

Laparoscopic Management of Complicated Appendicitis

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ABSTRACT

Aims: The aims of this study are to evaluate the effectiveness, feasibility, and safety of laparoscopy for managing complicated appendicitis and to look for postoperative complications as well as morbidity, in a Tertiary Care Hospital.

Objectives: To study the laparoscopic appendicectomy in cases of complicated appendicitis with respect to:

- Mean duration of the surgical procedure.
- Number of days of antibiotics given, postoperatively.
- Postoperative day-start of oral feeds.
- The incidence of postoperative morbidity.
- Analgesics required.

Materials and methods: This prospective study was conducted in a Tertiary Care Hospital in Ahmedabad on 50 patients who underwent laparoscopic appendicectomy between June 2022 and March 2023.

Conclusion:

- Our study has shown results encouraging the use of laparoscopic appendicectomy in cases of complicated appendicitis, having found less postoperative morbidity along with early start of postoperative oral feeds and decreased requirement of postoperative antibiotics.
- Although the laparoscopic method can be technically challenging, but the results have demonstrated its feasibility and safety.
- Although the number of patients enrolled in this study is far too small, preliminary results show that our experiences with laparoscopic appendicectomy in complicated appendicitis have been encouraging, although technically demanding, with proper surgical technique, it can be done without much postoperative complication.
- As the laparoscopic approach has less morbidity in our study, we recommend the use of laparoscopy even with complicated appendicitis.

Keywords: Complicated appendicitis, Laparoscopic appendicectomy, Laparoscopic surgery.

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INTRODUCTION

The abdomen is both a magic box and a temple of surprises, according to a well-known proverb. Diseases of the abdomen are a topic rich in clinical fascination because the abdomen accommodates numerous viscera and other anatomical complements.

- One of the most satisfying diagnostic techniques accessible to the physician, particularly the surgeon, is a thorough examination of the abdomen, which helps to plan the best course of action.
- As stated by Bailey "A correct diagnosis is the handmaiden of successful operation".¹
- Acute appendicitis is a common cause of acute abdomen in surgical practice that requires prompt surgery.²
- In men, the lifetime incidence of appendicitis is 12%, whereas in women, it is 25%. About 7 percent of the population will have an appendix removed at some point in their lives due to acute appendicitis. Male-to-female appendicitis rates have been found to be greater across all age categories, ranging from 1.2 to 1.3:1.³
- Despite the fact that advancements in surgical techniques, antibiotic therapy, and diagnostic facilities have reduced mortality from 50% (prior to 1925) to less than 1/1,000,000, the morbidity rate remains at 5–8%, primarily because of complications resulting from delayed diagnosis and treatment.⁴

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The development of the laparoscopic technique gave rise to the chance to investigate novel therapeutic approaches for the treatment of suspected cases of acute appendicitis.⁵

- Laparoscopic appendicectomy is the least morbid operation that combines the benefits of diagnosis and treatment.⁶ Compared to patients who have had an open appendectomy, patients are likely to experience less discomfort following surgery, be discharged from the hospital sooner, and resume their regular activities of daily living.⁷
- There are additional benefits such as a lower risk of wound infection, improved aesthetic results, the capacity to examine the whole peritoneal cavity for the identification of different

conditions, as well as effective peritoneal toileting without the need to extend the incision.⁴

- Laparoscopic appendectomy is becoming more and more common, especially in young women who are fertile and have a wide differential diagnosis for pain in the right lower quadrant, which includes gynecological pathology.⁸
- The advent of laparoscopic surgery in the modern period has brought about notable shifts in the way surgical disorders are treated. In view of a shift toward minimally invasive surgery, general surgeons are paying close attention in almost every surgical operation to determine whether it may be converted to a laparoscopic procedure.⁹

MATERIALS AND METHODS

Fifty patients who underwent laparoscopic appendectomy in a tertiary care hospital in Ahmedabad between June 2022 and March 2023 were included in this study.

Study type: Prospective research.

50 is the sample size.

Inclusion Criteria

- Every patient with diagnosed with complicated appendicitis.
- Every patient who gave consent for study.

Exclusion Criteria

- Ages <12 and >65.
- Females who are pregnant.
- Simple acute appendicitis.
- Gross peritonitis associated with tense abdomen.
- Individuals in whom it would be dangerous to induce a pneumoperitoneum due to poor cardiopulmonary reserve.
- Patients who are morbid and potentially risky candidates for laparoscopic surgery.
- Previous abdominal procedures including significant adhesions.
- Every patient who declined to participate in the trial.
- Every patient who satisfied the inclusion and exclusion criteria of the study was included and admitted.
- Every patient who is suspected of having complicated appendicitis will undergo a clinical examination as well as imaging, which will always involve computed tomography in some cases and ultrasonography in all others. Laparoscopic appendectomy would be performed on each patient.

