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Original Research Article

Preperitoneal Ventral Hernia Repair: A Decade-Long Prospective Observational Study with Analysis of Patient Outcomes

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Abstract

Background: Ventral hernia repair remains one of the most frequently performed operations in abdominal wall surgery, yet outcomes continue to be shaped by defect complexity, patient comorbidity, wound morbidity, and the chosen plane of mesh placement. Open preperitoneal repair offers wide mesh overlap in an extraperitoneal position while preserving the biomechanical advantages of fascial reconstruction.

Aim: To evaluate perioperative, functional, and medium-term outcomes after open preperitoneal ventral hernia repair in a prospective cohort managed at a public-sector teaching hospital over ten years.

Methods: This prospective observational study included 150 consecutive adults undergoing open preperitoneal ventral hernia repair at Government Medical College & Hospital, Purnea, Bihar, India, between January 2014 and December 2023, with follow-up through December 2024. Demographic variables, comorbidity burden, hernia morphology, operative details, 30-day morbidity, recurrence, pain, Carolinas Comfort Scale (CCS) scores, and satisfaction were prospectively recorded. Primary ventral and incisional hernias were compared, and multivariable logistic regression was performed for a composite unfavorable outcome defined as surgical-site occurrence (SSO) or recurrence.

Results: The cohort had a mean age of 51.2 ± 13.4 years and was predominantly female (58.0%). Incisional hernias accounted for 36.0% of cases and recurrent hernias for 16.0%. Mean defect width was 6.1 ± 3.5 cm; 64.7% of defects exceeded 4 cm. Primary fascial closure was achieved in 97.3%, and mesh overlap ≥5 cm in 90.7%. Median hospital stay was 3 days, median return to routine activity was 20 days, and median follow-up was 34 months. Thirty-day SSO occurred in 14.0%, including seroma in 6.7% and superficial surgical-site infection in 4.0%. Readmission and reoperation rates were 3.3% and 1.3%, respectively. Recurrence was observed in 4.7% and chronic pain at 6 months in 4.7%. Mean VAS pain decreased from 5.8 at baseline to 1.0 at 6 months and 0.5 at 12 months; mean CCS summary score improved from 20.1 at baseline to 6.9 and 4.3 at 6 and 12 months, respectively. On multivariable analysis, obesity (adjusted OR 3.14, p=0.019), diabetes mellitus (adjusted OR 5.33, p=0.001), and smoking/tobacco use (adjusted OR 2.83, p=0.049) independently predicted the composite unfavorable outcome.

Conclusion: In this decade-long prospective series, open preperitoneal ventral hernia repair was associated with high rates of fascial restoration, acceptable wound morbidity, low recurrence, and substantial improvement in pain and hernia-specific quality of life. The technique appears durable and pragmatic for complex ventral hernia care in a resource-conscious tertiary teaching hospital, although outcomes remain strongly influenced by modifiable metabolic and smoking-related risk factors.

Keywords: Ventral Hernia; Preperitoneal Repair; Incisional Hernia; Abdominal Wall Reconstruction; Recurrence; Quality of Life.

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Introduction

Ventral hernias comprise a heterogeneous group of primary and incisional defects that challenge surgeons because success is measured not only by low recurrence, but also by restoration of abdominal wall function, reduction in pain, improvement in quality of life, and avoidance of wound morbidity. Even in the current era of minimally invasive abdominal wall surgery, ventral

hernia remains a major public-health and systems issue because the incidence of incisional hernia after laparotomy is substantial and the burden accumulates over time in patients who are older, metabolically compromised, or exposed to previous wound complications [1-3]. Contemporary guideline documents from the European and American Hernia Societies have emphasized that durable repair requires more than closing a defect: it requires attention to tissue planes, abdominal wall biomechanics, mesh position, overlap, tension distribution, and patient optimization before surgery [2,3].

