

COMPARATIVE STUDY OF EARLY VERSUS DELAYED APPENDECTOMY IN THE MANAGEMENT OF ACUTE APPENDICITIS: OUTCOMES AND HOSPITAL STAY ANALYSIS

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Abstract

Background: Timely surgical intervention remains a cornerstone in the management of acute appendicitis. However, the optimal timing of appendectomy—whether early or delayed—continues to be debated, especially regarding clinical outcomes and hospital resource utilization. **Objective:** To compare the clinical outcomes and hospital stay duration between early and delayed appendectomy in patients with acute appendicitis. **Materials and Methods:** A prospective observational study was conducted on 100 patients diagnosed with acute appendicitis. Participants were equally divided into two groups: early appendectomy (within 12 hours of admission) and delayed appendectomy (12–24 hours post-admission). Demographic data, operative findings, postoperative complications, length of hospital stay, and 30-day readmission rates were recorded and analyzed. **Result:** The two groups were comparable in terms of age and gender ($p > 0.05$). Perforated appendix and localized abscess formation were significantly higher in the delayed group (18% and 14%, respectively) compared to the early group (6% and 4%, respectively) ($p < 0.05$). Postoperative wound infections occurred more frequently in the delayed group (20%) than in the early group (8%) ($p = 0.048$). Mean hospital stay was significantly shorter in the early group (2.6 ± 0.9 days) than the delayed group (4.2 ± 1.4 days) ($p < 0.001$). Readmission rates were higher in the delayed group (6%) than in the early group (2%), though not statistically significant. **Conclusion:** Early appendectomy is associated with reduced postoperative complications and shorter hospital stay. Timely surgical intervention may lead to better patient outcomes and efficient healthcare utilization.

INTRODUCTION

Acute appendicitis is one of the most frequently encountered surgical emergencies globally, with a lifetime risk estimated at 7–8%.^[4] Appendectomy remains the standard and definitive treatment for acute appendicitis. However, the timing of surgical intervention—whether early (within 12 hours) or delayed (after initial conservative management)—has been a topic of continued debate in both high- and low-resource healthcare settings.^[1, 5]

Early appendectomy is traditionally preferred, as it is believed to reduce the risk of complications such as perforation, peritonitis, and intra-abdominal abscess formation.^[3, 6] Delays in surgical management may allow disease progression, potentially leading to increased postoperative morbidity and longer hospital stays. A recent meta-analysis highlighted in-

hospital surgical delay as a significant risk factor for adverse outcomes, including perforation and infection.^[2]

Conversely, some studies suggest that a short delay, allowing for preoperative stabilization with intravenous fluids and antibiotics, may not worsen outcomes and could even help avoid unnecessary surgeries, particularly in cases of diagnostic uncertainty.^[1, 7] The World Society of Emergency Surgery (WSES) has acknowledged both immediate and delayed appendectomy as acceptable approaches, particularly in cases of appendiceal mass or phlegmon.^[5, 7]

In resource-constrained environments, delays are often dictated by logistical or systemic limitations rather than clinical decision-making.^[6] Therefore, evaluating the impact of surgical timing on patient outcomes is critical for improving clinical care and

ensuring effective use of healthcare resources. This study aims to compare early versus delayed appendectomy in terms of complications, length of hospital stay, and postoperative outcomes.

MATERIALS AND METHODS

Study Design and Setting: This was a prospective observational study conducted at Government Medical College (GMC), Rajanna Sircilla, Telangana.

Study Period: The study was carried out over a period of six months, from **September 2024 to February 2025**.

Study Population: A total of 100 patients diagnosed with acute appendicitis and admitted to the Department of General Surgery were included. Patients were enrolled based on clinical evaluation supported by imaging studies such as ultrasound or CT scan when necessary.

