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Current management of appendicitis at a community center—how can we improve?

Hannah G. Piper, M.D.*, Conrad Rusnak, M.D., William Orrom, M.D., Allen Hayashi, M.D., Johann Cunningham, M.D.

Department of Surgery, University of British Columbia and the Vancouver Island Health Authority, 1477 W 15th Ave., Suite 203, Vancouver, British Columbia, Canada V6H 1S4

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Abstract

BACKGROUND: Controversies regarding the diagnosis and treatment of appendicitis remain. Practices and outcomes at a community center including imaging, timing of surgery, and surgical technique are reported.

METHODS: From January to July 2006, 134 patients undergoing appendectomy in Victoria, British Columbia, were reviewed. Accuracy of preoperative imaging, time from the emergency room to the operating room, length of stay, and early complications were analyzed. Patients with and without perforation were compared using sample *t* tests.

RESULTS: Preoperative computed tomography was obtained for 101 patients (75%) with a negative appendectomy rate of 3% versus 10% for patients without imaging. Imaging did not prolong the time to surgery (11.8 vs 10.9 h, $P = .48$). Patients with perforation stayed in the hospital significantly longer and had more complications.

CONCLUSIONS: The liberal use of computed tomography resulted in fewer negative appendectomies without a significant delay to surgery. Patients with perforation had increased complications and longer hospitalizations. Efforts should be made to identify and treat early appendicitis.

Appendicitis remains the most common abdominal surgical emergency in North America, however, general surgeons continue to be challenged by the disease. The quest to improve on traditional methods of diagnosis and treatment has led to a number of debates in the management of appendicitis. With the widespread use of computed tomography (CT) within most emergency departments, what used to be largely a clinical diagnosis has become one that frequently relies on imaging. Although in general this has reduced the negative appendectomy rate, the cost in terms of delay to definitive care and radiation exposure needs to be considered. Concern for limited operating room resources and surgeon work hours has opened the discussion as to whether surgery can be delayed safely during the night, while administering antibiotics. Finally, in many centers laparoscopic appendectomy has become the norm. Surgeons who continue to perform open surgery must show equivalent outcomes in regards to length of stay and return to normal activities, and surgeons who perform laparoscopy must guarantee safety in the setting of perforation.

In community hospitals where a significant number of appendectomies are performed annually, the potential exists to set the standards for diagnosis and treatment. This study sought to identify the current practices at a busy community

* Corresponding author. Tel.: +1-778-233-8435; fax: +1-604-875-4036.

E-mail address: hgpiper@interchange.ubc.ca

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Table 1 Clinical parameters on presentation for patients undergoing appendectomy

Mean ± SD	All patients (n = 134)	Perforation according to surgeon (n = 52)	Perforation based on pathology (n = 20)	Without perforation (n = 70)	Without appendicitis (n = 12)
WBC count (×100,000)	13.4 ± 4.0	14.4 ± 4.0*	14.1 ± 3.6*	12.6 ± 4.0	12.0 ± 2.0
Temperature	37.2 ± .9	37.4 ± .9*	37.4 ± .9*	37.0 ± .8	37.2 ± 1.1
Heart rate	92 ± 18	97 ± 16*	96 ± 18*	89 ± 19	81 ± 16

*$P < .05$, comparing perforated with nonperforated or without appendicitis.

center and compare them with published data with the goal of identifying strengths and areas for improvement in this setting.

Methods

All patients who underwent urgent appendectomy between January 1, 2006, and June 30, 2006, at either the Victoria General Hospital or the Royal Jubilee Hospital in Victoria, British Columbia, were included in the study. Patients undergoing incidental appendectomy were excluded. A retrospective review of patient charts was performed for the following data: time of presentation to the emergency room, initial core body temperature, heart rate and white blood cell (WBC) count at the time of presentation, preoperative imaging studies, time to arrival to the operating room, surgical findings, type of surgery performed, pathology, early postoperative complications, and length of hospital stay. Patients were defined as having perforated appendicitis if this was documented in the pathology report or if the surgeon described perforation in the surgical dictation. The elapsed time interval from presentation to the emergency room to arrival in the operating room was calculated to the nearest tenth of an hour. Comparisons were made for the time to the operating room for patients with and without perforation and for patients who had preoperative imaging versus those who did not. Negative appendectomy rates were calculated for patients with and without preoperative imaging. Outcomes analyzed included postoperative complications within the fist 6 months and length of stay. Outcomes were compared for patients with and without perforation and for patients who had open versus laparoscopic surgery. The data were analyzed with the Student *t* test using a statistical package (SPSS for Windows version 12.0.1; SPSS, Chicago, IL). *P* values less than .05 were considered statistically significant.

Results

A total of 134 patients underwent urgent appendectomy between January 1, 2006, and June 30, 2006 at the 2 community hospitals in Victoria. This included 67 males (50%) and 67 females (50%) with an average age of 37 years (range, 5–86 y). There were 18 patients younger than the age of 16 years. Twelve patients did not have appendicitis on pathologic review, for an overall negative appendectomy rate of 9%. Twenty patients (15%) were diagnosed with perforated appendicitis based on pathology compared with 52 patients (43%) determined to have perforated appendicitis according to the surgeon's evaluation in the operating room. Patients with perforation as defined by pathology or by the surgeon were found to have a significantly higher WBC count, core body temperature, and heart rate at the time of presentation in the emergency room compared with patients without perforation or without appendicitis (Table 1).

Preoperative CT scans were obtained in 75% of patients. Of the patients found to have acute appendicitis on CT, 3 were not found to have appendicitis at the time of surgery, for a negative appendectomy rate of 3%. The negative appendectomy rate for patients who did not have preoperative imaging was 10%. In addition, another 6 patients underwent negative appendectomy after having preoperative imaging showing a normal appendix. Only 50% of patients younger than the age of 16 had preoperative CT scans compared with 80% of patients older than the age of 16. The time interval from presentation in the emergency room to surgery did not differ significantly for patients with or without perforation or for patients who had preoperative imaging versus those who did not (Table 2). Sixty-four patients (48%) were taken to the operating room during the night, between the hours of 10:00 PM and 7:00 AM, and a total of 28 patients (21%) had their surgeries within 8 hours. The majority of these patients (86%) presented to the emergency room between the hours of 2:00 PM and 8:00 PM.

Table 2 Time interval from the emergency room to the operating room

Patient group	Average time (range)
All patients from the emergency room to the operating room	11.6 h (2–24 h)
Patients with perforation	11.1 h (4–23 h)
Patients without perforation	12.3 h (2–24 h)*
Patients with imaging	11.8 h (2–24 h)
Patients without imaging	10.9 h (2–23 h)†
Patients with complications	16.0 h (8–24 h)

*$P = .06$, comparing perforated with nonperforated.
†$P = .48$, comparing with and without imaging.