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Prospective Comparative Study on Clinical Outcomes of Laparoscopic Versus Open Appendectomy in Acute Appendicitis: A Tertiary Care Experience in Northern Odisha.

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Abstract

Background: Acute appendicitis is one of the most common surgical emergencies globally. While open appendectomy (OA) has been the traditional gold standard for over a century, laparoscopic appendectomy (LA) has rapidly gained traction as a favored minimally invasive alternative. Objective: To compare the surgical outcomes, intraoperative parameters, postoperative recovery, and complication rates between laparoscopic and open appendectomies in a secondary care teaching hospital. ***Methods***: This prospective comparative study was conducted at Pandit Raghunath Murmu Medical College and Hospital (PRM MCH), Baripada, from March 2025 to March 2026. A total of 122 patients diagnosed with uncomplicated acute appendicitis were enrolled and equally divided into two groups: Open Appendectomy (n=61) and Laparoscopic Appendectomy (n=61). We evaluated key clinical parameters including operative time, intraoperative blood loss, postoperative pain via Visual Analog Scale (VAS), complication rates, length of hospital stay, and time taken to resume normal daily routines. ***Results***: Both study groups were well-matched in terms of baseline age and gender distribution ($p > 0.05$). LA showed a statistically significant longer operative time compared to OA (54.2 ± 10.1 vs. 42.5 ± 8.4 minutes, $p < 0.001$), but resulted in nearly half the intraoperative blood loss (22.4 ± 6.8 vs. 45.2 ± 12.5 ml, $p < 0.001$). Patients in the LA group experienced significantly less postoperative pain at 12, 24, and 48 hours post-surgery ($p < 0.001$). The incidence of surgical site infections (SSI) was notably lower in the LA group (1.6% vs. 11.4%, $p = 0.031$), contributing to a much lower overall complication rate (3.2% vs. 19.6%, $p = 0.005$). Furthermore, the laparoscopic approach resulted in earlier resumption of oral feeds (14.2 ± 3.1 vs. 24.5 ± 4.2 hours, $p < 0.001$), a shorter hospital stay (2.3 ± 0.8 vs. 4.8 ± 1.2 days, $p < 0.001$), and a quicker return to normal daily activities (10.2 ± 2.1 vs. 18.5 ± 3.4 days, $p < 0.001$). ***Conclusion***: Laparoscopic appendectomy is a safe, highly effective alternative to open surgery. Despite a slightly longer operative time, it offers clear, statistically significant advantages in terms of reduced postoperative pain, lower wound infection rates, shorter hospitalization, and faster overall patient recovery.

Keywords: Acute Appendicitis, Laparoscopic Appendectomy, Open Appendectomy, PRM MCH Baripada, Surgical Outcomes, Postoperative Complications, Hospital Stay.

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INTRODUCTION

Acute appendicitis remains the most frequent cause of the "acute abdomen" presenting to emergency departments worldwide, requiring prompt surgical intervention to prevent life-threatening sequelae such as gangrene, perforation, and generalized peritonitis. For over a century, the open appendectomy (OA) pioneered by Charles McBurney in 1889 stood unchallenged as the definitive, gold-standard treatment due to its straightforward technique and reproducible efficacy. However, the advent of minimally invasive surgery fundamentally transformed modern surgical practice. First described by gynecologist Kurt Semm in 1983, laparoscopic appendectomy (LA) has since sparked widespread clinical discussion among general surgeons regarding its routine adoption over the traditional open approach.

Today, the surgical community generally accepts that laparoscopic surgery offers superior cosmetic results, improved diagnostic accuracy—particularly in reproductive-age females where pelvic pathology can mimic appendicitis—and reduced abdominal wall tissue trauma. Yet, practical questions still linger regarding its longer operative time, equipment

availability, cost-effectiveness, and technical learning curve, especially in resource-constrained or high-volume secondary and tertiary teaching healthcare settings.

