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Outcomes of interval appendectomy in comparison with appendectomy for acute appendicitis

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ABSTRACT

Background: Traditionally, patients treated conservatively for periappendiceal abscess or phlegmon would subsequently undergo interval appendectomy (IA); however, recent evidence has shed doubt on the necessity of this procedure. This study aimed to assess the outcomes of patients who underwent IA, in comparison with those operated acutely for appendicitis.
Materials and methods: A retrospective analysis identified patients who underwent IA between 2000 and 2016. Their course and outcomes were compared with those of our previously published cohort of patients who underwent appendectomy for acute appendicitis.
Results: During the study period, 106 patients underwent IA. Their mean age was 39.7 ± 16.2 y, and 60.4% were females. In their index admission, 75.5% presented with abscesses. IA was performed successfully in all patients, and no patient required colectomy. Pathology demonstrated neoplastic lesions in 6/106, but only one was malignant. IA patients were compared with a cohort of 1649 acute appendectomy patients. This group was significantly younger (33.7 ± 13.3 y). Operation time was comparable between the groups (46.0 ± 26.2 *versus* 42.7 ± 20.9 min, respectively, $P = 0.33$). In the IA group, significantly more laparoscopic operations were performed (100% *versus* 93.9%), but with a higher conversion rate to open (1.9% *versus* 0.13%, $P < 0.001$). Although the overall complication rate was comparable, more intraoperative complications (2.8% *versus* 0.3%, $P < 0.001$) and deep/organ-space surgical site infections (surgical site infection; 4.7% *versus* 1.2%, $P = 0.003$) were reported in the IA group.
Conclusions: IA can be a challenging procedure and should not be performed on a routine basis. However, neoplasia must be actively ruled out, particularly in the older age group.

Introduction

Appendicitis is one of the most common causes of acute abdominal pain, and appendectomy is generally considered the treatment of choice.[1-3] In the United States, the lifetime likelihood of developing appendicitis is 8.6% and 6.7% for males and females, respectively, and the vast majority of cases present acutely, at a relatively early phase of the disease.[4] However, approximately 3.8%-7% of patients present at later stages of the inflammatory process, after the patient's

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defense mechanisms lead to the isolation of the inflammatory process, forming an inflammatory phlegmon or a well-defined periappendiceal abscess.[5-7]

Patients with periappendiceal abscess or phlegmon are commonly treated conservatively with antibiotics and drainage if necessary. This noninvasive approach generally stems from the concern that due to distorted anatomy, acute surgical intervention in these cases may lead to injury of surrounding intra-abdominal structures and possible necessity of performing ileocolic resection or right hemicolectomy.[5,6] Traditionally, these patients would subsequently undergo interval appendectomy (IA), with the objective to prevent recurrence as well as to rule out the possibility of neoplasia or inflammatory bowel disease.[8]

Recent evidence, however, shed doubt on the necessity of IA after successful conservative management of periappendiceal abscess or phlegmon. This alternate approach is supported by evidence of relatively low rates (<10%) of recurrence of appendicitis or abscess after conservative management, as well as reportedly high complication rates in patients undergoing IA, reported in some studies as being as high as 12%-23%.[9-11] In addition, the low rates of neoplasia (2%-5%) and the ability to diagnose these specific cases by follow-up computed tomography (CT) scans and colonoscopy in high-risk patients are utilized as arguments against the performance of IA on a routine basis.[12] Therefore, the "wait-and-see" approach has been adopted by several institutions after successful conservative management of periappendiceal abscess or phlegmon.

The high complication rate in IA is commonly cited as an argument against its performance. However, no studies, to the best of our knowledge have compared the operative and postoperative course of this operation with that of standard appendectomy for acute appendicitis. This comparison could potentially provide the clinician with clear evidence of the operation's technical difficulty and thereby defer him or her from its performance on a routine basis.

At our institution, before 2014, all patients after successful conservative management of periappendiceal abscess or phlegmon were referred for IA 6-12 wk after their index admission. It was in light of the aforementioned arguments against the routine performance of IA that our department policy changed in 2014, to only perform IA selectively in patients with recurrence or with clinical or radiologic suspicion of a neoplastic process.

The objective of this study was to assess the clinical course, outcomes, and final pathology of patients who underwent IA at our institution and to compare their operative and postoperative course to patients operated acutely for uncomplicated appendicitis.

Materials and methods

Following the institutional review board approval, a retrospective analysis was performed of IA cases operated at our institution between January 1, 2000 and December 31, 2016. Included in the analysis were patients aged ≥16 y, who underwent IA after previous conservative management of periappendiceal abscess or phlegmon. Exclusion criteria included patients aged <16 y and patients acutely operated for periappendiceal abscess or phlegmon. This group of IA patients was compared with a previously reported cohort of patients operated for acute appendicitis at our institution with no preoperative diagnosis of periappendiceal abscess.[3]

Relevant data were collected from our computerized medical records. Information reviewed for the IA group included patient demographics, clinical presentation, radiologic evaluation performed and its findings, necessity for drainage, length of stay (LOS), duration of antibiotic treatment, recurrent hospitalizations, performance of colonoscopy and CT after index admission, time until appendectomy, intraoperative findings and complications, postoperative LOS and complications, and final pathological result. For the cohort of patients operated acutely for appendicitis, information regarding demographic and clinical data, radiologic investigations, and operative and postoperative course was collected.

The primary outcome measured was the perioperative and postoperative complication rates in the IA and the acute appendectomy (AA) groups. Secondary outcomes included length of operation, operative approach (open *versus* laparoscopic), rate of conversion from laparoscopic to open surgery, duration of antibiotic therapy, return to emergency room, rehospitalization, and final pathologic result.

To identify differences between the two study groups (IA and AA groups), univariate analysis with *t*-test and chi square was used, and statistical calculations were performed using SPSS (version 20; SPSS, Inc.). $P < 0.05$ was considered statistically significant for all comparisons. Data are presented as the mean or median (standard deviation), as appropriate.

Results

Between January 1, 2000 and December 31, 2016, 149 patients were treated conservatively for periappendiceal abscess or phlegmon. Of these patients, 106 (71.1%) subsequently underwent IA, whereas 43 (28.9%) were not operated. The patients who underwent IA had a mean age of 39.7 ± 16.2 y, and 60.4% were females. The median number of days of illness before presentation was 7 d, and 27.4% of patients had documented fever on presentation. An ultrasound was performed for 46%, while almost every patient underwent a CT (98%). The radiologic investigations demonstrated an abscess in 80/106 patients (75.5%), whereas the remainder were found to have phlegmon without an abscess. The abscesses had a mean diameter of 5.6 ± 2.3 cm, and only 12/106 patients (11.3%) had a radiologically evident appendicolith. Thirty-seven of 80 patients (46.3%) required abscess drainage, and all but three were performed percutaneously (either ultrasound or CT guided). Three patients, however, required surgical drainage of the abscess. The mean length of the initial hospitalization was 7.4 ± 3.0 (range 3-18 d), and the patients received additional antibiotic treatment at home for a mean duration of 5.9 ± 4.4 d (a total of 13.3 ± 4.8 d of antibiotic treatment around the index admission). Table 1 summarizes demographic, clinical, and radiologic features of the IA group on their index admission.

After the index admission, 21/106 (19.8%) of the IA group were rehospitalized before their scheduled operation due to recurrent symptoms. Twenty-two patients (20.8%) underwent colonoscopy between the index admission and the IA, 15