ACR–AIUM–SRU PRACTICE PARAMETER FOR THE PERFORMANCE OF DIAGNOSTIC AND SCREENING ULTRASOUND OF THE ABDOMINAL AORTA IN ADULTS

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 care[1]. 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 considering 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 variables such as the condition of the patient, limitations of available resources, or advances in knowledge or technology after publication of this document. However, a practitioner who employs an approach substantially different from the guidance in this document may consider documenting in the patient record information sufficient to explain the approach taken.

The practice of medicine involves the science, and 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 purpose of this document is to assist practitioners in achieving this objective.

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1 *Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing, 831 N.W.2d 826 (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), and the Society of Radiologists in Ultrasound (SRU). Recommendations for Qualifications and Responsibilities of Personnel, Written Requests for the Examination, Documentation, and Quality Control and Improvement, Safety, Infection Control, and Patient Education vary among the three organizations and are addressed by each separately.

These practice parameters are intended to assist in the performance and interpretation of the dedicated sonographic examination of the abdominal aorta. The examination may be performed as a diagnostic or screening study [1-3]. Although it is not possible to detect every abnormality, following this practice parameter will maximize the detection of abnormalities of the abdominal aorta.

II. INDICATIONS AND CONTRAINDICATIONS

Indications for ultrasound of the abdominal aorta include, but are not limited to, the following:

A. Diagnostic Evaluation for Abdominal Aortic Aneurysm (AAA).

1. Palpable or pulsatile abdominal mass or abdominal bruit
2. Unexplained lower back pain, flank pain, or abdominal pain
3. Follow-up of a previously demonstrated AAA
4. Recommendations for rescanning patients are as follows [4]:
    i. For AAA size 3.0-3.9 cm: follow-up ultrasound every 3 years
    ii. For AAA size 4.0-4.9 cm: follow-up annually
    iii. For AAA size 5.0-5.4 cm: follow-up every 6 months
5. Follow-up of patients post-AAA repair, particularly after endovascular aortic aneurysm repair (EVAR)

B. Screening Evaluation for AAA

1. Men ages 65-75 who have ever smoked
2. Women ages 65 or older with cardiovascular risk factors
3. Individuals ages 50 or older with a family history of aortic and/or peripheral vascular aneurysmal disease
4. Individuals with a personal history of peripheral vascular aneurysmal disease
5. Individuals over age 75 with other risk factors for AAA [5]

There are no absolute contraindications to ultrasound of the aorta. If aortic rupture or dissection is clinically suspected, ultrasound is usually not the examination of choice.

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

See the ACR–SPR–SRU Practice Parameter for the Performance and Interpretation of Diagnostic Ultrasound Examinations [6].

IV. SPECIFICATIONS OF THE EXAMINATION

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

Documentation that satisfies medical necessity includes 1) signs and symptoms and/or 2) relevant history (including known diagnoses). The provision of 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 scope of practice requirements. (ACR Resolution 35 adopted in 2006 – revised in 2016, Resolution 12-b)

IV. SPECIFICATIONS OF THE EXAMINATION

A. Diagnostic Examination

The examination includes the following, when feasible:

1. Abdominal aorta

a. Longitudinal images (along the long axis of the vessel)
    i. Proximal (below diaphragm, near the celiac artery)
    ii. Mid (near the level of the renal arteries)
    iii. Distal (through the iliac bifurcation)
b. Transverse images (perpendicular to the long axis of the vessel)
    i. Proximal (below diaphragm, near the celiac artery)
    ii. Mid (near the level of the renal arteries)
    iii. Distal (through the iliac bifurcation)
c. Measurements
    i. Measurements are taken at the greatest diameter of the aorta, from outer wall to outer wall. The aorta should be imaged in the plane that is parallel to the long axis of the lumen (for measurement of the anteroposterior dimension) and perpendicular to the long axis of the lumen (for measurement of the transverse dimension). The aorta may also be scanned using a lateral or coronal approach if it cannot be visualized from an anterior transducer approach. The measurements obtained via these scan planes are equivalent to transverse measurements. Measurements obtained in the transverse plane may overestimate aneurysm size due to tortuosity of the abdominal aorta.
    ii. If an AAA is present, the maximal size and location of the aneurysm should be documented and recorded. The relationship of the dilated segment to the renal arteries and to the aortic bifurcation should be determined if possible.
    iii. At a minimum, the largest measurement should be recorded and reported. A measurement of the length of the aneurysm is optional.
    iv. If an AAA is present, the shape of the aneurysm should be documented either as fusiform, eccentric, or saccular. Documentation should include representative images, which enable the radiologist to characterize the shape of the aneurysm.