Inclusion Criteria

Patients aged ≥ 15 years with a confirmed diagnosis of acute appendicitis

Patients who consented to participate in the study
Patients undergoing either early (within 12 hours) or delayed (12–24 hours after admission) appendectomy

Exclusion Criteria

Patients with generalized peritonitis on admission
Patients managed conservatively without surgery
Patients with significant comorbidities contraindicating surgery
Pregnant women

Study Groups: Participants were divided into two groups:

Early Appendectomy Group: Patients who underwent surgery within 12 hours of admission

Delayed Appendectomy Group: Patients who underwent surgery after 12 to 24 hours of admission

Data Collection and Outcome Measures: Detailed clinical history, demographic data, laboratory results, imaging findings, operative notes, and postoperative outcomes were recorded using a structured proforma.

Primary outcomes included operative findings (e.g., perforation, abscess), postoperative complications (e.g., wound infection, intra-abdominal abscess), duration of hospital stay, and 30-day readmission rate.

Statistical Analysis: Data were analyzed using descriptive and inferential statistics. Categorical

variables were compared using the chi-square test, and continuous variables were analyzed using the independent t-test. A p-value < 0.05 was considered statistically significant.

Ethical Considerations

The study was obtained from the Institutional Ethics Committee of Government Medical College, Rajanna Sircilla. Written informed consent was obtained from all participants prior to inclusion. The study adhered to the ethical guidelines outlined by the Indian Council of Medical Research (ICMR).

RESULTS

A total of 100 patients diagnosed with acute appendicitis were enrolled in the study, with 50 patients assigned to the early appendectomy group (within 12 hours of admission) and 50 to the delayed appendectomy group (after 12–24 hours of admission).

Patient Demographics: The mean age of patients in the early appendectomy group was 28.4 ± 9.6 years, compared to 27.9 ± 10.2 years in the delayed group. Males constituted 58% and 60% of the early and delayed groups, respectively. There were no statistically significant differences in baseline demographic characteristics between the two groups ($p > 0.05$) (Table 1).

Operative Findings: Intraoperative evaluation revealed a higher incidence of perforated appendicitis in the delayed appendectomy group (18%) compared to the early group (6%), which was statistically significant ($p = 0.041$). Similarly, localized abscess formation was observed in 14% of delayed cases versus 4% of early cases ($p = 0.049$) (Table 2).

Postoperative Complications: Wound infections were more frequent in the delayed group (20%) than in the early group (8%), with a statistically significant difference ($p = 0.048$). Intra-abdominal abscesses occurred in two patients (4%) in the delayed group, while no such cases were reported in the early group (Table 3).

Hospital Stay and Readmission: Patients who underwent early appendectomy had a significantly shorter mean hospital stay (2.6 ± 0.9 days) compared to those who underwent delayed surgery (4.2 ± 1.4 days) ($p < 0.001$). The 30-day readmission rate was higher in the delayed group (6%) than in the early group (2%), although this difference was not statistically significant ($p = 0.28$) (Table 4).

Table 1: Demographics of Study Participants

Parameter	Early Appendectomy (n=50)	Delayed Appendectomy (n=50)	p-value
Mean Age (years)	28.4 ± 9.6	27.9 ± 10.2	> 0.05
Male (%)	58%	60%	> 0.05

