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Original Research Article

A Comparative Retrospective Study of Ventral Hernia Repair by Laparoscopic and Open Techniques at a Tertiary Care Center

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Abstract

Background/Objectives: Repairing ventral hernias laparoscopically has become increasingly popular because it may lower wound-related complications and shorten recovery compared with open techniques. This study evaluated and compared operative and postoperative outcomes between open ventral hernia repair and laparoscopic at Pacific Medical College Hospital.

Methods: Thirty individuals who had ventral hernia repair were the subject of a retrospective review from January to December 2024. Fifteen patients received laparoscopic repair and fifteen underwent open repair. Analysis was done on postoperative outcomes, surgical features, and patient demographics. The incidence of wound complications within 30 days was the main result. Secondary measures included operative time, intraoperative blood loss, and length of hospital stay, readmission or reoperation within 30 days, chronic pain at 3 months, and hernia recurrence.

Results: Baseline characteristics were similar between groups. The laparoscopic approach had a longer mean operative duration (105 ± 20 min vs 90 ± 22 min; p = 0.08) however, the blood loss was lower (60 ± 30 mL vs 120 ± 60 mL). Open surgery was necessary in one laparoscopic case. After laparoscopy, the median length of stay in the hospital was considerably lower (2 days [IQR 2–3] vs. 4 days [IQR 3–5]; p = 0.002). Wound complications occurred in 2 laparoscopic and 5 open cases (p = 0.18). Rates of readmission, reoperation, chronic pain, and recurrence did not differ significantly.

Conclusions: Laparoscopic ventral hernia repair offers advantages of lower wound morbidity and faster recovery, despite slightly increased operative time. The process seems to be a secure and efficient substitute for open repair.

Keywords: Open repair; postoperative outcomes; wound morbidity; Laparoscopic ventral hernia repair; minimally invasive surgery.

Introduction

Ventral hernia remains one of the commonest conditions treated by general surgeons, accounting for a significant proportion of abdominal wall procedures. These hernias include incisional hernias after prior laparotomy as well as primary kinds like umbilical and epigastric hernias.

The burden of disease is steadily increasing with the rise in obesity, diabetes, and other comorbidities that weaken the abdominal wall. Patients often experience pain, swelling, or cosmetic dissatisfaction, and in complicated cases may present with obstruction or strangulation. Surgical repair is the only definitive treatment, yet despite decades of refinement, recurrence and postoperative morbidity continue to challenge surgeons worldwide. For many years, open repair has been regarded as the standard approach. This method involves direct access to the hernia defect and placement of mesh in various anatomical planes, such as onlay, sublay, or retrorectus positions. Although this technique is widely practiced and can be applied to different clinical scenarios, it is frequently associated with wound-related complications.

Large incisions increase the risk of infection, seroma, hematoma, and delayed healing, particularly among patients with comorbidities. In addition, hospital stay, postoperative pain, longer and slower return to normal activity are recognized limitations. Open repair still carries a significant risk of wound morbidity, despite advancements in mesh technology and component separation.

The development of laparoscopic surgery has introduced an alternative that aims to overcome many of these shortcomings. First described in the early 1990s, laparoscopic ventral hernia repair uses tiny incisions to reduce the defect and insert a prosthetic mesh. Variations such as IPOM, IPOM-plus, TAPP, and eTEP have been adopted in different centers.

The technique offers several potential benefits, including lower rates of wound complications, reduced blood loss, less postoperative pain, shorter hospitalization, and earlier ambulation. At the same time, it is technically demanding, requires specialized equipment, and is often associated with longer operative times.

Concerns also persist about the long-term behavior of intraperitoneal mesh, including adhesion formation and rare but serious complications such as fistula. Evidence from randomized trials and meta-analyses suggests a consistent reduction in wound morbidity and hospital stay with laparoscopy, but recurrence and long-term outcomes appear broadly comparable with open repair.

Despite the availability of international data, local experience is essential to guide clinical decisions because outcomes are influenced by patient demographics, comorbidity patterns, and institutional practices. At Pacific Medical College Hospital, for the repair of ventral hernias, both open and laparoscopic methods are employed, but until now no formal comparison of results has been undertaken. The present retrospective analysis was therefore conducted over a one-year period to evaluate and compare the outcomes of these two approaches in our patient population. The study focused primarily on wound complications within 30 days of surgery, with additional assessment of operative time, blood loss, duration of hospitalization, early readmissions, need for reoperation, and incidence of chronic pain at three months, and recurrence during follow-up.

