



International Journal of Surgery Science

E-ISSN: 2616-3470
P-ISSN: 2616-3462
© Surgery Science
www.surgeryscience.com
2019; 3(3): 131-136
Received: 08-05-2019
Accepted: 12-06-2019

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Comparative study of open versus laparoscopic appendicectomy

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DOI: <https://doi.org/10.33545/surgery.2019.v3.i3c.159>

Abstract

Aim: The aim of the study is to compare open appendicectomy and laparoscopic appendicectomy with respect to Duration of the operative procedure, Analgesic requirement, Post-operative Complications, Duration of hospital stay, Cost factor involved.

Materials and Methods: The study subject consists of the patients admitted in the surgical wards of all units of our institute, involved 50 cases that were consecutively selected, where the investigator was a part of the surgical team managing the patients, by using random sampling technique.

Results: The mean age of the patients in two groups was 27.2 and 25.5 years respectively. Duration of surgery was 54 min in the open group and 71 min in the laparoscopy group. This difference was statistically significant ($P < 0.01$). Average pain score was 2.72 in open group as compared to 1.21 in laparoscopic group with $P < 0.001$ which was significant. The duration of analgesics used parenteral and oral in days were on an average 6.44 and 2.2 for open and laparoscopic group respectively.

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

Keywords: Laparoscopy, appendectomy, appendicitis

Introduction

Acute appendicitis is one of the commonest causes of acute abdomen encountered in surgical practice, requiring emergency surgery [1]. The life time rate of appendicectomy is 12% for men and 25% in women, with approximately 7% of all people undergoing appendicectomy for acute appendicitis during their lifetime. It has been observed that males had higher rates of appendicitis than females for all age groups with an overall ratio of 1.2 to 1 [1].

Even though modern diagnostic facilities, surgical skills, antibiotic therapy have brought down the mortality from 50% (before 1925) to less than 1/1,00,000 persons, still the morbidity is around 5-8% mainly due to delayed diagnosis & treatment, with the resultant complications [2].

With the introduction of the laparoscopic technique it provided an opportunity to explore new method of therapy in the management of the suspected cases of the acute appendicitis [3].

Laparoscopic appendicectomy combines the advantages of diagnosis and treatment in one procedure with the least morbidity [4]. Patients are likely to have less post-operative pain and to be discharged from hospital and return to activities of daily living sooner than those who have undergone an open appendicectomy [5].

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 [2].

Laparoscopic appendicectomy is increasingly being employed particularly in young women of child bearing age in whom the differential diagnosis of right lower quadrant pain is extensive including gynecologic pathology [6].

Critics of laparoscopic appendicectomy often point to the increased cost of the surgical equipments as a major disadvantage of the laparoscopic procedure despite these concerns however the cost effectiveness for the laparoscopic appendicectomy is easily realized once the decreased hospital stay and entire patient covalence period are accounted for. The modern era of laparoscopic surgery has evoked remarkable changes in the approach to surgical diseases. The trend towards minimally invasive surgery has prompted general surgeons to scrutinize nearly all

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surgical procedures for possibility of conversion to the laparoscopic technique [7]. Hence this study was done to compare open appendectomy and laparoscopic appendectomy.

Material and Methods

The study subject consists of the patients admitted in the surgical wards of all units of our institute with a clinical diagnosis of acute or recurrent appendicitis from 1ST October 2017 to 30TH March 2019 (including sampling procedures, if any).

Method of collection of data

This prospective study from 1ST October 2017 to 30TH March 2019. involved 50 cases that were consecutively selected, where the investigator was a part of the surgical team managing the patients, by using random sampling technique.

Inclusion criteria

All adult patients diagnosed with acute/chronic appendicitis concluded by clinical evaluation and confirmed by USG of abdomen requiring operative intervention are included in this study, after obtaining the consent to be included in the study.

Exclusion criteria

1. Patients with associated gynecological disease
2. Patient age less than 12 years
3. Appendicular abscess

Open appendectomy was performed either under general anesthesia or spinal anesthesia, through a muscle splitting incision in the right iliac fossa. The base of the appendix was crushed and ligated and the stump of the appendix was not invaginated.

