

forced expiratory examinations (sensitivity >90%).<sup>2</sup> A study is currently underway at our institution using three additional low-dose CT images through the airway to determine the prevalence of TBM in a patient population clinically suspected of having a pulmonary embolism, as TBM remains an under-diagnosed condition in patients presenting to the emergency department with shortness of breath.

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## Disclosure of financial interests

The authors and/or their spouses/significant others have no financial interests to disclose.

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# MRI of Acute Appendicitis in the Pregnant Patient

*Lucy B. Spalluto, MD, and David J. Grand, MD*

## A 34 YEAR OLD PREGNANT PATIENT PRESENTED

to the emergency department with a one day history of right-sided abdominal pain, nausea, and vomiting. The patient reported a recent positive urine pregnancy test. At the time of presentation, the patient was afebrile, with heart rate of 90 bpm, and blood pressure of 122/74 mmHg. Physical examination revealed right lower quadrant tenderness superior to the expected location of McBurney's point. Laboratory analysis demonstrated a white blood cell count of  $16.8 \times 10^3/\mu\text{L}$  (84% neutrophils), hemoglobin of 12.9 g/dL, and a platelet count of  $282 \times 10^3/\mu\text{L}$ .

Right upper quadrant and pelvic ultrasound (US) were performed. The right upper quadrant US was normal. Pelvic US demonstrated a six-week four-day live intra-uterine gestation. The appendix could not be visualized. Subsequently, a magnetic resonance imaging (MRI) study of the abdomen and pelvis was performed demonstrating a tubular, fluid filled structure (the appendix) arising from the posterior aspect of the base of the cecum (Figure 1, left). The retrocecal appendix measured up to eight mm in diameter. Fluid signal was also identified within the periappendiceal soft tissues (Figure 1, right).

Emergent laparoscopic appendectomy was performed. Pathology revealed acute appendicitis with mucosal ulceration, transmural inflammation and periappendicitis.

## DISCUSSION

The evaluation of abdominal pain in the pregnant population is challenging due to confounding factors present in normal pregnancy including displacement of normal pelvic structures from their usual location, nonspecific nausea and vomiting, difficult abdominal exam, and physiologic leukocytosis.<sup>1,2</sup> Given that appendicitis is the most common

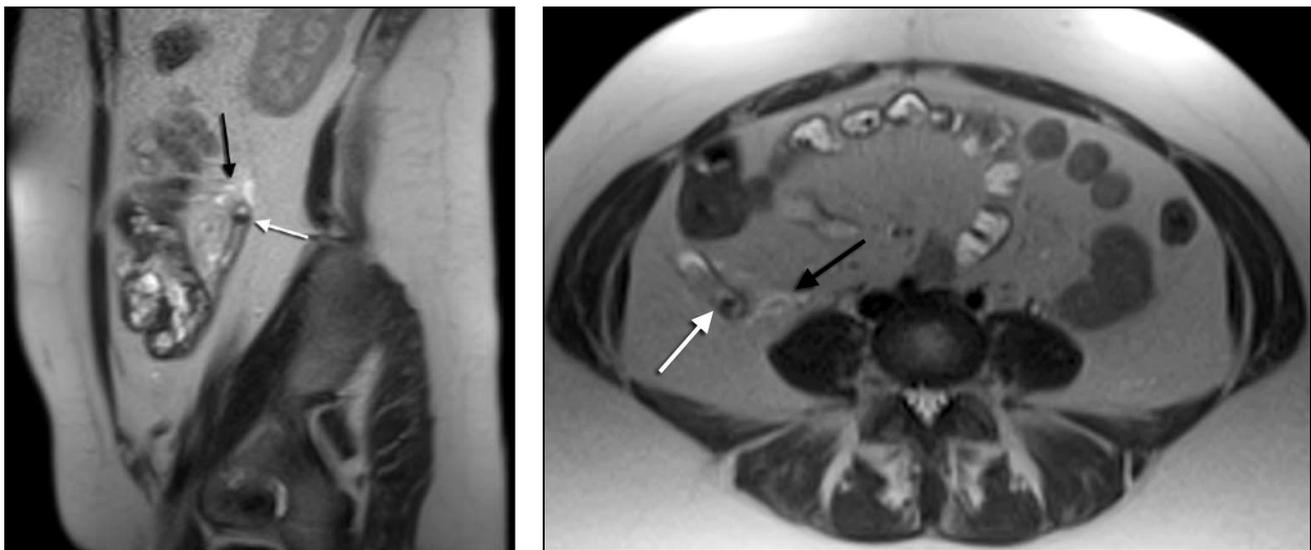


Figure 1. Acute appendicitis in a 34 year old pregnant patient with a six-week four-day gestation. Sagittal T2-weighted single shot fast spin echo (SSFSE) [left] and axial T2-weighted SSFSE [right] MR images demonstrate the retrocecal, dilated fluid filled appendix containing an appendicolith (white arrow) and peri-appendiceal inflammation (black arrow).

