

DEEP VEIN THROMBOSIS

WHAT IS DEEP VEIN THROMBOSIS?

The veins in your lower extremities (legs and feet) carry deoxygenated blood back to your heart and lungs to become oxygen rich. Found within your lower extremities are three main types of veins. **Deep veins** are large vessels that exist deep within the muscles of your thigh and calf. **Superficial veins** are much closer to the skin and may be visible and/or bulging in the form of varicose veins. **Perforator veins** act as a connection between the deep and superficial veins; they travel through the muscle to connect your deep veins to your superficial veins.

Deep vein thrombosis (DVT) is a clot that develops within a deep vein, often occurring in the deep veins of the calf, thigh, or pelvis, but it may also occur in the upper extremities (hands, arms, or shoulders). DVT is dangerous and can potentially lead to a life-threatening condition called **pulmonary embolism (PE)**. A pulmonary embolism can occur if a segment of clot breaks off and travels to the lungs.

WHAT ARE THE SIGNS AND SYMPTOMS?

The symptoms of a DVT may include **redness, pain, swelling, or warmth of the affected limb**. These symptoms are usually present in one limb; however, you may not experience symptoms. If a clot has broken off and traveled to the lungs causing a pulmonary embolism, it may cause **shortness of breath, sharp stabbing chest pain when breathing in, dizziness or fainting, fever, or rapid heartbeat**. PE is sometimes mistaken for a heart attack and can potentially be fatal.

RISK FACTORS FOR DEVELOPING DVT

There are several risk factors including:

- Previous history of DVT
- Family history of DVT
- Recent surgery
- Smoking
- Pregnancy
- Birth control pills or hormone replacement therapy
- Obesity
- Prolonged travel
- Cancer
- Sepsis or severe infection
- Covid-19 infection

LONG-TERM EFFECTS

Deep vein thrombosis can be associated with a condition called **post-thrombotic syndrome (PTS)**. Your risk of developing post-thrombotic syndrome increases dramatically after an episode of DVT in large veins above the knee. Post-thrombotic syndrome is a long-term complication characterized by chronic, persistent pain and swelling. It occurs when a DVT in the lower extremity causes damage to the one-way valves that exist inside your veins. Once damaged, the venous valves become unable to work properly allowing blood to backflow into the extremities. The abnormal backflow of blood due to incompetent venous valves causes a pressure buildup within the veins called venous hypertension. If severe, **venous hypertension** can lead to the development of chronic swelling, skin discoloration, pain, skin texture changes,

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and open ulcerations (sores) or wounds. **PTS** may be prevented with early diagnosis and aggressive treatment of deep vein thrombosis.

DIAGNOSIS

Deep vein thrombosis is commonly diagnosed by physical examination and a duplex ultrasound test.

Duplex ultrasound is a noninvasive, painless diagnostic test that uses high-frequency sound waves to measure how blood flows through your arteries and veins. It can detect a clot or other structural abnormalities. If your DVT is extensive, your physician may order a computed tomographic (CT) venogram to see more detail.

A **CT venogram** is an imaging test that uses IV (intravenous) contrast and specialized CT scans to create detailed pictures of the veins in your abdomen and lower extremities.

TREATMENT

Deep vein thrombosis has traditionally been treated with blood thinning medications. Recently, physicians have been performing interventional procedures to dissolve or remove clots within arteries and/or veins, this procedure is called a **thrombolysis**. Thrombolysis can be a combination of pharmacological (using medications) and mechanical methods and can be used for various conditions to dissolve and remove a clot blocking blood flow through an artery or vein. Thrombolysis utilizes medications often referred to as “clot-busting agents” such as tissue plasminogen activator (tPA) or recombinant tissue plasminogen activator to dissolve a clot. In cases with extensive clots (in addition to clot-busting medication), your physician may opt to mechanically remove the clot using inflation balloons, rotating catheters, capture catheters, suction catheters, and fluid jet devices.

WHAT TO EXPECT DURING THROMBOLYTIC THERAPY

During the procedure, you will have electrodes placed on your chest to monitor your heart rate and rhythm. A blood pressure cuff will be placed on your arm to monitor your blood pressure. An IV will be placed in your arm through which you will receive medication to help you relax. You will remain awake during the procedure with minimal pain or discomfort.

Thrombolytic drugs and devices are transported through small catheters (flexible thin tubes) within your veins. A small puncture is made into a vein in your groin, thigh or behind your knee, and a long catheter is directed to the area of the clot. IV contrast is injected into the catheter and under fluoroscopy (an imaging technique) pictures are taken of your veins to allow your surgeon to better visualize the extent and location of the clot. This is called a venogram and is used as a “road map” for treatment. You may feel a warm rush or burning sensation during the injection of contrast; this is normal and will subside within minutes. Once the venogram is complete, the physician has the road map of your veins to use for guidance during thrombolytic therapy.

