

ORIGINAL RESEARCH

Comparison of Laparoscopic and Open Appendicectomy: A Clinical Study on Patient Acceptance and Outcomes in Rural India

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ABSTRACT

Background: Appendicectomy is a common emergency surgical procedure for acute appendicitis, with laparoscopic appendicectomy (LA) and open appendicectomy (OA) being the two primary approaches. Despite the well-documented benefits of LA, its adoption in rural settings remains inconsistent due to various constraints. This study compared the clinical outcomes and patient acceptance of laparoscopic versus open appendicectomy in a rural Indian setting.

Methods: A total of 103 individuals with acute appendicitis were included, with 35 undergoing laparoscopic appendicectomy and 68 undergoing open appendicectomy. Data on post-operative pain, length of hospital stay, complication rates, recovery time, and patient satisfaction were collected and analyzed using SPSS version 19.

Results: The LA group reported significantly higher overall satisfaction, pain management satisfaction, and recovery experience compared to the OA group ($p < 0.001$). Postoperative pain was notably lower in the LA group at 24-, 48-hours, and 7 days post-surgery ($p < 0.001$). The LA group had a shorter hospital stay (2.3 ± 0.9 days) compared to the OA group (4.5 ± 1.2 days) ($p < 0.001$). The overall complication rate was lower in the LA group (8.6%) in contrast to the OA group (26.5%) ($p = 0.029$). Recovery time to normal activities was notably shorter in the LA group (8.5 ± 2.1 days) in contrast to the OA group (14.3 ± 3.4 days) ($p < 0.001$).

Conclusion: Laparoscopic appendicectomy offers superior outcomes in terms of patient satisfaction, decreased post-operative pain, shorter hospital stays, fewer complications, and quicker recovery compared to open appendicectomy in a rural Indian setting.

Recommendations: The adoption of laparoscopic appendicectomy should be encouraged in rural healthcare settings, with investments in training and equipment to overcome existing barriers. Further research should focus on long-term outcomes and cost-effectiveness in these settings.

Keywords: Laparoscopic Appendicectomy, Open Appendicectomy, Rural Healthcare, Patient Satisfaction, Surgical Outcomes patients.

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INTRODUCTION

Appendicectomy, the surgical removal of the appendix, remains one of the most commonly performed emergency surgical procedures worldwide. Acute appendicitis affects approximately 7% of the population at some point in their lives, necessitating timely surgical intervention to prevent complications such as perforation and peritonitis [1]. Traditionally, open appendicectomy (OA) has been the standard approach. However, laparoscopic appendicectomy (LA), introduced in the late 1980s, has gained popularity due to its minimally invasive nature and associated benefits [2].

Recent studies have increasingly highlighted the advantages of LA over OA, including reduced post-operative pain, shorter hospital stays, faster recovery, and fewer wound infections [3]. Additionally, LA offers improved cosmetic outcomes and greater patient satisfaction, which are particularly important in today's patient-centered healthcare environment. Despite these benefits, the adoption of LA in rural and resource-limited settings remains inconsistent due to factors such as the availability of skilled surgeons, equipment, and economic considerations [4]. In rural India, the prevalence of acute appendicitis and the associated morbidity and mortality underscore the

need for effective and accessible surgical treatments [5]. However, the choice between LA and OA often depends on the infrastructure and expertise available in rural healthcare facilities. Understanding the comparative outcomes and patient acceptance of these two surgical approaches in such settings is crucial for optimizing care and resource allocation [6].

This study aims to evaluate the clinical outcomes and patient acceptance of laparoscopic versus open appendectomy in a rural Indian setting.

METHODOLOGY

Study Design: A comparative clinical study.

Study Setting: The study took place at Department of Surgery, ESIC Medical College and Hospital, Bihta, India, spanning from December 2022 to November 2023.

Participants: The study comprised a total of 103 participants who underwent appendectomy. Out of the total, 35 patients received LA, whereas 68 patients undertook OA.

