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Original Research Article

A Comparative Study of Recto Rectus and Onlay Mesh Placement in Incisional Hernias

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Abstract

Background: Incisional hernia is a common long-term complication following abdominal surgery and is associated with pain, impaired quality of life, wound morbidity, and recurrence. Mesh reinforcement is widely accepted for repair, although the optimal mesh position remains debated. Onlay mesh placement is technically simpler, whereas retro-rectus mesh placement may provide better tissue integration and reduced wound-related complications. This study compared the surgical outcomes of retro-rectus and onlay mesh repair in patients with ventral and incisional hernias.

Aim: To compare the effectiveness and surgical outcomes of open retro-rectus mesh repair with onlay mesh repair in patients undergoing ventral hernia repair.

Materials and Methods: A prospective comparative hospital-based study was conducted in the Department of General Surgery, Narayana Medical College and Hospital, Nellore, from May 2024 to December 2025. Fifty adult patients with ventral hernias requiring surgical repair were included and alternatively allocated into two groups: onlay mesh repair (n=25) and retro-rectus mesh repair (n=25). Postoperative pain, wound complications, hospital stay, recovery, quality of life, cosmetic satisfaction, and recurrence were assessed. Patients were followed up on postoperative days 1 and 3, at discharge, and at 1, 3, and 6 months. A p-value <0.05 was considered statistically significant.

Results: The mean operative time was significantly longer in the retro-rectus group than in the onlay group (80.6 ± 10.8 vs. 71.8 ± 11.9 minutes; p=0.006). Seroma occurred in 12% of retro-rectus repairs compared with 16% of onlay repairs, while deep surgical site infection occurred in 0% and 4%, respectively. Overall postoperative complications were lower with retro-rectus repair (16% vs. 24%), although the difference was not statistically significant (p=0.48). Postoperative day-1 pain was higher following retro-rectus repair (5.6 ± 1.0 vs. 4.7 ± 1.0; p=0.04), but pain scores became comparable subsequently. At six months, quality-of-life scores were significantly higher in the retro-rectus group (90.4 ± 5.9 vs. 86.8 ± 6.5; p=0.04), as were cosmetic satisfaction scores (3.9 ± 0.7 vs. 3.5 ± 0.8; p=0.03). Recurrence occurred in 1 patient (4%) in the onlay group and none in the retro-rectus group, without statistical significance (p=0.31).

Conclusion: Retro-rectus mesh repair required a significantly longer operative time but demonstrated favourable postoperative outcomes, including fewer wound-related complications, better six-month quality of life, greater cosmetic satisfaction, and no recurrence during the six-month follow-up. Although the differences in complications and recurrence were not statistically significant, the overall findings support retro-rectus mesh placement as a preferable open technique for ventral and incisional hernia repair when adequate surgical expertise is available.

Keywords: Incisional hernia; Retro-rectus mesh; Onlay mesh; Hernia repair.

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Introduction

Incisional hernia is a prevalent long-term consequence after abdominal procedures, with occurrence rates estimated between 10% and 20%, contingent upon patient risk factors and the specific treatment performed. It substantially impacts patients' quality of life, elevates morbidity, and imposes a major healthcare expense due to recurrence, chronic pain, and the necessity for reoperation. Mesh reinforcement has emerged as the benchmark for incisional hernia repair, as it

decreases recurrence rates in comparison to initial suture repair. The selection of mesh implantation technology continues to be a subject of contention and active investigation. A hernia is the displacement of tissue or an organ through an unnatural opening, which may be congenital or acquired, such as at the site of a previous surgical incision—referred to as an incisional hernia. Hernias can occur in several anatomical locations, with inguinal hernias being the most common, followed by ventral hernias. [1]

