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The American College of Radiology will periodically define new practice parameters and technical standards for radiologic practice to help advance the science of radiology and to improve the quality of service to patients throughout the United States. Existing practice parameters and technical standards will be reviewed for revision or renewal, as appropriate, on their fifth anniversary or sooner, if indicated.

Each practice parameter and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review and approval. The practice parameters and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice parameter and technical standard by those entities not providing these services is not authorized.

Revised 2015 (Resolution 35)*

ACR–AIUM–SPR–SRU PRACTICE PARAMETER FOR THE PERFORMANCE OF SCROTAL ULTRASOUND EXAMINATIONS

PREAMBLE

This document is an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. Practice Parameters and Technical Standards are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care¹. For these reasons and those set forth below, the American College of Radiology and our collaborating medical specialty societies caution against the use of these documents in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the practitioner in light of all the circumstances presented. Thus, an approach that differs from the guidance in this document, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in this document when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations of available resources, or advances in knowledge or technology subsequent to publication of this document. However, a practitioner who employs an approach substantially different from the guidance in this document is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation, and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. Therefore, it should be recognized that adherence to the guidance in this document will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of this document is to assist practitioners in achieving this objective.

¹ *Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing*, ___ N.W.2d ___ (Iowa 2013) Iowa Supreme Court refuses to find that the *ACR Technical Standard for Management of the Use of Radiation in Fluoroscopic Procedures* (Revised 2008) sets a national standard for who may perform fluoroscopic procedures in light of the standard's stated purpose that ACR standards are educational tools and not intended to establish a legal standard of care. See also, *Stanley v. McCarver*, 63 P.3d 1076 (Ariz. App. 2003) where in a concurring opinion the Court stated that "published standards or guidelines of specialty medical organizations are useful in determining the duty owed or the standard of care applicable in a given situation" even though ACR standards themselves do not establish the standard of care.

I. INTRODUCTION

The clinical aspects contained in specific sections of this practice parameter (Introduction, Indications, Specifications of the Examination, and Equipment Specifications) were developed collaboratively by the American College of Radiology (ACR), the American Institute of Ultrasound in Medicine (AIUM), the Society of Radiologists in Ultrasound (SRU) and the Society for Pediatric Radiology (SPR). Recommendations for physician requirements, written request for the examination, procedure documentation, and quality control vary among the three organizations and are addressed by each separately.

These practice parameters are intended to assist practitioners performing ultrasound studies of the scrotum. In some cases, additional and/or specialized examinations may be necessary. Although it is not possible to detect every abnormality, adherence to the following practice parameters will maximize the probability of detecting most of the abnormalities that occur in the scrotum.

II. INDICATIONS

Indications for scrotal ultrasound include, but are not limited to [1,2], the following:

1. Evaluation of scrotal pain, including but not limited to testicular trauma, ischemia/torsion, and infectious or inflammatory scrotal disease [3-7]
2. Evaluation of a palpable inguinal, intrascrotal, or testicular mass [1,2,8,9]
3. Evaluation of scrotal asymmetry, swelling, or enlargement [1,2,10-12]
4. Evaluation of potential intrascrotal hernia [13]
5. Detection/evaluation of varicoceles [14]
6. Evaluation of male infertility [1]
7. Follow-up of prior indeterminate scrotal ultrasound findings
8. Localization of nonpalpable testes [15,16]
9. Detection of an occult primary tumor in patients with metastatic germ cell tumor [17] or unexplained retroperitoneal adenopathy
10. Follow-up of patients with prior primary testicular neoplasms, leukemia, or lymphoma [18]
11. Evaluation of an abnormality noted on other imaging studies (including but not limited to computed tomography [CT], magnetic resonance imaging [MRI] and positron emission tomography [PET]).
12. Evaluation of a disorder of sexual development [19]

III. QUALIFICATIONS AND RESPONSIBILITIES OF THE PHYSICIAN

Each organization will address this section in its document. ACR language is as follows:

See the [ACR–SPR–SRU Practice Parameter for Performing and Interpreting Diagnostic Ultrasound Examinations](#) [20].

IV. WRITTEN REQUEST FOR THE EXAMINATION

Each organization will address this section in its document. ACR language is as follows:

The written or electronic request for a scrotal ultrasound examination should provide sufficient information to demonstrate the medical necessity of the examination and allow for its proper performance and interpretation.

