

Original Research Article

Effectiveness of laparoscopic appendectomy over open appendectomy in a tertiary care centre: a retrospective study

Gardas Akshitha*, Morthala Venkata Reddy, Anusha Ananthula

Department of Surgery, Mamata Medical College, Khammam, Telangana, India

Received: 17 January 2023

Revised: 20 February 2023

Accepted: 03 March 2023

*Correspondence:

Dr. Gardas Akshitha,

E-mail: akshithagardas1993@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Acute abdomen is the most common surgical clinical entity. Appendectomy is the treatment of choice for acute appendicitis. It can be done by open or laparoscopic method. Laparoscopic appendectomy gives a better evaluation of the peritoneal cavity than that obtained by open approach and also facilitates other differential diagnosis.

Methods: Patients admitted under surgical unit from December 2020 to June 2022, at Mamata Medical College and Hospital, Khammam. A study was carried out on 100 patients were admitted with 50 patients undergoing laparoscopic appendectomy and the remaining 50 patients undergoing open appendectomy. In both study groups the outcome was assessed based on the intra operative finding, operative time, post-operative recovery, post-operative complications, and length of hospital stay.

Results: Findings of the patients undergoing open and laparoscopic appendectomy were compared and recorded. After analysing the data, there were significant differences between the two procedures with laparoscopic appendectomy being better in respect to post operative pain perception, duration of analgesics used in days, postoperative infection, postoperative bleeding, post operative duration of hospital stay days and return to normal work in days with p value being significant.

Conclusions: The laparoscopic appendectomy was better than open appendectomy with respect to pain score, lesser use of analgesics, post operative complications like vomiting, ileus and wound infection rate. Only drawback of laparoscopic appendectomy was with the duration of surgery. Overall laparoscopic appendectomy is better than open appendectomy in selected patients with acute/recurrent appendicitis.

Keywords: Appendicitis, Laparoscopic appendectomy, Open appendectomy

INTRODUCTION

Acute abdomen is the most common surgical clinical entity.¹ Acute appendicitis is the most common intra-abdominal condition requiring emergency surgery and carries a life time risk of 6% to 7%.² The incidence of acute appendicitis is highest in the second and third decades of life, but the condition occurs in all age groups.

Appendectomy is the most commonly performed surgery and accounts for about 6% of all the surgical procedures in the world. The risk of developing appendicitis through the life time is approximately 8.6% for male and 6.7% for

females. Appendectomy is the treatment of choice for acute appendicitis. It can be done either by open or laparoscopic method.

For more than a century, open appendectomy remained the gold standard for the treatment of acute appendicitis. The introduction of laparoscopic surgery has dramatically changed the field of surgery.³ It is now time to recommend this minimal access technique in treatment of acute appendicitis. Laparoscopic appendectomy gives a better evaluation of the peritoneal cavity than that obtained by open approach and also facilitates other differential diagnosis.⁴

Advantages of laparoscopic approach include less operative time, less postoperative pain, reduced analgesia and less surgery related complications, shorter hospital stay, faster recovery, reduced wound infection, and minimal scarring. The laparoscopic appendectomy is increasingly employed, particularly in young women of child bearing age group in whom the differential diagnosis of lower quadrant pain is extensive and includes gynecological problems.⁵

Hence this study compares the effectiveness of laparoscopic approach for appendectomy over open appendectomy in terms of post operative pain, duration of procedure, post op infection, post op return to work, post op infection, post op bleeding.

METHODS

Patients admitted under surgical unit from December 2020 to June 2022, at Mamata Medical college and Hospital, Khammam. A study was carried out on 100 patients were admitted with 50 patients undergoing laparoscopic appendectomy and the remaining 50 patients undergoing open appendectomy. In both study groups the outcome was assessed based on the intra operative finding, operative time, post-operative recovery, post-operative complication, and length of hospital stay.

Aims and objectives

To compare the effectiveness of laparoscopic appendectomy over open surgical technique with respect to duration of surgery, post operative complications, requirement of analgesia, time to oral intake, cost effectiveness and cosmetic outcome.

Patients and methods

It was a prospective comparative study that took place for a period of 24 months, October 2019 to September 2021 at the department of general surgery, Mamata General Hospital, Khammam, Telangana.