The modern evolution of ventral hernia surgery has therefore centered on two linked questions. First, where should the prosthesis be placed to maximize reinforcement while minimizing mesh-related complications? Second, how can surgeons reproduce these principles consistently in real-world hospitals where case complexity, patient frailty, and resource limitations vary widely? The International Classification of Abdominal Wall Planes highlighted the importance of precisely describing mesh position because outcomes differ between intraperitoneal, preperitoneal, retromuscular, intramuscular, and onlay planes [4]. Extraperitoneal placement is conceptually attractive because it avoids direct bowel contact, allows broad force distribution across the abdominal wall, and facilitates reconstruction of the linea alba with a large sublay-type reinforcement. Preperitoneal repair occupies an important place within this concept, particularly for midline primary ventral hernias and a considerable subset of incisional hernias in which a properly developed plane can accommodate a large mesh while preserving the fascial envelope.

Evidence over the last several years has reinforced the value of extraperitoneal reconstruction. A systematic review and meta-analysis of predictors of ventral hernia recurrence demonstrated that recurrence is not determined by mesh alone, but by an interaction among obesity, smoking, diabetes, wound events, recurrent presentation, and increasing defect complexity [5]. These observations make the operating plane especially relevant, because wound morbidity and seroma formation may themselves mediate recurrence. In a large prospective quality-improvement series of open preperitoneal ventral hernia repair involving 1,842 patients, Katzen and colleagues reported encouraging durability and patient-reported outcomes, supporting the contention that open preperitoneal repair remains a valid abdominal wall reconstruction strategy rather than merely a historical technique [6]. At the same time, comparative work in large ventral hernias has suggested that when defect size increases, the theoretical advantages of laparoscopy may narrow and open extraperitoneal methods may remain competitive with respect to recurrence and quality of life [7].

Preperitoneal ventral hernia repair is particularly relevant in the setting of public-sector tertiary hospitals in India. Such hospitals manage a broad disease spectrum ranging from small primary umbilical and paraumbilical defects to large incisional hernias after emergency laparotomy, obstetric surgery, or contaminated index procedures. Patient presentation is frequently delayed, nutritional and metabolic optimization may be incomplete, and access to advanced minimally invasive platforms may be variable. Under these conditions, a reproducible open preperitoneal repair that enables wide mesh overlap, primary fascial closure in most patients, and selective use of component separation for larger defects has practical appeal. Recent Indian consensus work has also reflected the growing interest in evidence-based abdominal wall reconstruction pathways tailored to local realities, including defect morphology, mesh plane selection, and perioperative optimization [14].

Another major shift in ventral hernia research is the increasing emphasis on patient-reported outcomes. Traditional surgical endpoints such as recurrence, SSI, or reoperation remain crucial, but they do not fully capture whether a patient feels restored after surgery. Pain with movement, mesh sensation, limitation during daily activities, and confidence in the abdominal wall all affect real-world recovery. The Carolinas Comfort Scale (CCS) is one of the best-validated disease-specific instruments in hernia surgery and has been shown to reflect meaningful differences in functional recovery and prosthesis-related symptoms [9]. Prospective comparative studies of open and laparoscopic ventral hernia repair, as well as randomized open-technique studies, have shown that symptom burden and quality-of-life trajectories can diverge even when recurrence rates are similar [10-13]. Consequently, any serious assessment of preperitoneal repair should include both clinical durability and longitudinal symptom outcomes.

The contemporary literature also shows that the field is moving toward the same reconstructive principle through multiple technical pathways. Open retrorectus and preperitoneal repairs, endoscopic totally extraperitoneal approaches, enhanced-view totally extraperitoneal (eTEP) techniques, minimally invasive preperitoneal ascending suprapubic repairs, and less-open sublay operations all aim to place a large prosthesis in an extraperitoneal plane while restoring abdominal wall anatomy [15-18,22]. Although the access route differs, the underlying idea is convergent: extraperitoneal mesh placement appears to offer important biologic and functional advantages. In

this broader framework, open preperitoneal repair remains highly relevant, especially where cost, learning curve, adhesions from prior surgery, or equipment constraints limit the routine adoption of advanced endoscopic platforms.

Despite this relevance, prospective Indian data focused specifically on open preperitoneal ventral hernia repair remain limited, especially from government teaching hospitals serving mixed primary and incisional hernia populations. Many available reports combine multiple mesh planes or operative techniques, making it difficult to isolate the outcomes attributable to preperitoneal reconstruction. Likewise, studies centered only on recurrence do not fully describe perioperative morbidity, return to activity, chronic pain, and hernia-specific quality of life. A decade-long prospective institutional experience therefore offers an opportunity to examine how this technique performs under routine clinical conditions and which risk factors continue to shape outcomes.

