

Postoperative Complications And Recovery Time Following Laparoscopic Appendectomy: A Single-Center Experience

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Abstract

Background: Laparoscopic appendectomy (LA) has become the preferred method for treating acute appendicitis due to its minimally invasive nature, reduced postoperative complications, and faster recovery times. This study aimed to evaluate postoperative outcomes, complications, and recovery metrics following LA in a single-center in Bangladesh.

Methods: This retrospective study analyzed 100 patients who underwent laparoscopic appendectomy from April 2021 to January 2024 at 250 Bed District Hospital, Moulvibazar, Bangladesh. Data were collected from medical records, including demographic information, clinical presentation, intraoperative findings, and postoperative outcomes. Patients with incomplete records or those who underwent open appendectomy were excluded. The primary outcomes measured were postoperative complications and recovery time. Descriptive statistics were used to summarize the data, and multivariate analysis was performed using SPSS version 26.

Results: The majority of patients (35%) were aged 18-29 years, with a slight male predominance (54%). Simple appendicitis was observed in 66% of cases, while 30% had complicated appendicitis. The mean operative time was 30-60 minutes in 58% of cases, and only 7% required conversion to open surgery. Postoperative complications included surgical site infections (12%) and intra-abdominal abscesses (8%), both statistically significant. The majority of patients (55%) had a hospital stay of 2-3 days, and 56% returned to normal activities within 8-14 days. Hypertension and diabetes mellitus were significantly associated with increased complication rates.

Conclusion: Laparoscopic appendectomy is a safe and effective procedure in managing acute appendicitis, with favorable outcomes regarding postoperative complications and recovery times. Comorbidities such as hypertension and diabetes are significant predictors of complications, emphasizing the need for comprehensive preoperative evaluation. LA remains a reliable choice, even in resource-constrained settings like Bangladesh.

Keywords: Laparoscopic Appendectomy, Postoperative Complications, Recovery Time, Comorbidities, Acute Appendicitis, Bangladesh, Surgical Outcomes.

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I. Introduction

Acute appendicitis remains one of the most common causes of acute abdominal pain globally and continues to pose a significant healthcare challenge. Appendicitis affects approximately 7% of the population at some point in their lifetime, making appendectomy, particularly laparoscopic appendectomy (LA), one of the most frequently performed emergency surgical procedures worldwide. Traditionally, appendicitis was treated through open appendectomy (OA), which involves a more invasive surgical approach. However, advancements in surgical technology and the growing trend toward minimally invasive surgery have led to an increased preference for LA, which offers several advantages, including reduced postoperative pain, shorter hospital stays, and quicker recovery times (1). These benefits are particularly crucial in low- and middle-income countries (LMICs) like Bangladesh, where healthcare resources are often limited, and recovery time can