By presenting our institutional experience, this study aims to contribute evidence that will help refine surgical decision-making and support efforts to optimize patient care in ventral hernia management.

Methods

Design: Retrospective single-center study, January–December 2024.

Setting: Pacific Medical College Hospital.

Participants: 30 adults undergoing primary or incisional ventral hernia repair (15 laparoscopic, 15 open). Exclusions: concomitant major abdominal surgery, loss to follow-up <30 days.

Data collected: demographics, comorbidities, ASA class, hernia type/size, and surgical approach, and mesh details, length of stay, readmission, reoperation, chronic pain, recurrence, complications, blood loss, and operating time.

Statistical analysis: Mann–Whitney U for continuous variables, Fisher's exact for categorical variables, $\alpha=0.05$.

Results

During the study period, 30 patients had their ventral hernias repaired; 15 of these were treated laparoscopically, while the remaining 15 were treated openly. In terms of clinical and demographic traits, the two groups were largely comparable. The mean age of the cohort was 48 years (range 24–72), and 62% were male. Median BMI was 27 kg/m², and comorbidities such as diabetes and HTN were distributed similarly between the groups. Primary hernias constituted 70% of cases, while 30% were incisional.

Table 1. Baseline Characteristics of Patients Undergoing Ventral Hernia Repair

Variable	Laparoscopic (n=15)	Open (n=15)	p-value
Mean age (years)	47.2 ± 11.8	49.1 ± 12.3	0.64
Male sex (%)	9 (60%)	10 (67%)	0.72
BMI (kg/m²)	26.9 ± 4.1	27.5 ± 4.8	0.58
Diabetes mellitus	5 (33%)	4 (27%)	0.71
Hypertension	6 (40%)	6 (40%)	1.00
Primary hernia	10 (67%)	11 (73%)	0.71
Median defect size	3.9 cm	4.1 cm	0.62

Laparoscopic repair was linked to a longer operating length (mean 105 minutes vs. 90 minutes, $p = 0.08$), although this difference lacked statistical significance.

In terms of intraoperative results. Estimated blood loss was significantly lower in the laparoscopic group (mean 60 mL vs 120 mL). Due to extensive adhesions, one patient having laparoscopic treatment needed to switch to open repair.

Component separation was used selectively in two open cases, while none of the laparoscopic procedures required this step.

Table 2: summarizes the operative details.

Variable	Laparoscopic (n=15)	Open (n=15)	p-value
Operative time (min)	105 ± 20	90 ± 22	0.08
Estimated blood loss (mL)	60 ± 30	120 ± 60	0.01*
Conversion to open	1 (6.7%)	–	–
Component separation	–	2 (13%)	–

***Significant difference (p<0.05)**

Postoperative recovery was faster in patients undergoing laparoscopic repair.

The median length of stay was 2 days (IQR 2–3) compared with 4 days (IQR 3–5) in the open group (p = 0.002). Wound complications occurred in 2 patients (13%) following laparoscopic surgery and in 5 patients (33%) following open repair (p = 0.18).

Most of them were conservatively treated superficial seromas or surgical site infections.

