

A Study to Assess Feasibility and Safety of the Laparoscopic Technique in Acute Appendicitis and Compare its Results with Open Appendectomy

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Abstract

Aim: The aim of the study was to assess technical feasibility and safety of the laparoscopic technique in acute appendicitis and compare its results with open appendectomy.

Methods: The present study included 50 patients presenting with clinical diagnosis of appendicitis. In order to compare the two techniques, patients undergoing LA were compared to patients undergoing OA over a period of 6 months. Those patients were excluded who had perforated appendicitis. Study to be carried out over a period of 6 months includes patient diagnosed with appendicitis and admitted to surgery ward at Department of General Surgery, Fort U Mediemergency Hospital, Patna, Bihar, India and enrolled in the study after obtaining the valid written informed consent.

Results: The maximum number of cases was observed in the age group of 25-36 years with a female (27) to male (23). The average age of patients undergoing LA was 26 years while it was 26.52 years for those undergoing OA. The mean operative time for the open appendectomy was 46.6 minutes and in laparoscopic appendectomy was 65.6 minutes. The difference between the two groups was significant, with a p-value of <0.001.

Conclusion: Laparoscopic appendectomy is better than open appendectomy with respect to wound infection rate, early resumption of oral feeds, lesser postoperative pain, postoperative hospital stays and return to normal activities. Though the mean duration of operation was more in the LA group, it can be considered as gold standard surgical treatment for the management of acute appendicitis.

Keywords: Appendicitis, Appendectomy, Laparoscopy

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Introduction

Appendicitis commonly presents with abdominal pain, fever, nausea and vomiting, although 40% of the patients lack this typical presentation. [1] Appendectomy is the most commonly

performed operation in the world, 6% of all the surgical procedures and is done as emergency procedure wherever possible, the only exception is formation of appendicular mass or abscess. In these

cases, interval appendectomy is performed as elective procedure.

For more than a century, open appendectomy remained the gold standard for the treatment of acute appendicitis. Laparoscopic appendectomy was first performed by Semm in 1983 in Germany and continued to evolve at such a rapid pace that it is now time to recommend this minimal access technique in the treatment of acute appendicitis, especially in the obese and when the diagnosis is uncertain. [2] Laparoscopic appendectomy gives a better evaluation of the peritoneal cavity than that obtained by open approach and also facilitates other differential diagnosis. Advantages of laparoscopic approach include less operative time, less postoperative pain, reduced analgesia, less surgery associated complications, shorter hospital stay, faster recovery, reduced wound infection and minimal scarring. Disadvantages of the laparoscopic operation are a steep learning curve, difficult hand eye coordination, 2-dimensional vision, limited freedom of movements and higher cost. [3]

Minimal invasive surgery has rapidly evolved as a major specialty in the past decade. Laparoscopic surgery has thoroughly changed the concept of general surgery over the last 15 years and surgeons have rapidly progressed from the diagnostic to the advanced procedures.

Open appendicectomy (OA) through laparotomy has been the gold standard for more than a century as far as surgical removal of appendix is concerned. [4] Recently several authors proposed that laparoscopic appendicectomy (LA) should be preferred for the treatment of acute appendicitis. Advantages of LA like less pain, faster recovery, fewer wound infections, improved cosmesis and less post-operative morbidity are obvious from the various randomized trial conducted worldwide comparing OA and LA. Review of the world literature suggests

that definitely the trend is moving from open to LA. [5] Appendicitis mostly occurs between 5-40 years of age with a median of 28 years. [6]

The aim of the study was to assess technical feasibility and safety of the laparoscopic technique in acute appendicitis and compare its results with open appendectomy.

Materials and Methods

The present study included 50 patients presenting with clinical diagnosis of appendicitis and were recruited to either open (50%) or laparoscopic (50%) appendicectomy. In order to compare the two techniques, patients undergoing LA were compared to patients undergoing OA over a period of 6 months. Those patients were excluded who had perforated appendicitis. Study was carried out over a period of 6 months includes patient diagnosed with appendicitis and admitted to surgery ward at Department of General Surgery, Fort U Mediemergency Hospital, Patna, Bihar, India and enrolled in the study after obtaining the valid written informed consent.

