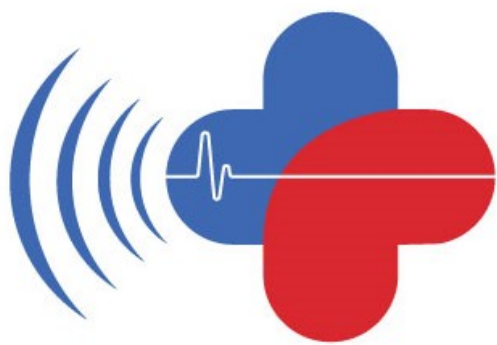




CSVs

THE COLLEGE AND SOCIETY
FOR CLINICAL VASCULAR SCIENCE
Great Britain and Ireland

Vascular Science Guidelines

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

November 2025

Version 2.0

Doc Ref PS-PG010



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2.0	Updated document with CSVS formatting	Author: PSC Review: Nov 2028 Approval: CSVS Exec	Nov 2025

Purpose

This document was prepared by the Professional Standards Committee (PSC) of the College and Society for Clinical Vascular Science (CSVS) to support the practise and delivery of high quality standardised Clinical Vascular Science. This document may be used in its entirety along with CSVS Vascular Ultrasound Service Specifications¹, or referenced in part with suitable additions made by local policy implementers. Also, the IPEM Society for Vascular Technology Professional Publications provide detailed indications for lower limb venous DVT Duplex investigations²

Suggestions for improving this document are welcome and should be sent to the Chair of the PSC (see csvs.org.uk for current PSC Chair details).

Introduction

Duplex ultrasound examination is used to assess the deep and superficial venous system of the upper and lower limb to determine the presence or absence of thrombosis.

There are many risk factors for deep vein thrombosis (DVT)³ such as previous DVT, obesity, Cancer, varicose veins, smoking etc.. with secondary risk factors such as recent surgery, trauma, immobility, chemotherapy, pregnancy, dehydration etc. The listed risk factors are not exhaustive.

Common Indications

Common indications for performance of this examination include:

- Swelling
- Pain
- Tenderness
- ?Source of Pulmonary Embolism (PE)
- Palpable Cord
- Assessment before, after or during central line placement

Contraindications and Limitations

Contraindications for upper and 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.
- Severe oedema/swelling/pain
- Limited mobility
- Consideration should be made to the age and mental status of the patient
- Patient discomfort
- Bowel gas when examining the abdominal veins
- IV or catheters that limit visualisation of vessels
- Bone; A short segment of the subclavian vein may not be examined as it passes under the clavicle

Patient Pathway

Duplex ultrasound assessment is the major diagnostic test in confirming the presence of acute DVT. To ensure best use of resources, the pathway often includes simple screening tests such as Wells scoring and D-dimer pathology testing before proceeding to a Duplex investigation.

The screening tests have high negative predictive values, but low positive predictive values. If these tests are positive a Duplex scan should be carried out.^{4,5}

Patient Referral

The main indication for this investigation is suspicion of DVT. It is important to note that it is difficult to diagnose a DVT by clinical symptoms alone and that other conditions such as cellulitis and lymphoedema can present similarly.⁴

Clinical features include sudden unilateral swelling, acute pain and tenderness. Patients with a suspected recurrent DVT or thrombophlebitis may also require this test. It may be

requested to investigate the source for PE where this would inform a change in patient management.

The major risk factors for DVT include recent surgery or trauma, immobility (including long-duration travel), coagulation disorders, active malignancy, pregnancy, oral contraceptives and hormone replacement therapy

Serial or repeat scanning to investigate propagation of DVT and/or recanalisation of veins may also be requested.

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, upper limb paresthesia, prominent veins in shoulder region, previous DVT and/or superficial vein thrombosis, lower limb venous ulcers and/or varicosities should be noted.^{6,7}

Patient Preparation:

No specific preparation is required.⁸ Clothing may need to be removed to allow easy access to the patient's leg or arm. Where appropriate, compression stockings and any other dressings should be removed.

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. Careful explanation of this will aid compliance as pain is often felt at the site of thrombosis and compression can be uncomfortable or painful for the patient.