Laparoscopic technique performed under general anesthesia using a standardized approach involving the open technique for the trocar insertion and by 3-port technique. The appendix was divided after double ligation of the base. Appendix extraction was performed using trocar sleeve to protect the wound from contamination during removal.

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

The following parameters were observed between the two procedures.

1. Duration of procedure
2. Postoperative pain using a visual analogue pain scale from 0 to 4. and duration of analgesic used in number of days.
3. Postoperative complications like nausea/vomiting, ileus, fever and wound infection.
4. Post-operative length of hospital stay in number of days was noted.
5. Conversion from Laparoscopic to open appendectomy.

A proforma was used to collect the relevant information. Data was analyzed using the Students t-test, Chi-square analysis and P value of <0.05 was considered significant.

Results

The results of the analysis of data on 25 patients who underwent open appendectomy (Figure 1) and another group of 25 patients, who were operated laparoscopically (Figure 2) were analyzed.

In present study 13 patients of open appendectomy and 8

patients of laparoscopic appendectomy were males. 12 patients of open and 17 of laparoscopic appendectomy were females (Table 1).

The mean age of the patients in two groups was 27.2 and 25.5 years respectively (Table 1). In present study 25 in open group and 25 in laparoscopic group complained of abdominal pain. History of vomiting was present in 16 of open and 20 of laparoscopic group. The other complaint was fever in 7 of open and 5 of laparoscopic group (Table 2, Graph 1). In present study 10 and 8 of the patient of open and laparoscopic group respectively had the history of episodes of abdominal pain in the past (Table 3). In present study, all patients in both groups had right iliac fossa tenderness. 6 patients in open and 4 patients in laparoscopic group had guarding/rigidity (Table 4). In present study, it was found that the Mean and SD of Total Count for Open appendectomy is $10,200 \pm 1988.37$ compared to Laparoscopic Appendectomy is $10,000 \pm 2067.65$. The laboratory parameters of patients in open and laparoscopic group were comparable, 20 and 18 of open and laparoscopic group respectively were showing differential count with shift to the left (Table 5).

Above study shows abnormal pathology in 20 (80%) and 18 (72%) of open and laparoscopic groups respectively. Ultrasound was normal in 5 and 7 of open and laparoscopic groups respectively (Table 6, Graph 2). In present study, the duration of surgery was 54 min in the open group and 71 min in the laparoscopy group (Table 7). This difference was statistically significant ($P < 0.01$). In present study, average pain score was 2.72 in open group as compared to 1.21 in laparoscopic group with $P < 0.001$ which was significant. The duration of analgesics used parenteral and oral in days were on an average 6.44 and 2.2 for open and laparoscopic group respectively (Table 8). Again this difference was significant ($P < 0.001$). Above analysis reveal that both pain and duration of analgesics used were highly significantly reduce in laparoscopic compared to open appendectomy.

In present study post-operative complications were analyzed in detail: vomiting, fever, wound infection and ileus (Table 9).

The incidence of vomiting was higher following open appendectomy than laparoscopic. Average post-operative ileus was 30.8 hours for open and 17.3 hours for laparoscopic group was noted. Wound infection was more common after open than laparoscopic and the difference. Fever developed more in the open group than the laparoscopic group and the difference. All these parameters were significant with $P < 0.01$. Duration of post-operative hospital stay was for open group 7.7 ± 2.3 and 2.8 ± 0.91 for laparoscopic group (Table 10). Which shows that laparoscopic appendectomy significantly reduced the hospital stay ($P < 0.001$). Patients who had laparoscopic appendectomies return to full activities by 13.5 ± 2.238 versus 20.8 ± 6.28 days for patients who underwent open appendectomies. Again this difference was significant ($P < 0.001$).

In present study, The mean total cost for Laparoscopic appendectomy is Rs 15308 when compared to Rs 9840 in Open appendectomy, this shows that LA is the more costlier than Open Appendectomy (charges for Laparoscopic was fixed at Rs 5000 and for Open appendectomy Rs 2000, this was added to the total charges of the patient till discharge day) (Table 11).

Discussion

Laparoscopic appendectomy is a major Surgical advance that has enabled the general surgeon to Stretch his hands in the Superspeciality area. The Controversy that currently exists over

the potential benefit of Laparoscopic appendectomy motivated us to analyze our Experience with this Procedure.

