

## “A Comparison between Laparoscopic and Open Appendectomy: A study in a tertiary care hospital”

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### Abstract

**Introduction:** In Bangladesh appendectomy is one of the most commonly performed surgeries usually done by conventional open method. The role of laparoscopic appendectomy is still not well defined in most of the literatures. Although now it is widely practiced but still it hasn't gained popularity here. We have very few comparative data of laparoscopic and open appendectomy.

**Aim of the study:** The aim of this study was to compare between the outcomes of laparoscopic and open appendectomy.

**Methods:** This was a prospective observational study which was carried out in the Department of Surgery of 250 BeddedBongamata Sheikh FazilatunnesaMujib General Hospital, Sirajganj, Bangladesh during the period from January 2017 to December 2017. All patients admitted with a diagnosis of acute appendicitis and underwent operative procedure were included in the study. Written informed consent was taken. Institutional review board clearance was obtained also. Patients were divided into two groups where every alternate case was Open appendectomy (OA) and Laparoscopic appendectomy (LA). The total study participants were 100 in number. Among them 50 were selected for OA and that was Group I. On the other hand, 50 patients were selected for LA and that was Group II.

**Result:** Among all the patients the most potential characteristic was Alvarado score. In this study the mean Alvarado score was  $7.39 \pm 0.77$  in Group I whereas it was  $7.52 \pm 0.65$  in Group II and the P value was  $< 0.05$  which referred the significant correlation between the groups. In analyzing the outcomes of both the procedures we found pain score and length of hospital staying as two potential features where the P values were  $< 0.05$  which indicated the significant correlation between both the procedures.

**Conclusion:** According to the outcomes of both the procedures in this study we did not find any potential feature of any one to remark any superiority of that procedure. For getting more specific findings we would like to recommend for conducting more studies with larger sized sample.

**Key words:** Laparoscopic, Open appendectomy, Appendicitis, Alvarado score.

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### I. Introduction

In Bangladesh appendectomy is one of the most commonly performed surgeries usually done by conventional open method. The role of laparoscopic appendectomy is still not well defined in most of the literatures. Although now it is widely practiced but still it hasn't gained popularity here. We have very few comparative data of laparoscopic and open appendectomy. Appendectomy is one of the most commonly performed surgeries worldwide. It is commonly done by conventional open method but with progress of laparoscopic surgical procedures, laparoscopic appendectomy is also practiced nowadays. Ever since its initial description by Semm in 1983, laparoscopic appendectomy has struggled to prove its superiority over the open technique.<sup>1</sup> The concept of minimal surgical trauma, resulting in significantly shorter hospital stay, less postoperative pain, faster return to daily activities has made laparoscopic surgery for acute appendicitis very attractive<sup>2</sup> but laparoscopic appendectomy has still not become popular in our country. In generally worldwide the diagnosis of appendicitis and decision for operation is made if Alvarado<sup>3</sup> score  $\geq 7$ . First appendectomy was reported by Amayand in 1735 and two hundred years down the line little has changed in management of

appendicitis.<sup>4</sup> Minimally invasive surgery has now revolutionized treatment modalities and thus there has been a paradigm shift in the way we manage our patients today. The concept of minimal surgical trauma, leading to significantly shorter hospital stay, less postoperative pain, faster return to daily activities<sup>5</sup> has made laparoscopic surgery for acute appendicitis a very attractive package. Laparoscopic appendectomy has been considered to be the procedure of choice in patients with acute appendicitis in a randomized comparison with open appendectomy,<sup>6</sup> but its role has still not been well defined and it still struggles to prove its superiority.

## II. Objectives

### a) General objective:

- To compare between the outcomes of laparoscopic and open appendectomy.

### b) Specific Objectives:

- To evaluate the characteristics of patients with acute appendicitis.

