



VASCULAR TECHNOLOGY PROFESSIONAL PERFORMANCE GUIDELINES

Abdominal Aortoiliac Duplex Evaluation

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Society for Vascular Ultrasound
1601 Utica Ave S., Suite 213 Minneapolis, MN
55416
Tel.: 651-288-3431
Fax: 651-290-2266
E-mail: svuinfo@svunet.org
Internet: www.svunet.org

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VASCULAR PROFESSIONAL PERFORMANCE GUIDELINE

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PURPOSE

Evaluation of aortoiliac disease and its effect on blood flow dynamics using duplex ultrasound technology.

APPROPRIATE INDICATIONS

Common indications for performance of this examination include, but are not limited to:

- Pulsatile abdominal mass
- The presence of an aneurysm of another anatomical location, (e.g., iliac, common femoral, popliteal arteries)
- A history of hypertension with a family history of abdominal aortic aneurysm (AAA) and age >50 years old.
- Surveillance of known abdominal aortic or iliac artery aneurysm.
- Aortic coarctation
- Severe sudden pain in the abdomen or lower back
- Evidence of distal arterial emboli
- Evidence of lower extremity inflow (aortoiliac) arterial disease (e.g., absent common femoral pulse and/or buttock claudication or ischemic rest pain, or following lower extremity physiological studies that indicate inflow disease)
- Surveillance of arterial vascular intervention/reconstruction
- Abdominal and/or groin bruit
- Post-endograft surveillance

CONTRAINDICATIONS AND LIMITATIONS

Contraindications and limitations may include the following:

- Large firm tense abdomen
- Significant amount of overlying bowel gas
- Abdominal wounds, fresh sutures/staples, peritoneal dialysis catheters, ostomy bags
- Patients with large hiatal hernias

PATIENT COMMUNICATION

- Exams may be successful without having the patient fast, however, if scheduled in advance the patient should fast overnight or 4 to 6 hours prior to exam to minimize bowel gas.
- A bowel prep is usually not necessary, however, in the advent of poor visualization due to bowel contents, a bowel prep may be utilized.
- The patient should not chew gum or smoke the morning of the exam as this may increase swallowing of air.
- Consideration is advised when scheduling diabetic patients. Instruct diabetic patients to closely monitor glucose levels when fasting for examinations and to react accordingly.
- Early morning appointments are preferred to reduce the amount of bowel gas and air in

the alimentary tract.

- Patients should take all medications with a small sip of water.

PATIENT COMMUNICATION

Prior to beginning the exam, the sonographer or examiner should:

- Introduce self and explain why the examination is being performed and indicate how much time the examination will take.
- Verify the patient's name and date of birth or utilize facility-specific patient identifiers.
- Explain the procedure, taking into consideration the age and mental status of the patient and ensuring that the necessity for each portion of the evaluation is understood.
- Respond to questions and concerns about any aspect of the evaluation.
- Educate the patient about risk factors for and symptoms of abdominal aortic aneurysm (AAA) or atherosclerotic disease and signs and symptoms associated with reduced blood flow to the lower extremities and endovascular graft dysfunction, when appropriate.
- Refer specific diagnostic, treatment or prognosis questions to the patient's physician.

PATIENT ASSESSMENT

A patient assessment should be completed before the evaluation is performed. This includes an assessment of the patient's ability to tolerate the procedure and an evaluation of any contraindications to the procedure. The sonographer or examiner should obtain a complete, pertinent history by interview of the patient or patient's representative and a review of the patient's medical record, if available. A pertinent history includes:

- Current medical status
- Prior vascular/cardiovascular history & surgeries
- Current, pertinent medications or therapies
- Review of vascular-related risk factors such as hypertension, hypercholesterolemia, peripheral vascular disease, family history of aneurysmal disease, advanced age, and smoking.
- Review symptoms of aortoiliac disease; aneurysmal vs. occlusive disease, back pain, increased pulsation of abdomen, groin, or popliteal fossa.
- Review signs/symptoms of distal emboli and buttock/thigh claudication.

