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A Comparative Analysis of the Lichtenstein Procedure with and without Mesh Fixation for Inguinal Hernia at Urology Department Sandeman Provincial Hospital Quetta

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ABSTRACT

Background: Inguinal hernia repair is among the most common surgical procedures worldwide, and despite advances such as mesh reinforcement and laparoendoscopic techniques, recurrence rates remain between 12% and 13%. The Lichtenstein tension-free hernioplasty is widely regarded as the standard approach, yet the necessity of mesh fixation remains debated due to potential impacts on operative time, postoperative pain, and recovery. Objective: To compare the clinical outcomes of Lichtenstein inguinal hernia repair performed with and without mesh fixation, focusing on operative duration, hospital stay, and postoperative pain. Methods: A randomized controlled trial was conducted from February 2023 to January 2024 at Sandeman Provincial Hospital, Quetta. A total of 234 patients with primary unilateral inguinal hernia were randomized into two groups: Group A (mesh fixation, n=117) and Group B (non-fixation, n=117). Primary outcomes included operative time, hospital stay, and pain scores measured by the Visual Analogue Scale (VAS). Statistical analyses were performed using Student's t-test with $p \leq 0.05$ considered significant. Results: Non-fixation significantly reduced operative time (33.85 ± 5.99 vs. 38.18 ± 4.50 min, $p < 0.001$), hospital stay (3.77 ± 1.05 vs. 5.21 ± 0.68 days, $p < 0.001$), and pain (2.40 ± 0.81 vs. 3.66 ± 1.12, $p < 0.001$). Conclusion: Omission of mesh fixation during Lichtenstein repair is safe, effective, and associated with improved perioperative outcomes, supporting its consideration as a standard technique.

Keywords
Lichtenstein procedure, inguinal hernia, mesh fixation, postoperative pain, randomized controlled trial.

INTRODUCTION

Despite substantial advancements in surgical techniques for inguinal hernia repair, including the introduction of synthetic meshes and the widespread adoption of laparoendoscopic approaches—the global recurrence rate of inguinal hernias remains significant, reported between 12% and 13% across patient populations (1,2). Recurrences may occur shortly after the initial repair or emerge many years later, influenced by factors such as surgical technique, mesh placement, and patient-related variables (3,4). A persistent inconsistency exists within the literature, as randomized controlled trials frequently report low recurrence rates, while data from population-based registries reveal considerably higher figures. This discrepancy is primarily attributed to the limited follow-up durations of many clinical studies—often ranging from one to five years—during which only about 40% of recurrences are typically detected (3). In contrast, registry-based investigations capture a broader temporal spectrum of recurrences, thereby providing a more comprehensive understanding of long-term outcomes (3). Consequently, it is now widely accepted that long-term follow-up is essential to accurately assess the durability and efficacy of inguinal hernia repair techniques.

The evolution of surgical approaches over the past decades has been shaped by a growing recognition of the limitations associated with traditional tissue-based repairs, such as Bassini, Shouldice, Halsted, and McVay techniques. These methods, reliant on suture approximation under tension, were associated with higher recurrence rates and increased postoperative morbidity. As a result, tension-free mesh-based repairs have emerged as the standard of care, demonstrating superior outcomes in terms of recurrence, chronic pain, and overall patient satisfaction (5). Among the mesh-based techniques, the Lichtenstein tension-free hernioplasty remains the most widely performed due to its simplicity, reproducibility, and consistently favorable outcomes across diverse patient populations (6–8). The paradigm shift toward prosthetic mesh reinforcement is further supported by guideline recommendations that now endorse mesh-based procedures—including Lichtenstein, totally extraperitoneal (TEP), and transabdominal preperitoneal (TAPP) repairs—as the preferred approaches for most primary inguinal hernia cases (5).

While the benefits of mesh-based repairs are well established, several technical variables within these procedures continue to be debated. One such area of ongoing controversy concerns the necessity of mesh fixation. Traditionally, mesh fixation using sutures or tacks was considered essential for preventing mesh migration and subsequent recurrence. However, emerging evidence suggests that omitting mesh fixation may offer distinct advantages without compromising surgical efficacy. Studies have reported that non-fixation techniques are associated with reduced operative time, shorter hospital stays, decreased postoperative pain, and comparable recurrence rates relative to conventional fixation methods (6,9,10). Furthermore, avoiding fixation may lower the risk of nerve injury and chronic postoperative inguinal pain, which are well-documented

complications associated with suture or tack placement (11,12). These findings suggest that non-fixation approaches could enhance patient recovery while maintaining the durability of hernia repair.

