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RESEARCH ARTICLE

Clinical Outcomes of Early Versus Interval Appendicectomy in Appendiceal Mass: A Study of 100 Patients

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Abstract

Background: Appendiceal mass is a well-recognized complication of delayed or progressive acute appendicitis, commonly seen when inflammatory response results in a localized phlegmon or abscess. Management remains controversial, with two primary strategies widely practiced: Early Appendicectomy (EA) performed at initial presentation, and Interval Appendicectomy (IA) following initial conservative treatment and delayed elective surgery. International variability in resource settings, surgeon preference, and diagnostic availability contributes to the ongoing debate over optimal care.

Objective: To compare clinical outcomes of EA and IA in patients presenting with appendiceal mass, with particular focus on operative difficulty, postoperative complications, hospital stay, recurrence, and overall morbidity.

Methods: A prospective observational study was conducted on 100 patients aged ≥15 years diagnosed with appendiceal mass at Dept. of Urology, Dinajpur Medical College andHospital, Bangladesh from January 2023 to December 2024. Patients were grouped into EA (n=50), who underwent surgery within 24–72 hours of admission, and IA (n=50), managed initially with antibiotics and supportive care followed by elective appendicectomy 6–8 weeks later. Data collection included demographic profile, operative findings, complication rates, recurrence during waiting period, and length of hospital stay. Statistical analysis was performed using SPSS version 25, with significance determined at $P < 0.05$.

Results: Operative difficulty was significantly higher in the EA group, with 82% demonstrating dense adhesions and 14% requiring conversion to open surgery. IA patients showed fewer operative complications (4% vs. 16%), shorter total hospital stay (5.8 ± 1.9 vs. 7.4 ± 2.3 days), and lower postoperative wound infection rate (6% vs. 12%). Recurrence occurred in 10% of IA patients during conservative waiting, though most were managed medically.

Conclusion: Interval appendicectomy following initial conservative therapy is associated with reduced operative morbidity, shorter recovery time, and easier surgical dissection, making it a preferable strategy in most cases. Early appendicectomy may be reserved for selected patients demonstrating clinical deterioration or failure of conservative management.

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1. Introduction

Acute appendicitis remains one of the most common surgical emergencies worldwide, with lifetime incidence estimated at approximately 7–10% in the general population [1]. Among cases of appendicitis, a subset of patients — particularly those who present late or have progressive inflammation — develop an appendiceal mass or phlegmon, which represents a localized complication where omentum and bowel adhere to the inflamed appendix, walling off perforation and limiting spread of infection [2]. Appendiceal mass accounts for approximately 2–6% of appendicitis cases and poses a unique clinical challenge as the management strategy is markedly different from simple appendicitis [3]. Traditionally, management pathways have been divided between two distinct treatment philosophies: Early Appendicectomy (EA) and Interval Appendicectomy (IA). EA refers to surgical removal of the appendix at the time of initial presentation despite the presence of inflammation, adhesions, and potential abscess formation. This approach was first widely adopted in the early 20th century when immediate removal of the diseased organ was viewed as critical to preventing complications such as rupture, generalized peritonitis, and mortality [4]. However, high complication rates, technical difficulty, and postoperative morbidity associated with EA in the inflamed tissue environment gradually led to reconsideration of this strategy. Conversely, IA was championed by Ochsner and later McArthur, who advocated for initial conservative management using antibiotics, hydration, analgesia, and allowing time for inflammation to subside before surgery is scheduled 6–8 weeks later, once conditions are more favorable [5]. This conservative-first approach was based on observed evidence that many appendiceal masses undergo spontaneous resolution with nonoperative therapy, thereby avoiding potentially hazardous emergency surgery.Modern imaging modalities such as ultrasound and computed tomography (CT) have greatly enhanced diagnostic accuracy, enabling early differentiation between phlegmon and perforated abscess and influencing treatment planning [6]. Moreover, minimally invasive techniques such as laparoscopic appendicectomy have changed the surgical landscape, potentially reducing morbidity associated with early intervention. Yet, despite technological and clinical advancements, considerable debate persists globally regarding the optimal timing of appendicectomy for cases with appendiceal mass.The concern surrounding IA lies primarily in the potential for recurrence of appendicitis during the waiting period, with recurrence rates ranging between 10–20% in published literature [7]. Conversely, EA is criticized for increased risk of bowel injury, extended operative time, surgical site infections, adhesions, and conversion to open surgery due to obscured anatomical planes [8].Given the global variation in practice and lack of consensus in low-resource settings, especially in South Asian countries such as Bangladesh, comparative studies are essential for evaluating outcomes based on locally available resources, surgeon expertise, and patient presentation profile. Thus, this study was conducted with the primary objective of comparing EA and IA in patients with appendiceal mass to evaluate differences in operative difficulty, complication rate, recurrence, hospital stay, and overall morbidity.

