26-year-old female with right-sided abdominal pain

Matt Onimus, MS4, Drexel University College of Medicine
Matthew Hartman, MD, Allegheny Health Network
Patient Presentation

• **HPI:** 26-year-old female with a history of previous hernia repair presented to the ED with a one day of right sided abdominal pain
  - Associated symptoms include nausea and vomiting
  - Pertinent negatives include no diarrhea/constipation/blood in the stool, no urinary symptoms, no fevers/chills, no chest pain or palpitations, no SOB/cough, no vaginal discharge/pain

• **PMH:** N/A

• **PSH:** inguinal hernia repair

• **Medications:** N/A

• **Physical Exam:** stable vital signs, afebrile, in distress due to pain, abdominal tenderness in RLQ with guarding but no peritoneal signs
Pertinent Labs

• WBC count of 15
• UA showed many bacteria but negative nitrite and leukocyte esterase
• Pregnancy test was negative
• CMP was normal
• Lipase was normal
Differential Diagnosis

- Acute appendicitis
- Mesenteric lymphadenitis
- Rupture of ovarian cyst
- Ectopic pregnancy
- Nephrolithiasis
- Urinary tract infection
- Pyelonephritis
- Adnexal torsion
- Pelvic inflammatory disease
- Inflammatory bowel disease
- Acute pancreatitis
- Gastroenteritis
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

This imaging modality was ordered by the ER physician

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT abdomen and pelvis with IV contrast</td>
<td>Usually Appropriate</td>
<td>✭✭✭✭</td>
</tr>
<tr>
<td>CT abdomen and pelvis without IV contrast</td>
<td>May Be Appropriate</td>
<td>✭✭✭</td>
</tr>
<tr>
<td>US abdomen</td>
<td>May Be Appropriate</td>
<td>0</td>
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<tr>
<td>MRI abdomen and pelvis without and with IV contrast</td>
<td>May Be Appropriate</td>
<td>0</td>
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<tr>
<td>US pelvis</td>
<td>May Be Appropriate</td>
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</tr>
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<td>MRI abdomen and pelvis without IV contrast</td>
<td>May Be Appropriate</td>
<td>0</td>
</tr>
<tr>
<td>CT abdomen and pelvis without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>✭✭✭✭</td>
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<tr>
<td>Radiography abdomen</td>
<td>Usually Not Appropriate</td>
<td>✭✭</td>
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<tr>
<td>Fluoroscopy contrast enema</td>
<td>Usually Not Appropriate</td>
<td>✭✭✭</td>
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<tr>
<td>WBC scan abdomen and pelvis</td>
<td>Usually Not Appropriate</td>
<td>✭✭✭✭</td>
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</tbody>
</table>
Findings (unlabeled)
Findings: (labled)

- Locule of free air by right hemidiaphragm
- Tiny locule of extraluminal gas
- Dilated appendix measuring up to 1.1 cm, thickened wall
Findings: (labeled)

- Appendicolith measuring up to 6 mm
- Tiny locule of extraluminal gas
Final Dx:

Perforated Appendicitis
Outcome

• Given the imaging findings, our patient was taken to the OR for a laparoscopic appendectomy
• A perforated appendix was identified with localized peritonitis and abscess formation
• Appendix was removed and RLQ was irrigated
• Patient was initially placed on ceftriaxone and metronidazole in the ED, but was subsequently switched to piperacillin/tazobactam following culture results
• Patient tolerated surgery well and recovered appropriately
Case Discussion

• Appendicitis is more difficult to diagnose in females of childbearing age due to possibility of gynecologic disorders
  • Women are misdiagnosed in 33% of cases, which leads to an increased incidence of perforation/complications

• Complications of acute appendicitis include perforation and peri-appendiceal abscess formation
  • Necrosis of the appendiceal wall can cause a focal rupture/perforation, leading to peritonitis
    • Approximately 20% of patients with perforated appendicitis present within 24 hours of onset of symptoms
    • Perforation should be considered in patients with temperatures exceeding 103°F, WBC count greater than 15,000, and imaging studies showing fluid collection in RLQ
  • Peri-appendiceal abscess formation is a result of concealed perforation and classically present after 5 days with high fever and abdominal pain
Imaging Considerations

- **Contrast-enhanced CT** can detect perforation with a sensitivity and specificity of 95% when certain findings are present:
  - Focal defect in enhancing appendiceal wall
  - Peri-appendiceal abscess or phlegmon
  - Extraluminal gas or appendicolith
  - Extraluminal leak of contrast

- **Ultrasound** can diagnose perforation by demonstrating right iliac fossa abscess or phlegmon with associated signs of appendiceal inflammation
  - Less accurate than contrast-enhanced CT
  - Detects perforation with a sensitivity of 44% and specificity of 93%
Management of Perforated Appendicitis

• Depends on clinical stability of the patient and the presence of an abscess
• If the patient is unstable/septic or with free perforation/generalized peritonitis, immediate appendectomy is indicated
• If the patient is stable with an abscess that is ≤ 3 cm or cannot be drained percutaneously, then immediate surgery is indicated
• If the patient is stable and appendectomy is not accessible or is high-risk, then non-operative treatment with IV antibiotics is indicated
• If the patient has an abscess ≥ 3 cm, then percutaneous drainage is indicated with interval appendectomy 6-8 weeks later to exclude appendiceal neoplasm and prevent recurrent appendicitis
References:

1. ACR Appropriateness Criteria https://acsearch.acr.org/list


