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Original Research Article

Laparoscopic versus open appendicectomy-a comparative study of clinical outcomes in an institutional centre

Noorin Fatma*, Binod Kumar, A. K. Jha, Indra Shekhar Thakur

Department of General Surgery, Patna Medical College and hospital, Patna, Bihar, India

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***Correspondence:**
Dr. Noorin Fatma,
E-mail: noorin92@gmail.com

ABSTRACT

Background: Appendicectomy remains to be one of the most common procedures performed by the general surgeon. Laparoscopic appendicectomy is likely to have less postoperative pain, less use of analgesics, early discharge, decreased wound infection, better cosmetics and also diagnostic and early return to routine work.
Method: This is a comparative study of 50 cases of appendicitis divided equally into two groups 25 in open and 25 in the laparoscopic which were randomly selected and operated in the department of general surgery at PMCH, Patna.
Results: In present study pain score was 2.97±0.7 for open group as compared to 1.56±0.7 in lap group ($p<0.05$) because of longer incision stretch of muscles and wound infection. Post operative complications like vomiting was lower in laparoscopic group with 12% as compared with 40% in open group ($p<0.05$) and ileus was lower in lap group with 27±4.6 and for open group 31±5.4 with $p<0.05$ which were significant. There is significant reduction in incidence of post operative wound infection in lap group 0% as compared to open group 32% ($p<0.05$). Duration of postoperative hospital stay was significantly low for lap group 2±0.78 as compared to open group 8±0.89. The return to normal activity was low for lap group 14±2.11 days as compared to open group 21.7±3.7days. Duration of surgery for open appendicectomy was 48±19 mins and for lap appendicectomy was 46±15 mins.
Conclusions: Overall laparoscopic appendicectomy is better than open appendectomy in selected patients with acute or recurrent appendicitis.

Keywords: Appendicectomy, Laparoscopic appendicectomy, Open appendicectomy

INTRODUCTION

Appendicitis remains one of the most common diseases faced by the surgeon in practice. It is the most common urgent or emergency general surgical operation performed in the United States and is responsible for as many as 300,000 hospitalizations annually.[1] Although appendectomy is frequently the first "major" case performed by the surgeon in training, the impact of a timely diagnosis and prompt treatment is as impressive as that of any other major surgical intervention. It is estimated that as much as 6 to 7% of the general population will develop appendicitis during their lifetime, with the incidence peaking in the second decade of life.[2]

Despite its high prevalence in Western countries, the diagnosis of acute appendicitis can be challenging and requires a high index of suspicion on the part of the examining surgeon to facilitate prompt treatment of this condition, thereby avoiding the substantial morbidity (and even mortality) associated with delayed diagnosis and subsequent perforation. Appendicitis is much less common in underdeveloped countries, suggesting that elements of the Western diet, specifically low fibre, high-fat intake, may play a role in the development of the disease process.[3]

It is very rare in infants and becomes so inversely common in childhood and early adult life reaching peak

incidence in teens and early twenties. After middle age the risk of developing appendicitis is quite small. Incidence of appendicitis is equal among male and females before puberty. In teenagers and young adults, male to female 3:2 at age 25. Thereafter the greater incidence in male declines.[4] In the past 30 years, the incidence has fallen dramatically such that lifetime risk of appendicectomy is 8.6% and 6.7% among males and females respectively.[4]

Even though modern diagnostic facilities, surgery skills, fluids and antibiotics therapy have brought down the mortality from 50% to less than 1/100000 still morbidity is more than 5-8% mainly due to delayed diagnosis and treatment.[5]

Laparoscopic appendicectomy combines the advantages of diagnosis,treatment in one procedure with least morbidity.[6] Laparoscopic appendicectomy is associated with reduced post operative pain, to be discharged from hospital sooner and return to daily living than those who have gone open appendicectomy.[7] The modern era of laparoscopic surgery has evoked remarkable changes in approaches to surgical diseases.

Aim and objective

Aim and objectives were to perform a comparative study between laparoscopic and open appendicectomy with respect to duration of surgery, post operative pain and duration of analgesic, post operative complications like vomiting, ileus, intra-abdominal abscess and wound infections, length of hospital stay, time take to return to resume normal work.

