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Short Term Outcomes of Laparoscopic Versus Open Appendicectomy in Patients with Acute Appendicitis

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Abstract

A prospective, observational study was carried out in the Department of Surgery of Sylhet MAG Osmani Medical College, Bangladesh, from May 2019 to May 2020, to compare the short-term outcomes of laparoscopic versus open appendectomy for acute appendicitis. A total of 120 patients who were diagnosed with acute appendicitis and underwent surgery were included in this study. The selected patients underwent appendectomy either by laparoscopic or using open method under general anesthesia. The patients were divided into two groups – 60 patients underwent laparoscopic appendectomy as group-I and the other 60 patients underwent open appendectomy as group-II. The mean age was 26.25±7.83 years in group-I and 22.88±6.92 years in group-II. The difference was statistically significant (P<0.05). Male predominance was found: 40(66.67%) in group-I and 44(73.33%) in group-II. However, the difference was not statistically significant (P>0.05). The mean operating time was 65.05±8.76 min in group-I and 40.08±4.82 min in group-II. The mean time resumption of diet was 7.3±0.9 hours in group-I and 25.4±4.5 hours in group-II. The mean postoperative pain was 1.32±0.47 in group-I and 3.27±0.69 in group-II. 1(1.7%) patient had wound infection in group-II; however, no patients in group-I developed wound infection. The mean duration of hospital stay was 2.20±0.40 days in group-I and 3.62±0.98 days in group-II. The majority (81.7%) of the patients had the best quality of the scar in group-I and 48(80%) in group-II. The mean quality of the scar was 4.82±0.39 in group-I and 2.90±0.44 in group-II. All those differences except wound infection were statistically significant (P<0.001). This study demonstrated that laparoscopic appendectomy is as safe and effective as the open procedure. The overall benefit of laparoscopic appendectomy is more, as it results in less postoperative pain, shorter duration of hospital stays, better wound healing, as well as cosmetic outcome as compared to open procedure.

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Introduction

The vermiform appendix is considered as a vestigial organ, its importance in surgery due only to its propensity for inflammation, which results in the clinical syndrome known as acute appendicitis. Acute appendicitis is the most common cause of “acute abdomen” in young adults and appendectomy is the most frequently performed urgent abdominal operation.[1] Acute appendicitis is relatively rare in infants and becomes increasingly common in childhood and early adult life, reaching a peak incidence in the teens and early 20s. Appendicitis was first recognised as a disease entity in the sixteenth century and was called perityphlitis. McBurney

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described the clinical findings in 1889.[1] The first appendectomy was performed from the hernia sac of a boy by Claudius Amyand in 1736.[1]

Appendectomy can be performed by open or laparoscopic procedure. Open appendectomy (OA) has been the gold standard treatment for more than 100 years, because of its proven safety and efficacy.[2] Laparoscopic appendectomy (LA) has evolved since it was first performed by a German gynaecologist Kurt Semm in 1983.[3] Laparoscopic appendectomy has gained acceptance as a diagnostic and therapeutic method for acute appendicitis.[4] In open appendectomy, adhesion of the appendix with surrounding omentum in the right lower quadrant, cecal inflammation, the presence of turbid fluid in the pelvis, variability in the inflammatory process and the location of appendix are the main causes of operative difficulties, besides providing only a limited space for abdominal exploration.[5]

With the introduction of minimally invasive endoscopic surgery, laparoscopic appendectomy has become increasingly popular and is claimed to be safe and superior to open appendectomy including demonstrated advantages in obese patients with regards to hospital stay and overall complications.[2] But laparoscopic appendectomy has not yet been considered as gold standard like that of laparoscopic cholecystectomy.[6] Both the procedures have their merits & demerits. But it has been seen from various studies that laparoscopic appendectomy has better outcome in considering wound healing, reduced postoperative pain, earlier resumption of diet, earlier discharge from hospital, and finally, a better cosmesis.[7] But laparoscopic appendectomy has some demerits as well, like increased operative time, the cost of the operation and a higher incidence of intra-abdominal abscesses, especially in case of a perforated appendicitis.[8] One added advantage of laparoscopic appendectomy is that survey of the whole peritoneal cavity can be done during surgery. Laparoscopy allows the diagnosis to be established and excludes any gynaecological pathology in female patients and reduces the rate of negative appendectomy.[1]

In different countries laparoscopic appendectomy now-a-days is very familiar and preferred than open appendectomy because of its better outcomes.[9] The aim of this study was to compare the short-term outcomes between laparoscopic and open appendectomy as modalities of treatment in acute appendicitis in a tertiary level public hospital in Bangladesh.

