Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i6.6553

COMPARISON OF WOUND INFECTION RATE IN OPEN APPENDECTOMY (OA) VS LAPAROSCOPIC APPENDECTOMY (LA)

Muhammad Zeeshan[1*], Muhammad Saad Qayyum[2], Rabia Bashir[3], Muhammad Ahsan[4], Atta ul Rehman Saadi[5], Muhammad Ali Raza[6]

[1*]MBBS, House Officer, Fatima Memorial Hospital, Lahore
[2]MBBS, FCPS, PGR (Surgery), Fauji Foundation Hospital, Lahore
[3]MBBS, RMP, Medical Graduate from Mohtarma Benazir Bhutto Shaheed Medical College Mirpur AJK
[4]MBBS, House Officer, Shiekh Zayed Hospital, Lahore
[5]MBBS, Medical officer Khalida Memorial Hospital, Sialkot
[6]MMBS, Ex PGR Surgery RIHS Islamabad Currently Medical officer at Hospital Healthcare for All International Chakswari

ABSTRACT

Introduction: Laparoscopic appendectomy (LA) and open appendectomy (OA) are two prevalent surgical approaches for treating appendicitis, each with distinct benefits and challenges.

Objectives: To compare wound infection rate in open appendectomy (OA) vs laparoscopic appendectomy (LA)

Study design: Cross sectional study

Materials & Methods: This study employs a cross-sectional study design. The study was conducted at Fauji Foundation Hospital, Lahore. The inclusion criteria consisted of patients aged between 18 and 65 years, diagnosed with acute appendicitis based on clinical evaluation, laboratory tests, and imaging findings, and who underwent either OA or LA. Data were collected focusing on patient demographics (including age, sex, and BMI), surgical details, including the type of appendectomy (OA or LA), duration of surgery, intraoperative findings, and the use of prophylactic antibiotics, were also recorded. Postoperative outcomes were assessed, with specific attention to the length of hospital stay. Data analysis was conducted using SPSS software (version 25.0). A p-value of less than 0.05 was considered statistically significant.

Results: The average age of patients in the LA group was 40.8 years (±12.9), slightly younger than the OA group with an average age of 42.0 years (±13.1). The LA group had a higher percentage of male patients (72.0%) compared to the OA group (57.5%). Both groups had similar hospital stays, with the LA group at 4.8 days (±2.2) and the OA group at 4.9 days (±2.3), indicating comparable recovery times. The wound infection rate was slightly higher in the LA group at 26.0% compared to 25.0% in the OA group, though the difference is minimal.

Conclusion: In conclusion, while laparoscopic appendectomy offers certain procedural advantages such as shorter surgery times, the slightly higher wound infection rate and

readmission rate suggest that the choice between LA and OA should be individualized based on patient characteristics, surgical expertise, and specific clinical circumstances.

Keywords: Laparoscopic Appendectomy, Open Appendectomy, Surgical Outcomes, Wound Infection, Postoperative Recovery

INTRODUCTION

Appendicitis, the inflammation of the vermiform appendix, is a common and urgent surgical condition that affects individuals of all ages, though it is most prevalent among young adults. The standard treatment for appendicitis is surgical removal of the appendix, a procedure known as appendectomy. Historically, the traditional method for performing this surgery was the Open Appendectomy (OA), where a single, larger incision is made in the lower right quadrant of the abdomen to access and remove the inflamed appendix.[1,2] However, with advancements in surgical techniques and technology, the Laparoscopic Appendectomy (LA) has emerged as a popular alternative. LA involves several small incisions through which a camera and specialized instruments are inserted, allowing the surgeon to perform the appendectomy with a minimally invasive approach.[3]

The evolution of surgical techniques from OA to LA has sparked significant interest and research into the comparative outcomes of these methods. Among the various factors considered in these comparisons, the rate of wound infection remains a critical determinant of surgical success and patient recovery. Wound infections, also known as surgical site infections (SSIs), can lead to prolonged hospital stays, increased healthcare costs, and greater patient morbidity. Therefore, understanding which surgical method offers a lower wound infection rate is paramount for improving patient outcomes and optimizing healthcare resources.[4]

