

## ORIGINAL ARTICLE

### Clinical Comparative Analysis of Laparoscopic Appendectomy and Open Appendectomy

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#### ABSTRACT:

**Background:** Both surgical methods are safe and well established in clinical practice but there has been a controversy about which surgical procedure is the most appropriate. Several studies have shown the advantages of laparoscopic surgery in terms of shorter hospital stay, rapid postoperative recovery, and better pain control. **Aim of the study:** To compare laparoscopic appendectomy and open appendectomy. **Materials and methods:** The study was conducted in the department of general surgery of the medical institute. 72 patients reporting to the surgical OPD with features of acute appendicitis were included in our study. All patients underwent minimum of 2 follow-ups - first after 1 week and 6 months later. Comparable data was tabulated and analyzed statistically to reach a conclusion regarding the surgical outcomes of both procedures. **Results:** A total of 72 patients were included in the study; with 36 patients in each group. Mean duration of post-operative pain was 2.1 days and 4.3 days. Post-operative complications rate was 6% for laparoscopic appendectomy and 14% for open appendectomy. Mean cost was Rs. 18292 for laparoscopic appendectomy and Rs. 13392 for open appendectomy. **Conclusion:** Laparoscopic appendectomy is safe and equally efficient compared to the conventional technique and can be recommended as the preferred approach for the treatment of acute appendicitis.

**Key words:** Laparoscopic appendectomy, open appendectomy, general surgery.

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#### INTRODUCTION:

Studies have shown that the most common reason for acute abdominal pain is appendicitis and having 8.6% lifetime risk for males and 6.7% risk for females.<sup>1</sup> The treatment of choice is the surgical removal of the inflamed appendix by using open appendectomy (OA) first described by McBurney in 1894 or by using laparoscopic appendectomy (LA) specified by Semm in 1983.<sup>2, 3</sup> Both surgical methods are safe and well established in clinical practice but there has been a controversy about which surgical procedure is the most appropriate. Several studies have shown the advantages of laparoscopic surgery in terms of shorter hospital stay, rapid postoperative recovery, and better pain control.<sup>4, 5</sup> However, there have been concerns about the risk of infectious complications, particularly the development of intra-abdominal abscess and superficial wound infection. This risk is significantly increased in cases of perforated appendicitis.<sup>6-8</sup> Hence the present study was planned to compare laparoscopic appendectomy and open appendectomy

#### MATERIALS AND METHODS:

The study was conducted in the department of general surgery of the medical institute. The ethical clearance for the study was obtained from the ethical board of the institute prior to commencement of the study. 72 patients reporting to the surgical OPD with features of acute appendicitis were included in our study. Patients below 12 years, pregnant women, patients unfit for GA/laparoscopy and those having generalized peritonitis were excluded from the study. After obtaining an informed consent, all patients

were subjected to a preoperative work up including routine investigations, USG abdomen, erect X ray abdomen, renal and liver function tests as well as any other tests required by the anesthesiologists. The subjects were then randomised into the open appendectomy and laparoscopic appendectomy groups, comprising of 36 patients each. All specimens were sent for histopathological examination. All patients were observed in the postoperative ward for 24 hours, and then shifted. Oral feeding was commenced on appearance of bowel sounds. Wounds were dressed on second postoperative day and sutures removed on the 7th postoperative day (in uninfected wounds). Discharge, in case of uncomplicated patients of open surgery was done as per patient's preference but at least after completing one bowel movement. All patients underwent minimum of 2 follow-ups - first after 1 week and 6 months later. Comparable data was tabulated and analyzed statistically to reach a conclusion regarding the surgical outcomes of both procedures.

The statistical analysis of the data was done using SPSS version 20.0 for windows. The Student's t-test and Chi-square test were used to check the significance of the data. The p-value less than 0.05 was predetermined as statistically significant.