Methods

This prospective, observational study was carried out in the Department of Surgery, Sylhet MAG Osmani Medical College Hospital, Bangladesh, from May 2019 to May 2020. Total 120 cases of acute appendicitis diagnosed by history and physical examination were enrolled in the study and some investigations like complete blood count, blood sugar, serum creatinine, and ultrasonography of whole abdomen were done. The patients were divided into two groups – 60 patients as included in group-I underwent laparoscopic appendectomy, while the other 60 patients in group-II underwent open appendectomy (all procedures were done under general anaesthesia). We have excluded complicated appendicitis (appendix mass, abscess, generalized peritonitis), diagnosed case of cirrhosis of liver, bleeding disorder, history of previous laparotomy.

Open appendectomies (OA) were performed through traditional transverse, right lower quadrant, muscle splitting incisions. The mesoappendix was serially ligated with 3-0 vicryl suture. The base of the appendix was doubly suture ligated with 0-chromic and then cauterized to prevent lymphocele. The right lower quadrant was irrigated with 500 cc of normal saline. The peritoneum and internal oblique fascia were closed with a running 0-vicryl suture as one layer separately from the external oblique fascia; Scarpa's fascia was closed with a running 3-0 vicryl suture. Then skin was closed.

Laparoscopic appendectomy was approached by a three-trocar technique with the addition of a fourth trocar when necessary. Usually, a 10 mm port was placed at the umbilicus for the camera, a 12 mm port was placed in the suprapubic area, and another 10 mm port was placed in the right upper quadrant. When needed, a 5 mm or 10 mm port was placed in the left lower quadrant. The mesoappendix was transected using clips, ligatures, or an EndoGIA stapling and cutting device. The appendiceal stump was controlled with ligatures or an EndoGIA staple line. The appendix was removed through the 12 mm port directly or after insertion into a bag. All patients had the procedure safely completed laparoscopically; the surgeons did not need to convert to an open procedure in any of the cases.

We collected all data in a patient data sheet. Duration of operative procedure, postoperative pain, resumption of diet, wound infection, and wound healing as well as any complications and duration of hospital stays were recorded. Total operating room time was measured from time of skin incision to skin closure. Postoperative hospitalization was measured from date of surgery to date of discharge. Postoperative pain control was evaluated by using Visual Analog Scale (VAS). Wound healing and wound infection was evaluated by ASEPSIS wound score. Quality of scar was evaluated by the Stony Brook scar evaluation scale.

All the data were compiled, sorted properly, and analyzed statistically using Statistical Package for Social Science (SPSS) version 20.0. Quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency and percentage. Unpaired Student's 't'-test and Chi-square test were performed to compare between the groups. P value <0.05 was considered as significant. Ethical clearance was obtained from the Ethical Review Committee (IRB) of Sylhet MAG Osmani Medical College, Bangladesh.

Results

The mean age was 26.25±7.83 years in group-I (laparoscopic appendectomy) and 22.88±6.92 years in group-II (open appendectomy). The difference was statistically significant (P<0.05). More than one-third of the patients belonged to age group 21-30 years: 21(35%) in group-I and 24(40%) in group-II. A male predominance was observed; male patients were 40(66.67%) in group-I and 44(73.33%) in group-II. However, the difference was not statistically significant (P>0.05) (Table-I). The mean operating time was 65.05±8.76 min in group-I and 40.08±4.82 min in group-II. The mean time resumption of diet was 7.3±0.9 hours in group-I and 25.4±4.5 hours in group-II. The mean postoperative pain was 1.32±0.47 in group-I and 3.27±0.69 in group-II. The differences were statistically significant (P<0.001) between the two groups. 1(1.7%) patient had wound infection in group-II; however,

no patients in group-I developed wound infection (P>0.05). The mean duration of hospital stay was 2.20±0.40 days in group-I and 3.62±0.98 days in group-II. The mean quality of the scar was 4.82±0.39 in group-I and 2.90±0.44 in group-II. The differences were statistically significant (P<0.001) (Table-II).

Table-I: Distribution of the study patients by age and sex (N=120)

Variables	Group-I (n=60)	Group-II (n=60)	P value
Age group (in years)			<0.05*
>20	7 (11.67%)	12 (20%)	
20-30	21 (35%)	24 (40%)	
31-40	18 (30%)	13 (21.67%)	
41-50	14 (23.33%)	11 (18.33%)	
Mean±SD	26.25±7.83	22.88±6.92	
Sex			
Male	40 (66.67%)	44 (73.33%)	>0.05**
Female	20 (33.33%)	16 (26.67%)	

Data were expressed as frequency and percentage and Mean±SD. * = P-value reached from Unpaired t-test, ** = P-value reached from Chi square test.

