



COMPARATIVE STUDY OF LAPAROSCOPIC AND OPEN APPENDECTOMY IN ACUTE APPENDICITIS: A PROSPECTIVE OBSERVATIONAL ANALYSIS

General Surgery

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ABSTRACT

Acute appendicitis remains one of the most frequent surgical emergencies, with laparoscopic appendectomy (LA) and open appendectomy (OA) being the primary treatment options. This prospective observational study was conducted over 18 months at RKDF Medical College Hospital and Research Centre, Bhopal, involving 88 patients equally divided into LA and OA groups (n=44 each). Key outcomes including operative time, hospital stay, pain levels, complications, return to work, and cosmetic satisfaction were assessed. LA demonstrated significantly shorter operative time (47.5 vs. 59.7 minutes), reduced hospital stay (2.84 vs. 4.14 days), and quicker return to work (4.4 vs. 7.4 days) compared to OA ($p < 0.0001$ for all). Pain scores were also lower in LA ($p = 0.009$), and cosmetic outcomes were more favorable ($p < 0.0001$). Although overall complication rates were comparable, postoperative fever was more frequent in OA. **Conclusion:** LA is superior in recovery, pain management, and cosmetic outcomes, and is preferred in uncomplicated cases.

KEYWORDS

Appendicitis, Laparoscopic Surgery, Open Appendectomy, Surgical Outcomes

INTRODUCTION

Acute appendicitis is among the most frequent causes of surgical emergencies, often requiring prompt intervention to avoid complications such as perforation, peritonitis, or sepsis¹. Clinically, it typically presents with right lower quadrant pain, nausea, vomiting, and fever, and appendectomy remains the gold standard for treatment². Since the first successful appendectomy by Claudius Amyand in 1735, surgical management has evolved significantly³.

Currently, two primary surgical approaches exist: open appendectomy (OA) and laparoscopic appendectomy (LA). Although both techniques are routinely practiced, the ideal approach remains debated due to variability in outcomes, patient characteristics, and institutional resources^{4,5}. LA has gained widespread acceptance over recent decades owing to its minimally invasive nature, offering advantages such as less postoperative pain, shorter hospital stays, quicker recovery, and better cosmetic results^{6,7}. It also enables comprehensive exploration of the abdominal cavity, facilitating identification of other potential pathologies⁴.

Despite these benefits, OA remains a commonly utilized technique, especially in resource-constrained settings and in patients with complicated appendicitis. It is generally associated with shorter operative times, reduced cost, and broader applicability in emergency situations^{3,9}. Moreover, OA does not require advanced laparoscopic equipment or training, making it a dependable choice in many healthcare facilities.

Numerous studies, including randomized controlled trials and meta-analyses, have attempted to compare LA and OA, yielding inconsistent findings¹⁰⁻¹². While many support the advantages of LA in uncomplicated cases, concerns have been raised about its longer operative time and higher cost. Furthermore, in cases of perforated appendicitis or abscess formation, LA may carry an increased risk of intra-abdominal infections or require conversion to OA^{11,12}.

Patient-specific factors such as age, BMI, comorbidities, and severity of inflammation further complicate decision-making. Therefore, this study aims to provide a comprehensive prospective analysis comparing the outcomes of LA and OA in acute appendicitis to help guide optimal surgical management.

MATERIALS AND METHODS

This prospective observational study was conducted at the Department of General Surgery, RKDF Medical College Hospital and Research Centre, Bhopal, over 18 months (April 2023–September 2024). A total of 88 patients diagnosed with acute appendicitis were included and divided into two groups: LA (n=44) and OA (n=44). Allocation was

based on mutual discussion among the surgical team and patients after clinical evaluation. Outcomes assessed included operative time, hospital stay, postoperative pain (VAS on days 1–3), complications, time to resume diet and normal activities, and cosmetic satisfaction. All patients were followed up on postoperative days 7, 15, and 30.

Inclusion Criteria

- Age 13–60 years
- Clinical and radiological diagnosis of acute or recurrent appendicitis
- Written informed consent provided

Exclusion Criteria

- Appendicular mass or abscess
- Pregnancy
- Patients requiring interval appendectomy
- Non-consenting individuals

Data Collection

Data were collected through structured case forms, including demographic details, clinical findings, operative notes, and postoperative outcomes. Pain, complications, recovery milestones, and cosmetic satisfaction were assessed during hospital stay and follow-up visits on days 7, 15, and 30.

