

Short Time Outcome of Open versus Laparoscopic Appendicectomy: A Comparative Study

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ABSTRACT

Background: Appendicectomy is the most commonly performed urgent abdominal operation. Despite continuously increasing popularity of minimal access surgery, laparoscopic appendicectomy has not gained enough popularity. Aim of this study was to compare the outcomes of two different appendicectomy procedures on different aspects to share our experience with others.

Materials and methods: This was a prospective type of observational study conducted in the Department of Surgery, Bangladesh Medical College Hospital, Dhaka. Study period was of 8 months (From 1st January 2019 to 31st August 2019). 100 cases were selected through random sampling and allocated in two groups, each group consisting of 50 cases.

Results: Duration of surgery in OA (Open Appendicectomy) was 44.54 ± 11.75 minutes and in LA (Laparoscopic Appendicectomy) was 68.28 ± 15.24 minutes (p value < 0.001). LA group needed less analgesic than OA group. Mean duration of hospital stay; in OA was 3.28 ± 0.64 days and LA was 2.44 ± 0.70 days (p value < 0.001). Overall complications were more in OA (26%) than LA (12%). Other pathological findings were found in 4 cases of LA group. Cosmetic outcome was better in LA group (p value < 0.001).

Conclusion: The laparoscopic appendectomy is safe, simple and efficient technique for treatment of acute appendicitis with result comparable to the open appendectomy, if not better.

KEY WORDS

Acute appendicitis; Laparoscopic appendicectomy; Open appendicectomy.

INTRODUCTION

Acute appendicitis is the commonest acute abdominal emergency from childhood to early adult life, and consequently, appendicectomy is the most commonly performed urgent abdominal operation.¹⁻⁵ It is a common indication for abdominal surgery, with a life-time incidence of between 7 to 9 percent with a peak

incidence between 10 and 30 years.⁶⁻⁸ Conventional open appendicectomy has been the treatment of choice for more than a century.^{9,10} Although in majority of cases, it is rather an uncomplicated operation associated with theoretically zero mortality rate (Approximately 0.1%) but there may be significant post-operative morbidity following open operation. These include wound infection, prolonged ileus, intestinal obstruction due to adhesions, infertility in females and less commonly, incisional hernia.¹¹⁻¹³ As a result, the open approach leads to a relatively long hospital stay and delays return to normal activities. Furthermore, a detailed examination of the abdomen and pelvis is not possible in open surgery.¹⁴ In the quest for an alternative approach that would reduce the post-operative complications, duration of hospital stay and convalescence period as well as provide improved operative exposure and cosmetic outcome, laparoscopic appendicectomy, in recent years, has emerged to be a popular and standard procedure for treating appendicitis successfully.¹⁵

Laparoscopic appendicectomy has emerged as a safe procedure and its potential advantages of shorter hospital stay, early mobilization, acceptable complication rate along with the recent enthusiasm of minimally invasive surgery, has led some authors to advocate this approach as the procedure of choice for uncomplicated acute appendicitis.^{16,17} Moreover, the

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laparoscopic approach may offer particular advantage in case of women of childbearing age and in obese individuals.^{18,19} The aim of this study was to compare the outcomes of these two surgical procedures on different aspects and to find out any significant difference.

MATERIALS AND METHODS

This was a prospective type of observational study conducted in the Department of Surgery, Bangladesh Medical College Hospital, Dhaka. Study period was of 8 months (From 1st January 2019 to 31st August 2019). 100 cases irrespective of sex, were selected through random sampling who fit the selected criteria. Following that, sampling units are allocated in two groups by lottery, each group consisting of 50 cases. Inclusion criteria were diagnosed case of acute appendicitis between 10 and 40 years age, Patients willingly give informed consent to take part in the study, Patients presenting within 3 days of abdominal pain. Diagnosis of acute appendicitis was confirmed by clinical, pathological and radiological investigations. Exclusion criteria were patient/attendant unwilling to give informed consent to take part in the study, pregnant women, patient presenting with appendicular lump. All cases underwent either laparoscopic or open appendectomy for acute appendicitis. Per-operative events and post-operative follow up were documented in a preset data collection sheet. After collecting information, data was checked, verified for consistency and edited for finalization of result. Statistical analyses were done by unpaired t-test and chi-square test. After editing and coding, the coded data was analyzed by computer with the help of SPSS software. Results are presented in tables as percentage. Ethical consideration was taken before start the study.

