

Medical Engineering & Physics
PMS
LEG ARTERY SCAN

Introduction and scope:

Duplex scanning can identify site, severity and extent of lower limb arterial disease. It is valuable in identifying lesions which can be treated with percutaneous transluminal angioplasty. The scan is also used for planning surgical intervention.

Referral criteria:

Referrals can be accepted from vascular surgeons and the diabetic foot team for patients with clinically appropriate symptoms of lower limb arterial disease. Referrals can also be accepted from other departments if a poor ABPI result indicates arterial disease and it is likely that the patient will need arterial intervention.

Responsibilities:

Test staff: scientific or technical staff trained in vascular duplex scanning.

Equipment:

Duplex scanner with 2, 3.5, 5 and 7 MHz transducer.

Method:

Examination protocol:

The examination can cover the arterial supply to the lower limb from the abdominal aorta to the pedal arteries, or just a specific region of interest.

Perform the examination in a longitudinal plane with colour Doppler, identifying any regions of disease.

If the patient is a new referral the scan should commence at the level of the abdominal aorta (in order to check for aneurysmal disease). If the patient has had previous imaging of the abdominal vessels the examination can begin by taking a waveform in the common femoral artery, if this is triphasic there is no need to scan the iliac arteries.

Take representative waveforms and images in the common femoral, superficial femoral and the profunda femoral arteries. Move distally down the leg to the distal popliteal artery, noting any disease. If a significant lesion has been found proximally, take ankle waveforms in the PTA, peroneal and ATA arteries. If no significant lesion has been found the crural vessels (TPT, PTA, ATA and peroneal artery) may be scanned in full if clinically indicated.

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If a haemodynamically significant ($\geq 2\times$ PSV increase) lesion is suspected, examine the area in detail with spectral Doppler. Where possible use an angle $\leq 60^\circ$. Record velocities proximal to and at the site of the stenosis and document the anatomical location of any haemodynamically significant lesion identified.

If an occlusion is identified record the site of the occlusion and level of reconstitution of the vessel. Document presence of collateral vessels where seen.

Pedal arteries:

The pedal arteries can be examined for the presence of disease, also the consultant may request the pedal arteries be examined for planning surgical intervention (distal bypass). In instances where the patient presents with a foot ulcer and normal flow to the crural vessels the pedal arteries should also be assessed. A high frequency linear array transducer should be used. The scan should include the distal ATA, the DPA, distal PTA, and medial and lateral plantar arteries. Take representative images of each vessel and waveform, and also measure the diameter of the vessel where patent.

Popliteal entrapment:

Where popliteal artery entrapment is suspected the popliteal artery should be interrogated as follows: With the patient in a normal standing position examine the popliteal artery and assess waveforms. The vessel should then be examined in active plantar flexion, this is achieved with the patient pushing up onto 'tip-toe' position. Assess the popliteal artery during plantar flexion examining for increased velocities/stenosis or cessation of flow/occlusion of the vessel.

It is important to note that compression of the popliteal artery is also seen in normal subjects, therefore the presence of this is not confirmation of popliteal entrapment however the absence of compression could exclude the condition.

Reporting

Any areas of stenosis should be reported along with their velocity increase and anatomical location. The site of any occlusive disease and level of reconstitution of the vessel. Representative waveforms from all arteries scanned should also be reported.

The site and diameter of any aneurysmal disease should be reported.

Any anatomical variations should also be described.

Where pedal arteries have been assessed the patency, waveform and diameter of the vessels should be reported.

When the patient has been examined for popliteal artery entrapment the appearance of the vessel and waveforms when relaxed and during plantar flexion should be commented on.

All reports are completed on the CRIS system.

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Where it aids clarity and understanding, the written report should be augmented with a diagram completed on the lower limb arterial template (VAS-FRM-7); diagrams are scanned into the PACS system, and this noted in the written report.

In the event of acute onset, critical limb ischaemia and/or aneurysmal disease the vascular team should be informed immediately.

Table 1. Criteria for lower limb artery duplex assessment.

PSV ratio	% Stenosis
< 2	< 50
2	50
4	75
Numerous lesions without any alteration in PSV ratio or with PSV ratio < 2	Diffuse disease
Absence of flow	Occluded

Images:

- Abdominal aorta with maximum diameter (if part of scan).
- Representative waveforms (if patent) from
 - CFA with velocity.
 - SFA (proximal, mid and distal) with velocity.
 - PFA origin
 - Popliteal (proximal, mid and distal) with velocity.
 - PTA, ATA and Peroneal arteries, with velocity.
 - Pedal vessels (where required), with waveform and diameter.
- Areas of stenosis and/or occlusion described in report.
- Areas of aneurysm with diameter measurement.

Inspection criteria:

Complete CRIS database patient tested / DNA / rebooked.

References:

SVT professional reporting guidelines:

www.svtgbi.org.uk/assets/Uploads/Professional-Issues/LowerLimbArterialPSCFinalJan20131.pdf

NICE Guideline CG147 (August 2012) Lower limb peripheral arterial disease: diagnosis and management

Vascular Ultrasound, How, Why and When; 3rd Edition, A Thrush and T Hartshorne
pg 117-140