

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 47 woman presents with an episode of right upper quadrant pain. She has had several such episodes through the past six years. These episodes are increasing in frequency and severity and now occur approximately twice every month. The patient has bloating and nausea during the episodes, but no vomiting. The episodes last several hours with the pain lingering for up to a few days, but she is asymptomatic between episodes. On physical examination, the patient has mild right upper quadrant tenderness without rebound, guarding, or rigidity. Her abdomen is soft with normal bowel sounds. Laboratory results include a normal comprehensive metabolic panel including ALT, AST, alkaline phosphatase, lipase, and amylase. The patient's CBC is normal including a normal WBC count. A right upper quadrant ultrasound is normal.

Given the patient's clinical history and the normal ultrasound study, which additional imaging study would be most helpful in further evaluation?

- (a) plain films of the abdomen
- (b) nuclear medicine hepatobiliary study
- (c) CT examination of the chest, abdomen, and pelvis
- (d) magnetic resonance imaging of the abdomen

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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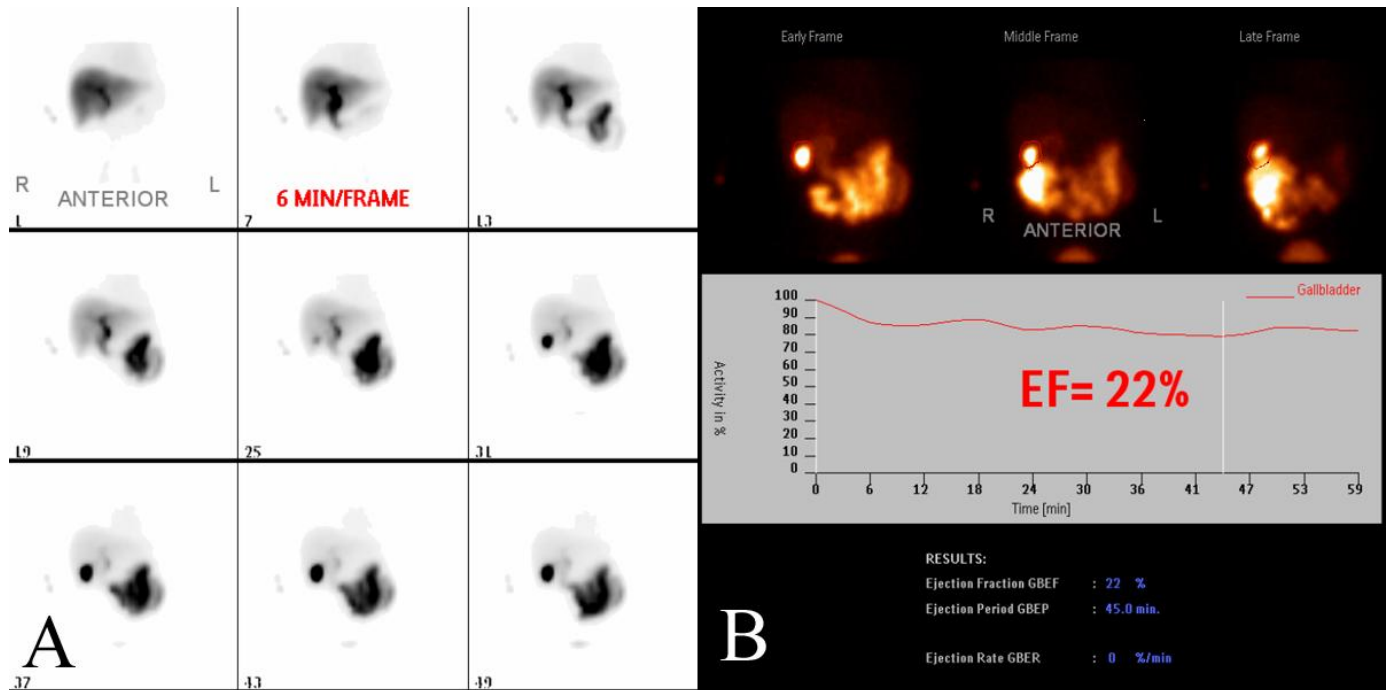
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Answer: (b), nuclear medicine hepatobiliary study. The patient's pain suggests hepatobiliary disease, but her laboratory results and ultrasound study are negative. In this situation, one possible diagnosis is hepatobiliary dyskinesia, best evaluated with a hepatobiliary scan.

