

Prospective study on Comparison of Laparoscopic appendectomy versus Open Appendectomy

¹Dr. Abhinaya L. E., Final Post Graduate, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

²Prof Dr. A. Anvar Ali M.S., Professor and Chief, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

³Dr. Prema M.S., Associate Professor, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

⁴Dr. Jayaraman.M.S., Assistant Professor, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

Corresponding Author: Prof Dr. A. Anvar Ali M.S., Professor and Chief, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

How to citation this article: Dr. Abhinaya L. E., Prof Dr. A. Anvar Ali M.S., Dr. Prema M.S., Dr. Jayaraman. M. S., “Prospective study on Comparison of Laparoscopic appendectomy versus Open Appendectomy”, IJMACR- January – February - 2022, Vol – 5, Issue - 1, P. No. 08 – 14.

Copyright: © 2022, Dr. Abhinaya L. E., et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License 4.0. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: Appendicitis continues to be one of the commonest causes of acute abdominal pain requiring surgical management. The surgical appendectomy can either be done by open method or the minimally invasive laparoscopic method. Both the approaches have their own merits and pitfalls.

Aims: To compare open and laparoscopic appendectomy in terms of operating time, post-operative pain, time taken to resume oral fluids, rate of wound infection, duration of hospital stay and time taken to resume routine work.

Study Design: This is a prospective study done between October 2019 to September 2021 which includes 50 patients undergoing open appendectomy and 50 patients

undergoing laparoscopic appendectomy for appendicitis, admitted in RMMCH – Rajah Muthiah Medical College Hospital, Chidambaram.

Results

- **Operating Time:** Laparoscopic appendectomy takes longer operating time when compared to open appendectomy
- **Post-Operative Pain:** Patients undergoing laparoscopic appendectomy have lesser post-operative pain when compared to open appendectomy group.
- **Time Taken To Resume Oral Liquids:** Patients undergoing laparoscopic appendectomy are started

on oral liquids earlier when compared to patients undergoing open appendectomy

- **Rate of Wound Infection:** It is lesser in the laparoscopic group when compared to the open group
- **Duration of Hospital Stay:** Laparoscopic appendectomy patients are discharged quicker than open appendectomy patients
- **Time Taken To Resume Routine Work:** Laparoscopically operated patients take lesser time to resume routine work or school when compared to the open group.

Conclusion: Even though laparoscopic appendectomy takes a longer operating time compared to the open appendectomy, laparoscopic group is better than open in all other aspects. Hence laparoscopic appendectomy is better than open appendectomy

Keywords: Appendicitis, Laparoscopic Appendectomy, Open Appendectomy, Wound infection

Introduction

Of all the intra-abdominal conditions requiring emergency surgery, appendicitis remains the commonest diagnosis worldwide, the lifetime risk of acquiring it being six percentage¹ and appendectomy accounting for 1 percentage of all general surgical procedures².

The mortality from appendectomy has reduced from 50 percentage (before 1925) to less than one in one hundred thousand in the current day. This is due to the modern diagnostic facilities, surgical skills and instruments, newer and higher antibiotics and advancements in anaesthesia. However the morbidity is 5 to 8 percentage. The factors attributing to these are post-operative wound infections occurring mainly due to delayed presentation of the patient, delayed diagnosis and treatment³.

Laparoscopic Appendectomy is both diagnostic and therapeutic in one procedure with less morbidity compared to open appendectomy⁴. In laparoscopic appendectomy patient has advantage of less post-operative complications, quicker return to routine work, better cosmesis and the ability for better peritoneal lavage without extending the incision as compared to open appendectomy⁵.

In women of child bearing age group, laparoscopic appendectomy has the advantage of confirming the diagnosis among the many other gynaecology related differential diagnoses⁶.

The current surgical world is shifting more towards minimally invasive advancements like laparoscopic and robotic surgeries. Hence surgeons are looking out for possible conversions to laparoscopic techniques in almost all intra-abdominal procedures, appendectomy being one of the basic among them⁷.