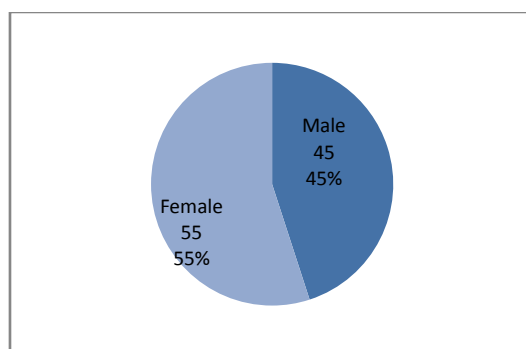
## III. Methodology & Materials

This was a prospective observational study which was carried out in the Department of Surgery of 250 Bedded Bongamata Sheikh Fazilatunnesa Mujib General Hospital, Sirajganj, Bangladesh during the period from January 2017 to December 2017. All patients admitted with a diagnosis of acute appendicitis and underwent operative procedure were included in the study. Written informed consent was taken. Institutional review board clearance was obtained also. Patients were divided into two groups where every alternate case was Open appendectomy (OA) and Laparoscopic appendectomy (LA). The total study participants were 100 in number. Among them 50 were selected for OA and that was Group I. On the other hand, 50 patients were selected for LA and that was Group II. Patients were excluded if the diagnosis of appendicitis was not established or if they had a history of symptoms for more than 3 days and/or a palpable mass in the right lower quadrant, suggesting an appendicular lump or abscess. Interval appendectomy, appendectomy performed incidental to other procedures, age of the patient <10 years and those refusing to participate in the study were excluded from this study. Besides these, patients with history of cirrhosis and coagulation disorders, generalized peritonitis, shock on admission, absolute contraindication to laparoscopic surgery, contraindication to general anesthesia and pregnancy were excluded according to the exclusion criteria of the study. Prior to the surgery, all the patients received a standard regimen of intravenous antibiotics. In patients with complicated appendicitis, antibiotics were continued for seven days and modified. Open appendectomy was performed through Lanz or Grid Iron incision. Following appendectomy the stump was transfixed with an absorbable suture. In the laparoscopic group, pneumoperitoneum was produced by continuous pressure of 10-12 mmHg of carbon dioxide via a Verres cannula infraumbilically. Following gas insufflation, a 10 mm trocar for the 30 degree angled laparoscope was placed in the infraumbilical area and two additional trocars, a 10 mm trocar in the suprapubic area and a third 5 mm trocar in the left lower abdominal quadrant were introduced under direct visualization. The patient was placed in a Trendelenburg position, with a slight rotation to the left. The appendicular artery was clipped with endoclips and divided while the base of the appendix was ligated with chromic endoloops. The specimen was extracted through the suprapubic port. All specimens were sent for histopathology. Patients were converted from laparoscopic to open appendectomies at the discretion of the surgeon. The parameters examined in this study included patient's characteristics (age, sex), operation time (from skin incision to wound closure), conversion to open procedure and intraoperative findings (normal, gangrenous or perforated appendix). Postoperative pain was assessed by a visual analogue score. The length of hospital stay and complications were also recorded. Patients were given injection ketorolac 30 mg eight hourly as the first medication for postoperative pain control for 24 hours along with tablet paracetamol 1gm per oral eight hourly once liquid diets was started 4-6 hours after the surgery. Gradually the diet was progressed as tolerated. Patients were discharged once their vitals were stable, had good pain control and tolerated soft diet. Statistical analysis was performed using SPSS statistical software, version 20. The numerical data was expressed as mean and standard deviation. Independent sample t tests for parametric continuous variables and chi-square analysis for categorical variables were used. P value of less than 0.05 was considered statistically significant.

## IV. Result

In our study among 100 participants 45 (45%) were male and 55 (55%) were female. So according to the patient's number female were dominating in this study. In analyzing the gender in both the groups it was found that, in Group I there were 22 (44%) male and 28 (56%) female patients. On the other hand, in Group II there were 23 (46%) male and 27 (54%) female patients. In both the groups the numbers of female patients were higher than the number of male patients individually. In age distribution it was found that the mean ( $\pm$ SD) age of the patients of Group I was  $32.45 \pm 16.11$  years whereas it was  $32.32 \pm 15.36$  years in Group II patients.

Duration of several complaints of the patients of Group I was  $1.71 \pm 0.75$  days whereas it was  $1.46 \pm 0.78$  days in Group II. Among all the patients the most potential characteristic was Alvarado score. In this study the mean Alvarado score was  $7.39 \pm 0.77$  in Group I whereas it was  $7.52 \pm 0.65$  in Group II and the P value was  $<0.05$  which referred the significant correlation between the groups. In analyzing the outcomes of both the procedures we found pain score and length of hospital staying as two potential features where the P values were  $<0.05$  which indicated the significant correlation between both the procedures. The average pain score was 5.3 in Group I patients whereas this average was 4.7 in Group II. On the other hand, the mean ( $\pm$ SD) length of hospital stay were  $3.16 \pm 1.86$  days in Group I and  $2.87 \pm 1.02$  days were in Group II. Besides these, SSI (Surgical site infection) was found in 8% patients of Group I and in 2% patients of Group II. Not a single case of ‘intra-abdominal abscess’ was found in any group patients. Moreover, respiratory distress was found in 2 patients of Group I and in 1 patient of Group II. Although not a single case of bowel obstruction was found in Group I but 1 case was found in Group II.



