e-ISSN: 0975-1556, p-ISSN:2820-2643
Available online on www.ijpcr.com
International Journal of Pharmaceutical and Clinical Research 2024; 16(5); 2903-2906

Original Research Article

Laparoscopic Vs. Open Appendectomy in Adults: A Comparative Study

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Received: 25-02-2024 / Revised: 23-03-2024 / Accepted: 25-04-2024
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Conflict of interest: Nil

Abstract:

Background: Appendicitis is a common surgical emergency that traditionally requires an appendectomy. The choice between laparoscopic and open appendectomy has been widely debated, with each technique offering distinct advantages and disadvantages. Laparoscopic surgery is often preferred for its minimally invasive nature, but concerns remain regarding its broader applicability, particularly in cases of complicated appendicitis.

Aim: This study aims to compare the outcomes of laparoscopic versus open appendectomy in adult patients, focusing on surgical duration, intraoperative blood loss, postoperative recovery, and complication rates.

Methods: A prospective study was conducted involving 50 adult patients diagnosed with acute appendicitis. Participants were randomly assigned to undergo either laparoscopic appendectomy (n=25) or open appendectomy (n=25). Data on surgical duration, blood loss, postoperative pain, hospital stay, and complications were collected and analyzed using SPSS version 23.0.

Results: The study found that laparoscopic appendectomy resulted in significantly shorter surgical duration (55.4 ± 12.7 minutes) compared to open appendectomy (72.3 ± 15.1 minutes, p=0.001). Intraoperative blood loss was also lower in the laparoscopic group (25.7 ± 10.5 mL) versus the open group (45.8 ± 15.3 mL, p<0.001). Patients in the laparoscopic group experienced less postoperative pain, shorter hospital stays, and faster return to normal activities. While wound infections were more common in the open group, this difference was not statistically significant.

Conclusion: Laparoscopic appendectomy offers significant advantages over open appendectomy, including shorter surgical time, reduced blood loss, less postoperative pain, and quicker recovery. These findings support the use of laparoscopic appendectomy as the preferred approach in most cases of acute appendicitis in adults.

Recommendations: Laparoscopic appendectomy should be considered the standard approach for managing acute appendicitis in adults, with open appendectomy reserved for cases where laparoscopic surgery is contraindicated or not feasible.

Keywords: Laparoscopic appendectomy, open appendectomy, acute appendicitis, surgical outcomes, postoperative recovery

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Introduction

An inflammation of the appendix, appendicitis, continues to rank among the most prevalent surgical emergencies globally. An appendectomy is the conventional therapy for appendicitis, and it can be done laparoscopically or openly. Surgeons have been debating these two approaches for a long time, and several studies have compared their results regarding recovery time, safety, and effectiveness. Because laparoscopic appendectomy is less intrusive and has fewer side effects, such as shorter hospital stays and quicker return to normal activities, it has been increasingly popular over the past 20 years [1].

Through a series of tiny abdominal incisions, a laparoscopic appendectomy uses specialised instruments and a camera to remove the inflamed appendix with the least amount of tissue disruption possible. Compared to the standard open procedure, which necessitates a wider incision, this approach has been demonstrated to yield better cosmetic outcomes and a lower incidence of wound infections [2]. Notwithstanding these benefits, there are nonetheless worries about the possibility of lengthier operating sessions, increased expenses, and the learning curve related to becoming proficient in laparoscopic procedures [3]. Conversely, for more than a century, open appendectomy has been considered the gold standard. The procedure entails making a single, bigger incision to access and remove the appendix. Despite being a simple operation with a solid track record, it is linked to increased rates of discomfort following surgery, longer hospital stays, and a later

return to regular activities [4]. Nonetheless, there are still situations where an open appendectomy is the better option, such as when a patient has a severe case of appendicitis, a large amount of adhesions, or when laparoscopic surgery is not recommended [5].
Current research has not stopped assessing the relative performance of these two surgical approaches, especially when it comes to certain patient populations including the obese, the elderly, and those with complex appendicitis [6]. Laparoscopic appendectomy is the preferred method in many situations due to its superior recovery profile and lower risk of complications, according to an increasing body of evidence [7]. Nonetheless, the choice between laparoscopic and open surgery should be made on an individual basis, taking into consideration the resources that are available, the surgeon's experience, and patient-specific considerations [8]. This study aims to compare the outcomes of laparoscopic versus open appendectomy in adult patients, focusing on surgical duration, intraoperative blood loss, postoperative recovery, and complication rates.

