

A Comparative Study of Laparoscopic Appendicectomy and Open Appendicectomy

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Abstract

Introduction: Appendicitis is one of the most common intra-abdominal condition requiring surgery. It has a lifetime risk of 6%.¹ Appendicectomy continues to be one of the commonest procedures in general surgery which accounts for approximately 1% of all surgical operation.² Laparoscopic appendicectomy has the advantage of diagnosis and treatment in one procedure with least morbidity. Critics of laparoscopic appendicectomy often point to the increased cost of the surgical equipments as a major disadvantage of this procedure. Despite these concerns, however the cost effectiveness for the laparoscopic appendicectomy is easily realized once the decreased hospital stay and entire patient convalescence period are accounted for.

Materials and Methods: During the period of study from 1st July 2021 to 30th June 2022, 60 patients with diagnosis of acute appendicitis admitted in Department of Surgery, GMCH were taken up for the purpose of the study. Appropriate haematological and radiological investigations were done as required.

Results and Observations: Our study population comprised of 60 patients with acute appendicitis out of which 32 patients were Male (53.3%) and 28 patients were Female (46.6%). Majority of the patients (38%) were observed to be in the age group of 21-30 years. Mean operating time between open and laparoscopy group was mean/standard deviation of 66/30.15 min and 50/17.39 min respectively. And average postoperative hospital stay was 4.1 days in open and 3.1 days in laparoscopic group. Return to normal activity was early for laparoscopic group 8 +/- 3.15 days as compared to open group 13.7 +/- 3.15 days.

Conclusion: From the study it is proved that Laparoscopic appendicectomy was better than open appendicectomy with respect to surgery duration, pain duration, early oral feed, lesser use of analgesics, post operative complications like vomiting, ileus and wound infection rate, duration of hospital stay and return to normal work.

Keywords: Acute Appendicitis, Laparoscopic appendicectomy, open appendicectomy.

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I. Introduction

Appendicitis is one of the most common intra-abdominal condition requiring surgery. It has a lifetime risk of 6%. Appendicectomy continues to be one of the commonest procedures in general surgery which accounts for approximately 1% of all surgical operation. Laparoscopic appendicectomy was first described by Kurt Semm in 1981. It is rare in infancy and elderly but common in teens, children and young adults. Appendicitis is much less common in underdeveloped countries, suggesting that elements of the western diet, specifically a low fibre, high-fat intake, may play a role in the development of the disease process. Modern diagnostic facilities, surgery skills, fluids and antibiotic therapy have brought down the mortality from 50% (before 1925) to less than 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 has the advantage of diagnosis and treatment in one procedure with least morbidity. Patients are likely to have less postoperative pain and decreased hospital stay and return to daily activities sooner than those who have undergone open appendicectomy. 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. Critics of laparoscopic appendicectomy often point to the increased cost of the surgical equipments as a major disadvantage of this procedure. Despite these concerns, however the cost effectiveness for the laparoscopic appendicectomy is easily realized once the decreased hospital stay and entire patient convalescence period are accounted for. Laparoscopic appendicectomy is increasingly employed in young women of child-bearing age in whom the differential diagnosis of right lower quadrant pain is extensive and includes gynecologic pathology.

II. Aims And Objectives Of The Study

The aim of the study is to compare Laparoscopic procedure for appendicectomy with open appendicectomy with respect to :

- Duration of surgery.
- Post operative pain and duration of analgesic use.

PROCEDURE	MALE	FEMALE
OPEN APPENDICECTOMY(OA)	14	16
LAPAROSCOPIC APPENDICECTOMY(LA)	18	12

- Post operative Complications like vomiting, ileus, intra-abdominal abscess and wound infection.
- Post operative length of hospital stay.
- Time taken to return to resume routine work.

III. Materials And Methods

It is a prospective comparative study conducted in Gauhati Medical College and Hospital in the period of 1 year from 1st July 2021 to 30th June 2022, wherein, 60 patients with acute appendicitis admitted in Department of Surgery were taken up for the purpose of study.