Explanation of Examination:

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
- 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
 - Specifically enquire about the site of any symptoms to enable focused assessment of additional areas that may fall outside of the routinely examined veins
 - 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. Due to the intimate nature of the examination it may be considered necessary to offer a chaperone.⁹ 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 vein and its contents; using compression of the vein in the transverse plane. Care should be taken when using compression when acute DVT is identified so as to ensure thrombus is not dislodged.

Spectral Doppler should be used to determine direction of flow and detect abnormal flow patterns.

Colour Doppler should be used to detect filling defects as an aid to the B-mode procedure in the detection of thrombus; it is an essential requirement for the assessment of the abdominal veins.

Lower limb venous DVT examination:

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 may be tilted downwards from the head by at least 30 degrees. 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.

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. The B-mode image should be examined 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 wave Doppler signal.

Continue to examine the lower limb veins distally examining the length of the femoral vein (FV) ¹⁰, the proximal profunda femoris vein, the popliteal vein (ensuring the whole length is visualised including the adductor region). Assessment of the calf veins may be undertaken as part of a whole leg scan however proximal-only scans may also be deemed appropriate as recommended in NICE guidelines³. This approach should be agreed as part of a locally validated pathway.

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 with legs dependent may help fill the veins and make imaging easier.

Although not routinely examined the anterior tibial veins (ATV), greater saphenous vein (GSV), anterior accessory saphenous vein (AASV) and small saphenous vein (SSV) may be examined if pain is localised to this area. ^{11, 12}

Upper limb venous DVT examination:

The patient is asked to remove their clothing to expose the upper limb and shoulder area.

B-mode imaging should be used to image the vein with and without compression. Incomplete compression of the vein indicates possible thrombus. 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). Continuous low flow in the subclavian vein with lack of normal phasicity, or absence of spontaneous and phasic flow 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 not possible or incomplete. Squeezing of the hand/forearm can be performed to augment flow and identify occlusive/non-occlusive thrombus.

Evaluation of the following veins could be included:

- Internal jugular vein
- Brachiocephalic vein
- Subclavian, axillary, brachial, radial and ulnar veins
- Basilic vein

- Cephalic vein
- Median cubital vein
- Any other superficial or connecting veins

Reporting

The report is a recording and interpretation of observations made during the upper and lower limb venous duplex examination; it should be written by the CVS 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 CVS.

The report should include:

- The presence/absence of phasic flow in the proximal veins.
- Which veins have been assessed & record the presence/absence of thrombus. (note, usage of the out-dated term 'superficial femoral vein' should be avoided so there is no confusion as to what constitutes a deep versus superficial thrombosis. The terms long saphenous vein and short or lesser saphenous vein are also out-dated, great saphenous vein and small saphenous vein should be favoured.^{14,15})
- If thrombus is identified, the extent of the thrombus should be quantified making reference to the anatomical position of the thrombus with reference to anatomical landmarks e.g. from medial femoral condyle; whether it is occlusive, non-occlusive and/or poorly adhered. B-mode can be used to evaluate if thrombus is acute or chronic, from its echogenicity, attachment and vein dilation, however, it is not always possible to differentiate between acute and chronic thrombus.
- The term 'free-floating' can be alarming to those not familiar with it, as it may be confused for clot in transit, however in some centres poor mural adherence of thrombus may guide patient management in some instances. This should be determined locally, and to facilitate this poor mural adherence should be documented in reports.
- Any limitations encountered during the examination.
- An appropriate number of annotated images that represent the entire ultrasound examination in accordance with local protocols and CSVS Image Storage Guidelines¹³
- Any incidental findings that mimic the symptoms of DVT, any differential diagnoses according to the sonographers training, competency and local requirements (e.g. Baker's cyst)

Ensure the referring clinical team are informed of critical ultrasound results without delay so that treatment plans can be made and implemented accordingly.

Where acute thrombus is identified in the ilio caval segment, it may be helpful to signpost the referring clinician to any locally agreed escalation plans in place to ensure early identification of patients who may benefit from intervention such as thrombolysis.