In this study, the mean age group is 27.2 yrs and 25.5 yrs in the open and laparoscopic Group respectively.

There was significant increases in the time taken for the procedure during Laparoscopic appendectomy compared to the open method (mean of 71.2 ± 25.67 Versus 53.8 ± 19.96 respectively. This was statistically significant ($P < 0.01$). Similar observations were observed in some of the studies [8-11].

This was because of Learning Curve level of surgical experience and patient Selection accounted for increased operative time.

There was Significant difference in the post-operative pain score between open and Laparoscopic appendectomy at the end of 24hrs (2.72 ± 0.89 vs 1.21 ± 0.45 respectively; $P < 0.001$). This difference could have been because of a longer incision and stretch of the muscles. Similar observation has been reported by others [9, 11-13].

The duration of post-operative analgesic required was more in the open group than the Laparoscopic group (6.44 ± 1.804 versus 2.2 ± 0.957 days respectively; $p < 0.001$). Similar observation have been reported by others [11, 14, 15].

Post-operative complication like vomiting was lower in laparoscopic groups 2(8%) as compared with 7(28%) in open

group and fever was lower in laparoscopic group 4(16%) as compared with 1 (4%) in open group. Post-operative ileus was lower in laparoscopic group with 17.3 hr and for open group 30.8 hr. The Similar observation have been observed [12, 16-18].

Post-operative wound infection rate was lesser in laparoscopic group with 1(4%) as compared with 5(20%) in open method. The Similar observation has been observed [11, 12, 19-22]. All these parameters were significant with $P < 0.01$

In addition to an therapeutic modality laparoscopic has distinctive advantage of being a diagnostic tool.

Duration of hospital stay was significant lower for the Laparoscopic group (mean 2.8 days) as compared to the open group (mean 7.7 days) with ($P < 0.001$). Similar studies has been reported by others [9, 12, 13, 15, 16, 23, 24].

The mean total cost for Laparoscopic appendectomy is Rs 15308 ± 462.78 when compared to Rs 9840 ± 1187.78 in Open appendectomy, this shows that LA is the more costlier than Open Appendectomy.

The return to normal activity was earlier for the laparoscopic group (13.5 ± 6.3 days) as compared to the open appendectomy 20.8 ± 13.5 days. This difference being Significant ($P < 0.001$). Other Studies has also shown Similar result [8, 12, 13, 15, 16, 19, 24].

Table 1: Age and Sex Distribution

Characteristic	Appendectomy				Total
	Open		Laparoscopy		
	N	%	N	%	
Patients analyzed	25	100	25	100	50
Sex					
Male	13	52	8	32	
Female	12	48	17	68	
Age (years)					
10-20	7	28	10	40	
21-30	10	40	10	40	
31-40	4	16	3	12	
41-50	4	16	2	8	
Mean age+/- SD	27.2±8.62 100		25.52±7.81 100		

Table 2: Presenting Complaints

Symptoms	Appendectomy			
	Open		Laparoscopic	
	N	%	n	%
Abdominal pain	25	100	25	100
Nausea/Vomiting	16	64	20	80
Fever	7	28	5	20

Table 3: Past History

History	Appendectomy			
	Open		Laparoscopy	
	n	%	n	%
Episode of pain	10	40	8	32

Table 4: Local Examination

Findings	Appendectomy			
	Open		Laparoscopy	
	N	%	n	%
Tenderness				
Present	25	100	25	100
Absent	0	0	0	0
Guarding/Rigidity				
Present	6	24	4	16
Absent	19	76	21	84

Table 5: Laboratory parameters

Parameters	Appendectomy			
	Open		Laparoscopy	
	Total count			
Mean ± SD	10,200±1988.37		10,000±2067.65	
Differential count with shift to left				
	n	%	n	%
Present	20	80	18	72
Absent	5	20	7	28

Table 6: Ultrasound Findings

Report	Appendectomy			
	Open		Laparoscopy	
	N	%	n	%
Normal	5	20	7	28
Abnormal	20	80	18	72

