

Original Article

Intraoperative and Early Postoperative Complications of Difficult Laparoscopic Appendicectomy: An observational study

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Abstract:

Although open appendicectomy has been performed successfully for more than 200 years, its preeminent position in the treatment strategy for the patient with appendicitis has been changed by laparoscopic appendicectomy in the last two decades. The present study consists of 150 cases of acute appendicitis disease seems to be difficult for laparoscopic appendicectomy selected on the basis of clinical and sonological criteria. They underwent laparoscopic appendicectomy and the results were evaluated on the spectrum of per operative and early postoperative complications, methods of identification of these complications and their managements. The overall intra operative complications in the present study in 8 (5.33%) cases and early postoperative complication in 15 (10%) cases. Laparoscopic appendicectomy results very few intraoperative and postoperative complications. Therefore, laparoscopic appendicectomy is worth recommending as an effective and safe procedure for acute appendicitis

Keywords: Laparoscopic appendicectomy, Appendicitis, Complications

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Introduction:

Acute appendicitis is a surgical condition with incidence of 1.17 per 1,000 [1] and lifetime risk of 8.6% in males and 6.7% in females [2].

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Complicated appendicitis (CA) occurs once the appendix has become gangrenous and/or has perforated with various degrees of peritonitis. The rate of CA is slowly increasing [3] and has been reported at an incidence of 12–30% [4]. It is associated with higher morbidity rates—wound infection rates 20% versus 5% in noncomplicated appendicitis (nCA) [5]—and mortality rates—5% versus 0.8% in nCA [6].

Since 1894, after the description of a series of case studies by McBurney, OA via the McBurney approach has been the gold standard procedure for appendectomy [7]. In the early 1980s Semm [8] described the first laparoscopic appendectomy. Subsequent technological advances and improvement of surgical laparoscopic techniques and expertise have given ground for trying to introduce this procedure as the mainstay of treatment for appendicitis. The advantages of LA in nCA appear to focus on the reduction of postoperative pain, wound infection rates, and in-hospital stay compared to OA, and that it has distinct diagnostic advantages in females of reproductive age [9]. The use of LA in CA though has been controversial and associated with increased rates of intra-abdominal abscess (IAA) complications [10, 11]. Recent advances in laparoscopic surgery are suggesting reduced postoperative wound infection rates of LA compared to OA in CA, and are actually recommending LA as the mainstay of treatment for these patients [11, 12]. Laparoscopic appendicectomy may be rendered 'difficult' by various problems encountered during surgery, such as difficulties in accessing the peritoneal cavity, creating a pneumoperitoneum, dissecting the appendix or extracting the excised appendix, patient's age >60 years, history of previous lower abdominal

surgery, surgery after 24 hours of onset of symptoms and complicated appendicitis [13]. Now the laparoscopic appendicectomy is the procedure of choice for both complicated and uncomplicated appendicitis because there is increase in the skill of surgeons with newer equipment's[14]. The skill of surgeons in laparoscopic techniques, thorough knowledge of risk factor are important if difficult appendix considered for laparoscopic management. Otherwise, hazards may occur ranging from simple to life threatening complications. For reduction of this complications various studies are going on in different parts of the world to find out types of complications of laparoscopic appendicectomy, their methods of identification, prevention and appropriate measures if complication arises.

Laparoscopic appendicectomy is gradually being popular in our country. But there are a lot of difficult cases where the chance of complication during laparoscopic appendicectomy is more. For reduction of these complication various studies are going on in different parts of the world. In Bangladesh though the rate of difficult laparoscopic appendicectomy is more but there are very few studies on complications of difficult cases. But it is very important to study about complications of difficult laparoscopic appendicectomy cases for further improvement of quality services to the patient. This reason has inspired me in doing this study.

Aims and Objectives

General objective

To identify the complications of laparoscopic appendicectomy in difficult cases in per operative and early postoperative periods.

Specific objectives:

1. To find out incidence of complications in such cases and to compare the result with similar series of study.
2. To find out methods of early detection of these complications.

Materials and Methods

This was a descriptive type of observational study carried out at the Department of Surgery, Sylhet M.A.G Osmani Medical College Hospital, Sylhet, Bangladesh from July' 2021 — December' 2022.

Study population: All the patients having Appendicitis disease fulfilling inclusion and exclusion criteria admitted to different surgical units of Sylhet M.A.G Osmani Medical College Hospital, Sylhet, Bangladesh.

Sample size calculation: Sample size will be calculated by using Cochran's formula.

