

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

Clinical Condition: **Left Lower Quadrant Pain — Suspected Diverticulitis**

Variant 1: **Typical clinical presentation for diverticulitis, suspected complications or atypical presentations.**

Radiologic Procedure	Rating	Comments	RRL*
CT abdomen and pelvis with IV contrast	9	For this procedure oral and/or colonic contrast may be helpful for bowel luminal visualization.	⚙⚙⚙⚙
CT abdomen and pelvis without IV contrast	6		⚙⚙⚙⚙
CT abdomen and pelvis without and with IV contrast	5		⚙⚙⚙⚙
MRI abdomen and pelvis without IV contrast	5		O
MRI abdomen and pelvis without and with IV contrast	5		O
X-ray contrast enema	4		⚙⚙⚙
US abdomen transabdominal graded compression	4		O
X-ray abdomen and pelvis	4		⚙⚙⚙
US pelvis transvaginal	2		O
<u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

LEFT LOWER QUADRANT PAIN — SUSPECTED DIVERTICULITIS

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Summary of Literature Review

Introduction/Background

The most common cause of left lower quadrant pain in adults is acute sigmoid and/or descending diverticulitis. It has been estimated that between 10% and 25% of patients with diverticulosis will ultimately develop diverticulitis [1]. Appropriate imaging triage for patients with suspected diverticulitis (ie, left lower quadrant pain) should address 2 major clinical questions: 1) What are the differential diagnostic possibilities in this clinical situation? and 2) What information is necessary to make a definitive management decision? Some patients with acute diverticulitis may not require any imaging, notably those with typical symptoms of diverticulitis (eg, left lower quadrant pain and tenderness) without suspected complications or those with a previous history of diverticulitis who present with clinical symptoms of recurrent disease. In few instances, such patients are treated medically without undergoing radiologic examinations, but diverticulitis can be simulated by other acute abdominal disorders [2]. Patients with diverticulitis may require surgery or interventional radiology procedures because of associated complications, including abscesses, fistulas, obstruction, or perforation. As a result, there has been a trend toward greater use of medical imaging to confirm the diagnosis of diverticulitis, evaluate the extent of disease, and detect complications before deciding on appropriate treatment.

Abdominal radiography is of limited value in evaluating diverticulitis unless complications such as free perforation (pneumoperitoneum) or obstruction are suspected. Nuclear medicine imaging has no role in the evaluation of left lower quadrant pain. The role of magnetic resonance imaging (MRI) has not been adequately evaluated, but preliminary data suggest that it may have diagnostic potential in patients with suspected diverticulitis [3-6]. The imaging examination most widely used for diagnosing diverticulitis is computed tomography (CT), but graded compression ultrasound (US), barium enema, and MRI have also been used.

Barium Enema

In the past, contrast enema was the primary imaging examination for diverticulitis but has been supplanted by CT. Diverticulitis is mainly an extraluminal process, and contrast enema shows the secondary effects of inflammation on the colon and will not show extraluminal abnormalities such as abscesses and pericolonic inflammation [7]. Barium enema is also more invasive and is not as sensitive for extracolonic pathology. Although CT has replaced the contrast enema as the initial imaging examination for diverticulitis, the contrast enema may be helpful in some instances as a follow-up study for evaluation for suspected fistula [8] or for surgical planning after treatment.

Computed Tomography

CT is now nearly universally used as the imaging examination of choice for evaluating patients with suspected descending or sigmoid colon diverticulitis because of its high sensitivity and specificity and its ability to demonstrate other causes of left lower quadrant pain that mimic diverticulitis [9,10]. It is widely available, reproducible, and has a reported overall accuracy of 99% [11]. CT has a major role for depicting extracolonic disease extent; this assessment is rarely possible with a contrast enema. By revealing the presence and extent of abscess formation, CT facilitates selection of patients for medical rather than surgical therapy, and determination if hospitalization is required [12-17]. When abscesses are present, it has been shown that US-guided and CT-

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guided percutaneous drainage of abscess collections can eliminate multistage operative procedures and, in some cases, can eliminate the need for surgery entirely [12,15,17]. Finally, CT can demonstrate extracolonic diseases (eg, genitourinary and gynecologic abnormalities) that have a similar clinical presentation [10]. One prospective study reported that contained perforation or abscess formation were detected with an accuracy of 96% (sensitivity 100%, specificity 91%) and 98% (sensitivity 100%, specificity 97%), respectively. Additionally, diagnoses other than diverticulitis as a cause of abdominal pain were correctly diagnosed using CT [18]. CT reveals the alternative diagnosis of epiploic appendagitis, which can clinically present similarly [19,20]. The imaging of premenopausal women with acute pelvic pain is discussed in the ACR Appropriateness Criteria® “[Acute Pelvic Pain in the Reproductive Age Group](#).”

A variety of contrast media have been used for CT to optimize the sensitivity and specificity of the examination, including oral and intravenous contrast agents and rectally administered contrast or air, although regardless of the technique used the accuracy is high for depicting findings of acute diverticulitis [21,22]. Low-dose CT techniques can achieve radiation dose reduction of 75%–90% compared with that of standard-dose abdominal multidetector row CT, with similar sensitivity and specificity [23]. Intravenous and oral contrast may aid in delineation of abscesses. Prior to abdominal abscess drainage, imaging with administration of intravenous and enteric contrast may minimize the risk of nontarget catheter placement.

