

Clinical Profile, Surgical Management and Early Outcomes of Incisional Hernia Repair: A Prospective Observational Study from a Tertiary Care Centre in Eastern India

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Abstract

Background: Incisional hernia is one of the most frequent long-term complications following abdominal surgery and remains associated with considerable morbidity, prolonged hospitalization, impaired quality of life, and increased healthcare expenditure. Despite advances in abdominal wall closure techniques and mesh reinforcement strategies, incisional hernia continues to pose a significant surgical challenge. Data regarding clinical characteristics and outcomes of different repair techniques from Eastern India remain limited.

Aim: To evaluate the clinical profile, operative management, and early postoperative outcomes of patients undergoing incisional hernia repair at a tertiary care teaching hospital.

Methods: A prospective observational study was conducted in the Department of General Surgery, MKCG Medical College and Hospital, Berhampur, Odisha, from October 2023 to November 2025. A total of 134 patients were screened for eligibility. Twenty-five patients were excluded due to failure to meet eligibility criteria, while 39 were excluded because of incomplete records. Seventy patients were included in the final analysis. Demographic characteristics, comorbidities, previous surgical history, hernia characteristics, operative techniques, postoperative complications, duration of drainage, hospital stay, recurrence, and quality-of-life outcomes were evaluated. Statistical analysis was performed using SPSS version 26.0.

Results: The mean age of patients was 46.2 ± 11.6 years. Females constituted 95.7% of the study population. Obesity and diabetes mellitus were present in 22.9% and 18.6% of patients, respectively. Lower-segment caesarean section was the commonest antecedent operation. According to the European Hernia Society classification, W2 defects constituted 90.0% of cases. ONLAY mesh repair was performed in 54.3% of patients, while laparoscopic intraperitoneal mesh placement and preperitoneal mesh repair accounted for 22.9% each. Seroma was the commonest postoperative complication (24.3%) and occurred predominantly following ONLAY repair. All patients completed 12 months of follow-up, and no recurrence was observed.

Conclusion: Incisional hernia predominantly affects middle-aged women following lower abdominal and pelvic surgery. ONLAY repair remains the most frequently employed technique; however, it is associated with higher rates of seroma formation. Laparoscopic repair offers favourable short-term recovery outcomes. Appropriate patient selection and optimization of modifiable risk factors remain essential for improving surgical outcomes.

Keywords: Incisional Hernia, Onlay Mesh Repair, Laparoscopic Intraperitoneal Mesh Placement, Preperitoneal Mesh Repair, Seroma, EHS Classification.

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Introduction

Incisional hernia is defined as a protrusion of abdominal contents through a defect in the

musculofascial layers occurring at the site of a previous surgical incision. It represents one of the

most common long-term complications following laparotomy and continues to be associated with significant morbidity, impaired quality of life, cosmetic concerns, and increased healthcare costs. The reported incidence varies between 10% and 20%, depending on patient-related factors, surgical technique, and duration of follow-up. [1-4]

The pathogenesis of incisional hernia is multifactorial. Patient-related factors such as obesity, diabetes mellitus, malnutrition, smoking, chronic pulmonary disease, advanced age, and connective tissue disorders interact with surgical factors including wound infection, emergency surgery, fascial dehiscence, incision type, and closure technique. [5-8] Several studies have demonstrated that postoperative wound infection remains one of the strongest predictors of subsequent incisional hernia development. [9-12]

Over the past two decades, management of incisional hernia has evolved considerably. Traditional suture repair has largely been replaced by mesh-based techniques owing to lower recurrence rates and improved functional outcomes. Currently available operative approaches include ONLAY mesh repair, preperitoneal mesh repair (PPMR), retromuscular repair, and laparoscopic intraperitoneal mesh placement (IPM). [13-17] Although laparoscopic approaches have gained popularity because of reduced wound complications and shorter hospital stay, the optimal surgical technique remains a subject of ongoing debate. [18-20]

The European Hernia Society (EHS) classification provides a standardized method for describing ventral and incisional hernias according to location and defect width, thereby facilitating comparison among studies and improving surgical planning. [7,13] Contemporary evidence suggests that hernia characteristics, patient factors, and surgeon expertise significantly influence outcomes following repair. [21-24]

In India, incisional hernia remains an important clinical problem, particularly among women undergoing obstetric and gynecological procedures. However, data from Eastern India regarding patient characteristics, operative management, and postoperative outcomes remain limited. The present study was therefore undertaken to evaluate the clinical profile, surgical management, and early outcomes of patients undergoing incisional hernia repair in a tertiary care centre in Odisha.

