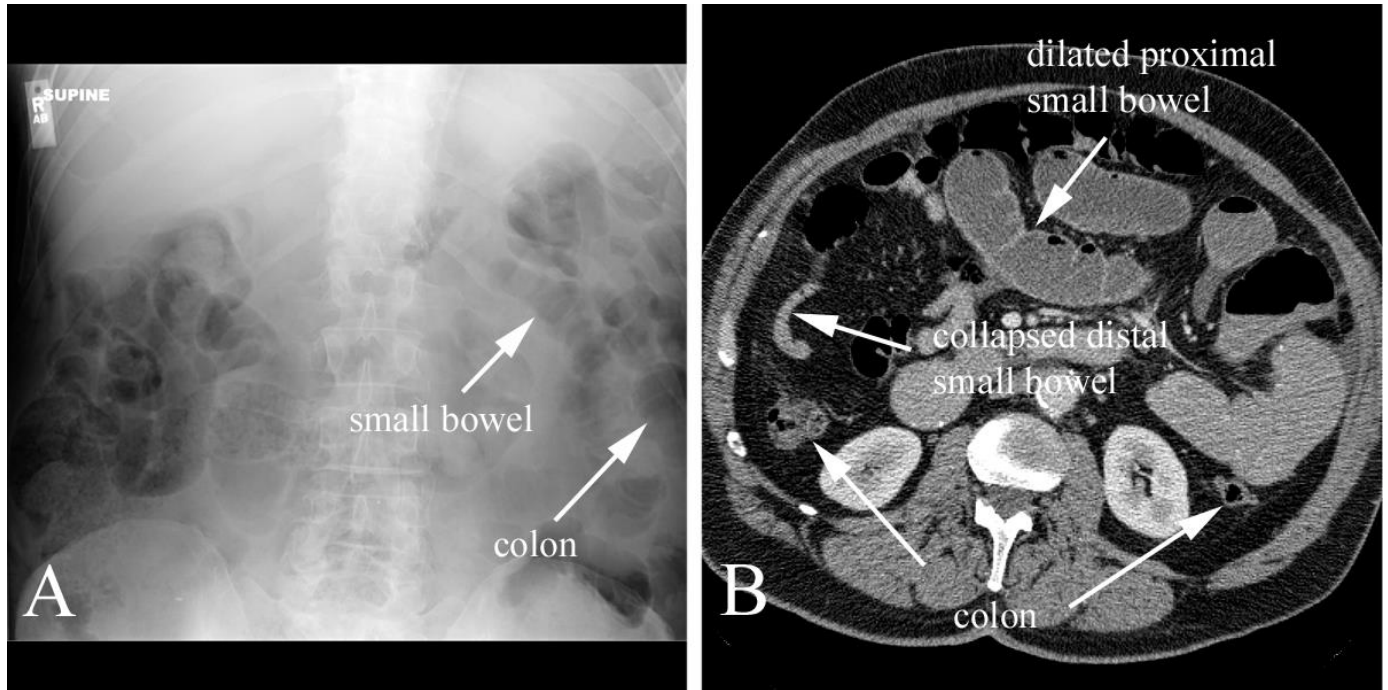


CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION



A 63 year old man presents with increasing abdominal pain which started approximately 20 hours ago. As the pain has progressed, the patient's abdomen has become distended and he has had no passage of gas or feces for the past two days. He denies nausea and vomiting. Five weeks ago, he underwent open surgery for repair of an abdominal aortic aneurysm. Plain films (panel A in the above figure) are nonspecific, with air containing small bowel loops but also material in the colon. A CT study (panel B in the above figure) demonstrates dilated proximal small bowel loops with collapsed distal small bowel loops, but also showed some residual material in the colon, compatible with an early versus incomplete small bowel obstruction. For a discussion of evaluation of abdominal pain and distension, please see Radiology Quiz of the Week #028 (07/09/2011).

Which further imaging study may be of benefit for this patient?

- (a) upper gastrointestinal (UGI) study performed with barium
- (b) ultrasound of the abdomen
- (c) magnetic resonance imaging of the abdomen and pelvis
- (d) small bowel challenge test performed with water-soluble contrast material