Aims And Objectives

To compare the efficacy of open and laparoscopic appendectomy in terms of the following parameters

- Operating time
- Post-operative pain
- Resumption of oral fluids
- Rate of wound infection
- Duration of hospital stay
- Time taken to resume routine work

Study Design

This is a prospective study done between October 2019 to September 2021 which includes 50 patients undergoing open appendectomy and 50 patients undergoing laparoscopic appendectomy for appendicitis, admitted in RMMCH – Rajah Muthaiah Medical College Hospital, Chidambaram.

Methodology

Patients who presented with abdominal pain, vomiting, fever, and on examination with tenderness in right iliac fossa with guarding or rigidity, were investigated with necessary investigation and were diagnosed of appendicitis were posted for surgery.

Open appendectomy were performed through a muscle splitting incision within the right iliac fossa. The bottom of the appendix was crushed ligated and stump of the appendix wasn't invigilated. Laparoscopic appendectomy were done employing a standardised approach involving a closed technique for trocar insertion and by 3 port technique. The appendix was divided after ligating the base. Appendix extraction was performed using trocar sleeve to safeguard the wound from contamination during removal. Duration of surgery taken for laparoscopic surgery was calculated from the time of port site incision to closure of the port site by suturing and for open is 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 outpatient department.

The following parameters were observed during follow up in comparison between two procedures post-operative pain using a visual analogue pain scale. Post-operative complications like vomiting and wound infection. Patients in both study groups were discharged as soon as possible and duration of stay in hospital and duration of analgesics used after surgery in number of days is noted. Wound infection was defined serous or pus discharge from the wound.

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

Observation And Results

One of the greatest advancements in modern surgical practice is the establishment of minimally invasive techniques including Laparoscopy. Surgeons today attempt to do all intra-abdominal surgical procedures laparoscopically. Many single institute randomised control trials have established laparoscopic procedures to be superior to open procedures, though a few studies go against this norm. In this study, we have done a comparative study among patients undergoing laparoscopic and open appendectomy for appendicitis, in a tertiary care hospital in a rural setting. In this study patients are compared with respect to operating time, post-operative pain, time taken to start oral fluids, rate of wound infection, duration of post-operative hospital stay and time taken to resume routine work.

Operating Time

Laparoscopic appendectomy has taken a mean of 69.5 ± 20.3 min and open appendectomy has taken a mean of 49.2 ± 12.4 min ($p < 0.001$). Similar observations have also been reported by other studies¹⁷. In almost all the studies in literature the operating time of laparoscopic appendectomy was found to be more than that of open appendectomy. In considering operating time, the exact identification of the timing of the start of the procedure and its conclusion vary. In general the time should be calculated from the insertion of first trocar to the end of skin suturing.

The laparoscopic procedures are more time consuming for the following reasons.

1. Inherent nature of slow manoeuvre of laparoscopic techniques

2. Time taken by careful slow insufflations.
3. Routine diagnostic laparoscopy before starting any laparoscopic procedure.

In our study the differences between the two means were found to be 20 minutes longer for the laparoscopic arm

Graph 1: Operating Time

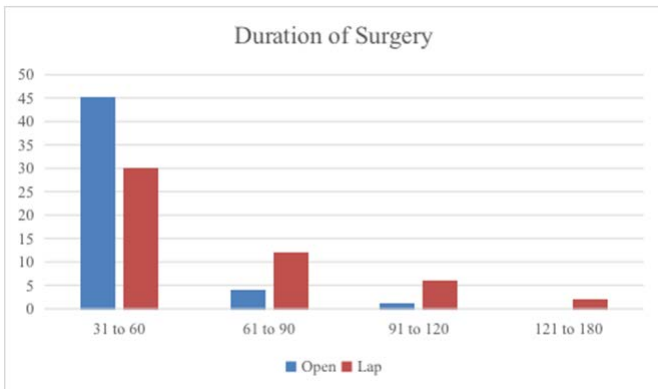


Table 1: Operating Time

Duration of surgery	open	lap
31- 60 min	45	30
61- 90min	4	12
91- 120 min	1	6
121- 180 min	0	2
MEAN	49.2± 12.4	69.5±20.3

Post-operative pain : In present study pain score was 2.7 ± 0.9 for open group as compared to 1.3 ± 0.5 in laparoscopic group ($P < 0.05$). This may be because of longer incision and stretch of muscles in the open arm. Similar observations have also been reported by other authors^{11,16,17}

It is proved that laparoscopic procedures cause less postoperative pain than their conventional counterparts.

