

ORIGINAL RESEARCH

Comparative Analysis of Laparoscopic versus Open Hernia Repair: A Cross-Sectional Study of Postoperative Pain and Recurrence Rates

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ABSTRACT

Background: Hernia repair is one of the most commonly performed surgical procedures worldwide. The choice between laparoscopic and open hernia repair techniques is influenced by several factors, including postoperative pain and recurrence rates. **Methods:** This cross-sectional study involved 200 patients who underwent hernia repair (100 laparoscopic and 100 open). The primary outcomes measured were postoperative pain, assessed using the Visual Analog Scale (VAS), and recurrence rates within the first year post-surgery. **Results:** Laparoscopic hernia repair showed significantly lower VAS scores postoperatively compared to open hernia repair ($p < 0.05$). The recurrence rates within one year of surgery were also lower in the laparoscopic group compared to the open group, though this did not reach statistical significance ($p = 0.07$). **Conclusion:** Laparoscopic hernia repair is associated with less postoperative pain and tends to have lower recurrence rates within one year compared to open hernia repair. These findings suggest that laparoscopic techniques could be considered the preferred approach in suitable candidates.

Keywords: Laparoscopic Hernia Repair, Open Hernia Repair, Postoperative Pain

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INTRODUCTION

Hernia repair is a fundamental procedure in general surgery, with a long history of evolving techniques and materials used to reduce hernia recurrence and minimize postoperative discomfort. Historically, open hernia repair was the standard approach, offering direct access to the defect and allowing for robust tissue repair. However, with the advent of minimally invasive surgery, laparoscopic hernia repair has gained popularity due to its perceived advantages, including reduced postoperative pain, quicker recovery times, and potentially lower recurrence rates.^{[1][2]}

This study aims to provide a comparative analysis of laparoscopic versus open hernia repair, focusing specifically on postoperative pain and recurrence rates. The choice between these two approaches is crucial, as it impacts patient recovery, satisfaction, and long-term outcomes. Various studies have explored these parameters separately, but comparative

data in a controlled environment remain limited. By conducting a thorough cross-sectional analysis, this research seeks to fill the gaps in literature and aid surgical decision-making.^{[3][4]}

AIM

To compare postoperative pain and recurrence rates between laparoscopic and open hernia repair.

OBJECTIVES

1. To evaluate and compare the intensity of postoperative pain in patients undergoing laparoscopic versus open hernia repair.
2. To assess and compare the recurrence rates within one year of surgery for laparoscopic versus open hernia repair.
3. To analyze patient satisfaction and recovery timelines associated with both surgical techniques.

MATERIAL AND METHODOLOGY

Source of Data: Data were collected from patients who underwent hernia repair surgery at our tertiary care center.

Study Design: A cross-sectional comparative study was designed to evaluate outcomes of hernia repair techniques.

Study Location: The study was conducted at the Department of General Surgery, [Name of Hospital], which is a tertiary healthcare institution.

Study Duration: Data were collected over a period of two years, from January 2021 to January 2023.

Sample Size: The study included 200 patients, with 100 undergoing laparoscopic hernia repair and 100 undergoing open hernia repair.

Inclusion Criteria: Patients aged 18 years and above who underwent primary hernia repair surgery were included.

Exclusion Criteria: Patients with recurrent hernias, concomitant major surgeries, or chronic pain disorders were excluded from the study.

Procedure and Methodology: Patients were randomly assigned to undergo either laparoscopic or open hernia repair. The surgical technique was chosen based on the surgeon's discretion and patient's clinical suitability.

Sample Processing: Not applicable as this study did not involve laboratory sample processing.

Statistical Methods: Data were analyzed using SPSS software. Continuous variables were compared using the t-test, while categorical variables were analyzed using the Chi-square test.

Data Collection: Data on postoperative pain were collected using the Visual Analog Scale (VAS) at 24 hours, 72 hours, and 1 week postoperatively. Recurrence was monitored through clinical examinations at follow-up visits at 1 month, 6 months, and 1 year post-surgery.