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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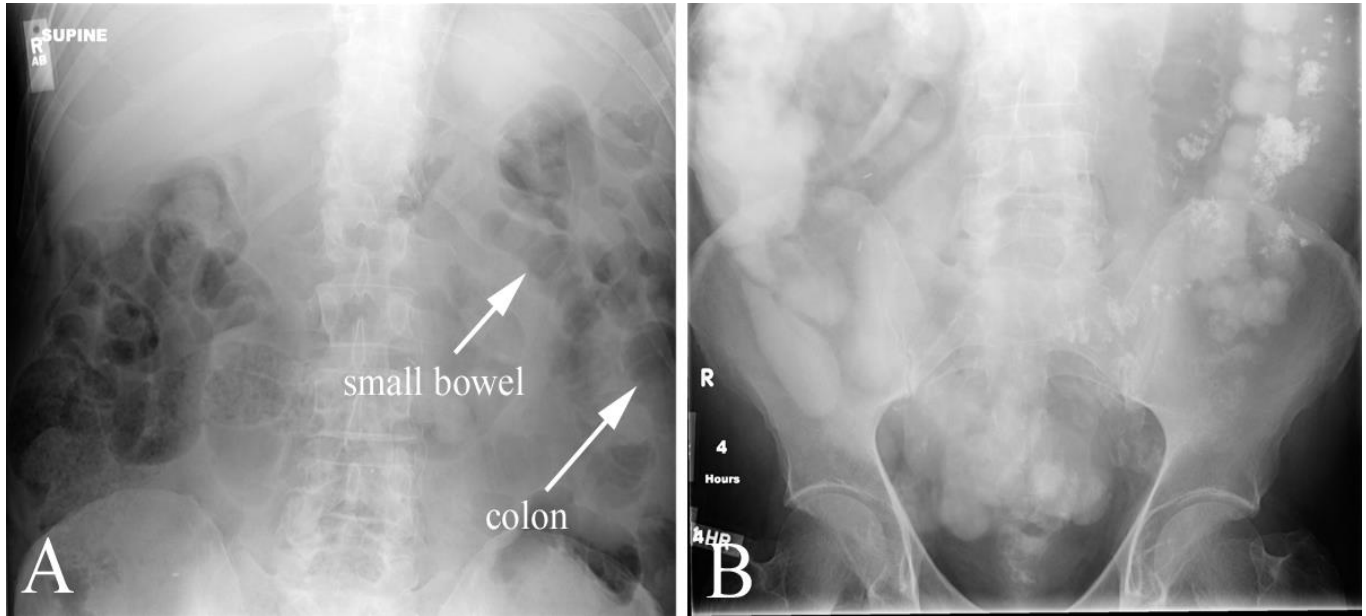
Which further imaging study may be of benefit for this patient?

- (a) upper gastrointestinal (UGI) study performed with barium
- (b) ultrasound of the abdomen
- (c) serial computed tomography of the abdomen and pelvis
- (d) small bowel challenge test performed with water-soluble contrast material

Answer: (d), small bowel challenge test performed with water-soluble contrast material. Patients with small bowel obstruction from adhesions present a difficult challenge and generally require surgical consultation. The surgeon may order a "Gastrografin® challenge test" to evaluate whether the patient has a partial small bowel likely to resolve with conservative treatment *versus* a complete small bowel obstruction requiring operative intervention. See below for further discussion of this test.

Upper gastrointestinal (UGI) study performed with barium was, many years ago, a popular examination for evaluation of epigastric or upper abdominal pain of unknown cause. While the examination could and did show ulcers, masses, and other abnormalities, it has been largely supplanted by endoscopy for evaluation of the gastric mucosa. UGI is not the appropriate study in this case, and (a) is incorrect. Ultrasound of the abdomen is the study of choice for suspected biliary colic/right upper quadrant pain, but ultrasound of the abdomen is not particularly effective in diagnosing obstruction, or the various causes of obstruction, and (b) is incorrect. Magnetic resonance imaging of the abdomen is usually reserved for evaluation of problem patients when ultrasound or CT is nondiagnostic, and (c) is incorrect.