Inclusion criteria

- Patients with acute pain in right iliac fossa.
- Patients proven to have acute appendicitis on clinical examination followed by USG.
- Patients proven to have current appendicitis in BaMFT.
- Age more than 12 years.
- Patient willing to be enrolled in study and have signed the consent form.
- Patient with no other systemic illness.

Exclusion criteria

- Patients medically unfit for pneumoperitoneum.
- Previous abdominal surgery.
- Age less than 12 years.
- Patient not willing to be enrolled in study.

- Pregnant females.
- Patient with systemic illness.

Factors and variables recorded include: Demographic data, clinical features, investigations, technique, post-operative pain, post-operative use of analgesia, complications, scar size, return of bowel movements, starting of oral liquids, hospital stay, functional index, time to subjective full recovery and days of sick leave have been documented.

And outcome has been recorded in a predesigned case record form. Return to normal activity and work was determined by questioning during postoperative clinic.

Following the calculation of the sample size, this study was conducted in which 50

patients were equally distributed in equally in two treatment groups – A and B group.

Statistical methods

All observations were analyzed statistically. Multiple linear and logistic regression analyses were used to assess the endpoints. All values are expressed as the mean value. The significance of differences between the groups was tested using Students t test and standard error of difference between two means was calculated ($P < 0.05$) was considered significance. The observation and inference are drawn from only those cases that were evaluated, investigated, and followed-up.

Results

Table 1: Age and sex incidence in present study

Parameters	Laparoscopic appendicectomy group (n=25)	Open Appendicectomy Group (n=25)
Male	12 (48%)	11 (44%)
Female	13 (52%)	14 (56%)
Age (years)	26 (16-36)	26.52 (16-36)

The maximum number of cases was observed in the age group of 25-36 years with a female (27) to male (23). The average age of patients undergoing LA was 26 years while it was 26.52 years for those undergoing OA.

Table 2: Operative time (minutes) in two groups

Operative time (Minutes)	Group LA		Group OA		P-value
	N	%	N	%	
≤50	23	92	13	52	<0.001
≥50	2	8	12	48	
Total	25	100	25	100	
Mean ± SD	65.6 ± 5.50		46.6 ± 5.70		

The mean operative time for the open appendectomy was 46.6 minutes and in laparoscopic appendectomy was 65.6 minutes. The difference between the two groups was significant, with a p-value of <0.001.

Table 3: Duration of hospital stay (days) in two groups

Hospital stays (Days)	Group LA		Group OA		P-value
	N	%	N	%	
≤ 2	20	80	15	60	0.045
≥ 2	5	20	10	40	
Total	25	100	25	100	
Mean ± SD	2.5 ± 1.40		1.7 ± 0.88		

Mean duration of hospital stay in case of a laparoscopic appendectomy was less than an open appendectomy. The mean duration of hospital stay in laparoscopic appendectomy was 1.7 ± 0.88 days and 2.5 ± 1.40 days in open appendectomy patients.

Table 4: Pain score in two groups

Pain Score at different hours	Group LA		Group OA		P-value
	Mean	SD	Mean	SD	
6 th hour	5.5	0.96	6.4	2.50	0.003
12 th hour	2.4	0.54	3.5	1.44	0.001
24 th hour	0.07	0.36	0.94	1.25	<0.001

The postoperative pain in our patients using a visual analogue score (VAS) was less in the LA group than the OA group.

Table 5: Time taken to return to normal work in two groups

Return to normal work (Days)	Group LA		Group OA		P-value
	N	%	N	%	
5-8	15	60	2	8	<0.001
9-12	5	20	4	16	
13-16	3	12	16	64	
17-20	2	8	3	12	
Total	25	100	25	100	
Mean \pm SD	7.8 \pm 2.73		12.6 \pm 3.89		

Six of our patients had wound site infection, and two had an intra-abdominal abscess in open appendectomy group. None of the laparoscopic appendectomy patients had any postoperative complications. Open appendectomy patients took more time to return to normal work with an average of 12.6 days while as laparoscopic appendectomy patients took 7.8 days to return to their normal work. The difference between the two groups was significant, with a p-value of <0.001.