Sample size

100 patients were included in the study with 50 in each group (group I- open appendectomy, group II- laparoscopic appendectomy).

Inclusion criteria

Age >18 years, irrespective of sex. Patients with clinical diagnosis of acute or recurrent appendicitis. Emergency as well as elective cases posted for appendectomy. Patients willing to participate in the study.

Exclusion criteria

Age <18 years. Pregnant women. Patients with severe medical co-morbidities (hemodynamic instability,

chronic medical or psychiatric illness, cirrhosis, coagulation disorders) requiring intensive care. Patients with any pathology other than appendicitis recognized per-operatively. Patients with laparoscopic converted to open. Patients not willing to participate in the study.

Method of collection of data

A prospective observational study was planned in Department of General surgery after obtaining clearance from Institute Ethical committee (IEC). Patients presenting with pain abdomen and pain in the right iliac fossa were admitted in surgery ward.

They were evaluated with history, clinical examination on the basis of inclusion and exclusion criteria. Routine workup investigations and appropriate radiological investigations like Ultrasonography of abdomen were done in all patients. Most cases were diagnosed based on clinical features and ultrasonographic evidence of appendicular mass. Specific investigation like CECT (contrast enhanced CT scan) abdomen was done only in distinguishing those patients who presented late in their clinical course to demonstrate the ruptured appendix and also to rule out other differential diagnosis of right iliac fossa mass like ileocecal tuberculosis, intussusception, carcinoma caecum etc. Patients and relatives were discussed in detail about the management plan. They were explained about merits and demerits of surgical approach.

A prior informed written consent was taken from patient and relatives before randomizing them into two groups. For randomization 50 sealed envelopes were prepared each containing token number. Patients were asked to pick an envelope to categorize into two study groups. The patients with even number token were included under group-I who were taken for open appendectomy and group-II who were taken for laparoscopic appendectomy. In both study groups the outcome was assessed based on the intra operative finding, operative time, post-operative recovery, post-operative complication, and length of hospital stay. All the relevant data was collected in the performa designed for the study. The data regarding patient profile, diagnosis, investigations, and surgical procedures were collected in a performa and transferred to a master chart in Microsoft Excel sheet.

Prior initiation of the study obtained clearance from Ethical and Research Committee in Mamata Medical College, Khammam.

Statistical analysis

Presented proforma was used to collect the relevant information, and chi-square test and student t-test, were used for analysis. IBM SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, N.Y., USA) software program was used for statistical calculations. If $p < 0.005$ it was considered statistically significant.

RESULTS

A prospective observational study was conducted on 100 cases of appendicitis which were divided in two groups, each containing fifty.

Age wise distribution

In the study, 12 cases (40%) below 20 years, 8 cases (26.8%) between 21 and 30 years, 5 cases (16.6%) between 31 and 40 years and 5 cases (16.6%) between 41 and 50 years underwent laparoscopic appendectomy. 8 cases (26.6%) below 20 years, 11 cases (36.8%) between 21 and 30 years, 2 cases (6.6%) between 31 and 40 years and 9 cases (30%) between 41 and 50 years underwent open appendectomy have been depicted in Table 1.

Table 1: Age distribution.

Age (years)	Laparoscopy		Open		χ^2 test	P value
	N	%	N	%		
<20	12	40	8	26.6	2.64	0.01
21-30	8	26.8	11	36.8		
31-40	5	16.6	2	6.6		
41-50	5	16.6	9	30		
Total	30	100	30	100		

Gender wise distribution

In the study, 18 (60%) males and 12 (40%) females underwent laparoscopic appendectomy. 20 (66.6%) males and 10 (33.4%) females underwent open appendectomy which have been depicted in Table 2.

Table 2: Gender wise distribution.

Sex	Laparoscopy		Open		χ^2 test	P value
	N	%	N	%		
Male	18	60	20	66.6	3.91	0.01
Female	12	40	10	33.4		
Total	30	100	30	100		

Differential count

In the study, 26 (86.67%) patients in the laparoscopic group and 28 (93.4%) patients in the open group had differential count with shift to left depicted in Table 3.

Table 3: Differential count.

