

# Benefits of Exercise Therapy in Peripheral Arterial Disease

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## Abstract

Peripheral arterial disease (PAD) is a common disorder caused largely by atherosclerosis. Although it is associated with increased morbidity and cardiovascular mortality, PAD remains underdiagnosed. Traditional PAD care has involved cardiovascular risk factor modification, use of antiplatelet agents, and revascularization. For those individuals who are eligible and willing to perform exercise therapy (ET), a significant benefit may be recognized. Despite this, ET faces several challenges to implementation. Notably, the lack of reimbursement by third party payers remains the major challenge to routine use of ET. (Prog Cardiovasc Dis 2011;53:447-453)  
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Several studies have documented the importance of recognizing and treating peripheral arterial disease (PAD) caused by atherosclerosis. This disease process may involve multiple extracoronary vascular beds including the cerebrovascular, aortorenal, mesenteric, and lower extremities. Peripheral arterial disease diagnosis is often confirmed only after end-organ ischemia or infarct occurs. Regardless of the presentation, PAD is associated with increased cardiovascular (CV) morbidity and mortality. The Framingham study reported that participants with intermittent claudication (IC) had double the CV mortality of those without IC regardless of sex.<sup>1</sup> The Edinburgh PAD study revealed increased risk of ischemic heart disease in those with asymptomatic PAD compared with the normal population prevalence (relative risk, 1.6).<sup>2</sup> In middle-aged adults, increased carotid or popliteal intimal-medial thickness is associated with clinically prevalent CV disease despite absence of hemodynamically significant disease.<sup>3</sup> Despite the high prevalence in those with recognized CV risk factors, PAD remains underdiagnosed, muting the potential benefits of secondary CV risk prevention.<sup>4</sup>

Not only CV morbidity and mortality are increased in those with PAD but also functional status is often severely impaired. Peak exercise performance in the claudicating patient is about 50% that of age-matched controls, equivalent to moderate to severe heart failure using New York Heart Association criteria.<sup>5</sup> Although IC is the classic symptom of PAD, only a minority of individuals present with typical claudication.<sup>6,7</sup> Thus, the natural history of PAD varies significantly (Fig. 1). One end of the spectrum involves asymptomatic disease in up to 50% of affected individuals; on the other end, 1% to 2% of those affected present initially with critical limb ischemia, that is, ischemic rest pain or leg ulceration. This latter presentation is associated with 25% risk of CV death within 1 year.<sup>7</sup>

## Contemporary PAD management

Individuals diagnosed with PAD should be managed with agents proven to decrease risk of death from adverse CV events, including angiotensin-converting enzyme inhibitors, statins, and antiplatelet agents.<sup>7-9</sup> In symptomatic cases, improvement can be achieved by endovascular revascularization, but such procedures are invasive, expensive, and may be associated with procedural adverse events. Advances in percutaneous treatment of lower

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**Abbreviations and Acronyms**

- ABI** = ankle-brachial index
- C** = continuous
- CV** = cardiovascular
- ET** = exercise therapy
- FMD** = flow-mediated dilation
- IC** = intermittent claudication
- G** = graded
- MWD** = maximal walking distance
- PAD** = peripheral arterial disease

extremity PAD have prompted many physicians who treat claudication to consider more liberal indications for percutaneous intervention. At the same time, it has been demonstrated that excellent improvement in maximum walking distance can also be achieved with supervised exercise therapy (ET), with a low risk of disease progression or amputation without revascularization. Numerous trials have demonstrated that supervised ET and claudication medications can significantly improve walking performance and quality of life in patients with IC.<sup>6</sup> Table 1 presents recommendations for PAD management.

