This condition is called **superficial thrombophlebitis** and is usually not dangerous. The clot rarely extends into the deep veins, so the risk of complications such as deep vein thrombosis and pulmonary embolus are rare. The treatment is usually pain relief with anti-inflammatory

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medications. Blood thinning medications (anticoagulants) are rarely needed unless the clot is close to the deep veins.

How is DVT and PE diagnosed?

If you have symptoms that make you worried about DVT or PE, you should go straight to your local doctor or your emergency department. If you are very short of breath or have chest pain, you should call an ambulance on 000.

The doctor will ask questions about your symptoms and your medical history. You will be examined for any signs of DVT in your legs and PE in your lungs. If DVT or PE is suspected you will have some of the following tests:

Blood tests – a D-dimer blood test is often taken. This is a marker of the likelihood of abnormal clot being present. If it is negative, you may not have a clot but you will have other tests if a clot is still suspected. If it is positive (elevated) then you may have a clot although there are other causes of an elevated D-dimer. Further tests need to be done to detect the clot.

Imaging:

Ultrasound. If you have symptoms in your legs, a Doppler ultrasound is often done to detect clot in the leg veins. This test is simple, non-invasive and quick to perform.

A contrast venogram is a dye study of the veins where dye is injected into the veins and an X-ray is taken. This is less commonly done but is useful where Doppler ultrasound is not possible.

MRI (magnetic resonance imaging) is another type of scan which uses a magnet to take an image of your body. This is not commonly done for DVT but is useful for detecting clots in unusual sites such as inside the skull or pelvis.

CT (computerised tomography) is a type of scan combining an injection of dye into the blood vessels and multiple x-ray images taken of your body at the same time. CT is very useful for detecting pulmonary embolus. This type of CT is called a CT pulmonary angiogram, or CTPA.

Ventilation/perfusion scan (VQ scan) is another way of detecting pulmonary embolus. It combines an injection of a dye into your veins with an inhalation of gas with a tiny amount of radioactive material, to compare the airflow in your lungs with the blood flow through your lung vessels.

Pulmonary angiography is a dye test where a catheter is inserted into a vein often in the groin, and dye is injected into the veins to highlight areas of blockage within the lungs. This is only rarely done these days.

How is DVT and PE treated?

TheBlood Unit

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The treatment of these unwanted clots is aimed at

1. preventing the formation of new clot
2. stopping the current clot from growing any larger
3. preventing the clot from breaking off and travelling through the blood stream into the lungs
4. reducing the likelihood of longer term problems in the legs from DVT and in the lungs from PE.

What treatment is prescribed?

The mainstay of treatment is blood thinners or anticoagulants, which can be tablets or injections.

Injected blood thinners are commonly enoxaparin (Clexane) or heparin. Clexane is often used because it is a simple small injection under the skin, and many patients can be treated with a single daily injection and often learn to treat themselves. For larger clots, twice-daily clexane is used, and for very serious clots, intravenous heparin infusions are sometimes used. Clexane or heparin is often started until the clot is considered to be stable, and then patients switch to tablet blood thinners if this is appropriate.

Tablet blood thinners include warfarin or Coumadin, or the newer tablet blood thinners such as rivaroxaban, dabigatran or apixaban. Your doctor will discuss the pros and cons of these tablets and help you understand which of these choices is the best one for you.

Isn't warfarin 'rat poison'?

No it isn't. The medication in rat poison is similar to warfarin but is not the same.

What are the risks of treatment?

The main risk with any blood thinner is bleeding. Your dose will be carefully chosen, and you will be monitored by the medical staff for any signs of bleeding such as blood noses, dark bowel motions, excessive bruising (some bruising is normal on blood thinners) etc. All patients on warfarin and sometimes patients on clexane or rivaroxaban have blood tests to determine if they are on the right dose.

What about thrombolysis or 'clot buster' medication?

There are some medications which can be infused into a vein that can dissolve clots. These have a high risk of bleeding complications so are only used in patients with life-threatening or limb-threatening massive clots. After these medications are given the patient is kept in the intensive care

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unit.

What about operations to remove the clot?

Some large leg vein clots are suitable for a procedure called 'thrombectomy' where a surgeon or a radiologist puts a catheter into the vein and uses a special device to remove or break up the clot often using some thrombolysis medication at the time. Often a filter (see below) needs to be placed in the large vein in the abdomen before this can be done, to prevent fragments moving into the lungs. This is an invasive procedure with a risk of complications and it may or may not be appropriate for your case.

What about a filter?

A filter, like a basket, can be placed by a radiologist into the large vein in the abdomen (the Inferior Vena Cava) to sit across the inside vein and catch clots if they break off from the leg vein clot. Sometimes it is not safe to put patients on blood thinners, or it becomes unsafe to continue blood thinners in a patient previously taking these medications, and a filter can be placed to try to prevent clots going to the lungs. Filters can be temporary, and the radiologist can attempt to remove the filter later, either because it is not needed, or because it becomes safe to switch back to anticoagulant medications. Filters are associated with short term and long term risks and are not routinely recommended in many situations.

Do I need to wear compression stockings?

Compression stockings are helpful to prevent long term complications after DVT. These are special medical-grade stockings that are tightest around the foot and ankle and get less tight up the leg. Your doctor will discuss whether these are recommended in your case.

For patients at risk of DVT/PE, especially those in hospital or immobilised due to medical or surgical illness, compression stockings can help prevent DVT.