Table-II: Distribution of the study patients by operational parameters (N=120)

Variables	Group-I (n=60)	Group-II (n=60)	P value
Operating time (in minutes)	65.05± 8.76	40.08± 4.82	0.001*
Time resumption of diet (in hours)	7.3±0.9	25.4± 4.5	0.001*
Postoperative pain (Visual analog scale)	1.32±0.47	3.27± 0.69	0.001*
Wound infection (ASEPSIS wound score)	-	1 (1.17%)	0.352**
Duration of hospital stay (in days)	2.20±0.40	3.62± 0.98	0.001*
Scar quality (Stony Brook scar evaluation scale)	4.82±0.39	2.90± 0.44	0.001*

Data were expressed as Mean±SD, except wound infection which was expressed as frequency and percentage. * = P-value reached from Unpaired t-test, ** = P-value reached from Chi-square test

Discussion

Our study reported that the mean operating time was significantly longer in laparoscopic appendectomy (LA) in comparison to open procedure. Kapischke *et al.* also reported a longer operative time during laparoscopic appendectomy.[10,11] Generally, it is accepted that laparoscopic procedures may take a long time, especially during early learning periods when performed by inexperienced surgeons.[12] However, a shorter operative time during laparoscopic appendectomy was also reported, which might be explained by the degree of experience and better visualization during laparoscopy.[13] However, Shimoda *et al.* found that the mean operating time was 64 minutes in the open appendectomy group, while 61.5 minutes in laparoscopic appendectomy. Operative time did not differ between the two groups.[14]

Khatana *et al.,* Biondi *et al.* and Pradhan *et al.* reported that the average operating time was more in the laparoscopic appendectomy as compared to open appendectomy (OA), which are similar to our study.[6,15,16] Operative time depends on the experience of the surgeon and the competence of the operating team.[16] In this study, it was observed that the mean time for resumption of diet was much more in open appendectomy. Biondi *et al.* reported similar observations that feeding is resumed early in the laparoscopic patients, as the gut is not exposed to the external environment; there is very low handling that causes minimum impairment of gut function.[15]

Shimoda *et al.* reported in their study that, advantages LA has compared to OA are much less postoperative pain, better cosmetic

appearance in follow-up, and early discharge from hospital, which all are true for our study findings.[14] Also, less postoperative pain and improved cosmetic appearance are accepted as the main advantages of LA.[17] Khatana *et al*. found postoperative pain was more intense in the open group, which also supports the findings of our study.[6] It is proved that laparoscopic procedure causes less postoperative pain than its conventional counterpart.[18] Though different studies have demonstrated almost similar findings on postoperative pain, the measuring of pain was based on different modalities, e.g., the requirement of analgesics, visual analogue scale (VAS) etc.[19,20] Patients who underwent laparoscopic appendectomy were more vocal of pain although it was of lower intensity. However, after 48 hours, they had a better sense of wellbeing.[19]

Wound infection is more common in complicated appendicitis and may not represent a serious complication; however, it has a strong impact on convalescence time and quality of life of the patients.[15] We observed that 1.7% of patients had wound infection in open appendectomy but no infection was observed in laparoscopic procedure. Zosimas *et al*. found that there is a lower incidence of wound infections with LA.[20] Regarding incidence of wound infections most of the recent studies reported that the incidence is significantly low in LA.[2,8,15,16] The lower rate of wound infection in the laparoscopic group may be due to placement of the detached appendix into an endo-bag or in cannula sheath before its removal from the abdominal cavity, reducing contact with the fascial surfaces and minimizing contamination.[15]

Shortening postoperative hospital stay is one of the most important factors for economic management of a public funded hospital; therefore, to shorten postoperative hospital stay, surgeons are required to reduce the risk of postoperative complications as much as possible.[14] In this present study, it was observed that the mean duration of hospital stay was 2.20±0.40 days in LA, while 3.62±0.98 days in OA; the difference is statistically significant. Khatana *et al.,* Biondi *et al*., Guller *et al.,* and Batajoo & Hazra also found postoperative stay for open appendectomy patients was much more than laparoscopic group, which is similar to the present study.[6,15,21,22] In contrast, Zosimas *et al.* found no significant differences with regards to the length of hospital stay between two procedures.[20]

In our study, better quality of the scar was found in LA in comparison to OA. Regarding cosmetic benefit, most patients in the LA group were highly satisfied by their scar size as compared to the OA group. Similarly, Kapischke *et al.* observed a significantly higher satisfaction of the patients of the laparoscopic group concerning size and appearance of scars, which supports our findings.[11]

Conclusion

To summarize, laparoscopic appendectomy had better outcomes in comparison to open appendectomy in terms of less postoperative pain, early resumption of diet, shorter duration of hospital stays, better wound healing and cosmetically better scarring of tissues.

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