Abdominal wall hernias are classified as primary ventral hernias and incisional hernias. Each year, around 300,000 to 350,000 ventral hernia surgeries are performed. About 75% are ascribed to primary anomalies, chiefly epigastric, umbilical, paraumbilical, and Spigelian hernias, whereas 25% are ascribed to incisional hernias. [2] Nonetheless, while incisional and primary ventral hernias are sometimes grouped together, it is crucial to acknowledge that each has distinct pathophysiology, differing patient risk factors, and thus, occasionally diverse treatment strategies. Hernias can cause significant discomfort and distress that greatly impact patients' quality of life. Moreover, they may urge individuals to reduce self-esteem of the patient and also may complicate as internal obstruction. Thus, ventral hernias frequently require surgical intervention and demand repair. [3] Two often employed open mesh placement procedures are onlay mesh repair, in which the mesh is positioned over the anterior rectus sheath, and retro-rectus mesh repair, where the mesh is situated in the area between the rectus muscle and the posterior rectus sheath. Every approach possesses distinct advantages and limits. The placement of onlays is technically less complex and commonly performed; yet, it presents an elevated risk of seroma, wound problems, and recurrence due to suboptimal tissue integration. Conversely, retro-rectus implantation offers a highly vascularised plane that enhances mesh integration, diminishes infection risk, and lowers recurrence rates; nonetheless, it is technically more challenging and entails a prolonged operating duration.

Despite several research, a general consensus about the optimal approach that ensures an ideal mix of safety, durability, and patient outcomes, particularly across various patient subgroups, remains elusive. The selection frequently relies on surgeon preference and institutional protocols rather than robust comparative data. In the Indian clinical context, where patient variables such as malnutrition, diabetes, obesity, and delayed presentation affect results, the generation of local data comparing retro-rectus and onlay mesh repairs is of significant importance. Consequently, this study is essential to: Assess and contrast postoperative problems including infection, seroma, haematoma, and wound dehiscence. Evaluate recurrence rates and long-term efficacy of the two methods. Evaluate surgical duration, length of hospitalisation, and total morbidity to ascertain cost-effectiveness in a resource-constrained environment. Offer evidence-based guidelines to assist surgeons in choosing the most effective procedure for incisional hernia repair within the local demographic. This study systematically compares open retro-rectus and onlay mesh placement to generate robust data that will enhance global literature and aid in the development of context-specific surgical guidelines, thereby improving patient outcomes and alleviating the incidence of incisional hernias.

Aim: To evaluate the efficiency of open retro rectus mesh repair in comparison with onlay mesh repair with relation to surgical outcomes. **Objectives:** Objectives of the study include post-operative complications, pain levels, wound infection, wound dehiscence, and recurrence rates in patients undergoing ventral hernia repair by retro rectus and onlay mesh repair for wound-related complications

Materials and Methods: This was a hospital-based prospective comparative clinical study done from May 2024 to December 2025 in 50 patients admitted to the Department of General Surgery, Narayana Medical College and Hospital, Nellore, who were diagnosed with ventral hernia and underwent surgical repair.

Inclusion criteria: Patients with ventral hernias requiring surgical repair. Adults aged 18 years and above. **Exclusion criteria:** Individuals with intricate hernias necessitating specialised surgical methods, Pregnant patients, Patients having substantial comorbidities, patients exhibiting active infections at the surgery site and Individuals with recurring incisional hernias.

Methodology: All patients hospitalised with ventral hernias were recognised and diagnosed accordingly. The participants were alternatively allocated into two groups: one group received retrorectus mesh repair, while the other received onlay mesh repair. Postoperative outcomes were evaluated for pain, wound infection, wound dehiscence, and recurrence. Each patient was monitored for a duration of six months. Postoperative follow-up evaluations were conducted on day 1, day 3, the day of discharge, and thereafter at 1 month, 3 months, and 6 months.

Statistical analysis: The data collected were statistically analyzed to determine clinical significance. A p-value of <0.05 was considered statistically significant.

Results

Table 1: Baseline Demographic Characteristics of Study Participants

Variable	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Age (years)	52.8 ± 11.6	54.2 ± 10.9	0.64
Male	7 (28.0%)	10 (40.0%)	0.37
Female	18 (72.0%)	15 (60.0%)	
Body Mass Index (kg/m²)	27.4 ± 3.3	26.6 ± 3.1	0.41
Hernia diameter (cm)	6.9 ± 1.5	6.7 ± 1.6	0.68
Duration since index surgery (months)	10 (40.0%)	11 (44.0%)	0.79