2. Materials and Methods

This study was designed as a prospective observational cohort study conducted at the Dept. of Urology, Dinajpur Medical College and Hospital, Bangladesh from January 2023 to December 2024. Ethical approval was obtained from the Institutional Review Board prior to commencement, and informed written consent was obtained from all participating subjects or their guardians when applicable. A total of 100 patients who presented with an appendiceal mass diagnosed clinically and radiologically were included in this study.

2.1 Study Population and Sampling

Patients aged 15 years and above presenting with right lower quadrant abdominal pain and a palpable mass suggestive of appendiceal phlegmon or abscess were screened. Clinical diagnosis was confirmed through abdominal ultrasonography in all cases, and computed tomography (CT) abdomen was used selectively when diagnostic uncertainty existed. Using purposive sampling, 100 eligible patients were recruited and divided into two study groups:

- ***Group A: Early Appendicectomy (EA)*** – 50 patients underwent appendicectomy within 24–72 hours of admission after initial stabilization.

- **Group B: Interval Appendicectomy (IA)** – 50 patients were treated conservatively initially and underwent elective appendicectomy 6–8 weeks later.

2.2 Inclusion and Exclusion Criteria

Patients were included if they were ≥15 years old, clinically stable, and had clearly identified appendiceal mass confirmed on imaging. Exclusion criteria included: diffuse peritonitis requiring emergency laparotomy, appendicular abscess >6 cm requiring urgent drainage, pregnancy, previous abdominal surgery, immunocompromised state, severe comorbidities disqualifying surgery, and failure to consent.

2.3 Treatment Protocols

For the EA group, preoperative resuscitation included intravenous fluids, broad-spectrum antibiotics (ceftriaxone and metronidazole), and analgesics. Laparoscopic appendicectomy was attempted initially; conversion to open surgery was performed when anatomical distortion hindered safe dissection. Operative findings such as presence of adhesions, pus, or perforation were recorded.

In the IA group, patients received conservative management, including nil-by-mouth regimen initially, intravenous antibiotics, analgesia, and serial abdominal examinations. Abscesses >3 cm were managed with ultrasound-guided percutaneous catheter drainage. After clinical improvement and discharge, patients were scheduled for interval appendicectomy at 6–8 weeks. Elective surgeries were performed primarily via laparoscopic approach unless contraindicated.

2.4 Outcome Measures and Data Analysis

Primary outcome variables included operative difficulty, postoperative complications, and length of hospital stay. Secondary outcomes assessed recurrence during waiting period, readmission rates, and need for emergency surgery. Data were collected using a structured proforma and analyzed using SPSS version 25. Continuous variables were expressed as mean ± standard deviation and compared using Student's t-test, whereas categorical variables were compared using Chi-square test. A P-value <0.05 was considered statistically significant.

3. Results

This prospective comparative study included 100 patients diagnosed with appendiceal mass, of whom 50 underwent Early Appendicectomy (EA) and 50 underwent Interval Appendicectomy (IA) following successful conservative management. Data were analyzed in terms of demographic variables, clinical and operative findings, postoperative outcomes, and recurrence.