CT and/or CT fluoroscopy is also advantageous for guiding abscess drainage, particularly in cases in which collections are small and deep, in close proximity to vital structures, and located in regions that are difficult to access [24].

Ultrasound

Although most of the reported experience has been with CT, some authors advocate transabdominal sonography as an alternate technique for evaluating patients with suspected diverticulitis. Graded-compression sonography is reported to have a sensitivity of 77%–98% and a specificity of 80%–99% in diagnosing diverticulitis [25]. One meta-analysis study suggested that graded-compression US and CT are both effective initial diagnostic tools but that CT is more likely to reveal alternative diagnoses for left lower quadrant pain, with sensitivity for alternate diagnoses ranging between 33% and 78% for US and between 50% and 100% for CT [26]. In a direct comparison of CT to US, one study reported a sensitivity of CT in detecting diverticulitis to be significantly higher than that of US: 81% versus 61% (P=0.048), with CT missing fewer cases than US [27]. Transvaginal sonography is of particular value when left lower quadrant pain and fever occurs in women of childbearing age. In this setting, gynecologic processes such as ectopic pregnancy and pelvic inflammatory disease are also important diagnostic considerations. Sonography is therefore an excellent choice for the initial imaging of this patient population. CT may be used when US is equivocal, when a nongynecologic etiology is suspected to be the cause of low abdominal pain, or when a global view of a gynecologic disease process is needed [28,29]. Graded-compression sonography for diverticulitis is a technique that is highly operator dependent, requiring a high level of expertise. US for diverticulitis is not widely used in the United States [26,30]. Sonography is also much more dependent on body habitus than CT or MR.

US guidance for abscess drainage may be appropriate for larger and more superficial collections and provides the best visualization of direct needle advancement, septations, loculations, adjacent vascular structures, and pelvic collections via a transrectal or transvaginal approach. An inherent disadvantage is the inability of US to penetrate extensive overlying soft tissue or air-filled structures [24].

Magnetic Resonance Imaging

The role of MRI in the setting of left lower quadrant pain has been evaluated, and preliminary data suggest that it may have diagnostic potential in patients with suspected diverticulitis, with reported sensitivity of 86%–94% and specificity of 88%–92% [3-6]. The findings for MRI are similar to those for CT, including demonstration of complications of diverticulitis, noting extraluminal air may be a subtle finding on MRI [5,31]. There is a potential role for MRI in imaging younger patients with recurrent episodes of known or suspected diverticulitis in order to reduce radiation exposure, although it has not been systematically evaluated to our knowledge. The feasibility of this modality for the workup of acute left lower quadrant pain deserves consideration.

Special Considerations

Diverticulitis and Colon Cancer

Finally, it should be recognized that perforated colon cancer can mimic both the clinical and radiographic findings of diverticulitis. CT findings that suggest colon cancer rather than diverticulitis include the presence of pericolic lymphadenopathy (1 cm) with or without pericolic edema. The literature suggests that likelihood of occurrence of colon cancer is higher when abscess, local perforation, or fistula is identified [32]. When there are inflammatory changes, edema in the root of the sigmoid mesentery, and no pericolic lymphadenopathy adjacent to a segment of thickened colon wall, the most likely diagnosis is diverticulitis [33]. In patients with a CT diagnosis of diverticulitis, the prevalence of colon cancer more closely approximates the prevalence of colon cancer in the asymptomatic general population than in the symptomatic population. Routine colonoscopy after a CT diagnosis of acute left-sided diverticulitis is not warranted, with the exception of age-appropriate and clinically indicated colon cancer screening [11]. For patients with findings suspicious for colon cancer on CT, colonoscopy is the preferred examination. In the future, less invasive examinations may become clinically relevant, including quantitative CT perfusion studies [34], diffusion-weighted MRI, and MR colonography [35,36].

Use of Oral and Rectal Contrast Media for CT

A retrospective review found no significant difference in the ability to correctly diagnose a suspected acute abdominal process when enhanced CT imaging was compared to unenhanced, with intravenous contrast alone the most frequent technique, followed by intravenous and oral contrast [22]. Although contrast practices for abdominal/pelvic CT vary nationally, rectal contrast is rarely used [37]. One study found the presence of perianastomotic air a reliable marker of anastomotic leaks at multidetector CT, and leakage of rectal contrast medium highly accurate and increasing confidence of diagnosis in evaluating colonic staple line leaks [38]. Rectal contrast may have a limited role in evaluating for perforation or for leak after surgical intervention.

Summary

- CT is now nearly universally used as the primary imaging examination for evaluating acute sigmoid and/or descending colon diverticulitis because of its high overall accuracy and its ability to reveal the presence and extent of extracolonic disease that might warrant percutaneous catheter drainage or surgery.
- Abdominal radiography and barium enema play far less substantial roles and should not be used as the primary modality for the diagnosis.
- US has limitations in depicting diverticulitis and alternative diagnoses. Image-guided percutaneous drainage may be performed with US or CT in the appropriate clinical setting.
- MRI, although potentially effective in the diagnosis of diverticulitis, is not widely used for this purpose at present. No large prospective studies to our knowledge have compared MRI with CT in the diagnosis of diverticulitis.

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.

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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.