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Original Research Article

Open versus laparoscopic appendicectomy: a prospective comparative study

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ABSTRACT

Background: Open appendectomy has been the gold standard for the treatment of acute appendicitis since its introduction by Charles Mc Burney in 1889. The introduction of laparoscopic surgery has dramatically changed the field of surgery. Various studies showed conflicting results about the superiority of laparoscopic approach over open for treatment of acute appendicitis. Present study is conducted to determine any possible benefits of the laparoscopic approach over open surgery.
Methods: The study was conducted in Dr. V. M. Government Medical College and hospital located in Solapur (Maharashtra) from September 2017 to September 2019. It is a prospective comparative study. Patients were randomly divided into 2 groups alternately where group A and B were operated by conventional and laparoscopic techniques respectively and their outcomes were compared.
Results: Mean age of patients in open and laparoscopic appendicectomy group was 29.67 years and 31 years respectively. Post-operative pain, wound infection and hospital stay was significantly more in open group as compared to laparoscopic group ($p<0.05$).
Conclusions: From the results of our study we conclude that laparoscopic appendicectomy has superior results as compared to open appendicectomy.

Keywords: Acute appendicitis, Open appendicectomy, Laparoscopic appendicectomy

INTRODUCTION

Appendicitis is the most common cause of surgical abdomen. The incidence of acute appendicitis is highest in the second and third decades of life, but the condition occurs at all ages.[1] Appendicectomy is the treatment of choice for acute appendicitis. It can be done either by open or laparoscopic method. Open appendectomy has been the gold standard for the treatment of acute appendicitis since its introduction by Charles Mc Burney in 1889.[2] The introduction of laparoscopic surgery has dramatically changed the field of surgery. With improvements in the equipment and increasing clinical experience it is now possible to perform almost any kind of procedure under laparoscopic visualization.[3]

Laparoscopic appendectomy was first performed by Semm in 1983.[4] Since then, this procedure has been widely used. Various studies showed conflicting results about the superiority of laparoscopic approach over open for treatment of acute appendicitis.[5,6] Present study aimed to compare the results of open and laparoscopic appendicectomy in terms of operative time, postoperative pain, wound infection, hospital stay, and time to return to normal work.

METHODS

After institutional ethics committee approval, present study was conducted in Dr. V. M. Government Medical College and hospital located in Solapur (Maharashtra) between September 2017 to 2019. This was a prospective comparative study.

Inclusion criteria

Patients of age 15years and above irrespective of sex, with diagnosis of acute appendicitis.

Exclusion criteria

Patients below 15 years of age, Patient having complicated appendicitis (Appendicular perforation, abscess, appendicular mass, gangrenous appendicitis) will be excluded. Patients with history of cirrhosis coagulation disorders, contraindication to general anaesthesia, inability to give informed consent due to mental disability, and pregnancy.

Patients included in the study as per the inclusion criteria mentioned above were subjected to routine haematological and radiological investigations and divided into open and laparoscopic group. Eligible patients were assigned to open and laparoscopic surgery by lottery method. Consent for conversion to open, if required, was taken in laparoscopic group before surgery. Open and laparoscopic surgeries were carried out under spinal and general anaesthesia respectively. Both the groups were compared for operative time, postoperative pain, wound infection, hospital stay, and time to return to normal work.

Statistical analysis

Data from each patient collected and tabulated using Microsoft Excel. All the statistical analysis was carried out by SPSS (Statistical Package for Social Sciences) version 16. Microsoft word and Excel have been used to generate graphs, table etc. Statistical method used was Z test and t-test for difference between two proportions. $p<0.05$ considered statistically significant.

RESULTS

Mean age of patients in open and laparoscopic appendicectomy group was 29.67 years and 31 years respectively. The difference in age between two groups was statistically not significant ($p>0.05$).

There were 16 males in open group and 15 males in laparoscopic group. There were 14 females in open group and 15 females in laparoscopic group. The difference in gender between two group was statistically not significant ($p>0.05$).

Table 1: Comparison of age between two groups.

Study group	Mean age in years	P value (using independent t test)
Open group (n=30)	29.67	> 0.05
Laparoscopic group (n=30)	31	

Table 2: Comparison of gender between two groups.