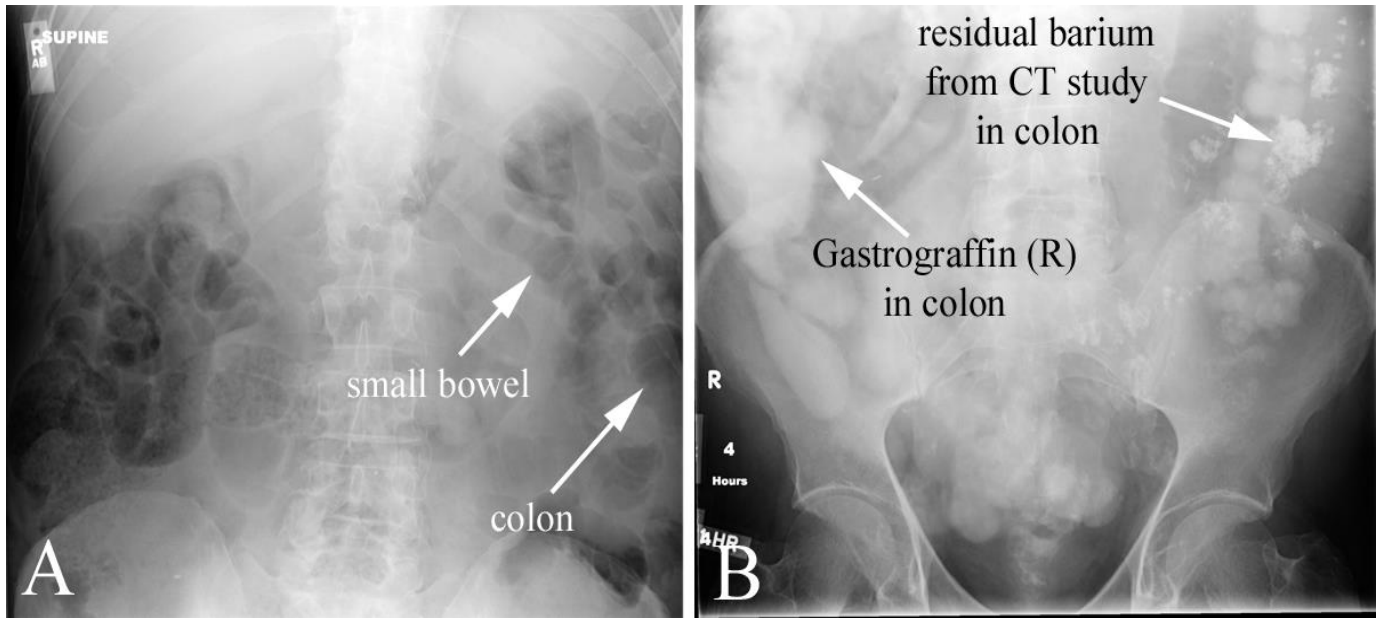
IMAGING STUDY AND QUESTIONS



Imaging questions:

- 1) The left panel (A) is the patient's abdominal plain film at the time of presentation (shown on page 1). What type of study is shown in panel B, above?
- 2) Are there any abnormalities?
- 3) What is the most likely diagnosis?
- 4) What is the next step in management?

IMAGING STUDY QUESTIONS AND ANSWERS



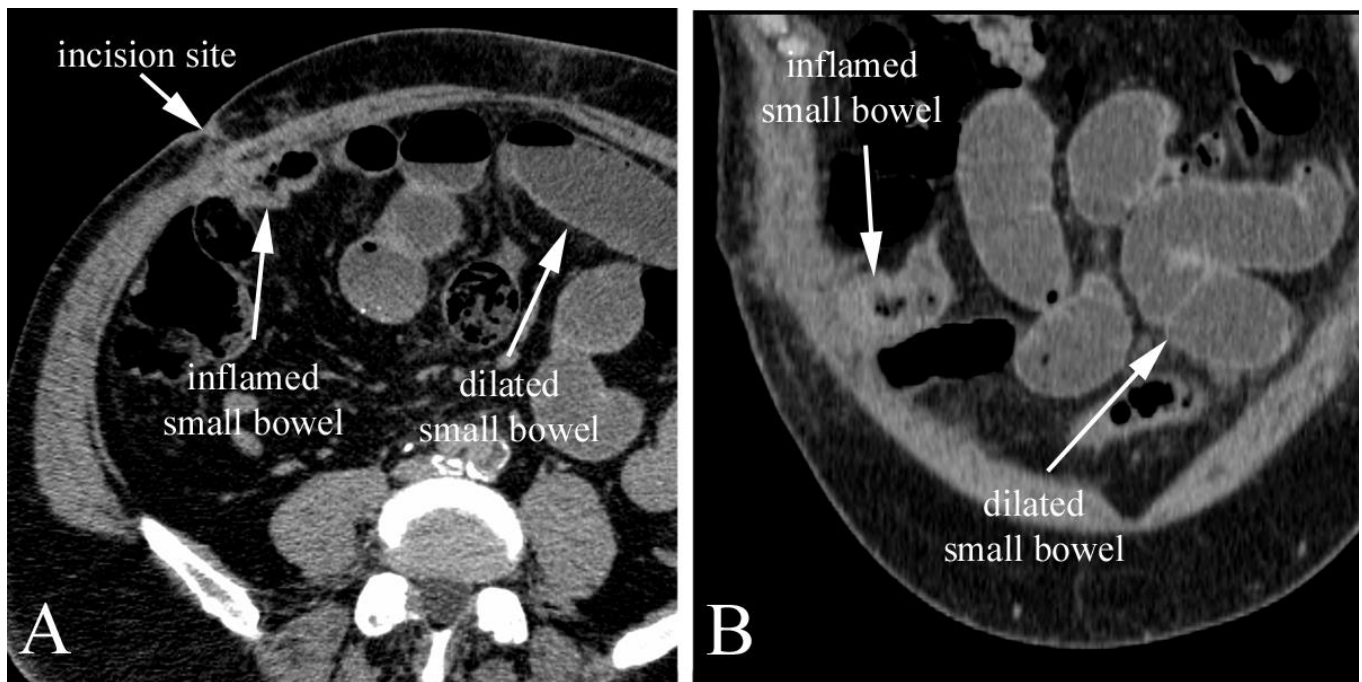
Answers to imaging questions:

