

# Tackling of Complicated Appendicitis by Laparoscopy: Is it Safe and Feasible?

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## Abstract

**Background:** Laparoscopic appendectomy has been widely practiced for uncomplicated appendicitis. Various reports demonstrated its merits in reducing post-operative pain, analgesic requirement, incidence of wound infection, and hospital stay. The role of laparoscopy in management of complicated appendicitis remains undefined. Complicated appendicitis is associated with a significant risk of post-operative morbidity, making the value of the minimally invasive approach is superior. **Methods:** This is a retrospective study done in Chittagong Medical College Hospital and various private hospitals in Chittagong from January 2008 to June 2011. Sixty patients with complicated appendicitis included perforated appendicitis, gangrenous appendicitis, and appendicular abscess or lump found intra-operatively. The conversion rate, operative time, postoperative abdominal and wound infections, the return to oral intake, and the length of hospitalization were analysed. Laparoscopic appendectomy was done by three trocar techniques in all cases. **Results:** During the study period, 60 patients underwent laparoscopic appendectomy for complicated appendicitis. There were 35 patients with perforated appendicitis, 12 patients with gangrenous appendicitis, and 13 patients with early appendicular lump or abscess. The average operating time was 65 min. The average length of hospitalization was 3.2 (2–5) days. The postoperative narcotic analgesic requirement was minimal. Laparoscopy was converted to open surgery in two patients (3.33%). Four (6.6%) had postoperative complications (diarrhoea). Three patients developed (5%) wound (port) infection. There was no statistically significant difference in operative time ( $P 0.13$ ). There was no mortality in the current series. **Conclusions:** Laparoscopic appendectomy is a safe and feasible treatment option in complicated appendicitis. It is advantageous than open surgery because of less wound infection, less morbidity, less hospital stay, early return to work, and not associated with increased risk of septic postoperative complications.

**Key words:** Laparoscopic appendectomy; Appendicitis; Complicated appendicitis.

## INTRODUCTION

Laparoscopic appendectomy for a non-inflamed appendix was first reported in 1983 by the gynaecologist Semm.<sup>1</sup> In 1987, Schreiber reported a laparoscopic-assisted appendectomy for the treatment of acute appendicitis.<sup>2</sup> Open appendectomy (OA) has withstood the test of time for more than a century since its introduction by McBurney,<sup>3</sup> lifetime risk of appendicitis is 6%. For decades, open

appendectomy has been the standard treatment for all forms of appendicitis with excellent results.<sup>1</sup> The overall mortality of OA is around 0.3%; and morbidity, about 11%.<sup>4</sup>

Numerous prospective randomized studies,<sup>5-7</sup> meta-analyses,<sup>8-10</sup> and systematic critical reviews<sup>9</sup> have published the topic on laparoscopic appendectomy, with a general consensus that the heterogeneity of the measured variables and other weaknesses in the methodology have not allowed to draw definitive conclusions and generalizations.<sup>11</sup>

Complicated appendicitis may be defined by perforation with purulent peritoneal collection, abscess formation, and early appendicitis comprises 20% to 30% in all cases of appendicitis. It has been associated with a significant risk of postoperative septic complications, including wound infections and intra-abdominal abscess formation.<sup>12,13</sup> The feasibility and validity of the laparoscopic approach has caused significant controversy mainly due to early reports of the increased incidence of intra-abdominal abscess rates.<sup>8,14-17</sup> Conversely, several more recent trials<sup>18-22</sup> have found a statistically significant reduction in early postoperative complications with the laparoscopic approach to the point that it has actually been proposed as the method of choice for complicated appendicitis.

## METHODS

A retrospective analysis was performed in Chittagong Medical College Hospital and various private hospitals in Chittagong from January 2008 to June 2011. This ambitious study was undertaken with the aims and objectives to evaluate safety, efficacy, and feasibility of laparoscopic appendectomy in routine clinical practice, to evaluate whether it is justifiable to perform laparoscopically in complicated appendicitis and to evaluate whether laparoscopic operation is better than conventional operation in terms of benefits of minimal invasive surgery.

These patients were further classified into three groups according to operative findings: Group 1—perforated appendicitis, Group 2—gangrenous appendicitis, and Group 3—appendicular abscess or lump.

Those patients presented with leucocytosis above 10,000 cells per ml and ultrasonogram findings of swollen and oedematous appendix with free fluid collection in the peritoneum or gangrenous appendix were diagnosed as complicated appendicitis.

Patients were excluded if the diagnosis of appendicitis was not clinically established and if they had a history of symptoms for more than 5 days and/or a palpable mass in the right lower quadrant.

## Surgical Technique

Laparoscopic operative technique included the insertion of standard 3port technique. More specifically, after the induction of general anesthesia, pneumoperitoneum was accomplished with the introduction of a 10-mm trocar with the open technique at the umbilicus. A 5-mm trocar was then inserted at the right iliac fossa, and finally a 10-mm trocar was inserted at the left iliac fossa. Initially, diagnostic laparoscopy was undertaken to see any purulent exudates, pus, or any lump in the appendix region. If any pus or exudates, suction was given to clear the abdomen. Then with a Trendelenberg position and a modest right up tilt of the table the right iliac fossa was explored further. The status of the appendix was ascertained at this stage and care was taken to avoid avulsion of a friable or gangrenous appendix from its base. The mesoappendix was divided by using of an endoclip. The base of the appendix was ligated by using vicryl 2(0) or endoclip. Copious amounts of saline were used for peritoneal lavage. Drains were used in all cases. A surgical glove was used as an endobag for retrieval of appendix thus avoiding port site contamination.