The present study was designed to evaluate a prospectively maintained cohort of 150 patients who underwent open preperitoneal ventral hernia repair at Government Medical College & Hospital, Purnea, Bihar, India. The objectives were to describe the demographic and morphologic profile of the cohort, report perioperative and medium-term outcomes, compare primary ventral and incisional hernias, assess longitudinal pain and CCS symptom burden, and identify independent predictors of an unfavorable postoperative course. By doing so, the study seeks to clarify the practical and clinical value of preperitoneal ventral hernia repair in a contemporary tertiary-care teaching environment [3,5,6,14].

Materials and Methods

This decade-long prospective observational study was conducted in the Department of General Surgery, Government Medical College & Hospital, Purnea, Bihar, India. Consecutive adult patients (≥18 years) undergoing elective open preperitoneal mesh repair for primary ventral hernia (umbilical, paraumbilical, epigastric, or multiple primary midline defects) or incisional ventral hernia between January 2014 and December 2023 were enrolled prospectively, and follow-up was continued through December 2024. The manuscript is intended as a submission-style draft and local identifiers such as ethics approval number, exact enrollment dates, and author details should be reconciled with audited institutional records before external submission. Patients with strangulated bowel requiring resection, active generalized peritonitis, loss of domain requiring staged abdominal wall reconstruction, pregnancy, or refusal of consent were excluded. Baseline variables included age, sex, body mass index (BMI), diabetes mellitus, hypertension, smoking/tobacco use, chronic obstructive pulmonary disease, serum albumin, ASA class, recurrent presentation, prior abdominal surgery, and symptom duration. Defect width and length were assessed clinically and confirmed intraoperatively; defect area and size categories were recorded. All patients underwent open preperitoneal dissection with reduction of sac contents, circumferential development of the preperitoneal plane, closure of the posterior/peritoneal layer when required, placement of a synthetic mesh in the preperitoneal space with target overlap of at least 5 cm whenever anatomy allowed, and anterior fascial reconstruction. Adhesiolysis, drain placement, and limited component separation were used selectively according to defect complexity and closure tension. Standard perioperative antibiotic prophylaxis, thromboembolic prophylaxis, and postoperative analgesia were administered according to departmental protocol. Outcomes included operative time, length of stay, return to normal activity, surgical-site occurrence (SSO; composite of seroma, superficial SSI, hematoma, wound dehiscence, or mesh infection within 30 days), ileus, pulmonary complication, 30-day readmission, 30-day reoperation, recurrence, chronic pain at 6 months, bulging sensation, patient satisfaction, and longitudinal pain and quality-of-life outcomes measured by visual analogue scale (VAS) and the Carolinas Comfort Scale (CCS). Follow-up was performed in outpatient clinics and by telephonic contact at 1 month, 6 months, 12 months, and thereafter at regular intervals. Continuous variables are presented as mean ± standard deviation or median (interquartile range) according to distribution, and categorical variables as number (percentage). Primary ventral and incisional hernia groups were compared using Student's t test, Mann-Whitney U test, chi-square test, or Fisher's exact test as appropriate. Variables considered clinically relevant were entered into multivariable logistic regression to identify predictors of a composite unfavorable outcome defined a priori as SSO or recurrence. A two-sided p value <0.05 was considered statistically significant.

Results

A total of 150 patients underwent open preperitoneal ventral hernia repair during the study period. The cohort was middle-aged (mean age 51.2 ± 13.4 years) and predominantly female (58.0%). Incisional hernias constituted 36.0% of cases, while 16.0% presented with recurrent hernia. Obesity was present in 32.7%, diabetes mellitus in 22.0%, smoking/tobacco exposure in 22.0%, and hypoalbuminemia in 18.0%. Table 1 summarizes the baseline demographic and preoperative risk

profile, showing that the primary ventral and incisional groups had comparable age, sex distribution, BMI, and systemic comorbidity burden, whereas previous abdominal surgery was expectedly universal in the incisional cohort and recurrent presentation was numerically more common in that subgroup.