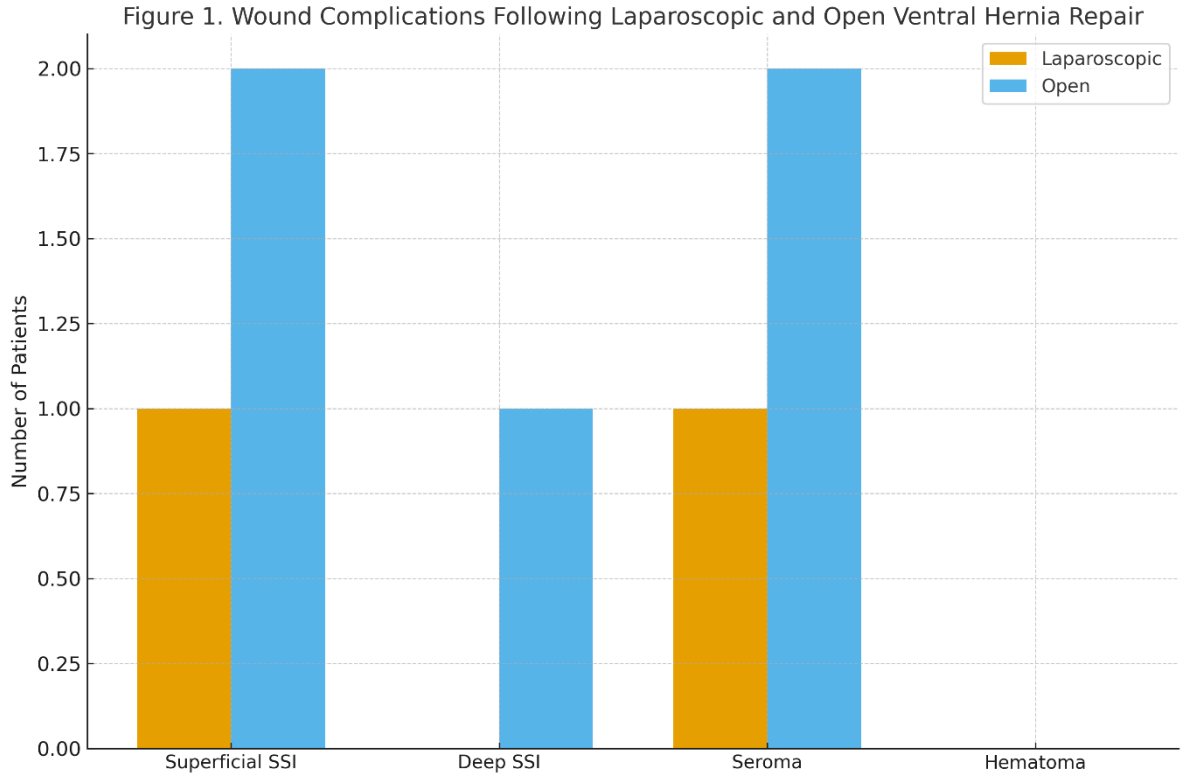

Figure 1: Wound Complications after Open Ventral Hernia Repair and Laparoscopic Procedures

During 30-day follow-up, readmission was required in 1 laparoscopic and 2 open patients. Reoperation was necessary in one open case due to deep wound infection. At three months, chronic pain was reported in 2 laparoscopic and 3 open cases. Recurrence was documented in one patient from each group during available follow-up. These outcomes are presented in Table 3.

Table 3. Postoperative Outcomes

Outcome	Laparoscopic (n=15)	Open (n=15)	p-value
Length of stay (days, median [IQR])	2.0 [2–3]	4.0 [3–5]	0.002*
Wound complications (30d)	2 (13%)	5 (33%)	0.18
Readmission (30d)	1 (6.7%)	2 (13%)	0.54
Reoperation (30d)	0	1 (6.7%)	0.31
Chronic pain ≥3 months	2 (13%)	3 (20%)	0.62
Recurrence ≤1 year	1 (6.7%)	1 (6.7%)	1.00

***Significant difference (p<0.05)**

Discussion

The analysis of our institution's 30 patients having ventral hernia surgery indicate a number of significant factors. Of surgical management. Both laparoscopic and open techniques were applied in comparable patient groups, and outcomes were evaluated across intraoperative and postoperative domains. The results show that while laparoscopic repair took a little longer to do than open repair, it was linked to fewer wound-related issues, a shorter hospital stay, and less blood loss. Rates of recurrence, readmission, reoperation, and chronic pain were broadly similar across both groups. These results suggest that while laparoscopy provides measurable benefits in recovery, both approaches remain viable, each with its own strengths and limitations.

A consistent observation in our study was the difference in intraoperative variables. The laparoscopic group demonstrated significantly lower blood loss, a benefit attributed to the smaller incisions and avoidance of extensive tissue dissection. This reduction has been documented in multiple series internationally, underscoring the minimally invasive advantage of laparoscopy. The laparoscopic cohort also required port installation, adhesiolysis, and secure mesh fixation, which resulted in a lengthier operating duration. The difference, though not statistically significant, is important in settings where operating room efficiency is a priority. Our single conversion to open surgery illustrates that while laparoscopy is safe, certain anatomical or technical challenges may still necessitate conversion, and surgical teams must be prepared to adapt intraoperatively.