Table 2: Distribution of Predisposing Risk Factors among Study Participants

Predisposing Risk Factor	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Age > 50 years	14 (56.0%)	15 (60.0%)	0.77
Obesity(BMI≥30 kg/m²)	6 (24.0%)	5 (20.0%)	0.73
Diabetes mellitus	8 (32.0%)	7 (28.0%)	0.76
Smoking	5 (20.0%)	6 (24.0%)	0.73
Anemia	5 (20.0%)	4 (16.0%)	0.71
Post-operative cough	3 (12.0%)	3 (12.0%)	1.00
Prior wound infection after index surgery	2 (8.0%)	2 (8.0%)	1.00

Table 3: Distribution of Index Surgery and Incision in the Study Groups

Variable	Onlay Mesh Group	Retro rectus Mesh Group	p-value
Type of Index Surgery			
Primary Ventral Hernia	15 (60.0%)	14 (56.0%)	0.99
Incisional Hernia	10 (40.0%)	11 (44.0%)	
caesarean section (LSCS)	7 (28.0%)	6 (24.0%)	
Abdominal hysterectomy	6 (24.0%)	7 (28.0%)	
Exploratory laparotomy	4 (16.0%)	4 (16.0%)	
Bowel surgery	3 (12.0%)	3 (12.0%)	
Appendicectomy	3 (12.0%)	3 (12.0%)	
Cholecystectomy	2 (8.0%)	2 (8.0%)	
Type of Index Incision			
Lower midline incision	13 (52.0%)	14 (56.0%)	0.78
Midline incision	12 (48.0%)	11 (44.0%)	

Table 4: Comparison of Preop Laboratory Parameters between the Study Groups

Laboratory Parameter	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Hemoglobin (g/dL)	12.6 ± 1.4	12.9 ± 1.3	0.41
Total leukocyte count (/µL)	7,520 ± 1,480	7,680 ± 1,390	0.68
Platelet count (/µL)	2.58 ± 0.52 ×10⁵	2.64 ± 0.49 ×10⁵	0.66
Random blood sugar (mg/dL)	132.4 ± 38.6	128.7 ± 35.9	0.72
Serum albumin (g/dL)	3.9 ± 0.4	4.0 ± 0.3	0.29
Serum creatinine (mg/dL)	0.92 ± 0.18	0.94 ± 0.17	0.73

Table 5: Comparison of Operative Time and Intraop Parameters in the Study Groups

Intraoperative Parameter	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Operative time (minutes)	71.8 ± 11.9	80.6 ± 10.8	0.006
Estimated blood loss (mL)	138.4 ± 52.6	145.7 ± 56.1	0.64
Mesh area used (cm²)	270.5 ± 58.2	282.9 ± 61.4	0.46
Duration of drain placement (days)	3.7 ± 1.1	4.0 ± 1.2	0.33

Table 6: Comparison of Early Postop Complications between the Study Groups

Early Postoperative Complication	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Seroma formation	4 (16.0%)	3 (12.0%)	0.68
Superficial surgical site infection	2 (8.0%)	2 (8.0%)	1.00
Deep surgical site infection	1 (4.0%)	0 (0.0%)	0.31
Mesh extrusion	1 (4.0%)	0 (0.0%)	0.31
Mesh removal	1 (4.0%)	0 (0.0%)	0.31

Table 7: Postop Hospital Stay and Recovery Parameters in the Study Groups

Postoperative Parameter	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group(n = 25)	p-value
Duration of hospital stay (days)	7.1 ± 1.3	7.4 ± 1.4	0.38
Time to ambulation (days)	1.6 ± 0.6	1.7 ± 0.5	0.52
Time to oral feeds (days)	1.3 ± 0.5	1.4 ± 0.5	0.47
Return to normal activity/work (days)	27.6 ± 6.8	29.4 ± 7.2	0.36

Table 8: Comparison of Postoperative Pain Scores (Vas) Between the Study Groups

Time Point (VAS 0–10)	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Postoperative Day 1	4.7 ± 1.0	5.6 ± 1.0	0.04
Postoperative Day 3	4.2 ± 1.0	4.4 ± 0.9	0.38
Postoperative Day 7	3.2 ± 0.9	3.0 ± 0.9	0.42
Postoperative Day 30	1.8 ± 0.8	1.6 ± 0.7	0.31

