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Original Article

Laparosc Endosc Surg Sci 2024;31(3):100-105
DOI: 10.14744/less.2024.34966

Comparison of postoperative outcomes between laparoscopic and mini-incision open appendectomy for acute appendicitis

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ABSTRACT

Introduction: Acute appendicitis is one of the most common causes of emergency abdominal surgery. Laparoscopic and open (mini-incision) appendectomy are the two primary surgical techniques used for treatment, each offering unique advantages.

This study aims to compare postoperative outcomes, including wound infection rates and pain levels, between laparoscopic and mini-incision open appendectomy.

Materials and Methods: A prospective study was conducted from July 2021 to July 2022 in Van, Türkiye, with 239 patients. After excluding 13 patients, 226 were analyzed. Surgeries were performed by a single surgeon. Data on age, gender, wound infection rates, postoperative pain (measured by the Visual Analog Scale), and length of hospital stay were collected. Statistical analysis was conducted using Mann-Whitney U and Chi-square tests.

Results: No significant differences were found between the laparoscopic and mini-incision open groups in terms of age, gender, wound infection rates, or postoperative pain at 12 and 24 hours ($p>0.05$). The wound infection rate was slightly lower in the laparoscopic group, but the difference was not statistically significant.

Conclusion: Both laparoscopic and mini-incision open appendectomy are safe and effective methods for treating acute appendicitis. No significant differences were observed in terms of wound infection rates, postoperative pain, or patient demographics. Larger studies with longer follow-up periods are recommended to further evaluate long-term outcomes.

Keywords: Acute appendicitis, Laparoscopic appendectomy, Open appendectomy, Postoperative pain, Wound infection

Introduction

Acute appendicitis is one of the most common causes of emergency abdominal surgeries worldwide, with laparoscopic and open appendectomy being the two primary surgical techniques employed.[1] Laparoscopic surgery, introduced in the late 20th century, offers several advantages such as reduced postoperative pain, faster recovery, and smaller incisions.[2] However, open appendectomy, particularly mini-incision techniques, remains a preferred method in many settings due to its simplicity and

Received: 27.09.2024 **Revision:** 27.09.2024 **Accepted:** 05.10.2024
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cost-effectiveness.[3] The choice between laparoscopic and open appendectomy often depends on the surgeon's experience, patient factors, and hospital resources.[4] Despite numerous studies comparing these techniques, there remains debate regarding their relative efficacy in terms of wound infection rates, postoperative pain, and recovery times.[5] Recent studies have suggested that both methods are comparable in terms of safety and outcomes, though laparoscopic surgery may offer slight advantages in specific patient populations.[6] This study aims to evaluate the differences in postoperative outcomes, including wound infection and pain, between laparoscopic and mini-incision open appendectomy.

Materials and Methods

This prospective study was conducted between July 2021 and July 2022 in the Başkale district of Van, Türkiye, and included a total of 239 patients. All surgeries were performed by a single surgeon to ensure consistency in surgical technique. Patients received a single preoperative dose of cefazolin for prophylaxis. Postoperatively, all patients were administered a single intravenous dose of paracetamol at the 6th hour for pain management.

Exclusion criteria included patients under 18 years of age, patients over 80 years of age, and those in whom another pathology besides acute appendicitis was identified during surgery. Based on these criteria, 13 patients were excluded from the study. Data were collected on patient demographics, surgical details, and postoperative outcomes for the remaining 226 patients.

The criteria evaluated in this study included patient age, gender, type of surgery (laparoscopic or open), postoperative pain levels measured using the Visual Analog Scale (VAS) at 12 and 24 hours, wound infection rates, and length of hospital stay. In addition, any postoperative complications such as wound infection and the need for reintervention were recorded. Statistical analysis was performed to compare outcomes between the laparoscopic and open appendectomy groups.

This study was conducted in accordance with the principles outlined in the Helsinki Declaration. As it was a retrospective study, ethical committee approval was not required.

What is original about this article?

This study provides a direct comparison of postoperative outcomes between laparoscopic and mini-incision open appendectomy in a specific population from a rural region in Türkiye. It offers valuable insights by using a prospective design, ensuring consistency through a single surgeon performing all procedures, and focusing on short-term postoperative metrics such as pain, wound infection rates, and hospital stay. Additionally, it addresses a gap in the literature by analyzing outcomes in a setting with limited resources, contributing to the global understanding of how these two surgical techniques perform in diverse healthcare environments.

Statistical Analysis

In the descriptive statistics of the data, mean, standard deviation, median, minimum, maximum, frequency, and percentage values were used. The distribution of the variables was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. For the analysis of quantitative independent data that did not follow a normal distribution, the Mann-Whitney U test was employed. The Chi-square test was used for the analysis of qualitative independent data. SPSS 28.0 software was used for the analyses.

Results

There was no statistically significant difference ($p>0.05$) in the average age and gender distribution of patients who underwent laparoscopic and mini-incision open acute appendectomy. The average age in the laparoscopic group was 32.8±12.8 years, while in the open surgery group it was 30.3±11.3 years. The gender distribution was similar in both groups, with 61.4% female and 38.6% male in the laparoscopic group, and 59.8% female and 40.2% male in the mini-incision open group (Table 1).

