SOCIETY FOR VASCULAR ULTRASOUND

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Consensus Document on Pre-Op Hemodialysis Access Mapping Protocol
By the Society for Vascular Ultrasound
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Purpose: Vessel mapping of the upper extremity is a necessary prerequisite to the creation of any hemodialysis access. It is utilized to evaluate arterial inflow, venous outflow and the adequacy of the venous system to support an autogenous or prosthetic access in the extremity. When performed properly, it will maximize utilization of autogenous fistulae while reducing the need for prosthetic grafts and catheters.

Equipment: Duplex ultrasound instrument with appropriate transducer selection, (i.e.: imaging carrier frequency of at least 5.0 MHz, with Doppler carrier frequency of at least 3.0 MHz), tourniquet, Doppler and/or photoplethysmography instrumentation, arm and/or finger blood pressure cuffs.

Patient Communication and Assessment: The vascular technologist / sonographer should explain why the vessel mapping is being performed, how it will be performed and approximately how long the study will take. Assessment should be performed prior to the procedure to assess the patient's ability to tolerate the procedure and to identify any contraindications to the procedure.

Contraindications and Limitations – must be noted in report

1. IV catheters and bandages may limit access to the superficial veins (IV/venipuncture must be strongly discouraged in any extremity being considered for access creation).
2. Improper patient positioning may prevent accurate measurement of the superficial veins (for example, if the arm is elevated above the level of the heart a falsely negative impression of the vein may result). This may occur in patients with prior stroke and/or flexion contracture.
3. Open wounds may limit access to areas of the circulation and must also be protected from contamination.

Patient Positioning: The patient should be reclining in a comfortable supine position for arterial pressures and for evaluation of the subclavian/axillary veins. For evaluation of arm veins, the head of the bed may be elevated 45 degrees with the arm dependent and abducted with a tourniquet applied, if necessary, to promote distension of veins. The room should be comfortably warm to minimize vasoconstriction.

Communication with Access Surgeon: It is essential that the Vascular Laboratory and the vascular technologist have an effective working relationship with the operating surgeon in order

to provide the full information required to identify the best long-term dialysis access options for each patient. A complete evaluation of all vein and arterial segments should be carried out as dictated by the laboratory protocol. Additional resource can be found at: http://www.svunet.org/about/positions/UEvein_mapping_dialysis.pdf.
The suitability of a particular vein for use in hemodialysis access, particularly with respect to diameter of the vein segments, and the specific protocol should be determined at each center/laboratory through direct communication, feedback and quality assurance programs involving both technical staff and access physicians.

Protocol for Creation of an AV Fistula and/or Synthetic Graft

1. Bilateral brachial systolic pressures and Doppler waveforms.
2. Duplex and comparison of axillosubclavian veins and arteries for patency & normal flow pattern.
3. Venous component:
    a. Duplex cephalic vein from wrist to shoulder noting any anatomic anomalies and evidence of phlebosclerosis. Diameter should be carefully documented throughout the entire course of the vein. Map / mark vein.
    b. Duplex basilic vein from its origin to its confluence with the brachial vein near the axilla noting any anatomic anomalies and evidence of phlebosclerosis. Diameter should be carefully documented throughout the entire course of the vein. Map / mark vein.
    c. Document patency and size of median cubital vein. Map/ mark vein.
4. Arterial Component
    a. Obtain bilateral brachial pressures with optional forearm and finger pressures.
    b. Duplex brachial artery, radial and ulnar artery documenting any evidence of atherosclerosis, abnormalities or anomalies, i.e. high bifurcation of the brachial, and any stenosis which must be confirmed with spectral analysis evaluation.
    c. An Allen's test may be performed if the veins are acceptable. If abnormal (digit pressure drops to <80 mmHg or a >30% drop with compression of the radial artery) proceed to next limb area.
        a. If the Allen's test is normal, measure ipsilateral first and 3rd finger pressures (if not already done).

NOTE: If no acceptable vein is found, proceed to contralateral arm.

Reporting: Final reports should include vein diameter, depth of superficial veins, presence and location of phlebosclerosis, arterial insufficiency, and presence of other atherosclerotic changes, anatomic variation, or other potentially significant findings. The permanent record should include diagnostic images, pressure and waveform data, explanations, and the technical worksheet provided to the interpreting physician for use in rendering a diagnosis and for archival purposes.