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**VASCULAR TECHNOLOGY
PROFESSIONAL PERFORMANCE GUIDELINES**

Transabdominal Pelvic Venous Duplex Evaluation

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PURPOSE

Transabdominal pelvic venous duplex examinations are performed to assess for abnormal blood flow in the abdominal and pelvic veins (excluding the portal venous system). The evaluation includes the assessment of abdominal and pelvic venous compressions, abdominal and pelvic venous insufficiency and evaluation of the presence or absence of pelvic varicosities.

Note: Abdominal and pelvic venous disorders can be previously referred to as pelvic congestion syndrome or PCS; however, with the expansion of research into the abdominal and 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 or 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

- Females-prior complete hysterectomy with oophorectomy.

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. The patient should not chew gum or smoke the morning of the exam as this may increase swallowing of air.
- 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, uterine, and parauterine veins. After completion of this evaluation, the patient should be allowed to empty their bladder to allow 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 patient 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 interview of 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 endometriosis, pelvic adhesions, uterine leiomyomata, adenomyosis, malignancy, and uterine prolapse.
- History of lower extremity and/or genital/labial varicose veins
- Dysuria
- Hematuria
- Pain during menstruation
- Pain during intercourse
- 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, hematuria and left flank pain.
- 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 are:

- Reversed Trendelenburg position with head elevation of 30 degrees.
- 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.

- Typically, a curvilinear array transducer 2-5 MHz
- A 1-5 MHz for deeper imaging.
- A linear 3-7 MHz for superficial veins.
- Display of two-dimensional structure and motion in real-time

- Doppler ultrasonic signal documentation
- Spectral analysis with color and/or power Doppler imaging
- Digital storage capabilities of ultrasound image

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 transabdominal pelvic venous evaluation incorporates B-mode, spectral Doppler with color and/or power Doppler imaging and include the following:

- **B-Mode 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 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 concern 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 plane.
 - 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 examination.
- 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 ovarian veins
- Trans-uterine and peri-uterine veins

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

- Common Femoral Vein
- Pelvic leak points: obturator veins, superior and inferior gluteal veins, perineal vein, labial vein, clitoral vein and round ligament vein.

Evaluation of the Uterus and Uterine/Parauterine Veins

It is best to begin with the evaluation of the fundus of the uterus and uterine/parauterine veins. The patient should have a full bladder to optimize visualization of the veins. Utilize **B-Mode, Color Doppler and/or Spectral Doppler images** to evaluate for the presence or absence of varicosities.

For patient comfort, the patient may relieve their bladder after completing this evaluation. Further evaluation of the transabdominal pelvic veins is continued according to facility-specific protocol.

Evaluation of the IVC

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

- The entire length of the IVC between the xiphoid process and umbilicus.
- 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

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

- Left renal vein
 - Cava side (before it crosses the SMA and AO)
 - At the level of the SMA and Aorta
 - Kidney side (peripheral to the SMA and Aorta)
 - Any areas of luminal reduction
- Anatomic anomalies require additional images, i.e., retro-aortic renal vein.
- Abnormalities require additional images i.e., in the presence of collateral veins and flow diversion from the LRV to the left ovarian vein (LOV).

- If required according to facility-specific protocol, calculate velocity ratio.

Evaluation for Iliac Vein Compression or Obstruction

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

- Left Common Iliac Vein
 - Proximal, at and distal to the right common iliac artery
 - Any areas of luminal reduction (Proximal, at and distal to the narrowed segment)
- Right Common Iliac Vein
- Bilateral External Iliac veins
- Abnormalities require additional images, i.e., in the presence of collateral veins, asymmetrical flow and any areas of luminal reduction.
 - **Note:** While less common, compression of all of the iliac vein segments is possible. When fully evaluating for pelvic venous disease compression of all of the iliac vein segments should be considered and documented appropriately.
- If required according to facility-specific protocol, calculate velocity ratio.

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. The following should be considered when assessing for reflux:

- To elicit reflux, the following maneuver(s) can be performed: Valsalva maneuver, distal augmentation or proximal compression.
- In the absence of spontaneous reflux with the patient in reversed Trendelenburg position, pelvic leak points can be evaluated according to facility-specific protocol.

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

- Bilateral Internal Iliac veins
 - at the confluence of the external and common iliac veins
- 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.

- External pelvic source veins on the lower extremity or pelvic leak points (obturator veins, superior and inferior gluteal veins, perineal vein, labial vein, clitoral vein and round ligament vein).
 - While not required, evaluation of pelvic leak points can indirectly show evidence of incompetence of deep pelvic vein branches some of which are directly related to the internal iliac veins.

Evaluation of the Ovarian Veins (Female) or Gonadal Veins (Male)

Evaluation of the ovarian veins or 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 or proximal compression.
- In the absence of spontaneous reflux with the patient in reversed Trendelenburg, position the patient in upright (sitting or standing) position. Repeat interrogation and documentation of the ovarian/gonadal veins.

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

- Bilateral ovarian veins (female):
 - Proximal, mid and distal
- Bilateral gonadal veins (male):
 - Proximal, mid and distal
- 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 transabdominal pelvic venous 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 Transabdominal Pelvic Venous 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 71 minutes
 - 93979 48 minutes

REFERENCES

- Labropoulos N, Jasinski P, Adrahtas D, Gasparis A, Meissner M. A standard ultrasound approach to pelvic congestion syndrome. *Phlebology* 2016; 1-12
- Labropoulos N, Borge M, Pierce K, et al. Criteria for defining significant central vein stenosis with duplex ultrasound. *J Vasc Surg* 2007;46: 101-107.
- Park SJ, Lim JW, Ko YT, et al. Diagnosis of pelvic congestion syndrome using transabdominal and transvaginal sonography. *AJR Am J Roentgenol* 2004; 182: 683–688.
- Kim SH, Cho SW, Kim HD, Chung JW, Park JH, Han MC. Nutcracker syndrome: diagnosis with Doppler US. *Radiology* 1996; 1: 93-97.
- Kurklinsky A, Rooke T. Nutcracker Phenomenon and Nutcracker Syndrome. *Mayo Clin Proc.* 2010; 85(6):552-559.
- Ignacio EA, Dua R, Sarin S, Harper AS, Yim D, Mathur V, Venbrux AC. Pelvic Congestion Syndrome: Diagnosis and Treatment. *Semin Intervent Radiol.* 2008 December; 25(4): 361–368. doi: 10.1055/s-0028-1102998.
- Gloviczki P, Comerota AJ, Dalsing MC, Eklof BG, Gillespie DL, Gloviczki ML, Lohr JM, McLafferty RB, Meissner MH, Murad MH, Padberg FT, Pappas PJ, Passman MA, Raffetto JD, Vasquez MA, Wakefield TW. The care of patients with varicose veins and associated chronic venous diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *J Vasc Surg.* 2011 May;53(5 Suppl):2S-48S. doi: 10.1016/j.jvs.2011.01.079.
- Caggiati A, Bergan J, Gloviczki P, Eklof B, Allegra C, Partsch H; International Interdisciplinary Consensus Committee on Venous Anatomical Terminology. Nomenclature of the veins of the lower limb: Extensions, refinements, and clinical application. *J Vasc Surg* 2005;41(4):719-724.
- Caggiati A1, Bergan JJ, Gloviczki P, Jantet G, Wendell-Smith CP, Partsch H; International Interdisciplinary Consensus Committee on Venous Anatomical Terminology. Nomenclature of the veins of the lower limbs: an international interdisciplinary consensus statement. *J Vasc Surg* 2002; 36(2):416-422.