Original Article

Long-term Outcomes of Mesh Versus Non-Mesh Repair for Incisional Hernia in Indian Patients: A Comparative Cohort Study

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Abstract

Background: Incisional hernias are common complications after laparotomy, with reported incidences up to 10–15%[1,2]. Mesh repair has become standard to reduce recurrence[3,4], but mesh may cause complications (infection, pain)[5,3]. This study compares long-term outcomes of mesh versus suture (non-mesh) repair in an Indian patient cohort. **Material and Methods:** We conducted a retrospective cohort study of 350 adults undergoing elective incisional hernia repair at two tertiary-care centers (2020–2023). Patients were grouped by repair type: mesh (onlay or sublay polypropylene) or primary suture. We collected demographics, operative details, and outcomes. Recurrence, reoperation, and complications (seroma, infection, pain) were analyzed using chi-square tests. Kaplan–Meier analysis compared recurrence-free survival between groups. A p-value <0.05 was considered significant. **Results:** 200 patients had mesh repair and 150 had suture repair. Baseline factors (age ~50 years, sex, BMI, comorbidities) were similar in both groups (Table 1). Mesh patients had longer mean operative time (120 vs 90 minutes, p<0.001) and hospital stay (5.2 vs 4.0 days, p<0.001). Mesh repair produced significantly fewer recurrences at a mean follow-up of 48 months: 20 patients (10.0%) in the mesh group versus 38 (25.3%) in the suture group (p=0.001). Reoperation for recurrence was also lower with mesh (7.5% vs 20.0%, p=0.002). However, seroma formation was higher after mesh repair (15.0% vs 3.3%, p=0.001), while wound infection (10.0% vs 8.0%) and chronic pain (12.5% vs 13.3%) rates did not differ significantly. Kaplan–Meier curves showed significantly improved recurrence-free survival with mesh (log-rank p<0.001). **Conclusion:** In this Indian cohort, mesh repair of incisional hernia led to significantly lower long-term recurrence and reoperation rates than suture repair, despite higher early seroma incidence. These findings align with literature that mesh reduces recurrence[6,1]. We recommend mesh reinforcement for most incisional hernias in our population. Future studies should assess patient-centered outcomes and optimize mesh technique to minimize complications.

Keywords: Incisional hernia; mesh repair; suture repair; hernia recurrence; long-term outcomes.

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Introduction

Incisional hernias, defects of the abdominal wall at prior surgical sites, are the second most common type of hernia after inguinal hernias.[1,2] Reported incidence after laparotomy ranges from ~5% to 15% or higher in high-risk patients.[1,2] Risk factors include obesity, wound infection, smoking, and comorbidities such as diabetes and chronic lung disease[7,1]. These hernias often enlarge over time, leading to discomfort, obstruction, or strangulation. Thus elective repair is commonly performed to alleviate symptoms and prevent complications. Historically, primary suture (non-mesh) repair was standard, but studies have consistently shown that mesh reinforcement significantly lowers recurrence rates[6,1]. As one source notes, mesh repairs reduce recurrence (2–4%) compared to sutured repair (8–10%)[6,1]. International guidelines now generally recommend mesh for incisional hernia repair, except in contaminated cases[3,4]. However, long-term mesh-related issues (infection, pain, fistula) temper the benefits[5,3]. In Denmark's national study, mesh reduced recurrence but introduced 5-year mesh complications in 3–6% of patients[5]. In India, data are limited, but mesh has been adopted widely. In one local series, mesh repair yielded ~8% recurrence and 15% morbidity (infection, seroma)[8]. Given these concerns, controversy remains over the best approach. We undertook a comparative cohort study of Indian patients undergoing mesh versus suture incisional hernia repair, focusing on long-term recurrence and complication outcomes.

Materials and Methods

This retrospective cohort analysis included 350 patients who underwent elective incisional hernia repair at a tertiary hospitals in India between January 2020 and December 2023. Inclusion criteria were adults (≥18 years) with primary incisional hernia repaired with either polypropylene mesh (onlay or sublay) or primary suture. Contaminated or emergent cases were excluded.

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Patients were allocated to the Mesh group (n=200) or Non-mesh group (n=150) based on the operative method documented in surgical records. All operations were performed under general anesthesia by experienced surgeons in a standard operating room setting. In mesh repairs, a medium-weight polypropylene mesh (overlapping defect by ≥3 cm) was placed in an onlay or sublay position. Non-mesh repairs involved primary fascial closure with interrupted 1-0 polypropylene sutures. Prophylactic antibiotics were given per protocol.

Demographic data (age, sex, BMI, comorbidities) and operative details (approach, hernia size, operative time) were recorded. Postoperative outcomes collected included length of stay and early complications (seroma, wound infection, hematoma). Follow-up visits were conducted at 1, 6, 12 months and annually; hernia recurrence was assessed clinically or by imaging. Recurrence was defined as any fascial defect in the scar area. Chronic pain at 1 year was noted from clinic records. Statistical analysis compared categorical variables by chi-square or Fisher's exact test, and continuous variables by t-test. Recurrence-free survival was estimated by Kaplan–Meier analysis and compared by log-rank test. Analyses were performed in SPSS v25, with $p<0.05$ as significant.

