

Guidance

Lower Limb Arterial Duplex Examination Guidance

1 Scope

Local

2 Purpose

To provide guidance on how to perform lower limb arterial duplex examinations using current guidance.

3 Definitions

ATA – Anterior tibial artery

CFA – Common femoral artery

CIA – Common iliac artery

CVS - Clinical Vascular Scientist

DPA – Dorsalis pedis artery

EIA – External iliac artery

IIA – Internal iliac artery

NICE – National Institute for Health and Care Excellence

PerA – Peroneal artery

PopA – Popliteal artery

PFA – Profunda femoris artery

PTA – Posterior tibial artery

SFA – Superficial femoral artery

SVT - Society for Vascular Technology for Great Britain and Ireland

TPT – Tibioperoneal trunk

Vs/Vp – Peak velocity ratio: The peak systolic velocity across the stenosis (Vs) is divided by the velocity just proximal to the stenosis (Vp).

4 Introduction

Duplex ultrasound examination of the lower limb arterial system is used to assess the location and severity of arterial disease (stenotic, occlusive and aneurysmal). Indications include claudication, rest pain, ulceration and ischaemia. The NICE guidelines¹ recommend that a duplex ultrasound assessment is used as the first line of imaging for people with peripheral arterial disease where revascularisation is being considered. Lower limb arterial ultrasound scanning is used to assess patients:

- pre/post-angioplasty
- pre/post-surgery
- Under surveillance

5 Undertaken by (staff groups)

A CVS who is accredited via the SVT or a trainee who has successfully passed the departmental competency assessment in performing and interpreting lower limb arterial duplex scans.

6 Clinical equipment list

Duplex ultrasound scanner with both linear and curvilinear transducers. A low and high frequency probe should be available.

7 Limitations

- Obesity
- Open wounds
- Casts
- Dressings
- Bowel gas
- Acoustic shadowing from calcified arteries

8 Chaperones

Chaperone posters are displayed in patient waiting areas advising patients that they may bring a friend or relative into the room with them or request a formal chaperone. All patients have the right to a chaperone if they request one.

As per trust and SVT chaperone guidance documents (see associated documents), it is mandatory to have a formal or informal chaperone present when scanning children under 18. It is mandatory to have a formal chaperone present for patients:

- with communications needs or learning difficulties
- who are intoxicated with drugs or alcohol
- who are unconscious
- where English is not their first language
- who are vulnerable for other reasons not stated.

9 Method

The patient is positioned supine on the couch.

The examination may cover the lower limb arterial supply from the abdominal aorta to the ankle, CFA to ankle or may focus on specific region as per request. If the patient has had previous imaging of the abdominal vessels it may not be necessary to scan the aorto-iliac segment. If the common femoral artery waveform is triphasic pulsatile there is no indication to scan the iliac arteries.

In most cases the following arteries should be evaluated:

- CFA
- PFA
- SFA
- PopA
- TPT
- PTA
- PerA
- ATA
- DPA

If indicated the examination is extended to:

- Aorta
- CIA
- EIA
- IIA

The following techniques should be adapted to assess the lower limb arteries:

B-mode

- To assess for aneurysmal dilations, atheromatous plaque, thrombus and dissection.

Colour Doppler

- To assess for the presence or absence of flow
- To determine direction of flow
- To identify stenoses

Spectral Doppler

- To determine direction of flow
- To determine waveforms
- To measure velocities
- To assess for any stenosis and occlusions

10 Interpretation

VELOCITY RATIO (Vs/Vp)	DEGREE OF STENOSIS
< 2	Not haemodynamically significant (<50%)
>2	>50%
>4	>75%
Multiple lesions with PSV ratio <2	Diffuse disease
No waveforms detected	Occluded

Table based on reported criteria²

11 Images

The following images should be recorded as a minimum:

- Abdominal aorta with maximum diameter (if relevant)
- Representative waveforms from each artery assessed
- Sites of stenosis and/or occlusion
- Aneurysmal arteries with maximum diameter measurement (if relevant)

Images are stored on a DVD or external hard drive, in a locked filing cabinet in a secure vascular studies unit scanning room.

12 Reporting

A report should be completed and signed on Epic within 24 hours. This will be sent to the referring source and a copy is saved in the imaging section of the patients chart. The report should include:

- Which arteries have been assessed with patency and representative waveforms
- Any anatomical variations
- The anatomical position of any stenosis and degree of stenosis
- The anatomical position of any occlusions, whether short or long occlusion and level of reconstitution
- Whether any proximal SFA occlusions are flush to the CFA bifurcation or the length of the stump
- The anatomical position and size of any aneurysms
- The anatomical position of any dissection
- Any limitations
- If disease is present, a diagram should be included.

Any urgent findings should be communicated to the requesting Doctor immediately.

13 Monitoring compliance with and the effectiveness of this document

Key standards to be monitored:

- That CVS perform lower limb arterial duplex scans in line with this guidance

This will be monitored and carried out by CVS by:

- Departmental audits
- Peer review
- Attending MDT meetings
- Attending vascular surgery audit meetings
- Patient satisfaction surveys

The lead CVS is responsible for overall compliance and follow up of any actions identified.

14 References

1. National Institute for Health and Care Excellence (2012) Lower Limb peripheral arterial disease: diagnosis and management. [CG147] London: National Institute for Health and Care Excellence
2. Thrush, A. & Hartshorne, T. (2010) Peripheral Vascular Ultrasound How, Why and When (3rd Edition). London: Elsevier Churchill Livingstone

15 Bibliography

Cole, S. E. A. (Ed.) (2001). Vascular Laboratory Practice - Part III Lower Limb Arterial Assessment.

York: Institute of Physics and Engineering in Medicine

Pellerito and Polak. (2012). *Introduction to Vascular Ultrasonography* (6th edition) Philadelphia: Elsevier Saunders.

Society for Vascular Technology, (2013) Professional Performance Guidelines: Lower Limb Arterial Duplex Ultrasound Examination. Available at: www.svtgbi.org.uk .

Associated documents

Cambridge University Hospitals NHS Foundation Trust, 2016. *Chaperones: Requirement for use of chaperones*. [online] Cambridge University Hospitals NHS Foundation Trust. Available at:
<http://merlin/Pages/Results.aspx?k=chaperone%20policy>

Professional Standards Committee, 2012. *SVT Chaperone Guidelines*. [online] Society for Vascular Technology of Great Britain and Ireland. Available at:
<https://www.svtgbi.org.uk/professional-issues/>

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