

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

Clinical Condition: Suspected Small Bowel Obstruction

Variant 1: Suspected complete or high-grade partial SBO.

Radiologic Procedure	Rating	Comments	RRL*
CT abdomen and pelvis without oral contrast with IV contrast	8		High
X-ray abdomen supine and upright	7		Med
CT abdomen and pelvis with oral water soluble contrast with IV contrast	5	Positive contrast in the bowel can obscure the etiology of the obstruction and enhancement of the mucosal bowel lumen.	High
CT abdomen and pelvis with oral dilute barium contrast with IV contrast	5	Positive contrast in the bowel can obscure the etiology of the obstruction and enhancement of the mucosal bowel lumen.	High
CT enterography with IV and water or water density contrast	4		High
CT enteroclysis	4		High
X-ray small bowel follow-through	4		Med
X-ray small bowel enteroclysis	4		Med
MRI abdomen	4		None
US abdomen	2		None
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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Clinical Condition:**Suspected Small Bowel Obstruction****Variant 2:****Suspected intermittent or low-grade SBO.**

Radiologic Procedure	Rating	Comments	<u>RRL*</u>
CT abdomen and pelvis with oral water soluble contrast with IV contrast	7	All are equally acceptable choices dependent on institutional preference and available resources.	High
CT abdomen and pelvis with oral dilute barium contrast with IV contrast	7	All are equally acceptable choices dependent on institutional preference and available resources.	High
CT enterography with IV and water or water density contrast	7	All are equally acceptable choices dependent on institutional preference and available resources.	High
CT enteroclysis	7	All are equally acceptable choices dependent on institutional preference and available resources.	High
X-ray small bowel follow-through	7	All are equally acceptable choices dependent on institutional preference and available resources.	Med
X-ray small bowel enteroclysis	7	All are equally acceptable choices dependent on institutional preference and available resources.	Med
X-ray abdomen supine and upright	5		Med
CT abdomen and pelvis without oral contrast with IV contrast	4		High
MRI abdomen	4		None
US abdomen	2		None
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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SUSPECTED SMALL BOWEL OBSTRUCTION

Expert Panel on Gastrointestinal Imaging: Pablo R. Ros, MD, MPH¹; James E. Huprich, MD²; Robert L. Bree, MD, MHSA³; W. Dennis Foley, MD⁴; Spencer B. Gay, MD⁵; Seth N. Glick, MD⁶; Jay P. Heiken, MD⁷; Marc S. Levine, MD⁸; Max Paul Rosen, MD, MPH⁹; William P. Shuman, MD¹⁰; Frederick L. Greene, MD.¹¹

Summary of Literature Review

There is no single generally accepted approach to evaluate patients with suspected small bowel obstruction (SBO). This, in part, reflects not only the differing perspectives of investigators who have written on the topic (surgeons and radiologists) but also the increasing application of sophisticated imaging studies. The diagnostic approach also depends upon the clinical presentation, ie, acute high-grade vs low-grade or intermittent [1].

Plain film radiography has been the traditional starting point for imaging evaluation of suspected SBO. It must be conceded, however, that studies testing the utility of plain film have yielded quite disparate results [2-5]. While some investigators report 80%-90% success in diagnosing SBO using radiographs [5], an overall accuracy equal to that of computed tomography (CT) [6], others have achieved rates only in the 30%-70% range [3,4,6]. In some even less encouraging studies, abdomen films have proved to be of little to no help in assessing the site or cause of SBO [6,7], or even to be misleading in 20%-40% of patients [3].

In light of these inconsistent results, it is reasonable to expect that abdomen radiographs will not be definitive in many patients with suspected SBO. In such a setting, gastrointestinal contrast studies (small bowel follow-through (SBFT), enteroclysis, barium enema) or cross-sectional imaging studies (CT, ultrasound (US), magnetic resonance imaging (MRI)) are options.

The single contrast barium enema with attempted reflux into the distal ileum can exclude colonic obstruction and may occasionally aid in distinguishing SBO from an adynamic ileus [9,10]. It is unreliable, however, for localizing and characterizing the site of SBO [9,11], as well as for identifying patients who will need surgery [11].

Opinion is divided on the usefulness of SBFT with orally administered barium. Some investigators have found this study useful for management of suspected SBO in 68%-100% of cases [10-12]. Because SBFT suffers from nonuniform small bowel filling, inability to test distensibility, and limitations posed by intermittent fluoroscopy, some authorities argue that enteroclysis is the appropriate examination in problematic SBO cases [9,13,14].