INCLUSION CRITERIA

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

EXCLUSION CRITERIA

- Children <10Yrs.
- Pregnant women.
- Clinically appendicular mass.
- Appendicitis with visceral pathology which needs open surgery

IV.RESULTS AND OBSERVATIONS

SEX DISTRIBUTION

The male to female ratio for OA and LA was 1:0.8 and 1.5/1 respectively. Among the patients who underwent appendicectomy both (open and laproscopic), 53.3% were male and 46.6% were female.

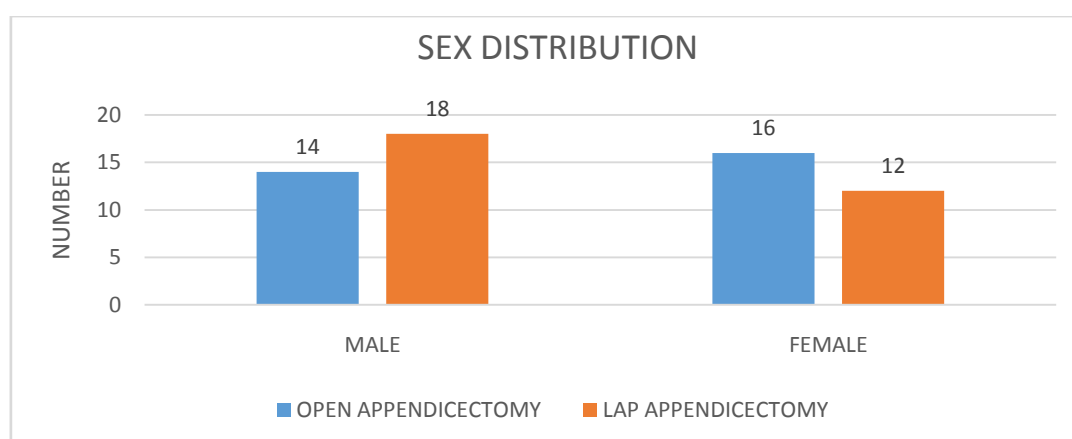


Figure: Sex Distribution

AGE DISTRIBUTION OF PATIENTS

Age in yrs	Open Appendicectomy	Lap Appendicectomy
10-20	14	8
21-30	8	15
31-40	4	6

41-50	3	1
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The age distribution was between 10 and 45 years in both open and laparoscopic appendicectomy cases.

