SOCIETY FOR VASCULAR ULTRASOUND

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VASCULAR TECHNOLOGY

PROFESSIONAL PERFORMANCE GUIDELINES

Mesenteric/Splanchnic Artery Duplex Imaging

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PURPOSE

Duplex imaging of the mesenteric arteries is performed to determine the absence or presence of stenosis, aneurysm, or other pathological condition of the splanchnic arteries. Duplex imaging is also used to locate and determine location, extent and type of pathology present.

APPROPRIATE INDICATIONS

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

- Postprandial pain and cramping (fear of food)
- Persistent diarrhea
- Recent and significant unexplained weight loss
- Abdominal bruits
- Unexplained gastrointestinal symptoms
- Postoperative evaluation of a vascular reconstruction or endovascular procedure
- Suspected aneurysm of mesenteric, hepatic, and/or splenic arteries
- Suspected median arcuate ligament syndrome (celiac artery compression syndrome)
- Suspected vascular insufficiency of the intestine

CONTRAINDICATIONS AND LIMITATIONS

Contraindications and limitations may include the following:

- Open abdominal wounds, sutures or staples
- Drains and/or peritoneal dialysis catheters
- Emphysematous breathing patterns, inability to hold breath
- Overlying bowel gas
- Obesity
- Large firm/tense abdomen
- Limitations in ability to change positioning
- Patient cooperation

PATIENT PREPARATION

- The patient should have no food by mouth for 8 hours prior to the procedure when possible.
- Studies should be performed early in the day to minimize bowel gas interference.
- If medications cannot be withheld until after the exam, patient may take morning medications with a small sip of water.
- The patient should not chew gum or smoke the morning of the exam as this may increase swallowing of air.
- The effects of solid food, water and liquids activate the gut resulting in elevated velocities

and increase in size of the vasculature. It should be noted that if the patient has eaten within 8 hours of the study, standard velocity criteria for determining stenosis are not relevant.

PATIENT COMMUNICATION

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

- Introduce themselves, 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.
- Explain to the patient that they may be asked to hold their breath at times during the exam. Demonstrate the technique with the patient to ensure compliance, either suspended breathing technique or breathing in without letting air out.
- Respond to questions and concerns about any aspect of the evaluation.
- Refer specific diagnostic, treatment or prognosis questions to the patient's physician.

PATIENT ASSESSMENT

A patient assessment must be performed before the exam. 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 their representative and a review the patient's medical record, when available.

A pertinent history includes:

- Presence or signs of peripheral vascular disease
- Cervical, abdominal or lower extremity bruit
- Abdominal pain after eating
- Weight loss
- Current medical status, especially regarding arterial disease
- Relevant risk factors for vascular disease
- Any information regarding previous studies for comparison and to document any changes.
- Previous interventions or surgery and surgical notes
- History of other related diseases, such as fibromuscular dysplasia
- Current medications or therapies
- Results of other recent imaging studies and/or prior examination

PATIENT POSITIONING

The exam is routinely performed with the patient in a supine position; however, the lateral decubitus views are frequently useful. The upright position or simple inspiration and holding the breath can be used when arcuate ligament compression is suspected.

The examiner should utilize an ergonomically comfortable position to avoid fatigue and injury.

INSTRUMENTATION

Use appropriate duplex instrumentation with 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 B-mode imaging, spectral Doppler analysis and color Doppler imaging of all accessible portions of the mesenteric 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 B-mode, color and spectral Doppler images.

Abdominal exams can require various acoustic windows and patient positions to optimize the data available from the patient. These vary from patient to patient depending upon anatomy, body habitus, prior surgery, and the presence and location of bowel gas.

B-mode and/or color Doppler images of the following vessels should be obtained:

- Abdominal aorta
- Celiac artery
- Splenic and hepatic artery (when indicated)
- Superior mesenteric artery at origin and proximal artery
- Inferior mesenteric artery

Spectral Doppler waveforms are obtained**,** with an appropriate angle of insonation (60 degrees or less), to assess the following vessels:

- Adjacent aorta to celiac or superior mesenteric artery
- Celiac artery origin
- Hepatic artery
- Splenic artery
- Superior mesenteric artery (origin, proximal, mid, and distal)
- Inferior mesenteric artery (origin and proximal vessel)
- Document patency of superior mesenteric vein and inferior vena cava

The presence of a prominent inferior mesenteric artery may indicate a significant compromise of the celiac axis and/or superior mesenteric artery. The common hepatic artery should be evaluated for patency and flow direction in cases of suspected celiac artery occlusion.

If resting velocities in the celiac artery are elevated and median arcuate ligament compression is suspected, instruct the patient to take in a large deep breath and hold it while sampling the arterial velocities, again. If arterial velocities remain elevated and/or turbulent, repeat velocity measurements with the patient sitting upright. Normalization of the velocities with either inspiration or upright position changes confirms arcuate ligament compression.

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 to the evaluation protocol (i.e., study limitations, omissions or revisions).
- Record all technical findings required to complete the final diagnosis in the patients' 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 name 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 mesenteric/splanchnic 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).
    - 93975 92 minutes
    - 93976 53 minutes

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