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Peripheral Artery Disease and Intermittent Claudication

WHAT IS PERIPHERAL ARTERY DISEASE AND INTERMITTENT CLAUDICATION ?

Disease Process Leading to Peripheral Artery Disease and Intermittent Claudication

Intermittent claudication is leg pain (most often in the calves) that does not clear up after walking and is relieved by rest. In severe cases even rest offers no benefit and pain can continue even when lying down. Intermittent claudication is a symptom of *peripheral artery disease (PAD)* :

The disease process leading to this leg pain is generally as follows:

- The process begins with *atherosclerosis* (commonly called hardening of the arteries), which results in blockage of oxygen flow in the arteries.
- Peripheral artery disease occurs when atherosclerosis affects the *extremities*, the feet and legs and hands and arms. (When atheroslcerosis affects arteries to the heart and brain, it is the major process leading to heart disease and stroke.)
- Intermittent claudication is the pain that occurs when the arteries in one or both legs are blocked.
- The most frequently affected artery in intermittent claudication is the *popliteal artery,* which leads off from the major artery in the thigh (called the *femoral artery*) and continues below the knee where it branches off and carries blood to the muscles in the calf and foot.

It should be noted that only about a third of patients with peripheral artery disease have typical symptoms of claudication.

Intermittent Claudication in Younger Adults

Intermittent claudication is very rare in younger people. If it occurs it is most often caused by either of the following:

- Entrapment of the popliteal artery.
- Adventitial cystic disease, a rare disorder that produces cysts that block the popliteal and other arteries.

WHAT ARE THE RISK FACTORS FOR PERIPHERAL ARTERY DISEASE AND INTERMITTENT CLAUDICATION

Men are at higher risk for peripheral artery disease (PAD) and claudication than women up until older ages when women catch up. People in northern regions tend to have a higher risk than those in southern areas.

The major risk factors for heart disease are also the most important risk factors for PAD and intermittent claudication. They include the following:

- Smoking.
- Hypertension.
- Increasing age. About 11% of people over 50 develop this condition.
- Diabetes.

HOW ARE PERIPHERAL ARTERY DISEASE AND INTERMITTENT CLAUDICATION DIAGNOSED?

People should be evaluated for peripheral artery disease if they have risk factors for heart disease, leg pain during walking, or ulcers on their legs.

Ankle-Brachial Index

Intermittent claudication caused by peripheral artery disease is diagnosed using a measurement called the ankle-brachial Index. This index employs a calculation based on measurements using ultrasound of blood pressure in the arms and legs.

- An index of .41 to .90 suggests peripheral artery disease. Measurements less than .40 indicate very severe blockage in the arteries in the leg. The lower the index the greater the risk for heart attack, stroke, or other serious circulatory or heart events.
- If the index measures between .90 and 1.30 but the physician still suspects atherosclerosis is the cause of the pain, then the patient takes a treadmill test. If the ankle-brachial index drops, then the physicians makes a diagnosis of peripheral artery disease.
- If the index is over 1.30, but the physician is suspicious that intermittent claudication may still be caused by a vessel that has become calcified (hardened), further tests may be conducted. This may include ultrasound, pressure measurement in the first toe, or others that might confirm or refute a diagnosis of peripheral artery disease.

Treadmill Test

Patients are often given a treadmill test if their ankle-brachial index is questionable. It is also used to determine the severity of the pain while walking and to assess the effectiveness of treatments.

WHAT ARE THE CONSEQUENCES OF PERIPHERAL ARTERY DISEASE AND INTERMITTENT CLAUDICATION?

Risk of Heart Attack and Stroke

People with intermittent claudication have the same risk of death from heart events or stroke as people with existing heart disease, even if they have no other evidence of heart or circulation problems.

Damage and Pain in the Legs

The pain in the legs itself clears up in 40% of patients (although this does not eliminate any accompanying heart risks). Damage in the leg from oxygen loss progresses in about 35% of patients to the point where 5% require amputation within five years of onset.

HOW ARE PERIPHERAL ARTERY DISEASE AND INTERMITTENT CLAUDICATION TREATED?

The treatment goals for peripheral artery disease (PAD) and claudication are the following:

- To manage the leg pain.
- To reduce the risk for heart attack and stroke.

Life Style Changes

Exercise is the most important life-style measure for patients with PAD and intermittent claudication. The benefits of regular moderate exercise for the heart are undisputed. Exercise training also changes blood flow in the leg and is proving to be as beneficial as medications and surgical procedures in many cases in increasing pain-free walking distance. The best results are seen in motivated patients who are given supervised training. Unfortunately, insurance does not usually cover these programs, and patients should understand that exercise must be regular and consistent, or benefits will be lost. [See *Exercise, Comprehensive Version.*]

Reducing Risk Factors for Heart Attack and Stroke

The following are a few recommendations for reducing the risks for circulatory diseases:

- For smokers, quitting is essential. (It should be noted that quitting smoking may not alleviate leg pain, at least not in the short term, but it certainly may slow the progress of the blockage and reduce risk to the heart.) [See *Smoking, Comprehensive Version.*]

- Aggressively controlling cholesterol levels is known to reduce mortality rates in patients with peripheral artery disease. [See *Cholesterol, Other Lipids, and Lipoproteins.*]