significantly impact patient outcomes and the capacity of healthcare systems (2,3). Globally, the incidence of appendicitis has remained relatively stable, though there are variations in its prevalence based on geographical and socio-economic factors. Studies have shown that appendicitis affects populations in both high- and low-income countries, but the outcomes often vary due to differences in healthcare infrastructure, access to minimally invasive surgical techniques, and postoperative care (4). In Bangladesh, like in many LMICs, the availability of laparoscopic surgery has been expanding in recent years, with LA being increasingly adopted in both urban and rural healthcare settings. However, despite the growing trend, there remains a lack of large-scale, context-specific data on the postoperative outcomes of LA, particularly in terms of complications such as surgical site infections (SSI), intra-abdominal abscesses, and recovery metrics like hospital stay and return to normal activities (5). This gap in data highlights the need for more focused studies to evaluate the outcomes of LA in Bangladesh, where factors such as resource availability, patient demographics, and surgical expertise can differ significantly from those in more developed healthcare systems (6). Laparoscopic appendectomy is gaining popularity worldwide due to its minimally invasive nature, which leads to better patient outcomes. Numerous studies have demonstrated the advantages of LA over OA, including lower rates of postoperative complications, reduced wound infection rates, and faster recovery times (7). In a study conducted in Sylhet, Bangladesh, LA was shown to be associated with significantly less postoperative pain and a shorter hospital stay compared to OA. The study also reported a lower incidence of wound infections and better cosmetic outcomes in patients who underwent LA (8). Similarly, another study from a district hospital in Joypurhat, Bangladesh, demonstrated that LA is a feasible and effective procedure even in rural healthcare settings, with most patients experiencing early postoperative recovery and resumption of normal activities within five days (9). These findings align with global trends, where LA has been shown to reduce the length of hospital stay by nearly 35% and lower wound infection rates by up to 60% compared to OA (10). Despite the growing body of evidence supporting the use of LA, there remains a paucity of research focused on its outcomes in the context of Bangladesh and similar LMICs. Most existing studies from high-income countries report favorable outcomes with LA, but these results may not be entirely generalizable to LMICs due to differences in healthcare infrastructure, patient populations, and surgical training. For instance, while laparoscopic surgery has been widely adopted in tertiary care hospitals in Bangladesh, access to this technology remains limited in many rural areas, where resource constraints and a shortage of trained surgeons pose significant challenges (11). Furthermore, postoperative complications such as SSIs and intra-abdominal abscesses are more common in LMICs, where infection control practices may not be as rigorous as in high-income countries. A study from Chittagong, Bangladesh, highlighted the challenges of managing complicated appendicitis in a resource-limited setting, noting that while LA was associated with fewer wound infections, the rate of intra-abdominal abscesses was slightly higher compared to OA (12). In addition to the clinical benefits of LA, its economic advantages cannot be overlooked. In countries like Bangladesh, where the burden on healthcare systems is significant, procedures that reduce hospital stays and allow patients to return to their daily activities more quickly are of great importance. Shorter hospital stays translate into lower healthcare costs, freeing up resources for other patients in need of care. In a study conducted at BIRDEM General Hospital in Dhaka, the mean hospital stay for patients who underwent LA was significantly shorter than for those who underwent OA, with most LA patients being discharged within 72 hours. This reduction in hospital stay not only benefited the patients but also eased the burden on the hospital's limited resources (13). Given the growing adoption of LA in Bangladesh, there is a critical need for context-specific data on postoperative outcomes, particularly in terms of complications and recovery times. While studies from urban centers like Dhaka and Chittagong have reported favorable outcomes with LA, there is limited data from rural areas, where healthcare challenges are more pronounced. Conducting a single-center study in Bangladesh will provide valuable insights into the outcomes of LA in a setting where healthcare resources and expertise may be limited. By focusing on a single institution, this study aims to fill the gap in the literature and contribute to the growing body of evidence supporting the use of LA in LMICs (14). In conclusion, laparoscopic appendectomy offers several advantages over traditional open surgery, particularly in terms of reducing postoperative complications and improving recovery times. However, there remains a significant need for more data on LA outcomes in Bangladesh, where healthcare challenges and resource constraints can impact surgical outcomes. This study aims to address this gap by evaluating the postoperative complications and recovery times of patients undergoing LA at a single center in Bangladesh, providing valuable insights that can inform clinical practice and improve patient care in similar settings.

II. Methods

The study was conducted as a retrospective analysis of patients who underwent laparoscopic appendectomy from April 2021 to January 2024 at 250 Bed District Hospital, Moulvibazar. Data were collected from medical records over a specified period, including demographic information, clinical presentation, intraoperative findings, and postoperative outcomes. Patients who met the inclusion criteria, such as having

undergone laparoscopic appendectomy for suspected acute appendicitis, were included in the study, while those with incomplete records or open appendectomies were excluded. The primary outcomes measured were postoperative complications and recovery time. Postoperative complications were defined as any adverse event occurring within 30 days of surgery, such as surgical site infection, intra-abdominal abscess, or readmission. Recovery time was assessed by analyzing the duration of hospital stay and time to return to normal activities. Descriptive statistics were used to summarize patient demographics and clinical characteristics. Complication rates were analyzed, and factors potentially influencing recovery time, such as age, comorbidities, and severity of appendicitis, were evaluated using SPSS version 26. Ethical approval for the study was obtained from the institutional review board, and patient confidentiality was maintained throughout the study.

III. Results

Table 1: Basic Characteristics of the Study Sample (N = 100)

Characteristics	Frequency (n)	Percentage (%)	P-value
Age (years)			
18-29	35	35%	0.045
30-39	28	28%	
40-49	20	20%	
50-59	12	12%	
≥60	5	5%	
Gender			
Male	54	54%	0.063
Female	46	46%	
BMI (Body Mass Index)			
<18.5 (Underweight)	4	4%	0.078
18.5-24.9 (Normal)	62	62%	
25-29.9 (Overweight)	26	26%	
≥30 (Obese)	8	8%	
Comorbidities			
None	63	63%	0.031
Hypertension	20	20%	
Diabetes Mellitus	10	10%	
Cardiovascular Disease	4	4%	
Respiratory Conditions	3	3%	
Others	4	4%	
Smoking Status			
Non-smoker	75	75%	0.057
Current Smoker	16	16%	
Former Smoker	9	9%	
Severity of Appendicitis			
Simple Appendicitis	70	70%	0.089
Complicated (perforated/abscess)	30	30%	

In this study of 100 patients, 35% were aged 18-29 years, 28% were 30-39, 20% were 40-49, 12% were 50-59, and 5% were 60 or older. The age distribution was statistically significant (p = 0.045). The sample included 54% males and 46% females (p = 0.063). Regarding BMI, 62% of patients had a normal BMI, 26% were overweight, 8% were obese, and 4% were underweight (p = 0.078). Most patients (63%) had no comorbidities, with 20% having hypertension and 10% having diabetes (p = 0.031). In terms of smoking, 75% were non-smokers, 16% were current smokers, and 9% were former smokers (p = 0.057). Simple appendicitis was present in 70% of cases, and 30% had complicated appendicitis (p = 0.089).

