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**Vascular Lab – Dudley Group NHS Foundation Trust.**

**Lower Limb Arterial Duplex (inc bypass grafts).**

**Reviewed July 2019.**

**Purpose:**

Lower limb arterial duplex examinations are carried out to assess for aneurysmal or occlusive disease within the abdominal vessels and lower limb arteries.

**Equipment:**

Colour duplex scanner: Philips EPIQ 5G.

Service and quality control test are carried out by supplier and Medical Physics Department, New Cross Hospital – Wolverhampton.

Consumables: Ultrasound gel, tissues, paper roll for the couch.

**Common Indications:**

* Claudication
* Rest pain/CLI
* ?Popliteal entrapment
* Non compressible vessels on ABPI or to exclude arterial disease when compression is to be considered.
* Ulceration/tissue loss
* Pre-renal transplant
* ?embolic event
* Bypass graft surveillance

**Procedure:**

The vascular sonographer should introduce themselves and correctly identify the patient using date of birth, address and unique hospital number.

An explanation of the procedure should be given, verbal consent obtained and any relevant medical history sought.

A 9-4 MHz linear array transducer is used with optimal settings for arterial duplex examination.

The patient should be examined in the supine position for the abdominal aorta and iliac arteries, and then the leg externally rotated to examine the lower limb arteries. The examination will either be uni or bilateral depending on the referral/patients symptoms.

The examination should include the following:

* Aorta
* Common iliac artery
* Internal iliac artery origin
* External iliac artery
* Common femoral artery
* Profunda artery (origin and proximal segment)
* Superficial femoral artery
* Popliteal artery
* Tibio-peroneal trunk
* Anterior tibial, posterior tibial and peroneal arteries
* If graft surveillance then the inflow vessel/anastomosis, bypass graft and outflow vessel/anastomosis should be interrogated.

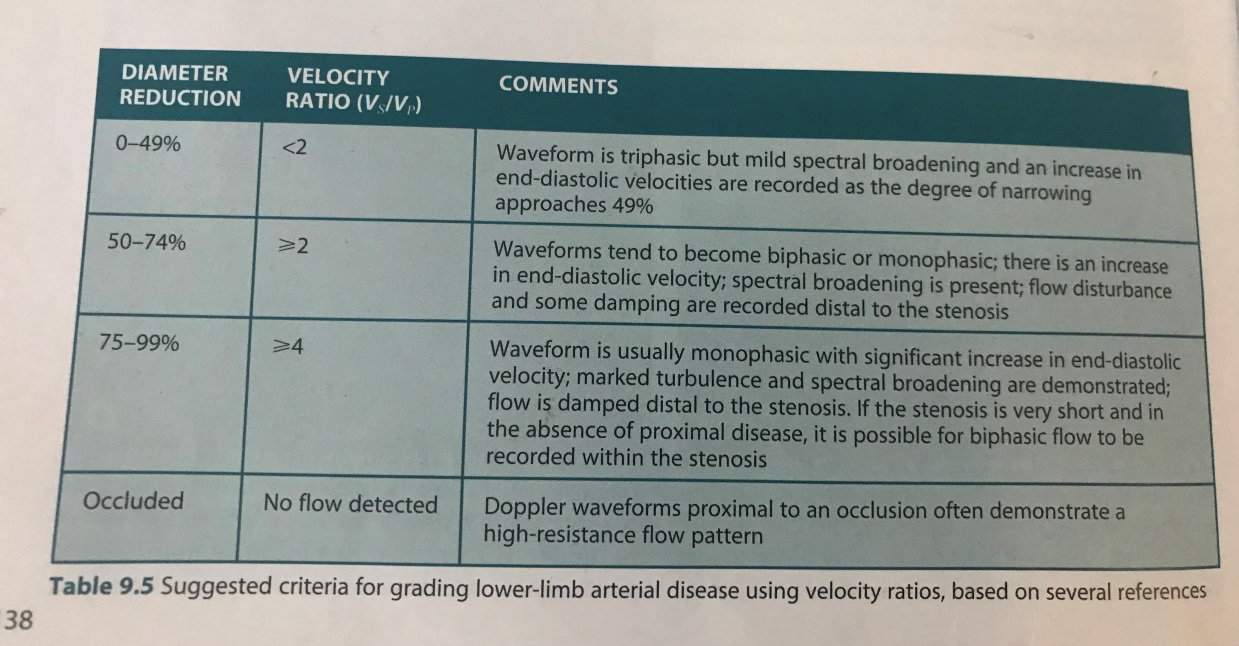
B-mode imaging should be used initially to evaluate and assess the relevant artery for the presence of any aneurysmal disease or pathology e.g. plaque, thrombus etc.

Colour Doppler is then used to identify the presence or absence of flow within the imaged vessels. Spectral doppler is then further required and used in conjunction with colour Doppler to determine flow direction, measure peak systolic velocities and assess the waveform shape to accurately quantify stenoses or occlusions within the vessels.

**Imaging and reporting:**

The entire length of the vessels/bypass grafts/stents, anastomoses and inflow/outflow vessels should be imaged and peak systolic velocities (PSV) should be taken at regular intervals. The waveform shape should be assessed for any changes to suggest the presence of disease.

Any areas where colour flow appears disturbed or there is obvious narrowing should be interrogated using spectral Doppler. The highest PSV should be measured at the narrowed region and in a normal area proximal to the disturbance in order to grade the degree of narrowing.

Stenoses are graded by percentage using the following criteria (Vs/Vp):

Vascular Ultrasound, How, Why and When. Abigail Thrush and Tim Hartshorne 3rd Edition (2010)

The report should include which arteries have been imaged and noted as to whether they are patent and the shape of the waveform (e.g. monophasic, biphasic, triphasic etc). For bypass grafts the inflow and outflow vessels should be imaged as well as the entire length of the graft and anastomoses.

The presence and anatomical position of any stenoses and length of occlusions, size and presence of any aneurysmal dilation should be included in the written report.

The vessel contents should also be described i.e. calcified atheroma.

Any limitations should also be included in the report and any vessel segments that could not be visualised should be documented.

Image storage: An appropriate number of annotated images should be saved in order to represent the entire examination, which will then be stored onto the PACS system.

The report is then to be typed on the CRIS system for the requesting clinicians to view, and any urgent findings should be immediately relayed to the vascular on-call team via on-call bleep or by phoning the on-call team on BLEEP: 8975 or R. Tullett – Vascular PA on BLEEP 5102. Alternatively B3 should be contacted.

**Graft surveillance protocol for stenosis as agreed by Interventional Radiologists & Vascular surgeons:**

1. If there is a 50-74% stenosis then email the referring surgeon and secretary.
2. If >75% stenosis then email referring surgeon, vascular secretary, interventional radiologists & Emma Towns (angio bookings) via email for booking into the next IR clinic + angioplasty.
3. If >75% and there are low flows within the graft and the graft is at risk of failure then refer directly to the vascular team on-call for an emergency inpatient angioplasty. Use vascular bleep number – for referral to B3.