



## Original Research Article

# LAPAROSCOPIC MANAGEMENT OF COMPLICATED APPENDICITIS: A RETROSPECTIVE ANALYSIS OF OUTCOMES AND COMPLICATIONS

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### ABSTRACT

**Background:** There is a rise in morbidity and longer hospitalization associated with complicated appendicitis, which includes perforated, gangrenous, and abscess-forming appendicitis. The safety and effectiveness of laparoscopic appendectomy in complex situations are still being studied, but it has become the standard method. Patients receiving laparoscopic treatment for complex appendicitis were the focus of this retrospective analysis of clinical outcomes, postoperative complications, and recovery measures.

**Materials and Methods:** A retrospective analysis was performed on 50 patients diagnosed with severe appendicitis. This study was conducted at department of General Surgery, Chettinad Hospital and Research Institute, Kelambakkam, Chennai, Tamil Nadu between July 2023 to June 2024. The inclusion criteria included patients aged 18 to 65 years with intraoperatively verified perforated, gangrenous, or abscess-related appendicitis. Demographic data, operation duration, intraoperative observations, conversion rate, hospital stay length, postoperative pain scores (VAS), time to oral intake, and postoperative complications were documented and analyzed. Statistical analysis was conducted utilizing descriptive statistics, with outcomes presented as mean  $\pm$  standard deviation and percentages.

**Results:** The average age of the 50 patients was  $38.6 \pm 12.4$  years, and 64 percent were male and 36 percent were female. Results from the surgery showed that 10 patients (20%) had appendicular abscesses, 16 patients (32% had gangrenous appendicitis), and 24 patients (48% had perforated appendicitis). Operative times averaged  $78.5 \pm 18.2$  minutes. Because of the extensive adhesions, 3 instances (6% of the total) needed to be converted to open surgery. On the VAS scale, the average pain score 24 hours after surgery was  $3.2 \pm 1.1$ . The overall duration of hospitalization was  $4.8 \pm 1.9$  days, and the average time to resume oral intake was  $1.6 \pm 0.7$  days. Of the nine patients who experienced problems after the operation, eight percent had infections at the surgical site, three had intra-abdominal collection, and two had prolonged ileus. There were no reports of fatalities.

**Conclusion:** There is a low conversion rate, appropriate operating time, and controllable postoperative complications when laparoscopic therapy of complex appendicitis is performed. Its positive effects on recovery, such as reduced hospital stays and early oral intake resume, lend credence to its use as the gold standard for some patients.

**Keywords:** Complicated appendicitis; Laparoscopic appendectomy; Perforated appendicitis; Postoperative complications; Surgical outcomes; Retrospective study.

## INTRODUCTION

A lifetime risk of about 7–8% makes acute appendicitis one of the most prevalent surgical emergencies on a global scale. Complications such as perforation, gangrene, peri-appendiceal abscess, or generalized peritonitis can develop from complex appendicitis if the condition is not detected or diagnosed promptly, even though early surgical surgery usually leads to favorable outcomes. Postoperative morbidity, length of hospital stay, and healthcare expenditures are all higher in difficult appendicitis cases compared to simple ones.<sup>[1, 2]</sup>

For complex appendicitis, the gold standard has always been an open appendectomy because of the risks of intra-abdominal abscess formation and the technical challenges of laparoscopy when inflammation and adhesions are present. Nonetheless, laparoscopic appendectomy has become more acceptable, especially in complex cases, because to developments in minimally invasive surgical procedures, enhanced instrumentation, and physician expertise. Possible benefits of the laparoscopic method include less postoperative pain, a shorter hospital stay, an earlier return to regular activities, improved cosmetic results, and a lower risk of wound infection.<sup>[3,4]</sup>

These advantages aren't without their drawbacks, though; in cases of complex appendicitis, there's a chance of intra-abdominal collections after the operation, the procedure takes longer than expected, and open surgery may be necessary. The results in the literature are inconsistent, and researchers are still trying to figure out whether laparoscopy is safe and successful in these situations.<sup>[5]</sup>

Consequently, the purpose of this research is to look back at the results, problems, and overall efficacy of laparoscopic management in patients with complex appendicitis who were treated at a tertiary care center. The focus will be on the following: operative parameters, postoperative recovery, complication rates, and outcomes.<sup>[6,7]</sup>

## MATERIALS AND METHODS

This retrospective analysis was performed in a tertiary care teaching hospital. This study was conducted at department of General Surgery,

Chettinad Hospital and Research Institute, Kelambakkam, Chennai, Tamil Nadu between July 2023 to June 2024. The study comprised 50 patients diagnosed with complicated appendicitis who were handled laparoscopically. Ethical approval was secured from the institutional review board, and patient confidentiality was preserved throughout the study. Complicated appendicitis was intraoperatively characterized as perforated appendicitis, gangrenous appendicitis, appendicular abscess, or appendicitis accompanied by localized or generalized peritonitis. All patients received a routine three-port laparoscopic appendectomy under general anesthesia.