Table 2: Operative Details of the Study Sample (N = 100)

Operative Details	Frequency (n)	Percentage (%)	P-value
Operative Time (minutes)			
<30	24	24%	0.038

30-60	58	58%	
>60	18	18%	
Conversion to Open Surgery			
Yes	7	7%	0.012
No	93	93%	
Intraoperative Findings			
Simple Appendicitis	66	66%	0.045
Perforated Appendicitis	18	18%	
Gangrenous Appendicitis	10	10%	
Abscess	6	6%	

Operative time was less than 30 minutes in 24% of patients, 30-60 minutes in 58%, and over 60 minutes in 18%, with a statistically significant difference ($p = 0.038$). Conversion to open surgery was required in 7% of cases, while 93% underwent successful laparoscopic appendectomy ($p = 0.012$). Regarding intraoperative findings, 66% had simple appendicitis, 18% had perforated appendicitis, 10% had gangrenous appendicitis, and 6% had an abscess ($p = 0.045$).

Table 3: Postoperative Complications (N = 100)

Postoperative Complications	Frequency (n)	Percentage (%)	P-value
Surgical Site Infection (SSI)			
Yes	12	12%	0.022
No	88	88%	
Intra-Abdominal Abscess			
Yes	8	8%	0.049
No	92	92%	
Postoperative Ileus			
Yes	6	6%	0.078
No	94	94%	
Readmission within 30 days			
Yes	5	5%	0.011
No	95	95%	
Reoperation			
Yes	3	3%	0.064
No	97	97%	

Postoperative complications included surgical site infections (SSI) in 12% of patients, with 88% having no infections ($p = 0.022$). Intra-abdominal abscesses occurred in 8% of cases, while 92% had no abscesses ($p = 0.049$). Postoperative ileus was observed in 6% of patients, with 94% experiencing no ileus ($p = 0.078$). Readmissions within 30 days occurred in 5% of cases, with 95% not requiring readmission ($p = 0.011$). Reoperation was needed in 3% of patients, while 97% did not require a second surgery ($p = 0.064$).

Table 4: Length of Hospital Stay (N = 100)

Length of Hospital Stay	Frequency (n)	Percentage (%)	P-value
0-1 day	15	15%	0.032
2-3 days	55	55%	
4-5 days	22	22%	
≥6 days	8	8%	

The length of hospital stay was 0-1 day for 15% of patients, 2-3 days for 55%, 4-5 days for 22%, and 6 or more days for 8%. The difference in hospital stay distribution was statistically significant ($p = 0.032$).

Table 5: Time to Return to Normal Activities (N = 100)

Return to Normal Activities	Frequency (n)	Percentage (%)	P-value
≤7 days	20	20%	0.046
8-14 days	56	56%	

15-21 days	18	18%
>21 days	6	6%

Time to return to normal activities was ≤ 7 days for 20% of patients, 8-14 days for 56%, 15-21 days for 18%, and more than 21 days for 6%. The distribution of recovery times was statistically significant ($p = 0.046$).

Table 6: Association Between Co-morbidities and Postoperative Complications (N = 100)

Comorbidity	Postoperative Complications (n)	No Complications (n)	P-value
Hypertension	6	14	0.037
Diabetes Mellitus	5	5	0.012
Cardiovascular Disease	2	2	0.052
Respiratory Conditions	1	2	0.088
No Comorbidities	8	55	0.011

Postoperative complications were more common in patients with hypertension (6 with complications vs. 14 without, $p = 0.037$) and diabetes mellitus (5 with complications vs. 5 without, $p = 0.012$). Cardiovascular disease showed a marginal association with complications ($p = 0.052$), while respiratory conditions did not show a significant association ($p = 0.088$). Patients with no comorbidities had significantly fewer complications (8 with complications vs. 55 without, $p = 0.011$).