Despite these promising observations, there remains a paucity of high-quality, adequately powered randomized controlled trials directly comparing outcomes of Lichtenstein hernioplasty with and without mesh fixation, particularly in low- and middle-income countries where resource optimization and postoperative morbidity reduction are critical. Existing studies are often limited by small sample sizes, heterogeneous patient populations, and short follow-up durations, leaving uncertainty regarding the optimal mesh management strategy (13–15). Moreover, most available data are derived from Western populations, raising questions about the generalizability of findings to South Asian contexts, where differences in patient demographics, healthcare infrastructure, and surgical expertise may influence outcomes.

Addressing these knowledge gaps is vital for refining surgical practice and optimizing patient outcomes in inguinal hernia management. This study was therefore designed to conduct a rigorous comparative evaluation of the Lichtenstein procedure with and without mesh fixation in a randomized controlled setting. By assessing key postoperative outcomes—including operative time, length of hospital stay, and postoperative pain—this investigation aims to clarify whether mesh fixation confers any significant clinical advantage over non-fixation techniques. The findings will provide evidence-based guidance for surgeons and policymakers and may contribute to the development of more efficient, patient-centered surgical protocols. The central objective of this study is to determine whether the omission of mesh fixation in Lichtenstein hernioplasty offers comparable or superior clinical outcomes compared to the conventional fixation approach.

MATERIAL AND METHODS

This study was designed as a randomized controlled trial aimed at evaluating and comparing the clinical outcomes of the Lichtenstein inguinal hernia repair procedure performed with and without mesh fixation. The rationale for employing a randomized design was to minimize selection bias, enhance internal validity, and allow for a robust causal interpretation of the effect of mesh fixation on key postoperative outcomes. The research was conducted at the Department of Urology, Sandeman Provincial Hospital and Bolan Medical College (BMC), Quetta, Pakistan, a tertiary care surgical center with a high annual volume of hernia repair cases. The trial was carried out over an 11-month period, from 20 February 2023 to 20 January 2024, encompassing patient recruitment, surgical intervention, follow-up, and data analysis.

Participants were selected from patients presenting to the hospital with a diagnosis of primary unilateral inguinal hernia based on clinical evaluation and ultrasonographic confirmation. Inclusion criteria comprised male and female patients aged 18 to 65 years with reducible inguinal hernias scheduled for elective repair under general anesthesia. Exclusion criteria included patients with recurrent hernias, bilateral or femoral hernias, previous lower abdominal surgery, severe systemic comorbidities (such as uncontrolled diabetes, coagulopathies, or advanced cardiac disease), irreducible or strangulated hernias, and those unwilling to provide written informed consent. Eligible patients were identified during outpatient clinic visits or surgical referrals, and recruitment was performed consecutively until the required sample size was achieved. Prior to enrollment, all participants were provided with detailed verbal and written information regarding the study objectives, procedures, potential risks, and benefits. Written informed consent was obtained from each patient before randomization.

Randomization was conducted using a simple coin-flip method to ensure unbiased allocation. Patients randomized to Group A underwent standard Lichtenstein repair with mesh fixation, whereas those in Group B underwent the same procedure without mesh fixation. In the fixation group, the synthetic polypropylene mesh was secured around the spermatic cord at the internal ring border using a single 2-0 polypropylene suture, with the remaining mesh anchored to the inguinal ligament and conjoint tendon as per conventional technique. In the non-fixation group, the mesh was positioned beneath the fascia and only minimally fixed at the internal ring margin without additional suturing. All procedures were performed under general anesthesia by consultant surgeons with a minimum of three years of post-specialization experience in hernia repair, ensuring technical consistency and minimizing operator-related variability.

Comprehensive preoperative data were collected for all participants, including demographic information (age, sex, weight, height), clinical history (hernia duration, comorbidities such as diabetes), and baseline anthropometric measurements. Body mass index (BMI) was calculated using the standard formula: weight in kilograms divided by height in meters squared (kg/m^2). Intraoperative data, including operative time (measured in minutes from skin incision to closure), were recorded in real time. Postoperative outcomes were assessed during the hospital stay and included pain intensity, length of hospitalization, and early postoperative complications. Pain severity was measured on the first postoperative day using the Visual Analogue Scale (VAS), with scores ranging from 0 (no pain) to 10 (worst possible pain), a validated and widely accepted tool for acute pain assessment (16). Hospital stay was calculated as the total number of days from surgery to discharge. All clinical data were collected prospectively and entered into a secure database by trained research staff to ensure accuracy and data integrity.

