



Peripheral Arterial Disease

Are the leg aches you experience with walking peripheral arterial disease (PAD)? While PAD cannot be cured, it can be treated.

Sometimes, it is treated with a combination of lifestyle changes, medical management, interventional therapy, and surgery.

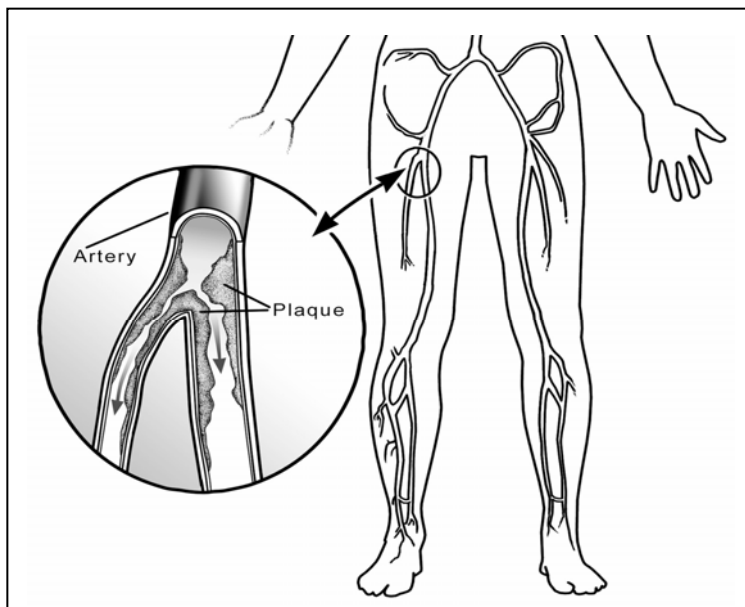
This handout explains PAD, its symptoms, the tests done to confirm a diagnosis, and lifestyle changes that can help.

What is peripheral arterial disease (PAD)?

Peripheral arterial disease (PAD) occurs when the arteries in your extremities (arms or legs) have a narrowing or blockage. This blockage decreases the blood supply to your muscles. PAD cannot be cured, but a healthy lifestyle may improve symptoms and keep the disease from getting worse.

Lifestyle choices, habits, and other diseases may increase the risk of developing PAD. Some of these are:

- Smoking/nicotine use.
- Diabetes.
- Hypertension (high blood pressure).
- Hyperlipidemia (high cholesterol).
- Heart disease (coronary artery disease or CAD).
- Cerebrovascular disease (stroke).
- Age 70 or older.
- Inactive lifestyle.



Arterial plaque decreases the blood supply to muscles.

Medical Terms

Arteries carry blood from the heart to all parts of the body.

Atherosclerosis is a narrowing of the arteries, caused by an irregularity called plaque.

Claudication is pain that occurs in the buttocks, thighs, or calves with walking.

Collateral circulation occurs when small arteries take on more blood and divert the blood flow around a narrowed artery.

Plaque is a build-up on the inner lining of an artery.

Rest pain occurs in the toes or feet as a result of atherosclerosis.

Veins return the blood to the heart.

Symptoms of PAD

PAD can cause aching, fatigue, cramping, or pain in your buttocks, thighs, or calves with walking. This pain, called *claudication*, goes away when you stop walking, but returns when you start walking again. The symptoms may be worse when walking up stairs or uphill. Advanced PAD involves pain in your toes while resting. This is called *rest pain*.

Circulation

Oxygen-rich blood is pumped from the heart and carried by *arteries* to all parts of the body. *Veins* return the blood to the heart.

An artery is a muscular tube with a smooth lining. Blood flows easily through it. When the inner lining of the artery is injured or inflamed, blood platelets, fats, and other materials build up. This causes an irregularity known as *plaque*, which leads to narrowing of the arteries, also known as *atherosclerosis*.

As the narrowing increases, the artery is still able to provide enough blood and oxygen to your muscles when you are at rest. During activity, however, there isn't enough blood supply for the increased demand, and the muscles may cramp or feel tired.

If the narrowing develops slowly, smaller arteries will carry more blood over time and allow some blood to flow around the narrowed area. This is called *collateral circulation*.

As atherosclerosis progresses, pain in the toes or feet may occur. This is known as *rest pain* and is common at night when you're lying flat and may be relieved by lowering your legs. When your legs are unable to get the nutrition needed for growth and repair, the affected tissue can die, leading to loss of a toe or a foot.

Other Signs and Symptoms of PAD

- Decreased hair growth on the legs.
- Blue or red discoloration of the foot when hanging down.
- Absence of pulses in the foot.
- Numbness, tingling, or pain in the foot, toes, or leg.
- Cold temperature of the foot and leg.
- A sore on the foot that does not heal.

When a blockage occurs suddenly, these symptoms will tend to be more immediate and severe. A sudden blockage occurs when a piece of plaque breaks off inside the artery and travels down a leg artery until it lodges. This blocks blood flow beyond that point. The symptoms worsen because there is not enough time for the collateral blood vessels to enlarge and carry additional blood flow.