Inclusion Criteria

- Patients diagnosed with acute appendicitis requiring surgical intervention.
- Age between 18 and 65 years.

Exclusion Criteria

- Patients with generalized peritonitis or appendicular abscess.
- Pregnant women.
- Patients with severe cardiopulmonary diseases.

Bias

Efforts were made to minimize selection bias by consecutively enrolling patients who met the inclusion criteria during the study period. The surgical approach was determined based on the availability of resources and surgeon expertise, ensuring a balanced comparison between laparoscopic and open procedures.

Variables

Variables included type of surgical approach, patient acceptance, postoperative pain, length of hospital stay, complication rates, and recovery time.

Data Collection

Data were collected using structured questionnaires and medical records. Preoperative, intraoperative, and postoperative data were recorded, including patient demographics, surgical details, and outcomes.

Procedure

All patients underwent standard preoperative evaluation, including clinical examination, laboratory tests, and imaging studies.

Surgical Procedure

- Laparoscopic Appendectomy: Performed using three ports and standard laparoscopic techniques.
- Open Appendectomy: Performed through a standard McBurney's incision.

Standard postoperative care protocols were followed for both groups, including pain management, wound care, and early mobilization. Patients were followed up at regular intervals for three months post-surgery to assess recovery and any complications.

Patient Acceptance Scores

Patient acceptance was assessed using a postoperative satisfaction questionnaire, which included three main parameters: Overall Satisfaction, Pain Management Satisfaction, and Recovery Experience. Each of these parameters was rated by patients on a scale of 1 to 5, where:

- 1 indicated very dissatisfied,
- 2 indicated dissatisfied,
- 3 indicated neutral,
- 4 indicated satisfied, and
- 5 indicated very satisfied.

The questionnaire was administered at the first follow-up visit, approximately one-week post-surgery. Patients were asked to reflect on their overall experience, the effectiveness of pain management, and their recovery process. The scores were then aggregated and analyzed to compare the levels of satisfaction between the two surgical groups, LA and OA.

Statistical Analysis

The data were inputted and analysed using SPSS version 19. Summary statistics were employed to describe the data. The t-test was used to compare continuous variables, whereas the chi-square test was used to evaluate categorical ones. A p-value below 0.05 was deemed to be statistically significant.

Ethical considerations

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

RESULT

The study included a total of 103 patients, with 35 patients undergoing LA and 68 patients undergoing OA. There were no significant variations between the two groups in terms of age, gender, and BMI ($p > 0.05$).

Table 1: Demographic Data

Characteristic	Laparoscopic Appendectomy	Open Appendectomy	p-value
Age (years)	32.4 ± 10.2	34.7 ± 11.5	0.321
Gender			

Male	18	36	0.851
Female	17	32	
BMI (kg/m ²)	24.6 ± 3.8	25.1 ± 4.1	0.527

Patient acceptance was measured using a postoperative satisfaction questionnaire. Patients undergoing laparoscopic appendectomy reported significantly higher overall satisfaction, pain management satisfaction, and recovery experience compared to those undergoing open appendectomy ($p < 0.001$).

Table 2: Patient Acceptance Scores.

Satisfaction Parameter	Laparoscopic Appendectomy	Open Appendectomy	p-value
Overall Satisfaction	4.8 ± 0.3	4.2 ± 0.6	<0.001
Pain Management Satisfaction	4.6 ± 0.4	4.0 ± 0.7	<0.001
Recovery Experience	4.7 ± 0.3	4.1 ± 0.6	<0.001

Post-operative pain was measured using a visual analog scale (VAS) at 24 hours, 48 hours, and 7 days post-surgery.