Table 7: Duration of the surgery

Duration	Appendectomy		*Significance	
	Open	Laparoscopy	t	p
	Mean duration / SD	53.8±19.96	71.2±25.67	2.67
Maximum time	100	120		
Minimum time	20	25		

Table 8: Post-operative pain score and management

Details	Appendicectomy		*Significance	
	Open mean SD	Laparoscopy Mean SD	T Value	P Value
Pain score (0-4)	2.72 ±0.89	1.21 ±0.45	7.57	<0.001
Duration of Analgesics used Parenteral and oral days	6.44 ±1.804	2.2 ±0.957	10.38	<0.001

Table 9: “Postoperative Complications”

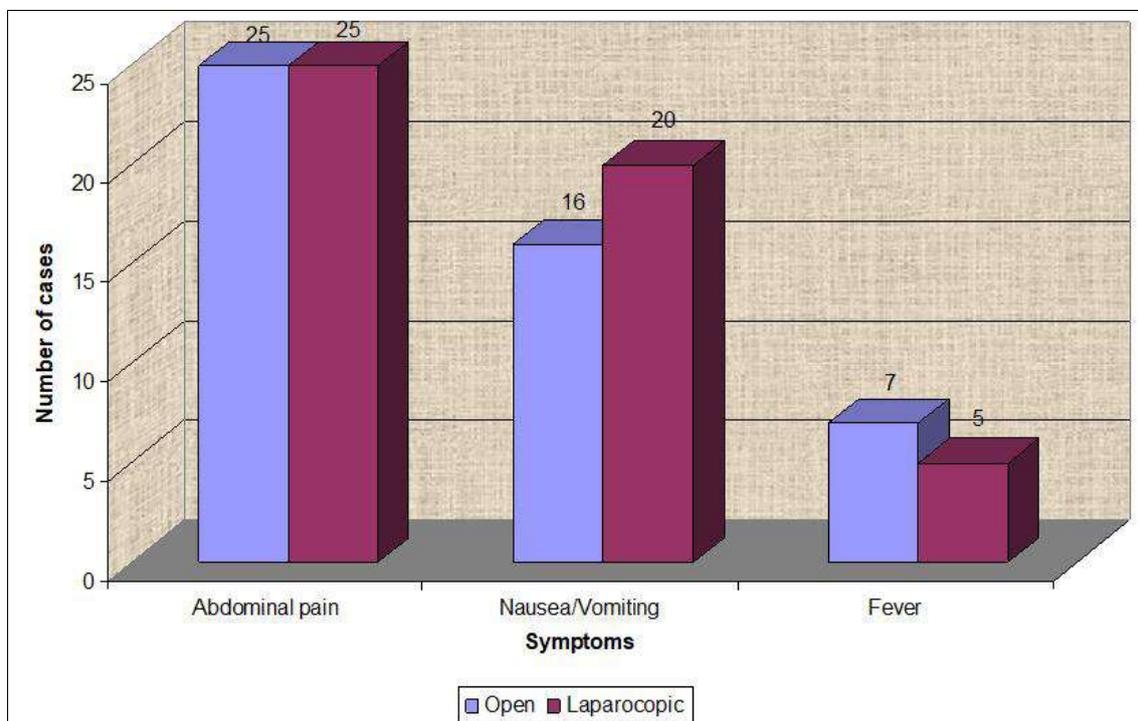
Complications	Appendicectomy				*Significance	
	Open		Laparoscopy		t value	P value
	n	%	N	%		
Vomiting	7	28	2	8		
Fever	4	16	1	4		
Wound Infection	5	20	1	4		
Ileus in hrs	30.8± 8.3		17.3±7.1		6.18	P<0.001

Table 10: “Post-operative Recovery”

