



Original Article

Short-term outcome of Laparoscopic Appendicectomy and Open Appendicectomy in acute appendicitis- a comparative study.

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Abstract

Background: Appendectomy, though being performed by both open and laparoscopic methods, there is a lack of consensus regarding which is the most appropriate method. This study will document important variables and parameters to compare therapeutic benefit of laparoscopic appendicectomy (LA) and open appendicectomy (OA).

Objective: The study aimed at comparing the short-term outcome of laparoscopic appendicectomy and open appendicectomy in cases of acute appendicitis, in terms of postoperative pain and complications, hospital stay, recovery and return to normal activities.

Methods: Whenever there was clinical suspicion of acute appendicitis, the patient was admitted to hospital, relevant history was recorded and clinical examination was conducted, necessary laboratory and imaging studies were performed and patient satisfying the inclusion and exclusion criteria was included in the study. The appendicectomy procedure was attended by the investigator and all relevant perioperative data were recorded.

Results: Post operative pain was mostly mild in LA group (40%), while in OA, it was mostly severe (38%) and moderate (34%). Postoperative complications were significantly higher in OA than in LA. Hospital stay was longer in OA (7.03 days) than LA (3.49 days). Early recovery and return to full normal activity was noted in LA (5.56 days) than in OA (11.26 days). Moreover, operative time was shorter in LA (56.37 min), than in OA (71.86 min).

Conclusion: Laparoscopic appendicectomy have clear advantages over open appendicectomy in respect to short term results.

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Introduction

Appendicitis is one of the most common surgical emergencies requiring appendectomy. Approximately 7%–10% of the general population develops acute appendicitis with the maximal incidence being in the second and third decades of life¹. The incidence of appendicitis seems to have risen greatly in the first half of this century, particularly in Europe, America and Australasia, with up to 16% of the population undergoing appendectomy. In the past 30 years, the incidence has fallen dramatically in these countries, such that the individual lifetime risk of appendectomy is 8.6% and 6.7% among males and females respectively².

Open appendectomy has been the treatment of choice for more than a century since its introduction by McBurney in 1894, and the procedure is standardized among surgeons³. Laparoscopic appendectomy (LA) was first described by Semm in 1983⁴.

Laparoscopic appendectomy has been shown to be feasible and safe in randomized comparisons with open appendectomy. Laparoscopic appendectomy has improved diagnostic accuracy along with advantages in terms of fewer wound infections, less pain, faster recovery and earlier return to normal activity⁵. On the contrary, operating time of laparoscopic appendectomy is longer and hospital cost is more. The laparoscopic approach has been supported as an alternate to open appendectomy by many comparative studies⁶. No consensus exists as to whether

laparoscopy should be performed in select patients or routinely for all patients with suspected acute appendicitis³.

Materials and Methods

The study was conducted in department of surgery, Dhaka Medical College Hospital between July, 2013 to June, 2014. 100 consecutive cases for open appendectomy and 100 consecutive cases for laparoscopic appendectomy was taken as study sample.

Whenever there was clinical suspicion of acute appendicitis, the patient was admitted and relevant history was recorded and clinical examination was conducted, necessary laboratory and imaging studies were performed and patient satisfying the inclusion and exclusion criteria was included in the study. The appendectomy procedure was attended by the investigator and all relevant perioperative data were recorded. Patients were followed up daily during their hospital stay period to assess postoperative course and relevant outcome variables were assessed and recorded. Patients with comorbid conditions like cardiac failure, COPD, asthma, patients having contraindications for creating pneumoperitoneum like extensive abdominal adhesions, hiatus hernia, acute peritonitis, ileus, intestinal obstruction, patients with clinically palpable lumps, patients with perforated appendix with diffuse peritonitis except those with local peritonitis were excluded from the study.