The process of thrombolysis often takes from 24 to 72 hours. Once the clot-busting medication is administered, the catheters are often left in place overnight to allow the medication to break up or “lyse” the clot. **During this period, it is imperative that you lie flat, keeping the affected extremity straight to minimize risk of bleeding.** Another venogram may be performed 12 to 24 hours later to assess whether the clot has dissolved or moved. This process may be repeated two to three times until a satisfactory result is achieved. Once the process is

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complete, the catheters are removed, and pressure is held at the puncture site for 20 minutes. A pressure dressing will be applied to the access site, and you will be asked to spend 4 to 6 hours with the affected part of your body lying flat.

WHAT ARE THE RISKS AND COMPLICATIONS OF THROMBOLYTIC THERAPY?

Like any procedure, thrombolysis is associated with certain risks and benefits.

- **Bleeding or hematoma:** This can occur at the access site. Bleeding into the brain can cause a stroke, but this is extremely rare affecting less than one percent of patients undergoing thrombolytic therapy.
- **Allergic reaction to contrast dye:** It is important to let your surgeon know if you have allergies to iodine, shellfish, or contrast dye before the procedure. If you have allergies, your physician may prescribe medications for you to take before your thrombolytic therapy.
- **Kidney dysfunction:** The contrast dye that is used during the procedure may be harmful to your kidneys. This may result in a temporary elevation in your creatinine level. You are at higher risk for developing kidney failure if you have a history of diabetes or known kidney disease. Your physician may choose to prescribe medications or give you fluids before your procedure to minimize the risks of kidney failure.
- **Clotting disorders:** Individuals with known clotting abnormalities may be at higher risk for bleeding and other complications during thrombolytic therapy.

INFERIOR VENA CAVA FILTERS

The inferior vena cava is a large vein in your abdomen that transports blood back to your heart. Depending on the extent and location of the deep vein thrombosis, your physician may recommend placement of an **inferior vena cava filter** (IVC filter). These filters are reserved for patients unable to take blood-thinning medications or for those at elevated risk of developing recurrent deep vein thrombosis with pulmonary embolism. IVC filters are small metal devices placed in the inferior vena cava and are designed to trap small segments of clot that are headed to the lungs. IVC filters are often temporary and can be removed when no longer needed but may be permanent in certain cases.

IVC filters are placed through a vein in your groin, arm, or neck. Your surgeon will make a small puncture into your vein with a needle. A small catheter is inserted and with assistance of x-ray images, the filter is guided to the appropriate location. A pressure dressing will be applied to the puncture site.

If your surgeon has placed a temporary or retrievable IVC filter, it is important that you follow up routinely for duplex ultrasound scans. A duplex ultrasound scan determines if there has been any more clotting in your veins or within the filter. In most cases your physician will **recommend that the filter be removed within 3 to 6 months** of placement or as soon as possible. The filter may be removed if you are then able to take blood-thinning medications or if you are no longer considered at high risk of DVT/PE.

HOW TO STAY HEALTHY

It is important to follow all the discharge instructions given to you by your physician. After one episode of DVT you are five times more likely to develop another episode of DVT. If your physician has prescribed a blood thinning medication such as **warfarin (Jantoven®)**, **Coumadin®** or **enoxaparin (Lovenox®)**, it is important that you take this medication as

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directed. Blood-thinning medications are designed to prevent new clots from forming within your veins; these medications do not break up or dissolve existing clots.

Blood-thinning medications will significantly increase your risk of bleeding. It is important that you follow appropriate steps to minimize your risks of bleeding and other complications:

- Limit alcohol intake.
- Notify your physician of any changes in your medications.
- If you are taking warfarin (Jantoven[®], Coumadin[®]), keep your intake of green leafy vegetables consistent.
- Use caution when shaving. Men often benefit from using an electric razor to minimize small cuts.
- Use a soft toothbrush to avoid bleeding of the gums.
- Reduce your risk of bleeding by taking safety precautions to prevent falls or accidents
- Take your medication as directed and at same time each day
- Consult with your physician regarding vitamins, over-the-counter medications, and natural products such as herbs.