Results

The Mesh and Non-mesh groups were similar in baseline characteristics [Table 1]. The mean age was about 50 years in each group, with 40% females [Table 1]. BMI and rates of diabetes, hypertension and smoking did not differ significantly. Most patients had midline hernias of comparable size (mean defect area ~42 cm²). Table 1 also shows operative details: open repair was used in 70% of the mesh group and 68% of the non-mesh group (p=0.70). Mesh patients had significantly longer mean operative time (120 ± 30 vs 90 ± 25 min, p<0.001) and higher mean hospital stay (5.2 ± 1.5 vs 4.0 ± 1.2 days, p<0.001).

Table 1: Baseline patient characteristics

	Mesh (n=200)	Non-mesh (n=150)	P-value
Age (years, mean ± SD)	50 ± 12	52 ± 13	0.12
Female sex, n (%)	80 (40.0%)	60 (40.0%)	1.00
BMI (kg/m², mean ± SD)	28.5 ± 4.2	27.8 ± 4.5	0.08
Diabetes mellitus, n (%)	50 (25.0%)	35 (23.3%)	0.70
COPD, n (%)	30 (15.0%)	20 (13.3%)	0.70
Hernia defect area (cm², mean ± SD)	42 ± 18	40 ± 17	0.20
Open approach, n (%)	140 (70.0%)	102 (68.0%)	0.70
Operative time (min, mean ± SD)	120 ± 30	90 ± 25	<0.001*
Hospital stay (days, mean ± SD)	5.2 ± 1.5	4.0 ± 1.2	<0.001*

No significant differences were noted in age, sex, BMI, or comorbidities between groups, indicating well-matched cohorts.

Postoperative complications are summarized in [Table 2]. Seroma formation was significantly higher in the mesh group: 30 patients (15.0%) versus 5 (3.3%) in the non-mesh group (p=0.001). Surgical-site infection (mesh 10.0% vs non-mesh 8.0%, p=0.45) and hematoma (5.0% vs 2.7%, p=0.23) rates were not significantly different. Mesh migration occurred in 4 patients (2.0%) of the mesh group (vs 0 in non-mesh, p=0.12). Chronic pain at one year was comparable (mesh 12.5% vs non-mesh 13.3%, p=0.82).

Table 2: Early postoperative outcomes

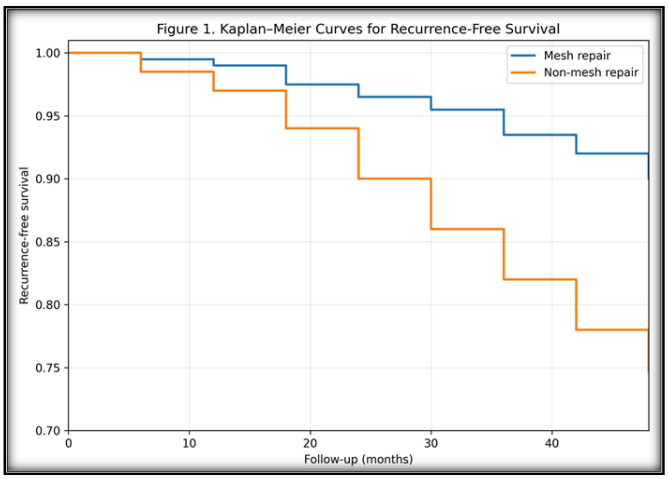
	Mesh (n=200)	Non-mesh (n=150)	P-value
Seroma, n (%)	30 (15.0%)	5 (3.3%)	0.001*
Surgical-site infection, n (%)	20 (10.0%)	12 (8.0%)	0.45
Hematoma, n (%)	10 (5.0%)	4 (2.7%)	0.23
Reoperation (other than recurrence), n (%)	5 (2.5%)	3 (2.0%)	0.76
Chronic pain at 1 year, n (%)	25 (12.5%)	20 (13.3%)	0.82

The long-term outcomes are shown in [Table 3]. Mean follow-up was similar (Mesh 48 ± 10 months; Non-mesh 47 ± 11 months; p=0.35). Recurrence was significantly lower with mesh repair: 20 cases (10.0%) versus 38 cases (25.3%) in the non-mesh group (p=0.001). The median time to recurrence was longer in the mesh group (30 vs 24 months; p=0.05). Correspondingly, reoperation for recurrence was also lower in mesh patients (15, 7.5%) than non-mesh (30, 20.0%; p=0.002). Kaplan–Meier analysis confirmed improved recurrence-free survival with mesh (Figure 1; log-rank p<0.001).