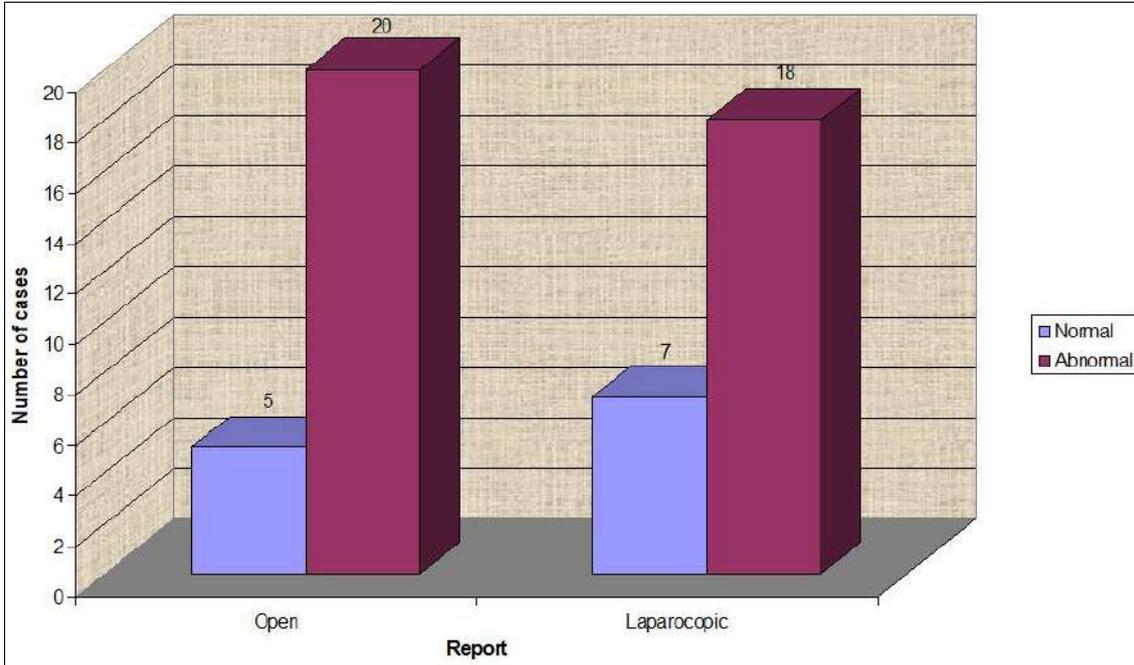
Details	Appendicectomy		Significance	
	Open	Laparoscopy	T value	P value
Duration of hospital stay after surgery (days) Mean /SD	7.7 ±2..3	2.8±0.91	9.9	< 0.001
Time taken for return to normal work (days) Mean /SD	20.8±-6.28	13.5±2.238	5.47	< 0.001

Table 11: Cost factor

Details	Appendicectomy		*Significance	
	Open Mean ± SD	Laparoscopy Mean ± SD	T Value	P Value
Cost (In Rupees)	9840 ± 1187.78	15308 ± 462.78	21.447	<0.001



Graph 1: Presenting Complaints



Graph 2: Ultrasound Findings



Fig 1: Open appendectomy

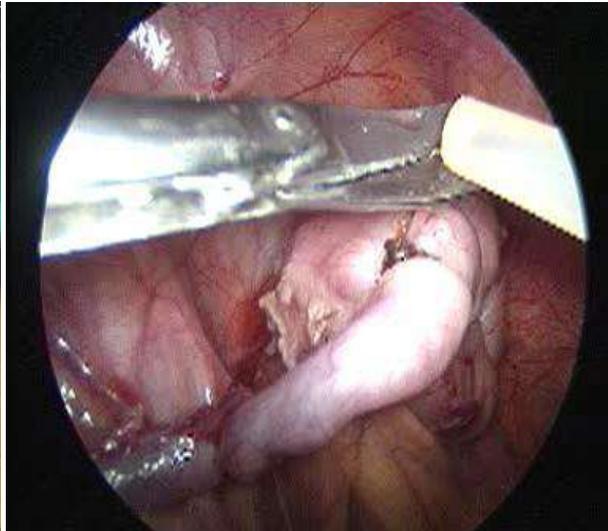


Fig 2: Laparoscopic appendectomy

Conclusion

The laparoscopic appendectomy was better than the open appendectomy with respect to pain score and lesser use of analgesics, post-operative complication like vomiting, ileus wound infection, fever. Postoperative recovery was good in respect with duration of hospital stay, return to normal work where as in terms of cost, Laparoscopic Appendectomy is costlier than Open Appendectomy. Overall laparoscopic appendectomy is better than appendectomy in selected patients with acute or recurrent appendicitis.

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