Office Evaluation of Leg Pain

Alex Powell, M.D.¹

ABSTRACT

A successful office evaluation of a patient who presents with leg pain encompasses several factors and treatment decisions. Of course, the first goal of the evaluation is to determine the etiology of the leg pain. Following this, a complete history and physical examination is mandatory. Frequently at this point, additional imaging studies will become necessary. It is only at this point can various treatment options be explored. Clearly, the office evaluation of a patient with leg pain needs to be comprehensive. In addition, the initial evaluation establishes a relationship with the patient, one that will need to continue for some time even if a successful intervention is performed.

KEYWORDS: Leg pain, atherosclerosis, peripheral arterial disease, physical examination, claudication

Objectives: Upon completion of this article, the reader should be able to perform the initial evaluation and examination of a patient suspected of having peripheral arterial disease and be able to differentiate between vascular and nonvascular etiologies of leg pain and then make appropriate treatment recommendations.

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A successful office evaluation of a patient who presents with leg pain encompasses several factors and treatment decisions. The first goal of the evaluation is to determine the etiology of the leg pain. Following this, a complete history and physical examination is mandatory. Frequently at this point, additional imaging studies will become necessary. It is only at this point can various treatment options be explored. As an example, it is not enough to determine that a patient has lifestyle-limiting claudication and needs an intervention. That history may apply to an otherwise relatively healthy 50-year-old patient with isolated iliac disease as well as a diabetic with active angina, renal insufficiency, and extensive tibial disease. Although an endovascular treatment would be an excellent option for the first patient, it may not be a good option at all in the second patient.

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PATIENT HISTORY

The initial portion of the office evaluation should focus on the relevant history to determine the etiology of the leg pain. Questions should be asked to determine an arterial, venous, neurogenic, or musculoskeletal etiology of pain. After determining where the pain is in the leg, the practitioner should determine what elicits the pain. Is it brought about by exercise? Is the pain reliably reproducible? What happens upon standing, walking faster,

¹Baptist Cardiac and Vascular Institute, Miami, Florida.

Address for correspondence and reprint requests: Alex Powell, M.D., Baptist Cardiac and Vascular Institute, 8900 North Kendall Drive, Miami, FL 33156 (e-mail: axpowell@yahoo.com).

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and Parag J. Patel, M.D.

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walking upstairs, with rest, lying down? Last, how long has the pain been present? By carefully history alone it is frequently possible to determine the etiology of the leg pain. As an example, arterial insufficiency typically occurs with exercise, involves the calf (thigh and buttocks on occasion), is reliably reproducible at the same walking distance (unless walking faster or upstairs, which leads to a faster time to onset), and is quickly relieved by rest. Neurogenic conditions such as spinal stenosis or nerve root compression typically have pain associated with movement, may occur at rest, and usually take a longer time to recover if the symptoms are brought about by exercise. Venous claudication typically is described as a tight, bursting pain that is very slow to subside. Often the patient reports a history of prior deep venous thrombosis.

If pain is caused by arterial insufficiency, consideration as to the cause of the occlusive disease should be given. Although atherosclerosis is by far the most common etiology, the physician should also consider other etiologies including embolism, arteritis, coarctation of the aorta, fibromuscular dysplasia, entrapment syndromes, thromboangiitis obliterans (Buerger's disease), adventitial cyst of the popliteal artery, and thrombosed aneurysm, among others. Although a complete discussion of these conditions is beyond the scope of this article, all should always be kept in mind. Presentation at a young age, without any apparent risk factors or family history, or sudden onset of symptoms should alert the physician that the etiology of the arterial insufficiency may in fact be due to something other than atherosclerosis.

PHYSICAL EXAMINATION

Although all components of a detailed physical examination should be performed in a patient suspected of having peripheral arterial disease (PAD), several key components must be performed. The purpose of the physical examination is to document the pulse exam, attempt to determine the level of occlusion, and also focus on the potential detection of additional vascular disease. Risk factors and complications of PAD should be assessed.

The value of the physical examination in the detection of additional disease is illustrated in the following example:

A patient presents to the office with lifestyle-limiting claudication. The lower-extremity pulse exam reveals evidence of bilateral femoral-popliteal disease. However, asymmetric brachial blood pressures are also noted. This should lead the physician to inquire about subclavian steal symptoms. It is common for a patient to not volunteer these symptoms and the detection of a potential serious and treatable condition is only made with a detailed physical examination.

