



Does size matter? Correlation of ultrasound findings in children without clinical evidence of acute appendicitis



Tishara Wijayanayaka^a, Jacob Davidson^b, Andreana Bütter^{b,*}

^a Division of General Surgery, London Health Sciences Centre, Schulich School of Medicine and Dentistry, Western University, London, ON, Canada

^b Division of Paediatric Surgery, Children's Hospital, London Health Sciences Centre, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada

ARTICLE INFO

Article history:

Received 23 January 2018

Accepted 1 February 2018

Key words:

Appendicitis
Ultrasound
Pediatric

ABSTRACT

Purpose: The purpose of this study was to determine whether children with a positive ultrasound (US) for acute appendicitis but a negative clinical picture developed appendicitis requiring definitive management.

Methods: After obtaining IRB approval, we conducted a retrospective review of patients ≤ 17 years who presented with possible acute appendicitis between April 1st, 2014, and December 31st, 2015. We included patients with a US suggestive of acute appendicitis based on size criteria but without concerning clinical features. Patients were discharged from the emergency department (ED) or admitted for observation. Variables included demographic data, US characteristics, clinical findings, length of follow-up, and appendectomy.

Results: Of the 31 patients identified, 45% were male and average age was 11.3 yrs. On US, the average maximal diameter of the appendix was 6.93 mm. The median length of follow-up was 16.8 months, including 10 returns to the ED by 9 patients. Three of these underwent immediate laparoscopic appendectomy, while one had interval appendectomy. There were no cases of perforated appendicitis, and only 2 cases demonstrated pathology consistent with appendicitis.

Conclusion: These findings demonstrate that it is safe to consider conservative measures such as observation or discharge in children with a positive US for appendicitis based on size criteria but a negative clinical picture.

Level of Evidence: 4

© 2018 Elsevier Inc. All rights reserved.

Acute appendicitis has a lifetime prevalence of 7%–8% and represents the most common cause of emergent surgery in the pediatric population [1]. However, diagnosing appendicitis remains a challenge. A careful history and physical examination are essential while bloodwork and imaging are often performed and may aid in confirming the diagnosis [2]. Despite limitations, ultrasound (US) is the preferred initial imaging method in cases of suspected appendicitis owing to its safety in use in the pediatric population [3]. It has been demonstrated that US, when used in combination with clinical scoring tools, such as the Alvarado Score (AS) [4] and Pediatric Appendicitis Score (PAS) [5], can improve the predictive value of diagnosing appendicitis in children, especially when there is concordance between clinical suspicion and radiological findings [6,7].

What remains less clear is how surgeons should proceed in situations where a US is found to be positive for acute appendicitis but the overall clinical impression of the patient suggests otherwise. Our study examined the safety of discharging children with a positive US

but a negative clinical picture for appendicitis by determining whether these patients had a higher likelihood of re-presenting to the emergency department (ED) with acute, perforated, or missed appendicitis.

1. Materials and methods

After obtaining IRB approval (REB #108463), we performed a retrospective chart review of patients, ≤ 17 years of age who presented to our institution's ED with possible acute appendicitis between April 1st, 2014 and December 31st, 2015. Patients were included in this study if they had a positive diagnosis of appendicitis based on US (i.e., diameter of appendix ≥ 6 mm or radiologist's impression based upon presence of features such as hyperemia, free fluid, and hyperechoic fat). Although preliminary radiology reports may have been generated by radiology residents, final reports by radiology attending staff were reviewed retrospectively. Additionally, patients must have had an overall negative clinical picture for appendicitis when assessed by the surgery team. A number of clinical factors were considered including presence of fever, focal tenderness, and abdominal pain at the time of assessment. Although we are unable to calculate an accurate clinical score for each patient retrospectively, patients were ultimately deemed to have a negative clinical impression if treatment with antibiotics or surgery

* Corresponding author at: Surgical Education, Western University, Pediatric Surgeon, Children's Hospital, London Health Sciences Centre, Rm B1-188, 800 Commissioners Road East, London, Ontario, Canada, N6C 2V3. Tel./fax: +1 519 685 8401.

E-mail address: Andreana.Butter@lhsc.on.ca (A. Bütter).

was not pursued. Patients were excluded from the study if clinically concerning features prompted the surgical team to manage directly with surgery or antibiotics, or if the appendix was perforated on US. Other exclusion criteria included no US performed, clearly negative US, equivocal US, and alternate diagnosis found on initial assessment. If a patient had multiple encounters for acute appendicitis, only the first was included in the study sample.

1.1. Measures and analysis

The variables of interest for this study included demographic characteristics, symptom duration, clinical features of appendicitis (eg. localized peritonitis), diameter of appendix, US findings, lab values, and length of stay if admitted. Charts were also reviewed to see whether patients presented to the ED, after initial discharge, for complaints suspicious of appendicitis within a follow up period of at least 6 months. The main outcomes of interest were return to the ED and the need for subsequent surgery or medical management of appendicitis. The analysis for this study only included patients who presented to the ED with symptoms of appendicitis. Based on the descriptive nature of this study and lack of comparison group, no statistical tests were performed. The analysis consisted of descriptive statistics, including percent, sample size, means/medians, and standard deviation. A subgroup analysis was completed to further describe the patients who returned to the ED after being initially discharged. All descriptive statistics were completed on Microsoft Excel (version 2010).

