1. **SCOPE & OBJECTIVE**
   1. Ultrasound assessment of the deep and superficial venous system to assess for venous reflux/incompetence .
   2. To provide operators with general instructions on how to undertake the investigation.
2. **RESPONSIBILITY**
   1. The clinical scientist (trainee clinical scientist) performing the scan is responsible for undertaking the procedure.
   2. The clinical scientist (or trainee clinical scientist under supervision) may alter procedure depending on individual patient and clinical information required.
   3. The chaperone/clinical scientist is responsible for undertaking the patient identification.
3. **IMAGING PROCEDURE**
   1. Confirm patient identifiers (Name, DOB and Address) and introduce themselves. Explain the scan procedure and obtain informed consent ([trust consent policy](https://nhswales365.sharepoint.com/:b:/r/sites/CAV_Controlled%20Document%20Library/Shared%20Documents/Policies/Consent%20Policy%20final%20201119%20v2%20-%20Copy.pdf?csf=1&web=1&e=v6ubXr)). Obtain clinical history if necessary or check symptoms agree with the request form.
   2. Explain the scan procedure, describing the suspected sites of incompetence and which areas of the body are to be scanned.
   3. Obtain informed verbal consent.
   4. This is potentially an intimate procedure and if deemed so, then a chaperone must be present in the room at the time of the investigation.
   5. Enter patient details into ultrasound machine.
   6. Select venous pre-set and appropriate probe.
   7. Use sterile gel if required as per the sterile gel SOP.
   8. Ask the patient to stand and identify the location of the varicose veins. Ask the patient if they have had previous varicose vein treatment (record any previous treatment on the report).
   9. Patient may stand during the procedure or sit on the edge of the bed with legs dependant.
   10. B-mode and colour Flow controls (as necessary) should be utilised to assess patency of the veins being assessed.
   11. Spectral and/or colour Doppler and/or triplex should be utilised to assess flow characteristics within the veins, including phasicity, spontaneity and direction of flow. Distal augmentation should be used to enhance the flow and assess for reflux.
   12. The common femoral, femoral, popliteal and deep calf veins should be assessed for patency and competency. Any acute or chronic thrombus that is identified should be noted. Any deep vein incompetence (defined as reflux time >1 second1) should be reported.
   13. A representative image of any deep venous insufficiency identified should be saved.
   14. The sapheno-femoral junction, great saphenous vein and anterior accessory saphenous vein should be assessed for competence. Any superficial vein incompetence (defined as reflux time >0.5 seconds1) should be noted.
   15. A representative image of the great saphenous vein and short saphenous vein showing competence or reflux should be saved as a minimum.
   16. Make note of any incompetent deep vein perforators and their location.
   17. Assess the sapheno-popliteal junction and small saphenous vein for patency and competence.
   18. Where superficial venous incompetence is identified, if the vein is likely to be suitable for radiofrequency ablation (i.e. not tortuous or very small calibre); record the diameter and depth of the vein and whether it is straight and remains within the fascia.
   19. Assess competence of the Giacomini vein, if present. If incompetence is identified, comment on radiofrequency ablation suitability.
   20. Any varicose veins that have not been linked to either the great or small saphenous system should be examined to identify any other sources of reflux – i.e. incompetent perforators or pelvic origin incompetence. This may involve assessment of the medial, anterior, lateral and posterior leg as the refluxing veins are “followed” back to their source.
   21. At the end of the scan give the patient some paper tissue to wipe themselves and inform them that the results of the scan will be forwarded to the referring consultant/GP.
4. **Images and Reporting** 
   1. End the exam on the machine to send images to PACS
   2. This is a dynamic scan and any images saved are not representative of the full scan performed. All images that are saved should be used to evidence diagnosis and aid reporting. The images alone should not be used to retrospectively diagnose
   3. For scans performed under ergonomically challenging conditions or with time constraints such as portable scans on the ward or within clinics a reduced set of images may be saved
