

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 42 year old man comes to the outpatient clinic with left lower quadrant pain of approximately 20 hours duration which has gradually increased in intensity since onset. The patient demonstrates tenderness in the left lower quadrant with guarding. Bowel sounds are normal and there is no flank pain. He has had no nausea or vomiting, and his bowel habits are basically normal and unchanged. Lab results include an elevated white blood cell count at 18,600 with 86% neutrophils.

Which imaging study is most appropriate for this patient?

- (a) plain films of the abdomen
- (b) ultrasound of the abdomen
- (c) computed tomography of the abdomen and pelvis
- (d) magnetic resonance imaging of the abdomen and pelvis

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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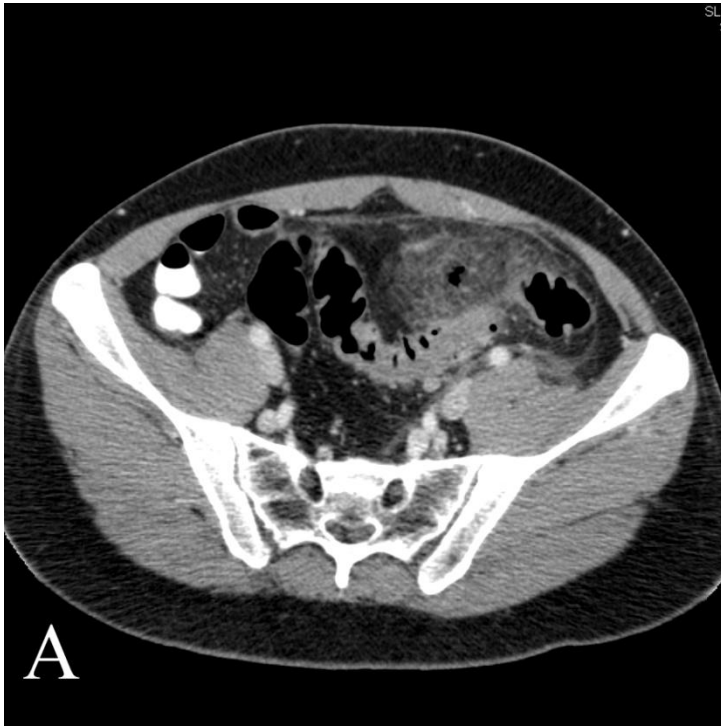
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Answer: (c), computed tomography of the abdomen and pelvis, is the correct answer. CT examination is the study of choice for “abdomen pain plus” where the “plus” represents inflammation (fever, elevated white count, rebound tenderness, peritoneal signs), suspected obstruction (distension with nausea/vomiting), and weight loss.

Plain films of the abdomen are generally of little utility in the evaluation of abdominal pain, with the possible exception of suspected obstruction. Even when obstruction is suspected, a plain film may be false-negative if the distended bowel loops are filled with fluid, and even if the plain film shows abnormal air-distended small bowel loops, a CT is often done to evaluate the location and cause of obstruction. Therefore, (a) is incorrect. Ultrasound of the abdomen is the study of choice for suspected biliary colic, but is not nearly as effective in diagnosing causes of abdominal pain originating in the other quadrants, 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 (d) is incorrect.

