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VASCULAR TECHNOLOGY PROFESSIONAL PERFORMANCE GUIDELINES

Lower Extremity Vein Mapping

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Society for Vascular Ultrasound
4601 Presidents Drive, Suite 260
Lanham, MD 20706-4831
Tel.: 301-459-7550
Fax: 301-459-5651
E-mail: svuinfo@svunet.org
Internet: www.svunet.org

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Lower Extremity Vein Mapping

PURPOSE

Vein mapping of the lower extremity is performed to evaluate the superficial veins to determine if they can be used for the creation of an arteriovenous dialysis access, lower extremity bypass graft, or coronary artery bypass graft.

COMMON INDICATIONS

- To identify an adequate vein, preoperatively, in a patient with peripheral arterial occlusive disease (PAOD) who is deemed a candidate for lower extremity bypass graft.
- To determine preoperatively, in a patient undergoing a coronary artery bypass if there is a suitable vein to be used as a conduit.
- To assess the availability of vessels prior to creation of a permanent dialysis access in a chronic renal failure (CRF) patient who has no suitable arm veins to use as a conduit for an arteriovenous fistula.

CONTRAINDICATIONS AND LIMITATIONS

Contraindications for lower extremity vein mapping are few; however, some limitations exist and may include the following:

- Open wounds may limit access to areas of the circulation and must also be protected from contamination

GUIDELINE 1: PATIENT COMMUNICATIONS AND POSITIONING

The technologist/sonographer/examiner should:

- 1.1 Explain to the patient why the vein mapping of the lower extremity is being performed and indicate how long it will take.
- 1.2 Explain the procedure to the patient, taking into consideration the age and mental status of the patient and to ensure that the patient understands the necessity for each aspect of the evaluation.
- 1.3 Respond to questions and concerns about any aspect of the vein mapping of the lower extremity.
- 1.4 Refer specific diagnostic, treatment or prognosis questions to the patient's physician.
- 1.5 Make sure the patient is reclining, with head elevated, in a supine position. The leg being evaluated should be externally rotated, if possible, for better access. Reverse Trendelenberg position is useful as well as dangling the leg over the side of the bed or stretcher to maximize vein diameter.
- 1.6 It can often be helpful to have the patient stand quietly for 5 minutes prior to beginning, in order to dilate the superficial veins.
- 1.7 Make sure the room is comfortably warm in order to enhance venous dilatation.

GUIDELINE 2: PATIENT ASSESSMENT AND PHYSICAL EXAMINATION

Patient assessment must be performed before the Vein Mapping of the Lower Extremity is performed. It includes assessment of the patient's ability to tolerate the procedure and an evaluation of any contra-indications to the procedure. Documentation of patient understanding of the reason the study is being performed.

The technologist/sonographer/examiner:

- 2.1 Obtains a complete, pertinent history by interview of the patient or patient's representative and review of the patient's medical records whenever possible. A pertinent history includes:
 - a. Current medical status
 - b. Presence of any risk factors, recent or past surgery on the extremity to be evaluated (previous vein stripping, lower extremity bypass grafts). Note any open wounds. Verify that the requested procedure(s) correlates with the patient's clinical presentation.
 - c. Note relevant medications or therapies.

GUIDELINE 3: EXAMINATION GUIDELINES

Throughout each exam, sonographic characteristics of normal and abnormal tissues, structures, and blood flow must be observed so that the scanning technique can be adjusted as necessary to optimize image quality and spectral waveform characteristics. The patient's physical and mental status is assessed and monitored during the examination, with modifications made to the procedure plan according to changes in the patient's clinical status during the procedure. Also, sonographic findings are analyzed throughout the course of the examination to ensure that sufficient data is provided to the physician to direct patient management and render a final diagnosis.

The technologist/sonographer/examiner:

- 3.1 Uses appropriate duplex instrumentation, which includes two-dimensional B-mode imaging and Doppler spectral waveform analysis of flow dynamics.
 - a. Spectral analysis with or without color Doppler imaging
 - b. Imaging carrier frequency of at least 5.0 MHz -10 MHz, possibly a 15MHz as the vessels are relatively superficial and small. This may provide better identification of intraluminal echoes if present.

