Complete Summary

GUIDELINE TITLE

Pulsatile abdominal mass.

BIBLIOGRAPHIC SOURCE(S)

Grollman J, Bettmann MA, Casciani T, Gomes AS, Holtzman SR, Polak JF, Sacks D, Stanford W, Jaff M, Moneta GL, Expert Panel on Cardiovascular Imaging. Pulsatile abdominal mass. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 5 p. [30 references]

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously published version: Grollman J, Bettmann MA, Boxt LM, Gomes AS, Henkin RE, Higgins CB, Kelley MJ, Needleman L, Pagan-Marin H, Polak JF, Stanford W. Pulsatile abdominal mass. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):55-9. [29 references]

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- May 23, 2007, Gadolinium-based Contrast Agents: The addition of a boxed warning and new warnings about the risk of nephrogenic systemic fibrosis (NSF) to the full prescribing information for all gadolinium-based contrast agents (GBCAs).

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Pulsatile abdominal mass

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Cardiology
Emergency Medicine
Family Practice
Geriatrics
Internal Medicine
Radiology
Surgery

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for a pulsatile abdominal mass

TARGET POPULATION

Patients with pulsatile abdominal mass

INTERVENTIONS AND PRACTICES CONSIDERED

1. Computed tomography angiography (CTA)
    - Abdomen
    - Abdomen, electron beam

2. Ultrasound (US)
    - Aorta
    - Aorta, duplex
    - Abdomen
3. Computed tomography (CT)
    - Abdomen, with contrast
    - Abdomen, without contrast
    - Virtual endoscopy
4. Catheter aortography, aorta
5. Magnetic resonance imaging (MRI), abdomen
6. Magnetic resonance angiography (MRA), abdomen
7. X-ray
    - Abdomen
    - Kidney, intravenous pyelogram (IVP)
8. Invasive (INV) tests
    - Lower extremity, runoff angiography
    - Viscera, angiography

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals, and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed for reaching agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Pulsatile Abdominal Mass

Radiologic Exam Procedure	Appropriateness Rating	Comments
CTA, abdomen	8	Prefer MDCTA. Accurately defines the anatomy of the aorta and its branches and the adjacent organs and tissues.
US, aorta	8	The definitive screening modality but only measures aortic diameter accurately.
CT, abdomen, with contrast	7	Accurately defines aortic size and useful in defining extent. Relatively quick with acceptable cost.
CATH, aorta, aortography	7	Accurately defines extent and branch involvement but less accurate in defining diameter. Expensive and invasive.
CT, abdomen, without contrast	6	If contrast injection contraindicated or for rapid and accurate screening.
MRI, abdomen	6	Better than CT in defining extent but more expensive and time consuming. Can diagnose an inflammatory aneurysm.
MRA, abdomen	6	Accurately defines the anatomy of the aorta and its branches and the adjacent organs and tissues.
CTA, abdomen, electron beam	6	
X-ray, abdomen	5	Easily performed and inexpensive, but not accurate in estimating diameter of the aorta. Lateral is more accurate than the frontal radiograph in estimating aortic diameter.
INV, extremity, lower,	5	Important if there are signs or

Radiologic Exam Procedure	Appropriateness Rating	Comments
runoff angiography		symptoms of peripheral vascular disease.
US, abdomen	4	May miss small aneurysm. Useful if aorta found normal on aortic US.
US, aorta, duplex	3	Useful only if signs or symptoms of peripheral vascular disease are present and angiography not planned.
INV, viscera, angiography	3	Rarely indicated. Risky in patients with large aneurysms.
X-ray, kidney, intravenous pyelogram, (IVP)	3	Only indicated if additional information needed about the urinary tract. May be a supplement to contrast enhanced CT studies.
CT virtual endoscopy	3	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the table are listed at the end of the "Major Recommendations" field.

Clinical palpation of a pulsating abdominal mass alerts the clinician to the presence of a possible abdominal aortic aneurysm (AAA), a common vascular disorder seen in older individuals. Although AAA is found more commonly in men, women are also afflicted, especially after age 70. However, the finding of a pulsatile abdominal mass can also be caused by a tortuous abdominal aorta and transmitted pulsations from the aorta to a nonvascular mass.

An AAA may be defined as a localized arterial dilatation of at least 50% greater than the normal diameter. Arteriomegaly, a variation of the same disease process, is a diffuse aneurysmal dilatation also greater than 50% of the expected normal diameter (some would accept the diagnosis of arteriomegaly at a diameter somewhat less). Although any arterial dilatation greater than the normal diameter is pathologically considered an aneurysm, the term ectasia is commonly applied to dilatations less than 50%.