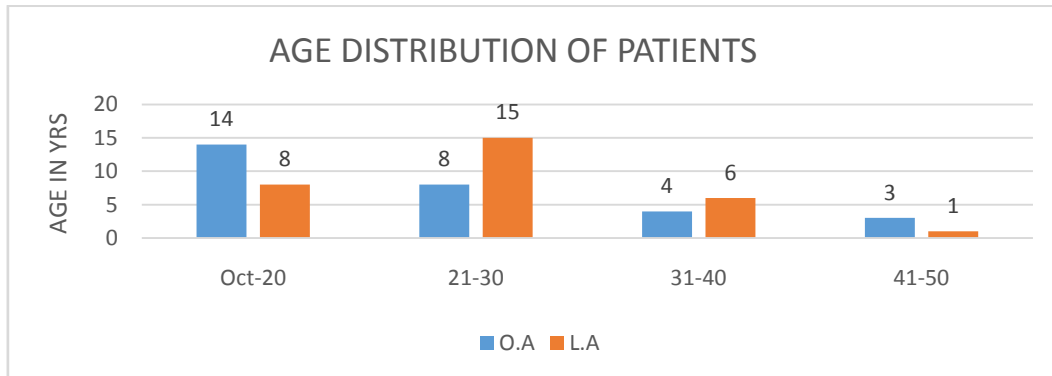


Figure: Age distribution of Patients

DURATION OF SURGERY

TIME(MIN)	OA	LA
MEAN	66	50
SD	30.15	17.39
BELOW MEAN TIME	17	18
ABOVE MEAN TIME	13	12

The time duration was recorded from the start of incision to closure in open appendicectomy whereas in laparoscopic appendicectomy time duration was measured after giving ports to closure. Operating time ranged from 20 to 140 min in open group and 25 to 100 min in laparoscopic group with a mean/standard deviation of 66/30.15 and 50/17.39 respectively. An assessment was made by comparing both the groups which resulted that laparoscopic appendicectomy was less time consuming. It will be much faster with increasing experience of the surgeon. This difference was statistically significant ($P < 0.01$).

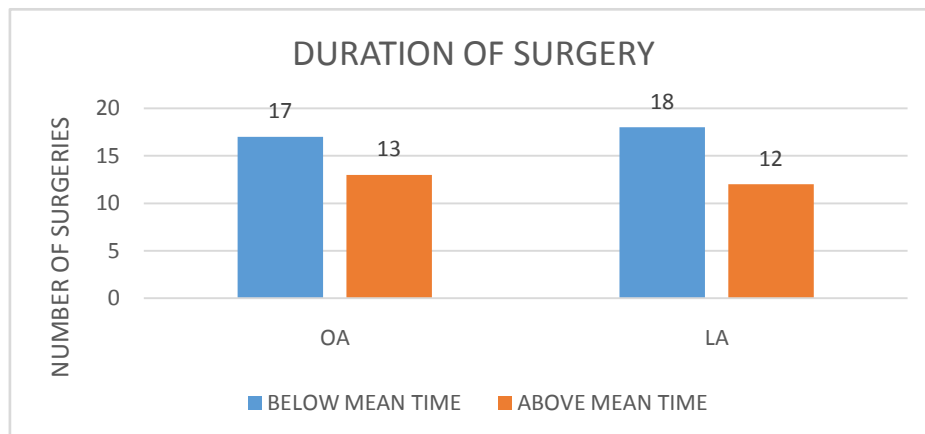


Figure: Time Duration

POST-OPERATIVE COURSE

	OA(Days)	LA(Days)
PAIN	2.2	1.8
ORAL FEED STARTED	2.6	1.7
AMBULATION	2.3	1.5
HOSPITAL STAY	4.1	3.1

RETURN TO WORK	12.2	7.2
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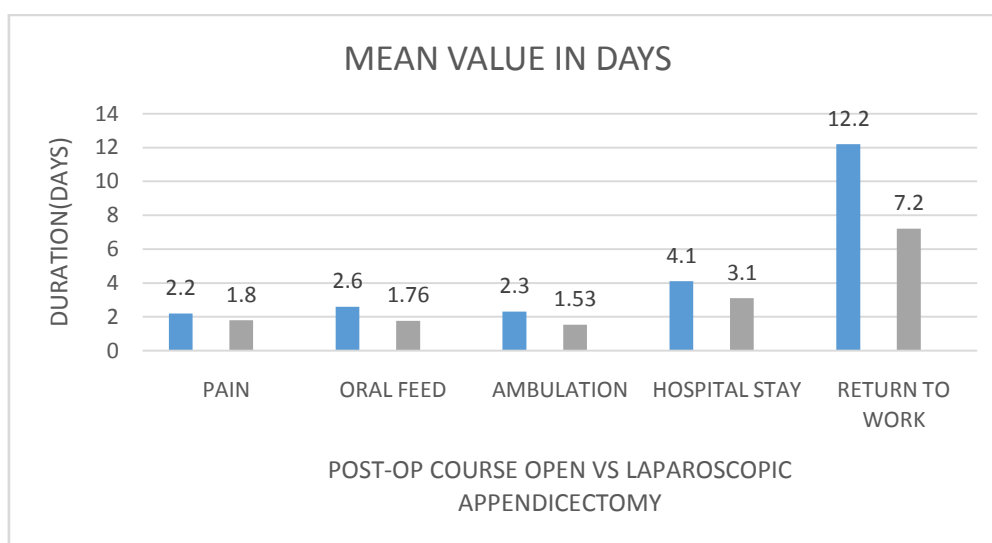