Table 3: Postoperative Pain Scores (VAS)

Time Point	Laparoscopic Appendectomy	Open Appendectomy	p-value
24 hours	4.1 ± 1.2	5.3 ± 1.4	<0.001
48 hours	3.2 ± 1.0	4.5 ± 1.3	<0.001
7 days	1.2 ± 0.8	2.4 ± 1.1	<0.001

Patients in the laparoscopic group experienced significantly less postoperative pain at all time points compared to the open appendectomy group ($p < 0.001$).

The length of hospital stay was substantially shorter for patients undergoing LA compared to those undergoing OA.

Table 4: Length of Hospital Stay

Group	Length of Stay(days)	p-value
Laparoscopic Appendectomy	2.3 ± 0.9	<0.001
Open Appendectomy	4.5 ± 1.2	<0.001

While individual complications did not differ significantly between the groups, the overall complication rate was notably lower in the laparoscopic appendectomy group ($p = 0.029$).

Table 5: Complication Rates

Complication	LA	OA	p-value
Wound Infection	2 (5.7%)	10 (14.7%)	0.140
Intra-abdominal Abscess	0 (0%)	3 (4.4%)	0.232
Ileus	1 (2.9%)	5 (7.4%)	0.374
Overall Complication Rate	3 (8.6%)	18 (26.5%)	0.029

The time taken for patients to return to normal activities was significantly shorter in the LA group compared to the OA group.

Table 6: Recovery Time

Group	Recovery Time (days)	p-value
Laparoscopic Appendectomy	8.5 ± 2.1	<0.001
Open Appendectomy	14.3 ± 3.4	<0.001

DISCUSSION

This clinical study compared the outcomes and patient acceptance of LA versus OA in a rural Indian setting, encompassing a sample of 103 patients. The demographic characteristics between the two groups were similar, ensuring a fair comparison of the surgical approaches. The results indicated that patients who underwent laparoscopic appendectomy

reported significantly higher levels of overall satisfaction, pain management satisfaction, and recovery experience compared to those who underwent open appendectomy. These findings reflect a clear preference for the minimally invasive laparoscopic approach among patients, likely due to its less invasive nature and quicker recovery process. Postoperative pain was notably lower in the

laparoscopic group at all assessed time points. This reduction in pain is a significant advantage of laparoscopic surgery, contributing to better patient comfort and faster mobilization postoperatively. Consequently, the length of hospital stay was notably shorter for the laparoscopic group, with patients discharged approximately two days earlier on average compared to those who underwent open surgery. Complication rates further favored the laparoscopic approach, with a significantly lower overall complication rate observed in this group. Although individual complications such as wound infections and intra-abdominal abscesses did not differ significantly, the aggregate reduction in complications underscores the safety and efficacy of laparoscopic appendectomy.

Additionally, the time to return to normal activities was markedly shorter for the laparoscopic group, emphasizing the quicker recovery associated with minimally invasive techniques. This aspect is particularly beneficial in rural settings, where rapid return to daily activities can significantly impact the socioeconomic status of patients.

Overall, this study demonstrates that laparoscopic appendectomy offers superior outcomes in terms of patient satisfaction, post-operative pain, hospital stay, complication rates, and recovery time compared to open appendectomy. These findings advocate for the broader adoption of laparoscopic techniques in rural surgical practices to enhance patient care and outcomes.

Comparing LA and OA in terms of patient outcomes, acceptance, and clinical benefits has been a significant focus of surgical research. A study compared 40 LA and 60 OA patients. They found that LA had significantly fewer infections (5% vs. 11.66%), shorter hospital stays (45% discharged on the second day for LA vs. 36% on the fourth day for OA), and lower postoperative pain scores. The study concluded that LA offers faster recovery, earlier return to work, and improved cosmetic outcomes [7].

A study reported that LA was related with shorter hospital stays (4.34 ± 1.37 days for LA vs. 5.09 ± 1.71 days for OA) and lower postoperative pain scores. The operative time was similar, but LA had fewer complications, particularly wound infections (3.4% in LA vs. 13.2% in OA) [8]. A study compared LA and OA in patients over 60 years old, finding that LA had shorter hospital stays and fewer complications. The study highlighted that LA leads to better postoperative outcomes and patient comfort [9].

