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LAPAROSCOPIC VERSUS OPEN APPENDICECTOMY: A SINGLE CENTER STUDY

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Abstract

Acute appendicitis is one of the commonest causes of acute abdomen encountered in surgical practice, requiring emergency surgery. Open appendicectomy by Grid Iron incision had been gold standard for many years. Laparoscopic technique provided an opportunity to explore new method of management of the suspected cases of the acute appendicitis.

This study is to compare laparoscopic and open appendicectomy in terms of intra-operative duration, complication of surgery and post operative outcome.

A total of 50 patients with clinical diagnosis of appendicitis were studied. After pre-operative work up, patients were randomly assigned for laparoscopic appendicectomy or open appendicectomy. All cases were observed in the intra- and post-operative period till they were discharged and then later followed up for a period of 4 weeks in the outpatient department.

A total of 25 patients assigned for laparoscopic appendectomy and 25 patients assigned for open appendectomy were analyzed. Majority of patients were male in 3rd or 4th decade of life and had acute appendicitis. There was statistically significant difference of duration of surgery, post-operative pain, duration of hospital stay and return to work in both the groups. There was statistically insignificant difference of post-operative complication in both the groups.

In conclusion, laparoscopic appendectomy is better than open appendectomy in a properly prepared and selected patient in terms of Duration of surgery, Post operative pain & need of analgesic, Post operative complications like wound infection, Duration of the postoperative hospital stay and Time period to return to work.

Keywords: Open Appendicectomy, Laparoscopic Appendicectomy, Visual Analogue Scale for Pain, Post-operative hospital stay.

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 appendicitis is 8.6% for men and 6.7% in women, with approximately 7% of all people undergoing appendicectomy for acute appendicitis during their lifetime. It has been said that nothing can be so simple yet too difficult as the diagnosis of acute appendicitis.

Open appendicectomy by Grid Iron incision had been gold standard for many years.

Laparoscopy is an efficient tool in the armamentarium of the surgeon to diagnose the patients of undiagnosed pain abdomen with numerous benefits and minimal complications [2].

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

Aim of study

To compare laparoscopic and open appendicectomy in terms of intra-operative duration, complication of surgery and post-operative outcome.

Patients and Methods

Source of Data: A total of 50 patients with clinical diagnosis of appendicitis admitted to the department of General Surgery, Rabindra Nath Tagore Medical College, Udaipur, Rajasthan, India during January 2020 to December 2020 were studied.

Patient selection criteria: *Inclusion Criteria*

1. Patient presenting with signs and symptoms of appendicitis in which appendicectomy was performed
2. Age more than 10 years

Exclusion Criteria

1. Generalized peritonitis
2. Appendicular mass /abscess
3. Pregnancy
4. Associated co-morbid conditions

Study type – Prospective randomized study.

Methodology: After pre-operative work up, patients were randomly assigned for laparoscopic appendicectomy or open appendicectomy (25 in each group).

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

The following parameters were observed in both the procedures -

1. Duration of procedure (Intra-operative duration)
2. Postoperative pain graded from 0 to 4 (visual analogue scale) assessed at the end of 24 hours post-operatively
3. Postoperative complications like wound infection or others
4. Post operative length of hospital stay in number of days
5. Return to the work after discharge from hospital in number of days
6. The conversion from laparoscopic to open appendicectomy if any

Post operative pain score was assessed at the end of 24 hours of surgery using the visual analogue scale.

The score was graded as:

1. Pain is absent
2. Pain is mild
3. Pain is moderate
4. Pain is severe

The pain was recorded by the patient perception. A pro-forma was used to collect the relevant information. Data was analyzed Using the Students t-test and Chi-square analysis and p value of <0.05 is considered Significant.

Results

A total of 25 patients assigned for laparoscopic appendectomy and 25 patients assigned for open appendectomy were analyzed.

In the study, 17 (68%) males and 8 (32%) females underwent laparoscopic appendectomy; and 16 (64%) males and 9 (36%) females underwent open appendectomy.