Figure: POST-OP COURSE OPEN VS LAPAROSCOPIC APPENDICECTOMY

V.DISCUSSION

During the period from 1st July 2021 to 30th June 2022, 60 patients, who underwent either open or laparoscopic appendicectomy were randomly selected for the study. 30 cases each of open and laparoscopic appendicectomy were taken up. All these patients were operated at Gauhati Medical College and Hospital, Assam. The relative advantage and disadvantages of the laparoscopic and open appendicectomy are measured primarily in terms of duration of surgery, post-operative pain and duration of analgesic used in days, Post operative complication like ileus, fever, vomiting, wound infection post operative recovery in the terms of post operative duration of hospital stay, returns to normal work were assessed.

LIST OF ANALYSIS

1. Sex distribution
2. Age distribution
3. Duration of surgery
4. Post operative course
5. Length of hospital stay and return to normal work.

Sex distribution: The male to female ratio for OA and LA was 1:0.8 and 1.5/1 respectively. Among the patients who underwent appendicectomy both (open and laparoscopic), 53.3% were male and 46.6% were female.

Age distribution: In the present study, the common age group was found to be 10 -20yrs (36%) and 21-30yrs (38%). The youngest patient in our study was 10/12 years of age and the oldest patient 45/45 years of age in OA and LA respectively. In our study a total of 32 male (14 open and 18 laparoscopy) and 28 female (16 open and 12 laparoscopy) were included. There were no significant differences in the mean age between the two samples (OA mean age 23yr, LA mean age 27yr).

Author	Age group	Percentage
GallendoGallego et al ⁴	20-30yrs	52%
Bailey & Love s	Teens & early 20yrs	
Hamilton bailey emergency surgery	10-20yrs	
Present study	10-30yrs	75%

Studies	Mean time(min)	
	Open	Laparoscopy
Heikkim T.J et al	82	91

Ortega AE et al	58	68
Yong JL et al	60	80
Geeta.K.R et al	58.2	74.13

TABLE: Duration of Surgery

In our study mean operating time between open and laparoscopy group was mean/standard deviation of 66/30.15 min and 50/17.39 min respectively. An assessment was made by comparing both the groups with the above studies which resulted that laparoscopic appendicectomy was less timeconsuming. We found that time taken to perform laparoscopic appendicectomy gradually declined as the study progressed. Difficulty was faced during adhesiolysis, resulting in an increase in surgery time. This difference was statistically significant ($P < 0.01$). It will be much faster with increasing experience of the surgeon. The fastest and longest time recorded was (20 minutes /120 minutes) in open and (25 minutes/100 minutes) in laparoscopic appendicectomy respectively. 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. Generally laparoscopic procedures are more time consuming for the following reasons.

- Inherent nature of slow manoeuvre of laparoscopic techniques.
- Time taken by careful slow insufflations.
- Routine diagnostic laparoscopy before starting any laparoscopic procedure.