### Inclusion Criteria:

- Patients aged 18–65 years.
- Intraoperatively confirmed complicated appendicitis.
- Patients who underwent laparoscopic appendectomy as the primary surgical approach.
- Complete medical records available for analysis.

### Exclusion Criteria:

- Patients with uncomplicated acute appendicitis.
- Patients managed with primary open appendectomy.
- Interval appendectomy following conservative management of appendicular mass.
- Pregnant patients.
- Patients with significant comorbid conditions contraindicating laparoscopy.
- Incomplete clinical or follow-up data.

**Statistical Analysis:** We used SPSS version 25.0 to evaluate the data that was entered into Microsoft Excel. Categorical variables were shown as frequencies and percentages, whilst continuous variables were shown as mean  $\pm$  standard deviation (SD). Demographic data, surgical parameters, and postoperative results were summarized using descriptive statistics. Statistical significance was determined when a p-value was less than 0.05.

## RESULTS

During the study period, 50 patients with difficult appendicitis confirmed during surgery had laparoscopic appendectomy. Demographic information, intraoperative results, surgical metrics, postoperative recovery, and complications were examined.

**Table 1: Demographic and Baseline Characteristics of Patients**

Variable	Value
Total patients	50
Mean age (years)	38.6 $\pm$ 12.4
Age range (years)	18–65
Male	32 (64%)
Female	18 (36%)
Mean duration of symptoms (days)	2.9 $\pm$ 1.1
Patients with comorbidities	12 (24%)
Diabetes mellitus	7 (14%)
Hypertension	5 (10%)

Most of the patients were men (64%), and the average age was 38.6 years. The average length of time that symptoms lasted until the patient came in was about

three days. Almost a quarter (24%) of patients had other health problems, with diabetes mellitus and high blood pressure being the most frequent.

**Table 2: Intraoperative Findings**

Intraoperative Diagnosis	Number of Patients	Percentage
Perforated appendicitis	24	48%
Gangrenous appendicitis	16	32%
Appendicular abscess	10	20%
Appendicular mass formation	2	5%
Localized peritonitis	21	42%
Generalized peritonitis	8	16%
Dense adhesions	14	28%

In the present study, perforated appendicitis was the most frequent intraoperative finding (48%), followed by gangrenous appendicitis (32%), appendicular

abscess (20%), and appendicular mass formation (5%).

**Table 3: Operative Parameters**

Parameter	Value
Mean operative time (minutes)	78.5 ± 18.2
Operative time range (minutes)	50–120
Conversion to open surgery	3 (6%)
Intraoperative complications	2 (4%)
Intraoperative bleeding (>100 ml)	2 (4%)
Drain placement required	22 (44%)

Operating times averaged 78.5 minutes. Dense adhesions and challenging anatomy were the main reasons why 6% of cases needed to be converted to open appendectomy. There were very few (4%).

intraoperative problems. As a result of infection or abscess development, nearly 50% of patients needed drains implanted.

**Table 4: Postoperative Recovery Parameters**

Parameter	Value
Mean VAS pain score at 24 hours	3.2 ± 1.1
Time to oral intake (days)	1.6 ± 0.7
Mean hospital stay (days)	4.8 ± 1.9
Return to normal activity (days)	9.5 ± 2.6
ICU admission required	2 (4%)

A mean VAS score of 3.2 at 24 hours indicated mild to severe discomfort following the operation. Patients were able to start taking oral medications again in about 1.6 days. A median of 4.8 days was spent in the

hospital. Within a week, the majority of patients were able to resume their regular routines. Due to systemic infection, only 4% of patients were required to be admitted to the intensive care unit.