Table 2: Post-Operative Pain Score

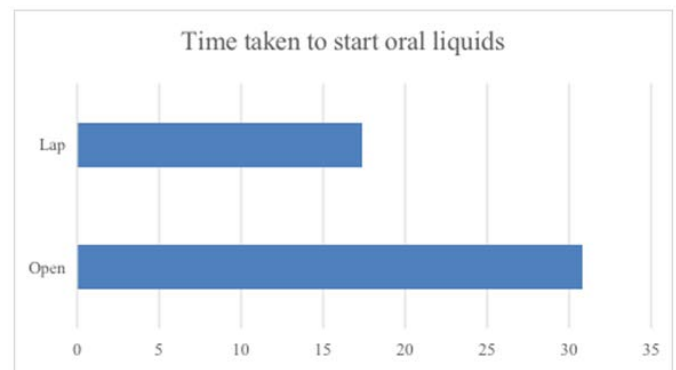
Details	Appendicectomy		Significance
	Open	Laparoscopic	T- value P- value
Pain Score (0-4)	2.7 score (±) 0.5	1.3 score (±) 0.5	6.94 <0.05sig*.

Graph 2: Post-Operative Pain Score by Visual Analogue Scale



Time taken to resume oral liquids : Post-operative complications like vomiting was lower in laparoscopic group with 8% as compared with 18% in open group ($P < 0.05$) and time taken to resume oral liquids was lower in laparoscopic group with 17.3 ± 7.1 and for open group 30.8 ± 8.9 with $P < 0.05$ which were significant. The similar studies done showed the incidence of emesis was lesser and time taken to resume oral liquids were lesser in laparoscopic group¹⁰.

Graph 3: Time Taken To Start Oral Liquids



Rate of wound infection

In present study there is significant reduction in incidence of post-operative wound infection in laparoscopic arm which is 4%, as compared to open group 16% ($P < 0.05$). A similar study done by others has also shown a significant reduction in wound infection rate^{9,10,11,12,14}

This is because with laparoscopic approach, the inflamed appendix was dissected without direct contact with the trocar wounds. Also, removal of the appendix was done completely within the trocar sheath, and there was no direct contact with the port opening. Also as the port site skin incisions are smaller, the wound infections are easier to control.

Table 3: Post-Operative Complications

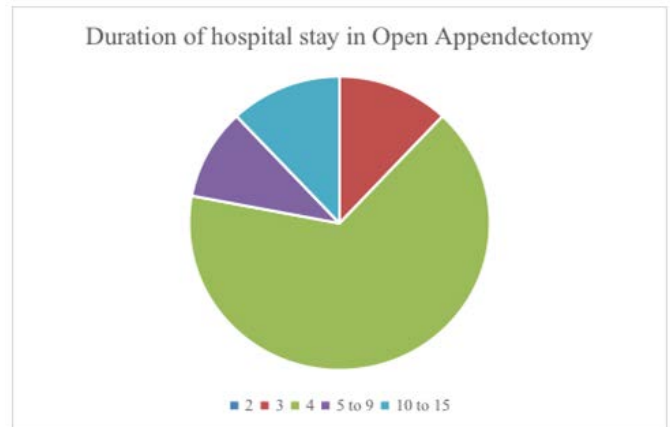
Complications	Open n (%)	Laparoscopic n(%)	Significance p-value
Vomiting	9(18)	4(8)	<.05, Sig*.
Wound Infection	8(16)	2(4)	<.05, Sig*.

