



RESEARCH ARTICLE

Comparative Evaluation of Outcomes in Laparoscopic and Open Appendectomy: A Retrospective StudyShiv Nandan Paswan¹, Mritunjay Kumar Sinha², Vijay Bharatkumar Dabhi³¹Assistant Professor, Department of General Surgery, Great Eastern Medical School & Hospital, Andhra Pradesh, India²Assistant Professor, Department of General Surgery, Great Eastern Medical School & Hospital, Andhra Pradesh, India³Assistant Professor, Department of General Surgery, Great Eastern Medical School & Hospital, Andhra Pradesh, India

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Abstract

Background: Appendectomy is a type of surgical procedure which is believed to be the most commonly done in the world. The minimally invasive techniques have resulted in laparoscopic appendectomy (LA) being the most popular over LA. Relative effectiveness of these methods however, remains of clinical interest.

Aim: To compare the clinical outcomes of laparoscopic and open appendectomy (OA) which is done in patients with acute appendicitis retrospectively.

Methodology: The department of general surgery, Great Eastern medical school and hospital carried out a retrospective observational study. 140 records of appendectomy in a 1-year period were examined. There were two groups of patients; LA and OA. Descriptive and inferential statistics were used to analyze data on the demographic characteristics, operative time, postoperative pain, hospital stay, complications, and recovery.

Results: Out of 140 patients, 75 (53.6%) patients underwent LA and 65 (46.4%) patients underwent open appendectomy. Laparoscopic group showed a great reduction in hospital stay (3.2 ± 11 days compared with 5.1 ± 18 days), postoperative pain and return to normal activities. Nonetheless, there was a bit longer operative time in the laparoscopic group. The open group had more postoperative complications like wound infection.

Conclusion: The LA has superior postoperative results as it has less pain, less hospitalization and fewer complications even though the operative time is a little longer. It may be regarded as the most desirable surgery in the appropriate patients.

Keywords: Appendectomy, Laparoscopic surgery, Open appendectomy, Acute appendicitis, Surgical outcomes

Introduction:

Acute appendicitis has continued to be one of the most common surgical emergencies in the clinical practice and is a leading cause of acute abdomen in all age groups [1]. It usually occurs because of the fecaliths, lymphoid hyperplasia or (rarely) neoplasms obstructing the lumen of the appendix, causing inflammation, infection, and eventual perforation, unless promptly treated. The most common complications that should be prevented by early diagnosis and timely surgery intervention are peritonitis and sepsis [2]. Appendectomy, hence,

remains the gold standard intervention of acute appendicitis and surgical interventions have undergone a series of changes over time in line with the medical technology and management of patients [3].

The most commonly known and widely held safe and effective procedure is the traditional OA popularized by Charles McBurney at the end of the 19th century. It entails a splitting of the muscles in the right lower quadrant and direct observation as well as excision of inflamed appendix [4]. The approach was widely

accepted since it was simple, reliable and had a relatively low rate of complications. It has been the conventional method of surgery over the decades especially in resource constrained areas where the sophisticated laparoscopic machines might not be easily accessible [5].

Minimally invasive surgery has brought a new era in the practice of surgery and LA has become a contemporary alternative. LA, introduced by Kurt Semm in 1983, involves the use of small incisions, specialized devices and a camera to perform the surgery with the minimum tissue injury [6]. The many benefits associated with this technique such as less postoperative pain, reduced hospital stay, accelerated recovery and better cosmetic results have led to its popularity. Moreover, the laparoscopic visualization can be used to explore the abdominal cavity better, which can be especially useful in the cases with uncertain diagnosis [7].

Several studies have been done over the years to compare laparoscopic and OA to ascertain the relative effectiveness and safety of the two procedures [8]. There is an indication that laparoscope appendectomy is linked to reduction in postoperative pain, reduced wound infections and faster resumption of normal activities. Nonetheless, it is also said to have a longer operating time, and greater startup expenses because of specialized equipment/training needs. The differences have led to debates among the surgeons on the best surgical method to use especially in various healthcare environments [9].

Moreover, some patient related variables, including age, gender, body mass index and severity of appendicitis may affect the outcomes of surgery [10]. The challenging cases such as complicated appendicitis, perforated or gangrenous appendicitis may pose extra complications and influence the surgical method selection. The experience of the surgeons and the facilities of the institution are also instrumental in outcome determination because laparoscopic surgery needs certain training and facilities [11]. As a result, the differences in study results among the different populations and healthcare systems demonstrate the necessity to make context-specific assessments [12].