Specific components of the physical exam that must be included in all patients with suspected PAD are as follows:

1. Cardiac examination including pulse and blood pressure: Hypertension is one of the five primary risk factors for development of PAD and coronary artery disease. In addition to the detection of any abnormal heart sounds, the rate and rhythm of the heart should be determined. On occasion, the detection of an abnormal rhythm can be the clue as to the etiology of a patient with PAD as the abnormal rhythm may lead to an embolic event. This is an important determination as the treatment plan may be completely different from a patient with long-standing atherosclerotic disease.
2. Head and neck examination: Simple auscultation of the neck can frequently detect carotid bruits. A detection of a bruit by itself obviously does not lead to intervention. However, it may prompt the physician to ask further questions pertaining to possible cerebral vascular ischemic disease. This finding may also lead to the ordering of a noninvasive examination that may more accurately determine the degree of any potential carotid stenosis. Although a fundal examination is likely beyond the scope and skill of most practitioners, the importance of this exam should not be overlooked. Evidence of chronic hypertension as well as evidence of embolic events can be detected.
3. Abdominal examination: The abdominal exam should include an evaluation of all surgical scars (on occasion some patients have neglected to mention bypass surgery), palpation for abdominal aortic aneurysm, and auscultation for potential bruits (indicating potential renal or mesenteric stenosis).
4. Peripheral pulse and extremity exam: An evaluation for peripheral pulses can be undertaken in any order desired. However, some favor beginning in the upper extremity as this can easily be overlooked, particularly if significant pathology is detected in the lower extremities. The upper-extremity pulse examination should begin with bilateral brachial artery pressure measurements. Again, this may lead to the detection of heretofore undetected upper-extremity occlusive disease. Evaluation of the lower extremities should begin with an overall assessment of limb size, coloration, temperature, and hair distribution. Clearly all pulses should be assessed and documented. Palpation of the popliteal fossa should not be neglected as this is a relatively common method to detect popliteal artery aneurysms.

Many schemes and much confusion exist about the classification of pulses. For simplicity and reproducibility, the following method can be of value. For palpable pulses, 1 = barely palpable, 2 = normal pulse,

3 = greater than normal (aneurysm). For Doppler signals (the source of the greatest confusion), the classification follows the quality of the waveform, not the volume as so often occurs: 1 = monophasic waveform, 2 = biphasic waveform, 3 = triphasic waveform. By using this method, not only can a reliably reproducible method be used but future exams may detect progressive pathology or restenosis after an intervention.

The importance of a complete pulse exam can be illustrated with the following example:

The patient has symptomatic carotid stenosis. A decision has been made to place a carotid stent. Because of the relative immobility, there are no symptoms of claudication. What was overlooked was a 1 (weak) right femoral pulse indicating an iliac stenosis. During carotid stent placement, a right groin access sheath could become occlusive across the stenosis. This occlusion could be easily overlooked for the entire procedure. Of course this could lead to disastrous consequences.

RISK FACTOR ASSESSMENT AND MODIFICATION

A critical component in the evaluation of a patient with PAD is risk factor assessment and modification. The five risk factors (Table 1) should be assessed.

Although a detailed discussion of risk factor adjustment is beyond the scope of this article, the physician examining for PAD should at the very least understand national treatment guidelines. It should not be overlooked that PAD is indicative of a systemic disease. All-comer PAD is associated with a 5 to 7% annual rate of nonfatal myocardial infarction, stroke, and vascular death. Overall mortality rate is 30% at 5 years and 50% at 10 years.

Although many references exist, the treating physician should be very familiar with the Trans-Atlantic Inter-Society Consensus (TASC) II¹ document. In this document are specific recommendations for risk factor adjustment. Likewise, the PAD Coalition,² a multisociety organization, has published similar guidelines. Again, although the details and science behind these recommendations is beyond the scope of this article, the recommendations are clear. Patients with PAD need aggressive risk factor modification.

The importance of risk factor modification in a patient with PAD is illustrated by the Heart Protection

Study Group.³ In this study, 6748 patients with PAD were randomized to simvastatin, antioxidant vitamins, combination therapy, or placebo. The follow-up period was 5 years. Overall, in the groups treated with simvastatin there was a 12% reduction in total mortality, a 17% reduction in vascular mortality, 24% reduction in coronary events, and a 27% reduction of strokes. The HOPE⁴ trial demonstrated the value of hypertensive control. In particular, this trial demonstrated a 22% risk reduction in patients who were randomized to ramipril, which, interestingly, was independent of blood pressure control.

The association between diabetes and PAD is well established. Hirsch et al⁵ documented that 29% of diabetics over the age of 59 have PAD. The TASC II recommendation for diabetic control is aggressive control of blood glucose levels with a hemoglobin A1c goal of <7.0% or as close to 6% as possible.

All patients with PAD need to be counseled as to the importance of smoking cessation. TASC II recommendations include aggressive counseling, group therapy, and nicotine replacement therapy.

IMAGING STUDIES

As part of the initial evaluation of a patient with suspected PAD, numerous imaging studies can be of benefit. Although of course these studies can confirm the presence of PAD, they can provide significantly more value. A decision on which imaging study to perform should be dictated by goals of treatment.

Noninvasive arterial examinations provide physiological data. Pulse volume recordings (some prefer segmental pressures) can also help to determine the level of potential occlusive disease. Inflow (aortoiliac) lesions can be differentiated from femoral-popliteal disease and tibial disease. With the addition of duplex evaluation, further anatomic and physiological data can be obtained.