Documentation that satisfies medical necessity includes 1) signs and symptoms and/or 2) relevant history (including known diagnoses). Additional information regarding the specific reason for the examination or a provisional diagnosis would be helpful and may at times be needed to allow for the proper performance and interpretation of the examination.

The request for the examination must be originated by a physician or other appropriately licensed health care provider. The accompanying clinical information should be provided by a physician or other appropriately licensed health care provider familiar with the patient's clinical problem or question and consistent with the state's scope of practice requirements. (ACR Resolution 35, adopted in 2006)

V. SPECIFICATIONS OF THE EXAMINATION

The testes should be evaluated in at least two planes, longitudinal and transverse. Transverse images should be obtained in the superior, mid, and inferior portions of the testes. Longitudinal views should be obtained centrally as well as medially and laterally. Each testis should be evaluated in its entirety. The size, echogenicity, and blood flow of each testis and epididymis should be compared to the contralateral side. Comparison of the testes is best accomplished with a side-by-side transverse image. If a palpable abnormality is the indication for the sonogram, this area should be directly imaged [1,2]. In the event that a testis is not identified within the scrotum, the ipsilateral inguinal canal and inguinal rings should be scanned. The pelvis and the retroperitoneum may also be scanned to look for testicular ectopia [16].

Relevant extratesticular structures should be evaluated. The head, body, and tail of the epididymis should be evaluated when technically feasible. The spermatic cord should be evaluated if there is suspicion for testicular torsion [21]. The scrotal wall, including the overlying skin, should be evaluated. Additional techniques such as the Valsalva maneuver or upright positioning can be used as needed. Any abnormality should be documented. In pediatric patients, testicular volumes could be provided using the Lambert formula length ((L) x width (W) x height (H) x 0.71) or ellipsoid formula (L x W x H x 0.52) [22].

Doppler sonography (spectral and color/power Doppler imaging) should be used as necessary in examinations of the scrotum and is required in the setting of acute scrotal pain. If used, color and/or power Doppler sonography should include at least one side-by-side image comparing both testes. Identical Doppler settings should be used to evaluate symmetry of flow between the testes. Low-flow detection settings should be used to document testicular blood flow.

VI. DOCUMENTATION

Each organization will address this section in its document. ACR language is as follows:

Adequate documentation is essential for high-quality patient care. There should be a permanent record of the ultrasound examination and its interpretation. Comparison with prior relevant imaging studies may prove helpful. Images of all appropriate areas, both normal and abnormal, should be recorded. Variations from normal size should generally be accompanied by measurements. Images should be labeled with the patient identification, facility identification, examination date, and image orientation. An official interpretation (final report) of the ultrasound examination should be included in the patient's medical record. Retention of the ultrasound examination images should be consistent both with clinical need and with relevant legal and local health care facility requirements.

Reporting should be in accordance with the [ACR Practice Parameter for Communication of Diagnostic Imaging Findings](#) [23].

VII. EQUIPMENT SPECIFICATIONS

Scrotal studies should be conducted with a real-time scanner, preferably using a 7 MHz or higher linear array transducer. A curvilinear or vector transducer with lower frequencies may be needed if the scrotum is enlarged, recognizing that there is a trade-off between resolution and beam penetration. The highest possible Doppler frequencies (typically in the 5.0 to 10 MHz range) providing optimal resolution and flow detection should be utilized. The Doppler frequency may differ from imaging frequency. Stand-off pads can be used, if necessary, to improve imaging.

VIII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION

Each organization will address this section in its document. ACR language is as follows:

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education appearing under the heading *Position Statement on QC & Improvement, Safety, Infection Control, and Patient Education* on the ACR website (<http://www.acr.org/guidelines>).

Equipment performance monitoring should be in accordance with the [ACR Technical Standard for Diagnostic Medical Physics Performance Monitoring of Real Time Ultrasound Equipment](#).