- c. Doppler carrier frequency of at least 3.0 MHz
- d. Hardcopy capabilities (film or digital storage of static images, video tape).
- 3.2 Follows a standard exam protocol for lower extremity (or upper extremity, if needed) vein mapping for peripheral artery bypass graft or CABG.
- 3.3 Uses B-mode gray scale imaging to:
 - a. Evaluate the superficial venous system, using a standard venous imaging protocol, to determine patency of the vessels. **The deep system, especially at the bilateral common femoral level, is evaluated for patency depending on the ordering physician and if indicated by the patient history.
- 3.4 For standard vein mapping, the entire great saphenous (as the preferred vessel) and small saphenous vein (if needed) are measured in transverse view as well as evaluated for consistency and/or anomalies throughout their course. Note large branches as these can cause malfunctioning of the graft, if in-situ is planned.
- 3.5 In addition to size measurements and noting branches, note should be made of compression, sclerosing, intraluminal echoes and frozen valve leaflets.
- 3.5 When indicated by the ordering physician the superficial veins are *marked* in their entirety, or required length, with an appropriate skin marker.

GUIDELINE 4: REVIEW OF THE DIAGNOSTIC EXAM FINDINGS

The technologist/sonographer/examiner should:

- 4.1 Review data acquired during the Lower Extremity Vein Mapping Examination to ensure that a complete and comprehensive evaluation has been performed and documented.
- 4.2. Explain and document any exceptions to the routine Lower Extremity Vein Mapping Examination protocol (i.e., study limitations, omissions or revisions).
- 4.3. Record all technical findings required to complete the final diagnosis on a worksheet (preferred by many surgeons for visualization of the findings), or other appropriate methods, such as computer logs, etc., so that the findings can be classified according to the laboratory diagnostic criteria (these criteria may be based on published or internally validated data) (see appendix).
- 4.4. Document the exam date, clinical indication(s), technologist performing the exam and a summary of the exam results in a vascular laboratory logbook or other appropriate method, i.e., computer log, etc.
- 4.5. Alert health care provider when immediate medical attention is indicated based on the Lower Extremity Vein Mapping Examination findings.

GUIDELINE 5: PRESENTATION OF FINDINGS

The technologist/sonographer/examiner should:

- 5.1 Provide preliminary results when necessary as provided for by internal guidelines based on the Lower Extremity Vein Mapping Examination findings.
- 5.2 Present record of diagnostic images, data, explanations, and technical worksheet to the interpreting physician for use in rendering a diagnosis and for archival purposes.

GUIDELINE 6: EXAM TIME RECOMMENDATIONS

High quality and accurate results are fundamental elements of the vein mapping of the lower extremity examination. A combination of indirect and direct exam components is the foundation for maximizing exam quality and accuracy.

- 6.1 Indirect exam components include pre-exam procedures: obtaining previous exam data; completing pre-exam paperwork; exam room and equipment preparatory activities; patient assessment and positioning (Guideline 1 &

2); and, post-exam procedures: cleanup; compiling, processing, reviewing exam data for preliminary and/or formal interpretation (Guidelines 3 and 4); patient communication (Guideline 2); exam charge and billing activities. Recommended time allotment is 15 minutes.

- 6.2 Direct exam components includes equipment optimization and the actual hands-on, examination process (Guideline 3). Recommended time allotment is 30 - 40 minutes for a unilateral exam, longer if bilateral.

GUIDELINE 7: CONTINUING PROFESSIONAL EDUCATION

Certification is considered the standard of practice in vascular technology. It demonstrates an individual's competence to perform vascular technology at the entry level. After achieving certification from either ARDMS (RVT credential) or CCI (RVS credential) or ARRT (RT-V credential), all individuals must keep current with

- 7.1 Advances in diagnosis and treatment of venous disease.
- 7.2 Changes in vein mapping protocols or published laboratory diagnostic criteria.
- 7.3 Advances in ultrasound technology used for the vein mapping evaluation.

APPENDIX

Published or internally validated data diagnostic criteria.

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