Frequently, an arterial noninvasive examination is all that is necessary to make treatment recommendations. Conservative as well as interventional management can be made from this examination. In addition, because the amount of blood flow can be quantified, a noninvasive arterial examination can also serve as a baseline examination. Response to any form of therapy can be readily compared with the baseline examination.

Computed tomographic angiography (CTA) and magnetic resonance angiography (MRA) examinations can provide more detailed anatomic information. Obviously, this can be of benefit when an intervention is planned. More precise details about the location as well as the extent of occlusive disease can be obtained. However, both MRA and CTA have pitfalls. Both modalities are relatively contraindicated in patients with renal insufficiency. Formerly, MRA was used in patients with renal failure. However, since the association between gadolinium and nephrogenic systemic

Table 1 Risk Factors

Smoking
Hyperlipidemia
Diabetes
Hypertension
Family history

fibrosis has been determined, it is no longer frequently used for this purpose.

CTA scanning can offer precise anatomic information. However, in patients with heavily calcified arteries, it may be difficult to determine vessel opacification. This is most problematic in those patients with significant tibial calcification. MRA can overestimate the degree of stenosis. In addition, it can underrepresent the actual extent of disease in patients with heavy calcification. Overall, in spite of the potential limitations, these studies can be of benefit in determining what type (open surgery versus endovascular) of treatment should be offered. In addition, imaging studies may alter the approach one would typically take in treating a patient. As an example, in a patient with left leg claudication and disease in the common iliac artery on CTA or MRA, the operator may choose to puncture the left groin for treatment. Without these imaging modalities, typically a right-sided approach would be necessary for the initial angiogram. For treatment, a second (in this case left femoral) puncture might be necessary. Typically because cross-sectional imaging modalities do not provide physiological data, they are not appropriate as an initial diagnostic study. The exception to this would be when a definitive anatomic study is necessary. Examples of this include aneurysm detection and monitoring or unusual causes of arterial insufficiency such as popliteal artery entrapment or cystic adventitial disease.

TREATMENT DECISIONS

The prime factor in treatment recommendations is the patient's current level of symptoms. Clearly patients with rest pain or tissue loss related to arterial insufficiency can benefit from intervention if this is feasible given the level of and extent of disease. Likewise, in patients with mild disease that does not impact on their daily life, conservative management is almost always the initial treatment plan.

In patients with lifestyle-limiting claudication, treatment decisions are more complex. The decision on whether or not to intervene is influenced by several factors. These include the patient's overall health, presence of potentially complicating medical conditions such as renal insufficiency, as well as the level and extent of disease. For instance, it may be appropriate to stent a patient with a focal iliac stenosis and severe claudication, although a dedicated walking program and medical management may be the appropriate decision in a patient with a long-segment superficial femoral artery occlusion. However, the importance of medical management and a walking program cannot be overstated. Most patients can benefit from this conservative therapy, and it should be considered as an initial treatment option. If this therapy fails, then more aggressive intervention can be done.

Many studies have demonstrated the benefit of a dedicated walking program. Perhaps the most definitive is a meta-analysis performed by Gardner and Poehlman.⁶ In this analysis, 33 total studies were reviewed with 21 meeting their inclusion criteria. In patients undergoing exercise rehabilitation with intermittent claudication, the distance to the onset of claudication increased 179% (125 ± 57 m to 351 ± 188 m). The distance to maximal claudication pain also increased by 122% (325 ± 148 m to 723 ± 591 m).

Medical management in addition to a dedicated walking program can be of further benefit in some patients. In a different meta-analysis, Thompson et al⁷ found that pain-free and maximum walking distance increased by 50 and 67% respectively. In addition, a decrease in triglyceride levels by 16% and an increase in high-density lipoprotein levels by 13% were observed. However, it should be noted that ~20% of patients cannot tolerate cilostazol secondary to side effects. Pentoxifylline has generally been shown to be ineffective.⁸

SUMMARY

Clearly the purpose of the initial office visit with leg pain is much more than evaluating a patient with leg pain to determine which procedure to perform. Through a careful history and physical examination that leads to the appropriate ordering of imaging studies, the physician involved with the treatment of a patient with suspected PAD can accomplish several goals. First, of course, is to determine if the patient who presents with leg pain has PAD as the etiology of their pain. Second, it can typically be determined why PAD has developed. Through careful analysis, a physician cannot only make the "easy" diagnosis of PAD in a patient with multiple risk factors but also determine that a young athletic patient with calf claudication upon extreme exercise may also have PAD from a more unusual cause such as popliteal artery entrapment.

After the etiology of the leg pain has been determined, the physician can also assess and hopefully impact risk factors. Not only can risk factor modification alter the course of PAD, but multiple studies have also shown that risk factor modification can affect overall cardiovascular health and mortality.

Through appropriate imaging studies, the physician can determine the severity of disease and also develop a reasonable plan for intervention when warranted. Of course, many studies have documented that many patients with PAD benefit through a walking program with possible adjunctive medical therapy, and this should always be considered prior to more invasive options.

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