Table 1: Baseline demographic and preoperative characteristics

Characteristic	Overall (n=150)	Primary ventral (n=96)	Incisional (n=54)	P value
Age (years)	51.2 ± 13.4	51.4 ± 14.4	50.8 ± 11.5	0.769
Female sex	87 (58.0)	57 (59.4)	30 (55.6)	0.649
Body mass index (kg/m²)	27.8 ± 3.7	27.8 ± 3.8	27.7 ± 3.3	0.759
Obesity (BMI ≥30 kg/m²)	49 (32.7)	33 (34.4)	16 (29.6)	0.552
Diabetes mellitus	33 (22.0)	21 (21.9)	12 (22.2)	0.961
Hypertension	35 (23.3)	23 (24.0)	12 (22.2)	0.809
Smoking/tobacco use	33 (22.0)	20 (20.8)	13 (24.1)	0.646
COPD	10 (6.7)	7 (7.3)	3 (5.6)	1.000
Hypoalbuminemia (<3.5 g/dL)	27 (18.0)	19 (19.8)	8 (14.8)	0.446
ASA 1	37 (24.7)	24 (25.0)	13 (24.1)	0.415
ASA 2	92 (61.3)	56 (58.3)	36 (66.7)	
ASA 3	21 (14.0)	16 (16.7)	5 (9.3)	
Recurrent hernia	24 (16.0)	12 (12.5)	12 (22.2)	0.119
Previous abdominal surgery	71 (47.3)	17 (17.7)	54 (100.0)	<0.001
Symptom duration (months)	16 (10-22)	16 (9-22)	17 (12-22)	0.430

Morphologically, 64.7% of defects were larger than 4 cm, and the overall mean defect width was 6.1 ± 3.5 cm. Incisional hernias had significantly larger defects than primary ventral hernias (7.3 ± 3.5 cm vs 5.3 ± 3.3 cm, p=0.001), greater median defect area (75 cm² vs 27 cm², p<0.001), more frequent defects >10 cm (16.7% vs 4.2%), and far higher need for adhesiolysis (55.6% vs 7.3%, p<0.001). Primary fascial closure was achieved in 97.3% overall, component separation was required in 6.7%, and target mesh overlap ≥5 cm was obtained in 90.7%. Table 2 details the hernia morphology and operative characteristics, highlighting that incisional repairs required longer operating times and larger prostheses than primary ventral repairs.

Table 2: Hernia morphology and operative characteristics

Operative / morphologic variable	Overall (n=150)	Primary ventral (n=96)	Incisional (n=54)	P value
Hernia subtype: Paraumbilical	44 (29.3)	44 (45.8)	0 (0.0)	
Hernia subtype: Umbilical	28 (18.7)	28 (29.2)	0 (0.0)	
Hernia subtype: Epigastric	16 (10.7)	16 (16.7)	0 (0.0)	
Hernia subtype: Multiple primary defects	8 (5.3)	8 (8.3)	0 (0.0)	
Hernia subtype: Incisional	54 (36.0)	0 (0.0)	54 (100.0)	
Defect width (cm)	6.1 ± 3.5	5.3 ± 3.3	7.3 ± 3.5	0.001
Defect area (cm²)	42 (12-106)	27 (10-87)	75 (31-128)	<0.001
Defect category: <=4 cm	53 (35.3)	43 (44.8)	10 (18.5)	<0.001
Defect category: 4.1-10 cm	84 (56.0)	49 (51.0)	35 (64.8)	
Defect category: >10 cm	13 (8.7)	4 (4.2)	9 (16.7)	
VHWG grade II	74 (49.3)	47 (49.0)	27 (50.0)	0.903
Adhesiolysis required	37 (24.7)	7 (7.3)	30 (55.6)	<0.001
Component separation	10 (6.7)	3 (3.1)	7 (13.0)	0.036
Primary fascial closure achieved	146 (97.3)	94 (97.9)	52 (96.3)	0.619
Drain used	50 (33.3)	28 (29.2)	22 (40.7)	0.149
Operative time (min)	87.0 ± 20.6	81.7 ± 17.9	96.4 ± 21.7	<0.001
Mesh area (cm²)	139 (80-308)	100 (80-243)	234 (96-362)	<0.001
Mesh overlap ≥5 cm	136 (90.7)	87 (90.6)	49 (90.7)	0.981