The mean age for patients undergoing laparoscopic appendectomy was 30.96 years and open appendectomy was 25.2 years. Majority of cases in both groups were from 3rd and 4th decade. (Table 1)

Table (1): Distribution according to Age

Age	Lap. Appendicectomy		Open Appendicectomy	
	N	%	N	%
≤20	2	8%	9	36%
21-30	12	48%	9	36%
31-40	7	28%	5	20%
41-50	4	16%	2	8%
Total	25	100%	25	100%

Most of the patients from both the groups had acute appendicitis. (Table 2)

Table (2): Distribution according to Pathology of Appendix

Pathology	Lap. Appendicectomy		Open Appendicectomy	
	N	%	N	%
Acute appendicitis	23	92%	20	80%
Perforation	1	4%	3	12%
Gangrenous	1	4%	2	8%
Total	25	100%	25	100%

The mean score for duration of time of surgery was 29.6 minutes in the laparoscopic group and 45.48 minutes in the open group. The difference was statistically significant (P=0.00). (Table 3)

Table (3): Duration of Surgery

Type of surgery	N	Mean	Std. Deviation
Lap. Appendicectomy	25	29.6	3.90
Open Appendicectomy	25	45.48	6.09
Standard error mean	1.477		
P value	0.00		

The mean pain score was 1.36±0.48 in the laparoscopic group. The mean pain score in the open group is 3.24±0.81. The difference was statistically significant (P=0.00). (Table 4)

Table (4): Distribution according to Postoperative Pain Score

Postoperative Pain Score	Lap. Appendicectomy		Open Appendicectomy		Chi Sq Test	P value
	N	%	N	%		
I	16	64%	0	0%	35.600	0.000
II	9	36%	6	24%		
III	0	0%	7	28%		
IV	0	0%	12	48%		
Total	25	100%	25	100%		

Mean number of dosages of analgesics for those who underwent laparoscopic appendicectomy was found to be 3.12 and mean number of dosages of analgesics for those who underwent open appendicectomy was 5.6. Chi square value was 35.170, p value is found to be 0.000 which was statistically significant. (Table 5)

Table (5): Amount of analgesics used (number of dosage)

	N	Mean	S.D.	Chi-square test	P
Lap. Appendicectomy	25	3.12	0.81	35.170	0.000
Open Appendicectomy	25	5.6	1.17		

Four patients in the laparoscopic group (16%) and 7 patients in the open group (28%) had post-operative complication (wound infection). The difference of was statistically non-significant (p>0.05). (Table 6)

Table (6): Distribution according to Postoperative Complication (Wound infection)

Postoperative Complication	Lap. Appendicectomy		Open Appendicectomy		Chi Sq Test	P value
	N	%	N	%		
Absent	21	84%	18	72%	1.049	0.306
Present	4	16%	7	28%		
Total	25	100%	25	100%		

The mean post operative hospital stay score was 1.96 days in the laparoscopic group and 2.92 days in the open group .The parameter difference was statistically significant (p< 0.05). (Table 7)

Table (7): Postoperative Hospital Stay Score (Number of days)

Type of surgery	N	Mean	Std. Deviation
Lap. Appendicectomy	25	1.96	0.66
Open Appendicectomy	25	2.92	0.79
Standard error mean	0.211		
P value	0.000		

The mean score return to work after discharge from hospital was 8.32 days in laparoscopic and 12.32 days in open group. The difference was statistically significant (P=0.007). (Table 8)

Table (8): Time Period to Return to Work (number of days)

Type of surgery	N	Mean	Std. Deviation
Lap. Appendicectomy	25	8.32	2.78
Open Appendicectomy	25	12.32	6.37
Standard error mean	1.419		
P value	0.007		

In laparoscopic group, 2 cases (8%) needed conversion to open due to difficulty in mobilization and delineation of appendix in perforated and gangrenous appendix (1 case each).

Discussion

The pathology report was acute appendicitis as the majority in both the groups with 92% in laparoscopic appendicectomy and 80% in open appendicectomy while the incidence of other pathologies like gangrenous appendicitis and appendicular perforation were 4% in laparoscopic appendicectomy& 8% in open appendicectomy and 4% in laparoscopic appendicectomy & 12% in open appendicectomy respectively.