   4. Record the name of any chaperone present in comments box on RADIS
   5. Complete the exam in RADIS
   6. Report the scan on the “CWM” patient reporting system.
   7. For venous insufficiency duplex examination, the report should include:
      * Which veins have been assessed and the competency of the veins/ extent of incompetence
      * Presence/absence of any thrombus
      * Any anatomical variations due to previous procedures
      * Any scan limitations
5. **REFERENCES**
6. European Society for Vascular Surgery (ESVS) 2022 Clinical Practice Guidelines on the Management of Chronic Venous Disease of the Lower Limbs - [Editor's Choice – European Society for Vascular Surgery (ESVS) 2022 Clinical Practice Guidelines on the Management of Chronic Venous Disease of the Lower Limbs - European Journal of Vascular and Endovascular Surgery (ejves.com)](https://www.ejves.com/article/S1078-5884(21)00979-5/fulltext#secsectitle0145)

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| **Scan type between** | **Report** |
| 06/08/2024- Bilateral venous | RIGHT: Deep veins patent and competent.  No obvious significant GSV or SSV incompetence. Some small superficial veins noted on the lower leg. Unable to augment due to vessel size. Small incompetent perforator vein at ankle level.  LEFT: Deep veins patent and competent.  SFJ incompetence via the GSV. The GSV is straight and within the fascia to knee level measuring 4-5 mm. The GSV feeds lower leg varices. No obvious SPJ. The SSV is competent. |
| 19/08/2024- Single leg venous | LEFT: The above knee SSV is incompetent draining into visible calf varices. The SSV has a direct connection with the above knee popliteal. The below knee SSV is small calibre post thrombotic in appearance |
| 19/08/2024- Single leg venous | LEFT: Deep veins patent and competent.  SFJ incompetence via the GSV. The GSV is straight and within the fascia throughout the thigh measuring approx. 4-5mm. The GSV feeds visible calf varices. Incompetent mid-thigh perforator vein. No obvious SPJ or SSV incompetence. |
| 23/08/2024- Bilateral venous | BILAETRAL: No significant deep or superficial venous incompetence. |
| 28/08/2024- Bilateral venous | RIGHT: Mild common femoral vein, popliteal and medial gastrocnemius vein incompetence.  Gross SFJ/I via the GSV. The GSV is straight for approx. 20 cm from the junction and measures 2.0 cm at groin level and 9mm in the thigh. The GSV is 2 mm below skin surface. No obvious SPJ/I or SSV incompetence.  LEFT: Deep veins patent and competent  Gross SFJ/I via the GSV. The GSV is straight for approx. 15 cm from the junction measuring 9 mm throughout the thigh and a depth of 4 mm below skin surface. No obvious SPJ/I or SSV incompetence. |
| 28/08/2024- Bilateral venous | RIGHT:  Deep veins: Patent and competent  Superficial veins: Incompetent neovascularised SFJ via incompetent vein (GSV territory) which is relatively straight to knee level and measures 6-9 mm. The ?GSV branches in the proximal thigh to feed network of small, superficial varices throughout the medial thigh. There is also an incompetent deep perforator vein at mid thigh level.  No evidence of any SPJ/SSV incompetence.  LEFT:  Deep veins: Mild CFV incompetence, likely due to gross SFJ incompetence. Otherwise the deep veins are patent and competent  Superficial veins: Incompetent SFJ via the GSV. The GSV is relatively straight and remains within the facia to knee level with a diameter of 10 mm and a depth of 2.5 cm.  No evidence of any SPJ/SSV incompetence. |
| 28/08/2024 – Bilateral venous | LEFT:  Deep veins: Patent and competent  Superficial veins: Incompetent SFJ via the GSV. The GSV is relatively straight and remains within the fascia to knee level with a diameter of 7 mm and depth and 3.2 cm. The incompetent GSV branches in the proximal thigh to feed visible varices in the medial calf, there is also an incompetent deep perforator vein in the mid medial calf.  No evidence of SPJ or SSV incompetence.  RIGHT:  No evidence of any gross deep or superficial venous incompetence. |
| 28/08/2024- Bilateral venous | RIGHT:  Deep veins: Patent and competent  Superficial veins:  No evidence of SFJ or GSV incompetence.  Incompetent SPJ via the SSV which branches in the proximal calf to feed the incompetent visible varices in the posterior calf. The SSV is competent distally.  LEFT:  Deep veins: Popliteal vein incompetence.  Superficial veins: Incompetent SFJ via the GSV which drains into the medial calf varices. The GSV is relatively straight and remains within the fascia to knee level with a diameter of 3.1 mm.  Incompetent SPJ via the SSV. The SSV has a diameter of 4 mm and remains relatively straight throughout the calf with a minimum depth of 7 mm. |