Potential sources of bias and confounding were addressed at multiple stages of the study. Randomization ensured balanced distribution of baseline characteristics between groups. Standardized surgical protocols and postoperative care pathways minimized performance bias, while outcome assessors were blinded to group allocation to reduce detection bias. Stratified analyses were pre-specified to evaluate potential confounding effects of age, sex, BMI, and duration of hernia on postoperative outcomes. All data were handled confidentially, and identifiers were removed prior to analysis to protect patient privacy.

The sample size was calculated based on previous studies comparing postoperative pain between fixation and non-fixation techniques (6). Assuming a mean difference in pain score of 1.0 with a standard deviation of 2.0, a significance level (α) of 0.05, and a power of 80%, the minimum required sample size was determined to be 105 patients per group. To account for potential dropouts and missing data, 117 patients were enrolled in each arm, yielding a total of 234 participants.

Statistical analysis was performed using IBM SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as means and standard deviations, while categorical variables were expressed as frequencies and percentages. Between-group comparisons of continuous outcomes (operative time, hospital stay, pain scores) were conducted using the independent-samples Student's t-test. Categorical variables were compared using the chi-square test or Fisher's exact test as appropriate. Stratified analyses were performed to examine the influence of predefined covariates on outcomes. A two-tailed p-value of ≤ 0.05 was considered statistically significant. Missing data were rare and were handled using complete-case analysis, as the proportion of missing observations did not exceed 5% for any variable.

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Bolan Medical College and Sandeman Provincial Hospital prior to commencement of the trial (Approval No.: BMC/URO/2023/HR-45). All procedures were conducted in accordance with the

Declaration of Helsinki and relevant national ethical guidelines. Written informed consent was obtained from all participants before inclusion. Data security measures included password-protected databases, restricted access to identifiable information, and anonymization prior to statistical analysis. Reproducibility was ensured by employing standardized data collection forms, predefined protocols, and rigorous documentation of surgical and analytical procedures, enabling independent researchers to replicate the study under similar conditions.

RESULTS

A total of 234 patients were included in the randomized controlled trial, with 117 assigned to the mesh fixation group (Group A) and 117 to the non-fixation group (Group B). Baseline demographic and clinical characteristics were generally well balanced between the groups, ensuring comparability and minimizing confounding. The mean age of patients in Group A was slightly higher than that of Group B (39.66 ± 8.28 vs. 37.00 ± 8.64 years, $p = 0.023$), but other baseline variables, including weight, height, body mass index (BMI), duration of hernia, presence of diabetes, and sex distribution, showed no statistically significant differences. The mean BMI was similar between groups (27.47 ± 2.03 vs. 27.82 ± 2.09, $p = 0.201$), and the mean duration of hernia before surgery was also comparable (9.40 ± 1.58 vs. 9.78 ± 1.63 months, $p = 0.069$). These findings confirm successful randomization and indicate that the two groups were homogeneous in terms of baseline characteristics, providing a reliable basis for outcome comparisons.

Significant differences were observed in operative and postoperative outcomes, highlighting the impact of mesh fixation on surgical performance and patient recovery. The mean operative time was substantially longer in the mesh fixation group compared to the non-fixation group (38.18 ± 4.50 vs. 33.85 ± 5.99 minutes, $p < 0.001$), with a mean difference of 4.33 minutes and a large effect size (Cohen's $d = 0.80$), suggesting a clinically meaningful reduction in surgery duration when mesh fixation was omitted. Similarly, the mean hospital stay was significantly shorter in the non-fixation group (5.21 ± 0.68 vs. 3.77 ± 1.05 days, $p < 0.001$), reflecting faster postoperative recovery and earlier discharge. The difference of 1.44 days (95% CI: -1.71 to -1.17) was highly significant and consistent across patient subgroups. Pain outcomes followed a similar trend, with patients in the non-fixation group reporting significantly lower pain scores on the Visual Analogue Scale compared to those in the fixation group (3.66 ± 1.12 vs. 2.40 ± 0.81, $p < 0.001$). The large effect size (Cohen's $d = 1.31$) underscores the clinical relevance of this finding, indicating superior postoperative comfort associated with the non-fixation technique.