In present study average post-op pain duration was 2.2 for open group as compared to 1.8 in laparoscopic group ($P < 0.05$) because of longer incision, stretching of muscles and wound infection. Similar observations have also been reported⁴⁸. Thus the post operative analgesic required was more in open group as compared to laparoscopic group. Similar results have also been found in the following study.¹⁴⁷ It is proved that laparoscopic procedures cause less postoperative pain than their counterparts. In this study none of the literature reviewed found more pain after laparoscopic procedure. The postoperative narcotic use is less after laparoscopic appendicectomy. Another interesting observation has been the patient's perception of pain after appendicectomy. However, after 48 hours they had a better sense of well-being and showed earlier postoperative food intake, ambulation and return to work. Post operative complications like vomiting was lower in laparoscopic group with 54% as compared with 80% in open group ($p < 0.05$). Ambulatory patients who did not require parenteral analgesia and tolerate oral feeds were considered fit for discharge. In present study incidence of post operative wound infection in laparoscopic group as compared to open group was 3:4. Moreover, the small size of trocar incisions renders wound infections easier to manage, with prompter resolution than those following conventional appendicectomy. Reduction in wound infection is expected because the appendix is usually brought through the laparoscopic cannula and does not touch the abdominal wound. Before removal of ports, peritoneal cavity is inspected for fluid or blood. There was no wound infection in the laparoscopic group, whereas in open group the infection rate was 7.6%. This is because with laparoscopic approach, the inflamed appendix was dissected without direct contact with the trocar wounds.

Duration of Hospital stay

Studies	Number of days (Mean)	
	Open	Laparoscopy
Attwood SE et al	3.8	2.5
Yong JL et al	4	3
Geeta.K.R et al	4.36	3.31
Present	4.1	3.1

Table: Duration of Hospital stay

In our study average number of postoperative hospital stay was 4.1 days in open and 3.1 days in laparoscopic group. It is important to state that duration of hospital stay in laparoscopic surgery was comparatively less.

In **Nguyen N, Zainabadi K, Mavadadi S, Paya M, Stevens CM, Root J, et al**, study stay was shorter for laparoscopic group ($P < 0.04$). Similar finding with 2.5 days versus 3.4 days were found for laparoscopic and open appendicectomy groups. In **Chin J Dig Dis** study reported the median length of stay was significantly shorter after laparoscopic appendicectomy (3 days versus 5 days, $P < 0.0001$) than after open appendicectomy. A

Yong J L, Law W L, Lo CY, Lam CM study reported the median hospital stay for patients in laparoscopic group and open group were 3.0 days (range, 1 to 47) and 4.0 days (range, 1to 47), respectively which were comparable⁵

Duration of return to work

Studies	Duration in days	
	Open	Laparoscopy
Ortega AE et al	14	9
Wei HB Hung et al	13.7	9.1
Geeta.K.R et al	19.44	13.86
Present	12.2	7.2

Table: Duration of return to work.

In our study return to normal work was earlier for the laparoscopic group as compared to the open appendicectomy. This difference was significant ($P < 0.001$). Other studies has also shown similar results.^{6,7,8} Return to normal activity was early for laparoscopic group 8 +/- 3.15 days as compared to open group 13.7 +/- 3.15 days. It has been shown that those patients who underwent successful laparoscopic appendicectomy have a better postoperative recovery. The reduced trauma to the abdominal wall is a very significant factor in postsurgical discomfort. The better mobility of the abdominal musculature and the earlier ambulation reduce the risk of the early postoperative complications of pneumonia and embolism. Post-op pain, early ambulation, oral feeding and early return to work was comparatively less in laparoscopic group. There were incidence of surgical site infection in 4 open appendicectomy 3 laparoscopic appendicectomy cases respectively. There was purulent discharge present which was managed conservatively. Mortality rate in both the groups were 0%.

IV. Conclusion

On analysing the data from the prospective study on 60 appendicitis cases carried over a period of 1yr, a definite difference in outcome between open and laparoscopic appendicectomy in consecutively selected patients is seen.

- Laparoscopic appendicectomy was better than open appendicectomy with respect to surgery duration, pain duration, early oral feed, lesser use of analgesics, post operative complications like vomiting, ileus and wound infection rate, etc.
- Post operative recovery was good in respect with duration of hospital stay, return to normal work. Satisfaction after surgery was higher in laparoscopic patients.
- Laparoscopic procedure is also helpful in diagnosing other condition like Ovarian cyst, Salpingitis, Adhesions, Ruptured luteal cyst, Ectopic kidney.
- Overall laparoscopic appendicectomy is better than open appendicectomy in selected patients with acute or recurrent appendicitis.

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