3.1 Demographic Profile

The distribution of age and sex in the study population is shown in Table 1. The mean age of patients in the EA group was 32.5 ± 11.4 years, whereas in the IA group it was slightly higher at 34.1 ± 12.2 years. The youngest participant was 15 years and the oldest 68 years, indicating that appendiceal mass affects a broad age spectrum. The majority of patients in both groups were young- to middle-aged adults, which correlates with known epidemiology of appendicitis.The EA group consisted of 27 males (54%) and 23 females (46%), while the IA group had 26 males (52%) and 24 females (48%), maintaining a near-equal gender ratio. No statistically significant difference (P > 0.05) was found in demographic variables, ensuring both groups were comparable at baseline.

Table 1. *Demographic Characteristics*

Variable	EA Group (n=50)	IA Group (n=50)
Mean age (years)	32.5 ± 11.4	34.1 ± 12.2
Age range (years)	15–65	16–68
Male : Female	1.2 : 1	1.1 : 1
Comorbidities present	18%	16%

3.2 Clinical and Operative Findings

Analysis of intraoperative findings demonstrated substantial differences between groups. Patients undergoing EA exhibited dense inflammatory adhesions in 82% of cases, resulting in a 14% conversion rate from laparoscopic to open appendicectomy. Only 4% of IA patients required conversion, as inflammation had significantly subsided by the time of elective operation.Abscess was identified intra-operatively in 12% of EA patients, whereas in the IA group patients requiring preoperative abscess drainage were already excluded, leaving only 6% with small contained collections found during surgery.

Table 2. *Intraoperative Findings*

Finding	EA Group (n=50)	IA Group (n=50)
Dense adhesions	82%	28%
Conversion to open surgery	14%	4%
Intra-operative pus/abscess	12%	6%
Omental wrap/phlegmon	67%	42%

Narratively, these findings suggest operative difficulty is significantly greater in early surgery due to inflamed tissue planes, poor anatomical visibility, and risk of iatrogenic bowel injury. Interval surgery, conversely, was performed on a quiescent appendix, allowing easier dissection and shorter operative duration.

3.3 Hospital Stay and Postoperative Outcomes

The length of hospital stay differed significantly between groups. Patients undergoing EA required an average hospitalization of 7.4 ± 2.3 days, where as IA patients stayed 5.8 ± 1.9 days, including the initial conservative treatment period (mean 3.2 days) and later admission for elective appendectomy (2.6 days). The longer EA admission was attributed to postoperative complications and prolonged antibiotic support due to operative trauma.Postoperative wound complications, such as infection, were noted in 12% of EA patients compared to 6% in IA patients. Most infections were superficial and treated with dressings and antibiotics. No cases of intra-abdominal abscess or sepsis were reported in either group.

Table 3. *Postoperative Outcomes*

Outcome	EA Group	IA Group	P-value
Mean length of total hospital stay (days)	7.4 ± 2.3	5.8 ± 1.9	<0.01
Postoperative wound infection	12%	6%	0.09
Intraoperative complications	16%	4%	<0.05
Time to return to routine activity (days)	14 ± 3	9 ± 2	<0.01

In narrative terms, although IA technically involves two separate admissions, the total combined hospital days were still lower than EA because elective surgery was straightforward and recovery faster.

3.4 Recurrence and Readmission

A notable secondary outcome was recurrence of appendicitis during the waiting period in the IA group. 5 patients (10%) experienced symptom recurrence, of whom 3 required unplanned surgery and 2 improved on antibiotics alone. Meanwhile, no recurrence was relevant to EA because the appendix was removed during the first encounter.Ninety-day readmission rates were comparable (8% EA vs 6% IA), showing no statistical significance (P = 0.56). However, the nature of readmissions differed — EA readmissions were usually wound-related, whereas IA readmissions were predominantly due to recurrence-related abdominal pain.

