THE SOCIETY FOR VASCULAR TECHNOLOGY OF GREAT BRITAIN AND IRELAND

Vascular Technology Professional Performance Guidelines

Lower Limb Venous Duplex Ultrasound Examination for the Assessment of Deep Vein Thrombosis (DVT)

This guideline was prepared by the Professional Standards Committee (PSC) of the Society for Vascular Technology (SVT) as a template to aid the clinical vascular scientist/vascular sonographer and other interested parties. This guideline may be used in part or in its entirety with suitable additions made by local policy implementers.
Suggestions for improvement of this guideline are welcome and should be sent to the Chair of the PSC – see www.svtgbi.org.uk for current chair details.

Purpose:

Duplex ultrasound examination is used to assess the deep and superficial venous system of the lower limb (groin to ankle level) to determine the presence or absence of thrombosis.

Common Indications:

Common indications for performance of this examination include:

- Swelling
- Pain
- Tenderness
- ? source of pulmonary embolism (PE)

Contraindications and Limitations:

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

- Obesity
- Casts, dressings, open wounds etc can limit visualisation.
- Severe oedema/swelling.
- Limited mobility
- Patients who are unable to cooperate due to reduced cognitive functions e.g.
  Alzheimer's or dementia and through involuntary movements
- Examinations undertaken portably at the patient's bedside maybe limited due to equipment and room dimensions
- Patient discomfort
- Bowel gas when examining abdominal veins

Equipment:

Regularly safety checked and maintained Duplex Doppler ultrasound machine with imaging frequencies of 3.5MHz and greater; with both linear and curvilinear transducers available. Doppler frequencies of at least 3.0MHz should be available, with colour Doppler capability[1]. Examination couch should be height adjustable preferably electrical. The CVS's chair should provide good lumbar support, be height adjustable and allow for the CVS to move close to the examination couch[2 3].
The examination room should be temperature controlled with adjustable lighting levels suitable for examination[2].
Suitable cleaning materials should be available in line with local and manufactures guidelines.

Examination and patient history:

The CVS undertaking the examination should:

- introduce themselves
- 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
    - Presence of risk factors e.g. previous DVT, recent major surgery, active cancer, family history of DVT, oral contraceptive pill or hormone replacement therapy
    - Results of other relevant diagnostics
- Verify that the requested procedure correlates with the patient's clinical presentation

Examination:

The examination may be unilateral or bilateral dependent upon clinical symptoms and departmental policy.

The patient is asked to remove their clothing to expose the lower limb from groin to ankle. The patient is examined in the supine position with the leg externally rotated and the knee slightly flexed.

The head and shoulders should be raised to encourage distension of the leg veins.

The legs should be tilted downwards from the head by at least 30^0. This helps to fill and distend the veins, making imaging easier DVT can cause intense pain in the leg and positioning may have to be altered to reduce discomfort.

Due to intimate nature of the examination it may be considered necessary to offer a chaperone[4]
During the examination the patient's mental and physical status should be monitored and modifications made to the examination accordingly.

The following appropriate techniques should be used to evaluate the lower limb venous system:

- B-mode should be used to image the vein and its contents; using compression of the vein in the transverse plane
- Spectral Doppler should be used to determine direction of flow and detect abnormal flow patterns
- Colour Doppler maybe used to detect thrombus as an aid to the B-mode procedure; it is an essential requirement for the assessment of the abdominal veins.

Start the examination in the groin at the common femoral vein (CFV). The CFV should be examined to assess for: spontaneous flow, respiratory and cardiac modulation, augmentation, compressibility, colour filling and examine the B-Mode image to assess for the presence of echoes within the vein. Assessment of the iliac veins should be included where there is suspicion of proximal obstruction as indicated by the referring clinician, the clinical history, or where during the investigation, flow in the common femoral vein does not exhibit spontaneous phasic flow with respiration as seen using pulsed Doppler signal.

It is important that providers understand and take into consideration the protocol used by other local organisations. This will help reduce the repeat testing that often occurs when a patient is referred to another organisation.

Continue to examine the lower limb veins distally examining the length of the femoral vein (FV), the proximal profunda femoris vein, the popliteal vein (ensuring the whole length is visualised including the adductor region). Assessment of the calf veins remains controversial[1], but thrombosed deep calf veins are a source propagating DVT and potential PE and should be assessed at the level of detail agreed with locally referring clinicians. The calf veins (soleal veins, gastrocnemius veins, posterior tibial veins and peroneal veins) may be performed either with the patient supine or sitting up, although sitting the patient up may help to fill the veins and make imaging easier.

Although not routinely examined the anterior tibial veins (ATV), long saphenous vein (LSV) and short saphenous vein (SSV) maybe examined if pain is localised to this area.

Care should be taken when using compression to assess fresh acute DVT to ensure thrombus is not dislodged.

If thrombus is identified the extent of the thrombus should be quantified making reference to the anatomical position of the thrombus and its upper and lower extent with reference to anatomical landmarks e.g. from medial femoral condyle; whether it is occlusive, non-occlusive or free-floating. B-mode can be used to evaluate if thrombus is acute or chronic, from its echogenicity, attachment and vein dilation.

Reporting:

The report is a recording and interpretation of observations made during the lower limb venous duplex ultrasound examination; it should be written by the CVS undertaking the examination and viewed as an integral part of the whole examination[5].

The report should include correct patient demographics; date of examination; examination type and the name and status of the CVS.

The reporting should include:

- The presence/absence of phasic flow in the proximal veins
- Which veins have been assessed & record the presence/absence of thrombus
- Where thrombus is identified, the location, length/extent, degree of patency and whether the thrombus is acute or chronic should be documented.
- Any limitations encountered during the examination
- An appropriate number of annotated images that represent the entire ultrasound examination - in accordance with local protocols and SVT Image Storage Guidelines[5]

A tongue of thrombus that is poorly attached to the vessel wall is potentially very dangerous and, if detected, must be highlighted in the report and the referring clinician made aware immediately

The report should also include any incidental findings that mimic the symptoms of DVT, such as thrombophlebitis, or other incidental findings such as a Baker's cyst, tissue masses.

Ensure appropriate 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.

Resources:

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

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

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

References:

[1] Physiological Measurement – Service Specifications Vascular Technology. Test : Assessment for Deep Venous Thrombosis (DVT) www.svtgbi.org.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 www.svtgbi.org.uk

[5] Society for Vascular Technology Professional Standards Committee Image Storage Guideline

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

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