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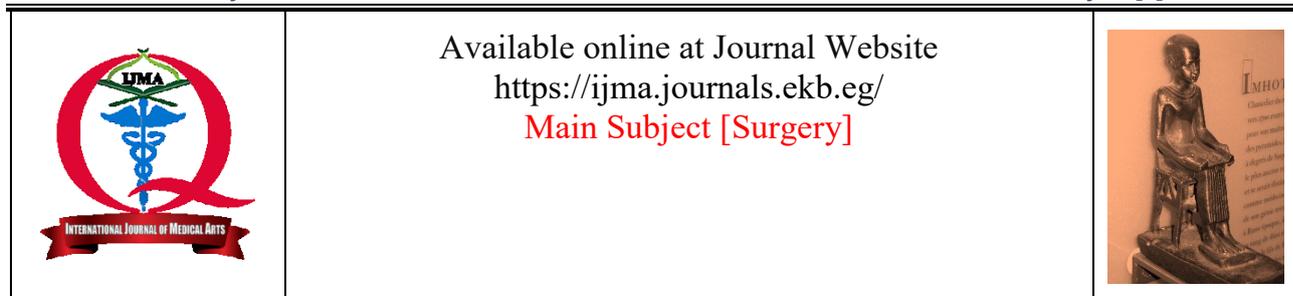
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## Original Article

### Comparison between Laparoscopic and Open Appendectomy: A Population-Based Study

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#### ABSTRACT

##### Article information

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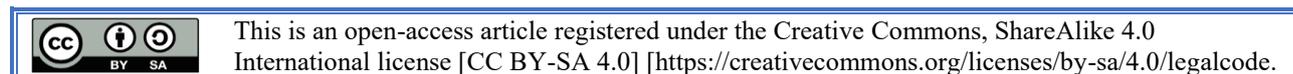
**Background:** The most frequent reason of pain abdomen and a common cause of emergency surgery is appendicitis. Males have an 8.6% lifetime risk of suffering appendicitis, while females have a 6.7 percent lifetime risk.

**Materials and Methods:** Between July 2018 and June 2019, we did a retrospective review of patients who had appendectomies at The Oxford Medical College Hospital in Bangalore, Karnataka. We looked at the clinical data of 140 patients who matched the inclusion criteria. The patients were split into two groups: those who had a laparoscopic appendectomy [LA = 70] and those who had an open appendectomy [OA = 70]. A total of 140 patients with acute appendicitis, 70 patients each underwent open and laparoscopic appendectomy.

**Results:** The time taken to return to ordinary daily activities were significantly different between the two groups, with the laparoscopic group taking  $11.5 \pm 3.1$  days on average against  $16.1 \pm 3.3$  days in the open appendectomy group. In the laparoscopic group, seven patients had complications, while in the open appendectomy group fifteen had complications. Laparoscopic appendectomy has fewer complications than open appendectomy.

**Conclusion:** Regardless of age, sex, or return to regular activity, laparoscopic appendectomy is the operation of choice for the majority of patients. It has fewer complications and requires a fewer hospital stays, as well as the ability to treat concurrent disorders.

**Keywords:** Open appendectomy; Laparoscopic Appendectomy; Appendix.



## INTRODUCTION

The most common root cause of pain abdomen and a common cause of emergency surgery is appendicitis [1]. Kurt Semm was the foremost to suggest laparoscopic appendectomy [LA] in 1983 [2], and since then, multiple researchers have weighed laparoscopy to traditional open appendectomy [OA]. LA is linked to decreased postoperative pain, a speedier recuperation, and fewer surgical complications in adults. Although, there is a divergence of opinion on whether or not a postoperative intra-abdominal abscess [IAA] following LA is a good option. In contrast to the latest Cochrane review that found a raised risk of IAA after LA, a cumulative meta-analysis by Ukai *et al.* found that the increased risk of IAA after LA vanished in papers published after 2001 [3-5].

With a lifetime risk of 6%, it is the second most prevalent general surgical technique in the United States, following laparoscopic cholecystectomy, and the most common intra-abdominal surgical emergency. OA has a 0.3 percent overall death rate and an 11 percent morbidity rate [6]. Given the vast number of operations done each year, the approval of a minimally invasive approach that improves the results might have a straight influence on patient care and a possible indirect impact on patient health expenditures. Several randomized prospective systematic critical reviews, [7-10] meta-analyses, [11-14], and research [15-18] have been published on the topic of LA, with a consensus that the heterogeneity of the measured variables and other methodological flaws has prevented definitive conclusions and presumptions [12, 13].