Statistical Analysis

Data were analyzed using Stata version 17.0. Continuous variables were compared using Student's t-test, and categorical variables with the Chi-square test. A p-value < 0.05 was considered statistically significant.

RESULTS

Table – 1 Baseline Characteristics of Study Participants (n = 88)

Variable	Laparoscopic (n=44)	Open (n=44)
Mean Age (years)	33.1 ± 10	34.5 ± 9.42
Gender		
- Male	20 (45.5%)	29 (65.9%)
- Female	24 (54.5%)	15 (34.1%)
BMI Category		
- Normal	12 (27.3%)	14 (31.8%)
- Overweight	17 (38.6%)	14 (31.8%)
- Obese	15 (34.1%)	16 (36.4%)
Comorbidities		
- None	38 (86.4%)	36 (81.8%)
- Present	6 (13.6%)	8 (18.2%)
Alvarado Score		
- Low	26 (59.1%)	13 (29.5%)

- Intermediate	15 (34.1%)	24 (54.5%)
- High	3 (6.82%)	7 (15.9%)

Table-2 Comparison of Surgical Outcomes and Complications

Outcome Variable	Laparoscopic (n=44)	Open (n=44)	P-value
Duration of Surgery (min)	47.5 ± 8.4	59.7 ± 16.3	< 0.0001
Hospital Stay (days)	2.84 ± 0.568	4.14 ± 0.852	< 0.0001
Return to Work (days)	4.4 ± 0.8	7.4 ± 1.2	< 0.0001
Postoperative Pain (VAS ≥3)	17 (38.6%)	29 (65.9%)	0.009
Postop Complications			0.169
- None	41 (93.2%)	35 (79.5%)	
- Fever	1 (2.27%)	6 (13.6%)	
- Bleeding	2 (4.55%)	2 (4.55%)	
- Wound Infection	0 (0%)	1 (2.27%)	
Cosmetic Satisfaction			< 0.0001
- Excellent	11 (25%)	0 (0%)	
- Very Good	10 (22.7%)	14 (31.8%)	
- Good	11 (25%)	15 (34.1%)	
- Fair	12 (27.3%)	8 (18.2%)	
- Poor	0 (0%)	7 (15.9%)	

The study enrolled 88 patients, equally divided between the laparoscopic appendectomy (LA) and open appendectomy (OA) groups. Baseline characteristics such as age, BMI, and comorbidities were comparable across groups. However, the LA group had a higher proportion of females and more patients with lower Alvarado scores, while the OA group included more males and patients with intermediate to high Alvarado scores, indicating more severe presentations.

Surgical outcomes strongly favored the LA group. The mean duration of surgery, hospital stay, and time to return to work were significantly shorter in the LA group compared to the OA group ($p < 0.0001$ for all). Postoperative pain, assessed using the Visual Analogue Scale (VAS), was significantly lower in the LA group ($p = 0.009$), with none of the OA patients reporting pain-free recovery.

Complication rates were slightly lower in the LA group (6.8%) compared to the OA group (20.5%), though this was not statistically significant ($p = 0.169$). Cosmetic satisfaction scores were significantly higher in the LA group, with 25% of patients rating their results as "Excellent" compared to none in the OA group ($p < 0.0001$). Overall, laparoscopic appendectomy demonstrated superior clinical and patient-centered outcomes.

DISCUSSION

In this study, laparoscopic appendectomy (LA) demonstrated superior outcomes compared to open appendectomy (OA) in managing acute appendicitis. Patients in the LA group experienced significantly shorter operative times, hospital stays, and earlier return to normal activities. Postoperative pain was notably less in the LA group, reflecting the minimally invasive nature of the procedure. Although complication rates were higher in the OA group, the difference was not statistically significant. Importantly, cosmetic satisfaction was significantly better in the LA group, likely due to smaller incisions and reduced postoperative scarring.

These findings align with existing literature that supports laparoscopic surgery as a safer, less invasive alternative with faster recovery and better patient satisfaction^{1,2}. However, selection bias may have influenced outcomes, as patients with more severe presentations were more often managed with OA. Further multicentric studies with larger samples are warranted to validate these findings and refine selection criteria for surgical approach in acute appendicitis.

CONCLUSION

Laparoscopic appendectomy offers significant advantages over open appendectomy in acute appendicitis, including reduced operative time, shorter hospital stay, faster recovery, less postoperative pain, and better cosmetic outcomes. Although both techniques are effective, laparoscopic surgery is preferable when feasible, especially in patients with early or uncomplicated presentations. Broader adoption may enhance overall patient outcomes and satisfaction.

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