| 28/08/2024- Single leg venous | RIGHT; Deep veins patent and competent.  Gross SFJ incompetence via the GSV. The GSV is straight throughout the thigh measuring 8mm. The GSV feeds visible calf varices. No obvious SPJ and the SSV is competent. |
| 29/08/2024- Bilateral venous | RIGHT: Competent common femoral vein. Incompetent femoral and popliteal veins.  Gross SFJ incompetence via the GSV. The GSV remains straight and within the fascia for approx. 20 cm from junction and measures 7.3 mm. No obvious SPJ. The SSV is competent.  LEFT: Competent common femoral vein. Incompetent femoral and popliteal veins.  Gross SFJ incompetence via the GSV. The GSV remains relatively straight throughout the thigh and measures 6mm. The GSV feeds multiple calf varices. No obvious SPJ. The SSV is competent. |
| 30/08/2024- Single leg Venous | LEFT: Deep veins patent and competent  Gross SFJ incompetence via the GSV. The GSV is straight and uniform throughout the thigh measuring 6mm. The GSV feeds visible calf varices. Incompetent mid-calf perforator vein. No obvious SPJ. The SSV is competent. |
| 30/08/2024- Single leg venous | LEFT: Patent and competent common femoral and femoral vein. The proximal popliteal vein is grossly incompetent.  No SFJ or GSV incompetence. Grossly incompetent SPJ via the SSV. The SSV feeds multiple branches proximal and mid calf. Not suitable for RFA. |
| 30/08/20240 Single leg venous | LEFT: Incompetent common femoral vein likely from junctional incompetence. Competent femoral and popliteal veins.  Gross SFJ incompetence via the GSV. The GSV is straight and within the fascia for approx. 15 cm (measuring 7mm) from junction. It then leaves the fascia becoming mildly tortuous throughout the leg. No obvious SPJ or SSV incompetence |
| 02/09/2024- Single leg venous | LEFT: Deep veins paten and competent.  No obvious significant SFJ incompetence. The GSV becomes incompetent in the proximal thigh and feeds visible calf varices. The GSV is small calibre measuring 3mm throughout the thigh. Localised proximal SSV incompetence following junction with tortuous GSV branch. The SSV below is competent. |
| 11/09/2024 – Bilateral venous | RIGHT:  Deep veins: Mild CFV incompetence, likely due to gross SFJ incompetence. FV and POPV are patent and competent  Superficial veins: Gross SFJ incompetence via the GSV. There is a large GSV dilation in the groin (AP diameter 30 mm), otherwise the GSV is relatively straight with a diameter of 8 mm throughout the proximal thigh and leaves the fascia approx. 10 cm distal to junction. The GSV is tortuous throughout the mid to distal thigh and feeds visible varices in medial calf. There is also an incompetent perforator vein in the mid medical calf.  No obvious SPJ. The Giacomini / SSV are patent and competent.  LEFT:  Deep veins: Patent and competent.  Superficial veins: Incompetent SFJ via the GSV. The GSV is relatively straight for approx. 6 cm distal to junction with a diameter of 3.8 mm. In the proximal thigh the GSV branches to feed varices in the medial/posterior thigh. Incompetent lateral thigh varies track proximally towards the hip, unable to image source.  No obvious SPJ. The Giacomini vein is incompetent (junctions with incompetent GSV in the proximal medial thigh). The giacomini vein is straight throughout the posterior thigh with a diameter of 4 mm. Incompetent SSV but small calibre in the calf. |
| 11/09/2024- Single leg venous | LEFT:  Deep veins: Deep veins patent and competent  Superficial veins: Gross SFJ via the GSV. Partial chronic thrombophlebitis seen in the proximal GSV. The GSV is relatively straight measuring 9.3 mm. The GSV leaves the fascia mid-thigh to feed visible varices. Chronic thrombophlebitis also seen in varicosities. No SPJ or SSV incompetence. |
| 11/09/2024- Bilateral venous | RIGHT:  Deep veins patent and competent  Competent SFJ and GSV. Incompetent vein of pelvic origin which junctions with the AASV causing incompetence. The AASV is straight and within the fascia for approx. 20 cm from junction measuring 4.6mm. No SPJ or SSV incompetence.  LEFT:  Deep veins patent and competent  Incompetent vein of pelvic origin which junctions with SFJ. SFJ incompetence via the GSV. The GSV is straight and within the fascia for approx. 15 cm from junction, measuring 5 mm in diameter. Large GSV branch at this point. No SPJ or SSV incompetence. |
