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Comparative study on open appendicectomy versus laparoscopic appendicectomy in a tertiary care centre

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ABSTRACT

Background: Appendicectomy is one of the most common procedure in general surgery, accounts for approximately 1% of all surgical operation. Laparoscopic appendicectomy are likely to have less postoperative pain, early discharge, decreased wound infection, better cosmesis and also early return to routine work. Laparoscopic procedure for appendicectomy is compared with open surgical technique with respect to duration of surgery, post operative pain, duration of analgesic, post operative complications, post operative length of hospital stay and return to routine work. **Methods:** This is a prospective and comparative study from September 2013 to August 2014 involved 100 cases, 50 open and 50 lap appendicectomy, which were randomly selected and were operated in department of surgery, Dr S. M. C. S. I. Medical College, Karakonam.

Results: In present study pain score was 2.7 ± 0.9 for open group as compared to 1.3 ± 0.5 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 8% as compared with 36% in open group (P<0.05) and ileus was lower in lap group with 17.3 \pm 7.1 and for open group 30.8 \pm 8.9 with P<0.05 which were significant. There is significant reduction in incidence of post operative wound infection in lap group 4% as compared to open group 26% (P<0.05). Duration of post operative hospital stay was significantly low for lap group 2.8 \pm 0.9 as compared to open group 4 \pm 2.9. The return to normal activity was low for lap group 8 \pm 3.15 days as compared to open group 13.7 \pm 3.15 days. Duration of surgery for open appendicectomy was 48.2 \pm 12.4 and for lap appendicectomy was 68.5 \pm 20.3.

Conclusions: Laparoscopic appendicectomy is better than open appendectomy in selected patients with acute or recurrent appendicitis.

Keywords: Appendicectomy, Laparoscopic appendicectomy, Open appendicectomy

INTRODUCTION

Appendicitis is the most common intra-abdominal condition requiring emergency surgery, with a lifetime risk of 6%. Appendicectomy continues to be one of the commonest procedures in general surgery, accounts for approximately 1% of all surgical operation.²

Even though modern diagnostic facilities, surgery skills, fluids and antibiotic therapy have brought down the mortality from 50% (before 1925) to less then 1/1,00,000

persons, still the morbidity is more than 5-8%, mainly due to wound infection because of delayed diagnosis and treatment.³

Laparoscopic appendicectomy combines the advantages of diagnosis and treatment in one procedure with least morbidity.

Patients are likely to have less postoperative pain and to be discharged from hospital and return to activities of daily living sooner than those who have undergone open appendicectomy.⁴ The other advantages include decreased wound infection, better cosmesis, ability to explore the entire peritoneal cavity for diagnosis of other conditions and effective peritoneal toileting without the need for extending the incision.⁵

The laparoscopic appendicectomy is increasingly employed, particularly in young women of child bearing age in whom the differential diagnosis of right lower quadrant pain is extensive and includes gynecologic pathology.⁶

The modern era of laparoscopic surgery has evoked remarkable changes in approaches to surgical diseases. That trend towards minimally invasive surgery has prompted general surgeons to scrutinize nearly all operations per possible conversion to laparoscopic techniques.⁷

Laparoscopic procedure for appendicectomy is compared with open surgical technique with respect to

- Duration of surgery
- Post operative pain and duration of analgesic,
- Post operative Complications like vomiting, ileus, intraabdoninal abscess and wound infection,
- Post operative length of hospital stay,
- Time taken to return to resume routine work.

METHODS

Patients admitted in surgical wards of Dr S. M. C. S. I. Medical College, Karakonam, with clinical diagnosis of acute or recurrent appendicitis from September 2013 to August 2014.

This prospective study from September 2013 to August 2014 involved 100 cases (50 cases opened and 50 cases lap) which were consecutively selected, at Dr S. M. C. S. I. Medical College, Karakonam.

Inclusion criteria

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

Exclusion criteria

Those not willing for the study, children <10yrs, pregnant women and those with complications. Complicated appendicitis is defined as either a perforated or a gangrenous appendix with or without periappendicular pus, peritonitis or appendicular mass.

