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APPENDICITIS IN THE INFANT POPULATION: A CASE REPORT AND REVIEW OF A FOUR-MONTH OLD WITH APPENDICITIS

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☐ **Abstract—Background: Appendicitis is uncommon in children <6 months old, with few observational studies reporting cases of children younger than 5 years old with the diagnosis. The classic periumbilical pain that migrates to the right lower quadrant, followed by the onset of fever and vomiting, is present in approximately 40% of pediatric patients under 12 years of age with appendicitis. Case Report: A 4-month-old girl presented to the Emergency Department (ED) with acute onset of grunting, pallor, fussiness, emesis, and diarrhea. The patient was initially afebrile, tachycardic, and tachypneic with a soft, nondistended, nontender abdomen and active bowel sounds. The patient became febrile, with a maximum temperature of 39.3°C (102.7°F), and remained tachycardic despite receiving fluids and antipyretics. Laboratory studies were notable for mild dehydration and sterile pyuria. Chest x-ray study was negative for infectious etiologies. Initial abdominal ultrasound found no clear etiology of the patient's symptoms. The patient was admitted to inpatient pediatrics for dehydration, fever, and presumed pyelonephritis. Twenty-four hours later the patient's abdomen became distended and diffusely tender to palpation, with obstipation and increasing episodes of emesis. Abdominal x-ray study demonstrated mild gaseous distension of multiple bowel loops with repeat abdominal ultrasound notable for a focal 8-mm, noncompressible hyperemic structure in the right lower quadrant. The patient was taken to the operating room for a laparoscopic appendectomy. Why Should an Emergency Physician Be Aware of This?: Appendicitis is a potentially life-threatening condition. In the infant population it frequently presents without the features typically seen in older children.** © **2016 Elsevier Inc.**

☐ **Keywords—infant; appendicitis; pediatrics; emergency; symptoms**

INTRODUCTION

Appendicitis is uncommon in children <6 months old, with few observational studies reporting cases of children younger than 5 years old with the diagnosis (1).

CASE REPORT

A 4-month-old girl presented to the Emergency Department (ED) with acute onset of grunting, pallor, fussiness, emesis and diarrhea. Medical history was significant for gastroesophageal reflux treated with lansoprazole and elemental formula.

In the ED, the patient was initially afebrile at 37.7°C (100°F), tachycardic at 205 beats/min, and tachypneic at 44 breaths/min, with a soft, nondistended, nontender abdomen, active bowel sounds, and negative stool guaiac. The patient became febrile, with a maximum temperature of 39.3°C (102.7°F). The patient received a 20-mg/kg fluid bolus and 60-mg Tylenol suppository (McNEIL-PPC, Fort Washington, PA). On re-evaluation, she remained tachycardic despite appropriate fluid resuscitation. Laboratory studies were notable for an

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unremarkable complete blood count, with 5.1 $\times$ 10^9/L white blood cells (WBC) and an absolute neutrophil count of 1.79 $\times$ 10^9/L, mild dehydration, and sterile pyuria, with urine positive for 30 WBC and negative for bacteria or nitrites. Chest x-ray study indicated a normal cardiothymic silhouette and was negative for infectious etiologies. Initial abdominal x-ray study was significant for a normal gas pattern and abdominal soft tissues, and found no clear etiology of the patient's symptoms. Due to persistent tachycardia and fever, the patient was admitted to inpatient Pediatrics for dehydration, fever, and presumed pyelonephritis.

Thirty hours after presenting to the ED, the patient's abdomen became distended and diffusely tender to palpation, with obstipation and increasing episodes of emesis. Repeat abdominal x-ray study demonstrated mild gaseous distension of multiple bowel loops (Figure 1), with repeat abdominal ultrasound notable for dilatated fluid-filled-loops bowel and a focal 8-mm, noncompressible hyperemic structure in the right lower quadrant (Figure 2). The patient was taken to the operating room for a laparoscopic appendectomy with an intraoperative finding of a perforated appendix.