Materials and Methods

Study Design and Setting: This prospective observational study was conducted in the Department of General Surgery, MKCG Medical College and Hospital, Berhampur, Odisha, India. The study was carried out over a period of 26

months from October 2023 to November 2025. The study protocol was reviewed and approved by the Institutional Ethics Committee of MKCG Medical College and Hospital (IEC Approval No. 102/21.08.24).

Study Population: Patients presenting to the Department of General Surgery with clinically diagnosed incisional hernia and planned for elective surgical repair during the study period were considered for inclusion. A convenience sampling technique was employed, and all consecutive eligible patients presenting during the study period were screened for participation.

Participant Selection: A total of 134 patients were assessed for eligibility during the study period. Twenty-five patients were excluded because they did not satisfy the inclusion criteria or were medically unfit for elective surgery. An additional 39 patients were excluded because of incomplete clinical records or incomplete perioperative documentation. Seventy patients fulfilled all eligibility criteria and were included in the final analysis.

All enrolled patients completed the planned follow-up period of 12 months and were included in the final outcome analysis.

Sample Size: No formal a priori sample size calculation was performed. Given the limited published data on incisional hernia repair from this region, a census-style approach was adopted: all consecutive patients meeting the eligibility criteria during the 26-month study period were enrolled, and the achieved sample size of 70 patients was determined by the number of eligible patients presenting during this interval rather than by a pre-specified statistical target. This approach is consistent with exploratory single-centre studies in settings where baseline incidence and effect-size estimates are not yet established, though it limits the precision of subgroup comparisons and should be considered when interpreting the results.

Inclusion Criteria

1. Patients aged 18 years or older.
2. Clinically diagnosed incisional hernia.
3. Patients scheduled for elective surgical repair.
4. Patients willing to provide written informed consent.

Exclusion Criteria

1. Patients younger than 18 years.
2. Strangulated incisional hernia requiring emergency surgery.
3. Incarcerated incisional hernia requiring emergency intervention.
4. Patients medically unfit for anaesthesia or surgery.
5. Patients unwilling to participate.

6. Patients with incomplete clinical documentation.

Data Collection: A predesigned and standardized data collection proforma was used for recording patient information. Data collected included:

- Demographic characteristics (age and sex)
- Body mass index (BMI)
- Comorbidities including diabetes mellitus
- Previous surgical history
- Nature of antecedent surgery (elective or emergency)
- Type of abdominal incision
- Hernia characteristics
- EHS classification
- Defect size
- Operative technique employed
- Operative duration
- Duration of drain placement
- Length of hospital stay
- Postoperative complications
- Recurrence during follow-up
- Quality-of-life assessment

Potential Confounders and Effect Modifiers:

Body mass index, diabetes mellitus, and the emergency or elective nature of the antecedent surgery were identified a priori as the principal potential confounders and effect modifiers for postoperative outcomes, given their established association with impaired wound healing and fascial failure in the existing literature. These variables were recorded for all patients and considered during interpretation of the association between operative technique and postoperative complications.

Clinical Assessment: All patients underwent detailed clinical evaluation including history, physical examination, routine haematological investigations, biochemical investigations, chest radiography, and electrocardiography whenever indicated. Additional imaging studies were performed based on individual patient requirements.

Hernia Classification: Incisional hernias were classified according to the European Hernia Society (EHS) classification system. Hernias were categorized according to anatomical location and defect width. Defect width was categorized as:

- W1: Defect width <4 cm
- W2: Defect width 4–10 cm
- W3: Defect width >10 cm

Anatomical locations were recorded according to standard EHS nomenclature.

Surgical Techniques: The choice of operative technique was determined by defect characteristics, patient factors, surgeon expertise, and intraoperative findings.

The following operative techniques were employed:

1. ONLAY Mesh Repair: Following reduction of hernia contents and closure of the fascial defect, polypropylene mesh was placed over the anterior rectus sheath with adequate overlap and secured using interrupted non-absorbable sutures. Closed suction drainage was routinely used.

2. Preperitoneal Mesh Repair (PPMR): The mesh was placed in the preperitoneal plane following adequate dissection and reduction of hernia contents. Fascial closure was performed prior to mesh placement whenever feasible.