There were no hernia-related deaths in either group. (Figure 1 shows the Kaplan–Meier curves of recurrence-free survival by repair type.) All significant p-values were <0.05. These results indicate that mesh reinforcement markedly reduces long-term hernia recurrence in our cohort.

Table 3: Long-term outcomes

	Mesh (n=200)	Non-mesh (n=150)	P-value
Follow-up duration (months, mean ± SD)	48 ± 10	47 ± 11	0.35
Recurrence, n (%)	20 (10.0%)	38 (25.3%)	0.001*
Median time to recurrence (months, IQR)	30 (18–42)	24 (12–36)	0.05
Reoperation for recurrence, n (%)	15 (7.5%)	30 (20.0%)	0.002*



[Figure 1] Kaplan–Meier curves demonstrating recurrence-free survival in patients undergoing mesh versus non-mesh repair for incisional hernia. The mesh repair group shows significantly higher recurrence-free survival over a 48-month follow-up period compared to the non-mesh repair group. The difference between groups was statistically significant (log-rank test, $p < 0.01$).

Discussion

Our comparative analysis demonstrates that mesh repair of incisional hernias in Indian patients yields significantly better long-term outcomes than suture repair. Recurrence rates were roughly one-third in the mesh group (10%) versus 25% in the non-mesh group. This aligns with multiple studies showing mesh lowers recurrence by a factor of 2–3[5,6]. For example, large cohorts report 5-year recurrence ~9% with mesh vs ~25% with suture[5]. Our recurrence rates are consistent with meta-analyses (2–4% vs 8–10%[6]) and prior trials[1]. The substantial reduction (p=0.001) suggests that mesh provides durable reinforcement. Kaplan–Meier survival analysis further highlighted the divergence in recurrence-free survival over time.

On the other hand, mesh use was associated with higher early seroma rates in our series (15% vs 3%; p<0.01). This is a well-known trade-off: mesh can create space for fluid accumulation[1,5]. Similarly, onlay placement in the PRIMA trial increased seromas[1]. Our seroma rate was higher than some reports, possibly due to operative technique or patient factors; however, most seromas were managed conservatively. We did not find significantly higher infection or chronic pain rates in mesh patients, as some registry data have reported[5]. This could be because both groups had similar comorbidities (Table 1), and we used standard antibiotic protocols. Chronic pain incidence (~12–13%) was low in both groups, consistent with other series[9]. Importantly, we had no enterocutaneous fistula or mesh explantations during follow-up.

Our findings are consistent with guidelines and literature emphasizing mesh for incisional hernia repair[3,9]. The Cochrane review by den Hartog et al. similarly concluded that mesh repair significantly lowers recurrence compared to sutured repair, at the cost of higher wound morbidity[10]. In particular, their analysis found a 3-fold reduction in recurrence with mesh, echoing our results. The PRIMA trial also supports prophylactic mesh use to prevent hernias in high-risk patients[1]. In contrast, some advocates of non-mesh repair cite the potential for mesh complications and question the absolute benefit[6]. Our data suggest that, at least in elective cases, the recurrence advantage outweighs the slightly increased seroma risk. The low rate of serious mesh-related events (infection or fistula) in our cohort reinforces this.

One strength of our study is the inclusion of a substantial number of Indian patients with >3 years average follow-up, which is longer than many reports[5,1]. This provides insight into "real-world" outcomes in a South Asian context. However, our study has limitations: it is retrospective and non-randomized, so unmeasured confounders may exist. Surgeon preference determined repair type, which could bias towards using mesh for larger or recurrent hernias. We attempted to match groups, and baseline factors were similar (Table 1), but selection bias cannot be excluded. We also did not stratify by hernia complexity or technique details (onlay vs sublay), which may influence outcomes. Future prospective trials in Indian settings could address these issues.

Overall, our results reinforce that mesh reinforcement is the preferred approach for elective incisional hernia repair in most patients, including those in India. Mesh implantation provides a strong benefit in reducing hernia recurrence[5,6]. The decision to avoid mesh should be reserved for select cases (e.g. contaminated fields, small hernias in very low-risk patients)[9,10]. Our study also highlights the importance of meticulous surgical technique and follow-up to manage seromas and optimize outcomes.

Conclusion

In this cohort of Indian patients, mesh repair for incisional hernia significantly improved long-term outcomes compared to non-mesh suture repair. Mesh use was associated with a markedly lower recurrence rate and fewer reoperations, with only a modest increase in early seromas. These findings support current practice favoring mesh reinforcement for incisional hernia. We conclude that in elective hernia surgery, the benefits of mesh in preventing recurrence outweigh its risks. Clinicians should continue to use mesh routinely for incisional hernias, while vigilant for mesh-related morbidity. Further research, especially randomized studies and quality-of-life assessments, will help refine patient selection and techniques for optimal repair strategies.

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Conflicts of interest

There are no conflicts of interest.

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