

# **Lower Extremity Arterial Disease**

**The Vascular Group, PLLC**



## **LOWER EXTREMITY ARTERIAL DISEASE**

People who have peripheral arterial disease (PAD) or poor circulation commonly suffer from atherosclerosis. When atherosclerosis, also known as “hardening of the arteries” develops, it is due to the lining of the artery becoming rough and thickened. The thickening of the arterial walls is caused by a buildup of fatty material or plaque, such as cholesterol. Clogging the arteries and decreasing blood flow. Plaque buildup does not occur overnight but develops over many years. Ulcers may also form inside an artery. These ulcers have a rough surface which may cause particles of plaque or blood clots to dislodge into the circulation causing blockage of blood flow.

Atherosclerosis can cause the arteries to the legs to become narrowed or blocked; this is what is meant by lower extremity arterial disease. Signs and symptoms of decreased blood flow to the legs depend on the location of the arteries involved and the amount of narrowing. You may notice pain and/or cramps in the hips, thighs, or calves when walking specific distances, which is relieved by rest. This is called claudication. This symptom occurs when you walk because the leg muscles need more oxygen-rich blood during exercise, but are unable to get it due to poor circulation.

As atherosclerosis progresses, pain in the toes or feet may occur at rest. This is called rest pain, and occurs because the arteries are unable to deliver enough blood to the feet at rest. Rest pain is aggravated by elevation and improved by hanging the foot down in a dependent position. It usually occurs at night while your feet are up on the mattress and awakens you from sleep.

The most advanced stage of arterial disease is tissue necrosis also known as gangrene. As the disease progresses, areas of injury may not heal and skin breakdown occurs, leading to gangrene (dead, black tissue).

## **Other Signs and Symptoms of Peripheral Arterial Disease (PAD)**

- Decreased hair growth on the legs and toes
- Paleness or loss of color of the leg or foot when elevated
- Blue/red discoloration of the foot when hanging down
- Absence of pulses in the foot
- Numbness, tingling, or pain in the leg, foot or toes
- Coolness of the leg or foot
- A sore on the foot that does not heal

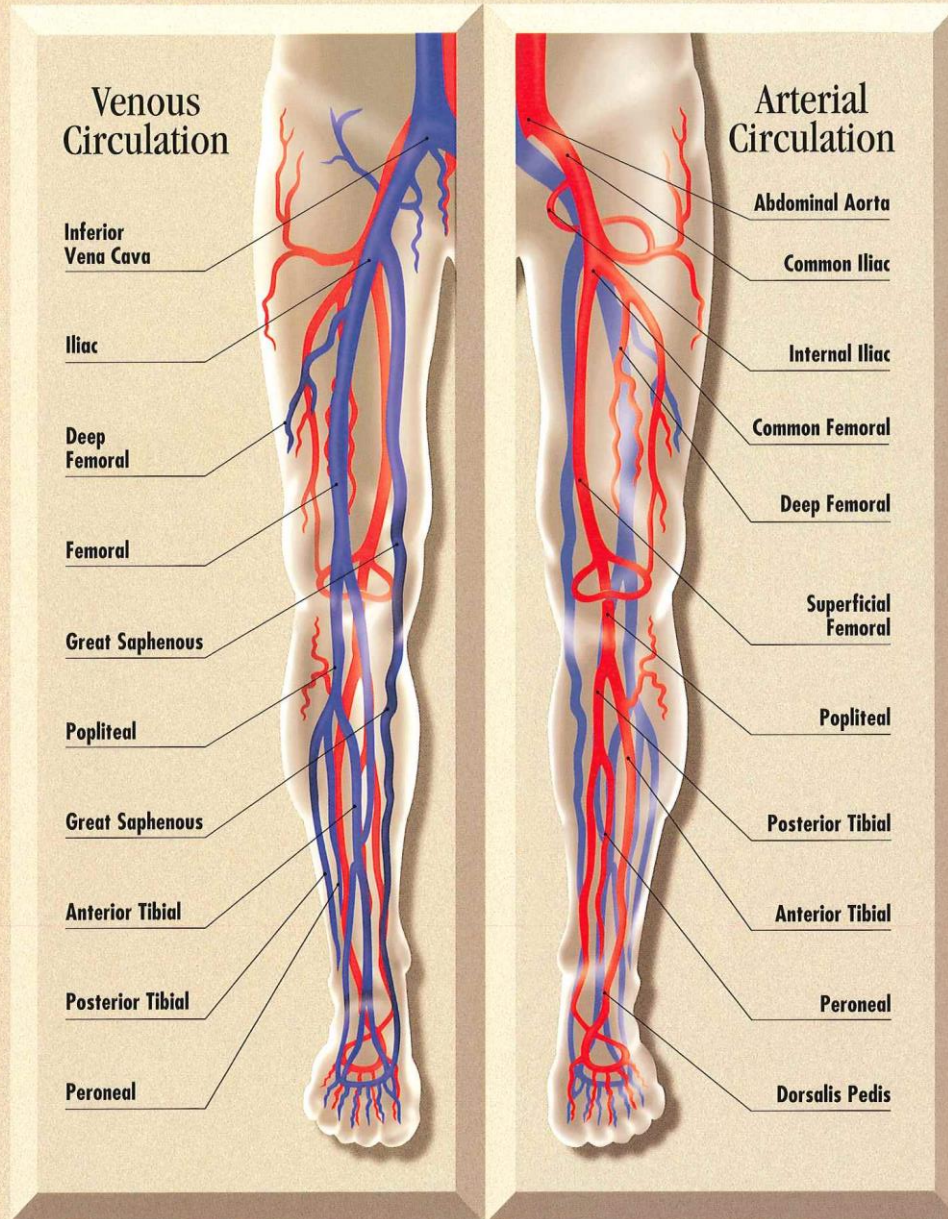
## **Risk Factors for Arterial Disease**