METHOD

This study was a prospective study started after taking all necessary permissions from the institutional ethics committee of Patna medical college and hospital. The due permissions from the head of department of surgery was also obtained.

Study subjects

A sample size of 50 were divided equally into two groups open (25) and laparoscopic appendicectomy (25) which were consecutively selected at PMCH, patna. The fact that a portion of this study extends into the COVID 19 pandemic should also be kept in mind.

Study duration

The study took place from September 2020 to September 2022.

Inclusion criteria

Patients with clinical diagnosis of acute on recurrent appendicitis with necessary investigations.

Exclusion criteria

Children below <12 years, pregnant women, clinically appendicular mass, interval appendicectomy, patient not giving consent.

Patients who presented with abdominal pain, vomiting, fever and on examination which tenderness in right iliac fossa with guarding or rigidity, where investigated with necessary investigation and with diagnose acute or recurrent open appendicitis for surgery.

Open appendicectomy performed through a muscle splitting incision in the right iliac fossa. The base of appendix was crushed, ligated and the stump of appendix was not invaginated. laparoscopic appendicectomy where done using a standardized approach involving trocar insertion and three ports technique. Appendix was divided after the ligation of the base appendix extraction. Duration of surgery taken for laparoscopic was from port side incision to closure of ports.

Statistical analysis

Descriptive analysis

Data was made using mean ± standard deviation for continuous data and frequency as number as well as percentage.

Analytical analysis

The basic parameters of the two categories were compared. Chi-square test was used for categorical variables. P=0.05 or less was considered for statistical significance.

Follow up

In terms of post op data, we studied the outcome in both the study groups. The data collected was compared between the two groups and presented in tabular form after analysis. The findings were compared with those of previous study to come to a conclusion.

RESULTS

This study consists of a total of 50 patients of laparoscopic and open appendicectomy. It is a comparative study of two years of open versus laparoscopic appendicectomy from September 2020 to 2022. The data is collected from the patients admitted in surgical wards. They were divided into two groups of 25 each of open and laparoscopic appendicectomy (Table 1).

In our study the mean duration of surgery in the open group was found to be 46 minutes and that in the laparoscopic group was found to be 48 minutes. P=0.748. This was not significant (Table 2).

In present study pain score 2.96±0.7 and 1.56±0.7in open and laparoscopic group. P=0.02 which was significant. Duration of analgesics 7.32±1.1 and 2.24±0.5 in open and laparoscopic group. P=0.02 which was significant. Above study showed both pain score and duration of analgesics were significantly reduced in laparoscopic as compared to open appendicectomy (Table 3).

In present study post operative complications were analysed in terms of vomiting, abdominal abscess, wound infections, ileus. The incidence of vomiting was 10 (40%) and 3 (12%) in the open and laparoscopic group. P=0.024 which was significant. Wound infections 8 (32%) in open and 0 (0%) in laparoscopic group. P=0.002 this difference was significant. Abdominal abscess was found to be 3 (12%) open and 0 (0%) laparoscopic group. P=0.074 which was significant. On an average postoperative ileus were 31±5.4 days and 27.6±4.6 days in open and laparoscopic respectively. P=0.018 was found to be significant.

Table 1: Mean duration of surgery using independent t test.

Groups	N	Minimum	Maximum	Mean	S. D.	Mean diff	P value
Open	25	30	90	46.60	15.392	-1.60	0.748
Laparoscopy	25	30	120	48.20	19.358		

Table 2: Comparison of mean duration of analgesics between the using independent t test.

Groups	N	Minimum	Maximum	Mean	S. D.	P value
Open	25	1	4	2.96	0.790	0.023
Laparoscopy	25	1	3	1.56	0.712	

Table 3: Comparison of the mean pain score between groups using independent t test.

Groups	N	Minimum	Maximum	Mean	S. D.	P value
Open	25	1	4	2.96	0.790	0.027
Laparoscopy	25	1	3	1.56	0.712	

Table 4: Distribution of subjects based on postoperative complaints.