Table 2: Operative Findings

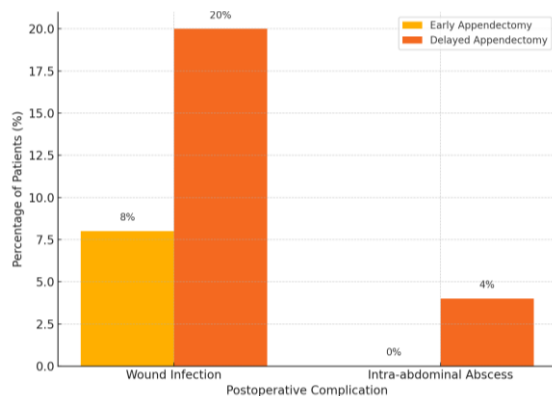
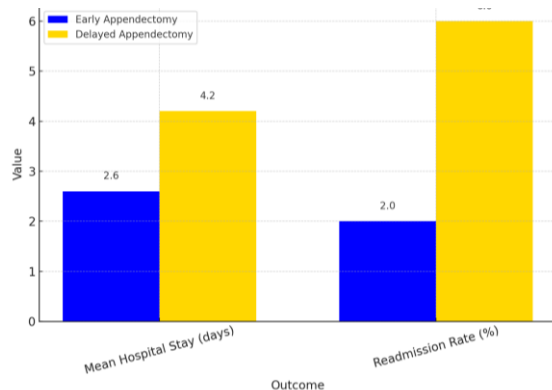
Finding	Early Appendectomy (n=50)	Delayed Appendectomy (n=50)	p-value
Perforated Appendix (%)	6%	18%	0.041
Localized Abscess Formation (%)	4%	14%	0.049

Table 3: Postoperative Complications

Complication	Early Appendectomy (n=50)	Delayed Appendectomy (n=50)	p-value
Wound Infection	4 (8%)	10 (20%)	0.048
Intra-abdominal Abscess	0 (0%)	2 (4%)	—

Table 4: Hospital Stay and Readmission

Outcome	Early Appendectomy (n=50)	Delayed Appendectomy (n=50)	p-value
Mean Hospital Stay (days)	2.6 ± 0.9	4.2 ± 1.4	< 0.001
Readmission Rate (%)	2%	6%	0.28

**Figure No.1: Postoperative Complications: Early vs Delayed Appendectomy****Figure-2: Hospital Stay and Readmission: Early vs Delayed Appendectomy**

DISCUSSION

This study evaluated the impact of surgical timing—early versus delayed appendectomy—on clinical outcomes among patients diagnosed with acute appendicitis. The findings demonstrate that early surgical intervention (within 12 hours of admission) is associated with significantly better outcomes, including lower complication rates and shorter hospital stays.

The incidence of perforated appendix was notably higher in the delayed group (18%) compared to the early group (6%). This observation supports previous studies that have shown delayed appendectomy increases the risk of perforation due to ongoing disease progression and inflammatory response [8, 9]. Similarly, localized abscess formation was more common in the delayed group (14%) than in the early group (4%), echoing findings from prior literature

emphasizing that delayed intervention may allow for the development of phlegmon or abscess.^[10, 12]

Postoperative complications, particularly wound infections, were also more frequent in the delayed group (20% vs. 8%). This finding aligns with studies reporting higher morbidity, including wound-related infections, in patients managed with delayed appendectomy.^[9,11] These complications could result from increased bacterial load and tissue inflammation present at the time of surgery when performed later.

The duration of hospital stay was significantly shorter in the early group (2.6 ± 0.9 days) than in the delayed group (4.2 ± 1.4 days), which is consistent with multicenter and meta-analytic evidence demonstrating that early surgery is associated with reduced hospitalization and better resource utilization.^[11, 13] Although the 30-day readmission rate was higher in the delayed group (6% vs. 2%), this difference was not statistically significant—an outcome mirrored in other studies that found mixed results regarding short-term readmissions.^[10, 13]

In summary, our findings reinforce the clinical and economic advantages of early appendectomy. Prompt surgical management of acute appendicitis minimizes complication rates and supports efficient patient throughput, a conclusion supported by robust international evidence.^[8–13]

CONCLUSION

This study highlights that early appendectomy, performed within 12 hours of admission, offers significant clinical advantages over delayed surgery in the management of acute appendicitis. Patients undergoing early surgery experienced fewer complications such as perforation and wound infection, along with a significantly shorter hospital stay. Although the difference in readmission rates between the two groups was not statistically significant, early intervention showed a consistent trend toward better outcomes. These findings support the practice of prompt surgical management to reduce morbidity and optimize healthcare resource utilization. Implementing early appendectomy protocols may lead to improved patient recovery, reduced hospital burden, and enhanced overall surgical efficiency in acute care settings.

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