Imaging studies are important in diagnosing the cause of a pulsatile abdominal mass and, if an AAA is found, to determine its size, extent, involvement of its branches and associated significant stenotic visceral, renal, and peripheral arteries. Confirmation of the presence of an AAA is extremely important because the mortality of ruptured AAA is greater than 50% when the patient reaches the hospital and probably greater than 90% if prehospital deaths are included. Currently elective repair is recommended for aneurysms 5.5 cm or greater in diameter. Ultrasound surveillance is recommended for aneurysms less than 5.5

cm in diameter because survival is not improved by surgery. Imaging studies commonly described in the literature include, in the order of their development: abdominal radiographs, intravenous urography, catheter aortography, US, CT, MRI, CTA, and MRA. The rapid recent technological advances in MRI and, particularly, CT have led to changes in the approach to the evaluation of both suspected and confirmed AAA.

Abdominal Radiograph

Radiographs are simple and inexpensive to obtain and, in past decades, were the classic imaging method to determine whether a AAA was present. The presence of calcification in the abdominal aortic wall, although common in patients with an AAA, is not invariably present but is necessary to positively identify a mass as vascular. Furthermore, a tortuous, calcified aorta can mimic an AAA unless both lateral walls can be seen. Generally, a supine anteroposterior abdominal radiograph is obtained, but a lateral projection may be helpful and has been recommended by some as the sole radiographic diagnostic modality. Although radiographs may be helpful in the diagnosis of the presence of a possible AAA, they are very unreliable for diameter measurement, an important deficiency because the diameter is predictive of the likelihood of rupture.

Intravenous Urography

Intravenous urography has the same limitations in the diagnosis of AAA, but it can give some information about the presence of urinary tract involvement. The additional expense does not justify its routine use for the diagnosis of AAA. Therefore, this procedure is recommended only if additional information about the urinary tract is needed. Further, contrast-enhanced CT of the abdomen may be obtained if obstructive uropathy is identified on the CT study.

Ultrasound

Ultrasound is the most commonly recommended screening imaging modality because, if properly performed, CT can accurately measure the aortic anteroposterior diameter. Also, it can be performed portably. Aortic US specifically should be requested if evaluation is for a pulsating abdominal mass, because general "abdominal US" may fail to disclose a small AAA. Abdominal US is then requested only if aortic US reveals a normal diameter aorta. Color flow duplex US is useful for the diagnosis of concomitant peripheral vascular disease when there are symptoms of claudication and the peripheral pulses, especially femoral, are decreased or absent. If aortography is to be performed, duplex scanning is superfluous unless concomitant renal insufficiency limits the contrast medium load. Aortic US is limited in its ability to delineate the craniad and caudad extent of the AAA as well as its involvement of the visceral, renal, and iliac arteries. Transesophageal echocardiography may define the thoracic extension of an AAA but is not recommended as a routine diagnostic modality.

Nuclear Medicine

Although blood pool radionuclide imaging can visualize AAAs, there is no real role for this technique as a routine method in the evaluation of pulsatile abdominal masses. Renal function evaluations such as with the Captopril challenge renal

scan may have rare indications if there is severe, difficult to control systemic hypertension. However, these studies have no place in the routine evaluation of a pulsatile abdominal mass.

Computed Tomography

CT has emerged as an accepted diagnostic imaging modality for an AAA. In addition to accurate diameter measurement, it can delineate its extent, justifying the significant expense above that of US. Many papers have proposed CT as the initial diagnostic modality, suggesting that in the absence of clinical findings of severe systemic hypertension, claudication, or decreased peripheral pulses, no further preoperative imaging would be necessary. Helical (spiral) CT can be performed rapidly and can be substituted for both radiographs and US. Intravenous iodinated contrast injection is necessary to obtain the full benefit of this modality, although noncontrast CT will accurately measure the diameter and delineate its extent. Helical CT with contrast (CTA) is a technological advance that better defines the anatomic pathology and has significantly decreased the need for angiography. Three-dimensional reconstructions using maximum intensity projections, curved planar reformations, and shaded surface displays are yielding superb diagnostic images of the abdominal aorta. Multidetector or multislice CT (MDCT) scanners, with 4 to 64 detector rows are faster and produce even better anatomical definition of the aorta and adjacent organs and tissues and, with new techniques, allow concomitant evaluation of renal, pelvic, and peripheral vasculature. Electron beam CT (EBCT) angiography has been successfully used to image the abdominal aorta, but EBCT scanners are not widely available. Virtual CT endoscopy of the aorta and its branches is an emerging technique that awaits validation and requires special software.