Discussion

Laparoscopic appendectomy is evolving as an operation of choice for acute appendicitis. Laparoscopy has enabled surgeons to decrease the rate of infection and complications that are often associated with the open procedure. This has been demonstrated in a number of studies. [7-10]

Acute appendicitis is the most common surgical emergency, and early surgical

intervention improves outcomes. The diagnosis of appendicitis can be elusive, and a high index of suspicion is important in preventing serious complications from this disease. Although, open appendectomy is considered a safe and effective operation for acute appendicitis with low morbidity, however, variability in the inflammatory process and the location of the appendix at times causes operative difficulties. It has also been associated with potential disadvantages like postoperative pain, wound sepsis and complications like intestinal obstruction, which may delay recovery. [11] Laparoscopic appendectomy was first reported by the gynaecologist Kurt Semm in 1982 but has only gained widespread acceptance during the past decade. Other minimally invasive approaches to appendectomy have been reported, including transvaginal [12] and single-incision laparoscopic surgery (SILS) [13]; however, these have not as yet been widely adopted.

In our study, the operation time in LA was taken from the insertion of the first trocar to skin closure and in open appendectomy from skin incision to skin closure. Twenty-two patients from OA group were operated in <50 minutes and 13 patients with time of >50 minutes with a mean duration of 46.6 ± 5.70 minutes while in LA group all the 23 patients had operation time >50 minutes with a mean time of 65.6 ± 5.50 minutes. The mean time difference between the two procedures was statistically significant (p-value of <0.01). Our results were comparable with the study of Naraintran S et al. [14] in which laparoscopic appendectomy has taken a mean of 68.5 ± 20.3 minutes, and open appendectomy has taken a mean of 48.2 ± 12.4 minutes (p<0.001) and K Naveen et al. [15] in which mean operating time was 60.8/45.7 min. for laparoscopic/open appendectomy.

In our study, out of a total 25 patients from the OA group, 15 patients had a hospital stay of <2 days, and 10 patients had a hospital stay of > 2 days. Ten patients who had a hospital stay of >2 days ranged from 3 to 6 days because some of them developed ileus, wound infection and intra-abdominal abscess. In contrast, two patients from LA group who had a hospital stay of > 2 days had an iatrogenic injury to terminal ileum and caecum which were discharged on an average of 5 to 6 days after surgery. Comparing the hospital stay between two groups, the hospital stay in the LA group was less than the OA group with a statistically significant p-value of 0.045. Comparing with other studies, the duration of hospital stay in our study was less because the turnover of patients is more in our department, so we discharged them early except those who developed any complication. Considering the significant p-value, our study is comparable with Naraintran S et al. [14], Kushwah N et al. [15]

We assess the postoperative pain in our patients using the visual analogue score

(VAS) at 1st hour, 6th hour and 12th hour post-operative pain score was found less in the laparoscopic group. Our results were comparable with the studies done by Naraintran S et al. [14], Kushwah N et al. [15], Khatoon A et al. [16] and Shaikh AR et al. [17,18]

Conclusion

Faster recovery, improved post-operative comfort, lower morbidity, and early oral intake are all advantages of laparoscopic appendectomy vs OA, as is lower post-operative pain and painkiller demand. The incidence of intraabdominal abscess development, wound-related complications, length of hospital stay, and time to return to regular activities and work were all lower for LA patients compared to OA patients. Laparoscopy is also helpful for diagnosing different forms of abdominal disease. As a result, laparoscopic appendectomy has great potential and may soon replace open appendectomy as the treatment of choice for effective and quality therapy of appendicitis in both an emergency and elective setting.

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