

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 36 year old man came to the outpatient clinic with left upper quadrant pain of approximately 10 hours duration which started at 1:30 A.M with relatively abrupt onset with a constant level of 5 to 6 on a 1 to 10 scale since. The patient had nausea but no vomiting. He has had renal stones in the past but states that the present pain is nothing like the pain he has had when passing renal stones. On physical examination, the patient is tender along the left side of the abdomen. Bowel sounds are normal and there is no flank pain. The patient's temperature is 98° F. Lab results included an elevated white blood cell count at 18,600 with 75% neutrophils.

Which imaging study is most appropriate for this patient?

- (a) plain films of the abdomen
- (b) upper gastrointestinal examination with barium
- (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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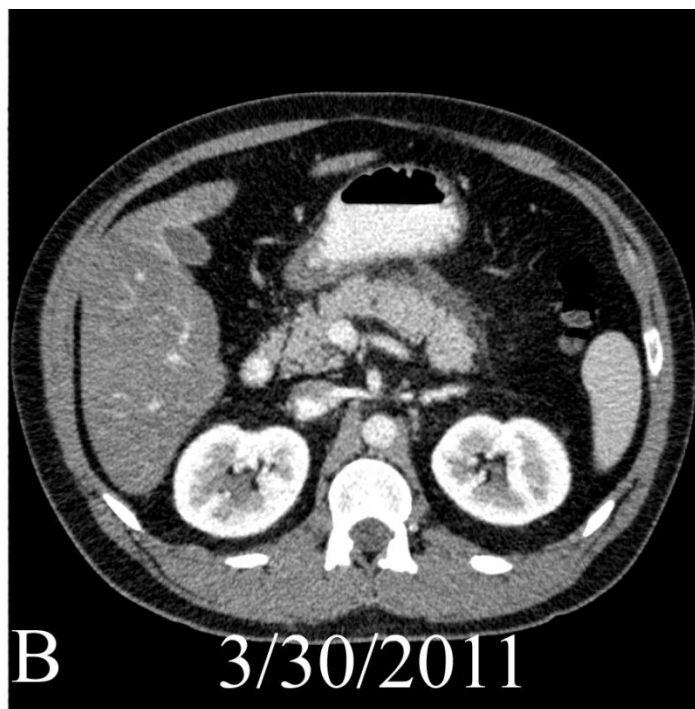
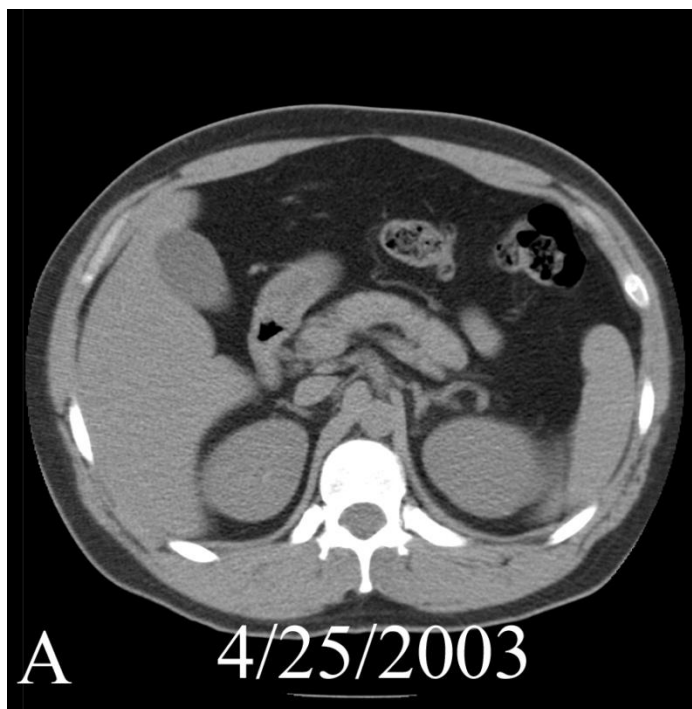
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Answer: (c), computed tomography of the abdomen and pelvis, is the correct answer. CT examination is the study of choice for “abdomen pain plus” where the “plus” represents inflammation (fever, elevated white count, rebound tenderness, peritoneal signs), suspected obstruction (distension with nausea/vomiting), and constitutional symptoms such as 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. Although once a mainstay of evaluation for evaluation of abdominal pain, the upper gastrointestinal exams are now rarely performed (having been largely supplanted by endoscopy), 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.