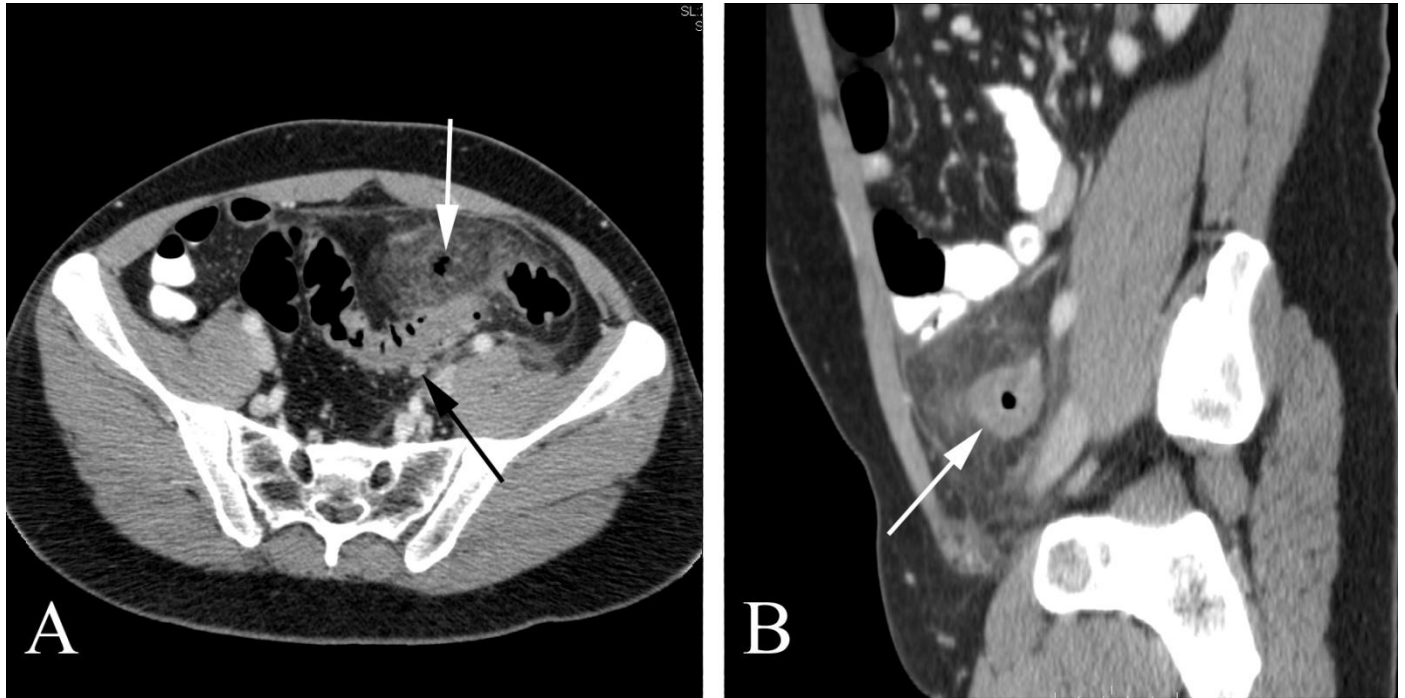
IMAGING STUDY AND QUESTIONS



Imaging questions:

- 1) What type of study is shown in the figure?
- 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



- 1) What type of study is shown in the figure? Computed tomography (CT) of the abdomen and pelvis, performed with oral and IV contrast material.
- 2) Are there any abnormalities? In A, an axial image, there is free intraperitoneal air (white arrow) surrounded by inflammatory changes in the fat adjacent to the sigmoid colon. The sigmoid colon has an abnormally thick wall along with diverticulae (black arrow). Note normal thickness bowel wall, as seen on other loops of bowel, is only a few mm. In B, a sagittal image, a white arrow points to the thick walled sigmoid colon seen “end on,” surrounded by inflammation in pericolic fat. The anatomy and abnormalities are much easier to see when using a workstation allowing rapid scrolling through a stack of images and/or off-axis reconstructions.
- 3) What is the most likely diagnosis? Diverticulitis.
- 4) What is the next step in management? Hospital admission for inpatient treatment with IV antibiotics, bowel rest, and surgical consultation.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP
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The patient was admitted to the hospital. With bowel rest and intravenous antibiotics his abdominal pain relatively rapidly subsided and his white count on the day after admission fell to 14,300. A surgical consultation was obtained. As was actually known at the time of the initial visit, the patient had a history of diverticulitis (this information was withheld from the initially provided patient information in this quiz for teaching purposes), and had undergone colonoscopy on a prior occasion (subsequent to resolution of a previous bout of diverticulitis, but before the present bout). The surgeon advised continued treatment with antibiotics with consideration for an elective resection of the diseased segment of the sigmoid colon when the patient's bowel was *not* acutely inflamed. Generally, operating when the bowel *is* acutely inflamed increases the risk of complications and often necessitates a "two stage" procedure: one stage wherein the diseased segment is removed and a temporary colostomy created, and a second stage wherein the colostomy is taken down and the bowel re-anastomosed. By operating on a noninflamed bowel electively, the diseased segment of sigmoid colon may be removed and the bowel reanastomosed during the same procedure.

SUMMARY

Presenting symptom: Left lower quadrant pain has multiple causes including diverticulitis, appendagitis epiploicae, and pyelonephritis. In many cases, such as this one, the patient's history is relatively straightforward. In this case, the history is classic for diverticulitis. The CT study was performed to confirm the diagnosis, and also to evaluate whether the patient had abscess formation which might require percutaneous or intra-operative drainage.

Imaging work-up: As noted on page 2, CT examination is the study of choice for "abdomen pain plus" where the "plus" represents inflammation (fever, elevated white count, rebound tenderness, peritoneal signs), suspected obstruction (distension with nausea/vomiting), and weight loss. An exception to this rule is if the pain is in the right upper quadrant, in which case biliary colic should be suspected, and right upper quadrant ultrasound should be performed (see Radiology Quiz of the Week #23). Whether the CT is to be performed with or without oral contrast, and with or without (or both) intravenous contrast, will vary widely from institution to institution, and is discussed in detail in the third reference listed below.

Establishing the diagnosis: The diagnosis of diverticulitis is typically made on the basis of classic CT findings when accompanied by abdominal pain. However, these patients do need to have colonoscopy performed to exclude underlying or co-existent neoplasm (as was done in this case). When the patient has repeated bouts of diverticulitis requiring repeated courses of antibiotics with or without hospitalization, surgical consultation with resection of the diseased segment will often be performed, and the diagnosis can then be confirmed on the basis of the surgically resected segment of bowel.

Take-home message: CT examination is the study of choice for imaging "abdomen pain plus."

FURTHER READING

Goldberg JE, Hodin RA. Appendicitis in adults. UpToDate, accessed 7/7/09.

Penner RM, Majumdar SR. Diagnostic approach to abdominal pain in adults. UpToDate, accessed 7/6/09.

Renfrew, DL. "First step" imaging of gastrointestinal symptoms. Chapter 6 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.