3. Laparoscopic Intraperitoneal Mesh Placement (IPM): Laparoscopic repair was performed using standard minimally invasive techniques. After adhesiolysis and reduction of contents, intraperitoneal mesh placement was performed with appropriate fixation according to surgeon preference.

In all patients, polypropylene mesh was utilized for reinforcement.

Postoperative Management: All patients received standardized perioperative antibiotic prophylaxis according to institutional protocols. Postoperative monitoring included assessment for wound complications, seroma formation, surgical site infection, chronic pain, and other procedure-related complications.

Definitions of Outcome Variables

Seroma: Clinically detectable postoperative fluid collection at the operative site confirmed on physical examination and requiring observation or intervention.

Surgical Site Infection: Infection occurring at the surgical wound according to standard Centers for Disease Control and Prevention (CDC) criteria.

Chronic Pain: Pain persisting beyond three months after surgery and attributable to the operative site.

Primary Outcome: The primary outcome was the occurrence of postoperative complications following incisional hernia repair.

Secondary Outcomes: Secondary outcomes included:

- Duration of drain placement
- Length of hospital stay
- Recurrence during follow-up
- Quality-of-life improvement
- Comparison of outcomes among operative techniques

Follow-up: Patients were followed in the outpatient department at regular intervals following

discharge. Follow-up assessments were performed for a period of 12 months. Clinical evaluation was performed during each visit to identify recurrence, chronic pain, wound complications, and overall patient satisfaction.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were expressed as mean $\pm$ standard deviation (SD), whereas categorical variables were expressed as frequencies and percentages. Comparisons between categorical variables were performed using the Chi-square test or Fisher's exact test whenever appropriate.

A p-value less than 0.05 was considered statistically significant.

Handling of Missing Data: Patients with incomplete clinical records or incomplete perioperative documentation (n=39) were excluded prior to analysis rather than imputed, as the missing information involved core baseline or outcome variables that could not be reliably reconstructed retrospectively. Consequently, the final analytic cohort of 70 patients contains no missing values for the variables reported, and no imputation methods were required.

Bias Reduction: To minimize selection bias, all consecutive eligible patients presenting during the

study period were considered for enrollment. Standardized clinical assessment protocols and uniform postoperative monitoring were employed to reduce information bias. Data collection was performed prospectively using a structured proforma to improve consistency and completeness.

Results

Participant Flow: During the study period, 134 patients with clinically diagnosed incisional hernia were assessed for eligibility. Twenty-five patients were excluded because they did not fulfill the inclusion criteria or were medically unfit for elective surgery. An additional 39 patients were excluded because of incomplete clinical records. Seventy patients were included in the final analysis and all completed the planned 12-month follow-up period.

Demographic Characteristics: A total of 70 patients underwent elective incisional hernia repair. The mean age was 46.2 ± 11.6 years (range 27–75 years). The majority of patients belonged to the 41–50-year age group. Females constituted 95.7% (67/70) of the study population, while males accounted for 4.3% (3/70). The index surgery that had led to the original incision was performed as an emergency procedure in 61.4% (43/70) of patients and electively in 38.6% (27/70).

Table 1: Baseline Characteristics of Study Population

Variable	Frequency (%)
Female	67 (95.7)
Male	3 (4.3)
Obesity (BMI >30 kg/m ²)	16 (22.9)
Diabetes Mellitus	13 (18.6)
Emergency Index Surgery	43 (61.4)
Elective Index Surgery	27 (38.6)
Mean Age (years)	46.2 ± 11.6

Previous Surgical History: Lower-segment caesarean section (LSCS) was the most common antecedent surgical procedure accounting for nearly half of all cases. Abdominal hysterectomy was the second most common antecedent operation. Collectively, obstetric and gynecological procedures accounted for the majority of incisional hernias observed in the present study.

Table 2: Previous Surgical Procedures

Procedure	n (%)
LSCS	34 (48.6)
Abdominal Hysterectomy	17 (24.3)
Exploratory Laparotomy	10 (14.3)
Bowel Resection and Anastomosis	4 (5.7)
Tubectomy	3 (4.3)
Others	2 (2.8)

Hernia Characteristics: According to the European Hernia Society (EHS) classification, W2 defects (4–10 cm) were the predominant defect size category and constituted 90.0% of all cases. W1 defects accounted for the remaining 10.0%. Regarding anatomical location, M4–M5 hernias represented the largest subgroup followed by L1 and M2–M3 hernias.

