

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

Clinical Condition: **Palpable Abdominal Mass**

Radiologic Procedure	Rating	Comments	<u>RRL*</u>
CT abdomen with or without contrast	8	Most definitive.	Med
US abdomen	7	Less costly and no ionizing radiation.	None
MRI abdomen with or without contrast	6	No ionizing radiation. See comments regarding contrast in text under "Anticipated Exceptions."	None
X-ray abdomen	5	A simple and inexpensive way to evaluate bowel for obstruction or constipation as cause of the "mass."	Med
X-ray contrast enema	4		Med
X-ray upper GI series	4		Med
X-ray upper GI series with small bowel follow-through	4		Med
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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PALPABLE ABDOMINAL MASS

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Summary of Literature Review

Little has been written about the generic use of imaging in evaluating palpable abdominal masses since the 1980s. Rather, newer reviews and case reports have been focused on evaluation of specific masses using computed tomography (CT), ultrasound (US), and magnetic resonance imaging (MRI).

Investigators have found both US and CT excellent for affirming or excluding a clinically suspected abdominal mass [1-5], with sensitivity and specificity values in excess of 95% [2,5]. This is particularly noteworthy since as few as 16%-38% of patients referred for suspected abdominal mass will have that diagnosis corroborated by an imaging study [6]. So, in most cases, the “mass” initially palpated does not actually exist.

Both US and CT can visualize the organ from which a mass arises. The success of US in determining organ of origin has been 88%-91% [1,2], while CT has fared somewhat better at 93% [5]. US is limited by bowel gas in cases of dilated bowel or by body habitus in some obese individuals. As one might expect, attempts to predict the pathologic diagnosis of masses based on imaging findings are less successful. US studies correctly predicted the pathologic diagnosis in 77%-81% of cases [1,2,7,8], while CT suggested the diagnosis in 88% of cases [5].

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 [3,7]. While certain combinations of clinical findings could lend themselves to a more targeted approach (for example, hematemesis plus a palpable gastric-region mass might merit endoscopy as the first study), cross-sectional imaging in general is

well suited to initial evaluation of abdominal masses. Plain radiographs may also be considered as a first step. If the patient reports constipation, a plain radiograph could confirm or exclude that diagnosis or diagnose bowel obstruction or colonic volvulus, for example, without the need for CT. One study in 1981 showed that, compared with strategies not using CT, the use of CT can result in savings in time for diagnosis and overall cost of hospitalization [3].

At the time of this writing, no comparative studies evaluating MRI vs CT or US are available. One recent report of a rare abdominal wall tumor did demonstrate the excellent multiplanar capabilities of MRI [9]. In the absence of data, the usefulness of MRI in evaluating palpable masses is unknown. It is likely comparable to CT and US.

Anticipated Exceptions

Nephrogenic systemic fibrosis (NSF), also known as nephrogenic fibrosing dermopathy) was first identified in 1997 and has recently generated substantial concern among radiologists, referring doctors and lay people. Until the last few years, gadolinium-based MR contrast agents were widely believed to be almost universally well tolerated, extremely safe and non-nephrotoxic, even when used in patients with impaired renal function. All available experience suggests that these agents remain generally very safe, but recently some patients with renal failure who have been exposed to gadolinium contrast agents (the percentage is unclear) have developed NSF [10-12], a syndrome that can be fatal. Further studies are necessary to determine what the exact relationships are between gadolinium-containing contrast agents, their specific components and stoichiometry, patient renal function and NSF. Current theory links the development of NSF to the administration of relatively high doses (eg, >0.2mM/kg) and to agents in which the gadolinium is least strongly chelated. The FDA has recently issued a “black box” warning concerning these contrast agents (http://www.fda.gov/cder/drug/InfoSheets/HCP/gcca_200705HCP.pdf).

This warning recommends that, until further information is available, gadolinium contrast agents should not be administered to patients with either acute or significant chronic kidney disease (estimated GFR <30 mL/min/1.73m²), recent liver or kidney transplant or hepato-renal syndrome, unless a risk-benefit assessment suggests that the benefit of administration in the particular patient clearly outweighs the potential risk(s) [11].

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when

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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. 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	Effective Dose Estimate Range
None	0
Minimal	< 0.1 mSv
Low	0.1-1 mSv
Medium	1-10 mSv
High	10-100 mSv

References

- Aspelin P, Hildell J, Karlsson S, Sigurjonson S. Ultrasonic evaluation of palpable abdominal masses. *Acta Chir Scand* 1980; 146(7):501-506.
- Barker CS, Lindsell DR. Ultrasound of the palpable abdominal mass. *Clin Radiol* 1990; 41(2):98-99.
- Dixon AK, Fry IK, Kingham JG, McLean AM, White FE. Computed tomography in patients with an abdominal mass: effective and efficient? A controlled trial. *Lancet* 1981; 1(8231):1199-1201.
- Holm HH, Gammelgaard J, Jensen F, Smith EH, Hillman BJ. Ultrasound in the diagnosis of a palpable abdominal mass. A prospective study of 107 patients. *Gastrointest Radiol* 1982; 7(2):149-151.
- Williams MP, Scott IH, Dixon AK. Computed tomography in 101 patients with a palpable abdominal mass. *Clin Radiol* 1984; 35(4):293-296.
- Colquhoun IR, Saywell WR, Dewbury KC. An analysis of referrals for primary diagnostic abdominal ultrasound to a general X-ray department. *Br J Radiol* 1988; 61(724):297-300.
- Annur Z, Sakijan AS, Annur N, Kooi GH. Ultrasound in the diagnosis of palpable abdominal masses in children. *Med J Malaysia* 1990; 45(4):281-287.
- White M, Stella J. Ovarian torsion: 10-year perspective. *Emerg Med Australas* 2005; 17(3):231-237.
- Karadag O, Altundag K, Elkiran ET, Dikbas O, Gedikoglu G, Kars A. Anterior abdominal wall synovial sarcoma: a rare presentation. *Am J Clin Oncol* 2005; 28(3):323-324.
- Broome DR, Girguis MS, Baron PW, Cottrell AC, Kjellin I, Kirk GA. Gadodiamide-associated nephrogenic systemic fibrosis: why radiologists should be concerned. *AJR Am J Roentgenol* 2007; 188(2):586-592.
- Kanal E, Barkovich AJ, Bell C, et al. ACR guidance document for safe MR practices: 2007. *AJR Am J Roentgenol* 2007; 188(6):1447-1474.
- Sadowski EA, Bennett LK, Chan MR, et al. Nephrogenic systemic fibrosis: risk factors and incidence estimation. *Radiology* 2007; 243(1):148-157.

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