Duration of hospital stay: It was significantly low for laparoscopic arm 2.8 ± 0.9 days as compared to open arm which is 4 ± 2.94 days. The longer hospital stay in open group compared to laparoscopic group also has been reported by others^{8,10,15}

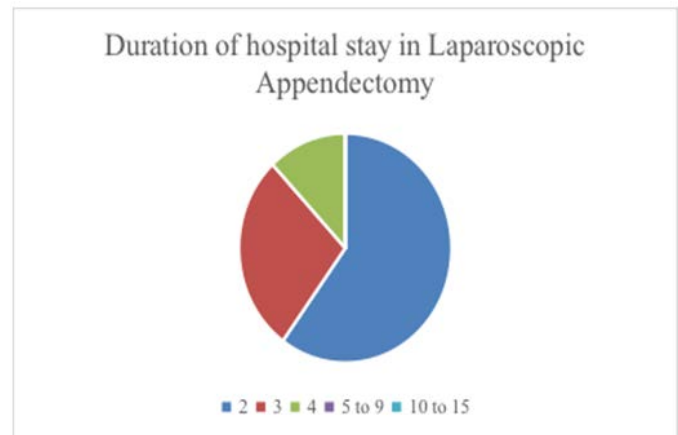
Table 4: Duration of Hospital Stay

Duration of hospital stay after surgery (days)	Appendicectomy	
	Open	Laparoscopy
1	0	0
2	0	30
3	6	14
4	33	6
5-9	5	0
10-15	6	0
MEAN	4 ± 2.94	2.52 ± 0.9
P value	<0.05	< 0.05

Graph 4: Duration of Hospital Stay in Open Appendectomy



Graph 5: Duration of Hospital Stay in Laparoscopic Appendectomy

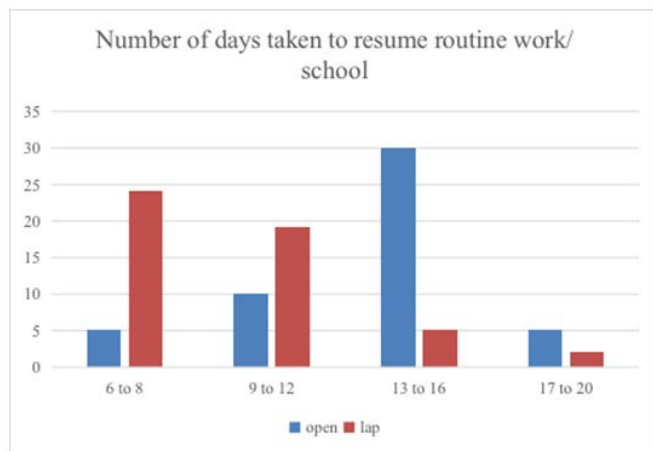


Time taken to resume routine work/school: The return to normal activity was early for laparoscopic group 8 ± 3.15 days as compared to open group 13.7 ± 3.15 days. Other studies have shown that laparoscopic group patients can return to normal work earlier^{10,11,12,13} It has been shown that those patients who underwent successful laparoscopic appendectomy have an improved postoperative recovery. The reduced trauma to the abdominal wall could be a significant factor in patients resuming work quicker in laparoscopic group

Table 5: Time Taken To Resume Routine Work/School

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

Graph 6: Number of Days Taken To Resume Routine Work.



Conclusion

In our study, we have compared open and laparoscopic appendectomy done for appendicitis in patients presenting to Rajah Muthaiah medical college hospital, Chidambaram as a single institute study in a tertiary care hospital in a rural setting. 50 patients undergoing open and 50 patients undergoing laparoscopic appendectomy were selected. The patients were compared in terms of operating time, post-operative pain, time taken to start oral liquids, rate of wound infection, duration of hospital stay and time taken to resume routine work. With all the analysis done, it is concluded that laparoscopic appendectomy takes a longer operating time compared to open appendectomy but it is better than open in terms of post-operative pain, oral liquids are started earlier in laparoscopic arm, rate of wound infection is lesser, duration of hospital stay is lesser and patients

undergoing laparoscopic appendectomy resume routine work earlier compared to open arm.