The purpose of this study is to directly compare the clinical outcomes of laparoscopic versus open appendectomy within our specific patient demographic at Pandit Raghunath Murmu Medical College and Hospital (PRM MCH) in Baripada, Odisha. By examining prospective, real-world clinical data over a twelve-month period, we aim to provide clear, evidence-based guidance for surgical teams operating in similar institutional setups.

MATERIALS AND METHODS

Study Design and Setting

We conducted a prospective comparative observational study at the Department of General Surgery, Pandit Raghunath Murmu Medical College and Hospital (PRM MCH), Baripada.

Study Period

Clinical data collection and patient follow-up were conducted over a 12-month period, from March 2025 to March 2026.

Participants and Sample Size

A total of 122 patients presenting to the surgical emergency and outpatient departments with a confirmed clinical and radiological diagnosis of acute appendicitis were enrolled after obtaining written informed consent. The sample size of 122 was divided evenly into two cohorts of 61 patients each based on the surgical approach selected (determined by surgeon preference, equipment availability, and informed patient consent):

- Group A (Open Appendectomy - OA): 61 patients (underwent surgery via standard McBurney/Lanz gridiron muscle-splitting incision).
- Group B (Laparoscopic Appendectomy - LA): 61 patients (underwent surgery via standard three-port laparoscopic technique with pneumoperitoneum).

Inclusion and Exclusion Criteria

Patients aged between 12 and 60 years diagnosed with uncomplicated acute appendicitis were included in the study. We excluded patients presenting with generalized peritonitis, palpable appendicular mass or abscess, severe systemic medical comorbidities (ASA grade III or IV), history of previous major lower abdominal surgery, and pregnant patients.

Data Collection and Outcome Parameters

We closely monitored all enrolled patients from the time of hospital admission through their routine postoperative outpatient follow-up up to 30 days post-discharge. Both groups received standardized perioperative prophylactic antibiotics and multimodal analgesia protocols. We systematically recorded operative time (measured in minutes from skin incision to complete skin closure), estimated intraoperative blood loss (in milliliters), postoperative pain intensity (evaluated at 12, 24, and 48 hours using a 10-point Visual Analog Scale [VAS]), time to resumption of oral liquid/solid feeds (in hours), postoperative complications (surgical site infection, paralytic ileus, intra-abdominal abscess), total duration of hospital stay (in days), and time taken to return to normal daily activities (in days).

Statistical Analysis

Collected data were compiled and analyzed using SPSS version 26.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were expressed as frequencies and percentages (%). An independent Student's t-test was utilized to compare continuous variables between the two groups, and the Chi-square test (or Fisher's exact test where appropriate) was applied for categorical variables. A p-value of < 0.05 was considered statistically significant.

RESULTS

Both study groups were highly comparable regarding their baseline demographic profiles. The mean age in the Open Appendectomy group was 28.4 ± 8.2 years compared to 27.9 ± 7.6 years in the Laparoscopic Appendectomy group ($p = 0.735$). Similarly, gender distribution showed a slight male preponderance in both cohorts (35 males / 26 females in OA vs. 33 males / 28 females in LA, $p = 0.812$). Because neither parameter showed a statistically significant difference, both groups started on an even baseline prior to surgical intervention (Table 1).

Description: Baseline demographic data demonstrating an even distribution of age and gender between both surgical groups (N = 122), establishing clinical comparability prior to surgery.

Table 1: Baseline Demographic Characteristics of the Study Population

Parameter	Open Appendectomy (n=61)	Laparoscopic Appendectomy (n=61)	P-value	Statistical Significance
Mean Age (years ± SD)	28.4 ± 8.2	27.9 ± 7.6	0.735	Not Significant
Gender: Male / Female (n)	35 / 26	33 / 28	0.812	Not Significant

When evaluating intraoperative parameters inside the operating room, the laparoscopic approach took an average of approximately 12 minutes longer to complete than the open procedure (54.2 ± 10.1 vs. 42.5 ± 8.4 minutes, $p < 0.001$). However, the laparoscopic group benefited from nearly half the intraoperative blood loss compared to the open group (22.4 ± 6.8 vs. 45.2 ± 12.5 ml, $p < 0.001$), both differences being highly statistically significant (Table 2).

