

## **Protocol for Venous Duplex Ultrasound Examination (Updated April 2016)**

### **Purpose**

To evaluate the deep and superficial venous systems for evidence of valvular incompetence or thrombosis and to establish the source of any reflux identified in the superficial veins.

### **Common Indications**

Common indications for the performance of lower limb venous insufficiency evaluation include, but are not limited to:

- Skin changes, venous eczema, hyperpigmentation
- Venous ulcers
- Recurrent swelling of the lower calf and ankles
- Pain or feelings of heaviness in the lower extremity
- Visible varicose veins
- Venous claudication
- Pain and oedema of the lower extremities

### **Contraindications and Limitations**

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

- Obesity
- Casts, dressings, open wounds/ulcers etc can limit visualisation.
- Patient severe oedema/swelling.
- Limited mobility e.g. unable to stand
- Patients who are unable to cooperate due to reduced cognitive functions e.g. Alzheimer's or dementia and through involuntary movements
- Patient discomfort, particularly calf tenderness

### **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.

Reflux time is quantified using pulsed Doppler. A reflux time of more than 0.5 seconds is classified as significant reflux.

### **Assessment of venous insufficiency**

The assessment is usually done with the patient standing. Alternatively if this is not possible may stand on the floor resting on the couch.

Start the examination in the groin at the common femoral vein (CFV) to assess the deep veins first. Assess the CFV for compressibility and flow. Flow should be spontaneous with respiratory and cardiac modulation in the CFV. Abnormal flow in the CFV or abnormal superficial veins in the groin/abdomen may be due to iliac vein obstruction and in these cases the iliac veins and inferior vena cava need to be examined.

Continue to examine the lower limb veins distally, examining the full length of the superficial femoral vein (SFV), popliteal vein and calf veins as detailed above. If thrombus is identified, the location and degree of patency should be documented. Incompetence (defined as a reflux time >0.5s) should also be noted (4).

Once the deep veins have been assessed return back to the groin to identify the sapheno-femoral junction (SFJ). Assess the SFJ and long saphenous system (LSV) for patency and competency. The LSV should be assessed throughout its length for patency and competency. The location of any incompetent segments should be noted, along with the position of any associated incompetent perforators or branches. It may be useful to record the diameter of an incompetent superficial vein if endovenous treatment may be considered.

The patient should be repositioned to assess the sapheno-popliteal junction and short saphenous vein (SSV). The SSV should be located in the posterior calf and traced back up the leg, assessing it for patency and competency as before. The anatomy associated with the origin of the SSV is very variable and should be commented on if the short saphenous vein is incompetent or if varicose veins arise from this area. Any varicose veins that have not been linked to either the long or short saphenous system should also be examined to identify any other sources of reflux –i.e. incompetent perforators.

### **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 report should include:

- Which veins have been assessed and the competency of the veins
- Any anatomical variations due to previous procedures (i.e. absence of LSV due to previous strip)
- Where thrombus is identified, the location and degree of patency should be documented
- Any limitations e.g. if areas in the calf are not visualized due to ulceration or bandages