

**American College of Radiology
ACR Appropriateness Criteria®**

Clinical Condition: Palpable Abdominal Mass

Radiologic Procedure	Rating	Comments	<u>RRL*</u>
CT abdomen with contrast	9	Use of intravenous contrast may help better delineate the mass.	☼☼☼
MRI abdomen without and with contrast	9	Use of intravenous contrast may help better delineate the mass.	O
CT abdomen without contrast	8	Use of intravenous contrast may help better delineate the mass.	☼☼☼
MRI abdomen without contrast	8		O
US abdomen	7	This procedure may be appropriate as a first imaging examination for certain abdominal masses in adults (eg, superficial). Usually this is the first examination in pediatric and pregnant patients.	O
CT abdomen without and with contrast	6	This procedure without, followed by with, contrast may be useful in cases in which enhancement pattern of mass may help differentiate or further characterize the lesion.	☼☼☼☼
X-ray abdomen	5	This procedure is a simple and inexpensive way to evaluate bowel for obstruction or constipation as the cause of the mass.	☼☼
X-ray contrast enema	4		☼☼☼
X-ray upper GI series	4		☼☼☼
X-ray upper GI series with small bowel follow-through	4		☼☼☼
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

PALPABLE ABDOMINAL MASS

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Summary of Literature Review

Introduction/Background

Pathology associated with palpable masses is extensive, hence subcategorization is often helpful. Palpable abdominal masses can often be characterized by physical examination as abdominal wall masses such as lipomas, hematomas, lymph nodes, endometriomas, and hernias or intra-abdominal masses including neoplasms and abdominal aortic aneurysms. Evaluation of pulsatile abdominal mass is discussed in the ACR Appropriateness Criteria[®] “[Pulsatile Abdominal Mass, Suspected Abdominal Aortic Aneurysm](#)” [1]. Additionally, distension from constipation, bowel obstruction, and/or volvulus can also sometimes present as a palpable mass. Evaluation of suspected pelvic mass in female patients is discussed in the ACR Appropriateness Criteria[®] “[Clinically Suspected Adnexal Mass](#)” [2].

Overview of Imaging Modalities

Little has been written about the use of imaging in evaluating palpable abdominal masses since the 1980s. Newer reviews and case reports have focused on evaluation of specific masses using computed tomography (CT), ultrasound (US), and magnetic resonance imaging (MRI). Radiography of the abdomen and fluoroscopy play a limited role in the diagnosis and workup of a palpable abdominal mass.

Ultrasound and Computed Tomography

Investigators have found both US and CT to be excellent for affirming or excluding a "palpable" abdominal mass [3-7], with sensitivity and specificity values >95% [4,7]. As few as 16%–38% of patients referred for suspected abdominal mass had a diagnosis corroborated by imaging in one study [8]. In other studies, 56.7% (30 of 53) to 68.3% (69 of 101) of patients demonstrated an abnormality confirmed by imaging [5,7]. Confirmation of the presence of the mass should be the first step in a palpable mass workup, which can often be accomplished by imaging if the physical examination is equivocal.

Both US and CT usually demonstrate the organ from which a mass arises. The accuracy of US in determining the organ of origin has been 88%–91% [3,4], whereas CT has fared slightly better at 93% [7]. US is limited by bowel gas in cases of dilated bowel or by body habitus. US is also partly operator-dependent, however likely to a lesser extent with directly palpable abnormalities. As expected, attempts to predict the pathologic diagnosis of masses based on imaging findings are less successful. In several studies US findings correctly suggested the pathologic diagnosis in 77%–81% of cases [3,4,9,10], whereas CT findings correctly suggested the diagnosis in 88% of cases [7].