Plain films of the abdomen are generally of little utility in the evaluation of right upper quadrant pain, particularly when a negative ultrasound study has already been performed. Therefore, (a) is incorrect. CT examination of the chest, abdomen, and pelvis would not further evaluate suspected biliary colic or biliary dyskinesia, and (c) is incorrect. Magnetic resonance imaging of the abdomen is generally used as a trouble-shooting examination when other studies are negative. When biliary disease is suspected, magnetic resonance cholangiopancreatography (MRCP) may be performed when there is a cholestatic pattern of enzyme abnormalities when there is a contraindication to endoscopic retrograde cholangiopancreatography (ERCP), but the patient does not have enzyme abnormalities, and (d) is incorrect.

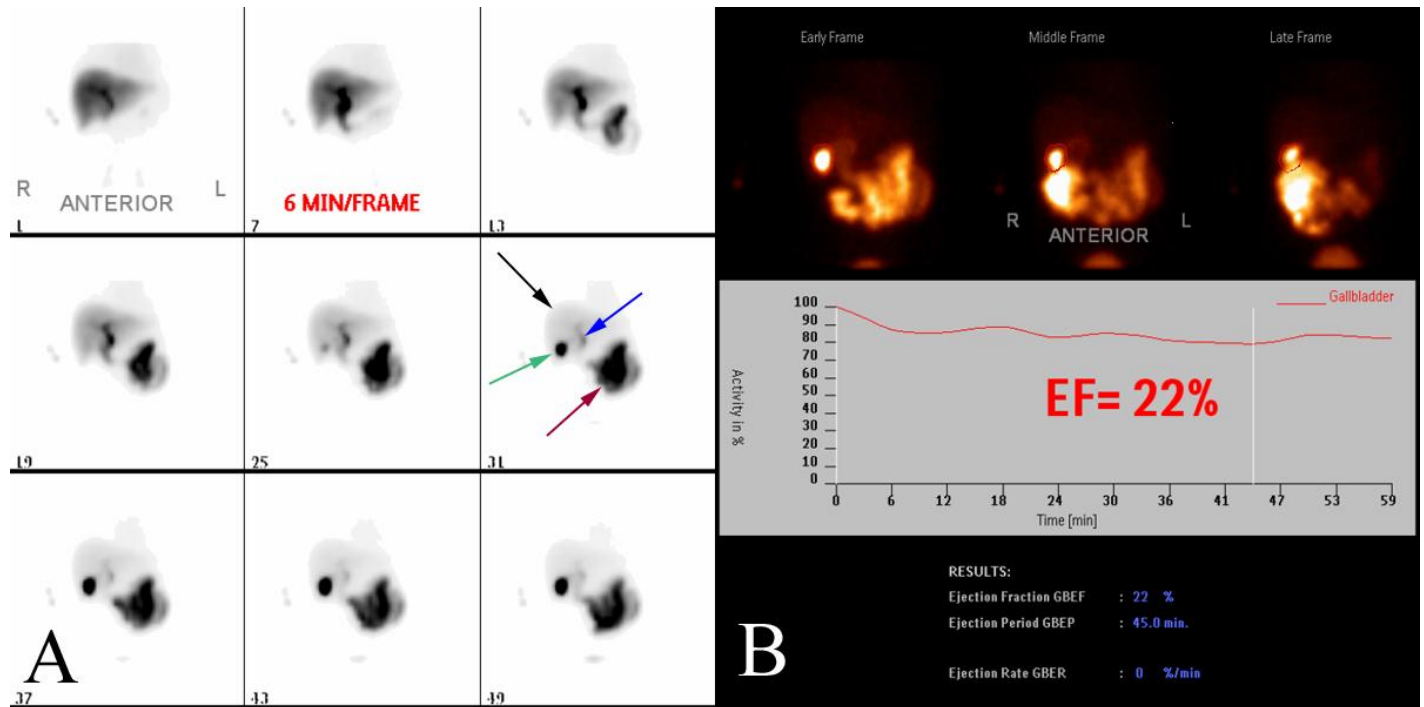
IMAGING STUDY AND QUESTIONS



Imaging questions:

- 1) What type of study is shown?
- 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



Imaging questions and answers:

- 1) What type of study is shown? A nuclear medicine hepatobiliary study. A. Sequentially obtained images, each acquired using six minutes of recording from a gamma camera able to detect the radiotracer injected into the patient at time 0. B. Images and graph obtained following injection of cholecystokinin, demonstrating the fraction of radiotracer material ejected from the gallbladder as a function of time.
- 2) Are there any abnormalities? Yes, there is a diminished ejection fraction. A (in the image labeled “31”) demonstrates the liver (black arrow), biliary tree (blue arrow), gallbladder (green arrow), and small bowel (red arrow) within one hour, which is normal. However, B shows a diminished ejection fraction of 22%. A normal ejection fraction value for this study would be a minimum of 40%.
- 3) What is the most likely diagnosis? Biliary dyskinesia.
- 4) What is the next step in management? Referral to a general surgeon for consultation regarding options for management of biliary dyskinesia.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP
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The patient was seen by a surgeon who took a history, performed a physical examination, and reviewed all the patient's records including laboratory data and images. The surgeon discussed the risks and benefits of laparoscopic cholecystectomy with the patient. The patient subsequently underwent laparoscopic cholecystectomy without complication. Evaluation of the resected gallbladder demonstrated chronic cholecystitis and cholesterosis. [The patient had no further episodes of right upper quadrant pain. - *note to KS – I do not have documentation in Meditech regarding this last statement, but assume you've seen the patient back in your office? –Thanks! DR*]

SUMMARY

Presenting symptom: The patient had typical features of biliary colic.

Imaging work-up: The initial study of choice for evaluation of biliary colic is a right upper quadrant ultrasound. Right upper quadrant ultrasound is sensitive, specific, and accurate for detection of gallstones and can also determine the caliber of the biliary tree and evaluate the liver, pancreas, and right kidney. In cases (such as this one) when the right upper quadrant ultrasound is normal but the patient has symptoms of biliary colic, enzyme abnormalities may be helpful to direct further workup, depending on whether there is a hepatocellular or cholestatic pattern of abnormality (see the 3rd and 4th references listed below). This patient did not have any enzyme abnormalities or blood work features suggesting acute inflammation. In such cases, nuclear medicine hepatobiliary evaluation performed with cholecystokin (a naturally occurring peptide which normally causes prompt gallbladder contraction) may be helpful in further evaluation. A diminished ejection fraction in such studies is compatible with the diagnosis of biliary dyskinesia.

Establishing the diagnosis: Biliary dyskinesia may also be referred to as “sphincter of Oddi dysfunction” or any of multiple additional terms, such as “papillary stenosis,” “sclerosing papillitis,” and “biliary spasm.” As is often the case when multiple names apply to the same entity, there is controversy about the precise definition of the entity, and about whether the entity represents a true disease. Generally speaking (although there are certainly experts who would take exception to this statement), a patient with classic clinical features of biliary colic with a normal ultrasound study, an abnormal ejection fraction on hepatobiliary imaging, and who improved following removal of the gallbladder may be diagnosed with “biliary dyskinesia” (regardless of the histology of the resected gallbladder).

Take-home message: Right upper quadrant ultrasound is the imaging study of choice for evaluation of pain suspicious for biliary colic or pancreatitis. When the ultrasound study is normal, further imaging including nuclear medicine hepatobiliary study performed with cholecystokin and calculation of the ejection fraction may provide useful additional information.

FURTHER READING

Fishman MB, Aronson MD. Differential diagnosis of abdominal pain in adults. UpToDate, accessed 7/7/09.

Hogan WJ. Clinical manifestations and diagnosis of sphincter of Oddi dysfunction. UpToDate, accessed 7/14/09.

Kaplan MM. Approach to the patient with abnormal liver function tests. UpToDate, accessed 7/7/09.

Renfrew, DL. “Second step” imaging of gastrointestinal symptoms. Chapter 8 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.