Table 3: Hernia Characteristics and EHS Classification

Variable	n (%)
W1 Defect (<4 cm)	7 (10.0)

W2 Defect (4–10 cm)	63 (90.0)
M4–M5W2	30 (42.9)
L1W2	28 (40.0)
M2–M3W2	5 (7.1)
Other EHS Categories	7 (10.0)

Operative Techniques: ONLAY mesh repair was the most commonly performed surgical procedure and accounted for more than half of all repairs. Laparoscopic intraperitoneal mesh placement (IPM) and preperitoneal mesh repair (PPMR) were performed with equal frequency.

Table 4: Distribution of Operative Techniques

Procedure	n (%)
ONLAY Mesh Repair	38 (54.3)
Laparoscopic IPM	16 (22.9)
PPMR	16 (22.9)

Postoperative Complications: Seroma formation was the most frequent postoperative complication and occurred in 17 patients (24.3%). Wound infection was observed in 11 patients (15.7%), while chronic pain occurred in 8 patients (11.4%). Comparison among operative techniques

demonstrated a significantly higher incidence of seroma following ONLAY repair ($\chi^2 = 7.297$, $p = 0.026$). Although wound infection and chronic pain were numerically more common following ONLAY repair, these differences did not achieve statistical significance.

Table 5: Postoperative Complications According to Operative Technique

Complication	LAP IPM	ONLAY	PPMR	p-value
Seroma	2	14	1	0.026
Wound Infection	1	8	2	0.363
Chronic Pain	1	6	1	0.458

Drain Duration and Hospital Stay: Drain duration differed significantly among operative techniques. Laparoscopic IPM demonstrated the shortest duration of drain placement, whereas ONLAY repair was associated with the longest duration. Similarly, mean hospital stay was significantly shorter in patients undergoing laparoscopic IPM compared with ONLAY repair and PPMR.

Table 6: Comparison of Drain Duration and Hospital Stay

Variable	LAP IPM	ONLAY	PPMR	p-value
Mean Drain Duration (days)	1.19 ± 2.69	4.50 ± 2.58	3.81 ± 2.29	<0.001
Mean Hospital Stay (days)	5.06 ± 1.69	8.55 ± 3.40	7.00 ± 2.22	<0.001

Follow-up Outcomes: All 70 patients completed the planned 12-month follow-up period, with no patients lost to follow-up and no withdrawals during the study period. No recurrence was observed during follow-up. Furthermore, all patients reported subjective improvement in quality of life following surgical repair.

Table 7: Follow-up Outcomes

Outcome	n (%)
Completed 12-Month Follow-up	70 (100)
Recurrence	0 (0)
Quality of Life Improved	70 (100)

Key Findings: The present study demonstrated a marked female predominance among patients with incisional hernia. Obstetric and gynecological procedures constituted the most common antecedent operations. W2 defects represented the predominant EHS defect category. ONLAY mesh repair remained the most frequently employed operative technique; however, it was associated with significantly higher seroma rates. Laparoscopic IPM demonstrated superior short-term recovery outcomes as reflected by shorter drain duration and reduced hospital stay. No recurrence was observed during the 12-month follow-up period.

Discussion

Incisional hernia remains one of the most challenging complications of abdominal surgery, contributing substantially to postoperative morbidity, impaired quality of life, and increased healthcare expenditure. Despite advances in surgical technique and abdominal wall reconstruction, the condition continues to represent a significant burden on both patients and healthcare systems. The present prospective observational study evaluated the clinical profile, operative management, and early outcomes of incisional hernia repair in a tertiary care teaching hospital in Eastern India.

Demographic Characteristics: The mean age of patients in the present study was 46.2 ± 11.6 years,

with the majority of patients belonging to the fifth decade of life. This finding is comparable to observations reported by Pattanaik et al. in Odisha, who demonstrated that incisional hernia most frequently presents during the fourth and fifth decades of life. [28] The delayed presentation may be explained by the progressive weakening of fascial tissues over time following abdominal surgery.

A striking finding in the present study was the overwhelming female predominance, with women constituting 95.7% of the study population. Similar findings have been reported by Pattanaik et al. and Ray et al., who identified female sex as the predominant demographic group affected by incisional hernia in India. [28,29] The high proportion of female patients in our series can be attributed to the large number of antecedent obstetric and gynecological procedures, particularly lower-segment caesarean section (LSCS) and abdominal hysterectomy.

