



*Circulating the Facts About
Peripheral Vascular Disease*

Venous Disease

*Brought to you by the Education Committee
of the Society for Vascular Nursing*



Circulating the Facts About Peripheral Vascular Disease

Venous Disease

This booklet will give you and your family information about problems with leg **veins** and their treatment.

Many healthcare providers are involved in the diagnosis and treatment of **venous** problems. Physicians, nurses, and vascular technologists will assess the condition of your blood vessels, explain test results, and discuss a plan of treatment with you. Only you can follow the treatment program and change some of your risk factors.

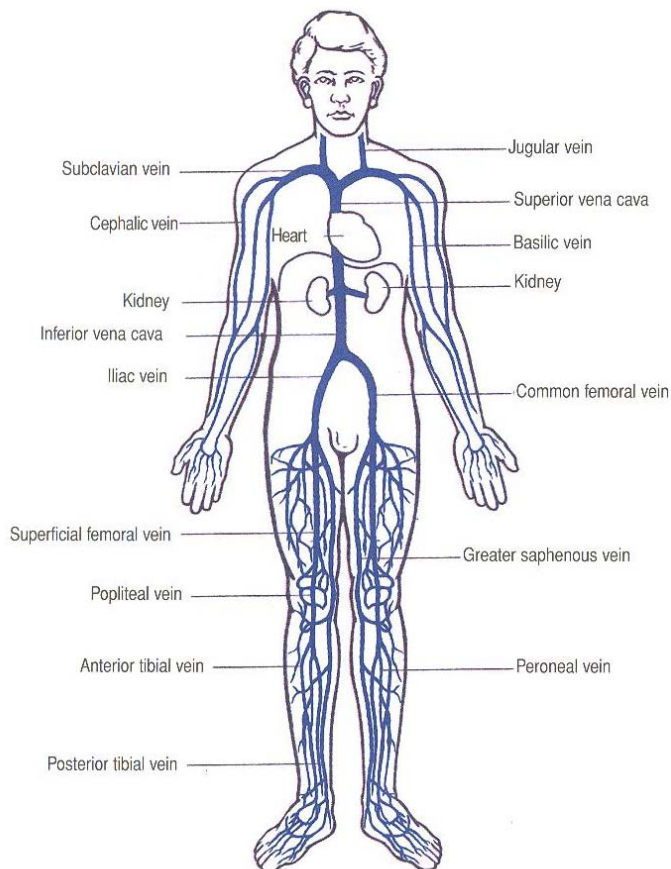
Information in this booklet:

- Identifies the **veins** involved
- Describes **venous circulation**
- Explains common **venous** problems
- Describes risk factors for developing **venous** problems
- Explains tests
- Provides information on treatment and surgery for **venous** problems

Boldface type is used to highlight words that may not be well known.
These words are defined on the last page of this booklet.

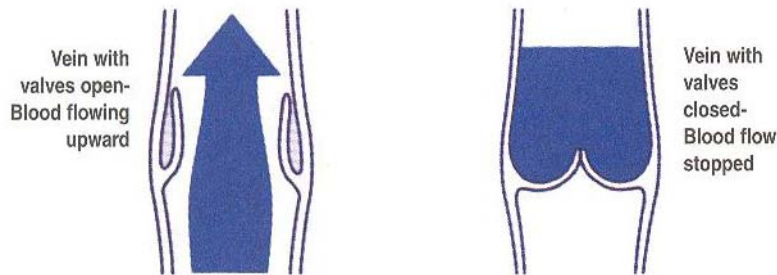
The Circulatory System

The circulatory system is a network of blood vessels, the largest being the arteries and the **veins**. The heart pumps oxygen-rich blood through the arteries to all body tissues. This provides body cells with the food and oxygen needed. The **veins** return the blood from the body to the lungs and heart to be enriched with food and oxygen and repumped out to the body tissues again. As **venous** blood flows toward the heart, it travels from the **superficial** to the deep **veins**. **Superficial veins** are located close to the surface of the skin. Deep **veins** are in the muscles of the arms and legs.