RESULTS

100 patients were selected for either laparoscopic (50 cases) or open (50 cases) appendectomy for acute appendicitis. Age distribution of patients revealed mean±SD age of open appendectomy was 20.30±6.79 years and laparoscopic appendectomy was 19.82±6.33 years (p 0.72) with highest frequency observed in 10-20 year age group (56% in open, 62% in laparoscopy). Among 50 cases of open appendectomy, 33 cases (66%) were male and 17 cases (34%) were female. Among 50 cases of laparoscopic appendectomy, 34 cases (68%) were male and 16 cases (32%) were female (p 0.83). Open cases needed 67.50±9.20 minutes' duration of anaesthesia and laparoscopic cases 83.82±13.05 minutes (p<0.001). Duration of surgery in group A (Open cases) was (Mean±SD) 44.54±11.75 minutes

and in group B was (Mean±SD) 68.28±15.24 minutes (p<0.001). Per operative hazards observed in 2% patients with laparoscopic appendectomy (p 0.31). Mean time required taking narcotic analgesic after surgery in Group A was 29.06±10.46 hours and in Group B 21.36±11.93 hours (p value: 0.001). Mean time time required taking NSAIDs analgesic after surgery in case of open procedure was 9.00±2.46 days and in case of laparoscopic appendectomy was 6.72±2.47 days (p <0.001).

Mean time required tolerating regular diet was 47.36±9.34 hours after open appendectomy and 30.94±8.15 hours after laparoscopic appendectomy (p <0.001). Regarding hospital stay, in Group A stay period was 3.28±0.64 days and in group B- 2.44±0.70 days (p<0.001). Indoor activity returned after a mean of 9.66±2.42 days in Group A and 6.28±2.04 days in Group B.

Table I Preoperative clinical features and operative findings

Preoperative finding	Group A (n=50)	Group B (n=50)	p Value
Symptoms			
Migratory RIF pain	36(72.0%)	40(90.0%)	0.68 ^{NS}
Anorexia	22(44.0%)	38(76.0%)	0.41 ^{NS}
Nausea vomiting	20(40.0%)	22(44.0%)	0.68 ^{NS}
Sings			
Tenderness (RIF)	50(100.0%)	50(100.0%)	0.40 ^{NS}
Rebound Tenderness	42(84.0%)	45(90.0%)	0.29 ^{NS}
Elevated Temperature	17(34.0%)	23(46.0%)	0.22 ^{NS}
Lab			
Leukocytosis	45(90.0%)	42(84.0%)	0.29 ^{NS}
Shift to left	7(14.0%)	9(18.0%)	0.58 ^{NS}
Operative findings			
Non- inflamed	0	0	-
Inflamed	44(88.0%)	47(94.0%)	0.42 ^{NS}
Phelgmonous	0	0	-
Gangrenous	6(12.0%)	3(6.0%)	0.31 ^{NS}

NS = Not Significant (p > 0.05)

S = Significant

n = Number of patients enrolled in a group

Group A (Open appendectomy)

Group B (Laparoscopic appendectomy).

Table II Post-operative complications

Complication	Group A (n=50) No. (%)	Group A (n=50) No. (%)	p value
Wound infection	7(14.0%)	2(4.0%)	0.005
Intra-abdominal abscess	0	0	0.07
Ileus	4(8.0%)	1(2.0%)	0.086
Respiratory	0	3(6.0%)	0
Urinary	2(4.0%)	0	0.086
No complications	37(74.0%)	44(88.0%)	0.001

S = Significant (p < 0.05)

NS = Not Significant

n = Number of patients enrolled in a group

Data were expressed as number and percentage, Statistical analysis were done by Chi-square test.