Magnetic Resonance Imaging

MRI and especially MRA define the anatomic extent of AAAs better than CT. The absence of iodinated contrast and ionizing radiation is a further advantage of this modality. Also, this modality is less costly than conventional angiography.

MRA specifically can image the visceral, renal, and iliac arteries. With rapid improvement in MRA technology, including reconstruction techniques, the ability to completely image an AAA and show its relationship to and involvement of its immediate aortic branches is improving. Gadolinium-enhanced 3-dimensional MRA is proving to be superior to angiography in the diagnosis and delineation of AAA. Newer blood pool agents may add further information and increase convenience and speed.

Catheter Angiography

The routine use of catheter angiography (CA) in the imaging of pulsatile abdominal masses and even AAAs confirmed by other modalities, previously controversial, is now rarely necessary. CA does not accurately measure the diameter of an AAA and rarely may even misdiagnose its absence. It is no longer the "gold standard" in defining the pathologic anatomy of an AAA and its branch and peripheral arteries. The use of CA is now limited to institutions without adequate MR or CT technology. Selective visceral, renal, spinal, and coronary arteriography are believed to be indicated only in very specific clinical situations.

Much of this information can now be obtained less invasively and probably more accurately with CTA and perhaps MRA.

Summary

The consensus of the literature supports aortic US as the initial imaging modality of choice when a pulsatile abdominal mass is present. If an AAA that may need surgical or endovascular intervention is confirmed by US or screening helical CT, the decision between contrast helical CT/CTA, MDCT, MRI/MRA, or conventional CA depends on the availability of the more sophisticated imaging modalities. Helical CTA and contrast-enhanced MRA clearly are satisfactory replacements for CA except when there are specific unanswered questions about coexistent peripheral vascular, renal, or visceral arterial obstructive disease or involvement by the aneurysm. They now may be performed so rapidly, safely, and accurately that CTA and MRA may now be considered as the initial test in patients with high clinical suspicion.

Anticipated Exceptions

In emergent situations where rupture has already occurred, all the imaging modalities may be bypassed, because the patient will need immediate operation for survival. In urgent situations, where clinical diagnosis is fairly certain and rupture is impending, CTA or MRA may be the initial and only examination requested, bypassing US.

Abbreviations

- CATH, catheter
- CT, computed tomography
- CTA, computed tomography angiography
- INV, invasive
- IVP, intravenous pyelogram
- MDCTA, multidetector computed tomography angiography
- MRA, magnetic resonance angiography
- MRI, magnetic resonance imaging
- US, ultrasound

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with pulsatile abdominal mass

POTENTIAL HARMS

Although abdominal radiographs may be helpful in the diagnosis of the presence of a possible abdominal aortic aneurysm (AAA), they are very unreliable for diameter measurement, an important deficiency because the diameter is predictive of the likelihood of rupture.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Grollman J, Bettmann MA, Casciani T, Gomes AS, Holtzman SR, Polak JF, Sacks D, Stanford W, Jaff M, Moneta GL, Expert Panel on Cardiovascular Imaging. Pulsatile abdominal mass. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 5 p. [30 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1995 (revised 2005)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Cardiovascular Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Julius Grollman, MD (*Principal Author*); Michael A. Bettmann, MD (*Panel Chair*); Thomas Casciani, MD; Antoinette S. Gomes, MD; Stephen R. Holtzman, MD; Joseph F. Polak, MD, MPH; David Sacks, MD; William Stanford, MD; Michael Jaff, MD; Gregory L. Moneta, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously published version: Grollman J, Bettmann MA, Boxt LM, Gomes AS, Henkin RE, Higgins CB, Kelley MJ, Needleman L, Pagan-Marin H, Polak JF, Stanford W. Pulsatile abdominal mass. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):55-9. [29 references]

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

ACR Appropriateness Criteria® *Anytime*, *Anywhere*™ (PDA application). Available from the ACR Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on February 20, 2001. The information was verified by the guideline developer on March 14, 2001. This summary was updated by ECRI on March 6, 2006. This summary was updated by ECRI Institute on May 17, 2007 following the U.S. Food and Drug Administration (FDA) advisory on Gadolinium-based contrast agents. This summary was updated by ECRI Institute on June 20, 2007 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents.

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