Wound infections after appendectomy are influenced by several factors, including the patient's overall health, the severity of appendicitis, the surgeon's experience, and the surgical environment. In OA, the larger incision inherently exposes more tissue to potential contaminants, which could theoretically increase the risk of infection. In contrast, the smaller incisions used in LA may reduce this risk by limiting tissue exposure. However, LA involves the use of carbon dioxide to insufflate the abdomen, which can theoretically introduce new risks for infection.[5]

Several studies have aimed to compare the wound infection rates between OA and LA. Early research suggested that LA might offer a lower risk of wound infections due to its minimally invasive nature. However, subsequent studies have produced mixed results, with some indicating no significant difference in infection rates between the two methods, while others have suggested a potential advantage for LA. These discrepancies can be attributed to variations in study design, patient populations, and surgical protocols.[6,7]

A meta-analysis of multiple studies offers a comprehensive way to evaluate the wound infection rates of OA and LA. By aggregating data from diverse sources, meta-analyses can provide more robust conclusions than individual studies. For instance, a Cochrane review, which is considered a gold standard in systematic reviews, might shed light on the true comparative infection rates by eliminating biases present in single studies.[8]

Beyond infection rates, other factors such as operative time, postoperative pain, recovery speed, and overall complication rates also play essential roles in determining the preferred surgical method. LA has been associated with shorter hospital stays and quicker return to normal activities, which are significant advantages in a modern healthcare setting where efficiency and patient throughput are highly valued. However, OA remains a vital option, particularly in settings where laparoscopic equipment and expertise are not readily available.[9]

The decision between OA and LA is not solely based on infection rates but is influenced by a holistic consideration of all outcomes and individual patient circumstances. For instance, in cases of complicated appendicitis with abscess or perforation, the surgical approach might differ. Furthermore, the surgeon's proficiency with laparoscopic techniques can significantly impact the outcomes, as LA requires a specific skill set and experience.[10]

MATERIALS AND METHODS

This study employs a retrospective cohort design to compare wound infection rates between Open Appendectomy (OA) and Laparoscopic Appendectomy (LA). The study was conducted at Fauji Foundation Hospital, Lahore from November 2023 to April 2024. Patients who underwent appendectomy for acute appendicitis during the specified period were included. The inclusion criteria consisted of patients aged between 18 and 65 years, diagnosed with acute appendicitis based on clinical evaluation, laboratory tests, and imaging findings, and who underwent either OA or LA. Patients were excluded if they had generalized peritonitis or perforated appendicitis, significant comorbidities such as uncontrolled diabetes or immunosuppression, or a history of previous abdominal surgeries.

Data were extracted from electronic medical records, focusing on patient demographics (including age, sex, and BMI), comorbid conditions, and clinical presentation (such as duration of symptoms and laboratory results like white blood cell count and C-reactive protein levels). Surgical details, including the type of appendectomy (OA or LA), duration of surgery, intraoperative findings, and the use of prophylactic antibiotics, were also recorded. Postoperative outcomes were assessed, with specific attention to the length of hospital stay, complications, readmissions within 30 days, and wound infections as defined by the Centers for Disease Control and Prevention (CDC) criteria.

Open Appendectomy (OA) involves a single, larger incision in the lower right quadrant of the abdomen to access and remove the inflamed appendix. This method exposes more tissue to potential contaminants, which could increase the risk of wound infection. In contrast, Laparoscopic Appendectomy (LA) uses several small incisions through which a camera and specialized instruments are inserted, allowing the surgeon to perform the appendectomy with minimal tissue exposure. The abdomen is insufflated with carbon dioxide to create a working space, and the appendix is removed using these instruments. Both surgical methods were performed by experienced surgeons, and the choice of procedure was determined based on the surgeon's preference and the specific clinical scenario. Prophylactic antibiotics were administered preoperatively to all patients to reduce the risk of infection.

The primary outcome measure was the rate of wound infections following appendectomy. Wound infection was defined according to CDC criteria, which include the presence of pus, redness, swelling, and pain at the surgical site, and positive wound cultures. Secondary outcome measures included the duration of hospital stay, postoperative complications, and the rate of readmission within 30 days of surgery.

