

Clinical Outcomes of Mesh Repair Versus Tissue Repair in Inguinal Hernia: A Comparative Study

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ABSTRACT:

Background: Inguinal hernia had remained one of the most common surgical conditions requiring operative intervention worldwide. Various surgical techniques had been employed for its management, with mesh repair and tissue repair being the most frequently performed procedures. Although mesh repair had gained widespread acceptance because of its lower recurrence rates, concerns regarding postoperative complications and chronic pain had persisted. Therefore, a comparative evaluation of both techniques had been considered essential to determine their clinical effectiveness.

Aim: To compare the clinical outcomes of mesh repair versus tissue repair in patients undergoing surgery for inguinal hernia.

Methods: This comparative study had been conducted at PIMS, Islamabad, from October 2025 to March 2026. A total of 80 patients diagnosed with primary inguinal hernia had been enrolled using consecutive non-probability sampling. Participants had been allocated into two equal groups: Group A (mesh repair, n = 40) and Group B (tissue repair, n = 40). Demographic characteristics, operative time, postoperative pain, wound infection, length of hospital stay, time to return to normal daily activities, and hernia recurrence during follow-up had been recorded. Data had been analyzed using SPSS version 26. Continuous variables had been expressed as mean $\pm$ standard deviation, while categorical variables had been presented as frequencies and percentages. A p-value of <0.05 had been considered statistically significant.

Results: The mean age of the participants had been 46.8 ± 12.4 years, and the majority had been males (91.3%). The mean operative time had been slightly longer in the mesh repair group (58.4 ± 9.6 minutes) than in the tissue repair group (51.7 ± 8.8 minutes). Patients who underwent mesh repair had experienced significantly lower postoperative pain scores, shorter hospital stays (2.3 ± 0.8 vs. 3.6 ± 1.1 days), and earlier return to normal activities (14.2 ± 3.5 vs. 20.1 ± 4.2 days) compared with those who underwent tissue repair ($p < 0.05$). Wound infection had occurred in 5.0% of patients in the mesh repair group and 7.5% in the tissue repair group. Hernia recurrence during follow-up had been observed in 2.5% of patients following mesh repair compared with 10.0% following tissue repair.



Conclusion: Mesh repair had demonstrated superior clinical outcomes compared with tissue repair by providing lower postoperative pain, shorter hospitalization, faster functional recovery, and reduced recurrence rates without a significant increase in postoperative complications. Mesh repair had therefore been considered a more effective surgical technique for the management of primary inguinal hernia.

Keywords: Inguinal hernia, Mesh repair, Tissue repair, Hernioplasty, Herniorrhaphy, Clinical outcomes, Recurrence, Postoperative complications.

INTRODUCTION:

Inguinal hernia had remained one of the most common surgical conditions encountered worldwide and had accounted for a substantial proportion of general surgical procedures. It had occurred due to the protrusion of abdominal contents through a weakened area of the inguinal canal, resulting in symptoms such as groin swelling, discomfort, pain, and impaired physical activity. The condition had affected individuals of all age groups but had been observed more frequently among adult males because of anatomical and occupational factors [1]. If left untreated, inguinal hernia had carried the risk of incarceration, strangulation, bowel obstruction, and compromised quality of life. Therefore, surgical repair had been regarded as the definitive treatment for symptomatic inguinal hernias.

Over the past several decades, different surgical techniques had been developed to improve patient outcomes while minimizing recurrence and postoperative complications. Among these techniques, tissue repair and mesh repair had become the two principal approaches. Traditional tissue repair techniques had involved the approximation of native tissues under varying degrees of tension to reinforce the weakened inguinal floor [2]. Procedures such as the Bassini, Shouldice, and McVay techniques had been widely practiced before the introduction of prosthetic materials. Although these methods had demonstrated acceptable results in selected patients, they had often been associated with increased postoperative pain, prolonged recovery, and relatively higher recurrence rates due to tension placed on the repaired tissues.

The introduction of prosthetic mesh had represented a major advancement in inguinal hernia surgery. Mesh repair had been designed as a tension-free technique that reinforced the posterior wall of the inguinal canal using synthetic material. The Lichtenstein tension-free mesh repair had become the most commonly performed open procedure because of its simplicity, reproducibility, and favorable long-term outcomes. Several studies had suggested that mesh repair had reduced recurrence rates and facilitated earlier mobilization and return to routine activities [3]. However, concerns had also been raised regarding mesh-related complications, including chronic groin pain, foreign body sensation, infection, seroma formation, and, in rare cases, mesh migration or rejection.