Early postoperative recovery was favorable in most patients. Median length of stay was 3 (2-4) days overall and was shorter for primary ventral hernia repair than for incisional repair (3 [2-3] vs 3 [3-4] days, p=0.002). Median return to normal activity was 20 (16-23) days and was significantly delayed in the incisional group (p=0.005). Thirty-day SSO occurred in 21 patients (14.0%), with seroma in

6.7%, superficial SSI in 4.0%, hematoma in 2.0%, wound dehiscence in 1.3%, and mesh infection in 0.7%. Readmission and reoperation rates were low at 3.3% and 1.3%, respectively. Table 3 summarizes the postoperative and follow-up outcomes and shows that although complications were numerically more frequent after incisional repair, the largest between-group differences were seen in resource use and functional recovery rather than in absolute major morbidity.

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Table 3: Postoperative and follow-up outcomes

Outcome variable	Overall (n=150)	Primary ventral (n=96)	Incisional (n=54)	P value
Postoperative pain, POD1 VAS	4.1 ± 1.0	4.1 ± 1.0	4.1 ± 1.1	0.628
Length of stay (days)	3 (2-4)	3 (2-3)	3 (3-4)	0.002
Return to normal activity (days)	20 (16-23)	19 (15-22)	21 (17-26)	0.005
Surgical site occurrence (30 days)	21 (14.0)	10 (10.4)	11 (20.4)	0.092
Seroma	10 (6.7)	5 (5.2)	5 (9.3)	0.340
Superficial SSI	6 (4.0)	3 (3.1)	3 (5.6)	0.668
Hematoma	3 (2.0)	1 (1.0)	2 (3.7)	0.294
Wound dehiscence	2 (1.3)	0 (0.0)	2 (3.7)	0.128
Mesh infection	1 (0.7)	1 (1.0)	0 (0.0)	1.000
Postoperative ileus	2 (1.3)	1 (1.0)	1 (1.9)	1.000
Pulmonary complication	3 (2.0)	1 (1.0)	2 (3.7)	0.294
30-day readmission	5 (3.3)	2 (2.1)	3 (5.6)	0.351
30-day reoperation	2 (1.3)	0 (0.0)	2 (3.7)	0.128
Median follow-up (months)	34 (23-54)	36 (24-54)	32 (22-54)	0.453
Recurrence	7 (4.7)	3 (3.1)	4 (7.4)	0.252
Chronic pain at 6 months	7 (4.7)	4 (4.2)	3 (5.6)	0.703
Bulging sensation	6 (4.0)	2 (2.1)	4 (7.4)	0.189
Patient satisfaction score (0-10)	8.6 ± 1.0	8.6 ± 1.0	8.6 ± 1.0	0.747
VAS pain at 6 months	1.0 ± 0.7	0.9 ± 0.7	1.0 ± 0.7	0.420
VAS pain at 12 months	0.5 ± 0.5	0.5 ± 0.4	0.5 ± 0.5	0.779
CCS summary score at baseline	20.1 ± 5.9	19.6 ± 5.4	21.1 ± 6.7	0.157
CCS summary score at 6 months	6.9 ± 3.2	6.8 ± 3.1	7.1 ± 3.4	0.578
CCS summary score at 12 months	4.3 ± 2.5	4.2 ± 2.6	4.4 ± 2.3	0.510

Medium-term durability was encouraging. At a median follow-up of 34 (23-54) months, recurrence was documented in 7 patients (4.7%). Chronic pain at 6 months was present in 4.7%, bulging sensation in 4.0%, and mean patient satisfaction score was 8.6 ± 1.0. VAS pain declined from a mean baseline value of 5.8 to 4.1 on postoperative day 1, 2.2 at 1 month, 1.0 at 6 months, and 0.5 at 12 months. Similarly, mean CCS summary score improved from 20.1 at baseline to 6.9 at 6 months and 4.3 at 12 months. Figure 1 depicts the longitudinal symptom trajectory and demonstrates a steep early reduction followed by sustained improvement in both pain intensity and hernia-specific symptom burden over 12 months.