Gender	Open group (n=30)	Laparoscopic group (n=30)	P value (using Z test)
Male	16	15	>0.05
Female	14	15	

Mean operative time in open and laparoscopic appendicectomy group was 61.5 and 86.5 minutes respectively which is statistically significant. Higher operative time in laparoscopic group in our study may be due to additional steps of operation like setup of instruments, insufflation, and making ports under direct vision and peritoneoscopy. Also, all the faculty members were involved in the operative management of the patients.

Table 3: Operative time.

S. no.	Operative time (in minutes)	Number of patients	
		Open group (%)	**Laparoscopic group (%)**
1	31-45	8 (26.67)	1(3.33)
2	46-60	8 (26.67)	2(6.67)
3	61-75	6 (20)	3 (10)
4	76-90	4 (13)	6 (20)
5	91-105	4 (13)	18 (60)
Total		30	30
Mean duration of surgery		61.50	86.50
SD		20.86	16.93

Test statistics: $t=5.01$, $df=58$, $p<0.05$; Statistically significant.

Mean post-operative pain score in open and laparoscopy group was 4.10 hours and 2.63 hours respectively. Low pain score in laparoscopic group is attributed to the smaller incisions and consequently less trauma to abdominal wall and less post-operative pain. Statistically there is significant difference between the two groups with respect to post-operative pain score.

Wound infection (10%) is the most common post-operative complication in open group as compared to lap group which was statistically significant.

Mean post-operative hospital stay in open and laparoscopic group was 5.33 and 3.53 days respectively. There is statistically significant difference between the two groups for hospital stays. Mean number of days required for

return to normal work in open and lap appendicectomy group was 18.16 and 13.33 days respectively which is statistically significant. Return to normal work was recorded as time taken to resume work and other activities of social life.

Table 4: Postoperative pain score at the end of 24 h.

S. no.	Postoperative pain score at the end of 24 h	Number of patients	
		Open group	Laparoscopic group
1	0-1	2	8
3	2-3	8	14
5	4-5	14	6
4	6-7	06	2
Total		30	30
Mean		4.10	2.63
SD		1.77	1.81

Test statistics: t=3.12, df=58, p<0.05; Statistically significant.

Table 5: Post-operative complications.

S. no.	Post-operative complications	Number of patients		Test statistics	Statistical Significance
		Open group (%)	Laparoscopic group (%)		
1	Wound infection	3 (10)	00 (00)	Z=1.77, p<0.05	Significant
2	Paralytic ileus	2 (6.67)	2 (6.67)	Z=00, p>0.05	Not significant
3	vomiting	3 (10)	2 (6.67)	Z=0.46, p>0.05	Not significant
4	Fever	2 (6.67)	1 (3.33)	Z=0.59, p>0.05	Not significant
5	Wound dehiscence	00 (00)	00 (00)	Z=00, p>0.05	Not significant
6	Intra-abdominal abscess	00 (00)	00 (00)	Z=00, p>0.05	Not significant
Total		30 (100)	30 (100)		

Table 6: Post-operative hospital stays.

S. no.	Post-operative hospital stays (in days)	Number of patients	
		Open group	Laparoscopic group
1	1	0	0
2	2	0	0
3	3	0	18
4	4	3	8
5	5	17	4
6	6	7	0
7	7	3	0
Mean hospital stays		5.33	3.53
SD		0.80	0.73

Test statistics: t=3.12, df=58, p<0.05; Statistically significant.

Table 7: Time to return to normal work.

S. no.	Time to return to normal work (days)	Number of patients	
		Open group	Laparoscopic group
1	5-10	0	6
2	11-15	3	16
3	16-20	23	8
4	21-25	4	0
Total		30	30
Mean		18.16	13.33
SD		2.75	3.70

Test statistics: t=3.59, df=58, p<0.05; Statistically significant.

Figure 1: Laparoscopic appendicectomy-port position. a) umbilical port (10 mm), b) left iliac fossa port (5 mm), c) suprapubic port (5 mm).