Blood flows faster and under more pressure in the arteries. Because of this pressure, the **artery** walls are strong and muscular. The **veins** are under less pressure and therefore the vein walls are not as strong.

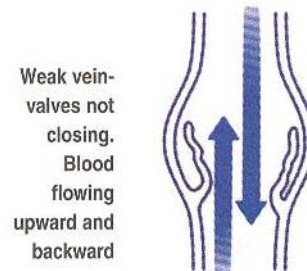
The inner walls of **veins** have a system of **valves** which open as blood flows toward the heart. The **valves** close to stop blood from flowing backward toward the feet. The muscles of the legs help **venous** blood return to the heart by squeezing the vein and pushing blood upward. Moving the feet and walking cause this pumping action to occur.



The system of **veins** in the body may develop two problems

- Vein walls become weak
- **Valves** in the **veins** may not work as well or may stop working altogether

In both of these instances, the blood collects or pools in the vein. Sluggish blood flow and pooling blood, sometimes referred to as **venous** stasis, may cause swelling and blood clots.



What Are the Diagnostic Tests For *Venous Disease?*

If your physician suspects that you have problems with your **veins**, you will be asked specific questions and examined in the sitting, lying, and standing positions. Specific tests ordered may be noninvasive and/or **invasive**.

Non-Invasive Testing

Non-invasive tests may be performed on an outpatient basis or during a hospital stay. They may be in a **non-invasive** vascular laboratory or a physician office. No special preparation is required. The tests are painless and without risks or side effects. The use of needles, dye, or x-ray, is not required. No special care is needed after the tests are done.

Venous Doppler Exam

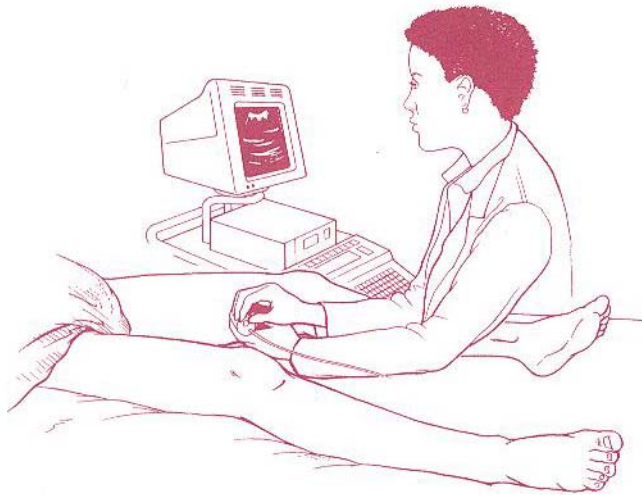
This test uses **ultrasound**, sending high frequency sound waves which are reflected from the moving red blood cells. During the test you will be asked to lie down and lightly bend your knees into a frog-legged position. The examiner places a probe over your **veins** at various locations on your legs and listens with a device that looks like a stethoscope. You may be asked to take a deep breath and hold it, then release your breath quickly, during the test. This test is used to diagnose blood clots or weak **valves** in the legs.

Impedance Plethysmography or IPG

This test evaluates the flow of the blood within the major **veins** of the legs. The examiner will place a blood pressure cuff on your thigh and plastic strips on your calf while you are lying down. The thigh cuff will be inflated during part of the test. The plastic strips are connected to a machine which will record blood volume and blood outflow in your **veins**. This test is used to diagnose blood clots.

Duplex Imaging

This test uses **ultrasound**, as in the Doppler test, but changes the sound waves into a picture of your **veins**. The examiner may have you stand, lie on your back, and (if possible) on your stomach. The examiner will place a cool gel on your legs and then run a probe over the **veins** to view them. This test may be used to diagnose many different problems of the **veins** including blood clots and weak **valves** in the legs.



Invasive Testing

A **venogram** is an x-ray picture of your **veins**. You may have this test done as an outpatient or while you are hospitalized . You will be taken to the x-ray department for this test and asked to sign a consent form since this x-ray involves dye injection. You will remain awake, although you may be given medication to help you relax. Dye is injected through a small needle in a vein. You can expect the dye injection to cause a brief hot, burning sensation. This test is used to diagnose blood clots and to obtain more specific information about the **venous** system.