Hence from our study, laparoscopic appendectomy is better than open appendectomy.

References

1. Guller U, Hervey S, Purver H, Muhlbair L, Peterson E, Eubanks S, al. "Laparoscopic database" Ann Surg 2004;239:43-52.
2. Telfor G, Wallace J, "Appendix" chapter 13 in Oxford text book of surgery, Morris PJ., Wood WC., Eds. Vol.2, 2nd Edn, Oxford Medical Publications, 2000; 180-189.
3. Palanivelu C, "Laparoscopic appendectomy" chapter 53 in Text book of surgical laparoscopy, Shrinivas Fine Art Limited, 2002;411-424.
4. Britton J, Barr H, "Endoscopic Surgery". Chapter 13 in Oxford text book of Surgery, Morris PS, Malt RA Eds. Vol.1, 2ndEdn, Oxford Medical Publications, 1994; 847-862.
5. RussellRCG, WilliamsNS, BulstrodeCJK. "The vermiform appendix". Chapter 67 in short practice of surgery, Bailey and Love's 25thEdn, Arnold Publication 2004; 1204-1218.
6. Apeltgren KN, Cowan BND, Metcalf ANM and Carol EH, "Laparoscopic appendectomy and the management of gynecologic pathologic conditions found at laparoscopy for presumed appendicitis" in Surgical Clinics of North America, No.0, and June 1996;76:469-482.
7. Eubanks S, Schaver PR, "Laparoscopic Surgery" Chapter 27 in Text book of Surgery, 15thEdn, Sabistan DC, Kirn H, Lyery, Eds. W.B.Saunders Company Prism Books (Pvt)Ltd.1997;791-807.

8. McAnena OJ, Austin O, O'Connell PR, Hederman WP, Gorey TF, Fitzpatrick J, "Laparoscopic versus open appendectomy: a prospective evaluation" *Br J Surg*, August 1992;79:818-820.
9. Tate JJT, Chung SCS, Dawson J, Leong HT, Chan A, Lau WY, et al, "Conventional versus laparoscopic surgery for acute appendicitis" *Br J Surg*. June 1993;80:761-762.
10. Ortega AE, Hunter JG, Peters JH, Swantrom LL, Schirmer B, "A prospective randomized comparison of laparoscopic appendectomy with open appendectomy." *Am J Surg*. 1995;169:208-273
11. Chung RS, Rowland Dy, Paul Li, Diaz J, Clevelan, Ohio, "A meta analysis of Randomized controlled trials of laparoscopic versus conventional appendectomy," *Am JSurg*, 1999;177:250-256.
12. Pedersen AG, Petersen OB, Wara P, Ronnjng H, Qvist N and Laurberg S, "Randomized clinical trial of laparoscopic versus open appendectomy" *Br J Surg*. 2001;88:200-205.
13. Moberg AC, Berndsen F, Palmquist I, Petersson U, Resch T and Montgomery A., "Randomized clinical trial of laparoscopic versus open appendectomy for conformed appendicitis" *Br JSurg*. 2005;92:298-304.
14. Mehoff AM, Merhoff GC., Falls K., Oregon, Franklin ME., San Antonio., and "Laparoscopic versus open Appendectomy" *Am J Surg*. 2000;179:375-378.
15. Martin LC., Puente I, Sosa JL, Bassn A, Breslaw R, McKenneyMC, et al, "Open versus Laparoscopic Appendectomy A Prospective Randomized Comparison", 1995;22(3):256-262.
16. Minne L, Varner D, Burnell A, Ratzler E, Clark J, Haun W, "Laparoscopic vs Open Appendectomy Prospective Randomized Study of outcome", *Arch Surg*, 1997;132:708-712.
17. RK Mishra, GB Hanna, A Cuschieri "Laparoscopic versus Open Appendectomy for the Treatment of Acute Appendicitis" *World Journal of Laparoscopic Surgery*, January-April 2008;1(1):19-28.