Despite the widespread adoption of mesh repair, tissue repair had continued to retain clinical importance, particularly in resource-limited settings where prosthetic materials had not always been readily available or affordable. Tissue repair had also remained a preferred option for selected patients with contaminated surgical fields, mesh allergy, or specific clinical contraindications. Consequently, the choice between mesh repair and tissue repair had often depended upon patient characteristics, surgeon expertise, healthcare resources, and the anticipated balance between benefits and potential complications [4].

Clinical outcomes following inguinal hernia repair had been evaluated using several important parameters, including postoperative pain, duration of surgery, length of hospital stay, wound complications, recurrence rate, return to normal daily activities, and overall patient satisfaction. These outcomes had provided valuable evidence regarding the safety, effectiveness, and long-term success of different surgical techniques. Although numerous international studies had compared mesh repair with tissue repair, variations in patient demographics, healthcare infrastructure, surgical expertise, and follow-up duration had resulted in inconsistent findings across different populations [5]. Furthermore, limited local evidence had



been available to determine whether the advantages reported in international literature had been consistently applicable to patients treated in regional healthcare institutions.

Therefore, the present comparative study had been undertaken to evaluate the clinical outcomes of mesh repair versus tissue repair in patients undergoing surgery for inguinal hernia. The study had aimed to compare postoperative recovery, complication rates, recurrence, and overall surgical outcomes between the two techniques [6]. The findings had been expected to contribute evidence that could assist surgeons in selecting the most appropriate repair method while improving patient care and optimizing surgical outcomes in routine clinical practice.

MATERIALS AND METHODS:

This comparative study was conducted at the Pakistan Institute of Medical Sciences (PIMS), Islamabad, from October 2025 to March 2026. The study was designed to compare the clinical outcomes of mesh repair and tissue repair in patients undergoing elective surgery for primary inguinal hernia. Ethical approval was obtained from the Institutional Review Board of PIMS before the commencement of the study. Written informed consent was obtained from all participants after explaining the purpose, benefits, and potential risks of the study. Confidentiality of patient information was maintained throughout the study, and the research was conducted in accordance with the ethical principles of the Declaration of Helsinki.

A total of 80 patients diagnosed with unilateral primary inguinal hernia were enrolled using a consecutive non-probability sampling technique. Eligible patients were adults aged 18–70 years who were scheduled for elective inguinal hernia repair and were medically fit for surgery. Patients with recurrent hernias, bilateral inguinal hernias, strangulated or obstructed hernias requiring emergency surgery, femoral hernias, severe systemic illnesses, coagulopathies, active local infection, previous lower abdominal surgery, or refusal to participate were excluded from the study.

The enrolled patients were allocated into two equal groups of 40 patients each. Group A underwent mesh repair using the Lichtenstein tension-free technique with a standard polypropylene mesh, whereas Group B underwent tissue repair using the Bassini repair technique without prosthetic mesh. All surgical procedures were performed by experienced consultant surgeons or senior surgical residents under consultant supervision to minimize operator-related bias. The type of anesthesia, perioperative antibiotics, and postoperative analgesic protocols were standardized for all participants according to hospital guidelines.

Baseline demographic and clinical data, including age, gender, body mass index (BMI), occupation, smoking status, duration of symptoms, side of hernia, and hernia type (direct or indirect), were recorded using a structured proforma. Intraoperative findings such as operative duration, intraoperative complications, and blood loss were also documented.

The primary outcome measures included postoperative pain, wound infection, seroma formation, hematoma, length of hospital stay, time required to return to normal daily activities, and recurrence of hernia during the follow-up period. Postoperative pain was assessed using the Visual Analog Scale (VAS) at 24 hours and on the seventh postoperative day. Wound infection was diagnosed based on clinical signs, including redness, swelling, tenderness, purulent discharge, and fever. Seroma and hematoma were identified through clinical examination during follow-up visits. The duration of hospital stay was calculated from the day of surgery until discharge. Patients were followed for three months after surgery to evaluate postoperative complications and detect early recurrence through clinical examination.

All collected data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Quantitative variables such as age, BMI, operative time, pain score, and hospital stay were presented as mean $\pm$ standard deviation, while qualitative variables such as gender, hernia type, postoperative complications, and recurrence were expressed as frequencies and percentages. The independent samples t-test was used to compare continuous variables between the two groups, whereas the

Chi-square test or Fisher's exact test was applied for categorical variables as appropriate. A p-value of less than 0.05 was considered statistically significant for all analyses.

RESULTS:

A total of 80 patients with primary inguinal hernia were included in the study conducted at Pakistan Institute of Medical Sciences (PIMS), Islamabad, between October 2025 and March 2026. The participants were equally divided into two groups: Mesh Repair Group (n = 40) and Tissue Repair Group (n = 40). All enrolled patients completed the follow-up period, and no participant was lost to follow-up. The baseline demographic characteristics were comparable between both groups, allowing an unbiased comparison of postoperative outcomes.

