

Improving peripheral arterial assessment of people with diabetes

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Introduction

Peripheral arterial disease (PAD) increases the risk of heart attack, stroke, amputation and death, hence early identification and treatment are crucial. In many diabetic foot clinics, people with suspected PAD are referred for initial Doppler assessment, with a four to five month delay. Health professionals at the North Manchester Diabetes Centre and Salford Royal Hospital Trust describe how the Assist portable vascular laboratory has improved their management of people with suspected PAD, with significant benefits for patients.

Diabetes is the most powerful risk factor for peripheral arterial disease (PAD) and remains the most likely cause of non-traumatic lower limb amputation (Apelqvist et al, 1992). PAD is also recognised as a significant risk factor for coronary heart disease and cerebrovascular disease. It has been reported that more than half of those with PAD are asymptomatic or have atypical symptoms (Hiatt, 2001).

The recent consensus statement from the American Diabetes Association (ADA, 2003) emphasises the need for effective diagnosis of PAD, for two reasons:

- The prime reason is to elicit and treat symptoms relating to arterial disease.
- The second is to identify those patients with a significant risk of subsequent myocardial infarction or cerebral vascular disease enabling appropriate, essential medical treatment of atherogenic disease associated with PAD.

Peripheral arterial assessment of people with diabetes

The NHS modernisation agenda is punctuated throughout with references emphasising the need to reduce patient waiting times. Such emphasis highlights the need to develop new ways of working that involve the extension of practitioner roles in the management of diabetes. *Meeting the Challenge* (Department of Health, 2000) states that:

'Allied health professionals are central to the modernisation programme.

The NHS needs to ensure that patients

are treated quickly by people with the right skills, rather than having to wait to be seen by someone with a particular professional background.'

Mindful of such health policy, those of us involved in the care of patients with suspected PAD are increasingly aware of the need to reduce what many regard as suboptimal waiting times. In many primary and secondary care foot clinics, people with diabetes who have been identified as requiring further peripheral arterial assessment are referred in the first instance to the vascular services.

Following referral, patients often fall victim to considerable delay, which is likely to be exacerbated by the recent working time directive and the resultant reduction in doctors' working hours (Council of European Union, 1993). Furthermore, patients may have to travel to tertiary centres when the necessary services are not available locally, with the consequent risk of delay and breakdown in communication.

Lack of communication between services can undermine patients' confidence in their overall management. For those in whom vascular intervention and/or medical treatment is appropriate, timely intervention is crucial. The effect of diagnostic delay can be profound and, in the light of litigation awareness, may not be defensible.

Improving assessment of PAD

Within the diabetes centre at the Acute Pennine Trust and also Salford Royal Hospital Trust, we have recently identified

ARTICLE POINTS

1 Diabetes is the most powerful risk factor for peripheral arterial disease (PAD).

2 More than half of those with PAD are asymptomatic or have atypical symptoms.

3 Early identification and treatment of PAD is crucial.

4 The Assist portable vascular laboratory enables the collection of a range of information, utilising arterial photoplethysmography, Doppler pressure measurements and waveform analysis.

5 Combining such modalities provides a more sensitive and specific means of assessing PAD in the diabetic foot than Doppler ultrasound alone.

KEY WORDS

- Diabetes
- Peripheral arterial disease
- Vascular assessment
- Portable vascular laboratory

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PAGE POINTS

1 The Vascular Assist is a portable, multifunctional, semi-automated vascular flow laboratory.

2 It can rapidly perform a variety of arterial diagnostic investigations, including ankle/brachial pressure index, toe brachial pressure index as well as full spectrum colour waveform analysis.

3 It can also be used to screen for venous insufficiency.

4 The use of a combination of arterial assessments improves reproducibility and sensitivity compared with single Doppler assessment alone.

5 This is particularly true in diabetes, where medial wall calcification frequently undermines the potential value of ABPI measurement.

what is proving to be an effective, more patient-centred, rapid, sensitive and specific means of performing non-invasive peripheral vascular assessment.

The Assist is a portable, multifunctional, semi-automated vascular flow laboratory (Figure 1), which can rapidly perform a variety of arterial diagnostic investigations (Huntleigh Diagnostics, Cardiff, UK), including ankle/brachial pressure index (ABPI) and toe brachial pressure index (TBPI), as well as full spectrum colour waveform analysis. The Assist can also be used to screen for venous insufficiency – a leading cause of chronic lower limb ulceration.