Results:

Table 1: Demographic characteristic of study population

Age (in years)	Laparoscopic (n=100)		Open (n=100)		P value
	Male	Female	Male	Female	
14-25	25 (45.45%)	15 (33.33%)	13 (28.29%)	25 (45.45%)	0.001
26-40	24 (43.64%)	21 (46.67%)	23 (51.11%)	22 (40%)	
41-50	6 (10.91%)	6 (13.33%)	8 (17.78%)	8 (14.55%)	
51-60	–	3 (6.67%)	1 (2.22%)	–	
Median age	33yrs	33yrs	33 yrs	33yrs	

Table 2: Distribution of patients by clinical symptoms and signs (n = 200)

	Count	Percentage
Fever	134	67.0%
Nausea/vomiting	162	81.0%
Diarrhea	8	4.0%
Constipation	61	30.5%
Psoas sign	16	8.0%
Rovsing sign	95	47.5%
Obturator sign	10	5.0%

n: Number of patients

Table- 3 Distribution of patients by per-operative findings in LA and OA patient groups (n = 200)

	Patient group				
	Laparoscopic appendicectomy		Open appendicectomy		
	Count	Percentage	Count	Percentage	
Gross specimen	Inflamed Appendix	28	28.0%	23	23.0%
	Adhesion	64	64.0%	35	35.0%
	Lump	4	4.0%	9	9.0%
	Distended appendix	4	4.0%	15	15.0%
	Perforated appendix / Gangrene	0	0.0%	18	18.0%
Position of Appendix	Retrocecal	46	46.0%	56	56.0%
	Pelvic	26	26.0%	17	17.0%
	Iliac	15	15.0%	20	20.0%
	Subhepatic	12	12.0%	5	5.0%
	Anterior	1	1.0%	2	2.0%
Peritoneal appearance	Normal	23	23.0%	34	34.0%
	Local inflammation	77	77.0%	66	66.0%
Abdominal fluid	Normal	21	21.0%	15	15.0%
	Increased (no pus)	71	71.0%	46	46.0%
	Increased with pus	8	8.0%	39	39.0%
Inflammation around appendix	Only in the appendix	32	32.0%	34	34.0%
	In and around the appendix	64	64.0%	33	33.0%

n : Number of patients

Table - 4: Different important parameters related to per-operative and postoperative course of patients in different patient groups (n = 200)

	Mean ± Std. Deviation	Std. Error Mean	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		P value*
					Lower	Upper	
Operative time (in minutes)	OA: 71.86 ± 10.988	OA: 1.099	15.490	1.623	12.289	18.691	<0.001
	LA: 56.37 ± 11.948	LA: 1.195					
Admission to Operation (in days)	OA: 5.64 ± 1.411	OA: .141	-7.230	.370	-7.961	-6.499	<0.001
	LA: 12.87 ± 3.416	LA: .342					
NPO to General Diet (in hours)	OA: 39.38 ± 13.114	OA: 1.311	15.390	1.564	12.303	18.477	<0.001
	LA: 23.99 ± 8.520	LA: .852					
Operation to discharge (in days)	OA: 6.05 ± 5.818	OA: .582	3.070	.672	1.742	4.398	<0.001
	LA: 2.98 ± 3.372	LA: .337					
Hospital Stay (in days)	OA: 7.03 ± 5.800	OA: .580	3.540	.600	2.352	4.728	<0.001
	LA: 3.49 ± 1.527	LA: .153					
To Full Activity (in days)	OA: 11.26 ± 6.458	OA: .646	5.694	.674	4.359	7.029	<0.001
	LA: 5.57 ± 1.923	LA: .193					

n: Number of patients

Table -5 : Distribution of patients by postoperative complications in LA and OA patient groups (n = 200)

	Patient group			
	Laparoscopic appendicectomy		Open appendicectomy	
	Count	Percentage	Count	Percentage
Atelectasis	2	2.0%	5	5.0%
Wound/port infection/dehiscence	5	5.0%	13	13.0%
Sepsis	0	0.0%	18	18.0%
Postoperative ileus	15	15.0%	22	22.0%
Intra -abdominal abscess	0	0.0%	8	8.0%
Intestinal obstruction	0	0.0%	1	1.0%
Secondary hemorrhage	1	1.0%	2	2.0%
Bleeding from port	4	4.0%	0	0.0%