Description: Comparison of total operative duration (incision to closure) and estimated intraoperative blood loss between the Open and Laparoscopic groups.

Table 2: Comparison of Intraoperative Characteristics

Intraoperative Variable	Open Appendectomy (n=61)	Laparoscopic Appendectomy (n=61)	P-value	Statistical Significance
Mean Operative Time (mins ± SD)	42.5 ± 8.4	54.2 ± 10.1	< 0.001	Significant
Intraoperative Blood Loss (ml ± SD)	45.2 ± 12.5	22.4 ± 6.8	< 0.001	Significant

Effective pain management is a critical determinant of early postoperative ambulation and patient comfort. Using the Visual Analog Scale (VAS) ranging from 1 to 10, patients in the laparoscopic group reported drastically lower pain scores across all time intervals during the first 48 hours following surgery ($p < 0.001$ at 12, 24, and 48 hours) (Table 3).

Description: Patient-reported pain intensity scores (mean ± SD) measured at 12, 24, and 48 hours following completion of surgery.

Table 3: Postoperative Pain Assessment (Visual Analog Scale - VAS)

Time post-surgery	Open Appendectomy (n=61)	Laparoscopic Appendectomy (n=61)	P-value	Statistical Significance
12 Hours (VAS Score ± SD)	7.2 ± 1.1	4.8 ± 0.9	< 0.001	Significant
24 Hours (VAS Score ± SD)	5.8 ± 1.0	3.1 ± 0.7	< 0.001	Significant
48 Hours (VAS Score ± SD)	4.1 ± 0.8	1.9 ± 0.5	< 0.001	Significant

One of the most pressing clinical concerns in abdominal surgery is the risk of postoperative morbidity. In this domain, laparoscopic appendectomy demonstrated clear superiority. The incidence of surgical site infections (SSI) was significantly higher in the open group compared to the laparoscopic group (11.4% vs. 1.6%, $p = 0.031$). While differences in paralytic ileus (6.5% vs. 1.6%, $p = 0.168$) and intra-abdominal abscess (1.6% vs. 0%, $p > 0.99$) did not reach individual statistical significance, the overall complication rate for LA was just 3.2% compared to 19.6% in the OA group ($p = 0.005$) (Table 4).

Description: Breakdown of specific postoperative adverse events and overall morbidity rates encountered by patients during their 30-day recovery period.

Table 4: Comparison of Postoperative Complications

Postoperative Complication	Open Appendectomy (n=61)	Laparoscopic Appendectomy (n=61)	P-value	Statistical Significance
Surgical Site Infection (SSI)	7 (11.4%)	1 (1.6%)	0.031	Significant
Paralytic Ileus	4 (6.5%)	1 (1.6%)	0.168	Not Significant
Intra-abdominal Abscess	1 (1.6%)	0 (0.0%)	> 0.99	Not Significant
Overall Complication Rate	12 (19.6%)	2 (3.2%)	0.005	Significant

Because they experienced substantially less pain, minimal ileus, and fewer wound complications, patients in the LA group bounced back much faster. They were able to tolerate oral feeds roughly 10 hours sooner than the open surgery patients (14.2 ± 3.1 vs. 24.5 ± 4.2 hours, $p < 0.001$), were discharged from the hospital in less than half the time (2.3 ± 0.8 vs. 4.8

± 1.2 days, $p < 0.001$), and returned to their normal daily activities over a week earlier (10.2 ± 2.1 vs. 18.5 ± 3.4 days, $p < 0.001$) (Table 5).

