Evaluation of early surgical intervention versus conservative management of appendicular mass

Original Article

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ABSTRACT

Background: The complications of appendicitis with an appendicular mass put the surgeon in a dilemma. Some state that appendectomy should be done early, while others advocate for starting with conservative management. The superiority of either protocol is a matter of debate, with contradictory reports. This study was performed to assess the feasibility and safety of immediate appendicectomy versus interval appendectomy.

Patients and Methods: This is a randomized controlled trial that included patients who presented with an appendicular lump. The study patients were equally randomized into two groups: group A, where patients were scheduled for early surgical invention, and group B, where patients were planned for initial conservative management followed by an interval appendectomy.

Results: This work included 32 patients who were equally enrolled in group A and group B. All patients in the two groups underwent appendectomy without the need for additional bowel resection. The median length of stay was 2.5 days in group A and 9.5 days in group B (*P<0.001*). The mean days to normal activity were 3.5±1.37 in group A and 6.56±3.12 in group B (*P=0.001*). The total number of patients with complications was three in group A (18.75%) and five in group B (31.25%), with a statistically nonsignificant difference (*P=0.414*). No cases of bowel injury or fecal fistulae were encountered in either group.

Conclusion: This study supports the safety and efficacy of immediate appendicectomy, demonstrating a significantly shorter hospital stay, faster recovery, and comparable overall complication rates.

Key Words: Acute appendicitis, appendicular mass, immediate appendectomy, interval appendectomy.

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INTRODUCTION

Acute appendicitis is one of the most common abdominal emergencies worldwide, with a wide spectrum of presentations ranging from mild acute appendicitis to gangrenous appendicitis and fecal peritonitis[1–3]. Identifying complicated cases is crucially important since guidelines propose that patients with complicated appendicitis should be managed with greater urgency[4,5].

When patients with acute appendicitis present after the onset of symptoms by about 2–7 days, complications such as appendicular mass may occur, appendicular masses constitute about 10% of cases presenting with acute appendicitis[6–9]. An appendicular mass could be an appendicular lump or phlegmon, which is an inflammatory mass formed from the inflamed appendix surrounded by the adjacent viscera and greater omentum. Further advancement of the condition can occur with perforation of the appendix and peri-appendicular pus collection that finally leads to an appendicular abscess formation and may further be gangrenous[10,11].

These complications put the surgeon in a dilemma about choosing the appropriate treatment strategy. There has been controversy regarding the optimum management of an appendicular mass. Although surgical treatment with appendectomy is indicated by most surgeons, some state it to be done early (within the first 24 h of diagnosis), while others advocate for starting with conservative management, and then delayed appendectomy is performed after a successful conservative management (within 6–8 weeks after admission), which is called interval appendectomy[12–14]. The superiority of either protocol is a matter of debate, with contradictory reports.

This study was performed to assess the feasibility and safety of immediate appendectomy versus conservative management followed by interval appendectomy for the treatment of acute appendicitis complicated by appendicular mass.

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PATIENTS AND METHODS:

Population of study

This is a randomized controlled trial that was conducted on patients who presented to the Emergency Department of the Surgical Unit at our institution with a clinical picture suggestive of acute appendicitis. The study was conducted per the Declaration of Helsinki after being approved by the regional research ethics committee.

Adult patients who were evidenced by clinical findings, laboratory investigations, and abdominal ultrasound (US) and/or computed tomography (CT) with oral and intravenous contrast to having an inflammatory appendicular mass were eligible for the study. Patients with suspected appendicular abscess, a mass that exceeded 8 cm in the longest diameter, gangrenous appendicitis, or malignant appendicular mass were excluded from the study. Patients who were hemodynamically unstable and pregnant or lactating females were also excluded. Informed written consents were obtained from the included patients or their legal guardians.

Sample size calculation

The sample size was assessed using the G* power 3.1.9.4 software (Universities Kiel, Germany). The calculation was based on the difference in the percentage of patients who achieved improvement after treatment without further intervention, as derived from a similar study[15]. After setting the study power at 80% and α at 0.05, a minimum of 13 patients in each group were required.

