



**VASCULAR TECHNOLOGY
PROFESSIONAL PERFORMANCE GUIDELINES**

Abdominal Pelvic Venous Duplex Evaluation

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VASCULAR PROFESSIONAL PERFORMANCE GUIDELINE

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PURPOSE

Abdominal pelvic venous duplex examinations are performed to assess for abnormal blood flow in the veins associated with pelvic venous disorders. The evaluations include assessment of the IVC, left renal vein, bilateral common and external iliac veins for obstruction and the gonadal (female- ovarian, male -testicular) and internal iliac veins for reflux and for the presence of pelvic varicose veins.

Note: Pelvic venous disorders had previously been referred to as pelvic congestion syndrome or PCS; however, with the expansion of research into the abdominal pelvic venous system updated nomenclature is imperative to the proper diagnosis and treatment of these conditions.

APPROPRIATE INDICATIONS

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

- Lower extremity edema
- Lower extremity varicose veins
- Vulvar edema
- Vulvar discomfort/heaviness
- Genital/ Labial varicose veins
- Perineal varicosities and/or discomfort
- Chronic pelvic pain of greater than six months duration that may include lower abdomen and/or lower back pain, heaviness, or a dull ache that is worse with prolonged standing or sitting
- Exertional lower extremity pain consistent with venous claudication
- Unilateral lower extremity swelling of suspected proximal venous origin
- Rectal discomfort/heaviness
- Urinary frequency
- Pain with urinating (Dysuria)
- Pain prior to the beginning of menstruation
- Pain during menstruation (Dysmenorrhea)
- Pain during intercourse (Dyspareunia) or after intercourse (post-coital ache)
- Left flank pain with or without hematuria (renal vein compression, previously known as Nutcracker Syndrome)
- Hemorrhoids
- Varicocele

CONTRAINDICATIONS AND LIMITATIONS

Contraindications and limitations may include the following:

- Obesity
- Significant amount of overlying bowel gas
- Recent surgery
- Hernia mesh

PATIENT PREPARATION

- To minimize bowel gas, the study should be done early in the day. The patient should have no food by mouth for 8 hours prior to the procedure when possible. However, consideration should be given to patients who need to eat i.e., diabetics.
- Assessment of the peri and transuterine veins
 - **Using a transabdominal approach:** Before beginning the exam, the patient should drink a minimum of 24 oz. of water to achieve a full bladder. This is essential for the evaluation of the fundus of the uterus, peri and transuterine veins. ***Upon completion of this evaluation, the patient should be allowed to empty their bladder for comfort.***
 - **Using an Endovaginal approach:** The patient should be instructed to empty their bladder for patient comfort.

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 patients about risk factors for and symptoms of abdominal and pelvic venous disorders.
- 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 interviewing the patient or patient's representative and review of the patient's medical record, if available. A pertinent history includes:

- Number of pregnancies and children
- History of lower extremity and/or genital varicose veins
- History of reoccurring lower extremity varicose veins post prior treatment
- Dysuria
- Hematuria
- Left flank pain
- Pain during intercourse
- Post coital pelvic and low back ache
- Risk factors for lower extremity venous insufficiency, previous deep vein and/or superficial vein thrombosis (DVT/SVT)
- Family history of venous thrombosis
- History of previous C-section, pelvic surgery, vein surgeries or interventions (ex: sclerotherapy, venous ablation procedures, venous stripping, or vein harvesting)
- Iliac vein stenting for iliac vein compression (May-Thurner Syndrome)
- For male patients: varicocele
- Current medications and/or therapies
- Results of other relevant diagnostic procedures

Complete a limited or focused physical exam, including observation and localization of any signs or symptoms of venous disease:

- Swelling
- Palpable cord
- Varicosities
- Pain/tenderness
- Verify that the requested procedure correlates with the patient's clinical presentation.

PATIENT POSITIONING

The optimal positioning for viewing the abdominal pelvic veins is:

- Reversed Trendelenburg position with head elevation of 30 degrees.
- Steep Reversed Trendelenburg (60 degrees or greater)
- Left lateral decubitus to confirm compression of the left renal vein and/or iliac veins
- For assessing reflux, an upright position (standing or sitting) is used to maintain dependency.

INSTRUMENTATION

Use appropriate duplex instrumentation with appropriate frequencies for the vessels being examined.

- Curvilinear array transducer 2-6 MHz
- Endovaginal ultrasound transducer (optional)
- A 1-5 MHz for deeper imaging
- A linear 4-12 MHz for superficial veins.
- Spectral analysis with color and/or power Doppler imaging
- Digital storage

EXAM PROTOCOL

Throughout each examination, the sonographer 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.