Description: Metrics detailing the speed of postoperative recovery, including time to resumption of oral diet, length of hospitalization, and return to standard daily routines.

Table 5: Postoperative Recovery Milestones and Hospital Stay

Recovery Parameter	Open Appendectomy (n=61)	Laparoscopic Appendectomy (n=61)	P-value	Statistical Significance
Time to Start Oral Feeds (hrs ± SD)	24.5 ± 4.2	14.2 ± 3.1	< 0.001	Significant
Mean Hospital Stay (days ± SD)	4.8 ± 1.2	2.3 ± 0.8	< 0.001	Significant
Return to Normal Activity (days ± SD)	18.5 ± 3.4	10.2 ± 2.1	< 0.001	Significant

DISCUSSION

The clinical debate between open and laparoscopic appendectomy often balances the speed, simplicity, and low direct instrument cost of the traditional open technique against the physiological and recovery benefits of minimal access surgery. In our prospective study at PRM MCH, Baripada, the empirical data paint a compelling picture favoring the laparoscopic approach for overall patient recovery and morbidity reduction [1, 2].

While it is true that laparoscopic appendectomy took significantly longer to perform in our cohort (54.2 vs. 42.5 minutes, $p < 0.001$), this finding is highly consistent with global surgical literature,including meta-analyses by Sauerland et al. [1] and Li et al. [2], as well as cohort studies by Biondi et al. [3] and Minutolo et al. [4]. This additional operative time is primarily attributable to equipment setup, creation of pneumoperitoneum, diagnostic laparoscopy, and the technical demands of intracorporeal knotting or endoloop application [5, 6]. However, spending an extra 12 minutes in the operating room pays substantial clinical dividends on the surgical ward.

Postoperative pain was dramatically lower in the LA group across all time points (VAS 4.8 vs. 7.2 at 12 hours; 1.9 vs. 4.1 at 48 hours, $p < 0.001$). Because laparoscopic trocar ports require much smaller fascial incisions than a traditional McBurney gridiron muscle-splitting incision, the anterior abdominal wall musculature and parietal peritoneum suffer far less mechanical trauma and tension [6, 7, 10]. Consequently, LA patients required fewer parenteral analgesics, mobilized earlier, and experienced faster restoration of bowel motility, enabling them to tolerate oral feeding much earlier (14.2 hours vs. 24.5 hours, $p < 0.001$) [9, 13].

Furthermore, our study demonstrated a statistically significant reduction in surgical site infections (1.6% in LA vs. 11.4% in OA, $p = 0.031$). Extracting the inflamed, bacteria-laden appendix through a protective laparoscopic trocar sleeve or specimen retrieval bag prevents the infected organ from making direct contact with the subcutaneous tissue and skin edges—a frequent mechanism of wound contamination in open procedures [8, 11, 14]. This marked reduction in wound morbidity and postoperative ileus directly translated to a shorter hospital stay (averaging just 2.3 days vs. 4.8 days, $p < 0.001$) and an impressive return to regular work and daily activity more than 8 days sooner than open appendectomy patients [12, 15]. In a busy secondary care teaching hospital serving a predominantly rural and working-class population, freeing up inpatient surgical beds and enabling wage earners to return to work a week earlier represent major socioeconomic advantages that offset the initial setup costs of laparoscopy [3, 4].

CONCLUSION

Laparoscopic appendectomy has proven to be a safe, clinically superior alternative to traditional open appendectomy in our institutional setting at PRM MCH, Baripada. While open surgery remains a slightly faster operation to perform, the laparoscopic approach provides overwhelming, statistically significant benefits to the patient: substantially less postoperative pain, lower intraoperative blood loss, reduced surgical site infections, earlier resumption of diet, a shorter hospital stays, and a much faster return to daily life. We strongly recommend laparoscopic appendectomy as the first-line surgical treatment of choice for uncomplicated acute appendicitis wherever equipment and surgical expertise permit.