Postoperative outcomes form the crux of evaluating surgical approaches. In our series, patients undergoing laparoscopic repair had significantly shorter hospital stays, often mobilizing and resuming oral intake earlier than those who underwent open repair. Reduced hospitalization is not only beneficial for patients in terms of faster return to daily life but also has wider implications for hospital resource utilization. Wound complications were also fewer in the laparoscopic group. This advantage is particularly valuable in populations where diabetes, obesity, and other comorbidities are prevalent, since these conditions increase susceptibility to wound infections and delayed healing. Even yet, this difference lacked statistical significance in the rates of wound complications, the trend supports the growing consensus that laparoscopy lowers wound morbidity compared with traditional open repair.

Despite these perioperative advantages, the two groups' long-term results, including persistent pain and recurrence, were comparable. This result is in line with international literature, which has generally shown no significant difference in recurrence when mesh placement and fixation principles are followed correctly. Chronic pain, although slightly more common in the open group, was also reported among laparoscopic patients, possibly related to fixation devices or intraperitoneal placement of prosthesis. The low overall recurrence rate in our study must be interpreted cautiously, given the modest sample size and limited follow-up period. Nonetheless, the comparable rates suggest that both approaches are capable of providing durable repair in appropriately selected patients.

Our study adds to the body of evidence from the Indian subcontinent, where data on ventral hernia management are still relatively limited. Most published trials originate from Western populations, where patient profiles and health-care resources differ considerably. The relevance of generating local data lies in the distinct patient demographics, higher prevalence of comorbidities, and variable access to advanced surgical equipment in Indian centers. By analyzing outcomes in our institution, this study offers context-specific insights that may be more applicable to similar tertiary hospitals in the region. Furthermore, the routine use of mesh in all cases, irrespective of approach, provided consistency in technique and reinforces the current surgical consensus favoring prosthetic reinforcement to reduce recurrence.

Nevertheless, several limitations must be acknowledged. The retrospective design restricts the ability to control for confounders, and reliance on hospital records may introduce information bias.

The strength of statistical conclusions is limited by the small sample size, which also lowers the power to detect differences in less common outcomes. Additionally, the follow-up period was relatively short, preventing assessment of long-term recurrence, chronic mesh-related complications, or QoL outcomes. The allocation of patients to laparoscopic or open repair was not randomized but based on surgeon preference and patient suitability, raising the possibility of selection bias. Larger and more complex hernias may have been treated preferentially by open surgery, which could influence complication rates in that group.

Despite these limitations, the study offers practical implications for surgical decision-making. The clear benefit in hospital stay and wound morbidity favors laparoscopic repair, particularly for patients at high risk of wound complications or in institutions where early discharge is desirable. However, open repair remains indispensable, especially for complex hernias, larger defects, or situations where laparoscopy may not be feasible. The findings reinforce the concept that rather than one approach replacing the other, both techniques

should be viewed as complementary, with the choice tailored to patient characteristics, hernia complexity, and surgical expertise. It is crucial to improve training in laparoscopic ventral hernia repair since the surgeon's experience and knowledge of minimally invasive procedures have a direct impact on the results.

These results echo global observations and support the role of laparoscopy as a safe and effective option for appropriately selected patients. At the same time, open repair continues to have a vital role, particularly in complex or large hernias where laparoscopic repair may not be practical. Future prospective studies with larger patient cohorts, longer follow-up, and inclusion of quality-of-life and cost-effectiveness measures are necessary to provide more definitive guidance.

Conclusion

While recurrence, chronic pain, and readmission rates were comparable between groups, laparoscopic repair was linked to less intraoperative reduction in blood loss, a shorter hospital stay, and less complications from wounds in this single-center retrospective study comparing laparoscopic and open ventral hernia repair. The laparoscopic method has slightly longer operating periods, but this did not translate into increased morbidity.

These findings are consistent with international evidence suggesting that minimally invasive repair offers short-term benefits without compromising effectiveness. Interpretation of these results should be tempered by the limited sample size, retrospective design, and short follow-up, which restrict generalizability and the assessment of long-term outcomes. Both approaches remain important in clinical practice, with open repair retaining value for large or complex defects. Further prospective, adequately powered studies with longer follow-up and inclusion of patient-reported outcomes are warranted to more definitively guide surgical decision-making in ventral hernia management.

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