AIUM Practice Guideline for the Performance of Diagnostic and Screening Ultrasound Examinations of the Abdominal Aorta in Adults

Guideline developed in collaboration with the American College of Radiology and the Society of Radiologists in Ultrasound.
The American Institute of Ultrasound in Medicine (AIUM) is a multidisciplinary association dedicated to advancing the safe and effective use of ultrasound in medicine through professional and public education, research, development of guidelines, and accreditation. To promote this mission, the AIUM is pleased to publish in conjunction with the American College of Radiology (ACR) and the Society of Radiologists in Ultrasound (SRU) this AIUM Practice Guideline for the Performance of Diagnostic and Screening Ultrasound Examinations of the Abdominal Aorta in Adults.

The AIUM represents the entire range of clinical and basic science interests in medical diagnostic ultrasound, and, with hundreds of volunteers, this multidisciplinary organization has promoted the safe and effective use of ultrasound in clinical medicine for more than 50 years. This document and others like it will continue to advance this mission.

Practice guidelines of the AIUM are intended to provide the medical ultrasound community with guidelines for the performance and recording of high-quality ultrasound examinations. The guidelines reflect what the AIUM considers the minimum criteria for a complete examination in each area but are not intended to establish a legal standard of care. AIUM-accredited practices are expected to generally follow the guidelines with recognition that deviations from these guidelines will be needed in some cases, depending on patient needs and available equipment. Practices are encouraged to go beyond the guidelines to provide additional service and information as needed.
I. Introduction

The clinical aspects contained in specific sections of this guideline (Introduction, Indications/Contraindications, Specifications of the Examination, and Equipment Specifications) were developed collaboratively by the American Institute of Ultrasound in Medicine (AIUM), the American College of Radiology (ACR), and the Society of Radiologists in Ultrasound (SRU). 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 guidelines are intended to assist in the performance and interpretation of a dedicated sonographic examination of the abdominal aorta. The examination may be performed as a diagnostic or screening study. Comprehensive population screening programs have not yet been developed in the United States but do exist elsewhere in the world. While it is not possible to detect every abnormality, following this guideline will maximize the detection of abnormalities of the abdominal aorta.

II. Qualifications and Responsibilities of Personnel

See the AIUM Official Statement Training Guidelines for Physicians Who Evaluate and Interpret Diagnostic Ultrasound Examinations and the AIUM Standards and Guidelines for the Accreditation of Ultrasound Practices.

III. Indications/Contraindications

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

A. Diagnostic Evaluation for an Abdominal Aortic Aneurysm

1. Palpable or pulsatile abdominal mass.
2. Unexplained lower back pain, flank pain, or abdominal pain.
3. Follow-up of a previously demonstrated abdominal aortic aneurysm.
4. Follow-up of patients with an abdominal aortic and/or iliac endoluminal stent graft.

B. Screening Evaluation for an Abdominal Aortic Aneurysm

1. Men 65 years or older.
2. Women 65 years or older with cardiovascular risk factors.
3. Patients 50 years or older with a family history of aortic and/or peripheral vascular aneurysmal disease.
4. Patients with a personal history of peripheral vascular aneurysmal disease.

Groups with additional risk include patients with a history of smoking, hypertension, and certain connective tissue diseases (eg, Marfan syndrome).

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.

IV. Written Request for the Examination

The written or electronic request for an ultrasound examination should provide sufficient information to allow for the appropriate performance and interpretation of the examination.

The request for the examination must be originated by a physician or other appropriately licensed health care provider or under their direction. The accompanying clinical information should be provided by a physician or other appropriate health care provider familiar with the patient’s clinical situation and should be consistent with relevant legal and local health care facility requirements.

V. 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;
      ii. Mid;
      iii. Distal.
b. Transverse images (perpendicular to the long axis of the vessel):
   i. Proximal (near diaphragm);
   ii. Mid;
   iii. Distal.

c. Measurements:
   i. Measurements of the proximal, mid, and distal aorta should be obtained. Measurements are taken at the greatest diameter of the aorta from outer edge to outer edge.
   ii. If an aneurysm 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. A measurement of the length of the aneurysm is not necessary.

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 edge to outer edge.