- 1) The left panel (A) is the patient's abdominal plain film at the time of presentation (shown on page 1). What type of study is shown in panel B, above? A Gastrografin® challenge test. This examination is performed by oral (or nasogastric tube) administration of 100 cc of the hyperosmolar contrast agent Gastrografin®, with sequential plain films of the abdomen taken following the examination. In cases of complete small bowel obstruction, contrast material will stay in the small bowel and not reach the large bowel. In incomplete small bowel obstruction, the contrast material reaches the small bowel in 24 hours or less. Panel A is the supine plain film obtained at the time of admission, and panel B was obtained 4 hours following administration of 100 cc of oral Gastrografin®.
- 2) Are there any abnormalities? No. The Gastrografin® contrast material is in the colon, indicating that the patient does *not* have a complete small bowel obstruction, and therefore the patient's partial small bowel obstruction will likely resolve with conservative management.
- 3) What is the most likely diagnosis? Partial small bowel obstruction from post-op adhesions.
- 4) What is the next step in management? The patient had already been referred to a surgeon, who ordered the Gastrografin® challenge test.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

Shortly after the 4 hour film taken above, the patient had a return of his appetite and bowel movements. He was pain free and his abdominal distension relented. He had no further bouts of similar symptoms.

Bonus images:



63 year old man with increasing abdominal pain and distension five weeks following open surgery for an abdominal aortic aneurysm. A. Axial CT shows dilated proximal small bowel loops, the incision site on the abdominal wall, and a thick walled, inflamed loop of bowel adjacent to the incision compatible with an adhesion. B. Coronal CT shows the same features. This demonstrates the advantage of CT over plain films in evaluation of patients with suspected small bowel obstruction: it can demonstrate the site and cause of the obstruction in patients.

SUMMARY

Presenting symptom: When abdominal pain is accompanied by abdominal distension and lack of bowel movements or flatus, especially in the setting of prior abdominal surgery, obstruction needs to be considered as a possible cause.

Imaging work-up: As noted Radiology Quiz of the Week #028 (7/9/2011), CT examination is the study of choice for “abdomen pain plus” where the “plus” suspected obstruction. Some authorities may list plain film evaluation as the initial examination of choice for abdominal pain when obstruction is suspected, and a plain film was obtained in this case. CT is far better at demonstration of both dilated proximal and collapsed distal small bowel and the transition point between them (see “Bonus image” on page 5). Once the diagnosis of small bowel obstruction has been established using CT, it is important to know whether the patient will resolve spontaneously or need to undergo surgery. This decision is generally made by a surgeon, and the surgeon may order a Gastrografin® challenge test. This test consists of oral administration of 100 cc of the hyperosmolar contrast agent Gastrografin® followed by radiographic examination (typically done at 4, 8, and 24 hours after administration). A normal result, associated with resolution of symptoms and no need for surgery, is the appearance of contrast material in the large bowel within 24 hours. An abnormal result, associated with a need for surgery, is no contrast material in the large bowel in 24 hours. Of course, severely ill patients will likely be taken to the operating room without the need for this test. Incidentally, some literature supports a therapeutic as well as a diagnostic role for the Gastrografin® challenge test (see El Lithey et al), but others deny this (see Abbas et al).

Establishing the diagnosis: CT and Gastrografin® challenge test in this case allowed the diagnosis of transient, incomplete small bowel obstruction. If the Gastrografin® challenge test had been positive (that is, if the contrast had not reached the large bowel in 24 hours), then the patient would likely have gone to the operating room and the diagnosis established by surgery.

Take-home message: CT examination is the study of choice for imaging “abdomen pain plus” where the “plus” represents possible obstruction (see Radiology Quiz of the Week #28 (7/9/2011)). In cases where the small bowel obstruction may be transient or partial, a Gastrografin® challenge test may be of benefit.

FURTHER READING

Abbas SM, Bissett IP, Parry BR et al. Meta-analysis of oral water-soluble contrast agent in the management of adhesive small bowel obstruction. *Br J Surg* 2007;94:404-411

El Lithy R, Morshed M, Yaakub J et al. Diagnostic and therapeutic benefits of oral Gastrografin® in adhesive intestinal obstruction. *Egyptian J Surg* 2011;30:62-68.

Renfrew, DL. “First Step” Imaging of Gastrointestinal Symptoms. Chapter 7 of Symptom Based Radiology, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.

Silva AC et al. Small bowel obstruction: what to look for. *RadioGraphics* 2009; 29:423-439.

For additional quiz cases and information, please visit www.symptombasedradiology.com