Studies have been done on people with atherosclerosis; this is to help predict which people will be at a high risk of developing this disease. These people usually have one or more of the following risk factors:

- Smoking
- Hypertension (high blood pressure)
- High cholesterol
- Diabetes
- Family history of atherosclerosis
- Obesity
- Inactivity

It is important to try and eliminate or minimize the risk factors that you can control, such as smoking, obesity, diabetes, and your activity level.

# Vasculature of the Leg



## **DIAGNOSTIC TESTS**

### **Non-invasive Venous Testing**

You may eat and drink before the exam and take your usual dose of medications unless instructed otherwise.

### **Venous Mapping**

A vascular technologist will apply gel and a probe on the skin of your leg. He/she will be looking for the presence, location, length, and size of the superficial veins in your legs and will mark these veins with a marker. A written copy will also go into your medical record. Your surgeon may use one or more of the “mapped” veins for bypass surgery. Please DO NOT wash these marks off until after your surgery.

### **Non-Invasive Arterial Testing**

You may eat and drink before the exam and take your usual dose of medications unless instructed otherwise.

### **Ultrasound**

This type of test uses ultrasound to send high frequency sound waves into the artery which are reflected by moving red blood cells. The test is used to diagnose blockage or ballooning of the artery and is often used to check your bypass after the surgery.

### **Magnetic Resonance Angiography (MRA)**

This test uses a large scanner with a powerful magnetic field to produce images. It does not use needles or dye, it is painless. The test takes about thirty to sixty minutes and requires you to lie very still in a noisy tube-like machine. Let your doctor know if you are claustrophobic before taking this test. This test cannot be done on people who have metal implants, such as metal plates, pacemakers, orthopedic screws, or cerebral aneurysm clips. It is okay if you have fillings in your teeth. Remove any jewelry or watches before the test. This test may be used to check for blockage in your arteries if you are not a candidate for a conventional angiogram.

## **Pulse Volume Recording (PVR)**

Blood pressure cuffs are placed at various levels on your arms or legs. The cuffs are inflated with a standardized quantity of air. Volume changes that occur beneath the cuff are recorded on graph paper. From this test the general location and severity of your disease can be determined. It takes about fifteen minutes to do this test.

## **Doppler**

This is an ultrasound stethoscope. Your doctor or nurse will apply ultrasound gel on areas of your arm or leg to listen to the blood flow. This is used frequently after your surgery to make sure your bypass is functioning properly.

