E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.48047/ijprt/16.01.163

Research Article

Early Appendectomy versus Conservative Management with Interval Appendectomy in Complicated Appendicitis: A Prospective Comparative Study

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ABSTRACT

Background: Management of complicated appendicitis remains controversial, with treatment options including early appendectomy and conservative therapy followed by interval appendectomy. Identifying the optimal approach is essential to reduce morbidity and improve patient outcomes. **Aim and Objectives:** To compare the clinical characteristics, intraoperative findings, and postoperative outcomes between early appendectomy and conservative management with interval appendectomy in patients with complicated appendicitis. **Materials and Methods:** This prospective comparative study included 120 patients diagnosed with complicated appendicitis. Patients were divided into two groups: Group I (n=60) underwent early appendectomy within 24 hours of admission, and Group II (n=60) received conservative management followed by interval appendectomy. Clinical, intraoperative, and postoperative parameters were analyzed. Statistical analysis was performed using the Chi-square test for categorical variables and the unpaired t-test for continuous variables, with $p<0.05$ considered statistically significant. **Results:** Baseline clinical characteristics were comparable between the two groups ($p>0.05$). Group I demonstrated lower incidences of simple mass (33.3% vs. 38.3%), appendicular abscess (10.0% vs. 18.3%), and adhesions (21.7% vs. 26.7%), though these differences were not statistically significant. Intraoperative complications such as bleeding, bowel trauma, and adhesions were slightly lower in Group I ($p>0.05$). However, the mean operative time was significantly shorter in Group I (90.6±4.7 minutes) compared to Group II (105.2±5.1 minutes)

(p<0.001). Postoperative complications, including wound infection (20.0% vs. 26.7%) and residual abscess (10.0% vs. 16.7%), were lower in Group I but not statistically significant. The mean hospital stay was significantly shorter in Group I (6.81±2.1 days vs. 8.1±2.9 days; p=0.01). **Conclusion:** Early appendectomy is a safe and effective approach in the management of complicated appendicitis, offering shorter operative time and reduced hospital stay, with a trend toward fewer complications compared to conservative management with interval appendectomy.

Keywords:
Complicated appendicitis, early appendectomy, interval appendectomy, conservative management, postoperative outcomes

INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies encountered in general surgical practice. In a subset of patients, delayed presentation or progression of inflammation results in the formation of an appendicular mass, which is a localized inflammatory phlegmon comprising the appendix, omentum, and adjacent bowel loops. The reported incidence of appendicular mass ranges from 2% to 6% of all cases of acute appendicitis and represents a significant management challenge [1,2].

Traditionally, appendicular mass has been managed conservatively using the Ochsner–Sherren regimen, which includes bowel rest, intravenous fluids, broad-spectrum antibiotics, analgesics, and close clinical monitoring. This approach aims to allow resolution of inflammation while avoiding the potential risks associated with emergency surgery in an inflamed and distorted operative field. Success rates of conservative management have been reported to be between 80% and 90% [3,4].

However, the necessity of routine interval appendectomy following successful conservative treatment remains controversial. Proponents argue that it prevents recurrence, eliminates the risk of missed appendiceal pathology (including neoplasms), and provides definitive treatment [5,6]. In contrast, opponents suggest that routine interval appendectomy may subject many patients to unnecessary surgery, increased healthcare costs, and avoidable morbidity, especially given the relatively low recurrence rates [7,8]. Recent evidence supports a more selective approach, recommending interval appendectomy only in patients who develop recurrent symptoms. Recurrence rates following conservative management range from 5% to 20%, with most recurrences occurring within the first year [9,10]. Advances in diagnostic imaging, antibiotic therapy, and minimally invasive surgical techniques have further influenced evolving treatment strategies.

Despite numerous studies, there remains no clear consensus regarding the optimal management of appendicular mass. While conservative treatment has traditionally been favored, early appendectomy is increasingly being explored as a viable alternative. Concerns regarding early surgery include technical difficulty, increased operative time, and risk of complications such as fecal fistula [11,12]. Conversely, conservative management carries risks of treatment failure, recurrent appendicitis, delayed diagnosis of underlying pathology (e.g., malignancy, Crohn's disease), and patient non-compliance with follow-up [13–15].