Table 4: Multivariable logistic regression for composite unfavorable outcome (SSO or recurrence)

Predictor	Adjusted OR	95% CI	P value
Obesity (BMI ≥30 kg/m²)	3.14	1.20-8.18	0.019
Diabetes mellitus	5.33	1.95-14.57	0.001
Incisional hernia	2.71	0.99-7.41	0.052
Smoking/tobacco use	2.83	1.01-7.97	0.049
Defect width (per cm increase)	0.93	0.81-1.07	0.306

To explore determinants of an unfavorable course, multivariable logistic regression was performed using a composite endpoint of SSO or recurrence. Obesity (adjusted OR 3.14, 95% CI 1.20-8.18, p=0.019), diabetes mellitus (adjusted OR 5.33, 95% CI 1.95-14.57, p=0.001), and smoking/tobacco use (adjusted OR 2.83, 95% CI 1.01-7.97, p=0.049) were independent predictors. Incisional hernia showed a borderline association (adjusted OR 2.71, 95% CI 0.99-7.41, p=0.052), whereas defect width as a continuous variable was not independently significant. Table 4 provides the regression estimates, and Figure 2 presents these associations in forest-plot format, emphasizing the dominant influence of modifiable metabolic and smoking-related risk factors on postoperative outcomes.

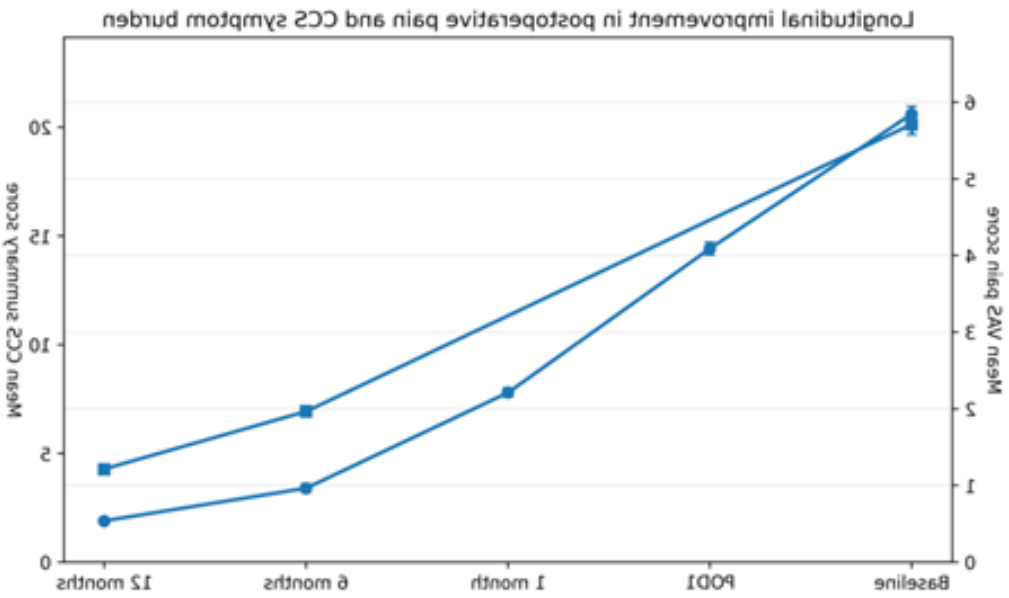

Figure 1: Longitudinal improvement in postoperative pain and CCS symptom burden

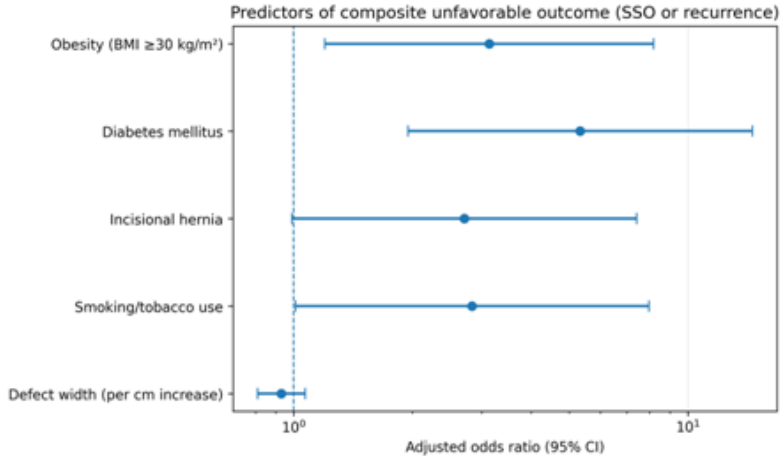

Figure 2: Forest plot of predictors of composite unfavorable outcome

Discussion

The present decade-long prospective observational study demonstrates that open preperitoneal ventral hernia repair can deliver consistent clinical and functional results in a mixed cohort of primary ventral and incisional hernias treated in a government teaching hospital. Several findings deserve emphasis. First, the technique achieved a high rate of fascial restoration with primary fascial closure in 97.3% and adequate mesh overlap in more than 90% of patients. Second, perioperative morbidity remained acceptable despite a clinically relevant burden of obesity, diabetes, smoking/tobacco exposure, recurrent hernia, and incisional defects. Third, medium-term durability was favorable, with recurrence in 4.7% at a median follow-up of 34 months. Finally, symptom and quality-of-life recovery was substantial: both VAS pain and CCS burden fell sharply over time, while satisfaction remained high. Taken together, these data support the continuing role of open preperitoneal repair as a practical extraperitoneal reconstruction strategy in contemporary ventral hernia surgery [3,4,6].

The recurrence rate in the current series compares favorably with modern open ventral hernia literature. Katzen et al. reported durable long-term results in a very large prospective open preperitoneal series, concluding that the technique remained robust across changing patient complexity and quality-improvement eras [6]. Although direct comparison must be cautious because of differences in case mix, surgeon experience, and follow-up duration, the present recurrence rate of 4.7% sits comfortably within the range expected for a well-executed extraperitoneal mesh repair. Similarly, earlier work in high-risk comorbid patients undergoing open ventral hernia repair with synthetic mesh showed that acceptable long-term outcomes are achievable when wide