The formula is:

$n = z^2 pq / d^2$, where n = estimated sample size

$z = 1.96$ (in 95 °A CI)

p = prevalence of Appendicitis 10%⁹

q = 1 - 0.10 = 0.90

d = Admissible error (marginal error)

Considered as 5% (0.05)

So the estimated sample size = $\frac{(1.96)^2 \times 0.10 \times 0.90}{(0.05)}$

Estimated sample was 150.

Study procedures:

After the admission of a patient with suspected acute appendicitis a proper diagnostic workup was done by taking history and clinical examination. The diagnosis was confirmed by Alvarado score. Emergency investigations like full blood count, random blood glucose, urine routine and microscopic examination, serum creatinine and ultrasonography of whole abdomen was done. The patients were resuscitated first. Intravenous broad-spectrum antibiotics Ceftriaxone and Metronidazole were administered to all patients on admission. The patients were nursed properly and adequate analgesia were given for relief of pain. After adequate resuscitation, patients underwent laparoscopic appendicectomy under general anesthesia. All patients received prophylactic antibiotics (intravenous ceftriaxone 75mg/Kg and metronidazole 50mg/kg) before 60 minutes of the laparoscopic port incision. Proper hydration will be maintained through the perioperative period by intravenous fluid. Skin

preparation will be done by 10% povidoneiodine solution. Per operative findings will be recorded in detail. Data was collected in pre-designed data collection sheet.

Ethical considerations: Informed written consent was taken from each patient.

Results

Table 1: Baseline characteristics of the study patients (n=150)

Baseline characteristics	No. of Patient	Percent (%)
Age group (years)		
11 – 20	65	43.0
21 – 30	35	23.0
31 – 40	15	10.0
41 – 50	20	13.0
51 – 60	12	8.0
61 – 70	3	2.0
Sex		
Male	108	72.0
Female	42	28.0
Presenting complaints	132	88.0
Pain RIF		
Migration of pain to RIF	129	86
Pain on coughing	105	70
Anorexia	108	72
Nausea / vomiting	90	60
H/O Fever	75	50
Pulse (>90)	75	50
Temperature (>37.5 o C)	30	20
Tenderness	06	04
Rebound tenderness	12	08
Guarding	88	59
Rigidity	21	14
Rovsing's sign	35	23
Psoas sign	40	26
Obturator sign	58	38
Dunphy's sign	15	10
Baldwin's sign	12	8

Table-1 shows the baseline characteristics of the study patients, where 43% patients were in 2nd decade, 23% patients were in 3rd decade, 10% were in 4th decade, 13% patients were in 5th decade, 8% patients were in 6th decade and 2% patients were in 7th decade. The patient having gall stone disease in which 108 patients (72%) were male and 42 patients (28%) were female.

The commonest symptom was Pain Right iliac Fossa (RIF) in 88 % cases, Migration of pain to RIF in 86 % cases. Pain on coughing in 70 % cases, Anorexia in 72% cases, nausea and vomiting in 60% cases, H/O Fever in 50% cases,

Pulse (>90) in 50 % cases, Temperature (>37.5° C) in 20% cases, Tenderness in 8 percent cases, Rebound tenderness in 08% cases , Guarding in 59 % cases, Rovsing's sign in 23% cases, Psoas sign in 26 % cases, Dunphy's sign in 10% cases, Obturator sign in 38 percent cases, Baldwin's sign in 08% cases.

Table-2 Ultrasonographic findings of whole abdomen (n=150)

Ultrasonographic findings	No. of patients	Percent (%)
Normal appearance of appendix	28	18.66
Inflammed appendix	110	73.33
Evidence of appendix mass	06	04
Evidence of appendix abscess	04	2.6
Evidence of intraabdominal collection	02	1.3

Table-2- shows that the patients in this study underwent ultrasonographic examination of whole abdomen. Out of 150 cases 28 (18.66%) cases had stone normal appearance of appendix, 110 (73.33%) cases had inflammed appendix, 06 (04%) cases had appendix mass, 04 (2.6%) cases had appendix abscess and 02(1.3%) cases had intraabdominal collection.

Table-3 Lab investigations of the study patients (n=150)

Lab investigations	No. of patients	Percent (%)
Complete Blood Count		
Total leucocyte count 4000-11000	12	08
Total leucocyte count >11000	138	92
Neutrophil Count< 80%	12	08
Neutrophil Count >80%	138	92
Urine for routine and microscopic examination		
Pus Cell 0-5/HPF	135	90
Pus Cell >5/HPF	15	10

HPF: High Power Field

Table shows Total leucocyte count was within normal level in 12 (08%) patients and increased in 138 (92%) patients. Neutrophil Count below 80% in 12 (08 %) cases and more than 80% in 138(92%) cases.