In rural settings, additional challenges such as loss to follow-up and refusal of

interval appendectomy after symptom resolution further complicate management decisions. Moreover, conditions such as ileocecal tuberculosis, which are prevalent in certain populations, may mimic appendicular mass and lead to diagnostic uncertainty. Therefore, the present study was undertaken to compare early appendectomy with conservative management followed by interval appendectomy, with the aim of evaluating the feasibility, safety, and outcomes of early surgical intervention in patients with complicated appendicitis.

MATERIALS AND METHODS

Study Design and Setting

This prospective, comparative study was conducted on 120 patients diagnosed with appendicular mass in the Department of Surgery at NC Medical College and Hospital, Israna, Panipat, Haryana.

Inclusion Criteria

- Patients aged 20–70 years of either gender
- Clinically and radiologically diagnosed cases of appendicular mass

Exclusion Criteria

- Patients with American Society of Anesthesiologists (ASA) grade III and IV [16]
- Patients with abdominal malignancy
- Patients with a history of failed conservative management for appendicitis within the previous six months

Study Protocol

After obtaining approval from the Institutional Ethics Committee, all eligible patients were enrolled in the study. A detailed clinical evaluation was performed for each patient. Laboratory investigations included collection of 5 mL of peripheral venous blood for biochemical analysis. Additional investigations included urinalysis, stool examination for parasitic infestation, abdominal ultrasonography, and plain abdominal X-ray to confirm the diagnosis and assess the nature of the appendicular mass. Patients were randomly divided into two equal groups (n = 60 each):

Group I (Early Appendectomy):

Patients underwent appendectomy within 24 hours of admission under general anesthesia.

Group II (Conservative Management with Interval Appendectomy):

Patients were managed conservatively with hospitalization, intravenous fluids, broad-spectrum antibiotics (Cefuroxime and Metronidazole), and analgesics. Clinical parameters and progression of the mass were monitored regularly. Patients were discharged after resolution of the inflammatory mass and were readmitted after 8–12 weeks for interval appendectomy.

Operative parameters such as operative difficulty and duration of surgery, as well as postoperative outcomes including complications, duration of hospital stay, and patient compliance, were recorded, analyzed, and compared between the two groups.

The study protocol adhered to the principles of the Helsinki Declaration [17]. Written informed consent was obtained from all participants prior to inclusion in the study.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 29.0 (IBM, Chicago, USA). Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation (SD). The Chi-square test was used for comparison of categorical variables, and the unpaired t-test was applied for continuous variables. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Distribution of clinical characteristics among studied patients

Variable	Group 1 (n=60)	%	Group 2 (n=60)	%	P-value
Simple Mass	20	**33.3%**	23	**38.3%**	**0.56**
Perforated Appendix	12	20.0%	8	13.3%	0.32
Loculated Pus Collection	9	15.0%	13	21.7%	0.34
Appendicular Abscess	6	10.0%	11	18.3%	0.19
Adhesions	13	21.7%	16	26.7%	0.53
Enterobius vermicularis	4	6.7%	6	10.0%	0.51
Intussusception	3	5.0%	4	6.7%	0.69
Readmission to Hospital	5	8.3%	8	13.3%	0.37
Gangrenous Appendix	7	11.7%	10	16.7%	0.44

The distribution of clinical characteristics was comparable between the two groups. Patients in Group I (early appendectomy) demonstrated lower frequencies of simple mass (33.3%), loculated pus collection (15.0%), appendicular abscess (10.0%), adhesions (21.7%), Enterobius vermicularis infestation (6.7%), intussusception (5.0%), readmission (8.3%), and gangrenous appendix (11.7%) compared to Group II (conservative management with interval appendectomy). However, a higher proportion of perforated appendix cases was observed in Group I (20.0%) compared to Group II (13.3%). Despite these differences, no statistically significant differences were observed between the groups for any of the clinical variables ($p > 0.05$), indicating comparable baseline disease characteristics.

Table 2: The operation variables among operated patients

Variable	Group 1 (n=60)	%	Group 2 (n=60)	%	P-value
Bleeding	9	15.0%	11	18.3%	0.63
Mild Trauma to the Bowel	6	10.0%	7	11.7%	0.77
Difficulty with Adhesions	14	23.3%	16	26.7%	0.67
Time of Operation (Mean±SD)	90.6 ± 4.7	—	105.2 ± 5.1	—	<0.001

Operative outcomes favored Group I. The incidence of intraoperative complications such as bleeding (15.0% vs. 18.3%), mild bowel trauma (10.0% vs. 11.7%), and difficulty due to adhesions (23.3% vs. 26.7%) was lower in Group I compared to Group II. However, these differences were not statistically significant ($p > 0.05$). Importantly, the mean duration of surgery was significantly shorter in Group I (90.6 ± 4.7 minutes) compared to Group II (105.2 ± 5.1 minutes), and

this difference was highly statistically significant ($p < 0.001$).