Several writers recently suggested that the new LA approach should be the recommended therapy for acute appendicitis. While laparoscopic cholecystectomy is now recognized as a standard procedure of cholecystectomy and has largely supplanted the previous approach across the world, appendectomy has yet to acquire the same level of acceptance [19].

## THE AIM OF THE STUDY

We compared laparoscopic and open appendectomy in a rural population in this study.

## PATIENTS AND METHODS

Between July 2018 and June 2019, we did a retrospective study of patients who had an appendectomy at The Oxford Medical College Hospital in Bangalore.

The Oxford Medical College is a community-based teaching hospital that primarily serves the needs of rural residents.

All of the surgeries were carried out at the hospital's two surgical units. History, clinical examination, test data, and imaging investigations were used to make a preoperative diagnosis.

Only the appendectomy procedure performed with McBurney's incision was studied in the open group. Patients who received midline incisions were not included in the research. Patients with severe medical diseases needing intense care [coagulation problems, cirrhosis, persistent medical or mental illness, hemodynamic instability] were excluded.

We looked at the clinical data of 140 individuals who matched the inclusion criteria. The patients were split into two groups: those who had an open appendectomy [OA = 70] and those who had a laparoscopic appendectomy [LA = 70]. Intraoperative findings, initial laboratory findings, co-morbidities, operation time, postoperative problems, and demographic information were among the clinical data obtained.

The patient's postoperative hospital stay was measured in days from the point he or she left the operating room to the time he or she was discharged from the hospital. From the moment of operation, the period of return to regular activities was determined in days.

## Statistical analysis

A typical statistical procedure was used to assess the data. On all variables, descriptive statistics such as means, medians, standard deviations, and percentages were utilized to describe the research population. The  $\chi^2$  test and Fisher exact test were employed to compare categorical and continuous variables. Significant was regarded as a P-value of 0.05. The SPSS software program version 18.0 was used to complete all the analyses [SPSS Inc., Chicago, IL].

## RESULTS

Out of the 70 open appendectomy procedures conducted, 40 [57.14%] were for uncomplicated appendicitis and 30 [42.86%] for complicated diseases such as appendiceal perforation with peritonitis. 34 [48.57 percent] of the laparoscopic surgeries involved uncomplicated illness, while 36 [51.43 percent] involved severe appendicitis.

In our study, the LA group's mean operational time was 49.64±13.1 minutes, compared to 34.64±8.14 minutes for open appendectomy [p =0.074]. The laparoscopic group stayed in the hospital for 1.40.6 days on average, compared to 2.81.4 days for the open appendectomy group [P = 0.0515].

Table [1]: Distribution of different age groups, gender and co-morbidities among patients

	Open appendectomy	Laparoscopic appendectomy	Total
<b>Age group[years]</b>			
18-30	5	5	10
31-40	30	20	50
41-50	15	25	40
51-60	13	17	30
>60	7	3	10
Total	70	70	140
<b>Gender</b>			
Male	45 [32.14%]	40 [28.57%]	85
Female	25 [17.86%]	30 [21.43%]	55
Total	70	70	140
<b>Co-morbid conditions</b>			
CAD	5	4	9
Hypertension	15	8	23
DM	7	5	12
COPD	11	5	16
Total	38	22	60
Mean Open appendectomy- 41.94±12.24, Mean Laparoscopic appendectomy- 39.64±14.14			

Table [2]: Surgical findings

Surgical findings	Open appendectomy [n=70]	Laparoscopic appendectomy [n=70]	P-value
Uncomplicated acute appendicitis	40	34	0.041
Gangrenous appendicitis	12	15	0.217
Appendiceal abscess	11	11	0.314
Peritonitis	7	10	0.192

Table [3]: Operative and post-operative data among patients

	Open appendectomy [n=70]	Laparoscopic appendectomy [n=70]	P-value
Operating time	34.64±8.14	49.64±13.1	0.074
Days of hospital stay	2.8±1.4	1.4±0.6	0.0515
Days taken to return to routine activity	16.4±3.1	10.6±2.7	<0.0001

Table [4]: Postoperative complications for OA and LA

Complications	Open appendectomy	Laparoscopic appendectomy	P-value
Vomiting	7	3	0.317
Wound infection	4	2	0.14
Wound dehiscence	3	1	<0.001
Intra-abdominal abscess	1	1	<0.001
Total	15	7	

## DISCUSSION

The most prevalent intra-abdominal condition needing emergency surgery is acute appendicitis [20]. Any patient arriving with an acute abdomen should be investigated for appendicitis, and a definitive preoperative diagnosis remains a difficulty [21, 22]. Seventy individuals with acute appendicitis received

OA and 70 patients had LA out of a total of 140 patients with acute appendicitis.