Table 9: Comparison of Qol Scores at Baseline and Follow-Up

Quality of Life Score (0–100)	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Preoperative (baseline)	67.6 ± 7.9	58.9 ± 8.2	0.58
At 1 month	69.2 ± 8.4	71.5 ± 7.9	0.33
At 3 months	79.4 ± 7.1	82.6 ± 6.8	0.11
At 6 months	86.8 ± 6.5	90.4 ± 5.9	0.04

Table 10: Comparison of Cosmetic Satisfaction Scores at 6-Month Follow-Up

Cosmetic Satisfaction Score (1–5)	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Mean cosmetic score	3.5 ± 0.8	3.9 ± 0.7	0.03
Satisfied (score ≥ 4)	14 (56.0%)	19 (76.0%)	0.13

Table 11: Comparison of Hernia Recurrence at 6-Month Follow-Up

Outcome	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Hernia recurrence at 6 months	1 (4.0%)	0 (0.0%)	0.31

Table 12: Comparison of Overall Postoperative Complication Rates

Postoperative complication	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Present	6 (24.0%)	4 (16.0%)	0.48
Absent	19 (76.0%)	21 (84.0%)	

Table 13: Comparison of Time to Return To Work between the Study Groups

Parameter	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Time to return to work (days)	27.6 ± 6.8	29.4 ± 7.2	0.36

Table 14: Summary of Key Outcomes between Onlay and Retro Rectus Mesh Repair

Outcome Parameter	Onlay Mesh Group (n = 25)	Retro rectus Mesh Group (n = 25)	p-value
Operative time (minutes)	71.8 ± 11.9	80.6 ± 10.8	0.006
Any postoperative complication	6 (24.0%)	4 (16.0%)	0.48
Seroma formation	4 (16.0%)	3 (12.0%)	0.68
Deep surgical site infection	1 (4.0%)	0 (0.0%)	0.31
Mesh extrusion / removal	1 (4.0%)	0 (0.0%)	0.31
Mean hospital stay (days)	7.1 ± 1.3	7.4 ± 1.4	0.38
Pain score at 1 month (VAS)	1.8 ± 0.8	1.6 ± 0.7	0.31
Quality of life score at 6 months	86.8 ± 6.5	90.4 ± 5.9	0.04
Cosmetic satisfaction score (6 months)	3.5 ± 0.8	3.9 ± 0.7	0.03
Hernia recurrence at 6 months	1 (4.0%)	0 (0.0%)	0.31
Time to return to work (days)	27.6 ± 6.8	29.4 ± 7.2	0.36

Discussion:

Extensive comparative analyses conducted in the past decade have consistently indicated that sublay/retro rectus implantation is associated with reduced wound morbidity and perhaps decreased recurrence rates, but the extent of these findings differs according to research design, hernia size, follow-up time, and patient risk profile. Timmermans et al. meta-analysis (2014) and subsequent systematic reviews/meta-analyses predominantly indicate a preference for the sublay/retro rectus plane for wound outcomes and occasionally recurrence. [4]

Baseline comparability and internal validity of our comparison: A principal advantage of our dataset is the effective matching of both arms at baseline, which minimises confounding and facilitates a clearer interpretation of perioperative and follow-up disparities. In our study, age, sex distribution, BMI, hernia diameter, and duration since index surgery were statistically equivalent between the onlay and retro rectus groups (all $p > 0.05$).

This is methodologically significant since age, obesity, diabetes, smoking, previous wound infection, anaemia, and cough (elevated intra-abdominal pressure) are recognised factors influencing wound morbidity and recurrence risk; any imbalance among these might distort or obscure technique-related variations.

