

A Comparison Between Ankle-Brachial Index and Quiescent-Interval Single Shot Non-Enhanced MRA for the Evaluation of Hemodynamically-Significant Peripheral Arterial Disease

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Purpose: To determine whether a rapid, non-enhanced MRA technique might provide an accurate alternative to the ankle-brachial index (ABI) and reduce the need for additional imaging procedures prior to revascularization in patients with peripheral arterial disease (PAD).

Introduction: PAD is a major cause of morbidity and accurate diagnosis is essential for optimal patient management. ABI is the initial diagnostic test of choice. However, there are several drawbacks of ABI. For instance, its accuracy is sometimes limited, e.g. in diabetic patients and those with extensive vessel wall calcification. Additional imaging with CTA, MRA, or DSA is usually required prior to revascularization. QISS MRA is a rapid, operator-independent non-enhanced MRA technique which has been reported to evaluate PAD with accuracy comparable to that of CE-MRA (1). We compared ABI and QISS MRA with respect to the following questions: (a) what is the accuracy for detecting hemodynamically significant stenosis? (b) is disease appropriately identified in the symptomatic leg? (c) what is the percentage of non-diagnostic studies? We then assessed radiologist confidence to proceed to revascularization after QISS MRA without further imaging.

Methods: The study was approved by the institutional review board. ABI and QISS MRA were compared for the detection of disease in symptomatic PAD patients. Using CE-MRA as the reference standard, we evaluated accuracy for detection of hemodynamically significant stenosis in a total of 40 patients (79 legs). In addition, we assessed QISS MRA image quality using a Likert score to establish confidence levels to proceed to revascularization without further imaging.

Results: 51.9% (41/79) of legs demonstrated hemodynamically significant (>50%) stenosis by ABI. 7.6% (6/70) of ABI studies were non-diagnostic due to vessel calcification. The percentage of legs showing hemodynamically significant PAD increased to 56.2% (41/73) when vessels suspected of being calcified were excluded from analysis. A total of 73.4% (58/79) of legs demonstrated hemodynamically significant (>50%) stenosis by QISS MRA. The sensitivity and specificity of QISS MRA for >50% stenosis were 93.4%/94.4% respectively ($p<0.05$). The sensitivity and specificity of ABI for > 50% stenosis were 66.7%/80.0% respectively ($p<0.05$). In 46.8% (37/79) of ABIs, disease was identified in the symptomatic limb compared with 92.4% (73/79) for QISS MRA. In 69.6% (55/79) of legs, revascularization could be considered as a treatment option. In 92.7% (51/55) of QISS MRA studies a Likert score ≥ 3 indicated confidence to proceed to revascularization based on QISS MRA study without the need for further imaging.

Conclusion: QISS MRA is more accurate than ABI for evaluating patients with PAD. Although ABI will likely remain the screening test of choice for PAD because of its simplicity, low cost, and bedside availability, we propose that QISS MRA may be preferred in situations where the accuracy of the ABI examination is known to be limited, including the elderly, patients with diabetes, and those with calcified vessels.

Figure 1: QISS non-enhanced MRA AP maximum intensity projection image showing a 2cm hemodynamically significant right superficial femoral artery stenosis. Patient had a normal resting ABI (0.9) on the right side.



(1)Edelman RR, et al. Magn Reson Med 2010; 63:951-958.

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