In urine for routine and microscopic examination pus cell below 5/HPF 135(90%) and above 15(10%).

Table-4: preoperative diagnosis (n=150)

Diagnosis	No. of patients	Percent (%)
Acute Appendicitis	142	94.66
Perforated Appendix	02	1.3
Recurrent Appendicitis	02	1.3
Appendix Abscess	04	2.6

Table-4 shows that among the 150 patients, 142 (94.66%) cases were diagnosed as Acute Appendicitis, 02 (1.3%) cases as Perforated Appendix, 02 (1.3%) cases as Recurrent Appendicitis and the remaining 04 (2.6%) cases as Appendix abscess.

Table-5: Causes of per operative difficulties (n=150)

Preoperative problem	No. of patients	Percent (%)
Gangrenous Appendix	34	22.66
Dense adhesion and difficult to dissect from Caecum	50	33.33
Perforated Appendix	38	25.33
Appendix abscess	10	6.66
Obese patient and huge fat in and around paracolic gutter and Mesentery	01	0.66
Total problem	133	88.67

Table-5 shows out of 150 patients per operative difficulties were faced in 133 patients. In 34 (22.66%) cases there were Gangrenous Appendix. In 50 (33.33%) cases there were Dense adhesion and difficult to dissect from Caecum. In 38 (25.33%) cases there were Perforated Appendix. In 10 (6.66%) cases there were Appendix abscess. In 01 (0.66%) cases patients were obese having huge fat in and around paracolic gutter and Mesentery making dissection difficult.

Table-6: Per operative complications during laparoscopic appendicectomy

Type / nature of complications	No. of patients	Percent (%)
Minor complications		
Appendicular artery bleeding	03	02
Trocar site bleeding	03	02
Major complications		
Injury to Caecum	01	0.6
Ileal injury	01	0.6

Table-6 shows preoperative complications during laparoscopic appendicectomy. Out of 150 patients 06 (4%) cases developed minor complications. Appendicular artery bleeding observed in 06 (04%) cases, bleeding from trocar site in 03 (02%) cases. Injury to Caecum in 01 (0.6%) cases. Injury to Ileum in 01 (0.6%) cases.

Table-7: Mean operation time (N=150)

Operative procedure	Time range (minutes)	Mean time (minutes)
Laparoscopic appendicectomy	35-115	40

Table-7 shows mean operation time 40 minutes with a range from 35 minutes to 115 minutes.

Table-8: Operation procedure adopted (N=150)

Operative procedure	No. of patients	Percent (%)
Laparoscopic appendicectomy	144	96%
Conversion to open appendicectomy	06	03%

Table -8 shows Laparoscopic appendicectomy was done in 144 (96%) cases and conversion to open appendicectomy needed in 06(04%) cases.

Table-9: Indications for conversion to open appendicectomy (N=150)

Indication	No. of patients	Percent (%)
Dense adhesion that obscured anatomy	03	02
Bleeding from iliocolic artery that was difficult to clip laparoscopically	03	02
Total	06	04

Table shows Out of 150 patients 06(04%) cases needed conversion to open appendicectomy. 03(02%) cases there was dense adhesions of appendix with caecum and surrounding structures that obscured the anatomy and in 03 (02%) cases there was bleeding from the ileocolic artery that was difficult to clip laparoscopically.

Table-10 Early postoperative complications (n=150)

Complication	No. of patients	Percent (%)
Postoperative stump leakage through drain (3 rd postoperative day and onwards)	03	02
Chest infection	06	04
Sub phrenic collection	03	02
Pelvic collection	03	02
Post operative peritonitis	00	00
Postoperative bleeding throw drain (Mild oozing that stopped spontaneously within 2 nd postoperative day)	03	02
Total	15	10

Table 10 shows out of 150 patients early post operative complications developed in 15 (%) Cases Among them Postoperative stump leakage through drain observed in 03 (02%) cases, Chest infection 06 (04%) cases, Sub phrenic collection observed in 03 (02%) cases, Pelvic collection observed in 03 (02%) cases postoperative bleeding through drain in 03(02%) cases.