## **Invasive Arterial Testing**

### **Angiogram**

An angiogram is an x-ray of your arteries. This test is done to determine the exact location of disease within your arteries. It is performed by a team of physicians, physician assistants, nurse practitioners, nurses and technicians. You will meet with someone prior to the test. They will review the procedure, possible side effects and ask you to sign a consent form. Blood work is drawn before the test to determine the ability of your blood to clot and your kidney function.

You will be required not to eat solid food eight hours before, and will need to stop liquids three hours before the angiogram. You will receive specific instructions regarding your medications, insulin and blood thinners from your doctor or nurse before the test.

You will not be able to drive for two days following the procedure. Therefore you will need to make arrangements for someone to drive you home. No heavy lifting, nothing greater than 10 lbs. for one week.

If you are a diabetic please check your finger stick the morning of your procedure.

For the test, an intravenous catheter is inserted into a vein in your arm and you may be given intravenous fluids and/or medications to help you relax. The femoral artery in your groin is most often used to insert a catheter in which to inject dye;

however the artery in your inner elbow or armpit may also be used. The area is first shaven and then numbed with a local anesthetic.

A catheter is inserted into the artery and dye is injected and then x-rays are taken. You will feel a warm sensation in your body as the dye is injected. When the catheter is removed, the physician will apply pressure to the insertion site for approximately fifteen minutes. The procedure takes one to one and a half hours to complete. After the procedure you will need to be on bed rest with the affected leg or arm straight for approximately four hours. This is to prevent any bleeding at the puncture site.

The dye acts like a diuretic, or water pill, so you may need to urinate frequently. You should drink a lot of fluids to help flush the dye from your kidneys. Notify the nurse or doctor if you have any pain, numbness or tingling during or after the procedure.

Some of our patients will need to take a medication called **Mucomyst** the day before the procedure. It is a small amount of a clear liquid with a bitter taste that can be taken in a small amount of fruit juice.

**ONLY if we have indicated that you will need it, it will be taken as follows:**

- One dose at 3pm the day before procedure
- One dose at 7pm the evening before procedure
- One dose in am of procedure just prior to leaving for your test

**Please let your doctor or nurse know prior to the test if you are allergic to contrast dye or shell fish. Then we will take appropriate precautions.**



## **ADMISSION PROCEDURE**

You will be admitted on the Vascular Surgery service under the care of the Vascular Surgeons. Your referring physician and any other medical specialist will be notified of your admission and surgery date.

If an angiogram is ordered on the day of admission, you should report to the specified area at the instructed time. Otherwise, you will receive a phone call from the Admitting Office with instructions for your arrival. If you do not receive a phone call by noon, please contact our office at 518-262-5640 or 1-877-827-2852.

If you are to be admitted the day of surgery (same day surgery) you will need to have pre-admission testing prior to your scheduled surgery. At pre-admission testing you will meet with an anesthesiologist, and nurse. You may have blood work, a urine test, EKG, and a chest x-ray. They will review pre-operative instructions including fasting and medications to take the morning of surgery.

This whole procedure takes approximately two to three hours. If you need to have any other testing we will try to schedule it the same day. If you are to be admitted the day before your surgery the above tests will be performed when you are admitted.

For same day surgery the hospital will notify you the day before your surgery after 2:00pm to tell you what time to report to the hospital. If your surgery is on a Monday you will be notified the Friday before your surgery.

## TREATMENT FOR LOWER EXTREMITY ARTERIAL DISEASE

### **Risk Factors**

Eliminate or minimize your risk factors for atherosclerosis; don't smoke, see a doctor to control your blood pressure or diabetes, eat a low fat/low cholesterol diet, lose weight if overweight, and perform regular exercise.

### **Angioplasty and Stenting**

This procedure may be used for short areas of blood vessels narrowing. This would be done at the same time as your angiogram if the doctor felt that it would be successful. A small catheter with a balloon is inflated and pushes the plaque against the inner wall of the artery making room for more blood flow. Then a stent is left in place to keep the artery dilated. The balloon is deflated and the catheter is removed. Dye is then injected and x-ray pictures are taken to make sure the artery has opened adequately. You will go home the day of your procedure.

An antiplatelet agent is usually given prior to the procedure and for some time after 1-3 months or longer. These are used to reduce the risk of platelet aggregation (clumping) and thrombus (clot) formation. Plavix and aspirin are common antiplatelet agents that are generally prescribed before and/or after your stenting.