Venous pressure measurements are used to evaluate **chronic venous insufficiency**. A small needle is placed in a surface vein of the foot and connected to a machine that will measure pressure. Pressure readings are compared while lying, sitting, and pumping the foot to check the function of the **valves** in your **veins**. After your physician obtains the results of your tests, treatment choices will be discussed with you.

What Is

Venous Disease?

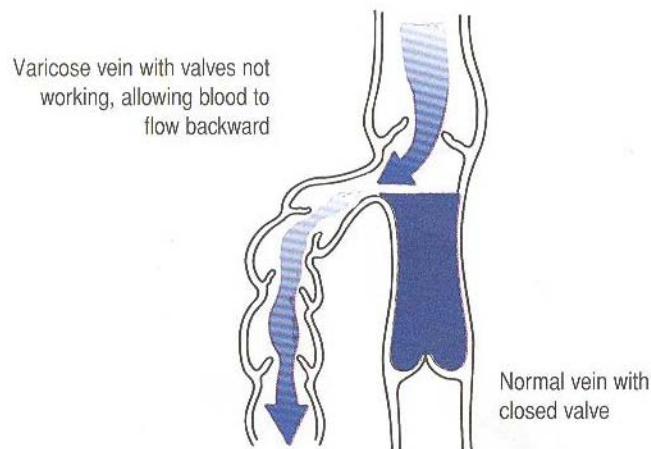
In this section, the main problems of **veins** will be explained. Causes, signs, and symptoms will be outlined. The recommended treatment for each problem will be discussed.

Varicose Veins

Varicose veins are **superficial veins**, located close to the surface of the skin, that have become stretched and appear bulging and uneven. Although **varicose veins** can be found in other parts of the body, they most frequently occur in the legs.

What Are the Causes?

The exact cause of **varicose veins** is unknown. One theory is that weak vein **valves** allow blood to collect in the **veins**. This collecting of blood causes the **veins** in the lower legs to stretch, become thinner (like a balloon as it is blown up), and twist. Eventually, fluid may seep out of the **veins** into the surrounding tissues and cause leg swelling.



Who Will Get

Varicose Veins?

Certain risk factors may lead to the development of **varicose veins**.

- Increased Age
- Multiple Pregnancies
- Heavy Lifting

Signs and Symptoms of Varicose Veins

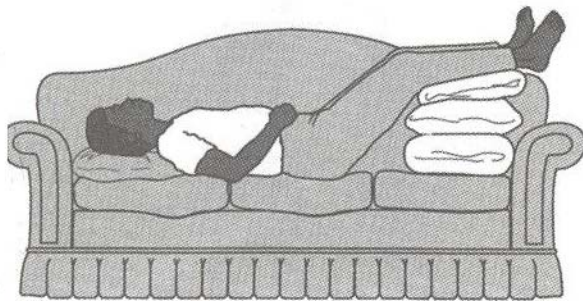
- Purple, bulging, or uneven appearance of **superficial** surface **veins** in the legs
- A dull, heavy ache in the legs after standing a long time
- Leg swelling
- Less common symptoms: itching, burning, fatigue, and cramping of the legs

Treatment of Varicose Veins

See your physician for proper treatment of your **varicose veins**.

To relieve symptoms and prevent the condition from becoming worse:

1. Avoid prolonged standing. If you must stand, flex your feet or stand on your tip toes, 2-3 times each minute
2. Elevate your legs above the level of your heart for 1/2 hour, three times daily
3. Wear fitted elastic support stockings prescribed by your physician to relieve symptoms and prevent the condition from becoming worse
4. Avoid crossing your legs
5. Control your weight