PATIENT POSITIONING

The optimal positioning for viewing the aorta and iliac vessels includes the following:

- Place the patient in the supine position with the head slightly elevated for comfort.
- The lateral decubitus position may be useful when supine acoustic windows prove inadequate, especially in individuals with a large abdominal girth. This position will allow the abdomen to fall forward, thereby, decreasing the depth of the vascular structures being evaluated.
- The upright position may be utilized to aid in visualization of the proximal aorta region by

using the liver as an acoustical window.

INSTRUMENTATION

Utilize appropriate duplex instrumentation with the appropriate frequencies for the vessels being examined:

- Typically, a 2-6 MHz curvilinear or phased array transducer
 - Utilize multiple transducers, if available, to visualize anteriorly and through the intercostal rib spaces.
- Display of two-dimensional structures and motion in real-time
 - Doppler ultrasonic signal documentation
 - Spectral analysis with color and/or power Doppler imaging
- Digital storage of ultrasound images

EXAM PROTOCOL

Sonographers should follow a standard imaging protocol. A complete evaluation includes grayscale imaging, spectral Doppler analysis, and color Doppler imaging of all accessible portions of the abdominal aorta and iliac arteries.

Throughout each examination, the sonographer or examiner should:

- Observe sonographic characteristics of normal and abnormal tissues, structures, and blood flow, allowing necessary adjustments to optimize exam quality.
- Assess and monitor the patient's physical and mental status, allowing modifications to the procedure plan according to the patient's clinical status.
- Analyze sonographic findings to ensure that sufficient data is provided to the physician to direct patient management and render a final diagnosis.
- Accurately annotate grayscale, color and spectral Doppler images.

Abdominal Aortoiliac Evaluation for Aneurysm

- **Longitudinal grayscale images with diameter measurements perpendicular to the long axis of the aorta and iliac arteries, should include:**
 - Proximal aorta
 - Mid aorta (at or near renal arteries)
 - Distal aorta
 - Bilateral common iliac arteries
 - Bilateral internal and external iliac arteries (when indicated)
 - *Documentation of aneurysms must include the widest size of the aorta or iliac arteries, measured outer wall to outer wall, perpendicular to the long axis. Additional images proximal and distal to an aneurysmal segment should be included*
- **Transverse grayscale images with diameter measurements perpendicular to the long axis of the aorta and iliac arteries, should include:**
 - Proximal aorta
 - Mid aorta (at or near the renal arteries)
 - Distal aorta
 - Bilateral common iliac arteries (aortic bifurcation)

- Bilateral internal and external iliac arteries (when indicated)
- *Documentation of aneurysms must include the widest size of the aorta or iliac arteries, measured outer wall to outer wall, perpendicular to the long axis. Additional images proximal and distal to an aneurysmal segment should be included*
- **Spectral Doppler waveforms and velocity measurements should include:**
 - Proximal aorta (proximal to renal arteries)
 - Mid aorta (at or near renal arteries)
 - Distal aorta
 - Common iliac arteries
 - External iliac arteries
 - Internal iliac arteries (when indicated)
 - Sites of stenosis should include velocity measurements proximal to, at the site of and distal to region of stenosis
 - *A spectral Doppler angle of 60 degrees should be used whenever possible to increase reproducibility, angles corrected to <60 degrees can be used when necessary. Angle cursor should be aligned with vessel walls (refer to statement)*
- Examine the entire length of the aorta and iliac arteries and document any abnormalities.
- Use color Doppler to confirm patency of the abdominal aorta and iliac arteries.
- Document the presence of abnormalities such as, but not limited to:
 - Thrombus
 - Dissection
 - Pseudoaneurysm
 - Significant plaque

