



THE SOCIETY FOR
VASCULAR TECHNOLOGY OF
GREAT BRITAIN AND IRELAND

PHYSIOLOGICAL MEASUREMENT SERVICE SPECIFICATIONS

Vascular Technology

Carotid Duplex

This investigation uses ultrasound to image and assess flow in the extracranial part of the carotid arteries. The ultrasound probe is used to scan the neck to look for restrictions in flow caused most commonly by fatty deposits (plaque), thrombus, or dissection of the vessel wall. There is potential for part of the plaque to disintegrate, with debris then being carried by the blood flow into the brain or the circulation of the eye (embolisation). Symptoms are variable and patients may suffer a stroke, transient ischaemic attack (TIA) or sudden loss or temporary loss of vision in one eye (amaurosis fugax).

Key guidance about the use of this test is given in Department of Health Implementing the National Stroke Strategy – An Imaging Guide published in May 2008¹. A joint working group was formed between the Vascular Society of Great Britain and Ireland, and the Society for Vascular Technology of Great Britain and Ireland to make recommendations about this test in order to standardise practice across the United Kingdom. These recommendations are given for the acquisition and interpretation and reporting of the data in a published paper: 'Joint recommendations for reporting carotid ultrasound investigations in the United Kingdom'². This is a key document for anyone involved in carotid duplex scanning. Its recommendations have been endorsed by: The British Medical Ultrasound Society, The Royal College of Physicians and the Society and College of Radiographers.

1. PATIENT PATHWAY

Carotid duplex scanning will be utilised and apply to TIA and stroke patient pathways. Carotid surgery or stenting is a possible endpoint of this pathway and should be undertaken within two weeks of the TIA. Therefore, if this diagnostic test is appropriate it should be carried out urgently, preferably within 24 hours of the onset of symptoms. This could be provided in a one stop TIA clinic. Guidance is given by the Department of Health¹. Guidance is also given by the Royal College of Physicians (RCP) Clinical Effectiveness Unit: 'National clinical guidelines for stroke'³.

2. REFERRAL

Clinical Indications

A suspected neurological event (stroke, TIA or amaurosis fugax) that may have resulted

from an embolic event arising from atherosclerotic disease at the carotid bifurcation is the most appropriate clinical indication for a carotid duplex scan. There are other less common indications such as a pulsatile mass in the neck.

Contra indications

None - although adequate access to the neck is required.

3. EQUIPMENT

Specification

A high resolution imaging ultrasound duplex scanner which has colour, power and pulsed Doppler modalities is required. A midrange (covering nominal frequencies of 4-9MHz) linear array transducer (probe) should be used.

There should be facilities to record images/measurements⁴. The Royal College of Radiologists (RCR) has more detailed technical standards for ultrasound equipment⁵.

The Joint Working Group gave recommendations on the equipment specification and in particular on the need for the ultrasound scanner to be capable of making accurate measurements of velocity².

It should be noted that a range of relatively low cost portable scanners are now available, not all of which will be suitable for vascular work.

It is important that the duplex scanner is of ergonomic design as explained in the health and safety section to minimise the risk of operator work related musculoskeletal disorders⁶.

Maintenance

Equipment should be regularly safety-tested and regularly maintained in accordance with the manufacturer's recommendations. Further information is available from the British Medical Ultrasound Society (BMUS): 'Extending the provision of ultrasound services in the UK'⁷.

Quality Assurance (QA) and Calibration

QA procedures should be in place to ensure a consistent and acceptable level of performance of all modalities of the duplex scanner. Such procedures are likely to be set up with involvement from Medical Physics Departments or service engineers as they require specialist skills and may require both imaging and phantoms.

Detailed guidance on the QA of the imaging modality of duplex scanning is contained in the Institute of Physics and Engineering in Medicine (IPEM) Quality Assurance of Ultrasound Imaging Systems report 102⁸. The IPEM report 70 Testing of Doppler Ultrasound Equipment, contains extensive information relating to performance testing of the pulsed and colour Doppler modalities of duplex scanners⁹.

Further general guidance is available in 'Guidelines for Professional working standards: Ultrasound practice'¹⁰.

Set up procedures

An appropriate probe should be selected. All duplex control settings should be set to defaults appropriate for extracranial carotid arterial investigation. Equipment manufacturer will normally provide appropriate default carotid settings.

Infection control

There are no nationally agreed standards for vascular ultrasound scanning but local infection control policies should be in place. BMUS⁷ advises that users should refer to

manufacturer's instructions for the cleaning and disinfection of probes and transducers and general care of equipment. It should be noted that ultrasound probes can be damaged by some cleaning agents and so manufacturer's specifications should always be followed. Sterile ultrasound gel and sheaths should be available and used in appropriate cases.