Randomization

The study patients were equally randomized into two groups: group A, which included patients who were scheduled for early surgical intervention within 24 h from the time of diagnosis confirmation and admission, and group B, which included patients who were planned for initial conservative management that would be followed by an interval appendectomy after 8 weeks if there was clinical improvement.

Randomization was done for either group using the closed envelope method conducted by an independent colleague.

Surgical intervention

The patients were operated on using an open approach through a lower midline incision within 24 h of admission in group A and after the initial conservative management in group B.

The surgery was performed as established. Under general anesthesia, a lower midline incision was performed. Suction was performed if there was peritoneal fluid. Localization of the ileocecal valve and mobilization of the cecum were done. The inflamed omentum and bowel loops were finely dissected, and adhesiolysis was performed. In some difficult cases, the abdomen was briefly irrigated with warm, sterile normal saline at the site of the adhesions to facilitate their release while following Taenia coli for the identification of the base of the appendicular mass. If the base of the appendicular mass was identified and found to be healthy, then it was crushed with right-angled artery forceps or hemostats. The forceps were placed 1 cm above the base. The base was double-ligated with very gentle handling of the tissues, which were mostly very friable, first proximal to the first crush with an absorbable suture that was held in a clamp or using a stapler on the cecum in a friable (nonhealthy) base. The base was then incised with a sharp blade near the second clamp, and the appendicular mass was removed in a block. Proper hemostasis was ensured, and irrigation of the abdomen with warm saline and the insertion of a pelvic drain was done in all patients. The abdomen was closed in layers, and a dressing was applied.

After surgery, patients were motivated for early mobilization and discharged when they were clinically stable.

Conservative management

Patients in group B were initially kept on conservative treatment per the Ochsner-Sherren regimen[16], which included keeping nil per oral, receiving intravenous fluids, broad-spectrum antibiotics, metronidazole, and analgesics. The patient's clinical condition was monitored daily, and they were discharged after the acute inflammatory state resolved. Patients were re-admitted after 8 weeks and scheduled for an interval appendectomy. If the patient's general condition did not improve and/or the size of the lump increased, or if it progressed to an abscess or diffuse peritonitis (as evidenced clinically or radiologically), then conservative treatment failure was considered, and the patient underwent emergent exploration.

Study outcomes

The outcomes of the current study were the length of hospital stay (LOS), the complication rate in each group, and the rate of medical treatment failure in group B.

Statistical analysis

The patients' data analysis was done using version 28 of the SPSS statistical software (IBM Corp., Armonk, New York, USA). The comparison of the two groups was done according to the data type. A *P value* less than 0.05 was considered statistically significant.

RESULTS:

This work included 32 patients who fulfilled the eligibility criteria and were accepted to participate in the study. The patients were equally enrolled in group A and group B. The patients' ages ranged from 18 to 59 years in group A and from 18 to 52 years in group A, with mean ages of 31.06±10.46 and 28.88±15.11, respectively. Males constituted 43.7% of group A (n=7) and 68% of group B (n=11). No statistically significant differences were found between the two groups in the age (*P=0.637*) or the sex distribution (*P=0.154*) (Table 1).

The study patients clinically presented with right iliac fossa pain (14 patients in group A; 87.5% and 12 patients in group B; 75%, *P=0.365*), vomiting (12 patients in group A; 75% and 12 patients in group B; 75%, *P=1.0*), diarrhea (six patients in group A; 37.5% and seven patients in group B; 43.75%, *P=0.719*), fever (four patients in group A; 25% and four patients in group B; 25%, *P=1.0*), and anorexia (10 patients in group A; 62.5% and 10 patients in group B; 62.5%, *P=1.0*). The mean duration of the symptoms was 8.31±2.7 days in group A and 9.5±3.67 days in group B (Table 1).

General clinical examination of the patients revealed that the mean pulse rate was 93.25±7.71 bpm in group A and 97.75±10.18 in group B (*P=0.169*), the mean systolic blood pressure was 121.88±10.63 and 121.88±11.24 in the two groups, respectively (*P=1.0*), and the mean diastolic blood pressure was 71.88±7.27 and 75.94±10.04 in the two groups, respectively (*P=0.210*) (Table 1).