### **Surgery**

Depending on the exact location and extent of your blockage, the doctor will determine what surgery is needed. Your doctor will have a general idea of what type of surgery you need after talking to you about your symptoms, and reviewing your tests. There are a few different types of surgery available.

***Endarterectomy*** – This surgery involves opening the diseased artery, removing the plaque, and closing the artery and incision.

***Bypass*** – This surgery involves the use of one of your veins, usually from either leg, or a synthetic graft to detour the blood flow around these areas of blockage. Incisions are made at various locations in the leg. The bypass is sewn into an artery above the blockage and to the artery below the blockage. Blood flow then goes from the artery, through the bypass, and back to the artery which supplies the leg with blood.

***In situ Bypass*** – This surgery uses the vein in its normal position to bypass the blocked artery of the same leg

### **What can I expect before surgery?**

The surgery is usually done with spinal or epidural anesthesia. Someone from the anesthesia department will speak to you before surgery and will discuss the different forms of anesthesia with you before you sign a permission form. You will not be allowed to eat solid foods eight hours before surgery. You will have intravenous lines inserted so that you can receive fluids before and during your surgery. Someone will review your medications to see which, if any, you can receive the morning of surgery. As well as talk to you about the importance of deep breathing and coughing exercises, and the importance of walking after surgery.

### **What can I expect during surgery?**

If you have spinal or epidural anesthesia you will be awake during the operation, but you will not feel anything below your waist. You will be given medication to help you relax. A urinary catheter will be inserted. The operation takes about three hours. You will lie flat on a table and the nurses will help make you comfortable. Sterile drapes will be positioned over you to prevent contamination of the area in which the doctor is operating.

### **What can I expect after surgery?**

Postoperatively you will spend some time in the Post Anesthesia Care Unit (PACU) or Recovery Room, approximately two to three hours. Then, you will be transferred to a hospital room.

**Days 1 and 2** – Immediately after surgery you will be on bedrest and will not be allowed to eat or drink. Usually the following morning after being seen by the doctor you will be allowed out of bed to walk, and can resume eating. When you are out of bed, it is important to keep your legs elevated to minimize swelling. It is normal to have some swelling of the operative leg. If you have a urinary catheter, it will be removed the day after surgery. The nursing staff will keep a pillow under your legs to prevent pressure on you heels. **It is important to keep pressure off of your heels at all times while you're in bed or in a chair.** Physical therapy will be ordered if the nursing staff and/or physicians feel it is necessary for your recovery.

**Days 3 to 7** – You will be encouraged to walk. The nurses will assist you until you are walking steadily. You may need a walker for safety initially. Once you are walking and moving around, and your doctor feels you are ready, you will be discharged from the hospital. The time of discharge is 10:00am.

## **DISCHARGE INSTRUCTIONS**

### **What can I expect when I go home?**

- No driving for two weeks after discharge
- It is normal for you to feel tired. This may last for four to six weeks.
- It is important for you to push yourself to get up every day, get dressed, and take short, frequent walks. You should gradually increase the distance of your walks.
- When resting, you should elevate your legs. It is normal to have swelling in the leg that was operated on. The swelling may last up to two months.
- Avoid prolonged standing as this will increase the swelling.
- Before leaving the hospital, you will be given a prescription for pain medication. It is important to take the pain medication to allow you enough comfort to walk and to perform light activities.

### **Wound Care**

- Along your surgical incision you will have staples or sutures. These will remain in place until you return for your post-operative office visit, which is approximately two weeks after you are released from the hospital. You should take a shower, not a bath, every day. You should cleanse your incisions gently with soap and water daily.
- Pat the area dry after the shower.
- If drainage is noted along your incision it needs to be painted with Betadine and covered with a dry sterile dressing.

## **What to Report**

- Redness that extends away from your incision.
- Drainage, not the color, odor and amount.
- Temperature greater than 101f for twenty four hours.
- A sudden change in the ability to move or use your leg, or a loss of the ability to feel your leg.
- A sudden increase in the pain that is not controlled by your pain medication.

It is important to keep your follow up appointments. If any problems occur, do not hesitate to call the Vascular Group. There is always someone there to answer your questions.