Group A (Open appendicectomy)

Group B (Laparoscopic appendicectomy).

Table III Overall satisfaction

Cosmetic outcome	Group A (n=50) No. (%)	Group B (n=50) No. (%)	p value
Excellent	0	17(54.0%)	<0.001
Good	14(28.0%)	29(58.0%)	<0.001
Satisfactory	27(54.0%)	2(4.0%)	<0.001
Poor	9(18.0%)	2(4.0%)	<0.001
Total	50(100.0%)	50(100.0%)	<0.001

S = Significant ($p < 0.05$)

NS = Not Significant

n = Number of patients enrolled in a group

SD = Standard Deviation.

Data were expressed as number and percentage,

Statistical analysis were done by Chi-square test.

Group A (Open appendicectomy)

Group B (Laparoscopic appendicectomy).

DISCUSSION

A total number of 100 cases of acute appendicitis were analyzed in this prospective observational study of laparoscopic versus open appendicectomy, half of the total patients were allocated to open procedure and the remaining half to laparoscopic appendicectomy. There was no mortality in our study. The overall reported mortality of appendicectomy is very low and was estimated in a review of a large administrative database at 0.05% for laparoscopic appendicectomy and 0.3% for open appendicectomy, reinforcing the fact that appendicectomy in the absence of peritonitis is a safe procedure, regardless of the technique performed.²⁰

Among the 100 respondents, majority presented with right iliac fossa pain (100%). Martin et al reported similar nature of pain for laparoscopic appendicectomy.²¹ Laparoscopic appendicectomy was done with general anesthesia and mean duration of anesthesia was 83.82 ± 13.05 minutes ($p=0.001$) whereas open appendicectomy was done by spinal anesthesia and mean duration of anesthesia was 67.50 ± 9.20 minutes ($p=0.001$). Both the results were significant and laparoscopic appendicectomy needed more time over open appendicectomy.

Mean duration of surgery (In minutes) in case of laparoscopic appendicectomy was 68.28 ± 15.24 minutes ($p=0.001$) and in the other hand in case of open appendicectomy mean duration of surgery (in minutes) was 44.54 ± 11.75 minutes ($p=0.001$). The operative

duration was 24 minutes longer in the laparoscopic appendicectomy group as compared to that in the open appendicectomy group. In considering operating time, the exact identification of the timing of the start of the procedure and its conclusion vary. In general the time should be calculated from the insertion of first trocar to the end of the skin suturing. Cox et al defined operating time as the time from incision to wound closure.²² Tate et al calculated the time as use of anesthesia to the administration of a reversal agent.²³ Both anesthesia and the actual skin to skin time was measured and were found longer in the laparoscopic appendicectomy group. No study was found demonstrating a shorter time for laparoscopic appendicectomy, despite the subjective perception that it can be an easier operation.²⁴⁻²⁶

No operative complication occurred in open appendicectomy group. Excessive bleeding occurred from mesoappendix and retroperitoneum in 1 patient in laparoscopic appendicectomy and was controlled by electrocautery. Injury to inferior epigastric vessels was avoided by placing trocars under direct vision. No visceral injury was occurred. Pier et al also observed similar result.²⁷

Open appendicectomy was done by spinal anesthesia and one dose of narcotic analgesic (Inj Pethidin 100 mg) was given in all patient just after surgery in operation theater. After operation, mean time required taking narcotic analgesic was 29.06 ± 10.46 ($p=0.001$) hours where 26 (52%) patient required narcotic analgesic after 21-30 hours. In case of laparoscopic appendicectomy mean time required taking narcotic analgesic was 21.36 ± 11.93 hours where 21(42.0%) patient required narcotic analgesic after 11-20 hours. The result shows laparoscopic appendicectomy needs more frequent narcotic analgesic. The meantime required taking NSAIDs analgesic after surgery in laparoscopic appendicectomy group was 9.00 ± 2.46 days and as compared to that in the open appendicectomy group mean time was 6.72 ± 2.47 days ($p=0.001$). Laparoscopic appendicectomy required less NSAIDs. The post-operative pain was qualitatively stratified into mild, moderate and severe, according to the Visual Analog Scale (VAS).

