THE SOCIETY FOR VASCULAR TECHNOLOGY OF GREAT BRITAIN AND IRELAND

PHYSIOLOGICAL MEASUREMENT SERVICE SPECIFICATIONS

Vascular Technology

Assessment for Assessment of venous reflux

This investigation uses ultrasound to image and assess flow in the deep and superficial veins of the legs. An ultrasound probe is used to scan the legs to detect the presence and direction of flow in the veins. Patients with primary varicose veins or recurrent varicose veins may be referred for this investigation. Other patients who may require this investigation include those with leg ulcers, venous skin changes and those with chronic leg swelling.

1. PATIENT PATHWAY

Duplex assessment of venous reflux is the major diagnostic test in the varicose vein pathway. Further guidance is given by the Vascular Society Great Britain and Ireland publication Provision of Services for Patients with Vascular Disease 2015[1] , Scriven et al[2] and the National Institute for Health and Care Excellence (NICE) [3]

Venous anatomy can be variable, and it is important to have a full understanding of possible variants, the recently updated venous nomenclature as well as knowledge of ultrasound identification and venous physiology [4, 5, 6].

2. REFERRAL

Clinical Indications

These include simple or complex primary varicose veins, secondary (recurrent) varicose veins, leg ulcers, skin changes and chronic leg swelling. There is also some evidence that duplex imaging should be a routine part of the investigation of every patient with varicose veins, particularly if they are to undergo intervention[3,4.] It is necessary as part of the selection process for surgery, foam sclerotherapy, laser and radiofrequency ablation. A duplex ultrasound investigation is also indicated where there is suspicion of reflux in the deep veins or where there is a history of deep vein thrombosis (DVT).

Contra indications

Where it is not possible to generate enough hydrostatic pressure to get good venous filling in the calf, then it is not possible to assess the competency of the leg veins. This may be due to inability of the patient to adopt the required positioning, pain or oedema.

Consideration should be given to patients who have dressings for ulcers. Ideally, there should be access to nursing staff that are able to remove and re-apply dressings to enable optimal access to the lower leg during the ultrasound assessment. It is important to consider the implications when the scan is carried out with compression bandages still in place.

3. EQUIPMENT

Specification

A high resolution imaging ultrasound duplex scanner which has colour, power and pulsed Doppler modalities is required. Mid range (covering nominal frequencies of 4-7MHz) and high range (covering nominal frequencies of 10-15MHz) flat linear array transducers (probes) should be available.

There should be facilities to record images/measurements[11]. The Royal College of Radiologists (RCR) has more detailed technical standards for ultrasound equipment[12].

It should be noted that a range of relatively low cost portable scanners is 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 safety section to minimise the risk of operator work related musculoskeletal disorders[13].

Maintenance

Equipment should be regularly safety-tested and regularly maintained in accordance with the manufacturer's recommendations by qualified personnel. Compliance with the Medical Devices Directive is required. Review of in-service equipment should typically be undertaken four to six years after installation.[12] Further information is available from the British Medical Ultrasound Society (BMUS).[14]

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 102[15] . 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 scanners[16].
Further general guidance is available in 'Guidelines for Professional working standards: Ultrasound practice'[17].

Set up procedures
An appropriate probe should be selected. All duplex control settings should be set to defaults appropriate for a venous investigation. Equipment manufacturer will normally provide appropriate default venous settings.

Infection control
There are no nationally agreed standards for vascular ultrasound scanning but local infection control policies should be in place. BMUS[18] 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. Particular care should be taken around ulcers.

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 disorders[14, 17, 19].

4. PATIENT

Information and consent
There is no legal requirement that written patient consent be obtained prior to a venous 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 attendance[20].
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 https://www.rcr.ac.uk/sites/default/files/publication/BFCR%2812%298_consent.pdf
The Circulation Foundation produces leaflets which provide further information to patients: www.circulationfoundation.org.uk.

Clinical history
The 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. Any history of lower extremity venous insufficiency, previous DVT and/or superficial vein thrombosis, extremity trauma, venous ulcers and/or varicosities should be noted.

Preparation
No specific preparation is required. Access will be required to the patient's full leg.
Compression stockings and where appropriate, other dressings should be removed to enable access to the areas of the limb which require scanning. This test involves using the probe to apply pressure on the limb to compress the vein, and also squeezing the limb below the level of the probe to check for venous reflux. Careful explanation of this will aid compliance as these processes can sometimes be uncomfortable for the patient.

The patient needs to be positioned such that enough hydrostatic pressure is generated to get good venous filling in the calf. The position should be as similar to standing as possible [4,7,8,9,10,21], in order to reproduce physiological conditions. Ideally the patient should be

standing with appropriate support (provision of a braked couch on its highest setting to lean against or low stool with arm support or tilt table is helpful) or, where this is not possible, sitting on the edge of the couch with the legs as dependent as possible. Horizontal limb positions are not appropriate for detection of reflux [4].Consideration should be given to the reliability of the results where patients are not able to tolerate optimal positioning.

A second person can be useful to help in situations where the patient is unsteady or it is not possible to squeeze the limb with one hand due to size or oedema.

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, seeking 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" [14] and United Kingdom Association of Sonographers "Guidelines for Professional Working Standards - Ultrasound Practice" [17] and the Royal College of Radiologists document "Standards for the provision of an ultrasound service" [24]

6. PROCEDURE, INTERPRETATION and REPORT

For detailed information on PROCEEDURE, 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:

(i) Full SVT accreditation (Accredited Vascular Scientist) http://www.svtgbi.org.uk/education

(ii) 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 venous duplex scanning. A list of CASE accredited courses can be found at http://www.case-uk.org

(iii) Medical staff should have successfully followed the RCR recommendations for training in vascular scanning to level 2 competence in peripheral extremity veins (BFCR(12)17):https://www.rcr.ac.uk/publication/ultrasound-training-recommendations-medical-and-surgical-specialties-third-edition

(iv) 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'[13] gives clear guidance on this issue as well as 'Guidelines for Professional Working Standards Ultrasound Practice'[17]

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 document[14] and UKAS Guidelines[17] 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:

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[4] 'Duplex Ultrasound Investigation of the Veins in Chronic Venous Disease of the Lower Limbs – UIP Consensus Document. Part I. Basic Principles' Coleridge-Smith P et al. Eur J Vasc Endovasc Surg (2006) 31: 83-92
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[11] SVT Guidance on Image Storage and use, for the vascular ultrasound scans 2012 http://www.svtgbi.org.uk/professional-issues/

[12] Standards for Ultrasound Equipment' Royal College of Radiologists 2014 https://www.rcr.ac.uk/publication/standards-provision-ultrasound-service

[13] Prevention of Work Related Musculoskeletal Disorders in Sonography - Society of Radiographers 2014 http://www.sor.org/learning/document-library/work-related-musculo-skeletal-disorders-sonographers

[14] 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

[15] Quality Assurance of Ultrasound Imaging Systems' IPEM report 102 2010

[16] Testing of Doppler Ultrasound Equipment' IPEM report 70 1994

[17] Guidelines for Professional Working Standards Ultrasound Practice. UKAS http://www.sor.org/system/files/document-library/members/sor_D41663_Prof._Guidelines_Booklet.pdf

[18] BMUS, Clinical Protocols https://www.bmus.org/policies-statements-guidelines/clinical-protocols/

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

[20] Improving Quality in Physiological Sciences (IQIPS) Standards and Criteria https://www.ukas.com/services/accreditation-services/physiological-services-accreditation-iqips/

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