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REFERENCES

1. Appelbaum L, Gaitini D, Dogra VS. Scrotal ultrasound in adults. *Semin Ultrasound CT MR*. 2013;34(3):257-273.
2. Mirochnik B, Bhargava P, Dighe MK, Kanth N. Ultrasound evaluation of scrotal pathology. *Radiol Clin North Am*. 2012;50(2):317-332, vi.
3. Deurdulian C, Mittelstaedt CA, Chong WK, Fielding JR. US of acute scrotal trauma: optimal technique, imaging findings, and management. *Radiographics*. 2007;27(2):357-369.
4. Dogra V, Bhatt S. Acute painful scrotum. *Radiol Clin North Am*. 2004;42(2):349-363.
5. Liang T, Metcalfe P, Sevcik W, Noga M. Retrospective review of diagnosis and treatment in children presenting to the pediatric department with acute scrotum. *AJR Am J Roentgenol*. 2013;200(5):W444-449.
6. Sung EK, Setty BN, Castro-Aragon I. Sonography of the pediatric scrotum: emphasis on the Ts--torsion, trauma, and tumors. *AJR Am J Roentgenol*. 2012;198(5):996-1003.
7. Vijayaraghavan SB. Sonographic differential diagnosis of acute scrotum: real-time whirlpool sign, a key sign of torsion. *J Ultrasound Med*. 2006;25(5):563-574.
8. Philips S, Nagar A, Dighe M, Vikram R, Sunnapwar A, Prasad S. Benign non-cystic scrotal tumors and pseudotumors. *Acta Radiol*. 2012;53(1):102-111.
9. Wasnik AP, Maturen KE, Shah S, Pandya A, Rubin JM, Platt JF. Scrotal pearls and pitfalls: ultrasound findings of benign scrotal lesions. *Ultrasound Q*. 2012;28(4):281-291.
10. Cooper ML, Kaefer M, Fan R, Rink RC, Jennings SG, Karmazyn B. Testicular microlithiasis in children and associated testicular cancer. *Radiology*. 2014;270(3):857-863.
11. Richenberg J, Brejt N. Testicular microlithiasis: is there a need for surveillance in the absence of other risk factors? *Eur Radiol*. 2012;22(11):2540-2546.
12. Rizvi SA, Ahmad I, Siddiqui MA, Zaheer S, Ahmad K. Role of color Doppler ultrasonography in evaluation of scrotal swellings: pattern of disease in 120 patients with review of literature. *Urol J*. 2011;8(1):60-65.
13. Rubenstein RA, Dogra VS, Seftel AD, Resnick MI. Benign intrascrotal lesions. *J Urol*. 2004;171(5):1765-1772.
14. Beddy P, Geoghegan T, Browne RF, Torreggiani WC. Testicular varicoceles. *Clin Radiol*. 2005;60(12):1248-1255.
15. Aganovic L, Cassidy F. Imaging of the scrotum. *Radiol Clin North Am*. 2012;50(6):1145-1165.
16. Delaney LR, Karmazyn B. Ultrasound of the pediatric scrotum. *Semin Ultrasound CT MR*. 2013;34(3):248-256.
17. Scholz M, Zehender M, Thalmann GN, Borner M, Thoni H, Studer UE. Extragonadal retroperitoneal germ cell tumor: evidence of origin in the testis. *Ann Oncol*. 2002;13(1):121-124.
18. Stoehr B, Zangerl F, Steiner E, et al. Routine scrotal ultrasonography during the follow-up of patients with testicular cancer leads to earlier detection of asynchronous tumours and a high rate of organ preservation. *BJU Int*. 2010;105(8):1118-1120.
19. Pires CR, De Moura Poli AH, Zanforlin Filho SM, Mattar R, Moron AF, Debs Diniz AL. True hermaphroditism-the importance of ultrasonic assessment. *Ultrasound Obstet Gynecol*. 2005;26(1):86-88.
20. American College of Radiology. ACR-SPR-SRU Practice Parameter for Performing and Interpreting Diagnostic Ultrasound Examinations. 2014; <http://www.acr.org/~media/13B896B9F4844E3082E7D7ED66AFC148.pdf>. Accessed October 8, 2014.
21. Baud C, Veyrac C, Couture A, Ferran JL. Spiral twist of the spermatic cord: a reliable sign of testicular torsion. *Pediatr Radiol*. 1998;28(12):950-954.
22. Paltiel HJ, Diamond DA, Di Canzio J, Zurakowski D, Borer JG, Atala A. Testicular volume: comparison of orchidometer and US measurements in dogs. *Radiology*. 2002;222(1):114-119.
23. American College of Radiology. ACR Practice Parameter for Communication of Diagnostic Imaging Findings. 2014; <http://www.acr.org/~media/C5D1443C9EA4424AA12477D1AD1D927D.pdf>. Accessed October 8, 2014.

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