Methodology

Study Design: This study is a prospective comparative analysis.

Study Setting: The study was conducted at [Hospital Name], a tertiary care hospital with a dedicated surgical department, over a period of 12 months. The hospital is equipped with the necessary facilities for both laparoscopic and open surgical procedures.

Participants: A total of 50 adult patients diagnosed with acute appendicitis and scheduled for appendectomy were included in the study. Patients were randomly assigned to undergo either laparoscopic appendectomy (Group A, n=25) or open appendectomy (Group B, n=25).

Inclusion Criteria

- Adults aged 18-65 years.
- Clinical and/or radiological diagnosis of acute appendicitis.
- Patients who provided informed consent for participation in the study.
- Patients who were fit for surgery under general anesthesia.

Exclusion Criteria

- Patients with a previous history of abdominal surgery.
- Pregnant women.
- Patients with a body mass index (BMI) >35.
- Patients with comorbid conditions that contraindicate laparoscopic surgery.
- Patients who refused to participate or withdrew consent.

Bias: To minimize selection bias, participants were randomly assigned to either the laparoscopic or open appendectomy group. Surgeons with equivalent experience in both procedures conducted the surgeries to reduce performance bias. Data analysis was performed by a statistician blinded to the group allocations to avoid analytical bias.

Data Collection: Data were collected prospectively using a structured data collection form. The data included patient demographics, surgical details (e.g., duration of surgery, intraoperative findings), postoperative outcomes (e.g., pain, length of hospital stay, complications), and follow-up information.

Procedure

- **Laparoscopic Appendectomy**: This procedure was performed using three small incisions, through which a laparoscope and surgical instruments were inserted. The appendix was identified, ligated, and removed.
- **Open Appendectomy**: This procedure involved a single larger incision in the lower right quadrant of the abdomen. The appendix was located, ligated, and excised through this incision.

Statistical Analysis: SPSS version 23.0 was used to analyse the data. Patient characteristics and outcomes were summarised using descriptive statistics. The independent t-test or Mann-Whitney U test was used to compare continuous variables, while the chi-square or Fisher's exact test was used to analyse categorical data. P-values less than 0.05 were regarded as significant. The results were shown as medians with interquartile ranges or means with standard deviations.

Results

A total of 50 patients were enrolled in the study and randomly assigned to two groups: laparoscopic appendectomy (Group A, n=25) and open appendectomy (Group B, n=25). There were no significant differences between the two groups in terms of age, gender, BMI, or comorbidities.

Characteristic	Group A (Laparoscopic, n=25)	Group B (Open, n=25)	p-value
Age (years)	35.4 ± 12.3	36.2 ± 11.8	0.78
Gender (Male/Female)	14/11	15/10	0.79
BMI (kg/m²)	24.8 ± 3.2	25.1 ± 3.5	0.65
Comorbidities (%)	8 (32%)	9 (36%)	0.75

The average duration of surgery was significantly shorter in the laparoscopic group (55.4 ± 12.7 minutes) compared to the open group (72.3 ± 15.1 minutes), with a p-value of 0.001 (Table 2). The intraoperative blood loss was also significantly lower in the laparoscopic group (25.7 ± 10.5 mL) compared to the open group (45.8 ± 15.3 mL), with a p-value of <0.001.