REFERENCES

1. Sauerland, S., Jaschinski, T., & Neugebauer, E. A. (2010). Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database of Systematic Reviews, (10), CD001546.

2. Li, X., Zhang, J., Sang, L., Zhang, W., Chu, Z., Li, X., & Liu, Y. (2010). Laparoscopic versus open appendectomy—a meta-analysis of randomized controlled trials. BMC Gastroenterology, 10(1), 129.
3. Biondi, A., Di Stefano, C., Ferrara, F., Bellia, A., Vacante, M., & Piazza, L. (2016). Laparoscopic versus open appendectomy: a retrospective cohort study assessing outcomes and cost-effectiveness. World Journal of Emergency Surgery, 11(1), 44.
4. Minutolo, V., Licciardello, A., Di Stefano, B., Arena, M., Arena, G., & Antonacci, V. (2014). Outcomes and cost analysis of laparoscopic versus open appendectomy for treatment of acute appendicitis. International Journal of Surgery, 12(Suppl 1), S96-S101.
5. Tzovaras, G., Baloyiannis, I., Kavalukas, J., Carmignani, P., & Pramateftakis, M. G. (2010). Laparoscopic versus open appendectomy in adults: a randomized clinical trial. Surgical Endoscopy, 24(12), 2987-2992.
6. Katkhouda, N., Mason, R. J., Towfigh, S., Gevorgyan, A., & Essani, R. (2005). Laparoscopic versus open appendectomy: a prospective randomized double-blind study. Annals of Surgery, 242(3), 439-450.
7. Guller, U., Hervey, S., Purves, H., Muhlbaier, L. H., Peterson, E. D., Eubanks, S., & Pietrobon, R. (2004). Laparoscopic versus open appendectomy: outcomes comparison based on a large administrative database. Annals of Surgery, 239(1), 43-52.
8. Yau, K. K., Siu, W. T., Tang, C. N., Yang, G. P., & Li, M. K. W. (2007). Laparoscopic versus open appendectomy for complicated appendicitis. Journal of the American College of Surgeons, 205(1), 60-65.
9. Tiwari, M. M., Reynoso, J. F., Tsang, A. W., & Oleynikov, D. (2011). Comparison of outcomes of laparoscopic and open appendectomy in management of uncomplicated and complicated appendicitis. Annals of Surgery, 254(6), 927-932.
10. Pedersen, A. G., Petersen, O. B., Wara, P., Rønning, H., Qvist, N., & Laurberg, S. (2001). Randomized clinical trial of laparoscopic versus open appendicectomy. British Journal of Surgery, 88(2), 200-205.
11. Markar, S. R., Blackburn, S., Cobb, R., Karthikesalingam, A., Evans, J., & Kinross, J. (2012). Laparoscopic versus open appendectomy for complicated appendicitis: a systematic review and meta-analysis. Journal of Gastrointestinal Surgery, 16(5), 1993-2004.
12. Southgate, E., Vousden, N., Karthikesalingam, A., Markar, S. R., Black, S., & Zaidi, A. (2012). Laparoscopic vs open appendectomy in older patients. Archives of Surgery, 147(6), 557-562.
13. Wei, B., Qi, C. L., Chen, T. F., Zheng, Z. H., Huang, J. L., Hu, B. G., & Wei, H. B. (2011). Laparoscopic versus open appendectomy for acute appendicitis: a meta-analysis. Surgical Endoscopy, 25(4), 1199-1208.
14. Ingraham, A. M., Cohen, M. E., Bilimoria, K. Y., Pritts, T. A., Ko, C. Y., & Esposito, T. J. (2010). Comparison of outcomes after laparoscopic versus open appendectomy for acute appendicitis at 222 ACS NSQIP hospitals. Surgery, 148(4), 625-637.
15. Jaschinski, T., Mosch, C. G., Eikermann, M., Neugebauer, E. A., & Sauerland, S. (2018). Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database of Systematic Reviews, 11(11), CD001546.