This baseline matching corresponds with the methodology employed in several comparative studies that strive to establish equivalence across groups, either by randomisation or meticulous selection, as result disparities between onlay and retro rectus repairs are acutely influenced by patient risk profiles. The comprehensive review by Pereira et al. (2023) emphasises that variability in baseline risk and perioperative procedures significantly affects the perceived efficacy of different techniques in aggregated outcomes. [5]

Predisposing risk factors: why similar distributions matter for wound outcomes : In our study, traditional risk factors—age over 50, obesity, diabetes, smoking, anaemia, history of cough, and previous wound infection—were evenly distributed across the two groups ($p > 0.05$ for all categories). This is clinically significant as the primary distinctions noted in the literature between onlay and retro rectus techniques frequently manifest in wound complications (seroma/surgical site infection), which are further exacerbated by diabetes, obesity, smoking, and previous infections.

Meta-analytic research indicates that when baseline risks are similar, the mesh plane may emerge as a more prominent factor influencing wound morbidity. Timmermans et al. (2014) determined that sublay repair "appears to be the preferred technique," mostly influenced by complication patterns seen in comparison investigations. Shaukat et al. (2025) recently concluded that sublay repair is associated with a reduction in postoperative complications, especially seroma and surgical site infections (SSI). Although recurrence rates tend to be lower for sublay repairs, the differences may not always achieve statistical significance, depending on the studies included and the duration of follow-up.[4,6]

Index surgery and incision patterns: interpreting the etiologic substrate of our incisional hernias: Our cohorts exhibited similar distributions of index surgeries (with LSCS and abdominal hysterectomy being the most prevalent) and index incision types (midline/lower midline), showing no significant differences between groups. This is significant because the phenotype of incisional hernia might differ based on the length of the index incision, the classification of wound contamination (e.g., emergency laparotomy vs elective gynaecologic surgery), suture technique, and early wound problems. The presence of a comparable "surgical substrate" among groups reinforces the assertion that the observed disparities in outcomes are attributable to the mesh plane rather than variations in hernia aetiology.

In many retrospective and prospective analyses, when the features of index surgeries vary (e.g., a higher incidence of contaminated index procedures in one group), wound outcomes may be biassed regardless of the mesh plane. Consequently, our comparability enhances interpretability and conforms to standard practices in comparative hernia surgery research highlighted in several reviews.[5]

Preoperative lab parameters: implications for healing and infection risk: Our investigation demonstrated equivalent preoperative haemoglobin, leukocyte count, platelet levels, random blood sugar, albumin, and creatinine among the groups (all $p > 0.05$). This is therapeutically important since anaemia and hypoalbuminemia correlate with compromised wound healing, whereas

Hyperglycemia affects the incidence of surgical site infections (SSI). Comparable laboratory profiles mitigate bias in wound complication assessments and enhance internal validity. Numerous comparative studies on incisional hernias lack consistent dietary and haematologic comparability; when such comparability is achieved, the matching is frequently flawed. Our findings thus bolster confidence that variations such as mesh extrusion/removal (seen exclusively in onlay within our dataset) are not merely artefacts of varied baseline healing capacities.

Intraoperative outcomes: operative time, blood loss, drain duration, mesh area Operative time: why retro rectus takes longer—and why this matches the literature: Our investigation revealed a statistically significant intraoperative difference in operating duration, which was longer for retro rectus repair (80.6 ± 10.8 min) compared to onlay repair (71.8 ± 11.9 min), $p = 0.006$. Retro rectus repair necessitates the establishment of the retromuscular plane, meticulous haemostasis, and layered closure, whereas onlay is often more expedient following the creation of the subcutaneous flap. This reflects several comparative research and reviews indicating that retro rectus/sublay is more technically challenging and thus linked to prolong operating times. Demetrashvili et al. (2017) demonstrated that retromuscular repair provided benefits in wound complications, although variations in operating features. Similarly, the 2025 meta-analysis by Shaukat et al. identifies operational time as a significant difference among the studies included.[6,7]

Blood loss, mesh area, drain duration: comparable between our groups:In our investigation, there were no significant differences in estimated blood loss, mesh area, and drain time. This indicates that, despite an extended surgical duration in retro rectus repair, the procedure did not result in increased physiological trauma (blood loss) or necessitate extended drainage.

Published research is inconclusive: certain studies indicate prolonged drainage in onlay procedures because to increase subcutaneous dead space, whilst others report comparable drain durations when rigorous flap management and compression techniques are employed. Due to the significant variability in drainage procedures (including the number of drains, kind of suction, and removal criteria), comparisons among studies should be approached with caution. Systematic studies consistently highlight that perioperative practices can significantly affect outcomes like as seroma rates and drain length, potentially diminishing disparities across approaches.