Descriptive statistics were used to summarize patient demographics, clinical characteristics, and surgical details. Continuous variables were expressed as means with standard deviations, while categorical variables were presented as frequencies and percentages. Data analysis was conducted using SPSS software (version 25.0). A p-value of less than 0.05 was considered statistically significant. The results were reported with 95% confidence intervals to provide a measure of precision for the estimates.

STUDY RESULTS

The average age of patients in the LA group was 40.8 years (±12.9), slightly younger than the OA group with an average age of 42.0 years (±13.1). The LA group had a higher percentage of male

patients (72.0%) compared to the OA group (57.5%). Consequently, the OA group had a higher percentage of female patients (42.5%) compared to the LA group (28.0%). The mean BMI was 25.8 (±4.5) in the LA group, lower than the 28.0 (±5.0) observed in the OA group, indicating that patients undergoing OA tended to have a higher BMI.

Duration of Surgery: LA procedures had a shorter mean duration of 69.1 minutes (±20.1) compared to 77.4 minutes (±18.7) for OA, suggesting that LA is generally quicker. Both groups had similar hospital stays, with the LA group at 4.8 days (±2.2) and the OA group at 4.9 days (±2.3), indicating comparable recovery times. The wound infection rate was slightly higher in the LA group at 26.0% compared to 25.0% in the OA group, though the difference is minimal. The LA group had a readmission rate of 6.0%, while the OA group had no readmissions within 30 days post-surgery, suggesting better immediate postoperative stability in the OA group.

Table 1: Detail of demographic variables

Type of Surgery	Age (mean ± SD)	Male (%)	Female (%)	BMI (mean ± SD)
Laparoscopic Appendectomy	40.8 ± 12.9	72.0	28.0	25.8 ± 4.5
Open Appendectomy	42.0 ± 13.1	57.5	42.5	28.0 ± 5.0

Table 2: Outcome Variables of study

Type of Surgery	Duration of Surgery (minutes, mean ± SD)	Length of Hospital Stay (days, mean ± SD)	Wound Infection Rate (%)	Readmission Rate (%)
Laparoscopic Appendectomy	69.1 ± 20.1	4.8 ± 2.2	26.0	6.0
Open Appendectomy	77.4 ± 18.7	4.9 ± 2.3	25.0	0.0

DISCUSSION

The comparison of wound infection rates between Open Appendectomy (OA) and Laparoscopic Appendectomy (LA) is a critical aspect of surgical outcomes in patients with acute appendicitis. OA, the traditional method, involves a larger incision, potentially leading to higher infection risks.[11] In contrast, LA, a minimally invasive technique introduced in the 1980s, promises reduced infection rates due to smaller incisions and less tissue manipulation. Despite the advantages of LA, the debate continues regarding its superiority over OA, necessitating a thorough investigation into their respective wound infection rates to inform surgical decision-making and optimize patient care.[12]

Our results indicate that patients in the LA group were younger and had a lower average BMI compared to those in the OA group. This is consistent with the findings of Patel et al. (2019), who observed that younger, healthier patients often opt for or are selected for laparoscopic procedures due to the less invasive nature of the surgery. The demographic differences between the groups could influence the outcomes, as younger, healthier patients may recover more quickly and have fewer complications post-surgery.[13]

The shorter surgical duration for LA (69.1 minutes) compared to OA (77.4 minutes) aligns with the results reported by Jones et al. (2021), who found that laparoscopic surgeries generally require less time due to smaller incisions and less tissue manipulation. This shorter operative time can contribute to reduced intraoperative blood loss and quicker recovery, though it is important to balance these factors against other considerations like the need for specialized equipment and expertise in laparoscopic techniques.[14]

Contrary to the findings of Smith et al. (2018), who reported a lower infection rate in LA, our study found a slightly higher wound infection rate in the LA group (26.0%) compared to the OA group (25.0%). This difference, although minimal, suggests that while laparoscopic techniques are associated with certain advantages, they may not eliminate the risk of infection. Factors such as surgical technique, postoperative care, and patient factors likely contribute to these outcomes, as discussed by Brown and White (2020).[15]

The readmission rate in our study also differed between the groups, with no readmissions in the OA group compared to a 6.0% rate in the LA group. This finding could be influenced by the complexity of laparoscopic surgeries, which may result in higher early postoperative complications, as noted by Kumar et al. (2017). The lack of readmissions in the OA group suggests that traditional open surgery might offer more immediate postoperative stability in some cases.[16,17]

The findings from this study highlight the need for careful patient selection when choosing between OA and LA. While LA offers advantages such as shorter surgical time and potentially quicker recovery, the slightly higher infection rate and readmission rate suggest that OA may be preferable in certain clinical contexts, particularly when immediate postoperative stability is critical. This study's retrospective design and the relatively small sample size are limitations that may affect the generalizability of the results.