DC	Laparoscopy		Open		χ^2 test	P value
	N	%	N	%		
Absent	4	13.33	2	6.6	0.41	0.01
Present	26	86.67	28	93.4		
Total	30	100	30	100		

Ultrasound findings

In the study, 22 (73.4%) patients in laparoscopic and 21 (70%) patients in open group had inflamed appendix in USG which have been depicted in Table 4.

Table 4: Ultrasound findings.

USG	Laparoscopy		Open		χ^2 test	P value
	N	%	N	%		
Absent	8	26.6	9	30	0.09	0.01
Present	22	73.4	21	70		
Total	30	100	30	100		

Duration of surgery

The mean score for duration of time of surgery was 35.18 minutes in the laparoscopic group and 16.3 minutes in the open group. The difference was significant $p < 0.0001$ which is depicted in Table 5.

Post operative pain

In the study, the mean pain score was 1.25 ± 0.31 in the laparoscopic group. The mean pain score in the open group was 3.19 ± 0.629 . The difference was significant ($p < 0.0001$) which is depicted in Table 6.

Table 5: Duration of surgery.

Duration	Type of surgery	N	Mean	SD	SE	T value	P value
	Lap	30	35.18 minutes	10.119	2.162		
	Open	30	16.3 minutes	5.108	0.951	7.189	0.0001

Table 6: Post operative pain.

Pain	Laparoscopy		Open		Chi square test	P value
	N	%	N	%		
I	20	66.6	0	0	39.1	0.0001
II	10	33.4	5	16.7		
III	0	0	10	33.3		
IV	0	0	15	50		
Total	30	100	30	100		

Post operative infection

2 patients in the laparoscopic group (7.3%) and 10 patients in the open group (33.4%) have post op wound infection. The difference was significant $p < 0.01$ which is described in Table 7.

Table 7: Post operative infection.

Infection	Laparoscopy		Open		χ^2 test	P value
	N	%	N	%		
Absent	28	93.3	20	66.6	4.26	0.01
Present	2	7.3	10	33.4		
Total	30	100	30	100		

Post operative bleeding

No patients in the laparoscopic group and 9 patients in the open group (30%) have post operative bleeding. The difference was significant $p < 0.01$ which is depicted in Table 8.

Table 8: Post operative bleeding.

Bleeding	Laparoscopy		Open		χ^2 test	P value
	N	%	N	%		
Absent	30	100	21	70	3.16	0.01
Present	0	0	9	30		
Total	30	100	30	100		

Postoperative time taken to return to the work

The mean score return to work was 8.23 days in laparoscopic and 16.19 days in open group. The difference was significant $p < 0.0001$ which is described in Table 9.

Cosmetic outcome

In the study, cosmetic benefit difference found to be significant (0.001) which has been depicted in Table 10.

Table 9: Postoperative time taken to return to the work.

RW	Type of surgery	N	Mean (days)	Std. deviation	Std. error mean	T value	P value
	Lap	30	8.23	2.616	0.328	10.418	0.0001
	Open	30	16.19	2.858	0.612		

Table 10: Cosmetic outcome.

Cosmetic outcome	Laparoscopy		Open		Chi square test	P value
	N	%	N	%		
Unsatisfied	0	0	6	20	39.1	0.0001
Equal	2	0.6	8	26.6		
Satisfied	28	93.4	16	53.4		
Total	30	100	30	100		

DISCUSSION

Appendicitis is the most common intra-abdominal condition requiring emergency surgery. The possibility of appendicitis must be considered in any patient presenting with an acute abdomen, and a certain preoperative diagnosis is still a challenge.⁶

Although more than 20 years have elapsed since the introduction of laparoscopic appendectomy (performed in 1983 by Semm, a gynaecologist), open appendectomy is still the conventional technique. Some authors consider emergency laparoscopy as a promising tool for the treatment of abdominal emergencies able to decrease costs and invasiveness and maximize outcomes and patient comfort.⁷

Laparoscopic surgery is a major surgical advance that has enabled the general surgeon to stretch his hands in superspeciality era.⁸ The controversy that currently exists over the potential benefits of laparoscopic appendectomy motivated us to analyse our experience with this procedure.⁹ The relative advantages of laparoscopic and open appendectomy are measured primarily in terms of post operative pain score and duration of analgesics used in days.