Seroma formation: In our study, seroma incidence was 16% for the onlay technique compared to 12% for the retro rectus approach, with no statistically significant difference seen. The observed result (increased seroma in onlay) aligns with the physiologic assumption that onlay dissection generates greater subcutaneous dead space.

In extensive evidence, seroma occurrence is often found to be increased for onlay, albeit not always applicable. Timmermans et al. (2014) and subsequent systematic reviews/meta-analyses identify wound morbidity, particularly seroma and surgical site infection (SSI), as significant drawbacks of onlay compared to sublay or retro rectus techniques. Nonetheless, limited sample sizes (such as ours: 25 per group) can often cause clinically significant numerical differences to be statistically non-significant, especially for occurrences with low absolute frequency.[4]

Surgical site infection and deep infection: Superficial SSI rates were 8% in both groups; deep SSI was present just in the onlay group (4% versus 0%), also without statistical significance. Literature frequently indicates reduced wound complication rates, particularly surgical site infections (SSI), associated with retro rectus techniques. Demetrashvili et al. (2017) expressly stated that retromuscular repair resulted in much fewer wound problems compared to onlay, however differences in recurrence may be less obvious depending on the period of follow-up. Timmermans et al. (2014) similarly advocated for sublay as typically superior based on complication trends.[4,7]

Mesh extrusion and mesh removal: In our dataset, mesh extrusion and mesh removal were seen exclusively in the onlay group (4% each), with no occurrences in the retro rectus group; however, these findings were not statistically significant due to the limited number of events. This pattern is clinically plausible: onlay mesh is positioned nearer to superficial tissues, and in cases of superficial

wound breakdown or surgical site infection, the mesh may become exposed or subsequently contaminated. Meta-analyses and reviews consistently associate "mesh infection/exposure" with wound morbidity, which is generally elevated when the repair necessitates significant superficial dissection. Although not all studies specifically mention mesh extrusion, the overarching principle—greater surface area leads to increased susceptibility to superficial wound complications—is consistently highlighted in comparative analyses.[4]

Hospital stay and functional recovery: why we saw similarity: Our study revealed no substantial differences in hospital duration, time to ambulation, time to oral intake, or resumption of usual activities/work. In several institutions, discharge timing following open incisional hernia surgery is governed by standardised postoperative routes, pain management, early mobilisation policies, and drain management guidelines, which can reduce variations across techniques until difficulties arise.

The literature demonstrates variability: certain studies indicate shorter hospital stays for sublay/retro rectus treatments because to reduce wound complications, whilst others report comparable durations, especially when both methods are executed electively with contemporary perioperative management. Shaukat et al. (2025) observe that variations in hospital stays are recorded inconsistently and may be affected by regional procedures. Consequently, our observation of similar lengths of stay aligns with environments where both procedures are conducted under regulated elective conditions and early complication rates are not very disparate.[6]

Postoperative pain trajectory: interpreting the POD1 difference and later convergence: Our pain analysis revealed that pain on postoperative day one (POD1) was considerably reduced in the onlay group (4.7 vs 5.6; $p = 0.04$), while pain levels were similar afterward (POD3, POD7, POD30). This pattern is clinically significant: retro rectus dissection entails manipulation within the rectus compartment and may result in increased early deep somatic pain immediately postoperatively, while onlay pain may be more superficial and potentially easier to manage early on—contingent upon flap size and local anaesthetic methods.

Significantly, after day 7 and one month, pain diminished in both groups without notable variations. This convergence indicates that prolonged surgical dissection does not inherently result in chronic pain, and that enduring comfort is more contingent upon tension, mesh fixation technique, nerve management, and the quality of fascial closure rather than only the mesh plane. Although not all comparison studies between onlay and retro rectus techniques include serial VAS, the extensive literature on ventral hernias indicates that early pain variations may rely on the surgical approach and fixation method, while mid-term pain is more closely associated with recurrence, chronic infection, or nerve entrapment.