non-obstetric surgical emergency in pregnant patients, it is a critical diagnosis to exclude.<sup>3</sup>

MRI has a reported sensitivity of 100% and specificity of 93.6% for diagnosing acute appendicitis in the pregnant patient, without exposure to ionizing radiation.<sup>4</sup> Described MR imaging features of acute appendicitis include an appendiceal diameter greater than 7 mm, an appendiceal wall thickness > 2mm, increased T2 signal representing fluid within the lumen of the appendix, and periappendiceal soft tissue inflammation.<sup>4</sup> The retrocecal location of the appendix likely accounts for the somewhat atypical location of the right-sided abdominal pain in this patient.

Finally, MRI not only confidently diagnoses or excludes appendicitis, but can simultaneously evaluate other com-

mon, potential causes of abdominal pain in pregnant patients such as gallstones, choledocholithiasis and nephrolithiasis. At our institution, MRI is currently available at all times to diagnose or exclude the presence of appendicitis in pregnant patients during any trimester without the need for IV contrast.

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# Pediatric Omental Infarction

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**AN 11 YEAR OLD MALE PRESENTED TO THE** pediatric emergency department with acute onset abdominal pain worsening over 24 hours. He denied trauma, nausea, vomiting, or diarrhea. He had no significant medical history, including no prior surgeries, medications or hospitalizations.

Upon arrival to the pediatric emergency department, he was noted to be awake, alert and uncomfortable. His initial vital signs were: temperature 38.3°C, blood pressure 115/69 mm Hg, pulse 113 beats per minute, respiratory rate 20

per minute and oxygen saturation 100% while breathing room air. His weight, height and **Body Mass Index (BMI)** were 52 kg (115 lbs), 142 cm (56 inches) and 25.8, respectively. Physical examination revealed tenderness to palpation in the right lower quadrant without rebound, guarding, masses or peritoneal signs. Laboratory analyses demonstrated a white blood cell count of  $15.9 \times 10^3$  per microliter, hemoglobin of 13.6 grams per deciliter, and platelet count of  $317 \times 10^3$  per microliter. Lipase and liver function tests were normal. **Sonography (US)** of

the abdomen, pelvis and appendix was performed given clinical concern for acute appendicitis. The abdominal and pelvic US were normal and the appendix US was inconclusive.

Given persistent pain, leukocytosis, and continued clinical concern for acute appendicitis, pediatric appendix **Magnetic Resonance Imaging (MRI)** without contrast was performed in accordance with the imaging algorithm for suspected appendicitis at Hasbro Children's Hospital. The MRI demonstrated the patient's normal appendix, without dilation, mural



Figure 1. Coronal 3D T2-weighted TSE SPACE sequence from MRI. Omental infarct with adjacent inflammation (large arrow). Normal appendix (small arrow).

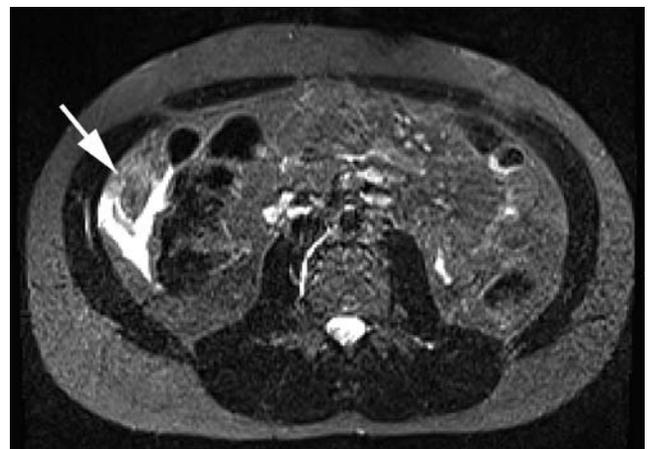


Figure 2. Axial STIR image from MRI. Omental infarct with surrounding inflammation and fluid (arrow).