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## **VASCULAR TECHNOLOGY PROFESSIONAL PERFORMANCE GUIDELINES**

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# Evaluation of Dialysis Access

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Society for Vascular Ultrasound  
4601 Presidents Drive, Suite 260  
Lanham, MD 20706-4831  
Tel.: 301-459-7550  
Fax: 31-459-5651  
E-mail: [svuinfo@svunet.org](mailto:svuinfo@svunet.org)  
Internet: [www.svunet.org](http://www.svunet.org)

# Evaluation of Dialysis Access

## PURPOSE

To determine the patency of the dialysis access graft and/or identify abnormalities that may be present.

## COMMON INDICATIONS

- Pseudoaneurysmal dilatation
- Loss of thrill or decrease in strength of thrill in access
- Difficult cannulation by the dialysis center
- Elevated recirculation time
- Elevated venous pressure
- Low urea reduction ratio
- Complaints of hand pain during or immediately after dialysis
- Venous hypertension or edema of affected limb

## CONTRAINDICATIONS AND LIMITATIONS

Contraindications for evaluation of dialysis access are few; however, some limitations exist and may include the following:

- Open areas with skin surface where the graft is exposed
- Extreme hypotension (flow volume and velocities may be affected)
- Anastomosis sites are sometimes difficult to evaluate due to angulation
- Evaluation of the outflow vein may be difficult due to location of access and/or obesity

## GUIDELINE 1: PATIENT COMMUNICATION AND POSITIONING

- 1.1 Explains why the dialysis access being performed and indicates how long it will take.
- 1.2 Explains 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 dialysis access evaluation
- 1.4 Refers specific diagnostic, treatment or prognosis questions to the patient's physician.
- 1.5 Patient positioning is most often supine, with the arm relaxed and extended out to the side with area to be evaluated closest to you. The patient may be examined in the sitting position, as long as the limb being examined can be positioned so that it is comfortable for the patient while still remaining accessible to the technologist.

## GUIDELINE 2: PATIENT ASSESSMENT

Patient assessment must be performed before Evaluation of the Dialysis Access is performed. It includes assessment of the patient's ability to tolerate the procedure and an evaluation of any contra-indications to the procedure.

- 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. Previous surgeries or invasive procedures involving the affected arm or neck
  - c. Current medications or therapies
  - d. Presence of any risk factors, recent or past surgery on the affected extremity.
  - e. Verifies that the requested procedure(s) correlates with the patient's clinical presentation
- 2.2 A clinical evaluation of the dialysis access should be performed:
- a. Determine access patency by the presence of a palpable thrill as well as the strength and consistency of thrill throughout the access
  - b. Provide a visual inspection of the limb and access site noting areas of redness, swelling, dilatation, presence of collateral vessels ecchymosis, rotation of puncture sites and palpable prominent pulsations (pseudoaneurysms)
  - c. Determine the direction of flow (arterial flow vs. venous outflow) within the dialysis access graft (if history or operative note is not available, this may difficult to determine)
  - d. With a loop graft, to differentiate between the arterial and venous limb of the dialysis access graft, gently compress the graft in the middle of the loop and check for a pulsation from the arterial limb, or inflow vessel. The venous side will be the side without pulsation or without flow with the inflow compressed.

### **GUIDELINE 3: EXAMINATION GUIDELINES**

Throughout each exam, sonographic characteristics of normal and abnormal tissues, structures, and blood flow must be observed so that 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.

- 3.1 Uses appropriate duplex instrumentation, which includes display of both two-dimensional structure and motion in real-time and Doppler ultrasonic signal documentation with:
  - a. Spectral analysis with or without color Doppler imaging
  - b. Imaging carrier frequency of at least 5.0 MHz
  - c. Doppler carrier frequency of at least 3.0 MHz
  - d. Hardcopy capabilities (it is recommended that both video and static images are acquired)
- 3.2 Follows a standard exam protocol for evaluation of dialysis access. Studies are usually unilateral. The standard exam includes B-mode images, utilizing the transverse plane, of the subclavian vein, bilaterally, to determine patency, noting that parts of the subclavian are not visible due to the clavicle. The infraclavicular and thoracic outlet segments can usually be evaluated through the anterior chest wall. The subclavian vein is usually accessible by both Doppler and color flow. The anatomic landmark is direct visualization the artery and vein side by side. The arm is scanned, using a transverse orientation, from the axilla to the antecubital space noting patency of both arterial and venous system. The arterial and venous anastomoses are identified and evaluated for patency and/or. In transverse view, the diameters of the arterial and venous limbs are measured approximately 1 cm from the anastomosis. Evidence of abnormalities within the lumen of the native artery or vein or within the graft is documented.

B-Mode data interpretation should attempt to determine graft patency.

- 3.3 Doppler is used primarily to document patency of the vessels and graft as well as to identify any areas of stenoses within the graft. Doppler spectral analysis is performed in the sagittal plane. All Doppler samples must be performed at an angle of 60 degrees or less with respect to the direction of blood flow, and Doppler cursor alignment is recommended parallel to the vessel walls. A representative waveform should be recorded. When stenosis is present, velocities should be measured prior to the stenosis as well as within the region of abnormality. Consideration should be made to obtain a flow volume measurement as part of the examination, as this parameter is often considered useful when evaluating dialysis access function.
- 3.4 Any abnormalities are identified and documented.

#### **GUIDELINE 4: REVIEW OF THE DIAGNOSTIC EXAM FINDINGS**

- 4.1 Reviews data acquired during the Evaluation of the Dialysis Access to ensure that a complete and comprehensive evaluation has been performed and documented.
- 4.2 Explains and documents any exceptions to the routine Evaluation of the Dialysis Access examination protocol (i.e., study limitations, omissions or revisions).
- 4.3 Records all technical findings required to complete the final diagnosis on a worksheet, 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 Documents 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 Alerts health care provider when immediate medical attention is indicated based on the Evaluation of the Dialysis Access findings.

#### **GUIDELINE 5: PRESENTATION OF EXAM FINDINGS**

- 5.1 Provides preliminary results when necessary as provided for by internal guidelines based on the Evaluation of Dialysis Access findings.
- 5.2 Presents 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 dialysis access 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; 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 25 minutes.
- 6.2 Direct exam components includes equipment optimization and the actual hands-on, examination process (Guideline 3). Recommended time allotment is 35-45 minutes provided the procedure is unilateral. It will take 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, all Registered Vascular Technologists must keep current with:

- 7.1 Advances in diagnosis and treatment of dialysis access grafts
- 7.2 Changes in dialysis access protocols or published laboratory diagnostic criteria
- 7.3 Advances in ultrasound technology used for dialysis access evaluation.

## **APPENDIX**

Published or internally validated data diagnostic criteria.

## **REFERENCES**

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