#### RESULTS:

A total of 72 patients were included in the study; with 36 patients in each group. Table 1 shows comparative analysis of clinical outcomes of study groups. The mean operative time of patients for laparoscopic appendectomy was 75.28 min and for open appendectomy was 60.25 min. Mean

duration of post-operative pain was 2.1 days and 4.3 days. Post-operative complications rate was 6% for laparoscopic appendectomy and 14% for open appendectomy. Mean hospital stay was 4.2 days for laparoscopic appendectomy and 7.2 days for open appendectomy. Mean cost was Rs. 18292 for laparoscopic appendectomy and Rs. 13392 for open appendectomy. On comparing the results we observed statistically significant results with mean duration of post-operative pain, mean hospital stay and mean cost ( $p < 0.05$ ).

**DISCUSSION:**

Acute 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. Although more than 20 years have elapsed since the introduction of laparoscopic appendectomy, open appendectomy is still the conventional technique.<sup>7,8</sup>

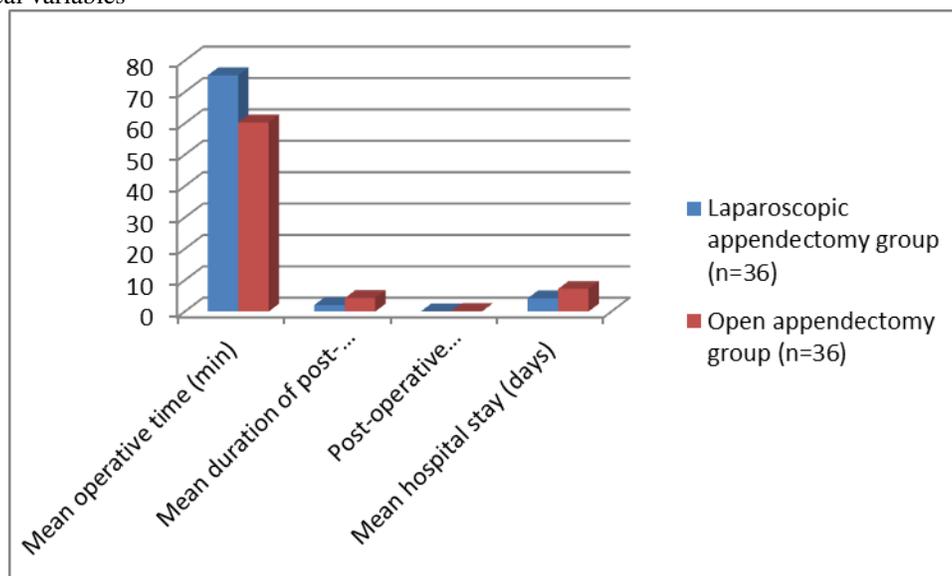
In the present study we observed that mean operative time for laparoscopic and open appendectomy was comparable and non-significant. On comparing we observed statistically significant results with respect to mean duration of post-operative pain, mean hospital stay and mean cost. The results were compared to other previous studies from the

literature and results were found to be consistent. Katkhouda N et al compared the safety and benefits of laparoscopic versus open appendectomy in a prospective randomized double blind study. Two hundred forty-seven patients were analyzed following either laparoscopic or open appendectomy. A standardized wound dressing was applied blinding both patients and independent data collectors. Surgical technique was standardized among 4 surgeons. The main outcome measures were postoperative complications. Secondary outcome measures included evaluation of pain and activity scores at base line preoperatively and on every postoperative day, as well as resumption of diet and length of stay. Activity scores and quality of life were assessed on short-term follow-up. There was no mortality. The overall complication rate was similar in both groups (18.5% versus 17% in the laparoscopic and open groups respectively), but some early complications in the laparoscopic group required a reoperation. Operating time was significantly longer in the laparoscopic group while there was no difference in the pain scores and medications, resumption of diet, length of stay, or activity scores. At 2 weeks, there was no difference in the activity or pain scores, but physical health and general scores on the short-form 36 (SF36) quality of life assessment forms were significantly better in the laparoscopic group.