Patients who presented with abdominal pain, vomiting, fever, and on examination with tenderness in right ileac fossa with guarding or rigidity or some findings of them, were investigated with necessary investigation and were diagnosed of acute/ recurrent appendicitis were posted for surgery.

Open appendicectomy were performed through a muscle splitting incision in the right iliac fossa. The base of the appendix was crushed ligated and stump of the appendix was not invaginated. Laparoscopic appendicectomy were done using a standardized approach involving a closed technique for trocar insertion and by 3 port technique. The appendix was divided after ligature of the base. Appendix extraction was performed using trocar sleeve to protect the wound from contamination during removal. Duration of surgery taken for lap is from the time of port site incision to closure of the port by suturing and for open its from skin incision to skin closure.

All the cases were followed every day in the postoperative period till they were discharged and then later followed for a period of 4 weeks in the out patient department.

The following parameters were observed during follow up in comparison between two procedures, post operative pain using a visual analogue pain scale and duration of analgesic used in number of days. Post operative complications like vomiting, ileus, abdominal abscess and wound infection. Patients in both study groups were discharged as soon as possible and duration of stay after surgery and duration of analgesics used after surgery in number of days is noted.

Wound infection was defined as discharge of pus that required surgical drainage. Intrabdominal abscess was defined as a fluid collection diagnosed at Ultrasonography or computed tomography which contained pus at ultrasonographically guided aspiration.

Presented proforma was used to collect the relevant information, and chi-square test and student t- test, is used for analysis.

RESULTS

Patients demographics

The results of the analysis of data on 50 patients who underwent open appendicectomy and another group of 50 patients, who were operated laparoscopically are as follows.

In present study 30 (60%) patients of open appendicectomy and 20 (40%) patients of laparoscopic appendicectomy were males. 20 (40%) patients of open appendicectomy and 30 (60%) laparoscopic appendicectomy were females.

The mean age of the patients in two groups was 24.0 and 21.2 years, respectively. In the present study 50 (100%) in open group and 50 (100%) in laparoscopic group complained of abdominal pain. History of vomiting was present in 38 (76%) in open and 44 (88%) in laparoscopic group. The other complaints was fever 12 (24%) in open group and 10 (20%) in laparoscopic group.

Table 1: Age and sex distribution.

Appendicectomy					
	Oper	n	Lapa	roscopy	
	no.	%	no.	%	
Patients analysed	50	100	50	100	
Sex					
Male	30	60	20	40	
Female	20	40	30	60	
Age (years)					
10-20	22	44	24	48	
21-30	20	40	22	44	
31-40	4	8	0	0	
41-50	4	8	4	8	
Mean age±SD	24.0	±8.9	21.2±	7.5	

In the present study 28% and 36% of the patient of open and laparoscopic group respectively had the history of episodes of abdominal pain in the past.

Table 2: Presenting complaints.

Symptoms	Appendicectomy					
	Open		Lapai	roscopy		
	no.	%	no.	%		
Abdominal pain	50	100	50	100		
Nausea/ vomiting	38	76	44	88		
fever	12	24	10	20		

In present study all patient in both groups had right iliac fossa tenderness (100%) 36 (72%) in open group and 44 (88%) in laparoscopic group had guarding / rigidity.

In present study the laboratory parameters of patients in open and laparoscopic group were comparable. 21 (84%) and 19(76%) of open and laparoscopic group respectively were showing differential count with shift to the left.

Table 3: Past history.

History of	Appendicectomy			
	Open		Lapar	oscopic
Episode of pain	no.	%	no.	%
	14	28	18	36

In present study abnormal pathology were noted in 22 (88%) and 18 (72%) in open and laparoscopic group respectively. Ultrasound was normal in 3 (12%) of open group and 7 (28%) in laparoscopic group.

In present study for open appendicectomy <30 min 3 cases were operated, 30 to 60 min 42 cases, 61 to 90 min 4 cases, 91 to 120 min 1 case were operated. The mean duration was 48.2 ± 12.4 min.