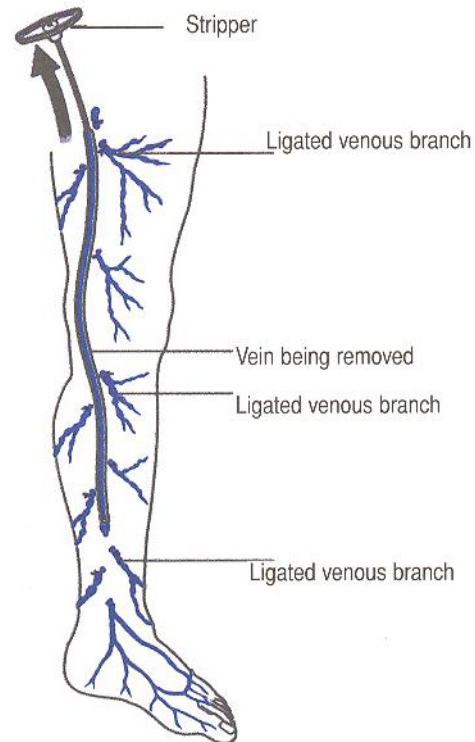
Other Treatments

Sclerotherapy is an outpatient procedure in which a chemical is injected into a varicose vein. This chemical causes the vein walls to stick together, preventing flow of blood in that vessel. Afterward the leg is firmly wrapped with an elastic bandage, or support stocking, to press the walls of the **superficial veins** together. When the bandages are removed, the bulging of the **veins** may be improved. Several sessions of **sclerotherapy** may be needed depending on the type and number of **veins** treated.

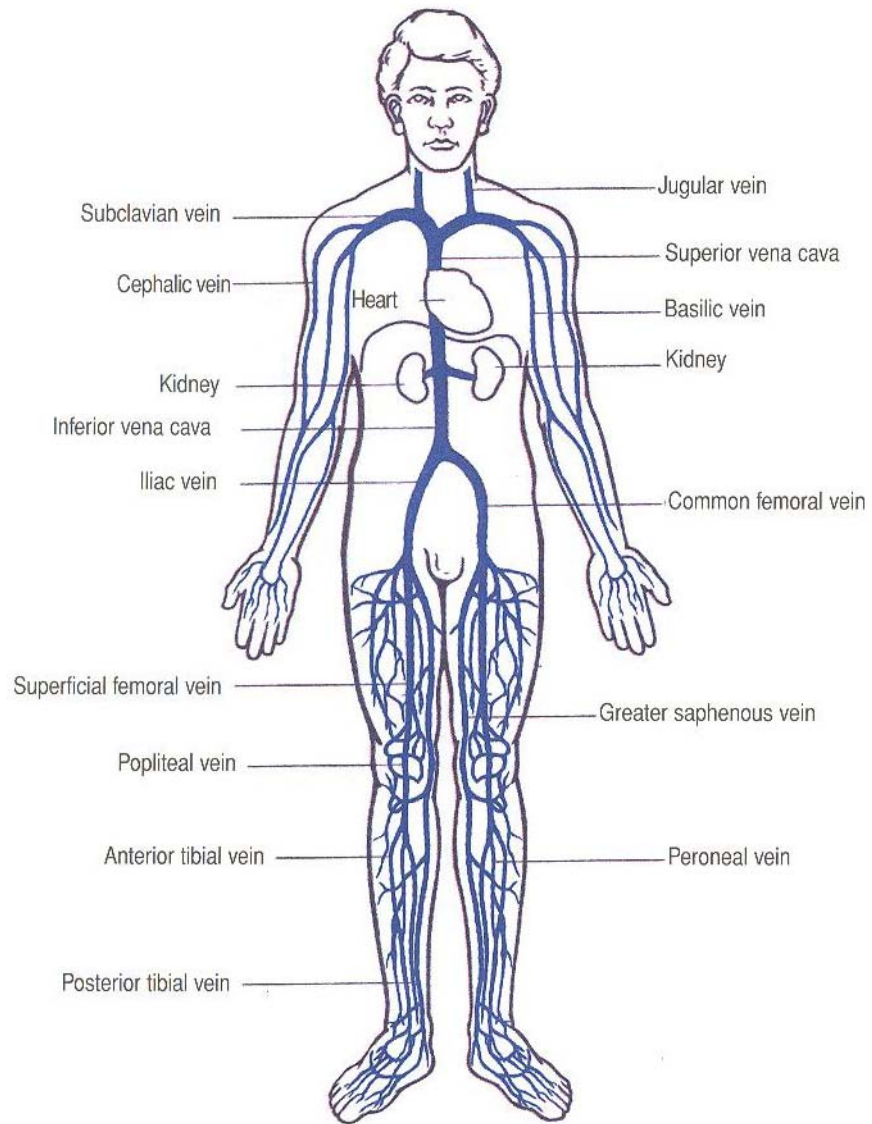
Endovenous Laser – Using a laser through a small puncture in the vein, the energy from the laser is sent into the vein and may collapse the vein, sealing it shut. Again compression bandages or compression stockings are placed on the leg post procedure.