## Postoperative Care

Analgesics were given regularly during the hospital stay, and a clear liquid diet was instituted after the first 24 hours with gradual advancement according to bowel movements. Antibiotic administration (Ceftriaxone - Metronidazole and occasionally Amicasin – intravenous + oral) was given for 7 days in most patients and for 10 days in a few patients.

## Statistical Analysis

The medical records of the patients in the three groups were reviewed and compared regarding conversion rate, operative time, mean hospital stay, postoperative abdominal and wound infections, mean time of return of oral intake by using chi square test and Wilcoxon rank sum test. Statistical significance was reached at P0.05.

## RESULTS

Sixty patients, 42 males and 18 females, mean age 24 yrs (range, 18–32 years), were diagnosed with complicated appendicitis. Patient data regarding demographics, operative time, and conversion correlated with the clinicopathologic subgroupings are presented in Table 1 and 2. There was no statistically significant difference in operative time among the three groups. Conversion to open appendectomy was

needed in 2 patients (3.33): the first patient had an inseparable appendicular lump (considered as Group 3 patient), whereas, the second patient (Group 1) exhibited major technical difficulties mainly due to perforation at the base appendix and slough out of portion of caecum.

Postoperative results are presented in Table 3. The average operating time was 65 mins. The average length of hospitalization was 3.2 (2–5) days. The postoperative narcotic analgesic requirement was minimal. Laparoscopy was converted to open surgery in 2 patients (3.33%). Four (6.6%) had postoperative complications (diarrhoea). Three patients developed (5%) wound (port) infection. No statistically significant differences occurred in operative time (P 0.13). There was no mortality in the current series.

Patient demographic shows that mean age distribution is 24 years; male 42, female 18.

Among 60 patients of complicated appendicitis, 35 patients were with perforated appendicitis, 12 patients with

gangrenous appendicitis, and 13 patients with early appendicular lump or abscess.

## DISCUSSION

The advantages of laparoscopic surgery are now well established. The technique is being applied to expand the number of surgical procedures. Laparoscopic appendectomy has now gained a favourable reputation uniformly. Several meta analyses and comparative studies, however, have shown that it retains the traditional advantages of the minimally invasive approach in terms of decreased wound pain, shorter length of hospital stay, lesser incidence of wound infection, quicker return to work, and improved cosmesis.<sup>23–25</sup>

Our series demonstrates the feasibility and safety of the laparoscopic approach in complicated appendicitis. Postoperative septic complications were absent, and the convalescence for the whole series was excellent.

A few clinical studies on laparoscopic appendectomy for complicated appendicitis have actually raised some serious questions.<sup>24</sup> Early reports have shown an increase in postoperative intra-abdominal abscess for burst or perforated appendicitis using the laparoscopic technique. Establishment of pneumoperitoneum in a septic environment has been implicated; however, the effect of pneumoperitoneum on animal models regarding bacterial translocation has had controversial results. Surgical learning curve issues and increased manipulation of the appendix have also been implicated.<sup>26</sup>

This series demonstrates results consistent with the latter: there was not a single septic complication (intra-abdominal abscess) in any group.

A noteworthy feature of this series is that no statistically significant differences occurred in operative time and postoperative convalescence between the groups. This finding implies that the laparoscopic approach achieves similar results regardless of the type of complicated appendicitis. The magnification offered by the laparoscopic view, the minimal manipulation of the peritoneal cavity contents and of the appendix and the ability to gain access to and thoroughly irrigate every intraperitoneal space contributes to the superiority of the minimally invasive approach over open surgery.<sup>27,28</sup>

However, all laparoscopic appendectomies were performed by surgeons with learning curves well past the accreditation requirements. Additionally the same experienced nursing team supported the majority of these operations. We do feel that both played a key role in achieving these excellent clinical results.

**Table 1:** Patient demographics

S. No	Demographic	Mean
1	Age	24 years
2	Sex	M-42, F-18

**Table 2:** Categorization of complicated appendicitis

Group	Type	Number	Percentage
1	Perforated appendix	35	58.34%
2	Gangrenous appendix	12	20%
3	Appendicular lump or abscess	13	21.66%
4	Complicated appendicitis	60	100%

**Table 3:** Different variables considered

S. No	Variable	Result
1	Operative time	65 min
2	Time to liquid	24 hour After
3	Parenteral analgesic	24 hours
	Oral analgesic	5 days
4	Conversion	2(3.3%)
5	Mean hospital stay	3.2 (2–5) days
6	Port infection	3 (5.00%)
7	Diarrhoea	4 (6.6%)

Outstanding cosmesis proved to be another highly appreciated feature for our patient that compliments the success of laparoscopic surgery in these complicated cases.

## CONCLUSION

To conclude in a nutshell, laparoscopic appendectomy is an attractive and superior alternative to conventional surgery. Laparoscopic management of acute appendicitis appears to have multiple advantages. Supporters of laparoscopic appendectomy claim that laparoscopy allows full evaluation of the abdomen and improves diagnostic accuracy.

Our series demonstrates the feasibility and safety of the laparoscopic approach in complicated appendicitis. Laparoscopic appendectomy is a safe and feasible treatment option in complicated appendicitis. It is advantageous than open surgery because of less wound infection, less morbidity, less hospital stay, early return to work, and no increased risk of septic postoperative complications.

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