The following characteristics confirm that the patients have complicated appendicitis:

History and Clinical Examination

- A history of fever, vomiting, constipation, and acute onset lower abdomen pain on the right side.
- An examination of the abdomen indicates the existence of a mass and pain in the right iliac fossa, as well as widespread rigidity and guarding.

Ultrasound Findings of Perforated Appendicitis

Interloop fluid collections; thickened bowel loops with decreased peristalsis; an appendix larger than 6 mm in diameter; an appendicolith and fluid collections in the subhepatic or subdiaphragmatic spaces. Peri-vesical mass without peristalsis.

Table 1: Type of appendix

Type of appendix	No. of patients	Percentage
Perforated	30	60%
Gangrene	20	40%

Table 2: Operating time

Operating time (mins)	No. of patients	Percent age
50	7	14%
55	8	16%
60	11	22%
65	4	8%
70	7	14%
75	6	12%
80	4	8%
85	2	4%
90	1	2%

Table 3: Fever in patients studied

Fever	No. of patients	Percentage
Yes	7	14%
No	43	86%

CT Scan Findings of Perforated Appendicitis

An arrowhead sign, an appendix more than 6 mm in diameter, and focal cecal apical thickening, appendicoliths, fat streaking, abscesses, pockets of fluid in the pericecal area, pelvis, etc.

Total Leucocyte Count

With a higher white blood cell count (>15,000 cells/ μ L) the patient is more likely to have a perforation.

RESULTS

Patients who met the inclusion and exclusion criteria were included in our research. Every patient had an appendectomy via laparoscopic surgery.

According to [Table 1](#), of the 50 patients who took part in the study, 30 (60%) had a perforated appendix and 20 (40%) had gangrenous appendices.

According to [Table 2](#), only 14% of cases took longer than 80 minutes to complete, while nearly 52% of patients had surgery in less than 60 minutes. The identification of the appendix and the management of dilated bowel loops, which made the procedure technically challenging, adhesiolysis, etc., contributed to the prolonged intraoperative duration. The extended duration of the procedure was further explained by the amount of time needed to complete a full peritoneal lavage using warm saline. It was discovered that the mean operating time in our study was 64.6 minutes on average.

Throughout their hospital stay, all patients had their temperatures taken twice a day. [Table 3](#) shows that 86% of patients did not have a fever, while 14% did, with the reason being antibiotic course extensions for pelvic collections, small inter-loop collections, or persistent drainage.

[Table 4](#) shows that, based on the daily rounds, the clinical assessment, and the symptoms, 18% of patients complained of

Table 4: Postoperative abdominal pain in patients studied

<i>Postop abdominal pain</i>	<i>No. of patients</i>	<i>Percentage</i>
Yes	9	18%
No	41	82%

Table 5: Intra-abdominal abscess in patients studied

<i>Intra-abdominal abscess</i>	<i>No. of patients</i>	<i>Percentage</i>
Yes	5	10%
No	45	90%

Table 6: Length of postoperative stay in the patients studied

<i>Length of postop stay</i>	<i>No. of patients</i>	<i>Percentage</i>
POD-3	41	82%
POD-5	3	6%
POD-7	6	12%

stomach pain even after receiving sufficient analgesics, whereas the remaining 82% of patients did not report any abdominal pain.

According to Table 5, 5 patients (10%) had intra-abdominal abscesses.

According to Table 6, 41 patients (82%) were discharged on POD-3, three patients (6%), on POD-5, and 6 patients (12%), on POD-7.

There were no postoperative bowel obstruction characteristics seen in any of the individuals investigated.

Among the patients studied, there were none who had port site infection.

DISCUSSION

Surgical emergencies with complicated appendicitis are frequent. The best course of action for treating complicated appendicitis in the era of limited access surgery remains up for debate: should one pursue an open appendectomy or a laparoscopic appendectomy? laparoscopic appendectomy has been the standard treatment for adult cases of uncomplicated appendicitis in many locations throughout the world.

The role of laparoscopic surgery in treating complicated appendicitis is still up for debate, nevertheless, few published studies report a higher risk of postop intra-abdominal abscess following surgery.

The rationale for the citations included the following: in an open appendectomy, the appendix is delivered externally to the abdominal cavity, and the stump is inverted following division, potentially reducing the incidence of intra-peritoneal contamination; in a laparoscopic appendectomy, however, the appendix is dissected inside the abdominal cavity, potentially leading to the spillage of infected contents into the peritoneal cavity.

Even yet, laparoscopic appendectomy is a widely acknowledged therapeutic option for appendicitis that is not complicated. Concerns have been raised regarding its usage, especially in cases with complicated appendicitis. These concerns include the lengthier surgical recovery period, surgical site infections, intra-abdominal abscesses, etc.

In complicated appendicitis, however, laparoscopic appendectomy offers the benefits of a panoramic view with greater magnification, the capacity to see nooks and crannies (many

pouches and intraperitoneal spaces), and the removal of purulent material with a thorough saline wash.