Among patients who underwent laparoscopic surgery, 92.8% did not experience wound infection, while 7.2% developed a wound infection. In the mini-incision open surgery group, 88.8% did not develop wound infections, while 11.2% experienced wound infections. However, the difference in wound infection rates between the two groups was not statistically significant ($p>0.05$) (Table 2).

According to the Visual Analog Scale (VAS) scores measured for postoperative pain levels, there was no significant difference in the VAS scores between the laparoscopic and mini-incision open surgery groups at both 12 hours and 24 hours postoperatively ($p>0.05$). The average 12-hour VAS score in the laparoscopic group was

Table 1. Demographic characteristics, surgical method, wound infection rates, and postoperative pain (VAS Scores) of patients undergoing acute appendectomy

	Min-Maks.	Median	Mid.±SD/n-%	
Age	13.0-66.0	27.0	31.1±11.8	
Sex				
Famale			152	60.3%
Male			100	39.7%
Acute App. Operation Type				
Laparoscopic			83	32.9%
Minimal Insision Open			169	67.1%
Wound Infection				
(-)			227	90.1%
(+)			25	9.9%
VAS Scores				
12.Hour	1.0-8.0	5.0	4.6±2.1	
24.Hour	0.0-5.0	2.0	1.9±1.0	

Table 2. Comparison of demographic data, wound infection rates, and postoperative pain (VAS Scores) between laparoscopic and mini-incision open appendectomy groups

	Acute Appendectomy Operation Type				p
	Laparoscopic (n=83)		Minimal Insision Open (n=169)		
	Mid.±SD/n-%	Median	Mid.±SD/n-%	Median	
Age	32.8±12.8	29.0	30.3±11.3	27.0	0.162[m]
Sex					
Famele	51/61.4%		101/59.8%		0.798[X²]
Erkek	32/38.6%		68/40.2%		
Wound Infection					
(-)	77/92.8%		150/88.8%		0.316[X²]
(+)	6/7.2%		19/11.2%		
VAS Scores					
12.Hour	4.6±2.0	5.0	4.7±2.1	5.0	0.866[m]
24.Hour	1.8±0.9	2.0	2.0±1.1	2.0	0.292[m]

[m]Mann-whitney u test / [X²]Ki-kare test.

4.6±2.0, while the 24-hour VAS score was 1.8±0.9. In the mini-incision open group, the average 12-hour VAS score was 4.7±2.1, and the 24-hour VAS score was 2.0±1.1. These findings suggest that there is no significant difference between the two surgical methods in terms of wound infection rates, pain levels (VAS scores), and patient demographics (Fig. 1).

Discussion

In this study, no statistically significant differences were found between laparoscopic and mini-incision open appendectomy in terms of wound infection rates, postoperative pain levels, and patient demographics. These findings support existing literature that highlights the comparable safety and efficacy of both surgical methods