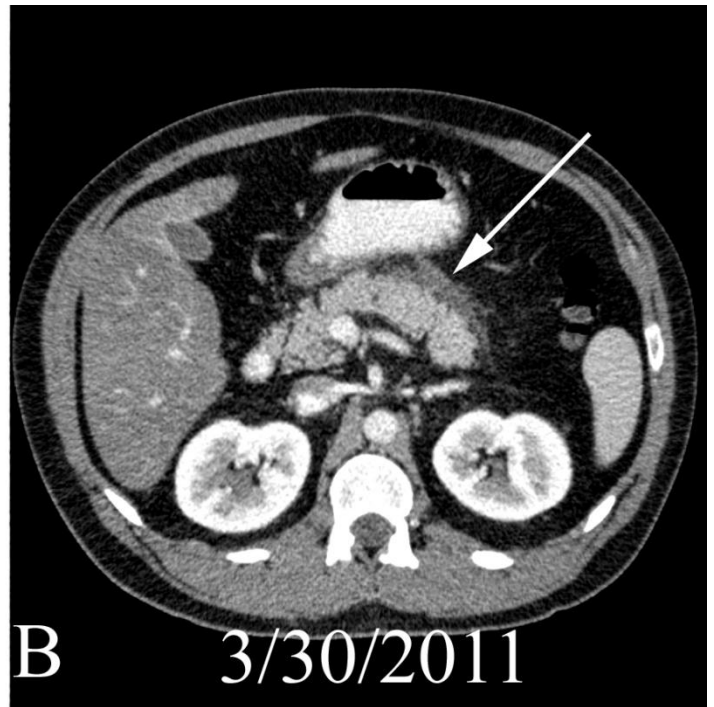
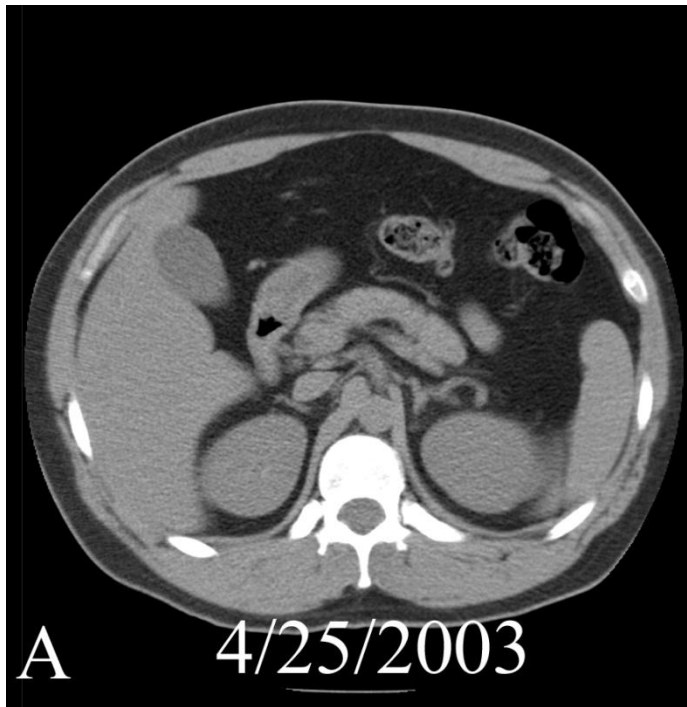
IMAGING STUDY AND QUESTIONS



Imaging questions:

- 1) What type of study is shown in the figures?
- 2) What is the difference between “A” and “B” (other than the date)?
- 3) Are there any abnormalities?
- 4) What is the most likely diagnosis?
- 5) What is the next step in management?

IMAGING STUDY QUESTIONS AND ANSWERS



Imaging questions:

- 1) What type of study is shown in the figures? CT scans of the abdomen. The study dated 4/25/2003 was done for a ureteral calculus (below the scan plane of the exam). The study done 3/30/11 was on the day of the clinic visit.
- 2) What is the difference between “A” and “B” (other than the date)? “A” was performed *without* oral or IV contrast material, and “B” was performed *with* both IV and oral contrast material.
- 3) Are there any abnormalities? In “B”, there is inflammation along the ventral surface of the pancreas (arrow), new from the prior study. Also, the liver is less dense than the spleen, something which is difficult to see in “A” but more conspicuous in “B”.
- 4) What is the most likely diagnosis? The inflammation along the pancreas likely represents pancreatitis, whereas the liver hypodensity likely represents fatty liver.
- 5) What is the next step in management? Determination of the cause of pancreatitis, with appropriate treatment directed toward this cause.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP
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Further laboratory evaluation (some of which was available prior to the CT scan, and some of which became available subsequently), included serum glucose of 276 and a hemoglobin A1C of 10.3. Upon further questioning, the patient denied any personal history of diabetes, but a screening program at his workplace had shown his blood glucose levels were high (according to the patient), although no further evaluation of this abnormality had been performed before the patient came in for evaluation of his abdominal pain. In addition, his serum sodium level was 118, which represented a “panic value” and resulted in the patient’s admission to the hospital. At the same time, his triglycerides were elevated at 1,091, his cholesterol was 670, and his HDL 33. The reported sodium level was probably inaccurately low because of hypertriglyceridemia. Amylase and lipase were both normal.

After admission and treatment with hydration and subcutaneous insulin, the patient’s glucose fell to 122 within 48 hours. He was educated regarding diabetes and started on medications including insulin, a statin, and a fibrate.

SUMMARY

Presenting symptom: Left upper quadrant pain has multiple causes including diverticulitis, appendagitis epiploicae, ulcer disease, splenic artery aneurysm, splenic infarction, and pancreatitis. In this case the patient also had significant elevation of the WBC count, and because of the combination of abdominal pain and suspected significant inflammation, a CT study was performed.

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 pancreatitis is generally based on the presence of typical midline or epigastric abdominal pain and elevated laboratory values of amylase or lipase, along with a clinical history of an inciting agent (such as alcohol or drugs). CT is usually *not* required to make the diagnosis, and is usually performed only to evaluate severe cases. In severe cases, CT may delineate abscess cavities which need to be drained and also assess frank pancreatic infarction (which has a poor prognosis). In this case, pancreatitis was not suspected prior to the CT study. No gallstone or duct distension was seen to suggest gallstone pancreatitis, and no abscess or pancreatic infarction was identified. The CT changes of peripancreatic inflammation, the elevated serum triglyceride level and lack of any specific causative agent (e.g., alcohol) established the diagnosis of hypertriglyceridemia-induced acute pancreatitis. While the pain of pancreatitis is what brought the patient to attention at the time of his visit, his larger problem is probably diabetes.

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

FURTHER READING

Gelrud, A, Whitcomb DC. Hypertriglyceridemia-induced acute pancreatitis. UpToDate, accessed 4/18/11.

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 7 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.