Surgical **ligation** and **stripping** is a type of surgery to treat **varicose veins**. Many short incisions are made along the leg. During **ligation**, the **varicose veins** are “tied off.” **Stripping** occurs when the damaged vein(s) is removed.

When a **superficial** vein is removed, the other **veins** in the leg easily take over the work of that vein. This simple surgery can be done under general, spinal, and, in some cases, local anesthesia during a hospital stay or on an outpatient basis. After surgery, the leg is firmly wrapped with an elastic bandage or support stocking to control bruising and swelling. Some bruising of the leg after surgery is normal and will go away. You may resume normal activities shortly after surgery, but lifelong attention to **varicose veins** is required.



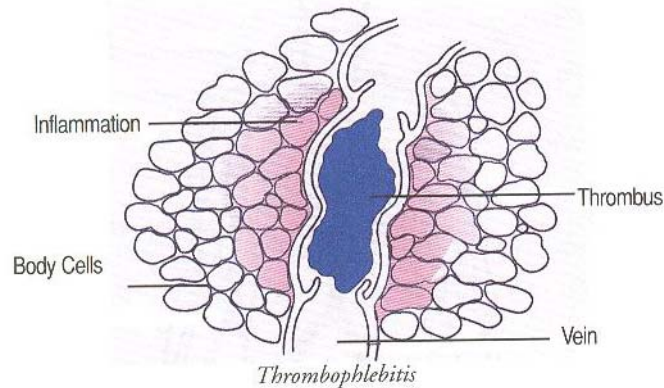
Vein Ligation and Stripping



Superficial and Deep Venous Systems

Deep Vein Thrombosis and Thrombophlebitis

Thrombosis is caused by a **thrombus** (blood clot) clinging to the wall of the vein. The clot irritates the vein wall causing inflammation and pain.



There are two types of **thrombophlebitis**. The first is called **superficial** because it occurs in the **veins** which are close to the skin surface. The other type is **deep vein thrombosis (DVT)**, and it occurs within a vein deep in the muscles. It usually occurs in a leg vein but can also occur in the arm or other areas of the body. Because the treatment is different for **superficial thrombophlebitis** and deep vein thrombosis, they will be discussed separately.

Superficial Venous Thrombophlebitis

What Are the Causes?

Possible causes of **superficial thrombophlebitis** are irritants to the lining of the vein. Some causes may be:

- Injury to the affected part of the body
- Infection
- Prolonged use of intravenous (IV) medications
- Family history of blood clots/inherited clotting disorder
- Hormone replacement therapy
- Smoking
- Traveling with prolonged sitting
- Cancer
- Infections or inflammations

Signs and Symptoms of Superficial Thrombophlebitis

- A hard, cord like feeling of the vein
- Tenderness or pain over the vein
- Redness or a feeling of warmth over the vein
- Possible swelling of the affected arm or leg

Treatment of Superficial Thrombophlebitis

- Warm, moist soaks to the area, as recommended by your physician. They may be continuous or for 30 minutes every 6 hours.
- Elevate the affected arm or leg
- Support stockings or elastic bandage
- Anti-inflammatory medicine
- Medicine for pain as needed

This condition usually improves quickly and without complications. These clots **do not** usually break off and float to another part of the body, such as the lung.