A study found that LA had a lower rate of complications, earlier mobilization, and shorter hospital stays compared to OA. Patients undergoing LA also reported lower pain levels post-surgery [10]. A randomized trial compared LA and OA for perforated appendicitis. LA resulted in shorter hospital stays and less postoperative pain, although operative times were longer compared to OA [11].

CONCLUSION

The study demonstrated that laparoscopic appendectomy resulted in higher patient satisfaction, less postoperative pain, shorter hospital stays, fewer complications, and quicker recovery compared to open appendectomy. These findings suggest that laparoscopic appendectomy is a preferable surgical approach for appendicitis in a rural Indian setting.

Limitations: The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendation: The adoption of laparoscopic appendectomy should be encouraged in rural healthcare settings, with investments in training and equipment to overcome existing barriers. Further research should focus on long-term outcomes and cost-effectiveness in these settings.

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List of abbreviations

LA: Laparoscopic Appendectomy

OA: Open Appendectomy

BMI: Body Mass Index

VAS: Visual Analog Scale

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Conflict of interest: The authors have no competing interests to declare.

REFERENCES

1. Bhangu A, Søreide K, Di Saverio S, Assarsson JH, Drake FT. Acute appendicitis: modern understanding of pathogenesis, diagnosis, and management. *The Lancet*. 2015 Sep 26;386(10000):1278-87.
2. Esposito C, Borzi P, Valla JS, Mekki M, Nouri A, Becmeur F, Allal H, Settini A, Shier F, Sabin MG, Mastroianni L. Laparoscopic versus open appendectomy in children: a retrospective comparative study of 2,332 cases. *World journal of surgery*. 2007 Apr;31:750-5.
3. Markar SR, Blackburn S, Cobb R, Karthikesalingam A, Evans J, Kinross J, Faiz O. Laparoscopic versus open appendectomy for complicated and uncomplicated appendicitis in children. *Journal of gastrointestinal surgery*. 2012 Oct 1;16(10):1993-2004.
4. Yaghoubian A, Kaji AH, Lee SL. Laparoscopic versus open appendectomy: outcomes analysis. *The American Surgeon*. 2012 Oct;78(10):1083-6.
5. Li P, Xu Q, Ji Z, Gao Y, Zhang X, Duan Y, Guo Z, Zheng B, Guo X, Wu X. Comparison of surgical stress between laparoscopic and open appendectomy in children. *Journal of pediatric surgery*. 2005 Aug 1;40(8):1279-83.
6. Ruiz-Patiño A, Rey S, Molina G, Dominguez LC, Rugeles S. Cost-effectiveness of laparoscopic versus open appendectomy in developing nations: a

- Colombian analysis. *Journal of Surgical Research*. 2018 Apr 1;224:33-7.
7. Singh L, Wadiwa Y. A retrospective comparative study between laparoscopic and open appendectomy in teaching hospital of India. *IntSurg J*. 2018.
 8. Hanspal S, Shah M, Akhtar M. Laparoscopic versus open appendectomy: a non-randomized comparative study. *IntSurg J*. 2020;7:1925.
 9. Srivastava S. Comparative Analysis of Clinical Outcomes of Open Appendectomy and Laparoscopic Appendectomy. *Int J Res Appl Sci Eng Technol*. 2022.
 10. Mirza SZ, Yousfani S-e-A, Brohi S, Yousuf HM, Tagar S, Dal NA. Comparison of Outcomes of Laparoscopic and Open Appendectomy in Management of Appendicitis. *J Pharm Res Int*. 2022;
 11. Talha A, El-Haddad H, Ghazal AE, Shehata G. Laparoscopic versus open appendectomy for perforated appendicitis in adults: randomized clinical trial. *SurgEndosc*. 2019;34:907-914.