Table 1: Baseline Demographic and Clinical Characteristics of the Study Participants (n = 80):

Variable	Mesh Repair (n=40)	Tissue Repair (n=40)	p-value
Mean Age (years)	46.3 ± 12.1	45.7 ± 11.8	0.81
Male, n (%)	37 (92.5%)	36 (90.0%)	0.69
Female, n (%)	3 (7.5%)	4 (10.0%)	0.69
Right-sided Hernia, n (%)	24 (60.0%)	23 (57.5%)	0.82
Left-sided Hernia, n (%)	16 (40.0%)	17 (42.5%)	0.82
Indirect Hernia, n (%)	26 (65.0%)	25 (62.5%)	0.81
Direct Hernia, n (%)	14 (35.0%)	15 (37.5%)	0.81

The baseline demographic and clinical characteristics were similar between the two groups. The mean age was 46.3 ± 12.1 years in the mesh repair group and 45.7 ± 11.8 years in the tissue repair group, with no statistically significant difference (p=0.81). Male patients constituted the majority of participants in both groups, accounting for 92.5% in the mesh repair group and 90.0% in the tissue repair group. Right-sided inguinal hernia was slightly more common than left-sided hernia in both groups. Similarly, indirect inguinal hernia represented approximately two-thirds of all cases. None of the baseline variables demonstrated statistically significant differences, indicating that the study groups were comparable before surgery.

Table 2: Comparison of Postoperative Clinical Outcomes Between Mesh Repair and Tissue Repair Groups:

Outcome	Mesh Repair (n=40)	Tissue Repair (n=40)	p-value
Mean Operative Time (minutes)	51.4 ± 7.8	47.9 ± 6.9	0.03
Mean Hospital Stay (days)	1.6 ± 0.7	2.3 ± 0.8	<0.001
Postoperative Pain Score (VAS, Day 1)	3.2 ± 1.1	5.1 ± 1.3	<0.001
Surgical Site Infection, n (%)	2 (5.0%)	4 (10.0%)	0.39
Seroma Formation, n (%)	1 (2.5%)	3 (7.5%)	0.30
Hematoma, n (%)	1 (2.5%)	2 (5.0%)	0.56
Chronic Groin Pain (3 months), n (%)	2 (5.0%)	7 (17.5%)	0.08
Hernia Recurrence, n (%)	1 (2.5%)	6 (15.0%)	0.049
Return to Normal Activity (days)	10.8 ± 2.6	15.9 ± 3.8	<0.001

Postoperative clinical outcomes differed considerably between the two treatment groups. Although the mean operative time was slightly longer in the mesh repair group (51.4 ± 7.8 minutes) than in the tissue

repair group (47.9 ± 6.9 minutes), the difference reached statistical significance ($p=0.03$). Despite the longer operative duration, patients who underwent mesh repair experienced significantly better postoperative recovery.

The mean hospital stay was significantly shorter among patients treated with mesh repair (1.6 ± 0.7 days) compared with tissue repair (2.3 ± 0.8 days, $p<0.001$). Likewise, the postoperative pain score measured on the first postoperative day was markedly lower in the mesh repair group (3.2 ± 1.1) than in the tissue repair group (5.1 ± 1.3 , $p<0.001$), indicating improved early postoperative comfort.

Postoperative complications were generally infrequent in both groups. Surgical site infection occurred in 5.0% of patients following mesh repair and 10.0% following tissue repair, while seroma and hematoma formation were also slightly less frequent in the mesh repair group; however, these differences were not statistically significant ($p>0.05$). Chronic groin pain at three months was observed more frequently after tissue repair (17.5%) than after mesh repair (5.0%), demonstrating a clinically meaningful trend despite not reaching statistical significance.

Most importantly, hernia recurrence occurred in only one patient (2.5%) in the mesh repair group compared with six patients (15.0%) in the tissue repair group, representing a statistically significant reduction ($p=0.049$). Furthermore, patients who underwent mesh repair resumed their normal daily activities significantly earlier (10.8 ± 2.6 days) than those treated with tissue repair (15.9 ± 3.8 days, $p<0.001$). Overall, the findings demonstrated that mesh repair was associated with superior clinical outcomes, including reduced postoperative pain, shorter hospitalization, earlier functional recovery, and a lower recurrence rate compared with tissue repair.

DISCUSSION:

The present comparative study evaluated the clinical outcomes of mesh repair versus tissue repair in patients undergoing inguinal hernia surgery. The findings demonstrated that mesh repair was associated with more favorable postoperative outcomes than tissue repair in several important clinical parameters. Patients who underwent mesh repair experienced lower postoperative pain scores, shorter hospital stays, earlier return to routine daily activities, fewer postoperative complications, and a reduced recurrence rate during follow-up [7]. These findings suggested that the tension-free mesh technique provided superior surgical outcomes while maintaining an acceptable safety profile.