Based on these reflections, the current study is an attempt to carry out a retrospective comparative study

of the outcomes of laparoscopic and OA [13]. This study aims at evidencing based on clinical parameters like operating time, recovery time, postoperative complications and hospital stay to determine the effectiveness of the two methods [14]. The results are hoped to lead to the use of informed clinical decisions and help streamline surgical management of patients with acute appendicitis [15].

Methodology

Here, the methodological framework which will be used to carry out the current study is outlined. The process of data collection, the analysis, and the comparison between laparoscopic and OA was done in a systematic and structured manner to ensure the right data was collected, the data analyzed and meaningfully compared. The methodology was developed to reduce the bias and increase the validity of the findings through clearly defined inclusion criteria, standard data extraction practices and proper statistical analysis.

Study Design

The study was intended to be an observational study (retrospective in nature) that seeks to compare clinical outcomes between laparoscopic and open appendectomy. The reason why a retrospective design was selected was to be able to analyze previously-collected patient data over a specific timeframe, and, therefore, effectively determine surgical practices without affecting the clinical decision-making process. This method helped to evaluate the actual results, both intraoperative and postoperative, in a heterogeneous patient group. The study has been able to cover all the data by examining previous records and minimizing both ethical and logistic limitations related to prospective trials.

Study Area

The research was done in the Department of General Surgery, Great Eastern Medical School and Hospital, Andhra Pradesh, India

Study Duration

The research had been conducted during a time span of one year.

Study Participants

The study sample was made up of patients that had appendectomy on acute appendicitis in the course of the study. The choice of the participants was made according to the stipulated inclusion and exclusion criteria in order to achieve homogeneity and reliability of the data set.

Inclusion Criteria

- Patients with acute appendicitis.
- Patients that had either laparoscopic or open appendectomies.
- The age of patients is above 15 years.
- Available complete medical records.

Exclusion Criteria

- The complicated appendicitis (abscess or mass that requires interval appendectomy) in the patients.
- Patients who had some abdominal surgery before.
- Incomplete medical records.

Sample Size

The study included 140 patients who fulfilled the inclusion criteria. The sample was categorized into two groups according to the type of surgery; LA and open appendectomy. The sample size was deemed to be sufficient to enable meaningful statistical comparison, and to represent the distribution of surgical practices in the study environment.

Procedure

Medical records of the hospital were accessed using the medical records department and systematically reviewed. The process of data extraction was done through a structured pre-tested proforma in order to ensure consistency and minimise errors. The data gathered consisted of demographic information, presentation, findings at the time of surgery and outcome at the end of the surgery.

The variables analysed in particular were the following:

- Age and gender of patients.
- Surgical procedure that has been done.
- Time (in minutes) of operation.
- Pain scales (after operation) (using standard pain assessment scales).
- Length of stay (days in hospital)

- Possible postoperative complications (wound infection, intra-abdominal abscess, ileus)
- The duration of time to get back to normal daily activities.

Patient information was held in confidence and anonymization of all identifiable data was done.

Statistical Analysis

Data collected were put in the Statistical Package of the Social Sciences (SPSS) version 27.0 and analyzed. There was use of both descriptive and inferential statistics methods to interpret the data in an effective way. Continuous variables were given as mean standard deviation whereas categorical variables were given as frequency and percentages.

To compare laparoscopic with open appendectomy:

- Categorical variables were tested with chi-square test.
- Continuous variables were used in independent t-test.

The multivariate analysis was done where necessary to determine the effects of the confounding factors. A p-value less than 0.05 was regarded to be statistically significant meaning that there is a significant difference between the two surgery methods.

Results

This section will provide the results of the research in the context of the analysis of 140 patients who have gone through appendectomy. The findings are presented in the way of demographic factors, the allocation of surgical methods, outcomes of operations and post-operative results, and profiles of complications. A brief description and interpretation are provided with each table, to help in interpreting the observed patterns.

Demographic profile of the study participants is given in Table 1 and its graphical representation is revealed in Figure 1. The majority of patients belonged to the 31–50 years age group (60, 42.9%), followed by 15–30 years (50, 35.7%) and >50 years (30, 21.4%). A larger percentage was male (85, 60.7%) as opposed to female (55, 39.3%). These results suggest that the prevalence of appendicitis was higher in middle-aged adults and that the predominancy of the same was male in this study group.

