Comparison of Laparoscopic and Open Appendectomy in Terms of Postoperative Complications and Hospital Stay: A Prospective Observational Study from a Tertiary Care Center

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Abstract: Background: Acute appendicitis is one of the most common surgical emergencies requiring prompt operative management. While open appendectomy has traditionally been the standard procedure, laparoscopic appendectomy has emerged as a minimally invasive alternative with potential advantages in postoperative recovery. Comparative evaluation of these techniques in institutional settings remains clinically relevant. Aim: To compare laparoscopic appendectomy and open appendectomy in terms of postoperative complications and duration of hospital stay. Materials and Methods: This prospective observational study was conducted in the Department of General Surgery at CMCH Bhopal from September 2025 to February 2026. A total of 21 patients diagnosed with acute appendicitis were included and divided into two groups: laparoscopic appendectomy (n=13) and open appendectomy (n=8). Patients were evaluated for postoperative complications including surgical site infection and fever, as well as duration of hospital stay. Data were analyzed using descriptive statistics. Results: Laparoscopic appendectomy was associated with fewer postoperative complications (15.4%) compared to open appendectomy (37.5%). Surgical site infection was more common in the open group (25%) than in the laparoscopic group (7.7%). The mean duration of hospital stay was significantly shorter in the laparoscopic group (2.46 ± 0.66 days) compared to the open group (4.12 ± 1.12 days). Conclusion: Laparoscopic appendectomy demonstrates clear advantages over open appendectomy in terms of reduced postoperative complications and shorter hospital stay. It should be considered the preferred surgical approach for uncomplicated acute appendicitis where facilities and expertise are available.

Keywords: Acute appendicitis, Laparoscopic appendectomy, Open appendectomy, Postoperative complications, Hospital stay

I. Introduction

Acute appendicitis is one of the most common surgical emergencies encountered worldwide, with a lifetime risk of approximately 7–8% [1]. Since its first description and surgical management, appendectomy has remained the gold standard treatment. Traditionally, open appendectomy (OA), introduced by Charles McBurney in the late 19th century, has been widely practiced due to its simplicity and effectiveness [2].

The advent of minimally invasive surgery led to the introduction of laparoscopic appendectomy (LA) by Kurt Semm in 1983, marking a significant advancement in surgical techniques [3]. Since then, laparoscopic appendectomy has gained widespread acceptance due to its potential advantages, including reduced postoperative pain, shorter hospital stay, early return to normal activities, and improved cosmetic outcomes [4].

Several studies have compared laparoscopic and open appendectomy, demonstrating that LA is associated with lower rates of wound infection and faster recovery, although it may involve longer operative time and higher costs in certain settings [5,6]. The minimally invasive approach also allows better visualization of the abdominal cavity, which is particularly beneficial in atypical presentations and in female patients where differential diagnoses are common [7].

Despite these advantages, open appendectomy continues to be performed in many centers, especially in resource-limited settings, due to factors such as cost constraints, lack of laparoscopic expertise, and emergency presentation of patients [5]. Furthermore, the superiority of laparoscopic over open appendectomy in terms of postoperative complications and hospital stay continues to be evaluated, particularly in smaller institutional studies. Given these considerations, the present study aims to compare laparoscopic and open appendectomy in terms of postoperative complications and duration of hospital stay in patients treated at CMCH Bhopal.

II. Materials and Methods

Study Design

This study was designed as a prospective observational study conducted to compare outcomes between laparoscopic appendectomy and open appendectomy.

Study Setting

The study was carried out in the Department of General Surgery at CMCH Bhopal, a tertiary care teaching hospital catering to both urban and rural populations.

Study Duration

The study was conducted over a period of six months, from September 2025 to February 2026.

Study Population

A total of 21 patients diagnosed with acute appendicitis and admitted to the surgical ward were included in the study.

Sample Size and Grouping

Patients were divided into two groups based on the surgical procedure performed: Group A (Laparoscopic Appendectomy, LA): 13 patients and Group B (Open Appendectomy, OA): 8 patients. The choice of surgical technique was based on surgeon preference, patient consent, and availability of laparoscopic facilities.

