



What – No Operation for Appendicitis? By Linda Hollen, RN, MS, CNP

May/June 2011

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CASE STUDY:

Caleb and Jackson, both age 12, presented to the emergency department (ED) with complaints of severe abdominal pain. In both patients, the pain had begun in the periumbilical region two days prior to presentation with subsequent migration to the right lower quadrant. Fever was present, but neither complained of vomiting or diarrhea. Both boys were evaluated in the ED. Pediatric surgery was consulted for presumed appendicitis. Laboratory tests and computed tomography (CT) scans were ordered.

Caleb's CT showed evidence of ruptured appendicitis with

multiple intra-abdominal abscesses. He had a significantly elevated white blood cell count (WBC) with increased neutrophils and elevated C-reactive protein (CRP). Jackson's CT scan showed evidence of a fluid filled appendix but no significant phlegmon or abscess. He too had elevated WBCs, increased neutrophils and elevated CRP.

Jackson went to the operating room for a laparoscopic appendectomy. The appendix was noted to be ruptured. Intravenous (IV) antibiotics were initiated at presentation and continued throughout his inpatient stay. He was discharged home seven

days later after resolution of fever, pain and normalization of labs. He continued oral antibiotics at home for an additional seven days.

Caleb was admitted to inpatient care and placed on the "interval appendectomy" pathway and did not go to surgery. IV antibiotics were started and continued while inpatient. After normalization of his labs and resolution of pain, he was discharged home with five days of oral antibiotics for a total of 14 days on antibiotic treatment. He will return in six to eight weeks for a scheduled, nonemergent laparoscopic appendectomy.

CASE DISCUSSION – WHY THE DIFFERENCE IN TREATMENT?

Incidence. Approximately seven percent of individuals will develop acute appendicitis in their lifetime. Perforation rates range from 30 to 45 percent in the pediatric population and approach 80 percent in patients under 5 years of age.¹ Delayed diagnosis is frequently to blame for the high incidence of perforation in this age group

Pathophysiology. The process begins with obstruction of the appendiceal lumen. In 40 percent of the cases luminal obstruction is caused by a fecalith, a hard, stony mass of feces. Irrespective of the cause of obstruction, continued mucus production and bacterial proliferation increase intraluminal pressure. At this point the child may have vague abdominal pain. This leads to impaired lymphatic and venous drainage causing tissue edema, ischemia, necrosis and perforation. As appendiceal inflammation increases, pain localizes to the right lower quadrant.¹ The actual function of the appendix is unknown but the profusion of lymphoid tissue within the appendix indicates a likely immunologic role.²

Evaluation. Right lower quadrant pain, migration of pain and abdominal rigidity are the textbook findings in appendicitis. Anorexia may precede the pain. Pain is often aggravated by movement. Nausea and vomiting may appear after the onset of pain although vomiting may occur early in the process in children.² Diarrhea is frequently present in ruptured appendicitis due to bowel irritation. Differential diagnoses of right lower quadrant pain are many and include constipation, bowel obstruction, gastroenteritis, pneumonia and urinary tract infection. Additional considerations in female patients are endometriosis, ectopic pregnancy, ovarian torsion and pelvic inflammatory disease.

Labs. Most frequently a CBC with differential will be ordered. WBC and neutrophils will be elevated in up to 96 percent of pediatric patients with appendicitis but is a nonspecific finding.³ CRP is sometimes ordered. A highly elevated CRP has been shown to correlate with ruptured appendicitis in some studies.⁴ Urinalysis is frequently ordered during the workup. While not

diagnostic for appendicitis, it can rule out urinary tract infection.

Imaging. Both ultrasound and/or CT studies can establish or exclude the diagnosis of appendicitis in a patient with an equivocal physical exam. Ultrasound is useful in female patients as it can aid in diagnosis of ovarian cysts, ovarian torsion, and other pelvic pathologies. A benefit to ultrasound is that it requires no contrast nor is there exposure to ionizing radiation. The appendix must be visualized on the ultrasound to make the diagnosis. If the appendix is not visualized or the findings are equivocal, CT exam is indicated. The highest diagnostic efficacy is found using IV and rectal contrast in pediatric patients. Moreover, with rectal contrast the appendix can be visualized in minutes rather than the one to two hours needed with oral contrast.⁵ An appendiceal specific CT is used to minimize ionizing radiation exposure to the child.

Operate or not? In the patient with nonruptured appendicitis, the treatment is prompt appendectomy.

Continued

Continued from the front.

Hospital discharge is 24 to 48 hours post surgery. For decades an appendectomy was also the standard to treat perforated appendicitis; however, a percentage of those patients would subsequently develop post-operative complications causing examination of the process and introduction to the interval appendectomy pathway. This pathway does not mean no operation; rather, it refers to conservative treatment of the appendicitis and an appendectomy at a later date when the acute inflammation has subsided.

Many prospective and retrospective studies have researched this issue. Whyte and others have proposed that the ideal patient for initial nonoperative treatment is the patient with an abscess who is nontoxic, has pain well controlled with oral pain medications and is able to orally feed within 24 hours.⁶ Any accessible abscess(es) should be drained. The patient is reevaluated at 24 hours. If the patient is without fever at 24 hours, the interval pathway is continued. In the patient who is febrile and without clinical improvement at 24 hours, the process should be reevaluated and consideration made for appendectomy. These researchers state that nonoperative treatment is appropriate for the vast majority of pediatric patients presenting with perforated appendicitis. Fever greater than 38°C after 24 hours of treatment and bandemia on admission are indicators of potential interval pathway failures.⁶ Further research is needed to accurately assess and properly assign patients to a nonoperative pathway and later appendectomy versus immediate operation. Research too continues to examine the need for an appendectomy

following successful resolution with conservative treatment.

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Pediatric surgery at Dayton Children's

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