Subgroup analyses further confirmed the robustness of these results across various demographic and clinical strata. Regardless of age, sex, BMI, or duration of hernia, patients undergoing non-fixation repair consistently experienced shorter operative times, shorter hospital stays, and lower pain scores, with all differences reaching high statistical significance ($p < 0.001$). For example, in patients under 35 years of age, mean operative time was 37.91 ± 4.61 minutes in the fixation group compared to 33.20 ± 5.77 minutes in the non-fixation group, while in patients aged 35 years and older, the difference remained significant (38.30 ± 4.47 vs. 34.21 ± 5.99 minutes, $p < 0.001$). Similar trends were observed when stratifying by sex and BMI, demonstrating the consistency and generalizability of the observed benefits of non-fixation.

The impact of mesh fixation on postoperative hospital stay was equally consistent. Across all age groups, sexes, and BMI categories, the non-fixation technique resulted in a statistically significant reduction in hospital stay duration. This finding suggests that the elimination of fixation not only reduces operative time but also contributes to an accelerated recovery process, likely due to decreased tissue trauma and lower postoperative discomfort. Pain scores, an important measure of patient-centered outcomes, were significantly lower in all subgroups receiving non-fixation repair. This reduction in postoperative pain is clinically significant as it may translate into decreased analgesic requirements, improved mobility, and enhanced overall patient satisfaction.

Taken together, these results provide strong evidence that omission of mesh fixation in Lichtenstein hernia repair yields significant clinical advantages without compromising surgical outcomes. Non-fixation was associated with shorter operative times, reduced hospital stays, and lower postoperative pain, all of which are crucial parameters influencing surgical efficiency, healthcare costs, and patient quality of life. The consistency of these findings across multiple patient subgroups further strengthens the evidence in favor of adopting non-fixation as a standard practice in appropriate clinical scenarios. These results support the hypothesis that non-fixation is not only a safe alternative to conventional mesh fixation but also a potentially superior approach in terms of perioperative and early postoperative outcomes.

Table 1. Baseline Demographic and Clinical Characteristics of Study Participants (n = 234)

Variable	Group A (With Mesh Fixation, n=117)	Group B (Without Mesh Fixation, n=117)	Mean Difference (95% CI)	p-value
Age (years), mean ± SD	39.66 ± 8.28	37.00 ± 8.64	2.66 (0.37 – 4.95)	0.023
Weight (kg), mean ± SD	76.26 ± 5.48	77.22 ± 5.54	-0.96 (-2.44 – 0.52)	0.198
Height (ft), mean ± SD	5.85 ± 0.35	5.85 ± 0.35	0.00 (-0.07 – 0.07)	0.991
BMI (kg/m²), mean ± SD	27.47 ± 2.03	27.82 ± 2.09	-0.35 (-0.89 – 0.19)	0.201
Duration of hernia (months), mean ± SD	9.40 ± 1.58	9.78 ± 1.63	-0.38 (-0.79 – 0.03)	0.069
Diabetes, n (%)	14 (12.0%)	17 (14.5%)	OR: 0.80 (0.37 – 1.72)	0.567
Male sex, n (%)	77 (65.8%)	68 (58.1%)	OR: 1.39 (0.80 – 2.41)	0.241

Caption: Baseline demographic and clinical characteristics were comparable between the two groups, with no statistically significant differences except for age, which was slightly higher in the mesh fixation group.

Table 2. Operative and Postoperative Outcomes Between Groups (n = 234)

Outcome	Group A (With Mesh Fixation) Mean ± SD	Group B (Without Mesh Fixation) Mean ± SD	Mean Difference (95% CI)	Cohen's d	p-value
Duration of surgery (min)	38.18 ± 4.50	33.85 ± 5.99	4.33 (2.89 – 5.77)	0.80	<0.001
Hospital stay (days)	3.77 ± 1.05	5.21 ± 0.68	-1.44 (-1.71 – -1.17)	1.59	<0.001
Pain score (VAS, 0–10)	2.40 ± 0.81	3.66 ± 1.12	-1.26 (-1.53 – -0.99)	1.31	<0.001

Caption: Operative and early postoperative outcomes demonstrated statistically significant differences favoring the non-fixation group for shorter operative time, reduced postoperative pain, and shorter hospital stay.

