Can Children With Uncomplicated Acute Appendicitis Be Treated With Antibiotics Instead of an Appendectomy?

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Editor's note: *Emergency physicians must often make decisions about patient management without clear-cut data of sufficient quality to support clinical guidelines or evidence-based reviews. Topics in the Best Available Evidence section must be relevant to emergency physicians, are formally peer reviewed, and must have a sufficient literature base to draw a reasonable conclusion but not such a large literature base that a traditional "evidence-based" review, meta-analysis, or systematic review can be performed.*

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INTRODUCTION

Acute appendicitis is a frequent indication for pediatric surgical consultation in the emergency department, where the criterion standard of treatment is appendectomy. However, operative management involves the risks of surgical complications and exposure to general anesthesia, in addition to a potentially lengthy recovery time. One meta-analysis of complications after laparoscopic and open appendectomy for nonperforated appendicitis in children found complication rates of 2.6% and 2.7%, respectively,[1] whereas another found rates of 5.7% and 2.6%.[2] Although these complication rates are low, surgery can be associated with significant time off of school for children and of work for their parents. Nonoperative management of uncomplicated appendicitis may thus offer a number of theoretical advantages.

Several case series,[3-6] prospective randomized studies,[7-10] and meta-analyses[1,11-14] have suggested that antibiotic treatment without interval appendectomy may be sufficient therapy for uncomplicated appendicitis in adults. A Cochrane Review concluded that surgery remained the criterion standard, although the authors conceded that "nonoperative management may be used as an alternative in a good quality RCT [randomized controlled trial] or in specific patients or conditions where surgery is contraindicated," because of the low to moderate quality of the studies reviewed.[15] A recent meta-analysis revealed a success rate of 63% at 1 year for nonoperative management, with no difference in the incidence of complicated appendicitis.[12] Given this experience in adult patients, the effectiveness of a nonoperative, antibiotics-only approach to the management of acute uncomplicated appendicitis in children is reviewed here.

SEARCH STRATEGY

Two authors (J.A.H. and B.G.C.) independently searched EMBASE and MEDLINE, using the terms "(nonoperative or non-operative) AND appendicitis AND children," resulting in 75 and 66 citations, respectively. Relevant studies involving children with uncomplicated, nonperforated acute appendicitis were selected for inclusion. A total of 4 relevant articles were identified. Review of the bibliographies of these articles revealed no further relevant studies.

ARTICLE SUMMARIES

Abes et al[16]

This retrospective chart review from Turkey evaluated children admitted for appendicitis who were initially managed nonoperatively. The diagnosis of appendicitis was made according to history, physical examination result, WBC count, and ultrasonographic findings demonstrating

an anteroposterior diameter of 6 mm or greater. Patients with abdominal pain for less than 24 hours with localized tenderness and hemodynamic stability were eligible for nonoperative management. The maximum diameter of the appendix on ultrasonography was recorded initially and again after 48 hours. Parenteral antibiotics were administered for at least 48 hours and were continued until abdominal tenderness resolved. Patients with persistent abdominal pain, no decrease in appendiceal diameter on ultrasonography, or increasing leukocytosis or temperature underwent open appendectomy. All patients were followed for 1 year to assess for recurrent appendicitis or the subsequent need for appendectomy.

Sixteen of 95 children with appendicitis were treated nonoperatively between 2003 and 2006, with a mean age of 9 years. The mean appendiceal diameter decreased from 7.11 mm initially to 4.64 mm in the 48 hours after the initiation of antibiotics ($P<.001$). The mean number of days until abdominal tenderness resolved was 5, with a range of 4 to 7 days. One patient failed nonoperative management and required appendectomy after 1 day of antibiotics. Two additional patients developed recurrent appendicitis within 1 year and required appendectomy. The initial failure rate of nonoperative management was 6% (95% confidence interval [CI] 1% to 28%) and the 1-year failure rate was 19% (95% CI 7% to 43%).

This small retrospective review demonstrated a decrease in appendiceal diameter with nonoperative management of appendicitis, with a low 1-year failure rate. The authors did not make any comparisons to a control group undergoing urgent appendectomy.

Armstrong et al[17]

This small case series consisted of children cared for by a single pediatric surgeon who offered nonoperative management to all patients with uncomplicated acute appendicitis, with less than 48 hours of symptoms and a diagnosis confirmed by abdominal imaging. The decision to proceed with appendectomy or antibiotic therapy was at the discretion of the patient and family. The authors chose to compare all children treated with early appendectomy between January and October 2011 with those treated with initial nonoperative management between May 2012 and February 2013. This resulted in 12 children in each group. Baseline patient characteristics, including age, sex, duration of symptoms, appendiceal diameter, and serum inflammatory markers, were similar in both groups. The endpoints of interest were failure and complications of the initial therapy. For patients treated nonoperatively, this included perforation or the need for an appendectomy. For children who underwent an appendectomy initially, this included peritonitis and surgical site infections. Secondary outcomes for both groups included the duration of initial hospitalization and recurrence of symptoms requiring hospitalization.

Nonoperative management was successful in 9 of 12 patients (75%): 2 children required an appendectomy within 6 weeks, and 1 more developed recurrent appendicitis 7 months later and underwent surgery then. One of these 3 children had a fecalith identified on initial imaging. Among the children treated operatively at the outset, 2 children (17%) developed a surgical site infection.

In this small series of children with appendicitis, nonoperative management was successful in the majority of cases in which it was attempted. Similarly, operative management resulted in low complication rates.

Minneci et al[18]

This small prospective study enrolled children aged between 7 and 17 years and with fewer than 48 hours of symptoms, a WBC count of less than 18,000 cells/μL, and imaging evidence of nonruptured appendicitis with an appendiceal diameter of 1.1 cm or less. Patients and families were offered the choice of appendectomy or nonoperative management with 24 hours of intravenous antibiotics followed by a course of oral antibiotics. Patients who did not improve within 24 hours were considered to have failed nonoperative management and underwent appendectomy. The primary endpoint was the percentage of patients who were successfully treated nonoperatively. Secondary outcomes included length of hospitalization, time to return to normal activity, and quality-of-life measures.

The 2 groups were demographically and clinically similar at baseline. Of 30 children managed nonoperatively, 2 required surgery during the initial hospitalization, and 1 required surgery within 30 days, for an overall 30-day success rate of 90% (95% CI 79% to 100%). Among the 47 children who underwent appendectomy, no operative complications occurred. Pathologic findings among these children showed that 2 had gangrenous appendicitis, 4 had perforated appendicitis, and 2 did not have appendicitis. Thus, 6 of the 47 children (13%) treated operatively had relatively complicated appendicitis, suggesting that their clinical presentation may have been more severe; this may have been reflected in the parental choice made to proceed directly to surgery. Follow-up during this 30-day period was fair because 7% of the children managed nonoperatively and 19% of the children managed operatively were not included in analysis of all secondary outcomes.