n : Number of patients

Discussion

More patients in LA groups were male, whereas in OA groups majority were female. In most of studies, it seemed to be opposite³. Regarding the duration of operation, open technique was more time consuming than laparoscopic technique in this study. Total operative time in this series was significantly shorter in the laparoscopic group (mean \pm SD, 56.37 \pm 11.948 minutes) than in the open group (mean \pm SD, 71.86 \pm 10.988 minutes), which was measured as actual skin-to-skin time. Mean difference was 15.490 minutes between operative period of these two groups, which is statistically significant ($p < 0.0001$). Our findings seemed a bit different from other studies⁵. In a prospective randomized multicentre study of A. Hellberg, operating time was significantly longer in the laparoscopic group (60 versus 35 min, $P < 0.01$)⁷. These differences of results in regard to operative time, owes to the fact that, in a tertiary level government hospital like DMCH, most OA was performed by trainees, whereas, most of the LA were performed by seniors (professor or associate professor). Only 2% patient undergoing LA required conversion. This also indicates the experience and skill of surgeons performing LA here.

In terms of postoperative outcome, significant difference was noted between the two groups. LA group was switched to oral diet and medication within 24

hrs, whereas OA group required longer. Very few studies are available that have compared tolerance to oral intake between the 2 groups. Some studies have shown significantly less time to tolerate oral intake in laparoscopic groups compared with open groups, while others show no significant difference⁸. In this study, significantly less time was needed for patients to tolerate oral intake with a mean (\pm SD) 23.99 \pm 8.52 hours in the laparoscopic group compared with a mean (\pm SD) 39.38 \pm 13.114 in the open group.

Post operative pain was measured by VAS (Visual Analogue Scale) on 1st post-operative day and found to be mostly mild (40%) and moderate (36%) in LA group, but was mostly severe (38%) and moderate (34%) in OA group. Although both groups received same protocol of analgesics post-operatively. Our finding is in agreement with findings of many other studies that demonstrate less pain and less analgesic requirements in laparoscopic groups^{5,9}.

Our study shows a significant short hospital stay (3.49 \pm 1.527 days) in the laparoscopic group compared with that in the open group (:7.03 \pm 5.800 days, $P \leq 0.001$). Our results are consistent with those of early publications¹⁰ as well as recent studies¹¹ that demonstrate a significantly short hospital stay. Mean difference of hospital stay was 3.54 days longer in OA group than in LA group, which is significant in terms of statistical analysis.

In this study, mean time to full recovery, i.e., time to resumption of work, was 3.49 ± 1.527 days in the laparoscopic group and 11.26 ± 6.458 days in the open appendectomy group with mean difference of 5.694 days ($P \leq 0.001$), which is statistically significant. Our finding is in agreement with a similar study by Hellberg et al⁷ that demonstrates median time to full recovery as 13 days in the laparoscopic group and 21 days in the open group ($P \leq 0.001$) and other randomized clinical trials and meta-analysis⁹. Our population group being a lower income group wanted to resume work earlier; therefore, we thought it would be a more reflective end point.

In our series, 13 patients (13%) in the laparoscopic group and 29 (29%) in the open group had wound/port infections/ wound dehiscence. Wound infections were more common in the open group. One study¹¹ shows no statistically significant differences in infectious complications between the laparoscopic and open group.

Intra-abdominal abscess formation is a serious complication and can potentially be life threatening. Intra-abdominal abscess and sepsis were absent in any of LA patient (0%) postoperatively, while these two modality of complications were significantly high in OA patients (8%). This finding is contrary to findings in other studies that show an increased risk of intra-abdominal abscess after laparoscopic appendectomy compared with open surgery¹², while others have reported the opposite¹³. However, this finding is not statistically significant. Moreover, this difference of findings in our study may be influenced by the learning period of trainees doing OA, in contrast to skilled consultants doing LA.

Conclusion

Laparoscopic appendectomy have clear advantages in respect to short term results. Important parameters (e.g. demographic data- age, sex etc, other factors like BMI, presenting symptoms, signs, preoperative findings) all that affects clinical outcomes of laparoscopic and open appendectomy, was assessed and clear comparison was shown. In terms of postoperative pain and complications, hospital stay, recovery and return to normal activities, the therapeutic outcome is proved better in Laparoscopic appendectomy than Open appendectomy.

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