Abdominal US showed appendicular masses in 11 (68.75%) patients in group A and 12 (75%) patients in group B, while CT examination was conclusive in all patients of the two groups (100%), with a statistically nonsignificant difference (*P=0.694* and 1.0, respectively) (Table 1).

Laboratory assessment demonstrated leukocytosis in 12 (75%) patients in group A and 14 (87.5%) patients in group B, with a statistically nonsignificant difference (*P=0.365*) (Table 1).

All patients in the two groups underwent appendectomy without the need for additional bowel resection. The LOS ranged from 2 to 3 days in group A, with a median of 2.5 days, and from 2 to 33 days, with a median of 9.5 days in group B, denoting a significantly longer stay length in group B (*P<0.001*) (Table 2).

The mean days to normal activity were 3.5±1.37 in group A and 6.56±3.12 in group B, with a statistically significant difference (*P=0.001*) (Table 2).

The patients' complications were intraperitoneal abscess (one patient in group B; 6.25% and none of the patients in group A, *P=0.310*), septicemia (one patient in group A; 6.25% and one patient in group B; 6.25%, *P=1.0*), and wound infection (two patients in group A; 12.5% and three patients in group B; 18.75%, *P=0.626*). The total number of patients with complications was three (18.75%) in group A and five (31.25%) in group B, with a statistically nonsignificant difference (*P=0.414*). No cases of bowel injury or fecal fistulae were encountered in either group (Table 2).

The patient with intraperitoneal abscess formation in group B was diagnosed on the sixth day of treatment with deterioration of the clinical condition and confirmation with the abdominal US. The patient underwent an emergency appendectomy.

Table 1: Baseline and clinical of the study patients

Parameters	Group A (*N*=16)	Group B (*N*=16)	*P* value
Age (years): range,	18–59	18–52	0.637
Mean±SD	31.06±10.46	28.88±15.11	
Sex distribution: *n* (%)			
Males	7 (43.75)	11 (68.75)	0.154
Females	9 (56.25)	5 (31.25)	
Clinical presentation: *n* (%)			
Right iliac fossa pain	14 (87.5)	12 (75)	0.365
Vomiting	12 (75)	12 (75)	1.0
Diarrhea	6 (37.5)	7 (43.75)	0.719
Fever	4 (25)	4 (25)	1.0
Anorexia	10 (62.5)	10 (62.5)	1.0
Pulse rate (bpm)	93.25±7.71	97.75±10.18	0.169
Systolic BP	121.88±10.63	121.88±11.24	1.0
Diastolic BP	71.88±7.27	75.94±10.04	0.210

Leukocytosis	12 (75)	14 (87.5)	0.365
Appendicular mass (US)	11 (68.75)	12 (75)	0.694
Appendicular mass (CT)	16 (100)	16 (100)	1.0

Table 2: Surgical and postoperative outcomes

Outcome	Group A (*N*=16)	Group B (*N*=16)	*P* value
Length of stay (days)	Median: 2.5	Median: 9.5	<0.001
Days to normal activity	3.5±1.37	6.56±3.12	0.001
Complications (*n*, %)	3 (18.75)	5 (31.25)	0.414
Intraperitoneal abscess	0	1 (6.25)	0.310
Septicemia	1 (6.25)	1 (6.25)	1.0
Wound infection	2 (12.5)	3 (18.75)	0.626
Bowel injury or fecal fistulae	0	0	–

DISCUSSION

The decision about immediate versus interval appendicectomy should consider efficacy and safety. Classically, an appendicular lump should be managed conservatively per the Ochsner-Sherren regime and not operated on. This is based on the assumption that surgery in this complicated acute condition is unsafe, with risks of accidental bowel injury and propagation of the infection process. Moreover, due to the difficult identification of the appendix within the conglomerated bowel, resection of adjacent bowel loops may be inadvertent[12–14,16].