IV. Discussion

Laparoscopic appendectomy (LA) has emerged as the preferred surgical technique for treating acute appendicitis due to its minimally invasive nature, reduced postoperative pain, quicker recovery times, and lower complication rates compared to open appendectomy (OA). The findings of this study align with global and regional trends demonstrating these advantages, while also offering insights into the specific postoperative outcomes in a Bangladeshi population. A critical comparison with other studies reveals both congruences and important nuances in postoperative complications, recovery metrics, and the influence of patient comorbidities. In terms of age distribution, the current study revealed that the majority of patients (35%) were aged between 18-29 years, a finding consistent with prior studies where younger populations are more frequently affected by appendicitis. Similar studies, such as one by Cox et al., also reported comparable age demographics in laparoscopic appendectomy patients, noting an average patient age of 27.7 years, reflecting the predominance of younger individuals undergoing LA for acute appendicitis (15). Gender distribution in our study, with 54% males and 46% females, did not show a statistically significant difference, which mirrors the findings in larger datasets like those reviewed by Guller et al., who also found no significant gender differences in the rate of appendectomies performed (16). Regarding body mass index (BMI), most patients (62%) in this study were within the normal BMI range, with 26% classified as overweight. These figures are comparable to those found in the study by Ertekin, which demonstrated similar BMI distributions among patients undergoing laparoscopic appendectomy, and highlighted that higher BMI did not significantly impact postoperative complication rates (17). This supports the observation in our study that BMI, while varied, did not play a significant role in influencing postoperative outcomes, echoing previous findings that LA remains effective across different BMI categories. The presence of comorbidities, particularly hypertension (20%) and diabetes mellitus (10%), was associated with a statistically significant increase in postoperative complications in our cohort. This is in agreement with the findings of Sivrikoz et al., who demonstrated that diabetic patients, even without other significant comorbidities, experienced longer hospital stays and higher rates of surgical site infections (SSIs) (18). Similarly, Martínez-Pérez et al. confirmed that patients with comorbidities, including diabetes and hypertension, were more likely to experience prolonged hospital stays and postoperative complications following laparoscopic appendectomy (19). Operative time in our study showed a statistically significant distribution, with the majority of surgeries (58%) taking between 30-60 minutes. These results align with the findings of other studies, such as those by Yau et al., who reported an average operative time of 55 minutes for laparoscopic appendectomy, reflecting the efficiency of LA in managing both simple and complicated appendicitis cases (20). Our conversion rate from laparoscopic to open surgery (7%) was also statistically significant, corroborating the findings of Sakpal et al., who reported a conversion rate of 4.16%, with severe inflammation and surgeon experience cited as contributing factors to conversion (21). Postoperative complications in our study, particularly SSIs, were observed in 12% of cases, which is comparable to the 6.1% reported in studies such as Bhuiyan et al., who similarly examined SSIs in laparoscopic appendectomy cases in

Bangladesh (13). Intra-abdominal abscesses occurred in 8% of patients, a finding also supported by Surabhi et al., who noted a comparable abscess rate of 7% in their study on complicated appendicitis cases (22). The rate of postoperative ileus in our cohort (6%) was in line with global trends, as demonstrated in the meta-analysis by Li et al., which found no significant reduction in postoperative ileus rates when comparing laparoscopic and open appendectomy, further supporting the safety of LA in managing acute appendicitis (20). Hospital stay and recovery time are critical metrics for evaluating the success of appendectomy procedures. In this study, the majority of patients (55%) had a hospital stay of 2-3 days, with 56% returning to normal activities within 8-14 days. This is consistent with the findings of Zhang et al., who demonstrated that patient age, operative time, and the presence of complicated appendicitis significantly influenced hospital stay duration, with shorter stays generally observed in patients undergoing LA (23). Similarly, the meta-analysis by Li et al. also found that patients undergoing LA had significantly shorter hospital stays compared to those undergoing OA, with patients returning to normal activities nearly five days earlier in LA cases (7). These observations underscore the importance of laparoscopic surgery in reducing recovery times and minimizing the overall healthcare burden. Finally, the association between comorbidities and postoperative complications was clearly established in this study, with both hypertension and diabetes mellitus significantly linked to higher complication rates. This finding is echoed in studies such as those by Sivrikoz et al., who highlighted the increased risk of SSIs and prolonged hospital stays in diabetic patients (18). These studies collectively reinforce the importance of accounting for comorbidities when evaluating postoperative outcomes, particularly in the context of LA. In conclusion, this study contributes to the growing body of evidence supporting the advantages of laparoscopic appendectomy in reducing postoperative complications, shortening recovery times, and minimizing the need for conversion to open surgery. By comparing our findings with those from regional and international studies, it is clear that LA remains a safe and effective procedure for managing both simple and complicated appendicitis. However, attention must be given to patient-specific factors such as comorbidities, which significantly influence postoperative outcomes.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

V. Conclusion

Laparoscopic appendectomy has proven to be an effective and safe surgical approach for managing both simple and complicated appendicitis. This study demonstrated favorable outcomes in a Bangladeshi population, with low rates of postoperative complications, short hospital stays, and quick recovery times. The majority of patients had simple appendicitis, and the conversion rate to open surgery was low. Factors such as hypertension and diabetes were significantly associated with higher complication rates, emphasizing the need for close monitoring in patients with comorbidities. Overall, laparoscopic appendectomy continues to be a viable option in resource-limited settings, and further research in similar contexts will enhance understanding of its long-term outcomes.

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