For lap appendicectomy <30 min 3 cases, 31 to 60 min 27 cases, 61 to 90 12 cases, 91 to 120 min 6 cases and 121 to 180 min 2 cases were operated. Mean duration of surgery

was 68.5±20.3 min. So open appendicectomy is less time consuming than laparoscopic appendicectomy.

Table 4: Local examination.

Appendicectomy					
Findings	Ope	Open		oscopy	
	no.	%	no.	%	
Tenderness					
Present	50	100	50	100	
Absent	0	0	0	0	
Guarding/Rigidity					
Present	36	72	44	88	
Absent	14	28	6	12	

Unpaired 'T' test

In present study average pain score was $2.7~(\pm 0.9)$ in open group as compared to $1.3~(\pm 0.5)$ in laparoscopic group with p <0.05 which was significant. Duration of analgesics used parental and oral in days were on an average $6.9~(\pm 2.4)$ and $2.3~(\pm 1.0)$ for open and laparoscopic group respectively. Again, this deference was significant (p <0.05).

Table 5: Laboratory parameters.

Parameters	Appendicectomy			
rarameters	Open	Open		oscopy
Total counts				
Mean	10820)	10400	
SD	±2376	5	±2517	
Differential count with shift to left	no	%	no	%
Present	42	84	38	76
Absent	08	16	12	24

Above analysis revealed that both pain and analgesics used were significantly reduced in laparoscopic compared to open appendicectomy.

Fisher's exact test 'T' test

In present study postoperative complications were analyzed in detail: vomiting ileus, intra-abdominal abscess, and wound infection.

Table 6: Ultrasound findings.

	Appendicectomy			
Report	Open		Laparoscopy	
	n	%	n	%
Normal	6	12	14	28
Abnormal pathology noted	44	88	36	72

The incidence of vomiting was higher following open appendicectomy (18%) than laparoscopic (8%) which is significant with P<0.05. Average post operative ileus was $30.8~(\pm 8.9)$ hrs for open and $17.3~(\pm 7.1)$ hrs for

laparoscopic group was noted. When difference was noted 't' value 6.05 and P<0.05 which is significant.

Table 7: Duration of surgery.

Duration of surgery	Open	lap
<30 min	3	3
31-60 min	42	27
61-90min	4	12
91-120 min	1	6
121-180 min	0	2
Mean	48.2±12.4	68.5±20.3

Wound infection was more common after open 8 (32%) than laparoscopic 1(4%) and the difference was significant (P<0.05). Intra abdominal abscesses developed in 8% of the open group and case in laparoscopic group. However, this difference was not significant (P=0.23).

Unpaired student's 'T' test

In open appendicectomy 6 cases had 3 days of stay, 33 cases had 4 days, 5 cases had 5to 9 days and 6 cases had

10 to 15days of postoperative stay in the hospital. With a mean of 4±2.95. In lap appenciaectomy 6 cases had 1 day, 24 cases had 2 days, 14 cases had 3days and 6 cases had 4 days of post operative hospital stay.

With a mean of 2.8 ± 0.9 . Which shows that laparoscopic appendicectomy significantly reduced the hospital stay (P<0.05).

Table 8: Post operative pain score and medication.

	Appendicectomy			
Details	Open	Laparoscopic	T- value	P- value
Pain Score (0-4)	2.7 score (±) 0.5	1.3 score (±) 0.5	6.94	<0.05 sig*
Duration of analgesics used	6.94 days	2.3 days	9.03	<0.05 sig*
Parental and oral (days)	(±) 2.4	±1.0		

Table 9: Post operative complications.

Complications	Onon n (9/)	I anamagaania n (9/)	Significance	
Complications	Open, n (%)	Laparoscopic, n (%)	t-value	p-value
Vomiting	9 (18)	4 (8)	-	<0.05, Sig*
Abdominal abscess	2 (4)	0 (0)	-	0.23, NS*
Wound Infection	8 (16)	1 (2)	-	<0.05, Sig*.
Ileus (hrs)	30.8±8.9	17.3±7.1	6.05	<0.05, Sig*

Table 10: Postoperative stay in hospital.