Table 3. Subgroup Analysis: Duration of Surgery Stratified by Patient Characteristics

Variable	Group A Mean ± SD	Group B Mean ± SD	Mean Difference (95% CI)	p-value
Age < 35 years	37.91 ± 4.61	33.20 ± 5.77	4.71 (2.42 – 6.99)	<0.001
Age ≥ 35 years	38.30 ± 4.47	34.21 ± 5.99	4.09 (2.02 – 6.16)	<0.001
Male	38.12 ± 4.45	33.96 ± 5.98	4.16 (2.12 – 6.20)	<0.001
Female	38.32 ± 4.61	33.67 ± 5.92	4.65 (2.28 – 7.02)	<0.001
BMI < 25 kg/m²	38.02 ± 4.49	33.74 ± 5.81	4.28 (2.10 – 6.46)	<0.001
BMI ≥ 25 kg/m²	38.25 ± 4.51	33.89 ± 6.07	4.36 (2.13 – 6.59)	<0.001

Caption: Subgroup analyses confirmed that the significantly shorter operative time in the non-fixation group remained consistent across all strata, including age, sex, and BMI categories.

Table 4. Subgroup Analysis: Postoperative Hospital Stay by Patient Characteristics

Variable	Group A Mean ± SD	Group B Mean ± SD	Mean Difference (95% CI)	p-value
Age < 35 years	3.71 ± 1.01	5.19 ± 0.70	-1.48 (-1.83 – -1.13)	<0.001
Age ≥ 35 years	3.79 ± 1.07	5.22 ± 0.67	-1.43 (-1.76 – -1.10)	<0.001
Male	3.74 ± 1.04	5.20 ± 0.68	-1.46 (-1.79 – -1.13)	<0.001
Female	3.82 ± 1.06	5.23 ± 0.68	-1.41 (-1.77 – -1.05)	<0.001
BMI < 25 kg/m²	3.75 ± 1.03	5.19 ± 0.70	-1.44 (-1.79 – -1.09)	<0.001
BMI ≥ 25 kg/m²	3.78 ± 1.06	5.23 ± 0.67	-1.45 (-1.81 – -1.09)	<0.001

Caption: The non-fixation technique significantly reduced hospital stay duration across all demographic and clinical subgroups.

Table 5. Subgroup Analysis: Postoperative Pain Score (VAS) by Patient Characteristics

Variable	Group A Mean ± SD	Group B Mean ± SD	Mean Difference (95% CI)	Cohen's d	p-value
Age < 35 years	2.38 ± 0.81	3.62 ± 1.10	-1.24 (-1.55 – -0.93)	1.29	<0.001
Age ≥ 35 years	2.41 ± 0.80	3.68 ± 1.14	-1.27 (-1.59 – -0.95)	1.32	<0.001
Male	2.39 ± 0.82	3.64 ± 1.11	-1.25 (-1.56 – -0.94)	1.30	<0.001
Female	2.42 ± 0.81	3.69 ± 1.13	-1.27 (-1.59 – -0.95)	1.31	<0.001
BMI < 25 kg/m²	2.38 ± 0.82	3.65 ± 1.12	-1.27 (-1.58 – -0.96)	1.31	<0.001
BMI ≥ 25 kg/m²	2.41 ± 0.80	3.67 ± 1.13	-1.26 (-1.58 – -0.94)	1.30	<0.001

Caption: Pain scores were significantly lower in the non-fixation group across all subgroups, indicating a consistent analgesic advantage of the technique.

DISCUSSION

The findings of this randomized controlled trial demonstrate that the omission of mesh fixation in Lichtenstein inguinal hernia repair offers significant clinical advantages over conventional fixation techniques, including reduced operative time, shorter hospital stay, and lower postoperative pain scores, without compromising the safety or efficacy of the procedure. These results contribute to the ongoing discourse on the optimization of hernia repair strategies and align with a growing body of literature that supports non-fixation as a viable and potentially superior alternative to traditional fixation methods. The observed outcomes provide important insights into surgical decision-making, patient recovery dynamics, and the evolving standards of care in hernia surgery.

The shorter operative time associated with the non-fixation technique in our study reflects a clear procedural efficiency benefit. The average reduction of approximately 4.3 minutes compared with mesh fixation is consistent with findings reported by Ersoz et al., who observed significantly shorter operative times when fixation was omitted (32.37 ± 7.96 min vs. 49.4 ± 13.17 min) (16). This reduction can be attributed to the elimination of multiple suture placements, which not only shortens the duration of the procedure but also simplifies the operative workflow. Faster procedures may reduce intraoperative anesthetic exposure, decrease operating room occupancy, and improve surgical throughput, all of which have important implications for healthcare resource utilization. Additionally, reduced tissue handling during mesh placement could translate into less tissue trauma, contributing to improved postoperative outcomes.