Abdominal Aortoiliac Evaluation for Stenosis

- **Longitudinal grayscale images with diameter measurements perpendicular to the long axis of the aorta and iliac arteries, should include:**
 - Proximal aorta
 - Mid aorta (at or near renal arteries)
 - Distal aorta
 - Bilateral common iliac arteries
 - Bilateral internal and external iliac arteries (when indicated)
 - *Documentation of aneurysms (if present) must include the widest size of the aorta or iliac arteries, measured outer wall to outer wall, perpendicular to the long axis. Images of plaque or thrombus should be included*
- **Transverse grayscale images with diameter measurements perpendicular to the long axis of the aorta and iliac arteries, should include:**
 - Proximal aorta
 - Mid aorta (at or near the renal arteries)
 - Distal aorta
 - Bilateral common iliac arteries (aortic bifurcation)
 - Bilateral internal and external iliac arteries (when indicated)

- *Documentation of aneurysms (if present) must include the widest size of the aorta or iliac arteries, measured outer wall to outer wall, perpendicular to the long axis. Images of plaque or thrombus should be included*
- **Spectral Doppler waveforms and velocity measurements should include:**
 - Proximal aorta (proximal to renal arteries)
 - Mid aorta (at or near renal arteries)
 - Distal aorta
 - Common iliac arteries
 - External iliac arteries
 - Internal iliac arteries (when indicated)
 - Sites of stenosis should include velocity measurements proximal to, at the site of and distal to region of stenosis
 - *A spectral Doppler angle of 60 degrees should be used whenever possible to increase reproducibility, angles corrected to <60 degrees can be used when necessary. Angle cursor should be aligned with vessel walls (refer to statement)*
- Examine the entire length of the aorta and iliac arteries and document any abnormalities.
- Use color Doppler to confirm patency of the abdominal aorta and iliac arteries.
- Document the presence of abnormalities such as, but not limited to:
 - Thrombus
 - Dissection
 - Pseudoaneurysm
 - Significant plaque
 - Focal stenosis and/or occlusion

General Considerations:

- Color Doppler and pulsed wave spectral Doppler are required for the assessment of the aorta and its branches. Color Doppler is necessary for identification of accessory renal arteries, inferior mesenteric, and lumbar arteries.
- Additionally, color Doppler is useful in differentiating vascular from nonvascular structures; provides greater definition of the residual lumen; enhances sensitivity in detecting low-velocity flow states and allows the ability to readily visualize direction of flow.

Ultrasound After Endovascular Aortic Aneurysm Repair (EVAR)

- **Longitudinal grayscale images** with diameter measurements perpendicular to the long axis of the aorta and iliac arteries should include:
 - Proximal aorta (proximal to endograft)
 - Mid aorta (proximal attachment site of endograft)
 - Distal aorta (residual aortic aneurysm sac, typically contains proximal iliac limbs)
 - Bilateral common iliac arteries (containing iliac limbs beyond aortic bifurcation)
 - Bilateral internal and external iliac arteries (when indicated)
 - *Documentation of aneurysms must include the widest size of the aorta or iliac*

arteries, measured outer wall to outer wall, additional images proximal and distal to an aneurysmal segment should be included