OBSERVATION AND RESULTS

Table 1: Comparison of Postoperative Pain and Recurrence Rates

Group	No Pain (n, %)	Pain (n, %)	No Recurrence (n, %)	Recurrence (n, %)
Laparoscopic	65 (65%)	35 (35%)	90 (90%)	10 (10%)
Open	45 (45%)	55 (55%)	60 (60%)	40 (40%)

Table 1 shows the postoperative pain and recurrence rates for laparoscopic versus open hernia repair. Among the patients who underwent laparoscopic surgery, 65% reported no postoperative pain, while 35% experienced pain; this group also had a low recurrence rate with 90% not experiencing recurrence and only 10% reporting recurrence. Conversely, in the

open repair group, a higher percentage reported pain (55%) and the recurrence rate was significantly higher, with 40% of patients experiencing recurrence and only 60% free from recurrence. This suggests that laparoscopic surgery may lead to better outcomes in terms of both pain management and recurrence.

Table 2: Intensity of Postoperative Pain

Group	Pain Scores Distribution (%)
Laparoscopic	0 (23%), 1 (9%), 2 (14%), 3 (12%), 4 (10%), 5 (8%), 6 (5%), 7 (6%), 8 (9%), 9 (4%)
Open	0 (0%), 1 (1%), 2 (4%), 3 (2%), 4 (12%), 5 (7%), 6 (9%), 7 (12%), 8 (16%), 9 (14%), 10 (23%)

Table 2 presents the distribution of pain scores on a scale from 0 (no pain) to 10 (worst pain) for both laparoscopic and open hernia repairs. The laparoscopic group generally reported lower pain scores, with the most common score being 0 (23% of

cases), indicating no pain. Scores gradually decreased from there. The open repair group, on the other hand, had no patients reporting a pain score of 0, and higher pain scores were more prevalent, with the most severe pain score of 10 experienced by 23% of the patients.

Table 3: Recurrence Rates Within One Year

Group	No Recurrence (n, %)	Recurrence (n, %)
Laparoscopic	90 (90%)	10 (10%)
Open	60 (60%)	40 (40%)

Table highlights the one-year recurrence rates for both surgical techniques. The laparoscopic group exhibited a significantly lower recurrence rate, with 90% of patients remaining recurrence-free and only 10% experiencing a recurrence. In contrast, the open repair

group had a 40% recurrence rate, with only 60% avoiding recurrence. This data aligns with the lower pain scores observed in the laparoscopic group, suggesting overall better surgical outcomes.

Table 4: Patient Satisfaction and Recovery Timelines

Group	Satisfied (n, %)	Not Satisfied (n, %)	Recovery Timeline Distribution (%)
Laparoscopic	90 (90%)	10 (10%)	<1 week (50%), 1-2 weeks (30%), >2 weeks (20%)
Open	70 (70%)	30 (30%)	<1 week (20%), 1-2 weeks (30%), >2 weeks (50%)

In Table 4, patient satisfaction and recovery timelines are compared. Laparoscopic surgery again shows favorable results, with 90% of patients satisfied with their surgical outcomes, and half of the patients recovering in less than a week. For the open surgery group, satisfaction drops to 70%, and the recovery timeline extends, with 50% of patients taking more than two weeks to recover. This longer recovery period correlates with the lower satisfaction rates observed.

DISCUSSION

The findings in Table 1, demonstrating lower pain and recurrence rates in laparoscopic hernia repair compared to open repair, are consistent with other studies in the literature. For instance, a meta-analysis by Reistrup H *et al.* (2023)^[5] reported that patients undergoing laparoscopic repair experienced significantly less postoperative pain and shorter recovery times. Moreover, the lower recurrence rates associated with laparoscopic techniques found in our study align with the results from Slooter CD *et al.* (2023)^[6], which highlighted improved long-term outcomes with laparoscopic approaches.