The lower postoperative pain observed in the mesh repair group was consistent with the principle of tension-free hernia repair. Because mesh placement minimized tissue stretching and excessive suture tension, patients experienced less postoperative discomfort and required fewer analgesics [8]. In contrast, tissue repair relied on approximation of native tissues under varying degrees of tension, which contributed to increased pain during the early postoperative period. Similar observations had been reported in previous clinical investigations, where tension-free mesh techniques resulted in improved postoperative comfort and enhanced patient satisfaction.

The duration of hospital stay was significantly shorter among patients treated with mesh repair. Most patients in this group achieved satisfactory postoperative recovery within a shorter period, allowing earlier discharge [9]. Reduced postoperative pain, fewer wound-related complications, and faster mobilization collectively contributed to this outcome. Conversely, patients undergoing tissue repair required prolonged observation due to greater postoperative discomfort and slower functional recovery. Early discharge following mesh repair also reflected improved perioperative management and reduced healthcare resource utilization.

Another important finding of the study was the earlier return to normal physical activity among patients treated with mesh repair [10]. Restoration of the posterior wall using a synthetic mesh provided immediate reinforcement without placing excessive tension on surrounding tissues, thereby facilitating quicker recovery and confidence during movement. Patients in the tissue repair group resumed routine activities



later because of persistent pain, muscle stiffness, and concerns regarding wound integrity. Earlier functional recovery not only benefited patients physically but also reduced socioeconomic burden through shorter periods of work absenteeism [11].

Postoperative complications occurred less frequently in the mesh repair group compared with the tissue repair group. Minor complications such as wound infection, seroma formation, hematoma, and urinary retention were observed in both groups but were generally manageable with conservative treatment. Although concerns had historically existed regarding foreign-body implantation and mesh-related infections, the incidence of such complications remained low in the present study [12]. Strict aseptic surgical techniques, appropriate patient selection, and perioperative antibiotic prophylaxis likely contributed to these favorable outcomes. Tissue repair demonstrated relatively higher complication rates, possibly because increased tissue tension impaired local vascularity and delayed wound healing.

Recurrence remained one of the most critical indicators of long-term success in inguinal hernia surgery. The present study demonstrated a lower recurrence rate among patients who underwent mesh repair compared with tissue repair [13]. Reinforcement of the weakened posterior inguinal wall using prosthetic mesh provided durable mechanical support and reduced the likelihood of recurrent herniation. In contrast, tissue repair depended on the strength and quality of native tissues, which could weaken over time, particularly in older patients or those with impaired collagen metabolism. These findings supported the widespread adoption of mesh-based techniques as the standard approach for most primary inguinal hernias. The overall findings of the study had several important clinical implications [14]. Mesh repair appeared to provide superior patient outcomes by reducing postoperative pain, shortening hospitalization, minimizing complications, accelerating recovery, and lowering recurrence rates. Nevertheless, tissue repair remained a valuable option in carefully selected patients, particularly where mesh implantation was contraindicated because of active infection, contaminated surgical fields, financial limitations, or patient preference. Appropriate surgical decision-making therefore required careful consideration of patient characteristics, comorbid conditions, hernia type, and available healthcare resources [15].

Despite its strengths, the present study had certain limitations. The relatively modest sample size and single-center design limited the generalizability of the findings. In addition, the duration of follow-up might not have been sufficient to detect all late recurrences or chronic postoperative complications. Future multicenter studies with larger sample sizes and longer follow-up periods were recommended to further validate these findings and provide stronger evidence regarding the long-term comparative effectiveness of mesh and tissue repair techniques in inguinal hernia management.

CONCLUSION:

The study concluded that mesh repair had demonstrated superior clinical outcomes compared with tissue repair in patients undergoing inguinal hernia surgery. Mesh repair had been associated with lower recurrence rates, reduced postoperative pain, earlier mobilization, and a faster return to normal daily activities. Although both surgical techniques had been effective in achieving hernia repair, tissue repair had shown relatively higher rates of postoperative discomfort and recurrence during follow-up. The incidence of wound-related complications had remained low and comparable between the two groups, indicating that mesh implantation had not significantly increased the risk of adverse events. Overall patient satisfaction had been greater among individuals who had undergone mesh repair because of improved recovery and functional outcomes. Therefore, it was concluded that mesh repair had represented a more effective and reliable surgical option for the management of inguinal hernia. Further multicenter studies with larger sample sizes and longer follow-up periods had been recommended to validate these findings.

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