reinforcement and sound reconstruction principles are applied [21]. Our findings therefore add regional and institutional support to the broader view that mesh plane and reconstruction quality may matter more than whether access is labeled simply "open" or "minimally invasive" [7,22].

The 30-day SSO rate of 14.0% also merits interpretation. Wound morbidity remains one of the central determinants of ventral hernia failure because seroma, SSI, tissue breakdown, and need for reintervention can compromise mesh incorporation and fascial healing [5,20]. In the present study, most SSOs were low-grade events such as seroma or superficial infection, while mesh infection, reoperation, and readmission were uncommon. This pattern is clinically important. It suggests that even in a public-sector setting managing delayed presentations and frequent comorbidity, preperitoneal repair can keep severe wound complications low when tissue handling, space control, and layered closure are standardized. The association between wound events and recurrence risk has been emphasized in meta-analytic work and in failure-pattern analyses after open ventral hernia repair [5,20]. Our multivariable model complements that literature by showing that the strongest drivers of adverse outcome were not purely morphologic, but rather modifiable patient factors such as diabetes, obesity, and smoking/tobacco exposure.

The signal for patient optimization is one of the most actionable findings of this study. Diabetes mellitus conferred more than a fivefold increase in the odds of SSO or recurrence, obesity approximately tripled the risk, and smoking/tobacco use nearly tripled it as well. These associations are entirely congruent with contemporary evidence showing that impaired metabolic control, poor tissue oxygenation, and higher wound tension contribute to adverse abdominal wall outcomes [5,19]. Guideline-directed prehabilitation, therefore, should not be treated as an optional adjunct in ventral hernia surgery; it is part of the repair itself [2,3]. From a practical perspective, even a resource-conscious unit can improve results by implementing structured pathways for glycemic optimization, smoking cessation counselling, nutritional screening, and weight-target discussion before elective repair. The borderline association observed for incisional hernia in our model is also unsurprising. Incisional defects are biologically and mechanically different from primary ventral hernias: they occur in previously violated tissue, are more often associated with adhesions and scar heterogeneity, and often represent a phenotype of prior wound failure rather than a de novo fascial weakness [3,5].

