University Hospitals Birmingham NHS
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CONTROLLED DOCUMENT

Lower Limb Arterial Duplex Ultrasound

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Lower Limb Arterial Duplex Ultrasound

Purpose

Duplex ultrasound examination is used to assess the arteries of the lower limb (aorta to ankle level) to determine the location and severity of vascular disease (occlusive and aneurysmal).

Common Indications

- Common indications for the performance of this examination include:
- Intermittent claudication.
- Ischemic rest pain.
- Gangrene.
- Ulceration.
- Post-surgical intervention follow-up e.g. angioplasty.
- Aneurysm.
- False aneurysm.

Contraindications and Limitations

Contraindications for lower limb arterial duplex ultrasound assessment are unlikely; however, some limitations exist and may include the following:

- Body habitus
- Casts, dressings, open wounds etc.
- Bowel gas when examining the aorto-iliac segment. Calcified arteries resulting from atherosclerosis may obstruct the ultrasound beam and cause acoustic shadowing artefact and may limit Doppler assessment.
- Patients who are unable to cooperate due to reduced cognitive functions e.g.
- Alzheimer's or dementia and through involuntary movements.

Equipment

- Duplex Doppler ultrasound machine with imaging frequencies of 3.5MHz and greater; with both linear and curvilinear transducers available1.
- Doppler frequencies of at least 3.0MHz should be available, with colour Doppler capability.
- Compliance with the Medical Devices Directive is necessary.
- Electrical safety testing is required annually, with regular maintenance and quality assurance testing to specified level by qualified personnel.
- Examination couch should be height adjustable preferably electrical. The scanning chair should provide good lumbar support, be height

adjustable and allow for the operator to move close to the examination couch23.
- The examination room should be temperature controlled with adjustable lighting levels suitable for examination2.
- Suitable cleaning materials should be available in line with local and manufactures guidelines.

Explanation of examination and patient history

The staff member undertaking the examination should:

- Welcome the patient and relatives.
- Introduce themselves and any other members of staff in the room.
- Confirm the patient's identity e.g. full name and date of birth
- Explain why the examination is being performed and give an indication of the test's duration
- Give an explanation of the procedure and it's duration – consideration should be made to the age and mental status of the patient
- Obtain verbal consent for the examination.
- Obtain a pertinent relevant medical history from the patient and/or notes
- Identify presence of any risk factors for example Smoking; diabetes; high cholesterol; obesity; hypertension; cardiovascular disease.
- Verify that the requested procedure correlates with the patient's clinical presentation.
- The test can be terminated at any point if the patient withdraws their consent for the procedure.
- Post procedure the patient must be informed how, when and by whom results/reports will be communicated.

Examination

- During the examination patients must be treated with respect, dignity and discretion.
- Patient comfort should be monitored throughout the test and alterations be made should a patient become uncomfortable.
- The examination may be unilateral or bilateral dependent upon clinical symptoms.
- The patient is asked to remove their clothing to expose the lower limb from groin to ankle.
- The patient is examined supine.
- The patient's dignity and privacy should be maintained at all times. Due to intimate nature of the examination it may be considered necessary to offer a chaperone4.
- During the examination the patient's mental and physical status should be monitored and modifications made to the examination accordingly.

- B-mode should be used to image the artery and assess for, aneurysmal dilation and vessel contents e.g. athermanous plaque.
- Spectral Doppler should be used to determine direction of flow, stenotic flow and absence of flow.
- Colour Doppler should be used to assess for the presence/absence of flow and aid the position of spectral Doppler when quantifying stenosis.
- A 50-75% stenosis is defined as a ratio of 2 but less than 2.5 when the peak sytolic velocity across the stenosis is divided by the nearest normal peak systolic. A >75% stenosis is defined as a ratio of 2.5 when the peak sytolic velocity across the stenosis is divided by the nearest normal peak systolic.

Depending on clinical signs and symptoms the following arteries could be included in the scan:

- Aorta
- Common iliac artery (CIA)
- External iliac artery (EIA)
- Common femoral artery (CFA)
- Proximal profunda femoris artery (PFA)
- Superficial femoral artery (SFA)
- Popliteal artery
- Tibio-peroneal trunk (TPT)
- Posterior tibial artery (PTA)
- Peroneal artery
- Anterior tibial artery (ATA)

Reporting

- The report is a recording and interpretation of observations made during the lower limb arterial duplex ultrasound examination; it should be written by the staff member undertaking the examination and viewed as an integral part of the whole examination.
- The report should include correct patient demographics; date of examination; examination type and the name and status of the staff member.
- Reports are in the form of an annotated diagram.
- The reporting should include; which arteries have been assessed commenting on the presence/absence of flow, the anatomical position of any occlusions or stenosis, the anatomical position and size of any aneurysms, any limitations e.g. difficult examination due to body habitus.
- In the presence of a stenosis the maximum velocity within the stenosis should be noted.
- Ensure appropriate efficient referral of critical ultrasound results to the referring consultant are made prior to the patient being

discharged so treatment plans can be enforced or expedited accordingly.

- Critical results must be verbally communicated to the on-call specialist registrar/consultant on the day of the test. Evidence of this communication should be noted on CRIS using auto report code DVASC2.
- Critical results can be defined as:
    - A diagnosis of an acute arterial occlusion.
    - Patient that descibes rest pain
    - An undiagnosed abdominal aortic aneurysm measuring more than 5.5cm in the AP plane.
    - A pseudoaneursym
- Unexpected results must be verbally communicated to the on-call specialist registrar/consultant on the day of the test. Evidence of this communication should be noted on CRIS using auto report code DVASC3
- All reports will be available on IMPAX within 24hrs of the scan being performed.
- Reports can be amended or removed by contacting the PACS team.

Quality Assurance

- Equipment is purchased in line with the Trust Procurement Policy
- Scanners are serviced in accordance with manufactures recommendation.
- Equipment faults are reported on the same day to medical engineering.
- Staff will perform test under supervision until they have been signed off as competent by a senior member of staff.

Monitoring

- Equipment is checked for damage on a weekly basis. Any damage is reported to medical engineers.
- Staff will have competency checked against the SOP on a quarterly basis by a senior member of staff.
- Lower limb arterial duplex will be audited against angiography
- Stakeholder feedback is obtained bi-annually through the Vascular Laboratory feedback questionnaire

Resources:

Society for Vascular Ultrasound Vascular Technology Professional Performance Guidelines Lower Limb Extremity Venous Duplex Evaluation 2011 www.svunet.org

American Institute of Ultrasound in Medicine Practice Guideline for the Performance of Peripheral Venous Ultrasound Examinations 2010 www.aium.org

Australasian Society for Ultrasound in Medicine Policies and Statements D20 Peripheral Venous Ultrasound2007 www.asum.com.au

References:

1. Standards for Ultrasound Equipment Royal College of Radiologists, February 2005 www.rcr.ac.uk

2. Guidelines for Professional Working Standards Ultrasound Practice United Kingdom Association of Sonographers (UKAS) October 2008 www.sor.org/learning/document-library

3. The Causes of Musculoskeletal Injury Amongst Sonographers in the UK Society of Radiographers, June 2002 www.sor.org/learning/document-library

4. Society for Vascular Technology Professional Standards Committee Chaperone Guidelines April 2012 www.svtgbi.org.uk