Follow a standard imaging protocol per department specific/facility specific anatomic algorithm. A complete abdominal pelvic venous evaluation incorporates grayscale, spectral Doppler with color and/or power Doppler imaging and include the following:

- **Grayscale imaging** is used to depict presence or absence of venous dilatation, optimize vessel wall and abnormalities i.e. thrombus or intraluminal echoes.
 - Proper vein diameter measurements are acquired from anterior wall to posterior wall.
 - Calculate diameter ratio as required by facility-specific protocol.
- **Color Doppler** is used to depict areas of abnormal flow or significant stenosis. **Power Doppler** is useful to confirm areas of possible vessel occlusion or low flow states.
- **Spectral Doppler** is used to evaluate flow characteristics and velocity. To obtain peak velocity, utilize color Doppler to note areas of aliasing and "walk" the spectral Doppler cursor throughout these areas. Post-stenotic turbulence is documented when present. Calculate velocity ratio as required by facility-specific protocol. To achieve accurate velocity ratio results, consider the following:
 - Obtain velocity measurements in longitudinal planes.
 - Maintain a Doppler angle between 45° and 60° parallel to the direction of the blood flow/vessel walls. Doppler angles less than 45° may be necessary due to patient anatomy. The same angle of insonation is maintained throughout the vein being assessed.
- Utilization of varying maneuvers to elicit reflux: Patient positioning, Valsalva

maneuvers, distal augmentation and/or proximal compression.

Interrogation and documentation of the following veins is the minimum requirement:

- Inferior vena cava (IVC)
- Left renal vein (LRV)
- Bilateral iliac veins (common, external and internal)
- Bilateral gonadal veins
- Trans-uterine (arcuate) and peri-uterine veins

The following veins are included if indicated or required by the facility specific protocol:

- Common Femoral Vein
- Pelvic escape points: obturator veins, superior and inferior gluteal veins, perineal vein, round ligament vein (inguinal escape point).

Evaluation of the Peri and Transuterine Veins (arcuate veins)

Grayscale

- Perform grayscale transverse and longitudinal sweeps of the uterus, cervix and vaginal canal looking for dilated transuterine (arcuate) veins.
- Perform grayscale transverse and longitudinal sweeps of the bilateral pelvic adnexa looking for dilated peri-uterine veins.
- Adjust Color Doppler settings Power Doppler and pulsed Doppler (decrease PRF) to aid in identifying these varicosities.
- Obtain anterior to posterior wall diameter measurements of any visible veins.
- Valsalva can be used to demonstrate reflux, especially when using an endovaginal approach. This is more challenging using a transabdominal approach due to probe displacement upon Valsalva.

For patient comfort, the patient may relieve their bladder after completing this portion of the exam.

Evaluation of the IVC

Interrogation and documentation of vein diameter measurements and spectral Doppler waveforms are obtained at the following sites:

- At the proximal, mid and distal abdomen. Anatomic anomalies require additional images i.e., hypoplasia, aplasia and duplication.
- Abnormalities require additional images i.e., presence of collateral veins, obstruction and compression.

Evaluation for Left Renal Vein Compression

The left renal vein should be interrogated using grayscale ultrasound to assess for areas of visible luminal reduction due to an external compression. Color flow Doppler is used to demonstrate luminal color flow filling and areas of aliasing which indicate a possible stenosis.

Interrogation and documentation of left renal vein diameters and spectral Doppler waveforms for peak vein velocities are obtained in longitudinal plane at the following sites:

- Distally (peripheral toward the kidney)
- At the level of the SMA or other region indicated by color flow aliasing) Proximally (centrally toward the IVC)
- Anatomic anomalies require additional images, i.e., retro-aortic renal vein.
- Abnormalities require additional images i.e., in the presence of renal hilar varicosities or flow diversion from the LRV to the left gonadal vein. Velocity and diameter ratios should be calculated using the distal (peripheral) peak venous velocity and diameter in comparison to the peak venous velocity and diameter measured at the site of compression

Note: If a significant diameter reduction or velocity ratio is present the patient in the supine/RT position, the patient may be positioned in a left lateral decubitus position for comparison.

Evaluation for Iliac Vein Obstruction (intraluminal changes or external compression)

The bilateral common and external iliac veins should be interrogated using grayscale imaging to assess for intraluminal changes such as wall fibrosis or synechia as well as any areas of visual luminal reduction due to an external compression. Color flow Doppler is used to demonstrate luminal color flow filling and areas of aliasing which indicate a possible obstruction.

- Bilateral common femoral veins
- Bilateral external iliac veins
 - Distal (peripheral toward the inguinal ligament)
 - Mid
 - Proximal (central toward the IVC)
- Bilateral common iliac veins
 - Distal (peripheral toward the inguinal ligament)
 - Mid
 - Proximal (central-toward the IVC)

Spectral Doppler to assess for spontaneous respiratory phasicity. In the following locations:

- Bilateral common femoral veins
- Bilateral peripheral external iliac veins
- Bilateral common iliac veins

Regions of suspected obstruction require additional images, i.e., visible luminal reduction grayscale, the presence of aliasing on color flow Doppler.