## **COMPLICATIONS**

While precautions are taken to prevent complications, our records show that lower extremity revascularization surgeries performed by The Vascular Group have approximately a three percent risk of complications. This means that three out of every hundred operations have some sort of complication; while ninety seven out of every hundred are without complications. We have attempted to outline these possible complications to help you understand the risks associated with your surgery. While the most common type of complications known have been listed, other unforeseen or remote complications may also occur.

Possible complications include bleeding, infection, graft blockage, stroke, difficulties in breathing (fluid in lungs, pneumonia), heart rate and/or rhythm disturbances, heart attack/heart failure, kidney failure, nerve injury, sexual dysfunction/male impotence, pseudo aneurysm (leakage of blood from the graft and artery connection), formation of blood clots, limb loss, and death.

If you have any questions or you feel you need more information, please call The Vascular Group and ask to speak to a Nurse Clinician or Physician.

**IMPORTANT INFORMATION FOR PEOPLE WHO RECEIVE A SYNTHETIC (MAN-MADE) GRAFT:**

It is currently recommended that people with man-made prosthetic grafts (this includes Gortex) receive oral antibiotics on the same day as any invasive procedures. This includes minor surgeries and some dental work. This recommendation is aimed at preventing infection of the graft material. Please cut out the following wallet sized card and present it to your dentist and doctors with your next office visit. They should keep a copy of it on file for their records

Name:  <hr/> <hr/>
Dear Doctor or Dentist, this patient has a prosthetic intravascular graft. It is recommended that he/she take antibiotics prior to any invasive procedures in order to prevent graft infection. For dosing regimens, please follow the Endocarditis Prophylaxis Regimen for Patients at Risk. If you have any questions, please call Vascular Surgery at Albany Medical Center (518) 262-5640 or 1-877-827-2852.

## **FOOT CARE FOR PEOPLE WITH PERIPHERAL DISEASE**

People with poor circulation must be very careful in caring for their feet. You must remember your circulation is less than normal and any injury to your feet could cause poor healing and/or infection.

### **Bathing**

- Wash your feet daily with a mild soap and warm water.
- Check the water temperature with your hands, not your feet. Sometimes the feet have less feeling and it is easy to burn yourself.
- After bathing, take care to dry your feet well. Pay special attention to between your toes.
- Inspect your feet daily. Examine around your toenails, between your toes, and the bottoms of your feet. If you can't see the bottoms of your feet well, try using a hand-held mirror, or ask a family member to help. Look for any corns, calluses, redness, swelling, bruises, or open areas.

### **Pedicure**

- Cut your toenails straight across and file the edges carefully. Do this after the nails have softened from bathing.
- Do not trim your nails if they are overly thickened, badly ingrown, infected, painful, or if you are a diabetic. In these cases, toenails should be cut by a foot doctor (podiatrist).

### **Footwear**

- Shoes should be made of soft, flexible leather. Man-made materials such as patent leather and plastic should be avoided as they prevent evaporation and may contribute to fungal infections.
- Shoes should be closed-toe and allow all toes to wiggle when standing.
- Sandals ideally should not be worn. They do not provide enough protection for your feet. Thong-type sandals may also cause blisters and open sores.
- It is best to buy shoes at the end of the day to allow for any swelling you may have.
- You should never go barefoot. Splinters can go unnoticed, as can heat from sidewalks of sand. These may cause damage to feet with poor sensation.

- Socks or stockings should always be worn with shoes to prevent blistering. Socks should be clean and preferable cotton or wool, and without seams in order to prevent pressure on the foot.
- Stockings should not be held up by garters or girdles; these cause too much constriction at the groin. Socks should not constrict at the ankle or above the calf (behind the knee).
- Support hose must be long enough to allow free movement of the toes. Support pantyhose should be loose at the groin.
- Check inside shoes before putting them on. Inspect for protruding seams, torn linings, lumps, or sharp objects.

### **Heat and Cold**

- Keep feet warm, wear socks and shoes. Avoid exposure of cold for long periods of time.
- Do not use heating pads or hot water bottles on your feet. Remember, your sensation is less in your feet due to poor circulation and you can burn yourself without realizing it. Instead, wear an extra pair of cotton or wool socks. Keep a lap blanket handy to wrap around your feet while sitting.
- Prevent sunburn of the feet in summer and avoid wading into very cold water.
- Allow damp or wet shoes to dry slowly on shoe trees to prevent misshaping.