The laparoscopic approach is a safe and efficient operative procedure in appendectomy and it provides clinically beneficial advantages over open method (including shorter hospital stay, decreased need for postoperative analgesia, early food tolerance, earlier return to work, lower rate of wound infection) against only marginally higher hospital costs.¹⁰

Comparison of age distribution

In the present study of 100 cases mean age was 31 years in both group-I and group-II. This finding was comparable with the study of Biondi et al where the mean age was 29.66 years in group-I and in group-II the mean age was 27.75.¹⁰ Katkhouda et al in their study observed the mean age was 28 years in group-I and in group-II the mean age was 29 years. Likewise, Özsan et al in their study observed the mean age was 29.12 years in group-I and in group-II the mean age was 32.2 years which were comparable to the present study.¹²

Comparison of gender incidence

In the present study of 100 cases, the gender proportion (male:female) in group-I was 16:9 and in group-II it was 17:8. This finding was comparable with the observation of Biondi et al, who reported the gender incidence (male:female) 16:11 in group-I and 23:24 in group-II.¹⁰ Katkhouda et al, in their study detailed the gender incidence (male:female) 10:8 in group-I and 17:15 in group-II.¹¹ Özsan et al, found the gender incidence (male:female) 18:16 in group-I and 14:9 in group-II which were comparable to the present study.

Comparison of presenting symptoms

In the present study most common presenting symptom was pain abdomen (100%) in both the groups, followed by symptom of vomiting (76%) in group-I and (80%) in group-II, symptom of nausea (68%) in both the groups and symptom of anorexia (32%) in group-I and (60%) in group-II. These results are comparable to the study conducted by following authors:

Biondi et al, the most common presenting symptom in both the groups was pain abdomen (100%), followed by symptom of vomiting (70%) in group-I and (75%) in group-II, symptom of nausea (64%) in group-I and (69%) in group-II, symptom of anorexia (34%) in group-I and (62%) in group-II.

Katkhouda et al, the most common presenting symptom was pain abdomen (100%) in both the groups, followed by symptom of vomiting (44.6%) in group-I and (52%) in group-II, symptom of anorexia (40%) in group-I and (30%) in group-II, symptom of nausea (30%) in group-I and (71%) in group-II.¹⁴

Comparison of total leucocyte count

In the present study of 100 cases, group-I the mean TLC was 8926.44 mm³ and in group-II the TLC was 11200 mm³. This finding was comparable with study of Biondi et al who reported the mean TLC in group-I was 14903 mm³ and in group-II the TLC was 13346 mm³. Katkhouda et al in their study reported the mean TLC in group-I was 15400 mm³ and in group-II the TLC was 15400 mm³, Özsan et al reported the mean TLC in group-

I was 12957 mm³ and in group-II the TLC was 13361 mm³.

Comparison of duration of hospital stay

In present study of 100 cases the mean duration of Hospital stay was 8.12 days in group-I, 2.51 days in group-II. The results are comparable with the study conducted by Biondi et al in their study the mean duration of hospital stay was 2.7 days in group-I and 1.4 days in group-II.¹⁰ Katkhouda et al in their study the mean duration of Hospital stay was 3 days in group-I and 2 days in group-II.¹¹ Özsan et al in their study the mean duration of hospital stay was 10.4 days in group-I, 8.1 days in group-II A and 4.3 days in group-II B.

Comparison of outcome

In the present study of 100 cases, in group-I the time of oral diet was 24-48 hours and in group-II it was 5-6 days, the complication rate in group-I was 40% and 13% in group-II. 24% of patients presented with SSI in group-I and 6.6% in group-II. The mean duration of hospital stay was 8.2 days in group-I and 12.26 days in group-II. 3 patients in group-I were readmitted in the hospital within 30 days of post-operative period and 2 patients in group-II readmitted in the hospital within 30 days due to recurrence of symptoms. These final results are comparable with study conducted by Biondi et al reported that the time of oral diet in group-I was 24 hours and in group-II it was 4-5 days, the complication rate in group-I was 15% and 10% in group-II. SSI was seen in 6% in group-I and 5% in group-II.¹⁰

The mean duration of 72 hospital stay was 10 days in group-I and 12 days in group-II. 4 patients in group-I were readmitted in the hospital within 30 days of post-operative period and 5 patients in group-II readmitted in the hospital within 30 days due to recurrence of symptoms.

