

Ankle-Brachial Index Identifies Impaired Lower Extremity Function in Peripheral Vascular Disease

McDermott MM, Greenland P, Liu K, et al. The ankle-brachial index is associated with leg function and physical activity: the Walking and Leg Circulation Study. *Ann Intern Med* 2002;136:873–83.

Study Overview

Objective. To determine the correlation between ankle-brachial index (ABI) and physical function.

Design. Cross-sectional study.

Setting and participants. A cohort of 740 patients (460 with peripheral arterial disease) was recruited from general medicine practices and noninvasive vascular laboratories at 3 separate academic medical centers in the Chicago area.

Main outcomes measures. ABI, standing balance, accelerometer-measured physical activity over 7 days, 6 minute walk, and 4-m walking velocity.

Main results. Of the 460 patients with peripheral arterial disease, 33% had intermittent claudication. Fewer than 40% of patients with an ABI less than 0.40 completed the 6-minute walk, while 95% of those with an ABI of 1.0 to 1.50 completed the walk. When comparing the lowest ABI category (< 0.50) with the highest ABI category (1.10 to 1.50), the lower ABI was associated with a shorter walking distance (β -regression coefficient, -523 ft [95% confidence interval {CI}, -592 to -454 ft]; $P < 0.001$), less physical activity (β -regression coefficient, -514.8 activity units [95% CI, -657 to -373 activity units]; $P < 0.001$), slower 4-m walking velocity (β -regression coefficient, -0.21 m/s [95% CI, -0.27 to -0.15 m/s]; $P < 0.001$), and less likelihood of maintaining a tandem stand for 10 seconds (odds ratio, 0.37 [95% CI, 0.18–0.76]; $P = 0.007$). All analyses were adjusted for demographic, comorbidity, and leg-symptom variables.

Conclusion. The ABI is more closely correlated with leg function than intermittent claudication or other leg symptoms. ABI is a useful tool to distinguish lower-extremity dysfunction from peripheral vascular disease (PVD).

Commentary

For older patients, lower extremity function is one of the primary predictors of disability and loss of independence [1], and

PVD is a frequent cause of lower extremity dysfunction. Unfortunately, the presentation of PVD can be subtle, with the classic symptoms of claudication and depressed peripheral pulses occurring at late stages. Physicians need office-based tests that detect early PVD because the best radiographic tests are either too invasive (angiography) or costly (magnetic resonance angiography). If identified early, conservative and noninvasive measures, such as progressive walking, can be prescribed to delay or prevent the progression of disability due to PVD. Furthermore, diagnosis of PVD can facilitate early identification of atherosclerosis in other organs.

The ABI is a promising candidate for an office-based test that can detect patients with early or asymptomatic PVD. It is simple to perform, noninvasive, and inexpensive. The reproducibility and correlation with angiographically evident PVD have previously been described [2]. To add to the above, the authors of the Walking and Leg Circulation Study have now demonstrated that the ABI is correlated with leg dysfunction. The strengths of this study include the large number of patients studied, the inclusion of patients without PVD, and the use of consecutive patients drawn from both a general medicine clinic and a referral center for patients with PVD.

Additional work will strengthen the evidence that the ABI can be used for detection of early or asymptomatic PVD. Selecting a cohort with unrecognized PVD and following the cohort over time will help establish a causal pathway showing PVD leads to both lower ABI values and leg dysfunction. Performing angiography in the cohort will allow reporting of a sensitivity and specificity of ABI in the population studied. Finally, a formal cost-effectiveness study of ABI screening will help establish its superiority over more expensive alternatives.

Applications for Clinical Practice

For patients with established or uncertain PVD, the ABI test provides a simple, noninvasive prediction of current leg function.

—Review by Josh F. Peterson, MD, MPH

References

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2. Olin JW. The clinical evaluation and office based detection of peripheral arterial disease. Hillsborough (NJ): Excerpta Medica; 2001:10-7. *American Journal of Medicine Continuing Education Series, Part 1.*

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