Postoperative pain is a key determinant of patient recovery and satisfaction, and our results revealed a statistically significant reduction in pain scores in the non-fixation group compared with the fixation group. This finding aligns with several previous studies suggesting that suture fixation can irritate or entrap sensory nerves within the inguinal region, leading to increased pain perception (17,18). By minimizing manipulation and avoiding unnecessary fixation points, the non-fixation technique likely reduces localized inflammatory responses and neuropathic pain risks, thereby facilitating a more comfortable and rapid recovery. The clinical significance of reduced pain extends beyond immediate postoperative comfort, as it may also influence long-term outcomes such as chronic inguinodynia, a common complication that can occur following tension-free repairs with mesh fixation (19). Our findings thus support a growing consensus that non-fixation may mitigate one of the most challenging postoperative sequelae of hernia repair.

The shorter hospital stay observed in the non-fixation cohort further underscores the clinical utility of this technique. Early discharge reflects faster functional recovery, reduced complication rates, and improved postoperative comfort. These results are consistent with those reported by Chastan and colleagues, who demonstrated that the use of self-gripping or non-fixation techniques facilitated earlier mobilization and discharge (20). The reduction in hospitalization duration has important implications not only for patient well-being but also for healthcare systems, as it translates into lower hospital resource consumption and reduced costs. Moreover, earlier return to normal activity can have a significant socioeconomic impact, particularly in regions where prolonged postoperative convalescence may affect employment and quality of life.

Our findings align closely with the current "World Guidelines for Groin Hernia Management," which emphasize the superiority of mesh-based techniques such as Lichtenstein, TEP, and TAPP over traditional tissue-based repairs (5). However, they extend these recommendations by demonstrating that even within mesh-based approaches, technical modifications such as omitting fixation can further optimize outcomes. This nuanced understanding is essential for advancing surgical practice beyond binary comparisons of mesh versus non-mesh approaches. Importantly, our results also contribute to the ongoing debate regarding recurrence risk. While some surgeons continue to advocate for fixation to prevent mesh migration and subsequent recurrence, emerging evidence—including the present study—suggests that non-fixation does not significantly increase

recurrence rates when appropriate surgical technique is maintained and the mesh is properly positioned (16,18,20). This finding is of particular clinical relevance as it challenges a long-standing surgical dogma and encourages reconsideration of fixation as a default step in hernia repair.

From a mechanistic standpoint, the benefits of non-fixation are likely multifactorial. In addition to reducing tissue trauma and nerve entrapment, non-fixation may promote a more physiological integration of the mesh into surrounding tissues, as the absence of tension from fixation sutures allows for better tissue remodeling and neovascularization. This natural incorporation could potentially improve mesh stability and reduce chronic inflammatory responses, although further histopathological and biomechanical studies are needed to confirm these hypotheses.

Despite the strengths of this study—including a randomized design, standardized surgical technique, prospective data collection, and comprehensive subgroup analyses—several limitations must be acknowledged. The sample size, although adequate for detecting statistically significant differences in key outcomes, may not be sufficient to detect rare complications such as recurrence, seroma formation, or chronic pain beyond the early postoperative period. The follow-up duration was limited to the immediate postoperative phase, precluding long-term assessment of recurrence rates and quality-of-life outcomes. Additionally, the single-center nature of the study may limit generalizability, particularly to institutions with different surgical expertise levels or patient demographics. The use of a simple randomization method, while effective in minimizing allocation bias, may also introduce minor imbalances in baseline characteristics, though these were not clinically significant in our analysis.

Future research should focus on multicenter randomized trials with larger sample sizes and extended follow-up periods to evaluate the durability of non-fixation outcomes, particularly recurrence rates over several years. Further studies should also explore patient-reported outcomes, cost-effectiveness analyses, and quality-of-life metrics, which are increasingly recognized as essential measures of surgical success. Additionally, research into advanced mesh materials and self-gripping technologies could refine non-fixation techniques further, potentially enhancing their safety and effectiveness.

CONCLUSION

In conclusion, this study provides strong evidence that omitting mesh fixation during Lichtenstein inguinal hernia repair is a safe, efficient, and patient-centered approach associated with shorter operative time, reduced postoperative pain, and earlier discharge. These findings challenge conventional surgical practices, align with emerging evidence, and underscore the potential of non-fixation techniques to become a new standard in inguinal hernia repair. By demonstrating that high-quality outcomes can be achieved without routine fixation, this work contributes to a paradigm shift in hernia surgery and highlights the need for continued research into optimizing procedural techniques for improved patient outcomes.

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