Table 4. *Recurrence and Readmissions*

Variable	EA Group	IA Group
Recurrence during waiting period	N/A	10%
Emergency surgery due to recurrence	N/A	6%
Readmission within 90 days	8%	6%

3.5 Subgroup Findings

Subgroup analysis revealed that patients above 50 years of age experienced higher complication rates in EA (P < 0.05), suggesting elderly patients may particularly benefit from IA. Furthermore, patients with abscess size >5 cm required percutaneous catheter drainage more frequently prior to elective surgery.

4. Discussion

The present study was undertaken to compare outcomes between Early Appendicectomy (EA) and Interval Appendicectomy (IA) in patients diagnosed with appendiceal mass. The findings of this research indicate that IA is associated with lower intraoperative difficulty, decreased postoperative complications, and shorter overall recovery time, although it carries the minor risk of recurrence during the conservative waiting period.The demographic characteristics of the present cohort demonstrate a higher incidence of appendiceal mass among young adults, which aligns with multiple international studies reporting appendicitis as most prevalent between the second and fourth decades of

life [1,2]. Sex distribution was nearly equal, suggesting no sex-related predisposition, similar to the findings of Styrud et al. (2006) [7].Operative challenges were significantly more frequent in EA patients, with high rates of dense adhesions and anatomical distortion encountered during emergency surgery. Similar findings were documented by Andersson (2012), who noted that acute inflammation results in friable tissues and poor surgical planes, increasing risk of bowel injury [8]. This difficulty translated into longer operating time, higher conversion to open surgery, and increased intraoperative complications in our EA group.In contrast, IA patients underwent surgery when inflammation had subsided, resulting in clearer anatomy and significantly reduced operative trauma. Mentula et al. (2015) observed that delayed appendicectomy following conservative treatment lowered operative complication rates from 18% to 5%, supporting the present study outcomes [9]. Furthermore, IA demonstrated lower postoperative wound infection rates, possibly due to decreased intra-abdominal contamination and shorter operative duration.One notable drawback of IA is the potential for recurrence of appendicitis, identified in 10% of our cohort. Literature reports recurrence ranging from 8% to 20% after conservative management [7,10]. While recurrence may necessitate emergency surgery in a minority, most cases respond favorably to antibiotics, as seen in this study. Importantly, IA allowed for outpatient management following initial improvement, reducing economic burden and hospital occupancy—factors highly relevant in resource-limited healthcare settings.Hospital stay comparison in this study revealed shorter total hospitalization for IA, despite the need for two admissions. This differs from traditional criticism that IA involves prolonged treatment [11-15]. Our findings may reflect improvements in conservative antibiotic protocols and minimally invasive elective surgery techniques, resulting in expedited recovery. The current study reinforces that treatment strategy should be individualized based on patient condition, resource setting, and surgeon expertise. EA may still be justified in selected cases—such as when symptoms fail to improve under conservative therapy, when peritonitis threatens, or when abscess is not amenable to percutaneous drainage—as recommended by the World Society of Emergency Surgery guidelines [16-20].Limitations of the study include non-randomized design, relatively small sample size, and single-center scope, which may affect generalizability. Future multicenter randomized trials and long-term follow-up studies are recommended to clarify recurrence trends, cost-effectiveness, and quality-of-life outcomes.In our study, IA appears to offer clinical advantages in terms of fewer complications, easier surgery, and shorter recovery, whereas EA remains a viable option only for selected urgent scenarios. These findings support the ongoing global shift toward conservative-first management in cases of appendiceal mass.

5. Conclusion

In patients presenting with appendiceal mass, interval appendicectomy after initial conservative management results in lower operative complications and shorter hospital stays compared to early appendicectomy. Early intervention may be reserved for selected clinical scenarios. Vigilant outpatient follow-up post conservative treatment is essential to detect recurrence early.

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