Deep Venous Thrombosis

Question and Answers for Patients and Health Professionals

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What is DVT?

Deep Venous Thrombosis, also called DVT, is a blood clot inside of a large vein in the body. In the normal state, there is a balance between the formation of clots and the breakdown of clots. Blood clotting is a normal and necessary part of life. DVT can occur when the formation of clots is greater than the breakdown of clots.

DVT most often occurs in the legs, but it can occur in the veins of the arms, abdomen, or chest. Superficial clots are less serious clots that can cause pain, redness, and swelling. These are clots in small veins that are close to the surface of the skin. Sometimes superficial clots can lead to DVT.

DVTs are very treatable. They can also lead to serious complications. The clot can interfere with the flow of blood and fluids of the vein. This can lead to leg swelling, since fluid has a hard time flowing out of the leg or arm. The clot can also lead to inflammation of the leg, causing pain and redness. Sometimes the redness and pain can be confused with an infection. Rarely there is so much swelling and pressure in the leg that there can be compression of important arteries.

Sometimes the clot can break off the inside wall of a vein and travel. The loose clot which travels is called an **embolism**. This loose clot can migrate to the blood vessels of the lungs. Once a clot is established for many hours in the leg, the clotwill attach to the wall of the blood vessel. This attachment lessens the risk of the clot breaking off. If a small clot or a small portion of a larger clot travels to the lung, there are usually no serious complications. If a larger clot travels to the lung, the clot can interfere with the flow of blood out of the heart and into the lung. This can be serious, and sometimes life threatening. If a large amount ofclot travels to the lung, a patient will often feel breathless, have chest pains, cough up blood, or feel light headed.

Patients with small clots and/or clots which are confined to the calf have a lower risk of a serious embolism. Patients with large clots and/or clots which are in the large veins of the pelvis have a higher risk of serious embolism.

The body has natural chemical mechanisms to remove clots in the body. These chemicals are called thrombolytic enzymes. These enzymes are always working in the body, but their efforts are opposed by the blood clotting system's addition of new clots and the expansion of current clots. The work of these clot-destroying substances can take days, weeks, or even months to complete their work to remove larger clots. Anticoagulants, sometimes called blood thinners, prevent expansion of clots and allow the body's natural systems to work more efficiently.

Testing for the presence of DVT.

When a patient is suspected of having a blood clot, certain tests are performed in order to accurately determine the cause of the swelling. Most commonly, an ultrasound is performed. This test uses sound waves and a microphone in order to create a picture of the inside of a vein. There are no needles uses for this test. Sometimes a needle is placed in a vein and a small amount of dye is injected. This venogram can show a picture of the clot inside of a vein. Computerized Axial Tomography (CAT) scans can often accurately demonstrate clots in certain patients.

Some blood tests are helpful in establishing the presence of clot, but they cannot be used alone to firmly know whether there is DVT. The presence of a particular fragment of clot, known as D-Dimer, usually indicates that the clotting system is activated. D-Dimer is normally present after surgery or trauma.

What causes DVT?

DVTs are caused by many different problems. Excess clotting can run in families. DVT can occur in patients who have had trauma, a surgical operation, or prolonged immobility. Cancer can also be associated with excess clotting.

How is DVT treated?

DVT is treated by using anticoagulant medications. These medications prevent expansion of the clot and prevent addition of new clot. These medications allow the body's natural chemicals to dissolve clots.

Since there are risks to bleeding risks in patients who take anticoagulant medications, health professionals inquire about these risks to determine if the risks of these medications are potentially greater than the benefits. In patients who are judged to have significant risks from taking anticoagulants a small filter can be placed into the vein behind the abdomen. This filter does not eliminate the clot in the leg, but the filter can prevent the clot in the leg from traveling to the lung. These filters are small devices made of a mesh of thin, pliable metal. These filters are introduced into the body through a vein in the neck, leg, or arm. Sometimes medications that can amplify the body's system of breaking apart clots are used. These medications are sometimes used for very large or life threatening clots. These medications are often used along with the anticoagulants that prevent new clot formation.

What is Heparin?

Heparin is an anticoagulant that prevents the formation of new blood clots. Heparin works quickly after administration. Since it takes a few days for anticoagulant pills (warfarin) to become effective, heparin is usually administered for about 5 days.

Heparin is a medication that is related to special complex sugar compounds. Some heparins are composed of many sugars attached to each other. In these types of heparins, there are large numbers of sugar molecules attached to each other, and the number of sugar molecules varies greatly within each batch of heparin. This type of heparin, in which there are many different sizes of heparin, is called *un-fractionated* heparin. This type of heparin has been available for many years.

Over the past several years, another type of heparin, called *low molecular weight heparin* (Lovenox®, Fragmin®), has been developed and extensively tested. This type of heparin contains the important, but smaller, sections of the larger heparin molecule. another molecule known as pentasaccharide (Arixtra®), contains only the 5 most critical sugars in heparin. These special types of heparin work very quickly after they are administered to a patient. all of these heparins must be given by intravenous or subcutaneous injection. Subcutaneous injections are given through tiny needles just under the skin, the same way that insulin is used for patients with diabetes. The dose of un-fractionated heparin must be adjusted to the results of a blood-clotting test called a PTT. These blood tests must be repeated several times over the course of a few days and the doses of the un-fractionated heparin must be adjusted accordingly. Patients generally need to be in the hospital, since so many tests and dose adjustments need to be made.

Low molecular weight heparin and pentasaccharide doses are determined according to the weight of a patient. No blood tests are generally needed to assure appropriate anti-clotting activity of the blood, although we can measure the activity of these smaller heparins by measuring the anti-Xa level. Patients who are pregnant or very obese are considered for testing. Given that these medications can be given once or twice daily by

subcutaneous injection, it is practical to use these medications in settings away from the hospital-such as home, nursing home, or office.