The distribution of pain scores in Table 2, where laparoscopic patients generally experienced lower pain levels, supports findings by Ndong A *et al.* (2023)^[7], who concluded that laparoscopic hernia repair leads to less chronic postoperative pain compared to open repair. This reduction in pain can be attributed to minimal tissue dissection and smaller incisions in laparoscopic surgery.

The recurrence rates presented in Table 3 are particularly important for evaluating surgical success. The higher recurrence rates observed in open repair in our study are mirrored by findings in the Cochrane review by van Veenendaal N *et al.* (2023)^[8], which pointed out a trend towards higher recurrence in open procedures due to the invasiveness of the technique.

Table 4's results, showing higher satisfaction and quicker recovery in the laparoscopic group, are echoed by Guidi Lyra V *et al.* (2024)^[9] & Goh SS *et al.* (2023)^[10], who found that patients undergoing laparoscopic repair not only reported higher satisfaction but also returned to normal activities more rapidly. This is likely due to less postoperative pain and physical restriction after laparoscopic surgery.

CONCLUSION

This cross-sectional study provides a comprehensive comparison between laparoscopic and open hernia repair, focusing on critical outcomes such as postoperative pain, recurrence rates, patient satisfaction, and recovery timelines. The findings underscore the advantages of the laparoscopic

approach over the traditional open method in various aspects of patient care and surgical efficacy.

Laparoscopic hernia repair significantly reduces postoperative pain, as evidenced by a higher percentage of patients reporting no pain and lower pain scores overall. This reduction in pain likely contributes to the observed higher patient satisfaction and faster recovery times, with most laparoscopic patients returning to normal activities within a week. Additionally, the laparoscopic method is associated with a lower rate of recurrence within the first year post-surgery, emphasizing its role in providing durable surgical outcomes.

In light of these findings, it is evident that laparoscopic hernia repair offers a superior alternative to open hernia repair, aligning with the broader surgical goal of minimizing patient discomfort while maximizing the quality of health outcomes. Future research should continue to explore long-term outcomes beyond the first year to further validate these results. Moreover, training and resources should be directed towards enhancing laparoscopic surgical skills across healthcare centers to make this minimally invasive option more accessible to a broader patient population.

LIMITATIONS OF STUDY

- Cross-Sectional Design:** The cross-sectional nature of this study limits our ability to establish causality. Longitudinal studies would be better suited to assess outcomes over time, particularly for measuring recurrence rates and long-term complications.
- Sample Size and Diversity:** Although a total of 200 patients were included, this sample size may still be too small to detect smaller differences between groups, especially in subgroups analysis. Additionally, the study population might not represent broader demographic and clinical diversity, limiting the generalizability of the findings.
- Subjective Measures:** The assessment of postoperative pain relied on self-reported measures, which are inherently subjective and can be influenced by individual pain tolerance and psychological factors. Objective pain measures or standardized pain assessment tools could provide more reliable and consistent data.
- Follow-Up Duration:** The follow-up period was limited to one year, which may not capture late recurrences or long-term complications associated with either surgical technique. Longer follow-up periods would provide a more comprehensive understanding of the durability of repair and long-term patient outcomes.

5. **Selection Bias:** The method of assigning patients to surgical techniques was not randomized and may be subject to selection bias. Surgeon preference and patient-specific factors could influence the choice of technique, potentially confounding the outcomes.
6. **Single-Center Study:** The study was conducted at a single center, which might introduce institutional biases related to surgical expertise, patient management practices, and postoperative care. Multi-center studies could help reduce these biases and increase the robustness of the conclusions.
7. **Lack of Cost Analysis:** The study did not include an analysis of the cost-effectiveness of laparoscopic versus open repair. Costs associated with surgical procedures, hospital stay, recovery time, and potential complications are important factors for healthcare providers and patients in deciding on the most appropriate surgical approach.

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