| 11/09/2024- Bilateral venous | RIGHT:  Deep veins: Patent and competent  Superficial veins: Gross SFJ incompetence via the GSV. The GSV is relatively straight and within the fascia to mid thigh (approx. 20 cm distal to junction) with diameter of 5 mm.  SPJ incompetence via SSV. The SSV is relatively straight and within the fascia throughout the calf with a diameter of 2.7 mm.  LEFT:  Deep veins: Patent and competent  Superficial veins: Gross SFJ incompetence via the GSV. The GSV is relatively straight and within the fascia 6.3 mm leaves. The GSV branches in the mid thigh, main incompetent branch tracks laterally. The GSV below this point is competent. The SPJ and SSV are competent. |
| 18/09/2024- Single leg venous | Left: No evidence of any deep or superficial venous incompetence. |
| 18/09/2024- Bilateral venous | RIGHT: Deep veins patent and competent.  Incompetent pelvic veins which track anteriorly down the thigh. Very small and tortuous. No obvious SFJ incompetence. The GSV branches in the mid thigh and becomes incompetent following junction with incompetent pelvic veins. Incompetent perforator vein medial-mid calf level. No obvious SPJ or SSV incompetence.  LEFT: Deep veins patent and competent.  Incompetent pelvic veins which junction with the SFJ. SFJ incompetence via the GSV. The GSV measures 7.9mm and is relatively straight and within the fascia for approx. 10 cm from junction. The GSV feeds large visible varices in the medial thigh. Incompetent medial mid-calf perforator vein. The SSV becomes incompetent in the mid-calf following junction with incompetent GSV branch. |
| 18/09/2024- Bilateral venous | RIGHT:  Deep veins: Patent and competent.  Superficial veins: Incompetent SFJ via the AASV. The AASV is relatively straight, with a diameter of 7 mm and remains within the fascia for approx. 6 cm from junction, becomes very superficial and tortuous and tracks anterolaterally down the thigh to feed visible varices. The GSV is patent and competent.  No obvious SPJ/SSV incompetence.  LEFT:  Deep veins: Patent and competent  Superficial veins: Incompetent vein seen in the left groin ?pelvic origin. Incompetent SFJ via the AASV. The AASV is relatively straight with a diameter of 5 mm and remains within the fascia for approx. 6 cm from junction, becomes very superficial and tortuous and tracks anterolaterally down the thigh to feed visible varices. The GSV is patent and competent.  No obvious SPJ/SSV incompetence. |
| 18/09/2024- Single leg venous | RIGHT: Deep veins patent and competent  No obvious SFJ or GVS Incompetence. There is a small calibre GSV mid-thigh branch which is incompetent. |
| 18/09/2024- Single leg venous | LEFT: Deep veins: Patent and competent.  Superficial vein: Competent SFJ and GSV. Localised mild incompetence seen in a few small, tortuous and superficial varices in the popliteal fossa, fed by an incompetent small calibre deep perforator in the posterior distal thigh. SPJ/SSV are competent. |
| 18/09/2024- Single leg venous | RIGHT:  Deep veins: Patent and competent.  Superficial veins: Incompetent pelvic vein which junctions with SFJ. Gross SFJ incompetence via the AASV and GSV. The AASV measure 6.5 mm and is straight for approx. 15 cm from junction. The GSV measures 4.9 mm. The GSV is relatively straight however here is a large branch approx. 10 cm from junction. No obvious SPJ. The Giacomini/SSV are competent. |
| 26/09/2024- Bilateral venous | RIGHT: Deep veins patent and competent  Incompetent pelvic veins which junction with SFJ. Gross SFJ incompetence via AASV and GSV. The AASV is straight and within the fascia to mid thigh measuring 5mm. The GSV is straight to distal thigh however small calibre measuring 2mm. No SPJ or SSV incompetence.  LEFT: Deep veins patent and competent. Incompetent pelvic veins which junction with SFJ. Gross SFJ incompetence via GSV. The GSV measures 5.6mm and is straight and within the fascia to distal thigh. The GSV then branches to feed visible varices. No SPJ or SSV incompetence. |
| 26/09/2024- Bilateral venous | RIGHT: Deep veins patent and competent.  No obvious SFJ incompetence or GSV incompetence (previous stripping). Incompetent perforator vein mid thigh. Gross SPJ incompetence draining into visible posterior knee and calf varices.  LEFT: Grossly incompetent femoral and popliteal vein incompetence.  No obvious SFJ or GSV incompetence. Gross SPJ incompetence via the short saphenous vein which feeds posterior calf varices. The SSV is relatively straight but there is a few branches mid calf and measures 6.5cm. |