There are potential side effects from any of these anti clotting medications. Since heparin prevents blood clots from forming, heparin can lead to bleeding. This is especially possible in patients who have had recent surgery or trauma. It can also occur in patients who have disorders of their blood clotting system or even in patients without any other known problem. These medications can rarely cause allergic reactions. Osteoporosis can occur in patients who take these medications for long periods of time. Rarely, these medications can decrease the numbers of platelets in the blood stream. Rarely, these medication can lead to an unusual form of excess blood clotting. Whether patients are treated at home or in the hospital, patients need to be followed carefully.

What is warfarin?

Warfarin, also known as Coumadin®, is an anticoagulant that is swallowed by mouth. Warfarin interferes with the body's ability to make good quality blood clotting proteins. Warfarin does this by interfering with the action of vitamin K. It takes several days for warfarin to begin to work effectively. The dose of warfarin needed to prevent blood clots from expanding varies greatly between different people. A blood clotting test called the PT or INR is used to adjust the dose of warfarin.

Vitamin K is found in many foods including many green vegetables. Since warfarin interferes with the action of vitamin K, it is advisable to maintain a steady intake of these vegetables. It is not necessary to avoid these vegetables. It is advisable not to eat great amounts of these vegetables for a few days and then none for a few days. This makes adjusting the dose of warfarin difficult.

The amount of warfarin available to the body can also be influenced by many medications. Some medications actually increase the amount of warfarin in the blood stream by pushing warfarin off certain proteins that carry warfarin. Some medications,

such as many antibiotics, kill bacteria in the intestine that normally make vitamin K. This can lead to an imbalance of warfarin and vitamin K and lead to increased risk of bleeding. It is usually possible to adjust the dose of warfarin to accommodate any diet or medication that a patient may be taking.

Preliminary studies have recently shown that small doses of oral vitamin K (100 to 500 micrograms per day) may lead to decreased INR variability.
http://www.ncbi.nlm.nih.gov/pubmed/18695375

What happens after DVT is successfully treated?

It can take several days before there is marked improvement in the swelling and discomfort associated with a DVT. Many times, there is long lasting mild swelling of the leg or arm. This can slowly improve over time.

After a person has one DVT, there is a greater risk of that person developing another DVT. This may be related to the injury that the clot causes to the inside wall of the blood vessel. the risk of recurrent DVT or death from recurrent DVT or PE have been shown to be lowered by using long term anticoagulation therapy.

"*Post phlebitic syndrome*" is a condition where there is long lasting swelling, hardness, discoloration, and discomfort in the leg after a DVT. The use of special compression stockings for 12 to 16 hours per day can diminish the chances of getting post phlebitic syndrome and diminish the severity of the post phlebitic syndrome.

Can a patient with DVT safely walk?

Many health professionals struggle with this question. The tradition for many years had been to keep patients with DVT in bed for several days. People have thought that walking might contribute to pushing the clot off the wall of the blood vessel and embolize. It is known that embolization can occur even when people rest. There is an

increased awareness by patients and health professionals regarding DVT. This knowledge contributes the recognition that patients of today are diagnosed when clots may be smaller than they would have in past years. Many patients who come to the physician with a DVT have had symptoms for hours or days. These patients often walk around considerably before diagnosis without developing symptomatic embolism.

Arguments in favor of rest include:

- patients with clots often have pain; pain should send us a message to which we should listen
- it may be wise to wait for the clot to attach to the wall of the blood vessel before allowing walking

Arguments in favor of walking if comfortable include:

- patients with DVT often walk around for days before diagnosis. What is the sense of confining these people to be rest after diagnosis?
- immobility itself can contribute to blood clots
- mobility can increase the blood flow near clots, and diminish the risk of clot propagation
- even patients confined to bed move their legs and flex their leg muscles
- recent high quality studies have allowed patients to be at home and walk with successful outcomes

A physician's recommendation regarding walking or not for patients needs to take into consideration many issues including:

- how long the symptoms of DVT have been present
- whether or not the patient has been walking before the diagnosis of DVT
- the degree of pain
- the degree of swelling
- the preferences of the prescribing physician and the patient
- the amount of walking planned

Sound advice for patients, who are not bed bound when their DVT is diagnosed: *walk if comfortable and rest if there is pain*.

What happens if a dose of Warfarin or Heparin is missed?

If a dose of low molecular weight heparin (Lovenox ®, Fragmin®), Pentasaccharide (Arixtra®) or warfarin is missed, take it when you realize that it was missed. If it is near the time of the next dose, then skip the missed dose and resume the dosing schedule. Do not take a double dose of the drug. If you are unsure, call your nurse or physician.

How long should someone take anticoagulants for?

Most people will take heparin or pentasacchride for a total of 5- 7 days. This will include the number of days on a heparin infusion in the hospital and low molecular weight heparin (Lovenox ®, Fragmin®) given at home. Warfarin is generally given for 3 to 6 months after a DVT. Some people will need to take warfarin for a longer time, sometimes even for their lifetimes.

There are some groups of patients who appear to benefit from long-term therapy with injectable heparin-related anticoagulant treatment. Some studies have shown that patient with active metastatic malignancy benefit form

When should a patient call the physician?

- Chest pain
- cough
- coughing up of blood
- light headed or passing out
- palpitations or heart racing
- unusual bleeding- gums, nose, skin, urine, stool

- black stool
- back pains or stomach/abdominal pains
- cold, blue, or painful feet
- new redness of leg or feet
- other questions

References

see http://anticoagulation-advisor.com/references