We compared LA and OA to see which one is better in terms of operation time, intraoperative findings, and postoperative complications. The postoperative hospital stay was measured in days from the moment the patient left the operating theatre until he or she was discharged. Time to return to regular

activities was estimated from the time of surgery. Out of the 70 OA procedures conducted, 40 [57.14%] were for simple appendicitis and 30 [42.86%] for complex illnesses such as appendiceal perforation with peritonitis. Thirty-four [48.57 percent] of the laparoscopic surgeries included simple illness, whereas 36 [51.43 percent] involved severe appendicitis. The current study found that the LA group's mean operative time of 49.64±13.1 minutes was lengthier than the OA group's mean operative time of 34.64±8.14 minutes [P =0.074].

The laparoscopic group stayed in the hospital for 1.4±0.6 days on average, compared to 2.8±1.4 days for the open appendectomy group [P = 0.0515]. The time needed to return to regular daily activities was significantly different between the two groups, with the laparoscopic group taking 11.5±3.1 days on average against 16.1±3.3 days in the OA group.

We found that open surgery had an excessive overall rate of complications than laparoscopic surgery. The laparoscopic group reported seven complications, whereas the open appendectomy group reported 15. In terms of vomiting and wound infection, there is a considerable difference between groups.

Wound infection is more likely in complex appendicitis, and while it may not be a dangerous complication in and of itself, it has a significant influence on patients' convalescence duration and quality of life. Intra-abdominal abscess, on the other hand, is a significant and life-threatening consequence. One patient in the laparoscopic group [0.14 percent] and one patient in the open group [0.14 percent] developed an intra-abdominal abscess [0.14 percent]. There were substantial differences in intra-abdominal abscess and wound dehiscence [P 0.001].

In comparison to the OA group, the LA group had a shorter hospital stay [1.40.6 days]. LA has been proven in several trials [23-26] to be safe and to result in a speedier recuperation to regular work with fewer wound problems. Other studies have contrast results, claiming that there is no substantial variation in outcome between the two surgeries and that LA is more expensive [27-30].

In any case, a recent comprehensive review of meta-analyses of randomized controlled trials weighing LA to OA found that both procedures are effective and safe for treating acute appendicitis [31]. Our study has found that the total operational time in the LA group was not significantly lengthier than in the OA group [p=0.074].

In general, surgeons' lack of competence with the laparoscopic method may cause the procedure to take more time. As a result, extra processes such as instrument setup, insufflation, creating ports under vision, and a diagnostic laparoscopy phase may account for the lengthier operation duration in laparoscopic appendectomy in our study. The length of a patient's hospital stay is a critical factor that has a direct impact on the patient's economy and health. We discovered that a simultaneous earlier bowel movement in patients handled laparoscopically was not associated with a longer hospital stay [P = 0.0515].

A previous study [32] have shown that the laparoscopic approach outcomes in a significantly shorter hospital stay. Return to work was utilized as an outcome in this research, with a mean time of 11.5±3.1 days in the LA group and 16.1±3.3 days in the OA group [P 0.001]. Our findings corroborate those of Hellberg *et al.* [33] as well as previous randomized clinical trials and meta-analyses [34, 35].

In our study, there was no fatality. The low fatality rates found in prior studies [0.05 percent and 0.3 percent] in LA and OA groups [34] revealed that appendectomy is a safe treatment independent of the method [29]. Laparoscopic appendectomy has fewer complications [10%] than open appendectomy [21%]. Although some studies demonstrate that LA patients are more prone to developing intra-abdominal abscesses, others find no significant difference between LA and OA patients [36-40]. This study has a few limitations. The current study did not compare age groups and gender. In age group above >60 years, there is an increased risk of neoplasia. Therefore, we excluded the increased risk of neoplasia. As this study is an observational study, we were not able to conclude the morbidity range. Therefore, we tried to conclude, which type of surgery is the best and has less side effects with lesser postoperative complications.

**Conclusions:** Regardless of age, sex, or return to regular activity, laparoscopic appendectomy is the operation of choice for the majority of patients. It has fewer complications and needs less hospital stay, as well as the ability to treat concurrent disorders.

**Source[s] of support:** NIL

**Conflicting Interest:** NIL

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