Your History and Physical Examination

During your physical examination:

- Your health care provider will ask you about your health history, including family history and possible risk factors.
- Tell your health care provider if you are having any symptoms of PAD, such as aching in your calves when you walk, or a sore on your toe that is not healing.
- When you are asked about what medicines you take, be sure to include aspirin, herbs, vitamins, and other over-the-counter supplements.
- Your provider will feel for pulses or listen with a stethoscope to all your major arteries – in your legs, arms, neck, and abdomen. This is because atherosclerosis affects all the arteries of the body.

Diagnostic Tests for PAD

Non-Invasive Tests

You may be sent to the non-invasive vascular diagnostic laboratory to have the blood flow to your legs and feet checked. Non-invasive tests do not require the use of needles, dye, or X-rays. These tests are painless and without known risks or side effects.

Vascular Ultrasound Evaluation

If the vascular ultrasound evaluation involves abdominal vessels, you will be asked not to eat prior to the examination. Otherwise, no special preparation is needed before the test and no special care is needed afterward. During this evaluation, a registered vascular technologist (RVT) will apply ultrasound gel and place the ultrasound transducer (also called a probe) over the artery being studied. Your tests may be done on an outpatient basis, rather than during a hospital stay.

Ankle-Arm Index

The Ankle-Arm Index (AAI) compares the blood pressure in your ankle with the blood pressure in your arm. You may be asked to walk on a treadmill for a few minutes and the blood pressures will be repeated to determine a diagnosis of PAD.

Duplex Ultrasound

Duplex ultrasound uses sound waves to produce an image of the artery. Doppler ultrasound is used to check the blood flowing through the arteries. This is useful for finding and determining the extent of narrowing or blockage in an artery.

Invasive Tests

Arteriogram

An arteriogram is an X-ray that gives your provider a “road map” of any narrowing or blockages in your arteries. The arteriogram is done in an imaging department and may be done on an outpatient basis, depending on your medical condition. You will remain awake for the procedure, although you will be given a medication to help you relax.

The doctor who does the arteriogram will place a needle in an artery, usually in your groin. A long, thin tube (*catheter*) is inserted through this needle into an artery and is threaded to the desired location in the body. Contrast dye is injected into the artery. You may feel warmth as the dye is released. The contrast dye fills the artery so blood flow shows up on the X-rays.

After the arteriogram, you will be asked to lie quietly in bed for several hours. Your pulses and blood pressure will be checked often.

Other Tests

You may have other imaging tests to help detect a narrowing or blockage of an artery:

- *Computerized tomography arteriography* (CTA) uses computer-generated X-rays to provide detailed images of arteries.
- *Magnetic resonance arteriography* (MRA) uses a strong magnet and radio waves to produce images of blood flow in the arteries.

Your Treatment Plan

Your health care provider will recommend treatment for your PAD based on your general health, your signs and symptoms of disease, and the results of your diagnostic tests. Although there is no cure for PAD, you can play a major role in the treatment process.

Foot Care

Even though your blood flow has been improved, you need to continue to care for your feet and toes:

- **Inspect your feet daily for areas of irritation.** Check between toes for cracking of the skin and sores. Check for areas of redness, swelling, or drainage. Report any of these findings to your provider.
- **Do not soak your feet.** Soaking removes natural oils and dries the skin. Wash with mild soap and lukewarm water. Dry well.
- **Apply perfume-free cream or lotion to the dry skin on your legs and feet, but not between your toes.**

- **Trim your nails even with the length of your toes.** Rough nail edges should be filed smooth. If you have impaired vision, or cannot reach your feet, ask a family member or friend to help you with this. If you have diabetes, a specialist should trim your nails.
- **Do not expose your feet to extreme heat or cold or to strong chemicals or disinfectants.**

Reducing Your Risks

A healthy lifestyle can slow the progression of PAD and help improve blood flow throughout your body. This can also reduce your risk of heart attack and stroke.

1. **If you smoke or use nicotine – Quit!** Each cigarette you smoke damages your arteries and decreases circulation. Quitting isn't easy, and for many people it takes several attempts before they are successful. Ask your provider for advice on programs or stop-smoking aids.
2. **Start walking and/or exercise daily.** Walking daily improves blood flow, decreases your blood pressure, and helps increase the blood supply through the collateral arteries. If you have diabetes, walking also helps control your blood sugar. When you start your walking program:
 - Start with short walks on level ground.
 - Bring a friend or join a group for support.
 - Track your progress. Each day, record how long and how far you walked.
 - Increase your walking distance a little each day and work up to walking for 30 minutes each day if you are physically able.
3. **Change your diet.** Making these diet changes can help control health problems:
 - Eat smaller portions, but more often, to maintain a healthy weight.
 - Switch to low-fat foods and/or limit all fats to one third of your daily calories.
 - Eat several servings of fruits and vegetables each day. Choose fruits and vegetables that contain fiber, vitamins, minerals, and antioxidants.

Questions?

After hours, call Paging:
206-598-6190. Ask
them to page the
Vascular Surgery
Resident on call or

_____,
your Attending Vascular
Surgeon.

4. **Manage your other health problems.** High blood pressure, high cholesterol, and diabetes can damage your arteries. Remember to:
 - Take your medicines as instructed.
 - Have your cholesterol, blood pressure, or blood sugar checked as directed.
 - Maintain a healthy weight.
5. **Take your medicine as prescribed.** Your health care provider may discuss options such as antiplatelet medicine to reduce your risk of heart disease or stroke. If medicine is prescribed, take it as directed.

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