Variables			Groups		Total	Chi-square value	P value
			Open	Laparoscopy			
V	-	Count	15	22	37	5.09	0.024*
		%	60	88	74		
	+	Count	10	3	13		
		%	40	12	26		
Aa	-	Count	22	25	47	3.19	0.074
		%	88	100	94		
	+	Count	3	0	3		
		%	12	0	6		
WI	-	Count	17	25	42	9.52	0.002*
		%	68	100	84		
	+	Count	8	0	8		
		%	32	0	16		

Table 5: Mean ileus between two groups using independent T test.

Groups	N	Minimum	Maximum	Mean	S. D.	P value
Open	25	24.0	39.0	31.08	5.40	0.018*
Laparoscopy	25	21.0	36.0	27.60	4.66	

Table 6: Comparison of the mean duration of stay in hospital and time to return to normal work.

Groups		N	Minimum	Maximum	Mean
DS	Open	25	6	9	8
	Laparoscopy	25	1	4	2
TI R	Open	25	12	26	21
	Laparoscopy	25	10	18	14

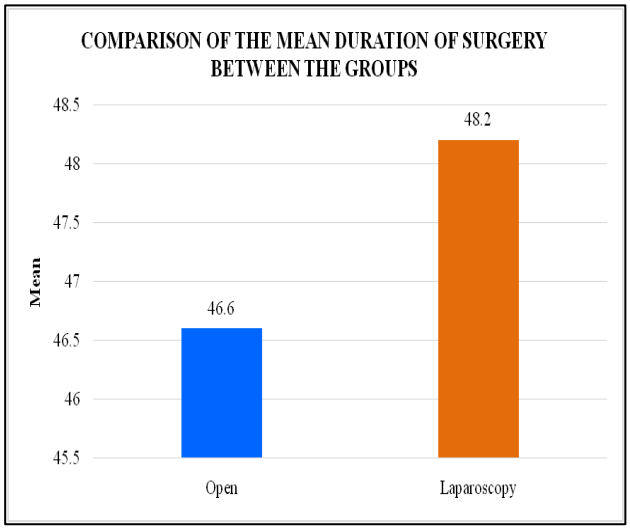

Figure 1: Comparison of mean duration of surgery.

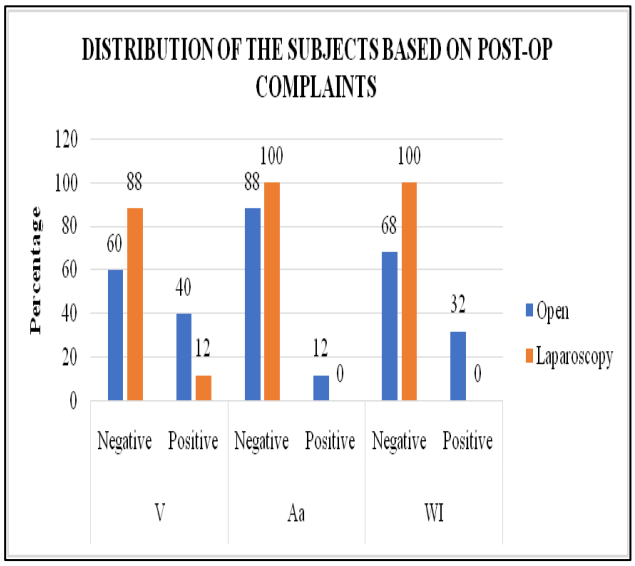

Figure 2: Distribution of subjects based on postoperative complains.

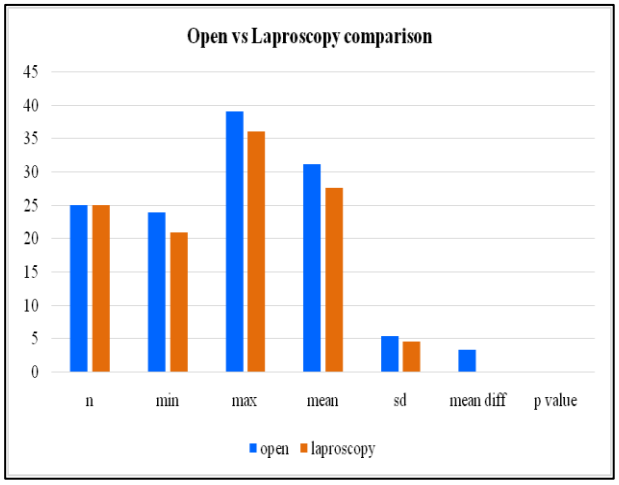

Figure 3: Mean ileus between the two groups.