Table 3: The problems observed after surgical operation among operated patients

Variable	Group 1 (n=60)	%	Group 2 (n=60)	%	P-value
Wound Infection	12	20.0%	16	26.7%	0.38
Residual Abscess	6	10.0%	10	16.7%	0.28
Hospital Stay (Mean±SD)	6.81 ± 2.1	—	8.1 ± 2.9	—	0.01

Postoperative complications were comparatively lower in Group I. The incidence of wound infection (20.0% vs. 26.7%) and residual abscess (10.0% vs. 16.7%) was reduced in Group I compared to Group II, although these differences were not statistically significant ($p > 0.05$). The mean hospital stay was significantly shorter in Group I (6.81 ± 2.1 days) compared to Group II (8.1 ± 2.9 days), with a statistically significant difference ($p = 0.01$).

DISCUSSION

The present study compared early appendectomy with conservative management followed by interval appendectomy in patients with complicated appendicitis. The findings indicate that early surgical intervention is associated with better operative and postoperative outcomes, despite comparable baseline clinical characteristics between the two groups. Conservative management has traditionally been considered the standard treatment for appendicular mass. However, failure rates of 2–4% have been reported, prompting the search for more effective alternatives that reduce complications, hospital stay, morbidity, and overall healthcare burden [18]. Delayed presentation is widely recognized as a major factor contributing to the formation of appendicular mass [19].

In the present study, patients undergoing early appendectomy demonstrated lower incidences of simple mass, loculated pus collection, appendicular abscess, adhesions, parasitic infestation (Enterobius vermicularis), intussusception, readmission, and gangrenous appendix compared to those managed conservatively. However, perforated appendix was more frequently observed in the early appendectomy group, likely reflecting greater disease severity at presentation.

Intraoperative findings favored early appendectomy, with fewer complications such as bleeding, bowel trauma, and difficulty due to adhesions. Although these differences were not statistically significant, the operative time was significantly shorter in the early appendectomy group, suggesting that delayed intervention increases technical difficulty due to fibrosis and distorted anatomy. Postoperatively, early appendectomy was associated with fewer complications, including wound infection and residual abscess formation, although these differences did not reach statistical significance. Importantly, the hospital stay was significantly shorter in the early appendectomy group, indicating faster recovery and reduced healthcare utilization.

These findings are consistent with previous studies. Agarwal and Agarwal (2017) reported fewer postoperative complications, shorter hospital stays, and earlier return to work with early appendectomy [19]. Patel and Patel [18] also demonstrated that early exploration is safe, cost-effective, and eliminates the need for readmission.

Kumar et al. [20] noted that interval appendectomy is associated with increased operative difficulty due to adhesions and bleeding. Similarly, Das et al. [21] supported the safety of early appendectomy with improved surgical techniques and perioperative care. Tarar et al. [22] observed prolonged hospitalization with conservative management.

Conversely, some studies advocate conservative management. Elsaady [23] reported that conservative treatment is safe and effective, with low recurrence rates that may not justify routine interval appendectomy. Demetrashvili et al. [12] also suggested that conservative management without interval surgery may be preferred, reserving surgery for recurrent cases. However, conservative treatment carries the risk of delayed diagnosis of underlying conditions such as malignancy or Crohn's disease, emphasizing the importance of follow-up investigations such as CT scan and colonoscopy [24,25]. Variations among studies may be attributed to differences in study design, sample size, disease severity, institutional protocols, surgeon expertise, and patient follow-up. The strengths of the present study include structured group comparison and evaluation of multiple clinical and operative parameters. However, limitations include the single-center design and relatively small sample size, which may limit generalizability. Larger multicenter studies are required to establish definitive treatment guidelines.

CONCLUSION

Early appendectomy in patients with appendicular mass is a safe and effective treatment strategy, associated with shorter operative time, reduced hospital stay, and a trend toward fewer complications compared to conservative management with interval appendectomy. It also reduces the need for readmission and facilitates earlier return to daily activities. Therefore, early surgical intervention may be considered a preferable approach in the management of complicated appendicitis, particularly when adequate surgical expertise and perioperative care are available.

Conflicts of Interest

The author has no conflicts of interest to be presented.

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