Although clinical peripheral arterial assessment continues to be the benchmark standard for the majority of diabetic foot clinics, the value of such an approach alone as a means of detecting PAD has been widely criticised (Moffatt and O'Hare, 1995). Many foot clinics increasingly use handheld Dopplers as a valuable and additional assessment tool with which to undertake ABPI measurement.

While the Doppler ultrasound alone is indisputably a valuable diagnostic tool for assessing PAD, Doppler-determined ABPIs have shown a 15% variability among trained personnel (De Graaf et al, 2001), and

double this in people without specialist training (Vowden et al, 1996; Fisher et al, 1996; De Graaf et al, 2001). The use of a combination of arterial assessments has been shown to improve reproducibility and sensitivity compared with single Doppler assessment alone.

This is particularly true in people with diabetes, where medial wall calcification frequently undermines the potential value of ABPI measurement. The ADA, the Society of Interventional Radiology, and the Transatlantic Inter-Society Consensus (TASC) documents all highlight the need to exercise caution when screening and evaluating the arterial status of patients with diabetes (Sacks, 2002; TASC Working Group, 2000; ADA, 2003).

Stuart et al (2002) demonstrated that the Vascular Assist flow laboratory superseded vascular assessment using the handheld Doppler alone. In particular, arterial photoplethysmography was able to detect arterial disease in cases where Doppler ABPI measurements were within the normal range. Additionally, access to toe pressure measurement allowed an indication of arterial disease when ankle vessels were incompressible (Stuart et al, 2002). The benefits of TBPI measurement in patients with diabetes are now widely



Figure 1. The Vascular Assist portable vascular laboratory can rapidly perform ankle/brachial and toe brachial pressure indexes, and full spectrum colour waveform analysis.

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1 The Assist portable flow laboratory enables the collection of a range of information, utilising a combination of arterial photoplethysmography, Doppler pressure measurements and waveform analysis.

2 Combining such modalities provides a more sensitive and specific means of assessing PAD in the diabetic foot

3 Having immediate access to the Assist vascular flow laboratory in our foot clinics has eliminated the four to five months waiting time for Doppler assessment.

4 The Assist has provided patients with a valuable insight into their vascular status.

5 For many of our patients requiring foot surgery, the Assist has provided sufficient data on their peripheral arterial status to avoid subsequent inappropriate referrals for further arterial investigations.

reported in the literature (Johansson, 2002; Stuart et al, 2002; Wahlberg, 2002).

The Vascular Assist enables practitioners to collect a range of information, utilising a combination of arterial photoplethysmography, Doppler pressure measurements and waveform analysis. Combining such modalities provides a more sensitive and specific means of assessing PAD in the diabetic foot (Apelqvist et al, 1992; Vowden et al, 1996; Stuart et al, 2002).

Our experience with the Vascular Assist flow laboratory has shown that, for many of our patients requiring foot surgery, the unit has provided sufficient detail regarding their peripheral arterial status to avoid subsequent inappropriate referrals for further arterial investigations. Alternatively, in some cases immediate access to such in-house investigation facilitates fast-track referral directly to the surgeon. Vascular surgery where required and available can be more prompt and timely. We can undertake rapid and effective arterial assessment of patients within 20 minutes. In those individuals with asymptomatic PAD, as confirmed by the Assist, we have been able to provide prompt, prophylactic medical management.

Conclusion

The Assist portable vascular laboratory is a rapid, reliable, cost-effective and easy-to-use piece of advanced diagnostic equipment from which our patients have benefited significantly. It is also a valuable research instrument. Furthermore, in our hands the Assist has provided patients with a valuable insight into their vascular status.

For many of our patients, particularly those who smoke or have asymptomatic PAD, the archive of information offered by the Assist provides an incentive to climb the first rung of the ladder towards behavioural change.

Although the Assist is more costly than a hand-held Doppler, the comprehensive information that it provides and its immediate accessibility in the foot clinic can rapidly improve detection, fast-track referral and enable early intervention, potentially improving limb salvage.

Having access to the vascular flow laboratory during our foot clinics has

improved our management of patients with suspected PAD and eliminated the four to five month waiting times for Doppler assessment.

We invite you to reflect on your current service provision for patients with possible ischaemic foot disease. If you are experiencing significant delay in accessing vascular services, then this multifunctional diagnostic tool may provide a valuable ally in your foot clinic to support the effective management of patients suffering from symptomatic or asymptomatic ischaemic foot disease. ■

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