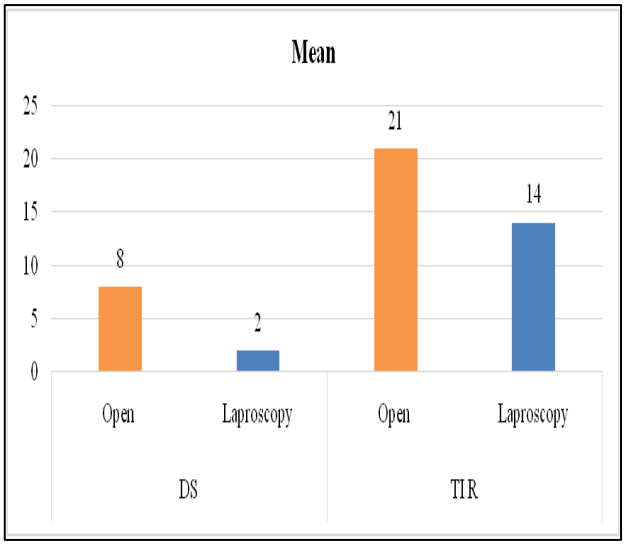

Figure 4: Mean duration of stay in hospital and time to return to normal work.

In our study the mean duration of stay in hospital for open and laparoscopic groups is 8 days and 2 days. P<0.05 which was significant. Time to return to normal work was found to 21 days in the open group and 14 days in the laparoscopic group. P<0.05 which was significant.

DISCUSSION

In this study, the relative advantages and disadvantages of open and laparoscopic procedures were analyzed in terms of duration of surgery, post operative pain score duration of analgesia, postoperative complications, duration of postoperative stays in hospital, return to normal at general surgery department in Patna medical college and hospital.

Duration of surgery

In comparison with respect to duration of surgery, laparoscopic appendicectomy has taken a mean of 48±19 mins and open appendicectomy has taken a mean of 46±15 mins (p=0.748). Operating time was found to be shorter in open appendicectomy.

In Pradhan et al a prospective comparative study the mean operative time of surgery was found to be 37.9±9.8 in open surgery and in laparoscopy 42.8±10.8 minutes and p=0.86 which was not very significant even though laparoscopic operative is higher than open surgery.[20]

In Wei et al a prospective randomised comparison operative time seemed to be shorter for open appendicectomy (28.7±16.3 mins) patients than for the laparoscopic patients (30±15.2 mins).[18]

Pain score

In the present study, the pain score was 2.96±0.7 for the

open group as compared to 1.56±0.712 in laparoscopic group (p<0.023) because long incisions stretches the muscle and increases the chances of wound infections and post operative pain.

In Ortega et al a prospective randomised comparison of laparoscopic appendicectomy with open appendicectomy postoperative pain on visual analogue revealed a significantly lower mean level among patients undergoing laparoscopic than open appendicectomy and p=0.001.[18]

In Alok et al prospective comparative study of laparoscopic appendicectomy versus open appendicectomy the average pain score was 2.7±0.25 in the open group as compared to laparoscopic 1.5±0.39 with p<0.05 which was significant.[21]

In Pradhan et al laparoscopic versus open appendicectomy a prospective comparative study mean comparison of operative pain by visual analogue scale was low in laparoscopic compared to open p=0.05.[20]

In Seeney et al results were significant pain score was low when compared to open.[14]

Post operative analgesic requirements

The postoperative analgesic requirement was more in open group 7.32±1.14 days as compared to laparoscopic group 2.24±0.59 days, p<0.027.