Post operative pain score was assessed at the end of 24 hours of surgery using the visual analogue scale [4]. In our study, the mean post operative pain score was recorded at the end of 24 hours for laparoscopic appendectomy was 1.36±0.48 and for open appendectomy it was 3.24±0.81. The parameter difference is statistically significant (p<0.0001). The long incision in open appendectomy and stretch of muscles during open procedure leads to this difference. Similar other studies like Hart R et al and Ortega et al was supported in favor in terms of post

operative pain score. Mean post operative pain score of laparoscopic was 2.25 and for open it was 3.01 in Hart R et al study [5]. Mean post operative pain score of laparoscopic was 2.01 and for open it was 3.25 in Ortega et al study [6].

Analgesics had to be given for the postoperative pain till patient did not complaint of any further pain. It was observed that pain was more in intensity and sustained more for patient who underwent open appendicectomy than those who underwent laparoscopic appendicectomy. Mean number of dosages for those who underwent open appendicectomy was found to be 5.6 and mean number of dosages for those who underwent laparoscopic appendicectomy was 3.12. Chi square value was found to be 35.17. P value was found to be 0.000 which was found to be statistically significant.

Complication in post operative period (wound infection) was present in 7 cases of open appendicectomy as compared to 4 cases in laparoscopic appendicectomy. Chi square value was found to be 1.049 and p value was found to be 0.306 which was found to be insignificant.

Several studies like Ortega AE et al6, Geetha KR et al [7] was supported in favor of laparoscopic group in terms of wound infection.

Number of cases had post operative wound infection in Ortega AE et al study [6] for open group was 11 and laparoscopic group was 4. Number of cases had post operative wound infection in Geeta KR et al study for open group was 11 and laparoscopic group was 0.7.

In the present study mean duration of the procedure in minutes was found to be 45.48 for open appendicectomy and 29.6 for laparoscopic appendicectomy. This was found to be comparable to the study conducted by Namir Katchouda, Rodney J Mason conducted at University of Southern California Medical Centre. In their study it was found that it took 60 minutes for the laparoscopic appendectomy group and 80 minutes for open appendectomy [8].

In our study, the mean hospital stay was 1.96 days in the laparoscopic group and 2.92 days in the open group. The difference was statistically significant ($p<0.0001$). The study shows that mean hospital stay was lower in the laparoscopic group which is very important in developing countries where most of them are on daily wages. Several studies like Attwood se et al, Yong JE et al, Geetha KR et al, and Wei B et al are in favor for laparoscopic group in terms of hospital stay. The mean hospital stay score was 3.31 days in the laparoscopic group and 4.36 days in the open group in Geetha KR et al study [7]. The mean hospital stay score was 3 days in the laparoscopic and 4 days in the open group in Young JE et al study [9]. The mean hospital stay score was 2.5 days in the laparoscopic group and 3.8 days in the open group in Attwood se et al study [10]. The mean hospital stay score was 4.1 days in the laparoscopic group and 7.2 days in the open group in Wei B hung et al study [11].

In the study, the mean score for return to work after discharge from hospital was 8.32 days in the laparoscopic and 12.32 days in the open group. The parameter was statistically significant ($p<0.0001$). The study shows that return to work was quicker in laparoscopic group compared to open group. Studies by Ortega AE et al, Geetha KR et al and Wei B et al are in favor of laparoscopic group in terms of return to work category. The mean score for return to work was 9 days in the laparoscopic group and 14 days in the open group in Ortega AE et al study [6]. The mean score for return to work was 13.86 days in the laparoscopic group and 19.44 days in the open group in Geetha KR et al study.7 The mean score for return to work was 9.1 days in the laparoscopic group and 13.7 days in the open group in Wei B et al study [11].

Conclusion

Laparoscopic appendectomy is better than open appendectomy in a properly prepared and selected patient in terms of

- Duration of surgery
- Post operative pain score and need of analgisic
- Post operative complications like wound infection
- Duration of the postoperative hospital stay
- Time period to return to work after discharge from hospital

However, as this was a small, single center study; further studies are required to establish the statement.

Authership & conflect of interest

This is to verify authership of this article and there is no conflect of interest in any way.

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