Deep Venous Thrombosis (DVT)

This is a serious condition that occurs when a deep vein is partially or completely blocked by a blood clot. Your physician's treatment goal is to prevent the clot from getting bigger or breaking off and floating in the blood stream to another part of the body, such as the lung.

What Are the Causes of DVT?

Possible causes of DVT are conditions that cause sluggish blood flow in the **veins**, or an increased tendency to form clots. These include:

- Prolonged bed rest
- Decreased activity for a long period of time
- A recent major surgery or the presence of a major illness
- Injury to the **veins**
- Obesity
- Pregnancy
- Injury to an arm or leg
- Cancer and its treatment
- Previous DVT or **pulmonary embolism (PE)**
- Use of birth control pill or hormone replacement therapy
- Family history of DVT or PE

Signs and Symptoms of DVT

- Unusual sudden swelling of an arm or leg
- Pain, cramping, or an aching feeling in one leg or arm
- Increased skin temperature and redness over a part of the arm or leg
- A bluish color of the skin, in severe cases
- There may be no symptoms at all

Treatment of DVT

If you are diagnosed as having DVT, you may need to be admitted to the hospital and you will need to stay in bed and keep the affected arm or leg elevated for a few days. The nurse will help you to properly elevate your leg, with your ankle raised higher than your knee and your knee higher than your waist. Bed rest and elevation will help decrease the swelling and help to prevent the clot from breaking loose from the vein wall. Pain medication may be given to make you more comfortable.

An intravenous **catheter** may be started so that you can receive a blood thinner medicine call heparin. Heparin helps prevent the clot from getting larger, while your body works on dissolving the clot and finding new routes for blood to pass around the clot. Blood tests will be done frequently to make sure that you are getting the right amount of heparin.

Before your discharge from the hospital, your medicine will gradually be changed from heparin to a pill called Coumadin or warfarin. It is very important that you take this medicine exactly as ordered by your physician. When you are an outpatient, you will also have your blood tested at intervals decided by your physician or nurse. This is to check the clotting of your blood and keep your dose of Coumadin safe and effective. You may have to take Coumadin for several months or longer if your physician believes it is necessary. You should have your blood checked at least monthly the entire time you are taking Coumadin.

Treatment of DVT (continued)

An elastic bandage may be used to wrap the involved arm or leg while you are in the hospital. You may be fitted for a special support stocking or sleeve before you go home from the hospital. This stocking/sleeve should be worn at all times for several months except while bathing or sleeping. Your physician will tell you when it is safe to stop using it.

The symptoms of swelling or discomfort may go away within a week of developing DVT, but it takes your body about six (6) months to recover. You can help the progress of your recovery by following your physician's or nurse's directions, taking your medicine, and keeping the swelling down. Because DVT can recur and cause permanent problems of swelling and leg discomfort, it is very important that you cooperate with the treatment.

Venous Ulcers

Venous ulcers can occur on the lower calf or ankle of the leg. They are caused by severe or long term swelling from poor **venous** flow which stretches and weakens leg tissue. This is called **chronic venous insufficiency**. The skin may become brown in color and leathery in texture. The skin breaks and **venous ulcers** form.

What Are the Causes?

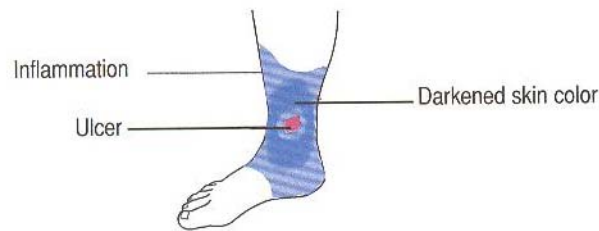
- Severe or long term leg swelling from backward blood flow in the **veins**
- Trauma (e.g., cuts, scrapes, blisters) to the lower legs

Signs and Symptoms of Venous Ulcers

- Bluish and/or brownish color of skin on lower legs
- Swelling and a feeling of heaviness in the legs
- Open sores with clear or blood-tinged drainage
- A burning or aching sensation at the **ulcer** sites