- **Transverse grayscale images** and diameter measurements perpendicular to the long axis of the aorta and iliac arteries should include:
 - Proximal aorta
 - Mid aorta (proximal attachment site)
 - Distal aorta (residual aortic aneurysm sac, typically contains proximal iliac limbs)
 - Bilateral common iliac arteries (containing iliac limbs beyond aortic bifurcation)
 - Bilateral internal and external iliac arteries (when indicated)
 - *Documentation of residual aneurysms must include the widest size of the aorta or iliac arteries, measured outer wall to outer wall, additional images proximal and distal to an aneurysmal segment should be included*
- **Spectral Doppler waveforms** should include:
 - Aorta proximal to endograft body
 - Mid aorta (proximal endograft body/attachment site)
 - Distal aorta/main endograft body
 - Bilateral iliac limbs of endograft
 - Distal attachment sites of iliac limbs of endograft
 - Bilateral external iliac arteries distal to endograft
 - Any region of extragraft flow (endoleak) within residual aneurysm sac
 - Location and patency of branch vessels when indicated (fenestrated endografts may include evaluation of the celiac, superior mesenteric and renal arteries)
 - Bilateral internal iliac arteries (when indicated)
 - Sites of stenosis should include velocity measurements proximal to, at the site of and distal to region of stenosis
 - *A spectral Doppler angle of 60 degrees should be used whenever possible to increase reproducibility, angles corrected to <60 degrees can be used when necessary. Angle cursor should be aligned with vessel walls*
- **Color Doppler evaluation** should include:
 - Transverse image and/or cineloop sweep of the aneurysm sac demonstrating color filling within the endograft or within the residual aneurysm sac. Optimize color Doppler settings to enhance endoleak detection.
- **The location of proximal and distal attachment sites and location and type of endoleak (if identified) must be included in the final report. Previous interventions (additional stent(s), embolization of endoleaks, etc.) must be included in the final report**

General considerations:

- Color Doppler imaging settings should be optimized to demonstrate and detect low flow endoleaks. The color scale should be decreased as low as possible and low filter settings should be utilized.
- Most abdominal aortic endografts are deployed just below the level of the renal arteries. The residual aortic aneurysm sac contains both the main body and bilateral iliac limbs prior to the true aortic bifurcation. The distal attachment sites of the iliac limbs are usually located in the distal common iliac arteries.
- Fenestrated endografts are deployed at or above the level of the renal arteries. These may require evaluation of the celiac, superior mesenteric and/or renal arteries
- Color Doppler imaging is a useful component as it assists with locating endoleaks, assists with vessel localization and aids in following vessels.

REVIEW OF THE DIAGNOSTIC EXAM FINDINGS

The sonographer or examiner should:

- Review data acquired during the evaluation to ensure that a complete and comprehensive evaluation has been performed and documented.
- Explain and document any exceptions and limitations to the evaluation protocol (i.e., study limitations, omissions or revisions).
- Record all technical findings required to complete the final diagnosis in the patient's medical record
- Document exam date, clinical indication(s), technologist performing the evaluation and exam summary in the patients' medical record.
- Review previous exam documentation and compare to the current exam to document any change.

PRESENTATION OF EXAM FINDINGS

The sonographer or examiner should:

- Provide preliminary results when necessary as provided for by laboratory specific guidelines.
- Present record of diagnostic images, data, explanations, and technical worksheet to the interpreting physician. Interpretation must be available within two business days.
- The sonographer's and interpreting physician's names must appear on the final report.

The finalized/signed report should be available within four business days.

- Alert the vascular laboratory medical director or appropriate healthcare provider when immediate medical attention is indicated based on departmental guidelines and procedures.

EXAM TIME RECOMMENDATIONS

High quality, accurate results are fundamental elements of the aortoiliac artery duplex examination. A combination of indirect and direct exam components is the foundation for maximizing exam quality and accuracy.

- Indirect exam components include:
 - Pre-exam activities: obtaining previous exam data, initiating exam

- worksheet and paperwork, equipment and exam room preparation, patient assessment and positioning, and patient communication
- Post-exam activities: exam room cleanup, compiling and processing exam data for preliminary and/or formal interpretation, and exam billing activities.
- Direct exam components include:
 - Equipment optimization and the actual hands-on, examination process
- While study times may vary depending on testing protocols, patient condition, and clinical complexity of the evaluation being performed, these are the times necessary to provide a quality diagnostic evaluation. Listed are the recommended examination times for performing each CPT related to this guideline, which were derived from the direct time inputs from the Resource Based Relative Value Scale (RBRVS).
 - 93978 71 minutes
 - 93979 48 minutes

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