Recent Endovenous Ablation (EVA) patients:

Where patients have thrombosis at the saphenofemoral junction or saphenopopliteal junction as a complication of recent EVA, it is helpful to describe and report this in line with the below classification for endothermal heat induced thrombosis (EHIT) to support management in line with European Society for Vascular Surgery guidelines.¹⁶

EHIT Class	Definition
I	Thrombus without propagation into the deep vein - Peripheral to the superficial epigastric vein - Central to the superficial epigastric vein, up to and including the deep

	vein junction
II	Thrombus propagation into the adjacent deep vein but comprising <50% of the deep vein lumen
III	Thrombus propagation into the adjacent deep vein comprising >50% of the deep vein lumen
IV	Occlusive deep vein thrombus contiguous with the treated superficial vein

References

- 1 The College and Society for Clinical Vascular Science of Great Britain and Ireland Vascular Ultrasound Services Specifications document <https://www.csvs.org.uk/professional-standards/quality-safety/>
- 2 Vascular Laboratory Practice Part IV (Lower Limb Venous Assessment). Cole, S.Waler, R. And Norris, R. 2001.IPEM.
- 3 Nice Guideline: Venous thromboembolic diseases: the management of venous thromboembolic diseases and the role of thrombophilia testing <https://www.nice.org.uk/guidance/ng158> (Nov 2025)
- 4 American College for Emergency Physicians. Clinical policy: critical issues in the evaluation and management of adult patients presenting with suspected lower-extremity deep venous thrombosis. Ann Emerg Med 2003; 42: 124-35
- 5 Measurement of the clinical and cost-effectiveness of non-invasive diagnostic testing strategies for deep vein thrombosis. S Goodacre, F Sampson, M Stevenson, A Wailoo, A Sutton, S Thomas, T Locker and A Ryan. Health Technology Assessment 2006; Vol. 10: No. 15.
- 6 Deep Venous Thrombosis (DVT) Differential Diagnoses. Kaushal. K, Patel. M, Brenner. B. Emergency Medicine. 2017: 543-763
- 7 The College and Society for Clinical Vascular Science of Great Britain and Ireland. Society Vascular Science Guidelines. Lower limb venous duplex (incompetence) <https://www.csvs.org.uk/professional-standards/svt-guidelines-ppgs/>
- 8 Standards for the Provision of an ultrasound service. Royal College of Radiologists 2005 www.rcr.ac.uk/docs/radiology/pdf/StandardsforUltrasoundEquipmentJan2005.pdf
- 9 The College and Society for Clinical Vascular Science of Great Britain and Ireland. Society. Professional Standards Committee Chaperone Guidelines. <https://www.csvs.org.uk/professional-standards/Professional-Practice/> (Nov 2025)
- 10 Nomenclature of the veins of the lower limbs: an international interdisciplinary consensus statement. Caggiati, A. Bergan, JJ.Gloviczki, P.Jantet, G. Wendell-Smith, CP. J Vasc Surg 2002; 36: 416-11.
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14 Nomenclature of the veins of the lower limbs: An international interdisciplinary consensus statement; J Vasc Surg 2002;36:416-22

15 Nomenclature of the veins of the lower limb: Extensions, refinements, and clinical application; J Vasc Surg 2005;41:719-24

16 European Society for Vascular Surgery (ESVS) 2021 Clinical Practice Guidelines on the Management of Venous Thrombosis. Kakkos SK, Gohel M, Baekgaard N, Bauersachs R, Bellmunt-Montoya S, Black SA, Ten Cate-Hoek AJ, Elalamy I, Enzmann FK, Geroulakos G, Gottsäter A, Hunt BJ, Mansilha A, Nicolaides AN, Sandset PM, Stansby G, Esvs Guidelines Committee, de Borst GJ, Bastos Gonçalves F, Chakfé N, Hinchliffe R, Kolh P, Koncar I, Lindholt JS, Tula mo R, Twine CP, Vermassen F, Wanhainen A, Document Reviewers, De Maeseneer MG, Comerota AJ, Gloviczki P, Kruip MJHA, Monreal M, Prandoni P, Vega de Ceniga M. European Journal of Vascular and Endovascular Surgery. 2021 Jan;61(1):9-82.