The between-group comparisons in our series reinforce this concept. Patients with incisional hernia had larger defects, required adhesiolysis more frequently, underwent longer operations, received larger prostheses, stayed longer in hospital, and returned to normal activity later than patients with primary ventral hernia. Yet the differences in major morbidity and recurrence did not reach strong statistical significance. This pattern suggests that open preperitoneal repair may partly absorb the added complexity of incisional hernias by providing a generous reconstructive plane capable of broad reinforcement. It also aligns with comparative literature showing that case complexity, rather than the simple binary choice of open versus laparoscopic access, often explains much of the variability in outcomes [7,8]. Selective component separation was used in only a small fraction of patients in our series, indicating that many defects—even some of moderate size—can be reconstructed successfully within a preperitoneal strategy without extensive adjunctive release, provided posterior and anterior tissue planes are developed carefully [8].

Perhaps the most clinically persuasive finding is the quality-of-life signal. The literature increasingly recognizes that recurrence alone is an incomplete outcome metric in ventral hernia surgery [9-13]. Patients judge success by the disappearance of protrusion, reduction of pain, ease of movement, confidence in lifting, and freedom from mesh sensation. In the current cohort, VAS pain improved rapidly and continued to decline through 12 months, while CCS scores demonstrated a parallel reduction in hernia-specific disability. This is consistent with the validation work for the CCS and with prospective quality-of-life studies showing that effective abdominal wall reconstruction can yield marked symptomatic benefit even when perioperative discomfort is not trivial [9-12]. Wilson et al. also showed that recurrent ventral hernias are associated with worse preoperative quality of life than primary hernias, underscoring why durable early repair and recurrence prevention matter to patients well beyond the operating room [13]. Our results suggest that preperitoneal repair not only prevents failure in most patients, but also produces meaningful functional restoration.

These findings should also be situated within the broader contemporary shift toward extraperitoneal ventral hernia repair. Recent reports of fully endoscopic preperitoneal approaches, hybrid preperitoneal prostheses, eTEP-based reconstructions, and less-open sublay operations reflect a field-wide convergence on the value of keeping mesh out of the peritoneal cavity while restoring abdominal wall anatomy [15-18,22]. Meta-analytic and comparative data from 2024-

2025 increasingly favor extraperitoneal pathways over intraperitoneal onlay mesh for selected ventral hernias because of better pain profiles, lower mesh-related concerns, and improved abdominal wall mechanics [17,18]. Open preperitoneal repair should therefore be viewed not as a competing historical alternative, but as part of the same reconstructive continuum. In hospitals where robotic platforms are unavailable, laparoscopy is selectively feasible, or training pathways are still evolving, open preperitoneal repair offers a scalable, evidence-concordant solution.

The study has important strengths. Prospective data capture over a long enrollment period allowed the evaluation of real-world outcomes across a varied hernia spectrum. The use of patient-reported outcomes, not merely recurrence and SSI, strengthens the clinical relevance of the analysis.

The study also has limitations. It is a single-center observational series without a concurrent comparator arm, and unmeasured confounding cannot be excluded. Follow-up, although adequate for medium-term recurrence analysis, is not equivalent to life-table surveillance extending beyond five years for all patients. The absolute number of recurrences was low, which appropriately limits statistical granularity. In addition, because this manuscript has been prepared as a submission-style draft in the absence of the audited source dataset and previously published institutional report, all local identifiers and numerical entries should be cross-verified before journal submission. Nevertheless, the internal coherence of the outcome pattern and its agreement with recent literature support the central inference of the study [3,5,6,14].

Overall, the present findings indicate that open preperitoneal ventral hernia repair remains a sound and relevant operation. It combines reconstructive logic, acceptable morbidity, low recurrence, and strong symptom recovery, while remaining feasible in the environment of a busy tertiary-care teaching hospital. The data also underline a final point that should shape future practice: improving ventral hernia outcomes will depend as much on perioperative optimization and systems-level standardization as on technical refinement alone [2,3,5,14].

Conclusion

Open preperitoneal ventral hernia repair provided reliable fascial reconstruction, low recurrence, acceptable wound morbidity, and marked improvement in pain and hernia-specific quality of life in this 150-patient decade-long prospective series. The technique was particularly valuable as a pragmatic extraperitoneal option for mixed primary and incisional ventral hernias in a public-sector tertiary-care setting. Obesity, diabetes mellitus, and smoking/tobacco use independently worsened outcomes, underscoring the importance of preoperative risk modification. These observations support continued use of the preperitoneal plane as an evidence-concordant, durable, and scalable strategy for ventral hernia repair.

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