DISCUSSION

Although appendicitis is uncommon in infants, neonatal and prenatal cases have been described (2). In the first 9 to 12 months of life, the appendix is funnel-shaped, with less prominent lymphoid tissue making it less prone to obstruction (2). In this age group, the patient may present with vomiting (85%), diarrhea (20–46%), fever (40%), irritability (40%), and grunting respirations (10–23%) (2,3). The classic symptom of periumbilical pain that migrates to the right lower quadrant, followed by the onset of fever and vomiting, is present in approximately 40% of pediatric patients under 12 years of age with appendicitis (2,4).

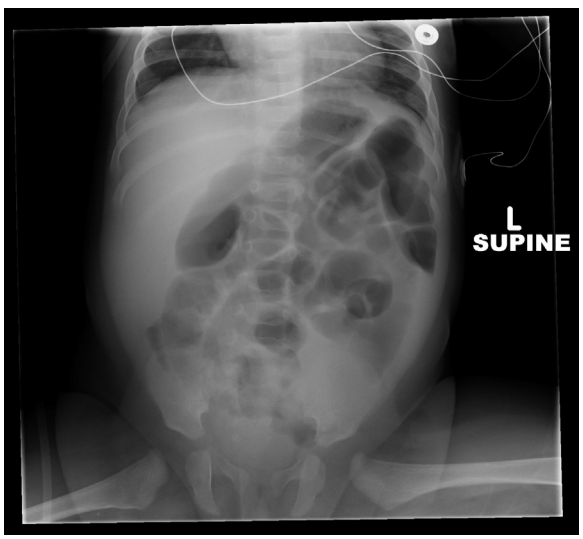

Figure 1. Abdominal x-ray study showing mild gaseous distension of multiple bowel loops.

The parents or patient describe atypical symptoms of diffuse abdominal pain, tachycardia, and flushed cheeks with temperature >37°C (100.4°F) (1,3). New-onset constipation followed by emesis and frequent small-volume, soft stools were more often reported than true diarrhea (1,3). In a retrospective analysis of 379 patients 3 to 12 years of age, perforation rate was highest (53%) in the youngest subset of patients (3–5.99 years), with 66% of these patients presenting with vomiting, 47% with fever, and 16% presenting with loose stool and irritability (1). In a retrospective case series of 63 patients, with a mean age of 2.2 years (range 11 to 35 months), 57% were initially misdiagnosed, with diarrhea reported in 33% (4). Perforation was reported in 84% of this subset. Thus, irritability, grunting respirations, and diarrhea may be present in younger patients, making appendicitis difficult to differentiate from a primary respiratory disease process, intussusception, or gastroenteritis; which are more common diagnoses in this age group (1,4–9).

Physical examination findings vary with age, with irritability sometimes the only sign in neonates. In this age group, the infant may lie still, appear withdrawn, and may be tachycardic or tachypneic, secondary to dehydration (7,8). A pulmonary examination is necessary to rule out lower-lobe pneumonia, and urinalysis is required to rule out urinary tract infection. The abdominal examination may elicit typical symptoms or, as in our case, be within normal limits initially (1,3).

Diagnosis of appendicitis as the etiology of abdominal pain in the pediatric population is challenging and largely clinical, with no pathognomonic laboratory tests available. Commonly ordered laboratory tests include urinalysis, complete blood count, and a comprehensive metabolic panel, especially when the etiology of the abdominal pain is unclear and the guidance of appendicitis scoring systems are being considered. The predictive value of WBC count is limited. An observational report of 772 patients between 1 and 19 years of age, presenting with abdominal pain, indicated that elevated WBC count or an absolute neutrophil count > 80% had an overall sensitivity of 79%, and specificity of 80% (10). C-reactive protein also has limited predictive value in confirming the diagnosis of appendicitis, with small, observational studies reporting that when both C-reactive protein and white blood cells are elevated, specificity for appendicitis is approximately 90%, although sensitivity remains low at approximately 40% (10). As seen with our patient, urinalysis is performed