A walking exercise program has been recommended since 1966, when the first randomized controlled trial of ET in persons with PAD demonstrated a marked improvement in treadmill walking ability.<sup>5,10</sup> In contrast, endovascular

interventions, particularly for patients with disease affecting femoropopliteal and tibioperoneal arteries, may suffer from limited durability. Surgical revascularization is associated with significant morbidity that does not justify its use in patients with stable claudication symptoms. Thus, a need exists to identify novel and safe therapies for treatment for patients with IC.<sup>11</sup> As a result, current PAD guidelines recommend supervised ET programs as the preferred initial treatment for patients with IC, along with treatment of modifiable risk factors.<sup>7,12</sup>

**Supervised exercise vs unsupervised exercise**

It could be reasoned that the benefits of supervised ET are similar to those of unsupervised ET. This theory has not been supported by prospective randomized studies. Parr et al performed a 3-arm trial of PAD subjects, with one group given advice only to “walk as much as possible at home,” a second group randomized to an upper body strength training program, and the third group receiving a dynamic (walking, cycling, circuit) conventional exercise rehabilitation program. At 6-week follow-up, those in a conventional exercise rehabilitation program (compared with advice only and upper body exercise, respectively) had the most improved parameters of maximal walking

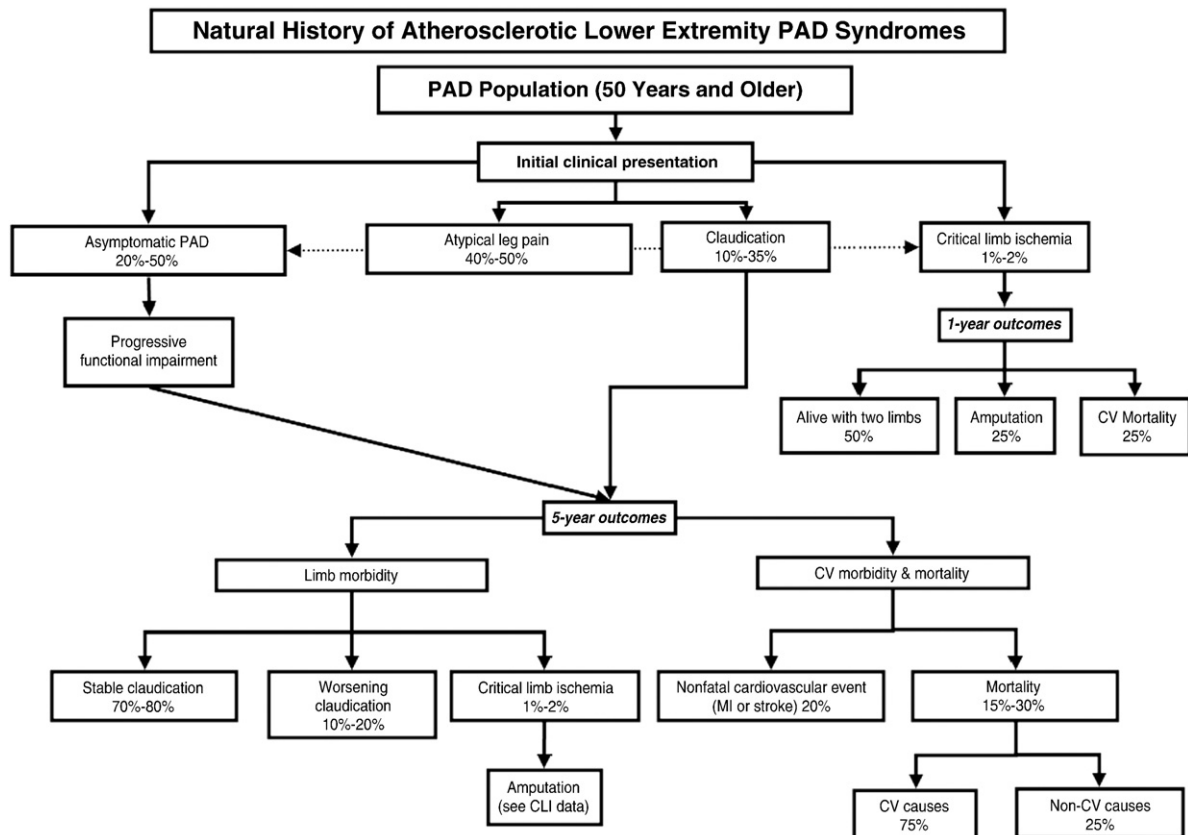


Fig. 1. Natural history of atherosclerotic PAD. Reprinted with permission, ©2006 American Heart Association.<sup>7</sup>

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