2. Common iliac arteries
    a. Longitudinal images of the proximal right and left common iliac arteries (along the long axis of the vessel)
    b. Transverse images (perpendicular to the long axis of the vessel) of the proximal common iliac arteries, just below the bifurcation
    c. Measurement of the widest visualized portion of each common iliac artery, from outer wall to outer wall

Color Doppler imaging and/or spectral Doppler with waveform analysis of the aorta and iliac arteries may be helpful to demonstrate patency and the presence of intraluminal thrombus.

After EVAR, color (or power) and spectral Doppler are required to document the presence or absence of endoleaks. Contrast-enhanced ultrasound (CEUS) has shown efficacy for identification of endoleaks [7]. Note: This would be an off-label use of CEUS based on current FDA approval status [8].

Interobserver measurements of an aortic aneurysm can vary by as much as 5 mm. Visual comparison with previous studies is recommended to ensure measurements are obtained at similar locations and to assess for interval change in aneurysm size. Consistent measurements of aneurysm diameter are recommended following endograft repair to check for interval enlargement in sac size [9]. Excessive transducer pressure should be avoided when measuring aortic size.

IV. SPECIFICATIONS OF THE EXAMINATION

B. Screening Examination for AAA

Anteroposterior measurements of the aorta sufficient to determine if an aortic aneurysm exists according to the criteria in Section C1 below should be obtained. If an aneurysm is present, its greatest dimension should be reported. However, if no aneurysm is identified, the largest diameter of the abdominal aorta should be reported.

IV. SPECIFICATIONS OF THE EXAMINATION

C. Interpretation of the Screening Examination Should Include at Least 3 Categories

1. Positive: Infrarenal AAA greater than or equal to 3 cm in diameter or greater than or equal to 1.5 times the diameter of the more proximal infrarenal aorta [10]. The latter definition is particularly important in women and small adults [11].
2. Negative: No infrarenal AAA
3. Indeterminate: Aneurysmal status not defined because of nonvisualization or partial visualization of the infrarenal abdominal aorta and/or iliac bifurcation.
4. The report should also state whether the suprarenal aorta was seen and, if seen, should reflect whether it is normal. The report should also state whether dilation of the aorta above the celiac artery is noted. For the area above the celiac artery, an aneurysm may be reported if the diameter is greater than 3.9 cm for males or 3.1 cm for females.

V. DOCUMENTATION

Reporting should be in accordance with the ACR Practice Parameter for Communication of Diagnostic Imaging Findings [12].

Adequate documentation is essential for high-quality patient care. There should be a permanent record of the ultrasound examination and its interpretation. Comparison with previous 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.

VI. EQUIPMENT SPECIFICATIONS

Equipment performance monitoring should be in accordance with the ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Real Time Ultrasound Equipment [13].

Abdominal aortic ultrasound should be performed with ultrasound units with transducers that allow for appropriate penetration and resolution, depending on the patient's body habitus. Diagnostic information should be optimized while keeping total ultrasound exposure as low as reasonably achievable.

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

Transducers should be cleaned after each use [14].

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 *ACR Position Statement on Quality Control and Improvement, Safety, Infection Control and Patient Education* on the ACR website (https://www.acr.org/Advocacy-and-Economics/ACR-Position-Statements/Quality-Control-and-Improvement).

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*Practice parameters and technical standards are published annually with an effective date of October 1 in the year in which amended, revised, or approved by the ACR Council. For practice parameters and technical standards published before 1999, the effective date was January 1 following the year in which the practice parameter or technical standard was amended, revised, or approved by the ACR Council.

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