Color Doppler and/or spectral Doppler imaging with waveform analysis of the aorta and iliac arteries may provide additional information.

After endoluminal graft placement, color (or power) Doppler imaging and spectral Doppler imaging are required to document the presence or absence of endoleaks.

Interobserver measurements of an aortic aneurysm can vary by as much as 5 mm. This variation makes visual comparison with previous studies particularly important to determine whether a significant change in size has occurred.3

B. Screening Examination for an Abdominal Aortic Aneurysm

1. Abdominal aorta:
   a. Longitudinal images (along the long axis of the vessel):
      i. Proximal;
      ii. Mid;
      iii. Distal.
   b. Transverse images (perpendicular to the long axis of the vessel):
      i. Proximal (near diaphragm);
      ii. Mid;
      iii. Distal.

C. Interpretation of the screening examination should include at least 3 categories:

1. Positive—Infrarenal abdominal aortic aneurysm greater than or equal to 3 cm in diameter or greater than or equal to 1.5 times the diameter of the more proximal aorta.4 The latter definition is particularly important in women.5
3. Indeterminate—Aneurysmal status not defined because of nonvisualization or only partial visualization of the infrarenal abdominal aorta.

The report should also state whether the suprarenal aorta was seen and, if seen, should reflect whether it is normal.

VI. Documentation

Adequate documentation is essential for high-quality patient care. There should be a permanent record of the ultrasound examination and its interpretation. Images of all appropriate areas, both normal and abnormal, should be recorded. Variations from normal size should be accompanied by measurements. Images should be labeled with the patient identification, facility identification, examination date, and the side (right or left) of the anatomic site imaged. An official interpretation (final report) of the ultrasound findings should be included in the patient’s medical record. Retention of the ultrasound examination should be consistent both with clinical needs and with relevant legal and local health care facility requirements.

Reporting should be in accordance with the AIUM Practice Guideline for Documentation of an Ultrasound Examination.
VII. Equipment Specifications

Abdominal aortic ultrasound examinations should be performed with real-time scanners 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.

VIII. Quality Control and Improvement, Safety, Infection Control, and Patient Education

Policies and procedures related to quality control, patient education, infection control, and safety should be developed and implemented in accordance with the AIUM Standards and Guidelines for the Accreditation of Ultrasound Practices.

Equipment performance monitoring should be in accordance with the AIUM Standards and Guidelines for the Accreditation of Ultrasound Practices.

IX. ALARA Principle

The potential benefits and risks of each examination should be considered. The ALARA (as low as reasonably achievable) principle should be observed when adjusting controls that affect the acoustic output and by considering transducer dwell times. Further details on ALARA may be found in the AIUM publication Medical Ultrasound Safety, Second Edition.

Acknowledgments

This guideline was revised by the American Institute of Ultrasound in Medicine (AIUM) in collaboration with the American College of Radiology (ACR) and the Society of Radiologists in Ultrasound (SRU) according to the process described in the AIUM Clinical Standards Committee Manual.

Collaborative Committee

ACR
Raymond E. Bertino, MD
Lincoln L. Berland, MD
Edward I. Bluth, MD

AIUM
Lin Diacon, MD, RDMS, RPVI
David M. Paushter, MD
Carl C. Reading, MD

SRU
Mark E. Lockhart, MD, MPH
Laurence Needleman, MD
Hisham Tchelepi, MD

AIUM Clinical Standards Committee
David M. Paushter, MD, Chair
Leslie Scoutt, MD, Vice Chair
Susan Ackerman, MD
Lisa Allen, BS, RDMS, RDCS, RVT
Mert Ozan Bahtiyar, MD
Harris L. Cohen, MD
Jude Crino, MD
Lin Diacon, MD, RDMS, RPVI
Judy Estroff, MD
Kimberly Gregory, MD, MPH
Charlotte Henningsen, MS, RT, RDMS, RVT
Charles Hyde, MD
Christopher Moore, MD, RDMS, RDCS
Olga Rasmussen, RDMS
Carl C. Reading, MD
Daniel Skupski, MD
Jay Smith, MD
Joseph Wax, MD
References

Suggested Reading
Additional articles that are not cited in the document but that the committee recommends for further reading on this topic.