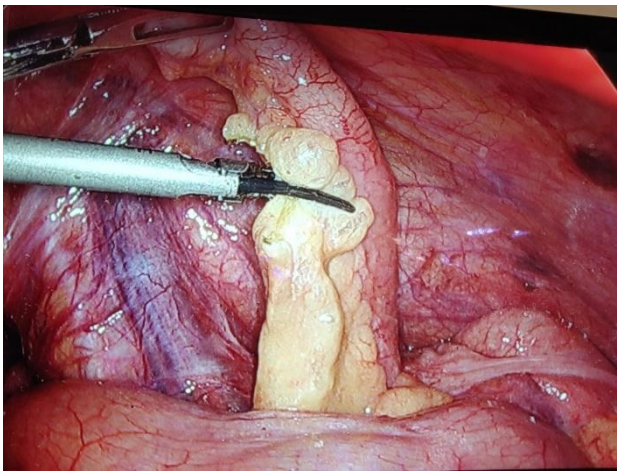

Figure 2: Seperation of mesoappendix with hormonic scalpel.

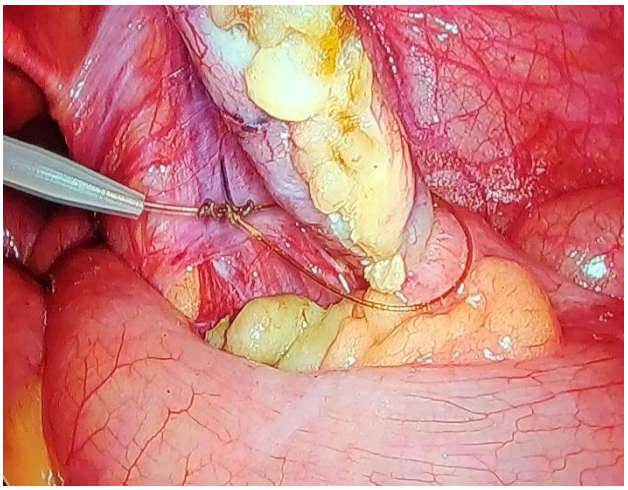

Figure 3: Catgut endoloop being applied to the base of appendix.

DISCUSSION

Mean age of patient in present study in open and Lap group was 29.67 years and 31 years respectively. The findings in our study were comparable with other national and international studies.[7-12] Male to female ratio in our study was 1.14:1 and 1:1 in open and laparoscopic group respectively. Similar findings were also noted in Subramaniam and Khatana et al study.[13,14]

Mean operative time for open group and laparoscopic group was 61.5 and 86.5 minutes respectively in our study. This figure is comparable with Marzouk et al, Yong et al, Moodadla et al study.[15-17] As compared to studies conducted by Jain et al, Mehta et al, Kumar et al, Khatana et al, Moodadla et al., the operative time was more in laparoscopic group in our study this may be because all the faculty members were involved in the operative management of the patients and also may be because of small sample size in our study.

Post-operative pain score at the end of 24 hrs in present study was 3.46 and 2.1 in open and laparoscopic groups respectively while it was 3.25 and 2.01 in Ortega et al study.[18] Less post-operative pain score was noted at the end of 24 hrs in laparoscopic group which was attributed to smaller incisions.

Post-operative analgesic requirement was 6.95 days and 2.29 days in open and laparoscopic group respectively in Frazee et al study.[19] Findings in our study was consistent with other studies. Less post-operative analgesic requirement in laparoscopic appendicectomy group may be due to the fact that the trocar incisions of laparoscopic appendicectomy contribute to minimal trauma to the abdominal wall and less pain.

Average hospital stay in present study was 5.33 days and 3.53 days in open and laparoscopic group respectively. Similar findings were noted in Wang et al, Patel et al study.[20,21] On an average 26.5 and 14 days were required for patients to resume the normal work in open and laparoscopic group respectively in Pedersen et al study.[22] In present study average 18.16 days were needed for return to normal work in open group, while that in laparoscopic group it was 13.33 days.

CONCLUSION

Laparoscopic appendicectomy is better than open appendicectomy in patients with acute appendicitis with respect to post-operative pain and analgesic requirement, early resumption of oral feeds, post-operative complications like wound infection, paralytic ileus, post-operative length of hospital stay, early return to normal work, better cosmesis and patient satisfaction. The only drawback of laparoscopic appendicectomy is the duration of surgery and requirement of general anaesthesia.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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