**Figure I:** Gender distribution of the Study population (N=100)

**Table I:** Characteristics of the both group’s patients (N=100)

| Components                    | Group I<br>(n=50) | Group II<br>(n=50) | p value |
|-------------------------------|-------------------|--------------------|---------|
| Male                          | 22                | 23                 | $>0.05$ |
| Female                        | 28                | 27                 |         |
| Age (Mean $\pm$ SD) Yrs.      | $32.45 \pm 16.11$ | $32.32 \pm 15.36$  | $>0.05$ |
| Duration of complaints (Days) | $1.71 \pm 0.75$   | $1.46 \pm 0.78$    | $>0.05$ |
| Alvarado score                | $7.39 \pm 0.77$   | $7.52 \pm 0.65$    | $<0.05$ |

**Table II:** Post-operative outcomes of the participants (N=100)

| Features                | Group I         | Group II        | P value |
|-------------------------|-----------------|-----------------|---------|
| Pain score              | 5.3             | 4.7             | $<0.05$ |
| Length of hospital stay | $3.16 \pm 1.86$ | $2.87 \pm 1.02$ | $<0.05$ |
| SSI                     | 4(8%)           | 1(2%)           | $>0.05$ |
| Intra-abdominal abscess | 0               | 0               | $>0.05$ |
| Respiratory distress    | 2               | 1               | $>0.05$ |
| Bowel obstruction       | 0               | 1               | $>0.05$ |

## V. Discussion

The aim of this study was to compare between the outcomes of laparoscopic and open appendectomy. The mean operative time in our study was around  $4.5 \pm 0.25$  minutes longer in laparoscopic group. Significant variations have been shown in various controlled studies. Preliminary studies<sup>7</sup> have shown significantly longer operative times for laparoscopic appendectomy. Inexperience of the surgeons with the new technique and thus a longer learning curve may have contributed to the longer duration of the operation in the early studies. While the later studies revealed no difference with duration as less as 2minutes.<sup>8</sup> Operative time depends on experience of the surgeon and competence of the operating team,<sup>9</sup> with increasing experience the operative time also decreases significantly. Our institution has been doing lap appendectomy since past seven years and all surgeons involved in this study had minimum of one year experience doing laparoscopic operations prior to the start of the study and that might explain the similar operative time in two groups. The rate of conversion is variable in various studies. Variety of reasons has been associated like patients, surgeons or technical factors.<sup>10</sup> The conversion rate in our study was 2.8% and the main reasons for conversion were due to lump and adhesions. Lower conversion rate (0-3.3%) has been reported.<sup>11</sup> One of the reported advantages of laparoscopic appendectomy is less post-operative pain. A meta-analysis from Pakistan<sup>12</sup> showed that LA results in significantly less post-operative pain, shorter hospital stay and quick resumption to work. The pain score was

similar in first 6 hours and this may be due to effect of spinal anesthesia in open group. The other factor would be because of discomfort due to gas insufflation while creating pneumoperitoneum in lap group. Pain score at 24 hours were significantly low for the laparoscopic group. However the total number of parenteral doses of narcotics or the number of dose so for all analgesics used between the two groups was not calculated and this might have created some bias in our study. Mean hospital stay was less ( $2.75 \pm 0.7$  days) for laparoscopic group compared to open ( $3.19 \pm 2.16$  days) ( $P < 0.01$ ). A study from Nepal also showed significant decrease in the length of hospital stay in patients undergoing LA ( $p < 0.001$ ), which is consistent with the findings of other studies. In accordance with other studies, there was fewer wound infection in LA group 2.5%, with the post-operative complication of 8.5%. In a study by Tate et al. they highlighted the difference in wound complication rates as a major benefit of laparoscopic appendectomy. However, there were three cases of readmission in our study. Third case was in LA group for bowel obstruction, who had to undergo exploratory laparotomy for adhesions. All 3 patients had an uneventful recovery.

### Limitations of the study

Our study had some limitations. We could not assess the cost analysis as the cost for both open and laparoscopic appendectomy is near about same in our hospital. Our follow-up was limited to 6 weeks postoperatively and long term complications were not evaluated.

### Conclusion and recommendations

As this was a single centered study with a small sized sample. So the findings of this may not reflect the exact scenario of the whole country. For getting more specific findings we would like to recommend for conducting more studies regarding the same issue with larger sized sample.

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