At the level of a suspected obstruction (visible luminal decrease on grayscale and the presence of aliasing on color flow Doppler) spectral Doppler waveforms for peak vein velocities and anterior-to-posterior wall diameters should be obtained at the following locations.

- Distal (peripheral toward the inguinal ligament)
- At the level of the obstruction
- Proximal (central toward the IVC) to the obstruction
- Velocity and diameter ratios should be calculated using the distal (peripheral) peak venous velocity and diameter in comparison to the peak venous velocity and diameter measured at the site of compression

Common areas of obstruction include:

- The left common iliac vein at the level of the right common iliac artery
- The left common iliac vein at the level of the left common iliac artery
- The right common iliac vein at the level of the right common iliac artery
- The right external iliac vein at the level of the right external iliac artery
- Broadened inguinal ligament

Indirect findings associated with a hemodynamically significant obstruction of an iliac vein include any or all the following:

- The presence of collaterals
- Spontaneous retrograde flow in the ipsilateral internal iliac vein
- The presence of pelvic varicosities
- Antegrade flow in the superficial epigastric vein
- The presence of genital or lower extremity varicosities associated with the pelvic escape points (Inguinal, perineal, gluteal and obturator escape points)
- Absence of symmetrical phasicity when comparing the right and left common femoral vein spectral Doppler waveforms.

Note: Special care should be taken with transducer pressure on the abdomen as to not extrinsically compress the common iliac veins, creating false positives.

Note: If a significant diameter reduction or velocity ratio is present with the patient in the supine position, the patient should be positioned in a left lateral decubitus position for repeatability.

Evaluation of the Internal Iliac Veins

- Evaluation of the internal iliac veins for assessment of flow characteristics may include different patient positioning and/or maneuvers to elicit reflux, according to facility-specific protocol. Evaluation can be done using either the transabdominal or the endovaginal approaches.

- Using a transabdominal approach for assessment of the bilateral internal iliac veins:
 - Interrogation and documentation of grayscale, color flow spectral Doppler waveforms are obtained at the level of the external and internal iliac vein confluence.
 - Valsalva maneuvers can be used to elicit for reflux; however, this can be limited due to probe displacement upon Valsalva.
- Using endovaginal assessment of the bilateral internal iliac veins:
 - Interrogation and documentation of grayscale, color flow and spectral Doppler waveforms are obtained along the internal iliac vein.
 - Endovaginal assessment of the bilateral internal iliac veins should include assessment for reflux with Valsalva maneuver.
- Document reflux time measured in milliseconds, according to facility-specific protocol.
- Abnormalities require additional images when present.
- Anatomic anomalies require additional images, according to facility-specific protocol.

Indirect findings associated with internal iliac vein reflux include any or all the following:

- The presence of genital, buttocks or lower extremity varicosities associated with the pelvic escape points (Inguinal, perineal, gluteal and obturator escape points)

Evaluation of the Gonadal Veins; Ovarian (female) or Testicular (male)

Evaluation of the gonadal veins for assessment of flow characteristics may include utilization of different patient positioning and/or maneuvers to elicit reflux, according to facility-specific protocol. The following should be considered:

- To elicit reflux, the following maneuvers are performed: Valsalva maneuver, distal manual augmentation.
- In the absences of spontaneous reflux with the patient in reversed Trendelenburg, position the patient in upright (sitting or standing) position. Repeat interrogation and documentation of the gonadal veins.

Interrogation and documentation of vein diameter measurements and Color/Spectral Doppler waveforms are obtained at the following sites:

- Bilateral gonadal veins at the following levels
 - Proximal abdomen
 - Mid abdomen
 - Distal abdomen
- Document reflux time measured in milliseconds, according to facility-specific protocol.
- Abnormalities require additional images when present.
- Anatomic anomalies require additional images, according to facility-specific protocol.

REVIEW OF DIAGNOSTIC EXAM FINDINGS

The sonographer or examiner should:

- Review data acquired during the duplex ultrasound exam to ensure that a complete and comprehensive evaluation has been performed and documented.
- Explain and document any exceptions or limitations to the protocol (i.e., study omissions or revisions).
- Determine any change in follow-up studies by reviewing previous exam documentation so that the current evaluation can document any change in status and duplicate prior imaging and Doppler parameters.
- Record the technical findings required to complete the final diagnosis on a worksheet or other appropriate method (e.g., computer software), so that the findings can be classified according to the laboratory diagnostic criteria.
- Document the exam date, clinical indications, sonographer performing the evaluation, and exam summary in the patient's medical record.

PRESENTATION OF EXAM FINDINGS

The sonographer or examiner should:

- Provide preliminary results, when necessary, as provided for by laboratory specific guidelines.
- Present the 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 and accurate results are fundamental elements of the abdominal pelvic 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, 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 75 minutes
 - 93979 50 minutes

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