Previous Surgical History: LSCS accounted for nearly half of all antecedent operations in the present study, followed by abdominal hysterectomy. Together, these procedures contributed to approximately three-fourths of all incisional hernias. This observation is consistent with reports from gynecological and obstetric surgical literature, where lower abdominal incisions have been identified as major contributors to postoperative abdominal wall defects. [3]

In addition, the index surgery leading to the original incision had been performed as an emergency procedure in 61.4% of patients in the present series. Emergency laparotomy is a well-recognized risk factor for incisional hernia, as urgent surgical conditions, bowel distension, and suboptimal closure circumstances increase the risk of subsequent fascial failure. [5,8]

The increasing rates of caesarean section observed globally may partly explain the growing burden of incisional hernia among women, as lower abdominal incisions are recognized contributors to subsequent abdominal wall defects. [3] The predominance of lower abdominal and pelvic surgery in our study population highlights the need for meticulous fascial closure techniques and optimization of perioperative wound care in this subgroup.

Risk Factors and Comorbidities: Obesity and diabetes mellitus were the most common comorbid conditions observed in our study. Obesity was present in 22.9% of patients, while diabetes mellitus was identified in 18.6%. These findings are in agreement with contemporary literature identifying obesity and metabolic disorders as

major risk factors for impaired wound healing and fascial failure. [2,11]

Excessive intra-abdominal pressure associated with obesity increases tension on abdominal wall closures and contributes to fascial disruption. Similarly, diabetes mellitus impairs collagen synthesis, angiogenesis, and wound healing, thereby increasing susceptibility to incisional hernia formation. Several investigators have emphasized the importance of preoperative optimization of modifiable risk factors before elective abdominal wall reconstruction. [22,23]

Hernia Characteristics: The European Hernia Society (EHS) classification has become the preferred system for describing ventral and incisional hernias because it provides a standardized framework for clinical reporting and comparison among studies. [7,13] In the present study, W2 defects (4–10 cm) constituted 90% of all cases. M4–M5W2 and L1W2 were the most common classifications. These findings suggest that most patients presented with moderate-sized defects suitable for elective mesh-based repair.

The predominance of W2 defects may reflect delayed presentation among patients in resource-constrained settings, where symptoms are often tolerated for prolonged periods before surgical consultation. Similar patterns have been reported in studies from resource-limited settings, where healthcare access and awareness influence presentation patterns.

Operative Techniques: ONLAY mesh repair was the most frequently employed surgical technique, accounting for 54.3% of repairs. Laparoscopic intraperitoneal mesh placement (IPM) and preperitoneal mesh repair (PPMR) accounted for 22.9% each.

The predominance of ONLAY repair reflects its technical simplicity, reproducibility, shorter learning curve, and widespread applicability in tertiary care centres. In resource-limited settings, ONLAY repair remains a practical and effective technique because it requires minimal specialized equipment and can be performed in a wide variety of hernia defects.

However, increasing evidence supports the use of sublay and minimally invasive approaches whenever feasible. European Hernia Society guidelines recommend mesh reinforcement techniques that minimize extensive subcutaneous dissection and reduce wound-related morbidity. [7,13]

Postoperative Complications: Seroma formation was the most common postoperative complication observed in the present study, occurring in 24.3% of patients. The incidence of seroma was

significantly higher following ONLAY repair compared with laparoscopic IPM and PPMR ($p = 0.026$). This finding is consistent with the systematic review and meta-analysis by Beckers Perletti et al., which demonstrated higher rates of seroma formation following procedures involving extensive subcutaneous dissection. [6] The ONLAY technique requires wide tissue plane dissection and creation of dead space, both of which predispose to postoperative fluid accumulation.

Although wound infection and chronic pain occurred more frequently following ONLAY repair, these differences were not statistically significant. Similar observations have been reported by Kokotovic et al., who demonstrated that wound complications remain among the most common adverse events following incisional hernia repair. [8]

Drain Duration and Hospital Stay: One of the most clinically relevant findings of the present study was the significantly shorter drain duration and hospital stay observed following laparoscopic IPM repair.

The mean hospital stay after laparoscopic IPM was 5.06 ± 1.69 days compared with 8.55 ± 3.40 days following ONLAY repair. Similarly, drain duration was substantially reduced in the laparoscopic group.