**Table 5: Postoperative Complications**

Complication	Number of Patients	Percentage
Surgical site infection (SSI)	4	8%
Intra-abdominal collection	3	6%
Prolonged ileus	2	4%
Port-site infection	2	4%
Re-intervention required	2	4%
Mortality	0	0%
Overall complication rate	9	18%

Postoperative problems manifested in 18% of individuals. The most prevalent complication was surgical site infection (8%), succeeded by intra-abdominal collections (6%). Two individuals necessitated percutaneous drainage for fluid collection. The study cohort exhibited no death, signifying positive overall outcomes.

## DISCUSSION

Complicated appendicitis remains a challenging clinical condition due to the severity of inflammation, risk of perforation, and higher incidence of postoperative complications. The role of laparoscopy

in such cases has been debated; however, accumulating evidence supports its safety and feasibility.<sup>[8,9]</sup>

In our study, the mean age of patients was 38.6 ± 12.4 years, with a male predominance (64%). In previous studies, a similar male predominance has been reported in complicated appendicitis, which may be attributed to delayed healthcare-seeking behavior among male patients. The age distribution in the present study also correlates with earlier reports indicating that complicated appendicitis is common among young and middle-aged adults.<sup>[10-12]</sup>

In the present study, perforated appendicitis was the most frequent intraoperative finding (48%), followed by gangrenous appendicitis (32%) and appendicular

abscess (20%). In previous studies, perforation rates ranging from 35% to 55% have been reported among complicated appendicitis cases, which is consistent with our findings. The relatively higher proportion of perforation may be attributed to delayed presentation, as reflected by the mean symptom duration of  $2.9 \pm 1.1$  days in this study.<sup>[13-15]</sup>

In the present study, the mean operative time was  $78.5 \pm 18.2$  minutes. In previous studies, operative times for laparoscopic management of complicated appendicitis ranged between 70 and 95 minutes. The operative duration observed in our study falls within this range, suggesting that laparoscopy is technically feasible even in complicated cases. Although dense adhesions were encountered in 28% of patients, the conversion rate to open surgery was only 6%. In previous studies, reported conversion rates vary between 5% and 15%, indicating that our conversion rate is comparatively low and acceptable.<sup>[16-18]</sup>

In our study, postoperative recovery parameters were favorable. The mean time to oral intake was  $1.6 \pm 0.7$  days, and the mean hospital stay was  $4.8 \pm 1.9$  days. In previous studies, hospital stay following laparoscopic management of complicated appendicitis ranged from 4 to 7 days. The shorter hospital stay observed in the present study may be attributed to early mobilization, minimal postoperative pain, and standardized perioperative care protocols.<sup>[19,20]</sup>

Postoperative complications were observed in 18% of patients in the present study. Surgical site infection (8%) was the most common complication, followed by intra-abdominal collection (6%). In previous studies, overall complication rates for laparoscopic management of complicated appendicitis have been reported between 15% and 25%.<sup>[21,22]</sup> The complication profile in the present study is therefore comparable to existing literature. Importantly, no mortality was recorded in this cohort. In previous studies, mortality rates are generally low and usually associated with severe sepsis or significant comorbidities.<sup>[23]</sup>

In the previous study the concern regarding increased intra-abdominal abscess formation after laparoscopic appendectomy in complicated cases has been widely discussed. In the present study, intra-abdominal collection occurred in 6% of patients, which is within the lower range reported in previous studies (5–10%). Proper peritoneal lavage, judicious use of drains, and appropriate antibiotic therapy may have contributed to this favorable outcome.<sup>[24,25]</sup>

In our study, laparoscopic management of complicated appendicitis demonstrated acceptable operative time, low conversion rate, manageable complication profile, and favorable recovery outcomes. In comparison with previous studies, our findings further support the growing evidence that laparoscopy is a safe and effective modality for the management of complicated appendicitis when performed by experienced surgeons.<sup>[26]</sup>

## CONCLUSION

A safe, practical, and successful surgical technique was identified in the present investigation for managing severe appendicitis by laparoscopy. No mortality was recorded, and the technique had an acceptable surgical length, a modest conversion rate of 6%, and a reasonable total complication rate of 18%. Resumption of oral intake soon after surgery, less postoperative pain, and an average hospital stay of less than five days all point to a positive postoperative recovery. Consistent with other research, this study adds credence to laparoscopy's status as the gold standard for treating appendicitis, no matter how complex the case. Laparoscopic appendectomy is a trustworthy and beneficial method for treating complex appendicitis, provided that the surgeon has sufficient training, the patient is a good candidate, and perioperative care is consistent.

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