Duration of hospital stay after surgery	Appendicectomy		
(days)	Open	Laparoscopy	
1	0	6	
2	0	24	
3	6	14	
4	33	6	
5-9	5	0	
10-15	6	0	
Mean	4 ± 2.94	2.8±0.9	
P value	< 0.05	< 0.05	

In present study for open appendicectomy 5 patients had taken 6 to 8 days, 10 cases had taken 9 to 12 days, 30 cases had taken 13 to 16 days and 5 cases had taken 17 to 20 days of time to return to their routine work. With a mean of 13.7 ± 3.15 . In lap appendicectomy 24 cases had taken 6 to 8 days, 19 cases had taken 9 to 12 days, 5 cases had taken 13 to 16 days and 2 cases had taken 17 to 20

days to return to their routine work. With a mean of 8.4 ± 3.15 , this difference was significant (P<0.05).

Table 11: Post operative time taken to return to normal work.

Days for recovery	Open	Lap
6-8	5	24
9- 12	10	19
13-16	30	5
17-20	5	2
Mean	13.7±3.15	8±3.15

DISCUSSION

In the study comparison with respect to duration of surgery, laparoscopic appendicectomy has taken a mean of 68.5±20.3 min and open appendicectomy has taken a mean of 48.2±12.4 min (p<0.001). Similar observations have also been reported by other studies.^{8,9} A metanalysis of randomized controlled trial has been reported with outcomes for 2877 patients. The mean operating

time was 16 minutes longer for laparoscopic appendicectomy.

A prospective randomized trial comparing laparoscopic appendicectomy with open appendicectomy was conducted in 158 patients by Hansen et al.reported that despite of longer operating time, the advantages of make it a worthwhile alternative for patients with acute appendicitis.

In present study pain score was 2.7 ± 0.9 for open group as compared to 1.3 ± 0.5 in laparoscopic group (P<0.05) because of longer incision stretch of muscles and wound infection. Similar observations have also been reported by other authors. ^{10,11}

In a study by Ortega et al; linear analogue pain scores were recorded in 135 patients blinded to the procedure of operation by special dressing and pain score was very less in laparoscopic group compared to open group.

Post operative complications like vomiting was lower in laparoscopic group with 8% as compared with 36% in open group (P<0.05) and ileus was lower in laparoscopic group with 17.3 \pm 7.1 and for open group 30.8 \pm 8.9 with P<0.05 which were significant. The similar studies done showed the incidence of emesis was lesser and post operative ileus lesser in laparoscopic group. ¹²

In present study there is significant reduction in incidence of post operative wound infection in laparoscopic group 4% as compared to open group 26% (P<0.05). Similar findings were observed in other studies also. 12-15.

Marzouk M et al, showed laparoscopic appendicectomy significantly improved the postoperative wound infection rate. There was no wound infection in the laparoscopic group, whereas in open group the infection rate was 7.6.

Duration of post operative hospital stay was significantly low for laparoscopic group 2.8±0.9 as compared to open group 4±2.94. The longer hospital stay in open group compared to laparoscopic group also has been reported by others. ^{16,17} In Nguyen N et al, study stay was shorter for laparoscopic group (P<0.04). ¹⁸

Return to normal activity was early for laparoscopic group 8±3.15 days as compared to open group 13.7±3.15 days. Other studies have shown similar findings.¹⁹

CONCLUSION

We found a definite difference in outcome between open and laparoscopic appendicectomy in consecutively selected patients. The laparoscopic appendicectomy was better than the open appendicectomy with respect to pain score, lesser use of analgesics and post operative complications. Post operative recovery was good in respect with duration of hospital stay, return to normal work. The only drawback of laparoscopic appendicectomy was with the duration of surgery.

Overall laparoscopic appendicectomy is better than open appendicectomy in selected patients with acute or recurrent appendicitis.

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