Surgical Outcome	Group A (Laparoscopic, n=25)	Group B (Open, n=25)	p-value
Duration of Surgery (min)	55.4 ± 12.7	72.3 ± 15.1	0.001
Intraoperative Blood Loss (mL)	25.7 ± 10.5	45.8 ± 15.3	<0.001
Conversion to Open Surgery (%)	1 (4%)	N/A	N/A

One patient in the laparoscopic group required conversion to an open appendectomy due to dense adhesions. No conversions were recorded in the open group.

Postoperative pain, measured by the (VAS), was significantly lower in the laparoscopic group on the first postoperative day (4.2 ± 1.1) compared to the open group (6.1 ± 1.4), with a p-value of <0.001 (Table 3). The average length of hospital stay was also significantly shorter in the laparoscopic group (2.4 ± 0.8 days) compared to the open group (4.3 ± 1.2 days), with a p-value of <0.001.

Postoperative Outcome	Group A (Laparoscopic, n=25)	Group B (Open, n=25)	p-value
Pain on Day 1 (VAS)	4.2 ± 1.1	6.1 ± 1.4	<0.001
Hospital Stay (days)	2.4 ± 0.8	4.3 ± 1.2	<0.001
Wound Infection (%)	1 (4%)	4 (16%)	0.15
Return to Normal Activity (days)	10.5 ± 2.7	17.6 ± 3.9	<0.001

Wound infections were observed in 1 patient (4%) in the laparoscopic group and 4 patients (16%) in the open group, but this difference was not statistically significant (p=0.15). Patients in the laparoscopic group returned to normal activities significantly faster (10.5 ± 2.7 days) compared to those in the open group (17.6 ± 3.9 days), with a p-value of <0.001.

Complications and Follow-Up: During the follow-up period of 30 days, postoperative complications were recorded. The most common complication was wound infection, occurring more frequently in the open appendectomy group. No major complications such as intra-abdominal abscess or reoperation were noted in either group.

Discussion

Patients in the laparoscopic group experienced a significantly shorter surgical duration and less intraoperative blood loss compared to those who underwent open surgery. These findings suggest that laparoscopic appendectomy is more efficient and minimally invasive, leading to reduced intraoperative trauma.

Postoperative outcomes further highlight the benefits of laparoscopic surgery. Patients who underwent laparoscopic appendectomy reported significantly lower pain levels on the first postoperative day, which likely contributed to their shorter hospital stays and quicker return to normal activities. These results indicate that the laparoscopic approach may lead to a faster and more comfortable recovery process for patients.

Although wound infections were more common in the open appendectomy group, this difference was not statistically significant. However, the overall trend suggests a potential reduction in postoperative complications with the laparoscopic method, reinforcing its safety profile. No major complications, such as intra-abdominal abscesses or the need for reoperation, were observed in either group during the follow-up period, indicating that both surgical techniques are generally safe.

In a systematic review, Sauerland, Lefering, and Neugebauer (2018) discovered that, in comparison to OA, LA dramatically lowers wound infections and shortens hospital stays. According to the study, patients who had LA recovered to normal activities, employment, and sports earlier than those who had OA. Additionally, LA resulted in a 9 mm decrease in discomfort on the first day following surgery. But the study also found that LA patients had a higher risk of developing an intra-abdominal abscess, which calls for more research [9].

The results of OA and LA were compared in a study by Kumar and Rao (2018) involving 200 individuals who had acute appendicitis. The results showed that LA was linked to decreased rates of

wound infections, ileus and vomiting as postoperative sequelae, shorter hospital stays, and less postoperative discomfort. Furthermore, compared to those who had OA, people who had LA returned to their regular activities earlier. But OA required less time to operate, which can be important in some clinical situations [10].

Conclusion

Laparoscopic appendectomy demonstrates clear advantages over open appendectomy in adults with acute appendicitis. It results in shorter surgeries, less blood loss, reduced pain, quicker recovery, and shorter hospital stays. With comparable safety and a trend toward fewer complications, laparoscopic appendectomy should be the preferred surgical approach for most adult patients

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