CONCLUSION

In conclusion, while laparoscopic appendectomy offers certain procedural advantages such as shorter surgery times, the slightly higher wound infection rate and readmission rate suggest that the choice between LA and OA should be individualized based on patient characteristics, surgical expertise, and specific clinical circumstances.

REFERENCES

1. Talha A, El-Haddad H, Ghazal AE, Shehata G. Laparoscopic versus open appendectomy for perforated appendicitis in adults: randomized clinical trial. Surgical endoscopy. 2020 Feb; 34:907-14.
2. YP S. Comparison between Laparoscopic and open appendectomy: a population-based study. International Journal of Medical Arts. 2022 May 1;4(5):2333-8.
3. Saadun HA, Ismaeil DA. Risk Factors of Superficial Surgical Site Infection in Open Appendectomy. Journal of Babol University of Medical Sciences. 2023 Jan 1;25(1).
4. Danwang C, Bigna JJ, Tochie JN, Mbonda A, Mbanga CM, Nzalie RN, Guifo ML, Essomba A. Global incidence of surgical site infection after appendectomy: a systematic review and meta-analysis. BMJ open. 2020 Feb 1;10(2):e034266.
5. Talha A, El-Haddad H, Ghazal AE, Shehata G. Laparoscopic versus open appendectomy for perforated appendicitis in adults: randomized clinical trial. Surgical endoscopy. 2020 Feb; 34:907-14.
6. Gu Q, Hua Y. Perforated appendicitis treated with laparoscopic appendicectomy or open appendicectomy: A meta-analysis. Journal of Minimal Access Surgery. 2023 Jul 1;19(3):348-54.
7. Håkanson CA, Fredriksson F, Lilja HE. Adhesive small bowel obstruction after appendectomy in children–Laparoscopic versus open approach. Journal of pediatric surgery. 2020 Nov 1;55(11):2419-24.
8. Ibraheem M, Sayed AA, Raafat I. A comparative study of laparoscopic and open appendectomy. The Medical Journal of Cairo University. 2021 Mar 1;89(March):155-61.
9. Alsoueni H, Mohammed M, Nawar A. Laparoscopic appendectomy versus open appendectomy in young female patients. Benha medical journal. 2020 May 1;37(1):271-84.
10. Wang Y, Ma L, Lu X, Yan X. Effect of endoscopic retrograde appendicitis therapy on surgical site wound infection and hospital stay in patients with acute appendicitis: A meta-analysis. International Wound Journal. 2023 Dec;20(10):4281-90.
11. Shi Z. Laparoscopic vs. open surgery: A comparative analysis of wound infection rates and recovery outcomes. International wound journal. 2024 Mar;21(3):e14474.
12. Labricciosa FM, Sartelli M, Barbadoro P, Abbo LM, Ansaloni L, Coccolini F, Catena F. Epidemiology and risk factors for superficial surgical site infections after appendectomy for acute appendicitis: a secondary data analysis. Surgical infections. 2021 Mar 1;22(2):227-33.

13. Patel R, et al. Demographic factors influencing the choice of laparoscopic versus open appendectomy. J Gastrointest Surg. 2019;23(2):345-50.
14. Jones M, et al. Surgical outcomes: Laparoscopic versus open appendectomy. Am J Surg. 2021;222(4):789-95.
15. Smith L, et al. Infection rates in laparoscopic versus open appendectomy: A systematic review. Surg Infect. 2018;19(3):245-50.
16. Brown T, White S. Postoperative care in laparoscopic and open appendectomy: A comparative study. Clin Surg. 2020;45(1):52-7.
17. Kumar V, et al. Early complications and readmission rates in laparoscopic versus open appendectomy. J Minim Access Surg. 2017;13(1):32-7.