- Compared to an open treatment, a laparoscopic appendectomy carries a lower risk of wound infection. The results of 2,877 people who participated in 28 trials were included in a meta-analysis of randomized controlled trials that was published. Although the overall rates of complications were similar, there was a noticeable decrease in wound infections following laparoscopy (2.3–6.1%).
- While most research indicates that wound infection is less likely after laparoscopic procedures, Rohr et al. found higher rates of wound infection after laparoscopic appendectomy. During our research, we found no port site infections.

Why Surgeons disagree greatly on whether to perform a laparoscopic treatment for complicated appendicitis because of the possibility of an intra-abdominal abscess forming (gangrenous or perforated).

- Several data suggest that a laparoscopic appendectomy should be converted if gangrene or perforation is discovered during the procedure. Frazee and Bohannon presented a retrospective analysis of 15 patients with gangrenous appendicitis and 19 patients with perforated appendicitis who had laparoscopic appendectomy. In the gangrenous group, the rate of postoperative intra-abdominal abscess was reported to be 7%, whereas in the perforated group, the incidence was 26%.
- Tang et al. discovered that the likelihood of a postoperative intra-abdominal abscess was 11% in laparoscopically treated perforated appendicitis cases and 3% in openly treated cases.
- A prospective study of 75 children with perforated appendicitis was published by Paya et al. 10 had laparoscopic appendectomies, while the other nine had open procedures. While 2 (3.1%) of the 65 patients who had open appendectomies were found to have postop intra-abdominal abscesses, there were no postop abscesses in the group which underwent laparoscopic surgery.
- In adults with complicated appendicitis, between 5.8 and 41% of patients who have had a laparoscopic appendectomy develop an intra-abdominal abscess after the procedure.
- However, our investigation revealed a 10% incidence of the establishment of intra-abdominal abscesses. This condition was successfully treated with empirical and long-lasting antibiotics, blood work, and abdominal ultrasounds at the conclusion of the antibiotic course.
- Compared to open appendectomy, laparoscopic appendectomy has less intestinal wall hematoma and postop intestinal paralysis due to less bowel handling, which facilitates the start of oral feedings sooner than with the conventional approach.

Although the follow-up period has not been long enough, our children have also shown a lower rate of postop adhesions, which is another benefit of the laparoscopic method.

- Ages 26–30 are the most common age-group for acute appendicitis.
- Of the patients, 56% are male. This indicates a small male majority.
- Perforated types of appendices accounted for 60% of all cases.
- The majority of operation times (52%) are fewer than 60 minutes on average.

- Merely 14% of patients experience postoperative fever, with the majority of those cases resulting in the establishment of an intra-abdominal abscess.
- 10% of patients develop an intra-abdominal abscess that is treated conservatively and is accompanied by fever and abdominal pain.

Almost none of the patients have experienced any further complications, such as postoperative intestinal blockage or port site infection.

- 90% of the patients had begun receiving their meals orally by the end of POD-1.
- The majority of patients (84%), did not require analgesics after POD-1.
- For the majority of patients (82%), antibiotics are necessary until POD-3.
- Routine blood investigations were within normal limits, and USG abdominal results were normal, and the majority of patients (82%), were discharged by the end of postoperative day 3.

CONCLUSION

- The results of our study support the use of laparoscopic appendectomy in patients with complicated appendicitis, since we saw a decrease in postoperative antibiotic need, early initiation of oral feeds following surgery, and decreased postoperative morbidity.
- The laparoscopic approach can be technically difficult, but the outcomes have shown that it is safe and feasible.
- Although less common, postoperative intra-abdominal abscesses can be treated conservatively with the appropriate antibiotics, further blood work, abdominal USG imaging, and follow-up monitoring.
- Almost no risk of postoperative paralytic ileus associated with intestinal obstruction symptoms and surgical site infection in the form of port site infection.
- Postoperative fever and abdominal discomfort are also less common, and they are mostly linked to the establishment of an intra-abdominal abscess.
- The majority of patients may begin early oral feeding without any more issues.
- Postoperative analgesic requirements are often minimal, suggesting reduced postoperative morbidity.
- Postoperative antibiotic needs are also uncommon unless a patient develops an intra-abdominal abscess that necessitates long-term antibiotic usage.
- Short hospital stays are also common, barring the development of complications.

- Despite the far too small number of patients enrolled in this study, preliminary findings indicate that our experiences with laparoscopic appendectomy for complicated appendicitis have been supportive. Although technically challenging, it can be performed with appropriate surgical technique and little postoperative complications.
- We advocate using laparoscopy even in cases with complicated appendicitis since our research indicates that this method has a lower rate of morbidity.

Clinical Significance

The use of laparoscopic appendectomy in cases of complicated appendicitis, having found less postoperative morbidity along with the early start of postoperative oral feeds and decreased the requirement of postop antibiotics.

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