These findings are consistent with contemporary literature supporting minimally invasive approaches for selected patients. [18] Minimally invasive repair reduces tissue trauma, limits wound complications, and facilitates earlier mobilization, thereby contributing to enhanced recovery and reduced healthcare utilization.

Recurrence and Follow-up: All patients completed the planned 12-month follow-up period. No recurrence was observed during the follow-up period.

While this finding is encouraging, it should be interpreted cautiously. Several studies have demonstrated that recurrence may occur several years after repair and may not become clinically apparent during the first postoperative year. [8] Consequently, longer-term surveillance remains necessary before definitive conclusions regarding recurrence can be drawn.

Nevertheless, the absence of recurrence during the first year suggests satisfactory short-term durability of mesh-based repair in the present cohort. Universal use of polypropylene mesh reinforcement may have contributed to these favourable outcomes.

Quality of Life: All patients reported subjective improvement in quality of life following surgical

repair. Incisional hernia is known to adversely affect physical functioning, body image, social interactions, and psychological well-being. [15,16] Successful repair therefore provides benefits extending beyond anatomical correction.

Hill et al. demonstrated substantial improvements in patient-reported quality-of-life measures following abdominal wall reconstruction. [15] Similarly, Smith et al. highlighted the psychosocial burden associated with abdominal wall hernias and emphasized the importance of patient-centred outcome assessment. [16]

Strengths of the Study: The present study possesses several strengths. First, it employed a prospective observational design with standardized data collection. Second, all patients completed the planned 12-month follow-up, eliminating attrition bias. Third, the use of EHS classification improved standardization of hernia characterization. Finally, the study provides valuable contemporary data from Eastern India, where published literature on incisional hernia remains relatively limited.

Limitations: Several limitations should be acknowledged. The study was conducted at a single tertiary care centre, which may limit generalizability. The sample size was relatively small and based on convenience sampling. In addition, the study primarily evaluated short-term outcomes, and longer follow-up is required to accurately assess long-term recurrence and mesh-related complications. Finally, operative technique selection was not randomized and may have been influenced by surgeon preference and patient characteristics.

Clinical Implications: The findings of the present study support the continued role of mesh-based repair as the standard of care for incisional hernia management. ONLAY repair remains a practical and widely applicable technique, particularly in resource-constrained settings. However, surgeons should remain aware of its higher propensity for seroma formation. Whenever feasible, minimally invasive approaches may provide superior short-term recovery outcomes.

Future multicentric studies with larger sample sizes, longer follow-up durations, and standardized patient-reported outcome measures are required to further refine management strategies and optimize outcomes following incisional hernia repair.

Conclusion

Incisional hernia remains a significant postoperative complication following abdominal surgery, particularly among women undergoing obstetric and gynecological procedures. The present study demonstrated that middle-aged females constituted the majority of affected

patients, with lower-segment caesarean section and abdominal hysterectomy being the most common antecedent operations.

W2 defects represented the predominant EHS classification category, indicating that most patients presented with moderate-sized abdominal wall defects suitable for elective mesh-based repair. ONLAY mesh repair was the most frequently employed operative technique because of its technical simplicity and broad applicability. However, this technique was associated with a significantly higher incidence of postoperative seroma formation. Laparoscopic intraperitoneal mesh placement demonstrated superior short-term recovery outcomes, including shorter drain duration and reduced hospital stay. All patients completed 12 months of follow-up, and no recurrence was observed during the study period.

The findings of the present study support the continued use of mesh-based reinforcement as the standard of care for incisional hernia repair. Careful patient selection, optimization of modifiable risk factors, meticulous surgical technique, and appropriate choice of operative approach remain essential for achieving favourable outcomes.

Further multicentric studies with larger sample sizes and longer follow-up periods are required to validate these findings and assess long-term recurrence patterns.

Strengths of the Study

- Prospective observational design.
- Complete 12-month follow-up for all enrolled patients.
- Use of standardized EHS classification.
- Assessment of multiple operative techniques within the same institution.
- Real-world data from a tertiary care centre in Eastern India.

Limitations of the Study

- Single-centre observational study.
- Convenience sampling method.
- Relatively small sample size.
- Lack of randomization between operative techniques.
- Follow-up limited to 12 months.
- Long-term recurrence beyond one year could not be assessed.

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