In Frazee et al study a prospective randomised trial comparing open (8 days) versus laparoscopic appendicectomy (2 days) duration of both parenteral and oral analgesic use favoured laparoscopic group.[10]

In Geeta et al comparative study of clinical outcomes and cost analysis also reported to have lower duration of analgesic use in the laparoscopic group (3.31 days) than in the open group (7.05 days).[23]

In Shaikh et al clinical outcomes of laparoscopic versus open appendicectomy a study of 100 patients showed significantly less use of analgesic in laparoscopic group (2.24 days) than in the open (7.25 days).[16]

Post operative complications

Postoperative complications like vomiting were found to be lower in laparoscopic group with 3 (12%) as compared with 10 (40%) in open group (p=0.024) and ileus was lower in laparoscopic group with 27±4.6 and for open group 31±5.4 with p=0.018which was significant.

In Sweeny et al moving from open to laparoscopic appendicectomy mean hours of ileus in open (33.3 days) and in laparoscopic (20.6 days).[14]

In Vellani et al evaluation of laparoscopic appendicectomy vs open appendicectomy in open (21 days) and laparoscopic (10.6 days).[22]

Postoperative wound infections

In the present study there is significant reduction in incidence of postoperative wound infection in laparoscopic group 0 (0%) as compared to open group 8 (32%) (p=0.02).

In Yong et al a comparative study of routine laparoscopic versus open appendectomy in open (4 days) and laparoscopic (3 days).[15]

In Wei et al laparoscopic versus open appendictomy: a prospective randomised comparison in open (7.2 days) and laparoscopic (4.1 days).[18]

In Geetha et al laparoscopic appendicectomy versus open appedicectomy: a comparative study of clinical outcomes and cost analysis- institutional experience in open (4.36 days) and laparoscopic (2 days).[23]

Post operative hospital stay

Duration of postoperative hospital stay was low for laparoscopic group 2±0.78 as compared to open group 8±0.89 (p<0.05) which was found to be significant.

In Yong et al a comparative study of routine laparoscopic versus open appedendectomy mean number of hospital days in open (4 days) as well as the laparoscopic (3 days).[15]

In Wei et al laparoscopic versus open appedicectomy: a prospective randomised comparison in open (7.2 days) and laparoscopic (4.1 days).[18]

In Geetha et al laparoscopic appendicectomy versus open appedicectomy: a comparative study of clinical outcomes and cost analysis institutional experience in open (4.36 days) and laparoscopic (3.31 days).[23]

Time to return to normal activity

The return to normal activity was early for laparoscopic group 14±2.11 compared to open group 21.7±3.7 value (p<0.05) which was found to be significant.

In Ortega et al study mean number of days to return to normal activity in open (14 days) and in laparoscopic (9 days).[11]

In Pederson et al number of days were (26.5 days) in open and in laparoscopic (14 days).[13]

In Wei et al it was found that who underwent open (13.7 days) took longer time to return to normal work than laparoscopic (9.1 days).[18]

In Geetha et al study it was found that patients in open (21.7 days) took longer time than laparoscopic (13.5 days).[23]

The debate about the choice of open versus laparoscopic appendicectomy for the treatment of appendicitis had been a point of controversy for surgeons. Critics of laparoscopic appendicectomy had always pointed out increase cost of surgical equipment as a major disadvantage of laparoscopic procedures. Although with the above concerns laparoscopic has become safe and popular procedures. Shorter duration of hospital stay and early recovery had made many surgeons to deepen their hands in this super specialty area. Discourse over the benefits of laparoscopic surgery has driven us to analyze our experience with this procedure.

In our study patients who successfully underwent laparoscopic appendicectomy have been proven remarkable advantages over open in terms of duration of surgery, post operative pain, use of analgesics, hospital stays and return to normal work. There was no laparoscopic to open conversion.

CONCLUSION

Based upon the study we draw an inference that laparoscopic surgery is more beneficial than open surgery. There was a definite upshot of laparoscopic surgery over open surgery in the selected patients. The laparoscopic surgery was better than open appendicectomy with respect to duration of surgery, post operative complications, pain and duration of analgesic usage, hospital stay and time to return to normal work.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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