**Table 1:** Comparative analysis of clinical outcomes of study groups

Variables	Laparoscopic appendectomy group (n=36)	Open appendectomy group (n=36)	p-value
Mean operative time (min)	75.28	60.25	0.21
Mean duration of post-operative pain (days)	2.1	4.3	0.002*
Post-operative complications rate	6%	14%	0.33
Mean hospital stay (days)	4.2	7.2	0.003*
Mean cost	18292	13392	0.001*

**Figure 1:** Clinical variables



Appendectomy for acute or complicated (perforated and gangrenous) appendicitis had similar complication rates, regardless of the technique. They concluded that unlike other minimally invasive procedures, laparoscopic appendectomy did not offer a significant advantage over open appendectomy in all studied parameters except quality of life scores at 2 weeks. It also took longer to perform. Biondi A et al compared the laparoscopic approach and the conventional technique in the treatment of acute appendicitis. Retrospectively collected data from 593 consecutive patients with acute appendicitis were studied. These comprised 310 patients who underwent conventional appendectomy and 283 patients treated laparoscopically. The two groups were compared for operative time, length of hospital stay, postoperative pain, complication rate, return to normal activity and cost. Laparoscopic appendectomy was associated with a shorter hospital stay, with a less need for analgesia and with a faster return to daily activities. Operative time was significantly shorter in the open group. Total number of complications was less in the LA group with a significantly lower incidence of wound infection. The total cost of treatment was higher by 150 € in the laparoscopic group. They concluded that 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.<sup>9, 10</sup>

Guller U et al compared length of hospital stay, in-hospital complications, in-hospital mortality, and rate of routine discharge between laparoscopic and open appendectomy based on a representative, nationwide database. Numerous single-institutional randomized clinical trials have assessed the efficacy of laparoscopic and open appendectomy. The results, however, are conflicting, and a consensus concerning the relative advantages of each procedure has not yet been reached. Patients with primary ICD-9 procedure codes for laparoscopic and open appendectomy were selected from the 1997 Nationwide Inpatient Sample, a database that approximates 20% of all US community hospital discharges. Multiple linear and logistic regression analyses were used to assess the risk-adjusted endpoints. Discharge abstracts of 43,757 patients were used for our analyses. 7618 patients (17.4%) underwent laparoscopic and 36,139 patients (82.6%) open appendectomy. Patients had an average age of 30.7 years and were predominantly white (58.1%) and male (58.6%). After adjusting for other covariates, laparoscopic appendectomy was associated with shorter median hospital stay, lower rate of infections, decreased gastrointestinal complications, lower overall complications, and higher rate of routine discharge. It was concluded that laparoscopic appendectomy has significant advantages over open appendectomy with respect to length

of hospital stay, rate of routine discharge, and postoperative in-hospital morbidity. Khalil J et al compared laparoscopic and open appendectomy (OA) in terms of primary outcome measures. It was a randomized controlled trial. A total of 160 patients were divided into two groups, A and B. Group A patients were subjected to laparoscopic appendectomy (LA), whereas Group B patients were subjected to OA. Data regarding age, gender, and primary outcome measures, such as hospital stay, operative duration, and postoperative complication, were recorded and analyzed. Percentages were calculated for categorical data, whereas numerical data were represented as mean  $\pm$  SD. After randomization, 72 patients in group A and 75 patients in group B were analyzed. The mean age of patients in groups A and B was  $23.09 \pm 8.51$  and  $23.12 \pm 10.42$  years, respectively. The mean hospital stay was  $1.52 \pm 0.76$  days in group A and  $1.70 \pm 1.06$  days in group B. The mean operative duration in group A and B were  $47.54 \pm 12.82$  min and  $31.36 \pm 11.43$  min, respectively. Pain (overall level) was significantly less in group A compared with group B. The two groups were comparable in terms of other postoperative complications, such as hematoma, paralytic ileus, urinary retention, and wound infection. They concluded that LA is an equivalent procedure and not superior to OA in terms of primary outcome measures.<sup>11, 12</sup>

#### CONCLUSION:

From the results this can be concluded that laparoscopic appendectomy is safe and equally efficient compared to the conventional technique and can be recommended as the preferred approach for the treatment of acute appendicitis.

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