David V. Cossman, M.D., F.A.C.S. Ryan A. Haqq, M.D. Rajeev K. Rao, M.D., F.A.C.S. Allan W. Tulloch, M.D., F.A.C.S. Willis H. Wagner, M.D., F.A.C.S.



# VASCULAR SURGERY ASSOCIATES

OFFICE LOCATIONS 8631 W. Third Street, Suite 615E Los Angeles, CA 90048 Tel (310) 652-8132

1301 20th Street, Suite 390 Santa Monica, CA 90404 Tel (310) 315-5765

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#### Why do my legs ache when I walk?

If you're 60 years old and you can't make it from one end of the United Terminal to the other at O'Hare airport without stopping to rest your aching buttock, thigh or calf muscles, it is likely that you have claudication. Claudication, a symptom of Peripheral Artery Disease or PAD, results from impaired oxygen delivery to exercising muscle due to occlusive arteriosclerotic plaques in the iliac, femoral, popliteal and tibial arteries. The severity of claudication, defined by walking distance before onset, is determined by the anatomic distribution of stenotic and occlusive arteriosclerotic plaques and the degree to which smaller collateral arteries can compensate for reduced flow through the major truncal arteries, not at all unlike the capacity of surface streets to handle traffic when the 10 and 405 freeways are blocked. Patients with a chronically occluded femoral or popliteal artery and no palpable pedal pulses may walk without claudication if they have developed ample collateral channels. We treat the patient, not the angiogram, and any patient who is able to walk as much as he or she needs to does not require intervention regardless of what the angiogram shows.

#### How do I know if my leg pain is due to poor blood flow or something else?

Ambulatory buttock, thigh or calf pain may be caused by many conditions, so it is helpful to know how to differentiate claudication from "pseudoclaudication" caused by spinal stenosis, other structural spine abnormalities, primary muscle pathology or an assortment of "aches and pains" caused by any number of musculoskeletal derangements. Surprisingly, a detailed history with a few key questions is all an astute clinician needs to zero in on claudication as the probable culprit. A surprising but nearly universal characteristic of ambulatory discomfort caused by PAD is that the ambulatory discomfort goes away within a minute or two, or even sooner, upon cessation of walking as it does not take long to clear the pain producing lactic acid produced by deoxygenated muscle during anaerobic exercise. None of the other conditions mentioned above that cause ambulatory pain correct so quickly, and when asked when the pain goes away answers like "that evening" or the next morning" or "next week" affirm that claudication is not the diagnosis. Further, unlike the other conditions, the claudicator just needs to stop walking. It is not necessary to sit down or bend over (like pseudoclaudication from spinal stenosis). While patients with other conditions can expect to become symptomatic within a very narrow range of time and distance, the claudicator will typically report that onset is variable depending upon pace and grade, with stairs being especially difficult to manage.

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Noninvasive arterial ultrasound studies are not necessary to diagnose PAD but may be important supplements to determine the

anatomic level and severity of the arterial disease. Ankle-brachial indices (ABI) compare the blood pressure in the ankle and arm at rest and after exercise. A drop from a normal resting index with exercise demonstrates that stressed ischemic tissue dilates causing the ankle blood pressure to fall and the ABI to drop. Patients with clear-cut claudication may have palpable pedal pulses and normal ABIs at rest that drop significantly with exercise as the palpable pedal pulses disappear. Color-flow Doppler and ultrasound imaging can also differentiate between localized stenoses and occlusions in the femoral popliteal tree compared to more extensive disease, allowing the vascular physician to council a patient about the kind of procedure that will be required, where it will be done, and a ballpark estimate of the expected success rate (see Figure 1).

## What are the treatment options?

Patients with claudication need to be informed that they are not at high risk of amputation and amputation prevention is not an indication for intervention. Long-term data shows that claudicators have a five-year 5% risk of requiring intervention for limb-threatening ischemia. Put another way, there should be no such thing as prophylactic intervention for PAD to prevent amputation as there is, for instance, in performing a carotid endarterectomy in an asymptomatic patient with a 99% carotid stenosis to prevent a stroke or a CABG or PTCA for a patient without angina with a high grade LAD stenosis who is at high risk for a major or even fatal MI.

Risk factor modification and exercise therapy are the cornerstones of conservative treatment for patients with PAD and claudication. Maximal medical therapy consists of antiplatelet and statin medication, exercise and smoking cessation. Nicotine causes atherogenesis and vasoconstriction which contribute to PAD and arterial insufficiency.



Figure 1: Arterial duplex of the superficial femoral artery. This image deonstrates a severe stenosis (velocity > 400 cm/s) of the superficial femoral artery. The characteristics of the waveform as well as the color flow image aid in the identification of a stenosis.



Figure 2: An array of endovascular tools are used by the vascular interventionalist in the treatment of PAD. A. Angioplasty balloon catheter B. Bare metal stent C. Covered (ePTFE) stent D. Atherectomy device.



Figure 3: Image A is an angiogram of the superficial femoral artery. Note the plaque (star) resulting in a >90% luminal stenosis. Image B is the post-treatment angiogram. This patient was treated as an outpatient with atherectomy and angioplasty with no residual stenosis and resolution of symptoms.

Smoking cessation alone will improve walking distance in a significant number of patients as will supervised exercise therapy.

Nevertheless, younger patients whose employment and/or enjoyment of life (travel, exercise) is severely impacted by claudication and who are not improved by conservative management will frequently seek more aggressive therapy even though they are not at risk of amputation or progressive ischemic symptoms. Most septogenarians and octogenarians aren't in a big rush and are not highly motivated to undergo a "simple" percutaneous procedure to get somewhere 10 minutes earlier.

## What if exercising isn't enough?

Open surgery and endovascular procedures are available to patients with lifestyle altering short distance claudication. For the appropriate carefully selected patient, outpatient percutaneous endovascular intervention, consisting of angioplasty, atherectomy and/ or stents is an attractive and effective way to upgrade one's functional status (see Figure 2). Just as the long-suffering patient will tell the orthopedic surgeon when it's time to replace the knee or hip, the claudicator will tell the vascular interventionalist when it's time to address their PAD.

Open surgical treatment for claudication, such a saphenous vein femoral popliteal bypass, has been virtually abandoned in favor of percutaneous endovascular procedures that have migrated from hospital based facilities into office based laboratories (OBL) where angioplasties, atherectomies, and stents are performed as outpatients using local anesthesia only (see Figure 3). The only certain thing in this rapidly changing field is that instrumentation and adjuvant therapy will continue to change and improve at a rapid pace. "We should have done this sooner" is music to an interventionalist's ears, but the judicious physician, aware of potential failures and complications, remains conservative and highly selective in offering patients endovascular treatment for claudication.