In case of laparoscopic appendicectomy visual field is more and we can inspect whole of the abdominal cavity which is another advantage of laparoscopic surgery. We can diagnosed others pathology. In my study I found ovarian cyst (2%), salpingitis (2%) and mesenteric adenitis in 4% of patients. But all the patients had inflamed appendix.

Postoperative course was uneventful in 37(74.0%) patients in open appendicectomy and 44(88.0%) patients in laparoscopic appendicectomy. Wound infection

was recognized by erythema and purulent discharge. In laparoscopic appendectomy port site infection found in 2(4.0%) patients and wound infection found in 7(14.0%) patients in open appendectomy. The appendix was delivered in to the trocar before removing. This maneuver minimizes the chances of wound infection to the skin. Incidence of wound infection was higher in open procedure as there is more chance of contamination. The incidence of wound infection was found less after laparoscopy.²⁸ There is no intra-abdominal abscess in my study. Paralytic ileus was observed in 4(8.0%) patients in open appendectomy and in laparoscopic appendectomy in 1(2.0%) patients. Urinary tract infection was observed in 2(4%) patients in open appendectomy.

Post-operative oral feeding could be started as soon as bowel sound appeared after both of the procedure. But mean time by which normal regular diet was tolerated was 47.36±9.34 hours in open appendectomy and in laparoscopic appendectomy it was 30.94±8.15 hours which are less than open procedure. The result was significant (P=0.001). The length of mean postoperative hospital stay after open appendectomy was 3.28±0.64 days (p=0.001) and in laparoscopic appendectomy, it was 2.44±0.70 days (p=0.001). The length was short in laparoscopic appendectomy. This findings is similar to other studies. In open appendectomy 46(92.0%) patients discharged within 3-4 days and in laparoscopic appendectomy 33(66.0%) patients discharged within 1-2 days.

The return to out-door activity following appendectomy is the subject of intense debates. A minimally invasive surgery by definition should allow for a quicker recovery, shorter convalescence at home and quicker return to work. In my study time to return to indoor activity is less in laparoscopic group. Mean duration of return to indoor activity in open procedure was 9.66±2.42days and in laparoscopic group was 6.28±2.04 days which is statistically significant. In open procedure 23(46.0%) patients returned to indoor activity within 9-11 days whereas in laparoscopic group 26(52.0%) patients returned to indoor activity within 6-8 days. Time to return to out-door activities in laparoscopic group was 18.96±5.33 days and mean duration of return to out-door activity in open procedure was 25.70±4.97 days.²⁹ Regarding cosmetic outcome, in open procedure group, 14(28.0%) patients were graded as good, 27(54.0%) patient were satisfied and 9(18.0%) patients were graded as poor. In other hand in laparoscopic group 17(54.0%) patients were graded as excellent, 29(58.0%) patient were graded as good, 2(4.0%) patient were satisfied. So cosmetic outcomes after laparoscopy are definitely outstanding and superior than open procedure and this is statistically significant (p=0.001).

LIMITATION

Although optimum care has been taken, still some limitations existed. The study was conducted in a selected institute, so the study population might not represent the whole community. A larger sample size would have given a better result. Complicated appendicitis were not evaluated.

CONCLUSION

After observing the outcome of both the procedure it can easily be concluded that laparoscopic appendectomy is superior over open procedure in terms of duration of anesthesia, duration of surgery, post-operative pain and discomfort, tolerance to normal diet, hospital stay, return to post-operative indoor and outdoor activities, wound infection and cosmesis. So laparoscopic appendectomy is safer procedure by expert surgeons. Analyzing more recent studies, it can be suggested that laparoscopy is becoming the first-choice method for management of acute appendicitis.

RECOMMENDATION

Similar study with large sample size with multicentre and long duration can be done for proper picture.

DISCLOSURE

All the authors declared no competing interest.

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