You Can Help To Prevent Venous Ulcers

- Avoid severe or prolonged swelling of the ankles
- Elevate your legs above the level of the heart for 30-60 minutes three times daily
- If possible, elevate the foot of your bed 4-6 inches on blocks or books
- Avoid pillows under your knees
- Wear elastic bandages, fitted support stockings, or a compression pump, as prescribed
- DO NOT sit or stand for periods of more than 15-20 minutes without walking or flexing your calf muscles
- Avoid injury to your legs
- Avoid crossing your legs
- Avoid constricting garments
- Reduce sodium (salt) in your diet as it causes fluid retention



Chronic Venous Insufficiency and Venous Ulcer

Treatment of Venous Ulcers

- Follow your physician's instructions for **ulcer** care
- When in bed, elevate your legs higher than the level of the heart to decrease swelling
- Elevate legs as much as possible during the day
- A compression pump may be used for severe swelling
- Elastic bandages or support stockings will help control swelling
- Your physician may order antibiotics if your **ulcer** shows signs of infection
- Good nutrition including protein, carbohydrates, vitamins and minerals
- Drink 6-8 glasses of liquid (water) daily unless on a fluid restriction

Warning Signs

Report the following problems to your physician or nurse:

- Increased swelling of the feet, ankles, or legs
- New or larger **ulcers** of the legs
- Increased pain in the legs
- New discoloration of the legs
- Foul smelling drainage from the leg **ulcers**
- A change in temperature of the leg
- Bleeding
- Fever

Other Treatment

There are several forms of dressings, treatments and compression therapy that may be ordered, follow the directions provided by your health care provider. You may be referred to a wound care specialist.

In Conclusion...

Venous disease can cause problems of a sudden and serious nature, or more chronic and long term ones. Tests and treatment prescribed depend on how serious the problem is. In all circumstances, following your healthcare provider's directions, taking your medicine as prescribed, and eliminating swelling will improve your symptoms and help to restore you to a more independent lifestyle.

For More Information

Venous Disease Coalition (www.venousdiseasecoalition.org)
www.preventdvt.org

For A

Better Understanding

ARTERY: A blood vessel carrying oxygen-rich blood from the heart to the rest of the body.

CATHETER: A flexible tube placed in a blood vessel to inject dye or medication.

CHRONIC VENOUS INSUFFICIENCY: A chronic condition of poor venous blood flow, swelling, and weakening of the skin tissue.

CIRCULATION: The route through which blood travels in the body

DEEP VENOUS THROMBOSIS (DVT): A condition in which a deep vein(s) is partially or totally blocked by a clot.

INVASIVE: Tests which involve injection, dye, and/or x-rays to diagnose disease.

LIGATION: A surgical procedure during which the varicose vein(s) is tied off.

NON-INVASIVE: Tests which do not involve needles, dye, or x-ray to diagnose disease.

PULMONARY EMBOLISM (PE): Occurs when a DVT breaks free from its original site in a vein and then travels through the blood stream and into the lungs.

SCLEROTHERAPY: Injection of a chemical into a varicose vein to stop flow of blood in that vessel.

STRIPPING: A surgical procedure in which the varicose vein is removed.

SUPERFICIAL: A vein close to the surface of the skin.

THROMBUS: A blood clot.

THROMBOPHLEBITIS: Inflammation caused by a blood clot clinging to the vein wall.

ULCER: A sore or break-down of the skin surface and/or deeper tissue.

ULTRASOUND: Sound waves which are transmitted over a blood vessel and reflect off of moving red blood cells.

VALVES: Cup-like structures within the inner wall of a vein which prevent backward flow of blood.

VARICOSE VEINS: Veins close to the surface of the leg which have become stretched and are bulging and uneven in appearance.

VEINS: Blood vessels that carry the blood from the body back to the heart.

VENOUS: Relating to the vein or blood flow in the vein.

VENOGRAM: X-ray picture of the veins obtained by the injection of dye into the venous system.

VENOUS PRESSURE MEASUREMENTS: A simple invasive procedure which measures venous pressure and function of the venous valves.

VENOUS STASIS ULCER: An open sore caused by severe or long term swelling of the leg, which weakens the skin tissue.



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