

Upper Extremity Arterial Disease

The Vascular Group, PLLC

UPPER EXTREMITY ARTERIAL DISEASE

Upper extremity ischemia (decreased blood supply to arm and hand) has a variety of potential causes. 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 in the arms to become narrowed or blocked, this is what is meant by upper extremity arterial disease. Signs and symptoms of decreased blood flow to the arms depend on the location of the arteries involved and the amount of narrowing. You may notice pain and/or cramps in the arm and or hand when using it, which is relieved by rest. This is called claudication. This symptom occurs when you use your arm because the arm muscles need more oxygen-rich blood during exercise, but are unable to get it due to poor circulation.

As atherosclerosis progresses, pain in the arm or hand may occur at rest. This is called rest pain, and occurs because the arteries are unable to deliver enough blood to the hand at rest. Rest pain is aggravated by elevation and improved by hanging the hand down in a dependent position.

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).

Atherosclerotic emboli (blood clot) is a relatively common cause of acute (sudden) arm ischemia. The emboli most often comes from the heart and lodges itself into one of the arteries of the arm.

Subclavian steal syndrome is an occlusion (blockage) of the subclavian artery that causes a reversal of vertebral arterial blood flow. The most common symptoms related to this are vertigo, dizziness, drop attacks and or visual disturbances. These symptoms occur because the arm “steals” blood from the circulation intended for the posterior aspect of the brain.

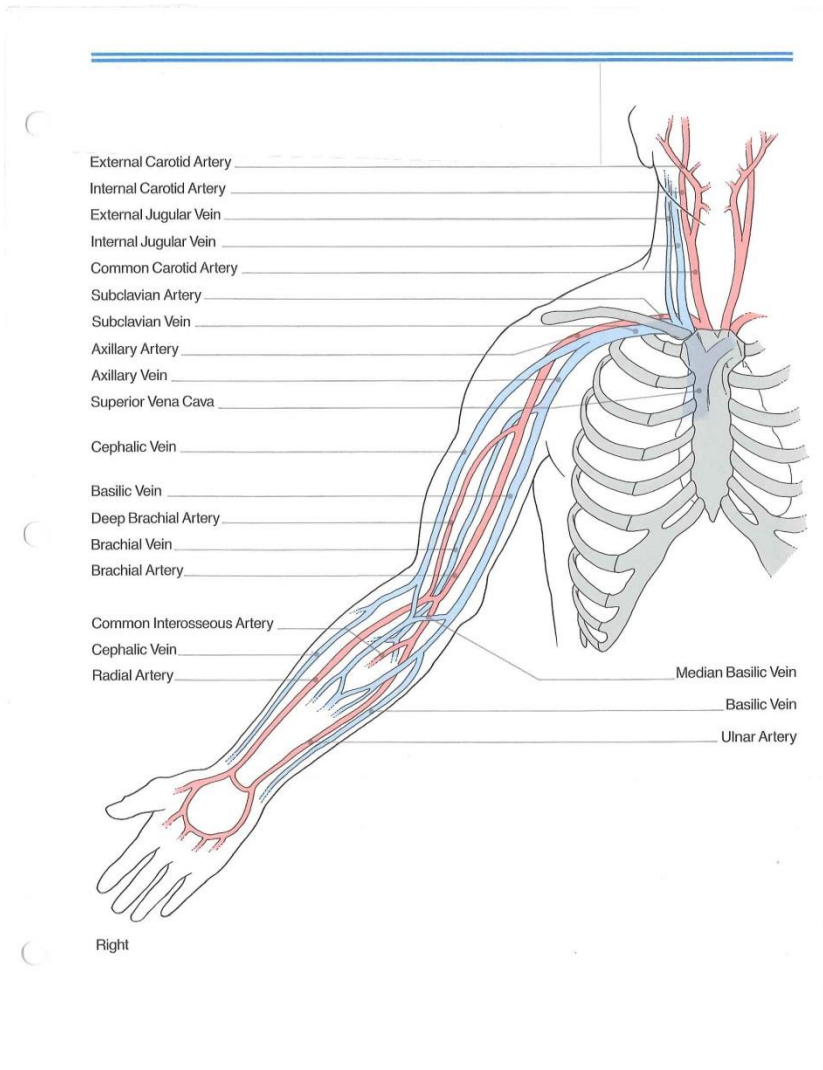
The symptoms of upper extremity arterial insufficiency vary considerably, depending on the level and acuteness of the obstruction and the degree of collateral circulation.

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.



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. An ultrasound gel is applied 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 before the test. They will review the procedure, possible side effects and ask you to sign a consent form. Blood work is usually drawn before the test to determine the ability of your blood to clot and your kidney function.

You will be required not to eat solids 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 shaved 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 be on bedrest with the affected leg or arm strain 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 dyes of shell fish, so we can 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 518-262-5620 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, urine testing, 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 tests we will try to schedule it the same day. If you are to be admitted the day before your surgery, these 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 OF UPPER EXTREMITY ARTERIAL DISEASE

Risk Factors

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

Balloon Angioplasty and Stenting

This procedure may be used for short areas of blood vessel 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. The balloon is deflated and the catheter removed. Dye is 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 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 is needed. Your doctor will have a general idea of what type of surgery you need after examining you, talking to you about your symptoms, and reviewing your tests. The types of surgery are as follows:

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 one of your arms or legs or a synthetic graft to detour the blood flow around the areas of blockage. Incisions are made at various locations in the arm. 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.

What can I expect before surgery?

The surgery is usually done with general (you will be asleep) 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 or drink after midnight the night before surgery. You will have intravenous fluids if you are admitted the night before your surgery. Routine blood work and urine specimens will be taken from you if needed. A chest x-ray and electrocardiogram of the heart may also be done. Someone will review your medications to see which, if any, you can receive the morning of surgery. They will also talk to you about the importance of deep breathing and coughing exercises, as well as the importance of walking after surgery.

What can I expect during surgery?

If you have general anesthesia you will be asleep during the operation. You will be given medication to help you relax. 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/Recovery Room) for approximately two to three hours. Then you will go to your hospital room.

Days 1 and 2 – Immediately after surgery you will be on bedrest and will probably 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. It is normal to have some swelling of the operative arm. You should keep your arm elevated on a pillow to decrease the swelling. Physical therapy will be ordered if the nursing staff and/or physicians feel it is necessary for your recovery. You will be encouraged to walk. The nurses will assist you until you are walking steadily. 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.
- When resting, you should elevate your arm. It is normal to have swelling in the arm that was operated on. The swelling may last up to two months.
- Avoid prolonged dangling of your arm 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 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. This will be 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, note the color, odor, and amount.
- Temperature greater than 101f for twenty four hours.
- A sudden change in the ability to move or use your arms or fingers, or a loss of the ability to feel your fingers.
- A sudden increase in 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 upper 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 questions or you feel you need more information, please call The Vascular Group at (518) 262-5640 or 1-877-827-2852 and ask to speak to one of the Nurse Clinicians.

IMPORTANT INFORMATION FOR PEOPLE WHO RECEIVE A SYNTHETIC GRAFT

It is currently recommended that people with man-made prosthetic grafts (including Goretex) 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:

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 question, please call the Vascular Group at (518) 262-5640 5640 or 1-877-827-2852.

Heat and Cold

- Keep fingers warm, wear gloves if out in the cold. Avoid exposure of cold for long periods of time.
- Do not use heating pads or hot water bottles on your hands or arms. Remember, your sensation is less in your fingers due to poor circulation and you can burn yourself without realizing it.
- Prevent sunburn of the arms in summer and avoid submerging into very cold water.

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. Please 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 effects 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.