>>EMERGENCY ULTRASOUND

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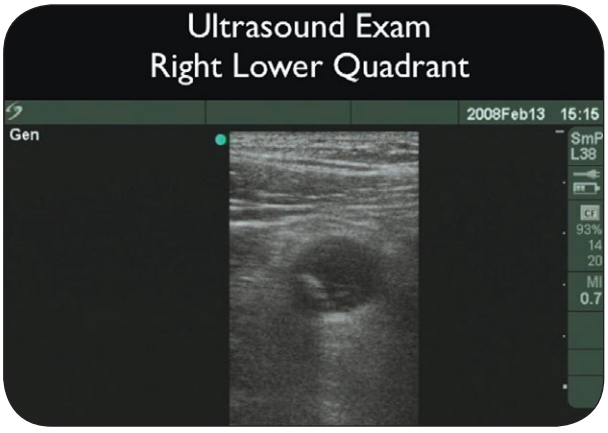
PRESENTATION



>> A 20-year-old man presents to your emergency department for evaluation of acute abdominal pain that has worsened over the last 18 hours. Initially, the pain was diffuse across his belly, but now it is more intense in the right lower quadrant. He also reports associated nausea, vomiting, and a recently developed fever.

The patient appears to be uncomfortable, and while his abdomen is not distended, palpation of the right lower quadrant elicits tenderness. Further examination of his genitalia and back finds no abnormalities. His vital signs are: heart rate, 104; blood pressure, 110/70; temperature, 100.8°F; respirations, 14.

Because the patient is male, the differential diagnosis for abdominal pain is far more limited than it would be in a female. Of the possible etiologies, this patient's symptoms point most strongly to acute appendicitis. Your options at this point are to call for a surgeon to perform an urgent operation, order an imaging study, such as a computed tomography (CT) scan or magnetic resonance imaging, or perform a bedside ultrasound. You call for a surgical consultation, but in the meantime you decide to perform a bedside ultrasound to confirm the diagnosis.

Bringing the ultrasound machine to the bedside, you place the transducer on the patient's abdomen in the right lower quadrant (see top image) and gently compress the area with the probe. The probe frequency will vary depending on body type (thinner patients are better visualized with a higher frequency), but it should be between 3 and 7 MHz.

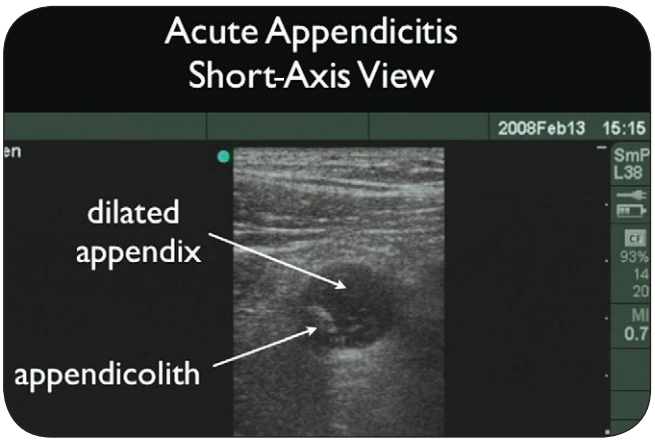
Based on the ultrasound image above, was your initial suspicion of acute appendicitis correct?

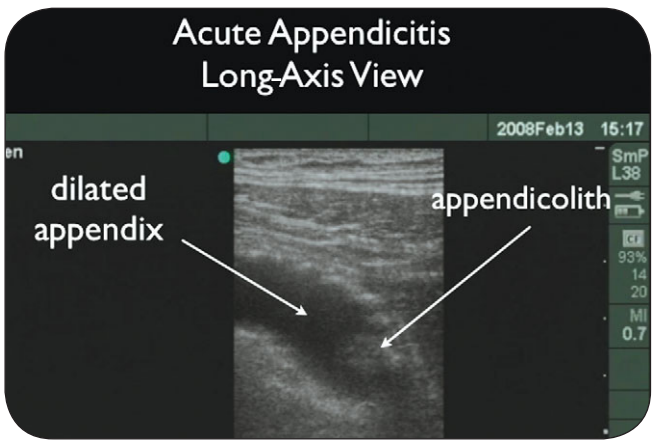
What is your diagnosis?

Turn page for answer **>>**

"Emergency Ultrasound" presents clinical cases that involve using emergency bedside ultrasound to make the correct diagnosis. To explore this case further, visit sound-bytes.tv on the Web, where you can view a linked movie of the case ("Appendicitis and Ultrasound") complete with real video ultrasound images.

DIAGNOSIS AND DISCUSSION





>> The ultrasound image on the previous page shows a dilated appendix in the form of a tubular, target-shaped structure in the patient's right lower quadrant. The structure is more than 6 mm wide and tender on direct compression. Your exam found that this structure was difficult to compress and exhibited no peristaltic activity. A shadowing calcified appendicolith can be seen inside the appendix, confirming your diagnosis of acute appendicitis.

The bottom image shown here demonstrates a long-axis view of a dilated and inflamed appendix with an appendicolith. Occasionally, periappendiceal fluid can be visualized around the appendix, an indicator of inflammation within the mesenteric fat encasing the structure.

There is no firm consensus concerning the proper diagnostic work-up of appendicitis. Methods vary widely from hospital to hospital and even from doctor to doctor. Of the various options, a CT scan with accompanying oral or intravenous contrast is currently the most common imaging study ordered in cases of suspected appendicitis. Ultrasound, however, has a definite place in the work-up due to its fewer contraindications. Children, thin men, and pregnant women, for example, are all great candidates for the use of ultrasound in this diagnostic work-up, especially given the absence of ionizing radiation compared to CT scanning.

With an overall sensitivity of around 80%, ultrasound is best used clinically to rule in appendicitis. It should be noted, however, that studies show that sensitivity varies widely by body type and the skill of the sonographer. In this case, the patient's suspicious clinical history and physical exam make the positive predictive value of the ultrasound very high. If signs of appendicitis are seen on the ultrasound, this is strongly predictive that the condition is present. If they are not, then the lower sensitivity of ultrasound dictates a further diagnostic study, such as a CT scan.

Based on the clinical examination and your ultrasound findings, the patient is diagnosed with acute appendicitis and taken to the operating room without need for additional diagnostic imaging. The inflamed appendix is removed and his recovery is free of complications.

Dr. Perera is an assistant clinical professor of emergency medicine at Columbia University College of Physicians and Surgeons and Weill Cornell Medical College and director of emergency ultrasound at New York Presbyterian Hospital in New York City. **Dr. Mandavia** is a clinical associate professor of emergency medicine and director of emergency ultrasound at Los Angeles County-USC Medical Center and an attending staff physician at Cedars-Sinai Medical Center in Los Angeles.