### **RISK FACTORS FOR ATHEROSCLEROSIS**

- Smoking
- Hypertension (high blood pressure)
- Family history of atherosclerosis
- Elevated cholesterol
- Heart disease
- Diabetes
- Age 65 years and older
- Appears more frequently in men than women
- Obesity

It is important to try to eliminate the risk factors for atherosclerosis that are under your control. Avoiding the things that lead to atherosclerosis can slow the progression of the disease. You should discuss these risk factors with your primary care provider.



## PREVENTION OF ATHEROSCLEROSIS

### Smoking Cessation

Nicotine causes the arteries to constrict or narrow, preventing blood from reaching the body's organs, tissues, and muscles. Smoking decreases the ability of your lungs to deliver oxygen to your blood and can cause the blood to clot more quickly. Smoking also prevents the development of new blood vessels, which is especially important in people with blockages in their circulation.

Many people think that smoking one or two cigarettes a day is okay. They are wrong. The effect of one cigarette lasts in the body for up to eight hours. Tobacco in any form is harmful and should be avoided. This includes pipes, cigars, cigarettes and chewing tobacco. People with claudication usually notice improvement in their walking once they stop smoking.

### Hypertension (High Blood Pressure)

Uncontrolled hypertension increases the workload of the heart. This causes increased stress to your heart and arteries. Hypertension is often silent, meaning it has no observable symptoms and should therefore be monitored regularly.

**Cholesterol Monitoring** – Cholesterol is a soft, waxy substance that can build up in your artery walls. This restricts blood flow through the arteries. Cholesterol comes from food. A total cholesterol level less than 200 is considered desirable. Borderline is 200-239 and high is 240 or greater.

Bad cholesterol (LDL) refers to (low-density lipoprotein) and has a lot to do with your family history. Everyone's bad cholesterol comes from two sources: the cholesterol that is absorbed from food and the cholesterol your body produces naturally, based on heredity. The average person should try to maintain an LDL below 130 mg/dl. If you have heart disease or diabetes, your goal should be less than 100 mg/dl.

Good cholesterol (HDL) refers to high-density lipoprotein cholesterol because it helps eliminate the bad cholesterol from the body. The **higher** your HDL cholesterol level the more good lipoproteins you have to remove stuck cholesterol from your blood vessels. Low is less than 40, high is 60 or greater.

### Diet

In order to prevent atherosclerosis and hypertension it is important to avoid foods containing high amounts of fat, cholesterol and salt. Choose lean meat, poultry, fish and dry beans as protein sources. Moderate your use of eggs (usually two to three per week, try cooking with less egg yolks and more egg whites) and red meats (portions no larger than the size of a deck of cards).

Limit your intake of butter, cream, hydrogenated margarine, shortening, coconut oil and food made from these products (usually no more than two tablespoons of fat per day). There are many new low fat, low salt, cholesterol free items available. Read the labels of prepared foods as you cook. Broil, bake or boil rather than fry your foods.

Learn to enjoy the natural flavors of foods. Cook with only a small amount of salt. Add little or no salt to food. Limit salty foods such as potato chips, pretzels, salted nuts, condiments, cheese, pickled foods and cured meats. Again, read labels carefully. Your medical doctor may prescribe a medication to lower your cholesterol in addition to your dietary restrictions.

### **Diabetes**

People who have diabetes (high blood sugar) are at an increased risk for developing atherosclerosis. Diabetes speeds up the production of atherosclerotic plaque. It is important to manage your diabetes closely to prevent this from happening. Your medical doctor can help you keep your blood sugar in control.

### **Exercise**

Exercise should be part of your daily activity. You should walk, ride a bicycle, or swim three to four times daily. This will help maintain muscle tone, improve circulation, and strengthen the arteries. Consult your medical doctor if you would like to do more vigorous exercise. If you develop difficulty breathing or chest pains, stop the activity and notify your doctor.

### **Follow Up Appointments**

Regular follow up appointments with your vascular surgeon are necessary to monitor the progression of your disease.