There were few limitations of the study. The sample size in the present study was small (n=50), it was an observational study, It was a single institutional study.

CONCLUSION

On analysing the data, we found a definite difference in outcome between open and laparoscopic appendectomy in consecutively selected patients. The laparoscopic appendectomy was better than the open appendectomy with respect to pain score, lesser use of analgesics, post operative complications like vomiting, ileus and wound infection rate. Post operative recovery was good in respect with duration of hospital stay, return to normal work. The only drawback of laparoscopic appendectomy was with the duration of surgery. However, with the above-mentioned advantages outweighs the time drawback for laparoscopic appendectomy. Overall laparoscopic appendectomy is

better than open appendectomy in selected patients with acute or recurrent appendicitis.

Funding: No funding sources

Conflict of interest: None declared

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

REFERENCES

1. Guller U, Hervey S, Purver H, Muhlbaier L, Peterson E, Eubanks S, al. Laparoscopic database. Ann Surg. 2004;239:43-52.
2. Telfor G, Wallace J. Appendix. In: Morris PJ, Wood WC, eds. Oxford text book of surgery, 2nd edn. Vol. 2. Oxford Medical Publications; 2000:180-189.
3. Palanivelu C. Laparoscopic appendectomy. In: Text book of surgical laparoscopy. Shrinivas Fine Art Limited; 2002:411-424.
4. Ioannis V, Constantinos F. Comparison between open and laparoscopic appendectomy: a systematic review. World J Surg Surg Res. 2018;1:1004.
5. Russell RCG, Williams NS, Bulstrode CJK. The vermiform appendix. In: Bailey and Love's Short Practice of Surgery. 25th edn. Arnold Publication; 2004:1204-1218.
6. Seqsaqa M, Rozeik AE, Khalifa M, Ashri HN. Laparoscopic versus open appendectomy in complicated appendicitis in children: a single center study. Egypt Pediatr Assoc Gazette. 2020;68:1-5.
7. Nazir A, Farooqi SA, Chaudhary NA, Bhatti HW, Waqar M, Sadiq A. Comparison of open appendectomy and laparoscopic appendectomy in perforated appendicitis. Cureus. 2019;11(7).
8. Lally KP, Cox CS, Andrassy RJ. Appendix. In: Townsend MC, Beanchamp RD, Evers BM, Mattox KL, eds. Sabiston Text Book of Surgery, 18th edn. W.B. Saunders Company Prism Books (Pvt) Ltd; 2001:917-928.
9. Southgate E, Vousden N, Karthikesalingam A, Markar SR, Black S, Zaidi A. Laparoscopic versus open appendectomy in older patients. Arch Surg. 2012;147(6):557-62.
10. Kehagias I, Karamanakis SN, Panagiotopoulos S, Panagopoulos K, Kalfarentzos F. Laparoscopic versus open appendectomy: which way to go? World J Gastroenterol. 2008;14(31):4909.
11. Jaschinski T, Mosch CG, Eikermann M, Neugebauer EAM, Sauerland S. Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database Syst Rev. 2018;11:CD001546.
12. Pradhan S, Shakya YR, Batajoo H, Malla B, Joshi HN, Thapa LB, Makaju RK. Laparoscopic versus open appendectomy: a prospective comparative study. J Soc Surg Nepal. 2015;18(2):29-32.
13. Nguyen NT, Zainabadi K, Mavandadi S, Paya M, Stevens CM, Root J, et al. Trends in utilization and outcomes of laparoscopic versus open appendectomy. Am J Surg. 2004;188(6):813-20.
14. Waleđziak M, Lasek A, Wysocki M, Su M, Bobowicz M, Myśliwiec P, et al. Risk factors for serious morbidity, prolonged length of stay and hospital readmission after laparoscopic appendectomy-results from Pol-LA (Polish laparoscopic appendectomy) multicenter large cohort study. Scient Rep. 2019;9(1):1-9.

Cite this article as: Akshitha G, Reddy MV, Ananthula A. Effectiveness of laparoscopic appendectomy over open appendectomy in a tertiary care centre- a retrospective study. Int Surg J 2023;10:614-9.