Accessory equipment

Examination couches and scanning stools must be of an appropriate safety standard and ergonomic design to prevent injury, particular consideration should be given to reducing the risk of operator work related musculoskeletal disorders⁶.

4. PATIENT

Information and consent

There is no legal requirement that written patient consent be obtained prior to an extracranial carotid arterial duplex examination. However, patients should be fully informed about the nature and conduct of the examination so that they can give verbal consent. It is desirable that this information is provided in written format and is given prior to their attendance¹¹. This information should also be verbally explained to the patient when they attend for the investigation. Examples of additional patient information to include can be found at the RCR http://www.rcr.ac.uk/docs/patients/worddocs/CRPLG_US.doc

The Circulation Foundation produces leaflets which provide further information to patients: www.circulationfoundation.org.uk.

Clinical history

The written referral for the investigation should contain relevant clinical history. This information should be verified and clarified for any discrepancies.

The nature and duration of symptoms should be established and relevant risk factors established e.g. hypertension³.

Preparation

No specific preparation is required. Good access will be required to the patient's neck. The patient will need to maintain the desired head position and not to talk during the scan.

5. ENVIRONMENT

The environment in which ultrasound scanners are used can have a profound effect on the efficiency of the service. A private room is preferable to carry out the scan, although it may be possible to use a curtained off area in a larger multi-scan bay unit, if provision is made to ensure privacy for each patient. On occasion, scans may need to be carried out in other localities e.g. in theatre, theatre recovery or at the patient's bedside. These scans may be limited due to poor environmental conditions, are time-inefficient and pose additional ergonomic risks for the operator and should be minimised where possible. The room lighting needs to be dimmable to ensure reflections do not interfere with the operator's view of the screen, and air-conditioning is recommended to prevent excessive temperatures. Operators can seek advice from the ultrasound manufacturer regarding exact requirements. Sufficient electrical power sockets are needed to support the demands of the scanner, couch, IT equipment and any accessories, the socket positions should be carefully planned to prevent trailing leads. Image storage and reporting on PACS or a similar system is recommended, IT provision should be compatible with efficient use of such systems, for example, dual monitors on computer workstations.

All equipment should be purchased with consideration for control of infection requirements, and should be easily cleaned and disinfected. Facilities for timely replacement, regular servicing, maintenance and safety checking should be in place.

The ability to minimise ergonomic risks should also inform ultrasound scanner, couch and seat/stool purchasing decisions. The maximum weight of the couch should be clearly displayed and consideration should be given to the provision of tilting couches for some vascular scans.

Further general guidance on the environment is given in the BMUS document “Extending the provision of ultrasound services in the UK”⁷ and United Kingdom Association of Sonographers “Guidelines for Professional Working Standards”¹⁰ and the Royal College of Radiologists document “Standards for the provision of an ultrasound service”⁶.

6. PROCEDURE, INTERPRETATION and REPORT

For detailed information on PROCEDURE, INTERPRETATION and REPORT please refer to Carotid Ultrasound Professional Performance guideline <https://www.svtgbi.org.uk/professional-issues/>

7. WORKFORCE

It is well recognised that ultrasound diagnosis is highly operator-dependent; it is essential the workforce has the appropriate knowledge and competence. This is achieved by ensuring the workforce has followed recognised education and training routes. This applies to both medically and non-medically qualified individuals.

Education and training requirements

All staff performing and reporting investigations should have successfully completed one of the following education and training routes:

1. Full SVT accreditation (Accredited Vascular Scientist)
<http://www.svtgbi.org.uk/education>
2. Post graduate qualification in ultrasound imaging from a Consortium for Accreditation of Sonographic Education (CASE) accredited course, with successful completion of a vascular module that included clinical competence in carotid duplex scanning.
3. A list of CASE accredited courses can be found at <http://www.case-uk.org/> Medical staff should have successfully followed the RCR recommendations for training in vascular scanning to level 2 competence in carotid duplex BFCR(17)3
<https://www.rcr.ac.uk/publication/ultrasound-training-recommendations-medical-and-surgical-specialties-third-edition>
4. Completion of the NHS Scientist Training Programme specialising in Vascular Science and statutory registration as a Clinical Scientist with the Health and Care Professions Council (HCPC.) <http://www.nshcs.hee.nhs.uk/join-programme/nhs-scientist-training-programme>

It is recommended that staff perform local competencies and are involved in audit (both results and peer audit

https://www.bmus.org/static/uploads/resources/Peer_Review_Audit_Tool_wFYQwtA.pdf) to maintain high standards.