Table 1: Demographic Characteristics (n = 140)			
Parameter	Category	Frequency	Percentage (%)
Age (years)	15–30	50	35.7
	31–50	60	42.9
	>50	30	21.4
Gender	Male	85	60.7
	Female	55	39.3

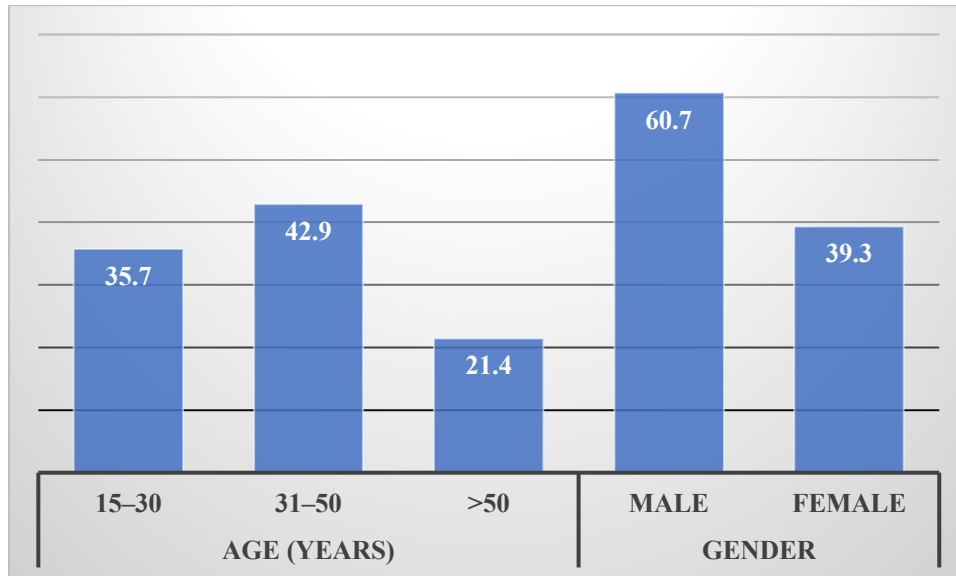


Figure 1: Visual Representation of Demographic Characteristics (n = 140)

The table 2 shows the distribution of the surgical procedures done and its graphical representation is shown in Figure 2. Seventy-five patients (53.6%), and 65 patients (46.4%), had laparoscopic and open

appendectomy, respectively. This indicates that laparoscopy surgery is preferred slightly more, which can be interpreted as a change of clinical practice towards minimal invasive surgery.

Table 2: Distribution of Surgical Approach		
Procedure	Frequency	Percentage (%)
LA	75	53.6
Open Appendectomy	65	46.4

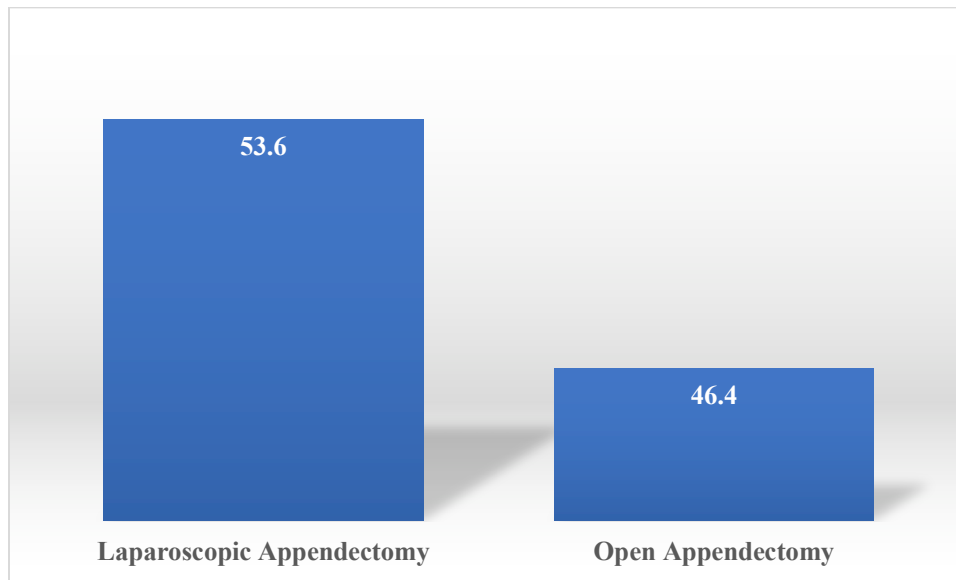


Figure 2: Visual Representation of Distribution of Surgical Approach

Table 3 presents the comparison of the operative and postoperative result of laparoscopy and open appendectomy. The laparoscopic group took a little longer period (65 ± 12 minutes) than the open group (55 ± 10 minutes) to complete the procedure. The laparoscopic group, however, had much reduced hospital stay (3.2 ± 1.1 days compared to 5.1 ± 1.8

days), postoperative pain, and the laparoscopic group returned to normal functioning much sooner (7 ± 2 days compared to 12 ± 3 days). The results show that although the LA has a longer operation, the recovery and comfort of the patients are superior in laparoscopic operative.