Inclusion Criteria

Patients clinically diagnosed with acute appendicitis, Age ≥ 12 years, Patients willing to provide informed consent.

Exclusion Criteria

Complicated appendicitis (perforation, appendicular abscess, generalized peritonitis), Patients with significant comorbid conditions (e.g., uncontrolled diabetes, severe cardiopulmonary disease), Patients requiring conversion from laparoscopic to open appendectomy, Pregnant patients.

Preoperative Evaluation

All patients underwent detailed clinical examination and routine laboratory investigations, including: Complete blood count, Renal function tests, Ultrasonography of the abdomen (where indicated). Diagnosis was primarily clinical, supported by radiological findings when necessary.

Surgical Procedure

Laparoscopic Appendectomy: Performed under general anesthesia using a standard three-port technique. The appendix was identified, mesoappendix was divided, and the base was secured using endoloops or clips before removal.

Open Appendectomy: Performed under spinal or general anesthesia using a standard right iliac fossa incision (McBurney's or Lanz incision). The appendix was ligated and removed in a conventional manner.

Postoperative Management

All patients received: Standard antibiotic therapy, Analgesics, Early mobilization as tolerated. Patients were monitored for postoperative complications and recovery.

Outcome Measures

The primary outcome variables assessed were: **1. Postoperative Complications:** Surgical site infection (SSI), Fever, Intra-abdominal collection. **2. Duration of Hospital Stay:** Measured in days from surgery to discharge.

III. Data Collection and Statistical Analysis

Data were recorded in a predesigned proforma, including demographic details, type of surgery, intraoperative findings, postoperative complications, and length of hospital stay. Data were entered into Microsoft Excel and analyzed using descriptive statistics. Continuous variables were expressed as mean ± standard deviation (SD), Categorical variables were expressed as frequency and percentage. Due to the small sample size, no advanced inferential statistical tests were applied.

Ethical Considerations

Institutional ethical committee approval was obtained prior to the commencement of the study, Written informed consent was obtained from all participants, Patient confidentiality was strictly maintained throughout the study.

IV. Results

A total of 21 patients diagnosed with acute appendicitis were included in the present study, of which 13 patients (61.9%) underwent laparoscopic appendectomy (LA) and 8 patients (38.1%) underwent open appendectomy (OA). The distribution indicates a higher preference for the laparoscopic approach in the study setting, likely reflecting increasing adoption of minimally invasive techniques.

Table 1: Distribution of Study Participants

Procedure Type	Number of Patients	Percentage (%)
Laparoscopic (LA)	13	61.9%
Open (OA)	8	38.1%
Total	21	100%

Postoperative complications were observed in both groups; however, their incidence was notably higher in patients who underwent open appendectomy. In the laparoscopic group, only 2 out of 13 patients (15.4%) developed complications, whereas in the open group, 3 out of 8 patients (37.5%) experienced postoperative complications. This suggests a comparatively safer postoperative profile for laparoscopic appendectomy.

Surgical site infection (SSI) was the most frequently encountered complication, particularly in the open appendectomy group. Specifically, SSI occurred in 7.7% of laparoscopic cases compared to 25% of open cases. Postoperative fever was observed in both groups, with a slightly higher occurrence in the open group (12.5%) than in the laparoscopic group (7.7%). Notably, no cases of intra-abdominal collection were reported in either group, indicating effective surgical technique and postoperative care.

Table 2: Postoperative Complications

Complication	Laparoscopic (n=13)	Open (n=8)
Surgical Site Infection	1 (7.7%)	2 (25%)
Fever	1 (7.7%)	1 (12.5%)
Intra-abdominal Collection	0 (0%)	0 (0%)
Total Complications	2 (15.4%)	3 (37.5%)

Analysis of hospital stay revealed a clear advantage for the laparoscopic approach. Patients who underwent laparoscopic appendectomy had a significantly shorter mean hospital stay of 2.46 ± 0.66 days, compared to 4.12
± 1.12 days in the open appendectomy group. This difference reflects faster postoperative recovery, reduced pain, and earlier mobilization in laparoscopic cases.