Methods of examination that challenge the distensibility of the small bowel, such as standard or CT enteroclysis, offer improved sensitivity and specificity over standard barium small bowel and CT exams in evaluating suspected intermittent or low-grade small bowel obstruction [1,3,9,15,16]. Evidence is compelling that enteroclysis is highly reliable in pinpointing sites of low- and high-grade obstruction [13,17,18], as well as in distinguishing adhesions from obstructing neoplasms [13]. CT enteroclysis (CT-E) should be considered as an alternative, especially in patients with a history of malignancy [1]. Enteroclysis has low patient acceptance and is dependent on the skill of the radiologist performing the examination.

CT enterography does not require intubation of the small bowel and therefore has greater patient acceptance and is less dependent on the technical skill of the radiologist. CT enterography with a water density contrast agent offers an alternative to CT enteroclysis, particularly where there is reluctance to use pharmacologic manipulation of small bowel activity. This is particularly true in patients with partial or intermittent small bowel obstruction. Its clinical usefulness in this clinical scenario has not yet been convincingly established, however.

Evaluation of suspected small obstruction with oral water-soluble contrast agents is controversial. Some authors point out that this technique is disadvantageous because of the potential for intravascular volume depletion and electrolyte imbalance, plus the poorer imaging characteristics as compared with barium [9,20]. Others have found both low osmolar and high osmolar water-soluble agents to be useful in diagnosis, amelioration, and management of small bowel obstruction [21-24]. Their stance is bolstered by reports of admittedly rare complications with barium studies, such as conversion from partial to complete obstruction [25]. A randomized controlled study concluded that water-soluble contrast administration was not useful in the management of these patients [26].

Convincing studies have confirmed the usefulness of the standard CT examination in suspected high-grade SBO. Diagnostic accuracy of more than 90% has been reported [4,5,27], with success in distinguishing SBO from ileus

¹Co-Author, Brigham & Women's Hospital, Boston, Mass; ²Co-Author, Mayo Clinic, Rochester, Minn; ³Panel Chair, Radia Medical Imaging, Everett, Wash; ⁴Froedtert Hospital East, Milwaukee, Wis; ⁵University of Virginia Health Science Center, Charlottesville, Va; ⁶Presbyterian Medical Center, Philadelphia, Pa; ⁷Mallinckrodt Institute of Radiology, St. Louis, Mo; ⁸Hospital of the University of Pennsylvania, Philadelphia, Pa; ⁹Beth Israel Hospital, Boston, Mass; ¹⁰University of Washington, Seattle, Wash; ¹¹Carolinas Medical Center, Charlotte, NC, American College of Surgeons;

Reprint requests to: Department of Quality & Safety, American College of Radiology, 1891 Preston White Drive, Reston, VA 20191-4397.

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[28] and in identifying the cause of obstruction [3,27]. Patients with suspected high grade obstruction do not require additional oral contrast medium since the fluid in the bowel provides adequate contrast. Low-grade obstruction is a relative “blind spot” for standard CT. One study demonstrated correct diagnosis in fewer than half of such cases [15]. Newer multidetector (MDCT) scanners with MPR capabilities have been noticeably more effective in evaluating SBO and other abdominal pathology, particularly when coronal reconstructions are added. CT is an excellent means of detecting complications of bowel obstruction such as ischemia and strangulation [29-33].

Largely because of the success of enteroclysis and CT in diagnosing and characterizing SBO, US has been used rarely in the United States; therefore data are scanty. In skilled hands, sonography has been reported to have a nearly 90% success rate in diagnosing SBO [7,34-36]. In the pediatric age group, sonography has proven useful in evaluating intussusception [18], midgut volvulus [37], and other causes of SBO [38]. CT proved superior to US in one study [39].

Increasing evidence supports MRI’s capability to detect and characterize SBO [40-43]. Because of its higher cost and convincing lack of incremental diagnostic gain as compared with CT, MRI should not be used routinely for evaluating suspected SBO. Pregnant patients are a particularly good population to offer MRI for SBO.

Conclusions

Standard CT has emerged as the preeminent imaging modality for the evaluation of SBO and should be considered in the initial evaluation of patients with suspected high-grade SBO. The barium enema and small bowel examination play a less significant role and should not be used as a primary modality in the diagnosis of acute small bowel obstruction.

If intermittent or low-grade small bowel obstruction is a chief diagnostic concern, standard or CT-E is appropriate [1,3,15,16]. CT-E offers several advantages over standard CT and enteroclysis techniques, but its role in evaluation of small bowel obstruction is unclear at this time.

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. 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

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