- For people with diabetes, intensively controlling insulin reduces the risk for heart attacks, although its effects on peripheral artery disease itself are weak at best. Such patients should be certain to watch blood sugar levels, but they may need to choose other approaches for claudication. [See *Diabetes Type II, Comprehensive Version*]

- People should aggressively control hypertension. Evidence suggests that the most protective agents for patients with high blood pressure and PAD may be angiotensin-converting-enzyme (ACE) inhibitors. [See *High Blood Pressure, Comprehensive Version.*]

Aspirin and Other Antiplatelet Drugs for Reducing Risk for Heart Attack and Stroke

So-called antiplatelet drugs increase blood flow by reducing the risk for blood clots. Aspirin is the standard anti-platelet agent and is taken daily by many heart patients to reduce the risk for a heart attack. It also improves leg circulation in PAD patients, although evidence on risk reduction of risk of heart events and stroke is unclear in these patients. Clopidogrel, a more potent anti-platelet agent, may have greater heart and circulatory benefits for PAD.

Medications for Improving Blood Flow in the Legs

A number of medications are available to relieve leg pain while walking and improve blood flow through various mechanisms. To date, however, the benefits of any of these drugs are not entirely clear.

- *Pentoxifylline.* Pentoxifylline (Trental) is standard agent in the US for managing claudication. It reduces the sticky properties of blood, improving its flow. Unfortunately, major studies report only a small effect on walking ability. The most common side effects include headache, nausea (in nearly a third of those taking pentoxifylline), heartburn and gas, dizziness, blurred vision, and flushing.

- *Cilostazol.* Cilostazol (Pletal) reduces blood clotting factors to improve blood flow. It improves walking distance and quality of life and is superior to pentoxifylline, the first agent approved for claudication. About a third of patients experience headache with this drug. Gastrointestinal distress may also occur. It can be taken with aspirin, an anti-clotting agent commonly recommended for patients with PAD. Similar agents have had serious side effects in patients with heart failure, and such individuals should avoid Cilostazol.

- *Naftidrofuryl.* Naftidrofuryl (Nafronyl) is available in Europe for intermittent claudication. It enhances the ability for damaged muscle tissue to absorb oxygen from blood. It appears to improve treadmill walking but not overall walking distance. It may have benefits for the heart.

- *Prostaglandins.* Prostaglandins improve blood flow by relaxing smooth muscles and some may have anti-clotting activity. Early studies on prostaglandin E1 in intermittent claudication are promising, but the drug must be injected. Beraprost, a prostaglandin that can be taken orally, is also showing promise in extending the limits of exercise and may also have heart benefits. More research is needed.

- *Other Agents for Improving Blood Flow.* Other agents used to improve blood flow include buflomedil, cinnarizine, and cyclandelate, but evidence on their benefits is very weak.

Alternative Agents

Levocarnitine. Levocarnitine (L-carnitine) and a derivative, propionyl levocarnitine, act on metabolism in the leg muscles. Both these agents are proving to increase pain-free walking and quality of life. Propionyl levocarnitine appears to be the more effective drug but is not yet available in the US. High doses of L-carnitine may cause body odor and gastrointestinal disturbances such as nausea, vomiting, diarrhea, and abdominal cramps.

Ginkgo Biloba. One analysis of eight studies reported that the herbal remedy ginkgo biloba has some modest effect on pain-free walking. The drug has blood-thinning properties and is available over the counter. It should be strongly noted that herbal remedies are not regulated and standards are not guaranteed. In addition, all agents that are effective, even so-called natural ones, are also likely to have side effects.

Ginkgo has a small risk for bleeding, which may increase in combination with other medications, such as warfarin or high-doses of vitamin E.

Vitamins

- *Vitamin C.* One study suggested that people with intermittent claudication had lower vitamin C levels than average, which was further associated with severity of peripheral artery disease. The association may be due to a higher incidence of smoking. In any case, supplements might be helpful, particularly in smokers with peripheral artery disease.
- *Vitamin E.* Small studies have reported some benefits from the use vitamin E, which has some anti-clotting properties. There are no well-conducted studies, however, on its safety and effectiveness over time.
- *Vitamin B.* Folate acid and other B vitamins reduce levels of homocysteine, which may be a risk factor for heart disease.

Surgery for Intermittent Claudication

In severe cases, surgical procedures to open obstructed blood vessels using angioplasty or by bypassing them are effective, although, in the case of angioplasty at least, benefits are not long lasting.

WHERE ELSE CAN HELP FOR LEG DISORDERS BE OBTAINED?

National Heart, Lung, and Blood Institute Information Center, P.O. Box 10305, Bethesda, MD 20824-0105. Call (301-592-8573) or on the Internet (http://www.nhlbi.nih.gov/nhlbi/nhlbi.htm)

American Heart Association, 7272 Greenville Ave., Dallas, Texas 75231-4596. Call (214-373-6300) or (call 800-242-8721) or on the Internet (http://www.americanheart.org/)

American College of Cardiology, Heart House, 9111 Old Georgetown Rd., Bethesda, MD 20814-1699. Call (800-253-4636) or (301-897-540) or on the Internet (http://www.acc.org/)

Aspirin Foundation of American. Call (800-432-3247) or on the internet (http://www.aspirin.org)

A very useful web site (http://www.heartinfo.org/).

Offers a useful heart risk evaluation test. (http://www.heartriskevaluations.com/)

Find a Specialist

http://www.ama-assn.org/aps/amahg.htm

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