



Vascular Technology Professional Performance Guidelines

Upper Limb Venous Duplex Ultrasound

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 maybe 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

To evaluate the deep and superficial venous systems of the upper limb extremity in order to identify the presence of thrombus.

Common Indications

Common indications for the performance of upper limb venous duplex evaluation include:

- Swelling
- Pain
- Tenderness
- Palpable cord
- Assessment before after or during central line placement.

Contraindications and Limitations

Contraindications for upper limb venous duplex are unlikely; however, some limitations exist and may include the following:

- Obesity
- Casts, dressings, open wounds/ulcers etc can limit visualisation.
- Severe oedema/swelling.
- Patients who are unable to cooperate due to reduced cognitive functions e.g. Alzheimer's or dementia and through involuntary movements
- Very thin patients have very small vessels
- IV or catheters that limit visualisation of vessels
- Bone; A short segment of the Subclavian vein cannot be examined as it moves under the clavicle.

Equipment:

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.

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.

The examination couch should be height adjustable, preferably electrical. The couch should be capable of tilting by at least 30 degrees or alternatively the patient may be scanned standing in which case a raised platform/step with patient support may be useful. The CVS's chair should provide good lumbar support, be height adjustable and allow for the CVS to move close to the examination couch^{1,2}.

The examination room should be temperature controlled with adjustable lighting levels suitable for examination¹.

Explanation of 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 and/or superficial venous thrombosis, upper extremity trauma, cancer.
 - history of previous AV Fistula
 - Nature of patients symptoms
- Complete a limited physical exam, which includes observation and localization of any pain or swelling.
- 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 upper limb from wrist to neck.

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

- B-mode should be used to image the vein with and without compression. With incomplete compression indicating possible thrombus. If thrombus is present its age should be determined (chronic/acute) using echogenicity as a guide. It is also important to determine the occlusive nature of the thrombus using b-mode in conjunction with colour flow.

- Spectral Doppler should be used specifically within the subclavian vein to assess the waveform (i.e. whether it is phasic in nature). It is good practice to compare this with the other side even in a unilateral scan as venous flow differs widely from patient to patient. In order to augment the phasic nature of flow it may be necessary to ask the patient to exaggerate their breathing. Continuous flow in the subclavian vein can be an indicator of more proximal occlusion.
- Colour Doppler should be used to assess for the presence/absence of flow in any areas where compression is incomplete. Squeezing of the hand/forearm can be performed to augment flow and identify occlusive/non-occlusive thrombus.

Evaluation of the following veins should be included:

- Internal jugular vein
- Brachiocephalic vein (Right)
- Subclavian, axillary, brachial, radial and ulnar veins.
- Basilic vein
- Cephalic vein
- Median cubital veins
- Any other superficial or connecting veins.

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 examination³.

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

The report should include:

- The presence/absence of phasic flow in the proximal veins
- Which veins have been assessed and the presence/absence of any thrombus,
- Where thrombus is identified, the location, length/extent, degree of patency and estimated age should be documented
- Any limitations e.g. if veins not imaged due to cannular insertion.
- An appropriate number of annotated images that represent the entire ultrasound examination - in accordance with local protocols and SVT Image Storage Guidelines³

Referral of critical ultrasound results should be made to the referring consultant or appropriate medical/surgical team (as per local protocol) prior to the patient being discharged so that treatment plans can be developed, enforced or expedited accordingly.

RESOURCES:

Society for Vascular Ultrasound Vascular Technology Professional Performance Guidelines Upper Extremity Venous Duplex Evaluation 2013 www.svunet.org – members only
 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 Ultrasound 20 www.asum.com.au

REFERENCES:

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- ¹ Guidelines for Professional Working Standards Ultrasound Practice United Kingdom Association of Sonographers (UKAS) October 2008 www.sor.org/learning/document-library
- ² The Causes of Musculoskeletal Injury Amongst Sonographers in the UK Society of Radiographers, June 2002 www.sor.org/learning/document-library
- ³ Society for Vascular Technology Professional Standards Image Storage Guideline 2012 www.svtgbi.org.uk

SVT Professional Standards Committee December 2013