Deep vein thrombosis

In medicine, deep vein thrombosis (also known as deep-vein thrombosis or deep venous thrombosis and usually abbreviated as DVT) is the formation of a blood clot (“thrombus”) in a deep vein. It is a form of thrombophlebitis (inflammation of a vein with clot formation).

Deep vein thrombosis commonly affects the leg veins (such as the femoral vein or the popliteal vein) or the deep veins of the pelvis. Occasionally the veins of the arm are affected (if spontaneous, this is known as Paget-Schrötter disease). A DVT can occur without symptoms, but in many cases the affected extremity will be painful, swollen, red, warm and the superficial veins may be engorged. The greatest complication of a DVT is that the clot could dislodge and travel to the lungs, which is called a pulmonary embolism. A late complication of DVT is the post-phlebitic syndrome, which can manifest itself as edema, pain or discomfort and skin problems.

According to Virchow's triad, venous thrombosis occurs via three mechanisms: decreased flow rate of the blood, damage to the blood vessel wall and an increased tendency of the blood to clot (hypercoagulability). Several medical conditions can lead to DVT, such as compression of the veins, physical trauma, cancer, infections, certain inflammatory diseases and specific conditions such as stroke, heart failure or nephrotic syndrome. There are several factors which can increase a person's risk for DVT, including surgery, hospitalization, immobilization (such as when orthopedic casts are used, or during long-haul flights, leading to economy class syndrome), smoking, obesity, age, certain drugs (such as estrogen or erythropoietin) and inborn tendencies to form clots known as thrombophilia (for example, in carriers of factor V Leiden). Women have an increased risk during pregnancy and in the postnatal period.

The most commonly used tests for the diagnosis of DVT are a blood test called D-dimers and doppler ultrasound of the affected veins. Sometimes, further testing is required to find the cause of the DVT. In specific cases, an attempt can be made to break down the clot (using thrombolytic agents). To prevent further accrual and formation of new clots with a risk of pulmonary embolism, anticoagulation (blood thinners) is advised (if not possible, an inferior vena cava filter may be used). Prevention of DVT is advised in many medical and surgical inpatients using anticoagulants, graduated compression stockings (also known as thromboembolic deterrent stockings) or intermittent pneumatic compression devices. Signs and symptoms

There may be no symptoms referable to the location of the DVT, but the classical symptoms of DVT include pain, swelling and redness of the leg and dilation of the surface veins. In up to 25% of all hospitalized patients, there may be some form of DVT, which often remains clinically inapparent (unless pulmonary embolism develops).

There are several techniques during physical examination to increase the detection of DVT, such as measuring the circumference of the affected and the contralateral limb at a fixed point (to objectivate edema), and palpating the venous tract, which is often tender. Physical examination is unreliable for excluding the diagnosis of deep vein thrombosis.

In phlegmasia alba dolens, the leg is pale and cool with a diminished arterial pulse due to spasm. It usually results from acute occlusion of the iliac and femoral veins due to DVT.
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In phlegmasia cerulea dolens, there is an acute and nearly total venous occlusion of the entire extremity outflow, including the iliac and femoral veins. The leg is usually painful, cyanosed and oedematous. Venous gangrene may supervene.

It is vital that the possibility of pulmonary embolism be included in the history, as this may warrant further investigation (see pulmonary embolism).

A careful history has to be taken considering risk factors (see below), including the use of estrogen-containing methods of hormonal contraception, recent long-haul flying, intravenous drug use and a history of miscarriage (which is a feature of several disorders that can also cause thrombosis). A family history can reveal a hereditary factor in the development of DVT. Approximately 35 percent of DVT patients have at least one hereditary thrombophilia, including deficiencies in the anticoagulation factors protein C, protein S, antithrombin, or mutations in the factor V and prothrombin genes.

Cause/Etiology

Main article: Thrombosis

Virchow's triad is a group of three factors known to affect clot formation: rate of flow, the consistency (thickness) of the blood, and qualities of the vessel wall. Virchow noted that more deep venous thrombosis occurred in the left leg than in the right and proposed compression of the left common iliac vein by the overlying right common iliac artery as the underlying cause (see May-Thurner syndrome).

The most common risk factors are recent surgery or hospitalization. 40% of these patients did not receive heparin prophylaxis. Other risk factors include advanced age, obesity, infection, immobilization, use of combined (estrogen-containing) forms of hormonal contraception, tobacco usage and air travel ("economy class syndrome", a combination of immobility and relative dehydration) are some of the better-known causes.[4] Thrombophilia (tendency to develop thrombosis) often expresses itself with recurrent thromboses.

It is recognized that thrombi usually develop first in the calf veins, "growing" in the direction of flow of the vein. DVTs are distinguished as being above or below the popliteal vein. Very extensive DVTs can extend into the iliac veins or the inferior vena cava. The risk of pulmonary embolism is higher in the presence of more extensive clots.

Diagnosis

The gold standard is intravenous venography, which involves injecting a peripheral vein of the affected limb with a contrast agent and taking X-rays, to reveal whether the venous supply has been obstructed. Because of its invasiveness, this test is rarely performed.

Physical examination 1. Homans' test: Dorsiflexion of foot elicits pain in posterior calf. However, it must be noted that it is of little diagnostic value and is theoretically dangerous because of the possibility of dislodgement of loose clot.
However, these medical signs do not perform well and are not included in clinical prediction rules that combine best findings in order to diagnose DVT.