Table 3: Operative and Postoperative Outcomes

Parameter	Laparoscopic	Open
Operative time (min)	65 ± 12	55 ± 10
Hospital stay (days)	3.2 ± 1.1	5.1 ± 1.8
Postoperative pain score	Lower	Higher
Return to normal activity (days)	7 ± 2	12 ± 3

Table 4 presents the postoperative complications rate in each of the groups. The OA group (12, 18.5%) had more wound infection as compared to the laparoscopic group (4, 5.3%). In the same way, ileus was more common in the open group (5, 7.7% as compared to laparoscopic group (2, 2.6%). There was

no difference between the two groups in terms of intra-abdominal rates of abscesses (3, 4.0% in laparoscopic vs 4, 6.2% in open). These results imply that LA has less postoperative complications especially the surgical site infections.

Table 4: Postoperative Complications

Complication	Laparoscopic (%)	Open (%)
Wound infection	4 (5.3%)	12 (18.5%)
Intra-abdominal abscess	3 (4.0%)	4 (6.2%)
Ileus	2 (2.6%)	5 (7.7%)

Discussion

The current research can be considered an in-depth comparative analysis of laparoscopic and open

appendectomy, which shows a definite difference in clinical outcomes of the two types of surgery. Results of the current research point to the fact that LA is characterized by a more favorable postoperative

recovery, less complications and the overall outcome of the patient (Olmi et al., 2005) [16]. Of the 140 patients, there was a slightly more preference towards LA (75, 53.6%) than the OA (65, 46.4%) which is consistent with the current trend of using less invasive methods in the practice of surgery (Wullstein et al., 2001) [17].

In terms of demographic distribution, the majority of patients were in the 31–50 years age group (60, 42.9%), followed by 15–30 years (50, 35.7%) and those above 50 years (30, 21.4%). There was a higher number of males (85, 60.7%) than females (55, 39.3%). This suggests that the incidence of acute appendicitis is higher in young and middle aged adults, and more so in males (Yagmurlu et al., 2006) [18]. The higher incidence of laparoscopic surgery in this study reflects the trend towards the use of innovative surgical techniques, possibly due to better infrastructure, surgeon training and patient education about less invasive surgery.

The operative and post-operative parameters found that the duration of the operation was longer in the laparoscopic group (65 ± 12 minutes) as compared to the open group (55 ± 10 minutes). This may be due to the technical difficulties and learning curve of laparoscopic surgery (Yau et al., 2007) [19]. But despite the longer length of the procedure, LA showed better results. The length of hospital stay was considerably shorter in the laparoscopic group (3.2 ± 1.1 days) than the open group (5.1 ± 1.8 days). Moreover, the postoperative pain experienced by the patients who had laparoscopic surgery was less severe, and the patients were able to return to their normal activities earlier (7 ± 2 days versus 12 ± 3 days).

The laparoscopic group had significantly fewer complications, adding to the benefits of this approach. The incidence of wound infection was higher in the OA group (12, 18.5%) than in the laparoscopic group (4, 5.3%). Likewise, ileus was more common in the open group (5, 7.7%) compared to the laparoscopic group (2, 2.6%). While intra-abdominal abscess formation did not differ significantly between the two groups (3, 4.0% in laparoscopic group vs 4, 6.2% in open group), the overall complications were fewer in LA (Yong et al., 2006) [20]. These results indicate that laparoscopic surgery results in less trauma and exposure, thus

reducing the risk of complications. In conclusion, this study suggests that LA should be favoured over OA for improved outcomes, albeit with slightly longer operating time.

Conclusion

This retrospective comparative study shows that LA is a safe and effective method of removing appendicitis, with substantial benefits in terms of postoperative pain, length of hospital stay, time to return to normal activities, and complications (wound infection and ileus). While the laparoscopic procedure may take longer, the advantages in terms of improved patient outcomes and reduced complications more than compensate for this. This study adds to the growing trend towards minimally invasive surgery in the treatment of acute appendicitis and underscores the need to embrace LA as the preferred method of surgery in appropriate patients to enhance patient recovery and streamline healthcare.

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