Currently, with the advancement of surgical expertise and anesthesia techniques, advocates for early appendectomy presume that such an approach would reduce hospital stays and prevent the need for hospital re-admission. Early appendectomy confirms the diagnosis and is safe and curative[12–14]. Additionally, interval appendectomy with initial conservative management may pose certain risks, such as appendicitis recurrence or the development of more advanced complications over time[12–14].

In this study, we compared the outcomes of early versus interval appendectomy. Patients with more advanced masses were excluded. During emergent appendectomy, careful adhesiolysis was done to identify the appendix and preclude the resection of adjacent bowel loops, bowel injury, or fistula formation. The LOS was a key parameter evaluated in both groups. The median LOS was 7 days longer in the group treated conservatively than that treated with an early appendectomy. This denotes that prompt surgical intervention was associated with faster resolution of appendicitis-related issues. These findings are consistent with Pandey *et al*.[17] and Tarar *et al*.[18], who reported a significant prolongation of the hospital stay in the group that underwent initial conservative management. Also, Patel and Patel[19], Khan *et al*.[20], Singh and Rani[21], and Das *et al*.[22] found a significantly higher percentage of patients requiring shorter LOS in the group who underwent emergent surgery than those who began with conservative treatment.

Furthermore, the present study showed that immediate appendicectomy offered a more rapid recovery and return to usual activities. Similarly, in the study of Abdulraheem and Amer[15], the number of patients who achieved functional improvement was significantly higher in the emergent appendectomy group. Early return to work, together with the shorter LOS, would result in reduced healthcare costs and improved patient satisfaction.

The current work showed that both groups were comparable in the complication rate, with a higher rate of complication seen in the interval appendectomy group, however, without statistical significance. This was also shown in the studies of Tarar *et al*.[18] and Singh and Rani[21] which showed an interval appendectomy-associated higher complication rate.

On the other hand, the meta-analysis study of Simillis *et al*.[23] reported that patients treated with a conservative regimen followed by interval appendectomy had comparable LOS to those treated with urgent appendectomy with fewer complications. Similar data were reported by van Amstel *et al*.[24], based on their meta-analysis study, and they concluded that interval appendectomy after conservative treatment should be the treatment of choice for patients with appendicular masses.

The drawback of these two meta-analyses is that almost all the included studies were retrospective. This raises a crucial consideration regarding the impact of study design on the observed outcomes in acute appendicitis. Being retrospective real-world

experience, where acute appendicitis, a common emergency condition, is usually managed by junior surgeons, this could account for the higher postoperative complication rates. This is further emphasized when most of the prospective studies demonstrated immediate appendectomy-related better outcomes[15,18,20–22]. The acknowledgment of the potential benefits associated with urgent appendectomy in the hands of experienced surgeons suggests a tailored approach to clinical decision-making. For such a complicated condition, clinicians may consider the urgency of intervention in conjunction with the surgeon's experience level to optimize outcomes.

It is worth noting that, coinciding with the ongoing rise in the incidence of cancer colon, reports indicate that 5.9–12% of patients with appendicular masses have colon cancer[25,26]. Therefore, in view of the faster patients' recovery and the comparable complications rate, we believe that urgent appendectomy should be prioritized as the treatment of choice to avoid the potentiality of delayed diagnosis or missing a hidden pathology such as malignancy[27–29].

The present study is limited by the relatively small sample size. Also, the study investigated a unique population with the inclusion of cases with appendicular lumps or phlegmons only.

The study, however, is strengthened by being a randomized controlled trial that addressed an issue that is still a matter of wide debate. Further prospective research with larger sample sizes and long-term follow-up is warranted to validate these findings and inform evidence-based clinical decision-making in the management of appendicitis with appendicular mass.

CONCLUSION

This study supports the safety and efficacy of immediate appendicectomy, demonstrating a significantly shorter hospital stay and faster recovery. The comparable overall complication rates between the immediate and interval groups, albeit slightly higher in the latter, underscore the importance of careful consideration in clinical decision-making.

CONFLICT OF INTEREST

There are no conflicts of interest.

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