Discussion

More than 40 years have passed since the introduction of laparoscopic appendicectomy. During this period, the procedure has not achieved as great appreciation as laparoscopic cholecystectomy.⁸

Although open appendicectomy has been performed successfully for more than 200 years, its preeminent position in the treatment strategy for the patient with appendicitis has been changed by laparoscopic appendicectomy in the last two decades.¹⁵

Laparoscopic appendicectomy has become the preferred treatment option for gall stone disease and cholecystitis in many parts of the world because of its shorter hospital stay, less morbidity, early return to work and cosmetically better outcome. Vast majority of cases of acute appendicitis can be operated successfully by laparoscopic procedure. Only 4.16% cases may need conversion to open cholecystectomy for successful completion of cholecystectomy or to overcome various problems that a surgeon may encounter during laparoscopic procedure.¹⁶

Though it is a safe procedure and has high patient compliance in all aspect, it has some disadvantages as well. Various complications may arise during operation and in the postoperative period such as, injury to Ileum, per operative and postoperative bleeding, postoperative stump leakage, chest infection, sub phrenic and pelvic collection etc.¹⁷

The present study consists of 150 cases of acute appendicitis disease seems to be difficult for laparoscopic appendicectomy selected on the basis of clinical and sonological criteria. They underwent laparoscopic appendicectomy and the results were evaluated on the spectrum of per operative and early postoperative complications, methods of identification of these complications and their managements.

Age distribution of the patients ranged from 11-70 years with maximum number of patients in their second decade which is classical for acute appendicitis. Female patients were 2.57 times more than male patients. Out of 150 cases 28 (18.66%) cases had stone normal appearance of

appendix, 110 (73.33%) cases had inflamed appendix, 06 (04%) cases had appendix mass, 04 (2.6%) cases had appendix abscess and 02(1.3%) cases had intraabdominal collection.

All the patients were investigated with complete blood count and urine for routine and microscopic examination. Total leucocyte count was within normal level in 12 (08%) patients and increased in 138 (92%) patients. Neutrophil Count below 80% in 12 (08 %) cases and more than 80% in 138(92%) cases.

In urine for routine and microscopic examination pus cell below 5/HPF 135(90%) and above 15(10%).

Out of 150 patients per operative difficulties were faced in 133 patients. In 34 (22.66%) cases there were Gangrenous Appendix. In 50 (33.33%) cases there were Dense adhesion and difficult to dissect from Caecum. In 38 (25.33%) cases there were Perforated Appendix. In 10 (6.66%) cases there were Appendix abscess. In 01 (0.66%) cases patients were obese having huge fat in and around paracolic gutter and Mesentery making dissection difficult. The present value is almost similar with the study of Markides et al. where it was 05%.¹⁴

In the present study, per operative bleeding was encountered in 6 (04%) cases where appendicular artery bleeding in 03 (02%) cases, which was managed by converting the procedure to open appendicectomy as the artery was difficult to ligate or to clip laparoscopically. Bleeding from trocar sites was encountered in 03 (02%) cases, which was managed by application of pressure or by suture.

In present study Injury to Caecum in 01 (0.6%) cases. Injury to Ileum in 01 (0.6%) cases.

Postoperative stump leakage through drain observed in 03 (02%) cases. In another study Beldi et al showed incidence of postoperative stump leakage after laparoscopic appendicectomy in 5.3% cases.¹⁸

Postoperative Chest infection was in 06 (04%) cases in this series.

In this study postoperative bleeding was encountered in 3(02%) cases that stopped spontaneously within 2nd postoperative period and sub hepatic collection in 03 (02%) cases.

In the present series, out of 150 patients laparoscopic appendicectomy was performed successfully in 144 (94%) cases and conversion to open appendicectomy needed in 06 (04%) cases. Conversion needed in 03 (02%) cases due to uncontrolled bleeding from the ileocolic artery that was difficult to ligate or to apply clip laparoscopically and in 03(02%) cases there was dense adhesions of appendix with caecum and surrounding structures that obscured the anatomy. Finnerty et al¹⁹ showed conversion to open cholecystectomy needed in 5% cases in his study. In another study Sakpal et al.¹⁶ showed 4.16% conversion rate. These incidences are higher than that of the present series.

The overall intra operative complications in the present study in 8 (5.33%) cases and early postoperative complication in 15 (10%) cases which is lower than the study of Shaikh et al where intra operative complication encountered in 10 cases and early postoperative complications in 18 cases.¹⁵

There was no mortality in present study.

The present study had the following limitations. This study was carried out in short time period taking a small sample size and only per operative and early postoperative complications were studied, but long term follow-up could not be carried out to evaluate any further late complication.

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