Regulation

It is important both staff and employers are aware that although ultrasonography is not currently a regulated profession, there is a move towards future statutory regulation of all healthcare science groups. Current statutory or voluntary registration includes:

- (i) Registered on the SVT Voluntary Register
- (ii) UK Registered Physicians on the General Medical Council (GMC) Specialist Register
<http://www.gmc-uk.org/doctors/register/LRMP.asp>
- (iii) Registered Clinical Scientist with Health and Care Professions Council (HCPC)
<http://www.hpc-uk.org/check/>
- (iv) Registered on the Public Voluntary Register of Sonographers held by the Society and College of Radiographers (SCoR.) <https://www.sor.org/practice/ultrasound/register-sonographers>

Maintaining competence

It is important scanning competence is maintained by all personnel performing these investigations, either by performing a minimum number of scans per year, or through a CPD scheme. Criteria for ensuring continuing competence are set by professional bodies.

Continuing Professional Development (CPD)

Staff must undertake CPD to keep abreast of current techniques and developments, and to renew or extend their skills.

- I. SVT accredited sonographers must maintain their accreditation by meeting the CPD requirements of the SVT:
<https://www.svtgbi.org.uk/education/maintaining-avs-registration/>
- II. Staff with a post graduate qualification in ultrasound imaging should meet the CPD requirements for SCoR registration:
<http://www.sor.org/learning/document-library/continuing-professional-development-professional-and-regulatory-requirements>
- III. Medical staff should follow the requirements required for maintaining their skills, as well as the need to include ultrasound in their ongoing CME:
<https://www.rcr.ac.uk/clinical-radiology/cpd-scheme>
- IV. Clinical Scientists maintain registration with CPD through the HCPC.
<http://www.hpc-uk.org/registrants/cpd/standards/>

8. AUDIT, SAFETY & QA

Safety

The provider should be aware of the guidelines for the safe use of ultrasound equipment produced by the Safety Group of BMUS. In particular, they should be aware of ultrasound safety precautions related to vascular scanning. All staff should be aware of local safety rules and resuscitation procedures.

Sonographers are at risk of work related musculoskeletal disorders. To minimise this risk the scanner and its control panel, the examination couch and scanning stool must be of appropriate safety standard and ergonomic design.

The published document by the Society of Radiographers (SCoR) 'Prevention of Work Related Musculoskeletal Disorders in Sonography'⁶ gives clear guidance on this issue as well as 'Guidelines for Professional Working Standards Ultrasound Practice'¹⁰

QA and Audit

There are no specific requirements, but a mechanism of audit/quality control to ensure patients continue to receive high level of diagnostic accuracy should be in place.

QA and audit programs should cover:

- Equipment performance
- Patient service
- Quality of investigation

The BMUS document⁷ and UKAS Guidelines¹⁰ also give guidance. Equipment QA is covered in section 3 of this document.

Websites:

www.rcr.ac.uk
www.bmus.org
www.svtgbi.org.uk
www.svunet.org
www.case-uk.org
www.ipem.ac.uk
www.hpc-uk.org
www.rcplondon.ac.uk
www.vascularsociety.org.uk
www.circulationfoundation.org.uk
www.sor.org
www.nice.org.uk

References:

¹ Implementing the National Stroke Strategy – An Imaging Guide' May 2008

<http://www.bnms.org.uk/other-guidelines/doh-publication/departement-of-health-publications.html>

² Joint recommendations for reporting carotid ultrasound investigations in the United Kingdom' Oates CP et al Eur J Vasc Endovasc Surg 2009 37: 251-261.

³ National clinical guidelines for stroke fifth edition prepared by the intercollegiate stroke working party 2016

<https://www.rcplondon.ac.uk/guidelines-policy/stroke-guidelines>

⁴ SVT Guidance on Image Storage and use, for the vascular ultrasound scans 2012

<https://www.svtgbi.org.uk/professional-issues/>

⁵ Standards for the Provision of an Ultrasound Service' Royal College of Radiologists 2014

<https://www.rcr.ac.uk/publication/standards-provision-ultrasound-service>

⁶ Prevention of Work Related Musculoskeletal Disorders in Sonography - Society of Radiographers 2014

https://www.sor.org/sites/default/files/document-versions/sor_industrystandards_prevention_musculoskeletal.pdf

⁷ Extending the provision of ultrasound services in the UK' BMUS 2003
https://www.bmus.org/static/uploads/resources/EXTENDING_THE_PROVISION_OF_ULTRASOUND_SERVICES_IN_THE_UK.pdf

⁸ Quality Assurance of Ultrasound Imaging Systems' IPEM report 102 2010

⁹ Testing of Doppler Ultrasound Equipment' IPEM report 70 1994

¹⁰ Guidelines for Professional Working Standards Ultrasound Practice. UKAS

http://www.sor.org/system/files/document-library/members/sor_D41663_Prof_Guidelines_Booklet.pdf

¹¹ Improving Quality in Physiological Sciences (IQIPS) Standards and Criteria
<http://www.iqips.org.uk/documents/new/IQIPS%20Standards%20and%20Criteria.pdf>