Notify your physician if you have any of the following:

- Excessive menstrual bleeding or bleeding between menstrual periods
- Nose bleeds
- Bleeding from gums
- Blood in urine
- Bruising
- Diarrhea, vomiting, or inability to eat (this can alter medication levels)
- Become pregnant or breastfeeding
- High blood pressure
- Health problems such as liver disease or renal insufficiency (your kidneys are not working to clear toxins) or antiphospholipid syndrome
- Signs of allergic reaction such as rash, hives, itching or wheezing

Seek help if you experience:

- **Severe headaches**
- **Changes in strength in a part of your body or have trouble speaking**
- **If you are vomiting blood**
- **If you have blood in your urine, or bloody or dark stool**
- **A serious fall or head injury, even if there are no other symptoms**
- **Any bleeding that will not stop**
- **If you are scheduled for a procedure, it is important to consult with your physician regarding directions of your medication.**
- **Do not stop taking your medication without speaking with your physician**

BLOOD-THINNING MEDICATIONS: TAKE AS DIRECTED

Warfarin (Jantoven[®] formerly known as Coumadin)

- After discharge, you may be given both warfarin (Jantoven[®], Coumadin[®]) and Enoxaparin (Lovenox[®]). The blood-thinning effects of warfarin (Jantoven[®], Coumadin[®]) often take at least 5 days to become therapeutic. Lovenox[®] is given as a bridge therapy to protect you from developing a new or larger DVT in the meantime.

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- If you are discharged on warfarin (Jantoven®, Coumadin®), you will need to follow up with your primary physician in **3 to 5 days** to have a blood test called an INR (international normalized ratio) performed. An INR determines how thin your blood is. For the first few months, your primary physician may draw an INR once weekly until your level has become therapeutic. It is extremely important to follow up with the INR checks and take as directed the medications by your physician.
- Once your INR reaches a therapeutic level, you will be instructed to **discontinue** the enoxaparin (Lovenox®) treatment. This normally takes around 5 days.
- In most cases, enoxaparin (Lovenox®) is used purely as a bridge treatment until your INR becomes therapeutic.
- Depending on your circumstances, the INR level should be (2.0 to 3.0) or (2.5 to 3.5). Your physician will give you personalized instructions upon discharge.

Enoxaparin (Lovenox®)

- Enoxaparin (Lovenox®) is a pre-filled weight-based injectable blood thinner that is prescribed for treatment of DVT.
- Depending on your condition, your physician may prescribe a once-daily dose or twice-daily dose.
- Enoxaparin (Lovenox®) is primarily used as bridge therapy but can also be used for long-term treatment and prophylaxis (prevention) of DVT.
- Enoxaparin (Lovenox®) is injected at a 90-degree angle into a fatty area of the abdomen. Do not rub the site after injection.
- Prior to discharge, a team of healthcare professionals will educate you on the appropriate dosing, application, and disposal of enoxaparin (Lovenox®) syringes.

OTHER “BLOOD THINNER” MEDICATIONS

Your physician might prescribe a classification of oral medication called direct-acting inhibitors instead of Enoxaparin or warfarin. There are many different direct-acting inhibitors, depending on your health history and clinical presentation will determine which medication your physician will prescribe. Medications may include:

Dabigatran (Pradaxa®)

Rivaroxaban (Xarelto®)

Apixaban (Eliquis®)

Edoxaban (Savaysa®)

Betrixaban (BevyxXa®)

Some of the advantages of these medications are that they work quickly with no need for bridging therapy and frequent monitoring, there is no dietary concern for vitamin K rich food interactions such as with warfarin (Jantoven®, Coumadin®), or medication redosing. Because these medications leave the body rapidly it is especially important to take them at the same time every day and not miss any doses. Notify your physician if you have a history of or are newly diagnosed with a liver or renal impairment. These impairments can affect how your body responds to the medication, and most of them do not have a reversal agent, making it important to notify your physician of changes in your health.

WHAT TO DO AT HOME

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After an episode of DVT, it is important that you follow specific discharge instructions:

- **Walking** is extremely important. Sedentary behavior may put you at increased risk for recurrent DVT.
- **Compression therapy** can be the single most important measure to take after an episode of DVT. Compression therapy **helps prevent** the development of post-thrombotic syndrome (PTS). You will be discharged with a prescription for compression stockings ranging from pressure gradients of 20-30 mmHg to 30-40 mmHg. It is necessary that you wear compression stockings **each day**. You may remove the compression stockings at bedtime and re-apply after a morning shower. Your local surgical supply store will measure your legs and fit you for the appropriate size compression stockings
- **Leg elevation** is important after an episode of DVT to relieve any swelling that can occur. When sitting, try to keep the affected leg elevated to a level at or above the level of your heart.
- **Adequate hydration** is beneficial for blood flow and overall health.

WHAT TO LOOK FOR AND WHEN TO CALL YOUR PHYSICIAN

Contact your physician immediately if you experience the following:

- Increased pain or fever
- Swelling, warmth, or pain at the puncture site
- Worsening of leg swelling
- Bleeding
- Shortness of breath or chest pain
- Coughing up blood

DISCHARGE INFORMATION AND FOLLOW-UP

The hospital discharge time is before 11 am. Please arrange transportation in advance.

After you have been discharged from the hospital, you will need to schedule a follow-up visit with your surgeon in 1 to 2 weeks after your procedure. Your follow-up visit will take place at one of our outpatient clinics. **To make an appointment please call 631.638.1670.**