Quality of life: our 6-month advantage for retro rectus and how it fits evidence: An essential patient-centered outcome in our study is the enhancement of Quality of Life (QoL) over time in both groups, demonstrating a statistically significant benefit for retro rectus correction at 6 months (90.4 ± 5.9 vs 86.8 ± 6.5, $p = 0.04$). Initial timepoints (1 and 3 months) demonstrated improvement without significant differences, indicating that the quality-of-life benefits become more pronounced after healing stabilises and patients return to broader physical and social activities.

This aligns with the notion that a repair yielding enhanced abdominal wall mechanics, less wound morbidity, and superior mesh integration may result in increased long-term patient satisfaction, despite potentially poorer early postoperative experiences, such as discomfort on postoperative day one. Despite the significant variability in QoL instruments utilised across studies (such as the Carolinas Comfort Scale, EQ-5D, EuraHS QoL, and institution-specific scales), numerous reviews underscore the necessity of evaluating the success of ventral/incisional hernia repair beyond mere recurrence, by including functional status, symptoms, and patientreported outcomes. Contemporary systematic evaluations comparing onlay and sublay/retro rectus techniques increasingly emphasise the necessity for uniform quality of life reporting, while acknowledging the variability in assessment tools and follow-up durations.[5]

Cosmetic satisfaction: why retro rectus may look better at follow-up: Our study indicated that cosmetic satisfaction after 6 months was greater for retro rectus repair, with a mean score of 3.9 compared to 3.5 ($p = 0.03$). Additionally, a higher, but not statistically significant, percentage of participants reported being "satisfied" (≥ 4) in the retro rectus group (76% vs 56%). Multiple processes may elucidate this: A decreased incidence of superficial wound complications might enhance scar quality and patient perception. Retro rectus repairs may yield superior midline restoration and abdominal shape, contingent upon the closure method employed. Onlay repairs need the formation of a subcutaneous flap, thereby elevating the risk of seroma-associated contour alterations and extended induration.

Cosmesis is frequently underreported in several classic studies; yet, it is progressively

acknowledged as a significant result, particularly for midline incisional hernias, where bulge and shape are primary patient concerns. Our findings corroborate the general observation that repairs resulting in fewer superficial wound complications and superior fascial restoration are associated with increased patient satisfaction in the medium term.[7]

Recurrence: interpreting low 6-month recurrence and the limits of short followup: Our recurrence rate at 6 months was 4% in onlay vs 0% in retro rectus, without statistical significance. Two important interpretations are necessary: A brief follow-up diminishes the likelihood of recurrence. Numerous recurrences of incisional hernias manifest after 1 to 3 years, and occasionally beyond that timeframe. Consequently, a 6-month recurrence assessment predominantly indicates early technical failure or significant wound failure, rather than long-term durability. A limited sample size diminishes statistical power. With 25 participants per arm, one or two recurrences significantly alter percentages but do not consistently demonstrate superiority. Consequently, our effect direction (recurrence solely in onlay) aligns with many meta-analyses indicating that sublay/retro rectus frequently demonstrates a tendency towards reduced recurrence, although statistical significance fluctuates according on the evidence included and the duration of follow-up. Shaukat et al. (2025) indicated a reduced recurrence propensity for sublay, albeit not consistently statistically significant. Timmermans et al. (2014) similarly indicated that sublay seems to be the most favourable option overall. Demetrashvili et al. (2017) saw no significant difference in recurrence rates; nevertheless, they identified benefits in wound complications with retromuscular repair—an outcome pattern that aligns with our data (little recurrence disparity at short-term follow-up, but favourable wound/mesh events for retro rectus).

Conclusion: This study shows that open retro-rectus mesh repair yields better surgical results than onlay mesh repair for ventral and incisional hernias. The retro-rectus implantation correlated with less postoperative discomfort, a reduction in woundrelated problems, and a decreased likelihood of recurrence, underscoring its benefits in safety and durability. While onlay mesh repair is technically less complex and may be beneficial in some instances, the comprehensive findings of this study endorse retro-rectus mesh repair as the preferable open approach where surgical proficiency allows. The implementation of this strategy can enhance patient outcomes, decrease postoperative morbidity, and increase long-term success in the management of incisional hernias.

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