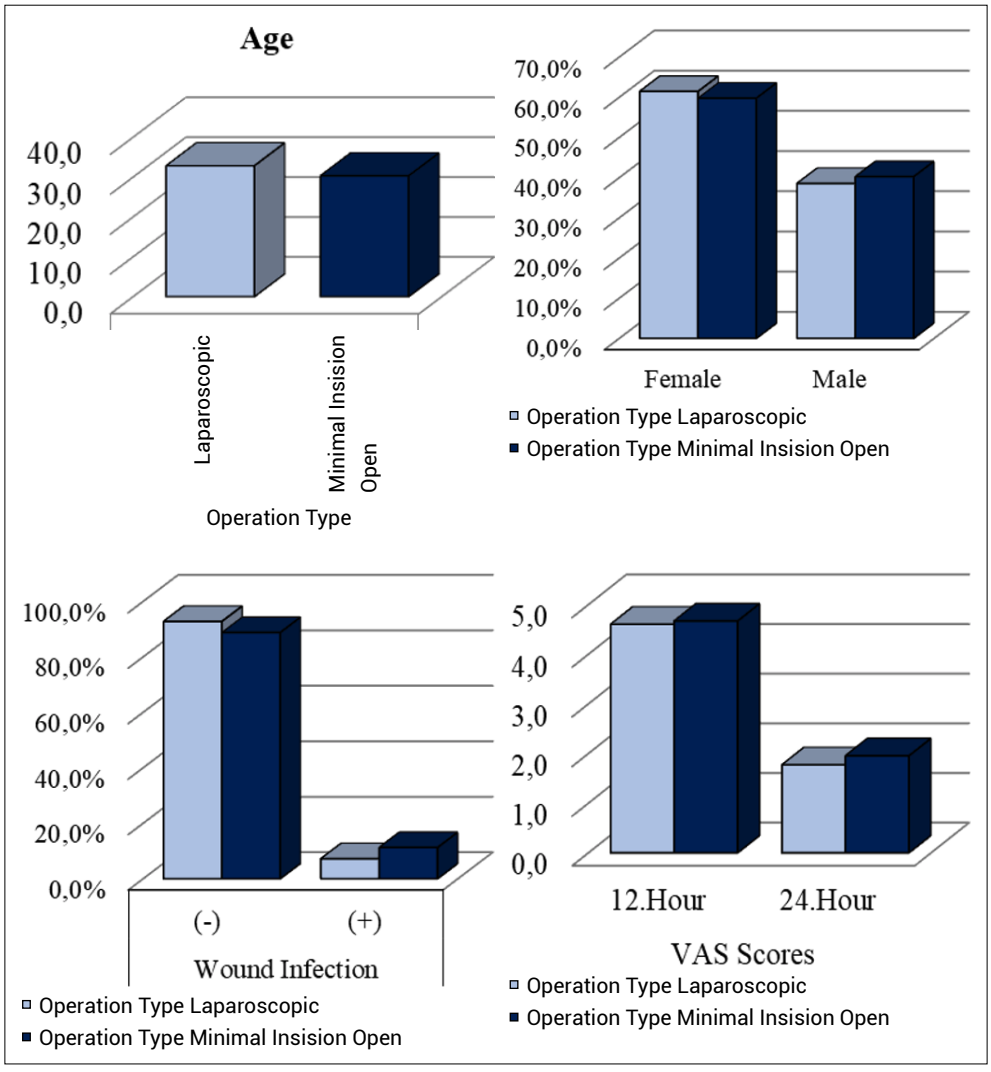

Figure 1. Comperasion MIA vs laparoscopic appendectomy.

for treating acute appendicitis.[7,8] While laparoscopic surgery is often favored due to its minimally invasive nature, which is typically associated with faster recovery times, smaller incisions, and reduced postoperative pain, our study did not observe significant differences in pain outcomes between the two groups at 12 and 24 hours postoperatively. This aligns with findings from other recent studies, suggesting that pain levels may not always be a decisive factor in determining the optimal surgical approach for appendicitis.[9]

Wound infection rates were slightly lower in the laparoscopic group (7.2%) compared to the mini-incision open group (11.2%), but the difference was not statistically significant. This finding indicates that both techniques are safe and that proper surgical technique and postoperative care can effectively mitigate the risk of wound infection regardless of the method used.[10] Additionally, the overall wound infection rates in both groups are consistent with infection rates reported in other studies on appendectomy, further emphasizing the safety of both approaches.[11]

In terms of demographic factors, no significant differences were found between the groups in age or gender distribution. This suggests that patient characteristics such as age and gender do not play a major role in determining the choice of surgical method. Rather, the decision may be more influenced by surgeon preference, hospital resources, and the availability of laparoscopic equipment.[12] Furthermore, the lack of significant differences in pain scores between the two groups, both at 12 and 24 hours postoperatively, suggests that both methods provide comparable pain relief in the immediate postoperative period.[13]

One of the strengths of this study is that it contributes to

the growing body of evidence indicating that both laparoscopic and mini-incision open appendectomy are viable treatment options for acute appendicitis. Both techniques demonstrated similar outcomes in terms of safety and patient comfort. This supports the idea that surgeon expertise and hospital protocols may have more influence over the selection of the surgical method than the patient's condition alone.[14] However, while our study did not find significant differences in short-term outcomes, some studies suggest that laparoscopic appendectomy may offer long-term benefits, such as reduced adhesion formation and fewer complications related to wound healing.[15]

One limitation of this study is its relatively small sample size, which may have reduced the statistical power to detect subtle differences between the two surgical groups. A larger cohort would allow for a more robust comparison and might reveal more nuanced differences in outcomes, such as long-term complications or recovery times.[16] Another limitation is the short follow-up period, which focused on immediate postoperative outcomes like pain and wound infection, rather than longer-term complications such as chronic pain or recurrence of symptoms.[17] Future research should aim to address these limitations by including larger patient populations and following up over longer periods to assess outcomes like recurrence rates, chronic pain, and overall quality of life.[18]

Moreover, patient-specific factors such as obesity, comorbidities, and the severity of appendicitis at presentation may also influence surgical outcomes and should be taken into account in future studies. Previous research has indicated that laparoscopic surgery may be particularly beneficial in patients with obesity, as the smaller incisions reduce the risk of wound complications in this population.[19] Understanding which patient groups benefit most from each surgical approach could help to further individualize treatment and improve overall outcomes.[20]

In conclusion, this study supports the growing consensus that both laparoscopic and mini-incision open appendectomy are safe and effective treatment options for acute appendicitis. Although no significant differences were found in terms of wound infection rates, pain scores, or patient demographics, both surgical techniques provide good clinical outcomes when performed by experienced surgeons. Moving forward, larger-scale studies with longer follow-up periods and a focus on specific patient populations may help to better define the advantages of each method and guide clinical decision-making.

Disclosures

Ethics Committee Approval: This study was conducted in accordance with the principles outlined in the Helsinki Declaration. As it was a retrospective study, ethical committee approval was not required.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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