Investigators have stressed the ability of CT and US to image masses no matter what their organ of origin and have touted them as first-line procedures for evaluating palpable masses [5,9]. Given its lack of ionizing radiation, US may be preferred as a first-line imaging modality in certain radiation-sensitive populations (eg, pediatric and pregnant populations) or in patients with suspected subcutaneous masses [11]. CT imaging, which is relatively more costly and involves ionizing radiation, may then be reserved for cases requiring further problem solving secondary to indeterminate US findings or for detecting lesions not visible on US due to body habitus and/or overlying bowel gas. One study demonstrated that, compared with strategies not using CT, the use of

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CT can result in savings in time for diagnosis and overall cost of hospitalization [5]. Accordingly, when US findings are indeterminate, CT imaging should be obtained in a timely manner. US still remains more appropriate as the first-line imaging in the pediatric population because of its high sensitivity (90%–99%), specificity (97%–100%), and lack of ionizing radiation [12].

Magnetic Resonance Imaging

At the time of this review, no comparative studies evaluating the imaging of palpable abdominal masses with MRI versus CT or US are available to our knowledge. However, MRI has many important advantages. MRI may be used to evaluate complex lesions not definitely characterized by US or CT. MRI excels in specifically characterizing fat, protein, fluid, blood products, vascularized tissue, and metal. Furthermore, MRI does not entail exposure to ionizing radiation and demonstrates cross-sectional and multiplanar capability similar to that of US and multidetector CT. Hence, MRI may demonstrate distinct advantages in all patients with palpable abdominal mass, specifically in the radiation-sensitive patient populations, when the US findings are nondiagnostic. Although MRI offers potential advantages, its exact performance in evaluating palpable masses relative to US and CT remains unclear given the absence of data; however, it is likely at least comparable.

Radiographs

Radiographs may also be considered as a first step in certain situations. If the patient reports constipation, a radiograph could be used to confirm that diagnosis or to offer alternative diagnosis such as bowel obstruction [13,14]. However, when radiographs are not diagnostic for the source of palpable mass, further imaging will be required [15,16].

Fluoroscopy

Fluoroscopy studies such as contrast enema, upper GI series, and small-bowel follow-through are usually not first-line imaging studies for palpable masses in adults. However, they may be used to further characterize associated degree of obstruction or abnormalities in GI functional function or transit [17]. As extraluminal findings are commonly not assessable by contrast enema or upper GI series, additional imaging may be required even if an intraluminal mass is detected. In pediatric patients, upper GI studies can be used to confirm hypertrophic pyloric stenosis, which can present clinically as a palpable abdominal mass. However, ultrasound is the first-line imaging modality for the evaluation of pyloric stenosis.

Summary of Recommendations

- CT, MRI, and US are complementary imaging modalities for evaluation of a palpable abdominal mass.
- Abdominal radiography and fluoroscopic studies have limited roles for the diagnosis and characterization of a palpable abdominal mass.
- US is the first-line imaging modality when ionizing radiation from CT is of particular concern (eg, pediatric or pregnant patients) and when the mass is superficial.

Summary of Evidence

Of the 17 references cited in the *ACR Appropriateness Criteria® Palpable Abdominal Mass* document, 1 is categorized as a well-designed therapeutic study. Additionally, 16 references are categorized as diagnostic references including 3 quality studies that may have design limitations. There are 13 references that may not be useful as primary evidence.

The 17 references cited in the *ACR Appropriateness Criteria® Palpable Abdominal Mass* document were published between 1980–2014.

While there are references that report on studies with design limitations, 1 well-designed study provides good evidence.

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the

long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults (see Table below). Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® [Radiation Dose Assessment Introduction](#) document.

Relative Radiation Level Designations		
Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
○	0 mSv	0 mSv
⊕	<0.1 mSv	<0.03 mSv
⊕⊕	0.1-1 mSv	0.03-0.3 mSv
⊕⊕⊕	1-10 mSv	0.3-3 mSv
⊕⊕⊕⊕	10-30 mSv	3-10 mSv
⊕⊕⊕⊕⊕	30-100 mSv	10-30 mSv

*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (eg, region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as “Varies”.

Supporting Documents

For additional information on the Appropriateness Criteria methodology and other supporting documents go to www.acr.org/ac.

References

1. American College of Radiology. ACR Appropriateness Criteria®: Pulsatile Abdominal Mass, Suspected Abdominal Aortic Aneurysm. Available at: <https://acsearch.acr.org/docs/69414/Narrative/>. Accessed August 20, 2014.
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The 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 examinations 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 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.