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All Sites	VAS-DP-17	Kelly Swagell	
Title		Version Date	Version Number:
Pseudoaneurysm duplex ultrasound		Dec 2021	1.2

Scope & purpose

Pseudoaneurysm duplex ultrasound examinations are carried out to assess for the presence and location of pseudoaneurysms or arterio-venous fistulae (AVF) post-intervention, most commonly in the proximal femoral or radial arteries.

Common indications for performance of this examination can include clinical signs post intervention (e.g. angiogram, cardiac ablation, endarterectomy), such as:

- Pulsatile mass
- Groin bruit
- Entire leg swelling
- Extensive bruising

Personnel

Clinical vascular scientists (CVS), including trainees.

Principles / performance characteristics

To determine the presence or absence of pseudoaneurysms or arterio-venous fistulae (AVF).

Service users & background

Patients who have had a femoral or radial puncture as part of a clinical procedure. These procedures may lead to vascular complications such as pseudoaneurysms or arterio-venous fistulae (AVF).

There are few contraindications for pseudoaneurysm ultrasound examinations; however, limitations may include the following:

- Raised BMI
- Severe oedema/swelling
- Dressings, casts, open wounds, staples, haematoma etc.
- Acoustic shadowing
- Patients who are unable to lie flat
- Patients who are unable to cooperate due to reduced cognitive functions e.g. Alzheimer's or dementia and through involuntary movements
- Examinations undertaken at the patient's bedside may be limited due to equipment and room dimensions
- Patient discomfort

Facilities, equipment & special supplies

Duplex ultrasound machine with both linear and curvilinear transducers available. There should be a selection of transducers delivering a wide range of frequencies (high and low).

Ultrasound gel to provide a couplant between transducer and patient.

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Examination couch should be height adjustable. The CVS's chair should provide good lumbar support, be height adjustable and allow for the CVS to move close to the examination couch.

Cleaning materials should be available in line with local and manufacturer's guidelines. These are available either in each procedure room or located in the laboratory store room.

Calibration

Across all sites annual calibration and safety checks of the ultrasound equipment are performed by Clinical Engineering (Trust contract with GE Healthcare).

Quality control

Second opinions from vascular scientist colleagues are requested routinely if clarification is sought.

Trainee vascular scientists have all pseudoaneurysm scans checked until they are signed off by a senior colleague for competency.

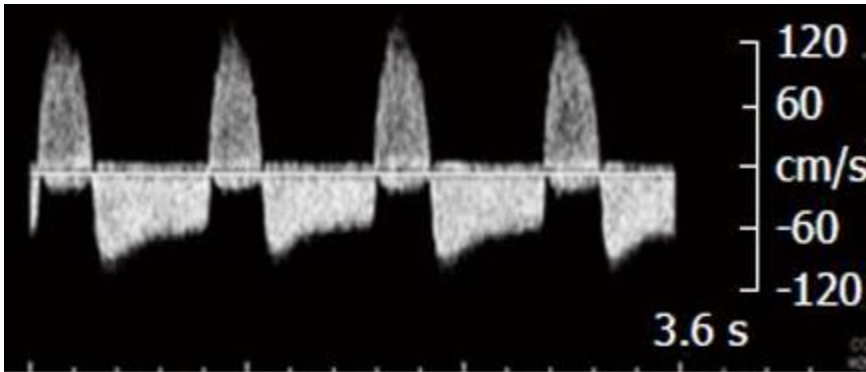
Environmental & safety controls

Infection control procedures followed in accordance with Trust infection control and risk assessment policies – Please see 'Personal Protective Equipment (PPE) for infection prevention and control' policy, 'Hand Hygiene' policy and 'Staff Risk Assessments' which are all available through the Trust Intranet.

Tristel wipes are for cleaning the ultrasound machines and probes after patient use. Universal Clinell wipes are for cleaning all other equipment. Where high risk infection presents or post-op wounds are present use probe covers with sterile gel or Tegaderm dressings, in addition to routine cleaning.

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Pseudoaneurysm duplex ultrasound procedure

	Preceding document: <i>VAS-MP-6 Patient management</i>
1.	The patient is asked to adjust their clothing to expose the area of interest. For groin scans the patient is examined in the supine position with their leg which is to be scanned slightly flexed and externally rotated to allow the CVS maximum access to the vessels to be examined. For upper limb scans the patient may be sitting or lying down with their arm rested on a pillow.
2.	<p>The scan is performed in both B-mode and colour Doppler, in both longitudinal and transverse planes, and spectral Doppler in longitudinal planes. B-mode should be used to image the artery and assess for aneurysmal dilation, pseudoaneurysm and vessel contents e.g. atheromatous plaque. Colour Doppler should be used to assess for the presence/absence of flow in vessels and aneurysm sac. Spectral Doppler can provide information on presence/absence, resistance, direction and pulsatility of flow.</p> <p>The machine controls should be optimised continually throughout the scan to obtain the best image to aid with diagnosis.</p> <p>The following vessels should be assessed in a groin assessment: distal external iliac artery, common femoral artery, proximal superficial femoral artery, proximal profunda femoris artery, distal external iliac vein, common femoral vein, proximal femoral vein and proximal deep femoral vein.</p> <p>The following vessels may be assessed in an upper limb assessment depending on where the site of interest is located: brachial artery, radial artery, brachial veins and radial veins.</p>
3.	<p>Document any visualised pseudoaneurysms. This may be fully patent or partially thrombosed, detected using b-mode and colour Doppler. Document the maximum size of the sac, residual lumen, the diameter of the neck and length of the tract. Bidirectional waveforms (figure 1) should be identified in a pseudoaneurysm neck.</p> 
4.	<p>Flow in femoral veins should be phasic with respiration. Turbulent and pulsatile flow in the venous system is consistent with arterio-venous fistulae (AVF).</p> <p>Low resistance waveforms in one of the arteries with bi/triphasicity restored a few cms distally may also be suggestive of an AVF.</p>

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	<p>If an AVF is identified, document the location and diameter.</p> <p>If pulsatile flow is identified in the common femoral vein but no AVF evident, assess waveforms in the contralateral CFV also.</p> <p>Keep in mind that a venous aneurysm may be a possibility.</p>
	<p>Subsequent documents: <i>VAS-MP-6 Patient management, VAS-MP-1 Results processing</i></p>

Reporting

The diagrammatic report is a record and interpretation of observations made during the pseudoaneurysm duplex ultrasound examination; it should be written by the CVS undertaking the examination.

The report should include correct patient demographics, date of examination, examination type, the name and status of the CVS and any clinical history deemed relevant.

The report should include:

- Presence or absence of a pseudoaneurysm
- Presence of AVF in applicable
- Any masses and the presence/absence of flow or vascularization should be documented
- All measurements taken (including pseudoaneurysm neck / length if appropriate)
- Waveforms and velocities in arteries, and waveforms in femoral veins (if examined) should be included
- All diameter measurements to be documented in centimetres

If a pseudoaneurysm or AVF is identified, ensure that the referring clinical team are contacted and the ultrasound results relayed, prior to the patient leaving the department.

Any incidental findings should be documented and further imaging recommended when clinically appropriate.

References

1.	n/a
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