2. Results

A total of 327 patient encounters were originally identified, of which 222 were excluded owing to immediate surgery ($n = 197$) or antibiotics ($n = 25$). Another 62 were excluded since no US was performed ($n = 7$), the US was clearly negative ($n = 16$), the appendix was not visualized ($n = 36$), or the findings were deemed equivocal ($n = 3$). Six patients had a perforated appendix, three were diagnosed with kidney stones or ovarian torsion, and three had multiple encounters.

Of the 31 patient encounters included in the study, 19 patients were discharged from the ED and 12 were admitted and observed. The average age of the patients was 11.3 years ($SD = 3.8$), and more than half were female (54.8%) (Table 1). The most common duration of symptoms was less than 24 h (36.7%) and only 23.1% of patients had a temperature of 38 °C or higher. Only 25.8% of patients demonstrated vomiting, 16.1% focal tenderness and 35.5% abdominal pain at the time of assessment by pediatric surgery. From the US findings, the average maximum diameter of the appendix was 6.93 mm ($SD = 1.58$) (Table 1). The US images also showed that 20.0% of patients had hyperechoic fat, 50.0% had trace or small amounts of free fluid, 6.7% had a fecalith, 30.0% had swollen lymph nodes, and 30.0% had hyperemia.

The average length of stay for admitted patients was 0.5 days ($SD = 0.9$). None of the patients admitted for observation required surgery initially. Only one patient was started on antibiotics upon discharge, but this was because of a urinary tract infection (UTI) diagnosed after admission. The median follow up was 16.8 months, with a minimum follow up period of 6 months. During this time, there were 10 returns to the ED made by 9 patients who required general surgery consultation owing to clinical and radiological features concerning for appendicitis (Table 2). Of these 9 patients, 2 underwent immediate laparoscopic appendectomy for acute abdominal pain and localized tenderness suspicious for appendicitis, of which only 1 had pathology showing acute appendicitis. A third patient had an appendectomy almost 1 year later for acute appendicitis (which was confirmed on pathology) while a fourth had an interval appendectomy. None of the children who returned and eventually underwent appendectomy had fecaliths on initial US. During the follow up period, there were no cases of missed or perforated appendicitis.

Table 1

Demographic, clinical features, laboratory and imaging findings in study patients.

Variable	Patients (N = 31) % (n)
Mean Age in years (sd)	11.3 (3.8)
Sex	
Male	45.2 (14)
Female	54.8 (17)
Symptom duration	
<24 h.	36.7 (11)
24–47 h.	16.7 (5)
>48 h.	46.7 (14)
Temperature ≥ 38.0	
Yes	23.1 (6)
No	76.9 (20)
If yes, average temperature (sd)	38.7 (0.8)
Vomiting	
Yes	26.7 (8)
No	73.3 (22)
Focal tenderness at time of assessment	
Yes	16.7 (5)
No	83.3 (25)
Abdominal pain at time of assessment	
Yes	36.7 (11)
No	63.3 (19)
Average leukocytes (sd)	9.8 (5.1)
CRP ≥ 5	
Yes	46.2 (12)
No	53.8 (14)
If yes, average CPR (sd)	27.0 (20.9)
US findings	% (n)
Average maximum diameter (mm) of appendix (sd)	6.93 (1.6)
Hyperechoic fat	20.0 (6)
Free fluid	50.0 (15)
Fecalith	6.7 (2)
Lymph nodes	30.0 (9)
Hyperemia	30.0 (9)

3. Discussion

The increasing use of imaging on almost all children presenting to the ED with abdominal pain has resulted in more frequent surgical consultations for possible appendicitis and discrepancies between ultrasound and clinical findings. Our study highlights the importance of overall clinical judgment when determining whether a child initially suspected to have appendicitis based on a positive US by size criteria,

Table 2

Patients assessed by pediatric surgery after returning to the emergency department for possible acute appendicitis.

Patient #	Interval (days)	Disposition	Pathology
1	5	Discharged	
1 ^a	301	Laparoscopic appendectomy	Acute appendicitis
2	158	Admitted	
3	1	Discharged	
4	370	Discharged	
5	3	Discharged	
6	5	Laparoscopic appendectomy	Acute appendicitis
7	1	Discharged	
8	1	Laparoscopic appendectomy	Normal appendix
9	128	Elective laparoscopic appendectomy	Normal appendix

^a Represents second presentation to emergency department.

Download English Version:

<https://daneshyari.com/en/article/8810308>

Download Persian Version:

<https://daneshyari.com/article/8810308>

[Daneshyari.com](https://daneshyari.com)