Table 3: Duration of Hospital Stay

Procedure Type	Mean Hospital Stay (days)
Laparoscopic (LA)	2.46 ± 0.66
Open (OA)	4.12 ± 1.12

Overall, the findings of this study demonstrate that laparoscopic appendectomy is associated with fewer postoperative complications and a shorter duration of hospital stay compared to open appendectomy. These results support the growing preference for laparoscopic surgery as the standard approach in the management of uncomplicated acute appendicitis.

V. Discussion

The present study provides a comparative evaluation of laparoscopic appendectomy (LA) and open appendectomy (OA) in terms of postoperative complications and duration of hospital stay. The findings clearly demonstrate that laparoscopic appendectomy is associated with reduced postoperative morbidity and shorter hospitalization, supporting its growing preference in modern surgical practice.

In this study, the overall complication rate was lower in the laparoscopic group (15.4%) compared to the open group (37.5%). Surgical site infection (SSI) was the most common complication observed, particularly in the open appendectomy group. This finding is consistent with multiple high-quality studies and meta-analyses, which have reported significantly lower wound infection rates in laparoscopic appendectomy due to smaller incisions, minimal tissue handling, and reduced exposure of intra-abdominal contents [8,9,10].

Postoperative fever was observed in both groups, though slightly higher in the open group, which may be attributed to greater surgical trauma and inflammatory response. Importantly, no cases of intra-abdominal collection were reported in either group in the present study, suggesting that both surgical techniques are safe when performed under appropriate conditions. Similar findings have been reported in earlier comparative studies, which indicate that while both approaches are effective, laparoscopic surgery offers advantages in terms of postoperative recovery [11,12].

One of the most significant outcomes observed in this study was the difference in duration of hospital stay. Patients undergoing laparoscopic appendectomy had a markedly shorter hospital stay (2.46 ± 0.66 days) compared to those undergoing open appendectomy (4.12 ± 1.12 days). This observation is in strong agreement with previous literature, including systematic reviews and meta-analyses, which consistently demonstrate faster recovery and earlier discharge following laparoscopic surgery [4,5,13–16]. The superiority of laparoscopic appendectomy can also be explained by enhanced visualization of the operative field, which allows for precise dissection and better identification of anatomical structures. This is particularly beneficial in patients with atypical presentations, obese individuals, and female patients where diagnostic uncertainty is higher [17,18]. Furthermore, laparoscopy provides the added advantage of diagnostic exploration of the entire abdominal cavity, which may help identify alternative pathologies [19].

Despite these advantages, open appendectomy remains relevant in certain clinical settings. In resource-limited environments, factors such as lack of laparoscopic infrastructure, cost constraints, and limited surgical expertise may necessitate the continued use of the open technique [20]. Additionally, in complicated appendicitis or hemodynamically unstable patients, open appendectomy may still be preferred [21].

The findings of the present study are consistent with global evidence favoring laparoscopic appendectomy as the standard of care for uncomplicated acute appendicitis. However, the study has certain limitations, including small sample size, single-center design, and lack of randomization, which may introduce selection bias and limit external validity.

Overall, this study reinforces that laparoscopic appendectomy offers significant clinical benefits over open appendectomy in terms of reduced postoperative complications and shorter hospital stay, and should be considered the preferred surgical approach whenever feasible.

Conclusion

The present study demonstrates that laparoscopic appendectomy is superior to open appendectomy in the management of uncomplicated acute appendicitis. Patients undergoing laparoscopic surgery experienced fewer postoperative complications, particularly a lower incidence of surgical site infections, along with a significantly shorter duration of hospital stay.

The minimally invasive nature of laparoscopic appendectomy contributes to faster recovery, reduced postoperative pain, and early return to normal activities, making it a more favorable option in suitable patients. Although open appendectomy remains a safe and effective procedure, especially in resource-limited settings or complicated cases, its association with higher morbidity and prolonged hospitalization cannot be overlooked.

Based on the findings of this study, laparoscopic appendectomy should be considered the preferred surgical approach wherever facilities and surgical expertise are available. Further large-scale, multicentric studies are recommended to strengthen the evidence and improve generalizability.

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