ORIGINAL RESEARCH ARTICLE

Clinical Outcomes of Mesh Repair Versus Tissue Repair in Inguinal Hernia

Mukesh Bansal[1]*, Kanav Bansal[2], Swapandeep Kaur[3]

[1] Consultant, General Surgery, Usha Bansal Nursing Home, Sri Muktsar Sahib, Punjab, India.
[2] Junior Resident, Department of General Surgery, NIMS University, Rajasthan, India.
[3] Junior Resident, Department of General Surgery, Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Amritsar, Punjab, India.

Corresponding Author: Dr Mukesh Bansal
Email: drmukesh2003@yahoo.co.in

Abstract: Background: Tension-free mesh reinforcement and anatomical tissue repair are established approaches for inguinal hernia surgery. Differences in postoperative recovery, complications and recurrence remain clinically relevant to individualized procedure selection.**Objective:** To compare perioperative outcomes, postoperative pain, time to return to normal activity and short-term complications after open mesh and tissue repair of primary inguinal hernias.**Methods:** A single-centre comparative observational study involved 60 adults undergoing elective open inguinal hernia repair from March 2024 through March 2026 at Usha Bansal Nursing Home, Sri Muktsar Sahib, Punjab. Thirty patients underwent Lichtenstein mesh repair and 30 underwent Shouldice tissue repair. Baseline characteristics, operation time, pain at 24 hours and day 7, hospitalization, recovery and complications through six months were evaluated. Continuous outcomes were compared using Welch's t test or Mann–Whitney U test, and categorical outcomes by Fisher's exact test.**Results:** Mean operation time was 55.5 ± 8.2 minutes with mesh versus 66.4 ± 9.7 minutes with tissue repair (P = <0.001). Pain scores at 24 hours were 3.6 ± 0.7 and 4.7 ± 0.9, respectively (P = <0.001). Return to normal activity occurred after 9.7 ± 2.2 versus 14.4 ± 3.7 days (P = <0.001). At six months, recurrence was identified in 0 mesh patients and 2 tissue-repair patients (P = 0.492).**Conclusion:** In this small comparative cohort, mesh repair was associated with shorter operations and earlier functional recovery, while observed short-term complications were infrequent in both groups. The limited sample and six-month follow-up restrict inference about durable recurrence and chronic pain.

Keywords: inguinal hernia; Lichtenstein repair; Shouldice repair; mesh; tissue repair; postoperative pain; recurrence; recovery.

Received:18.06.2026 | Revised:26.06.2026 | Accepted:02.07.2026 | Published:21.07.2026

Citation: Dr. Mukesh Bansal *et al* (2026). Clinical Outcomes of Mesh Repair Versus Tissue Repair in Inguinal Hernia. STEMed, 7(2): 125-129.

1. INTRODUCTION

Inguinal hernia repair is among the most frequently performed general surgical procedures worldwide. Open anterior mesh repair using the Lichtenstein technique is widely employed because prosthetic reinforcement provides a tension-free repair, while sutured tissue techniques remain useful in carefully selected patients [1–3]. The choice of method is influenced by patient preferences, defect characteristics, expected pain and recovery, cost, and local surgical expertise.

Non-mesh techniques differ substantially in their anatomical reconstruction and recurrence performance. The Shouldice operation is the best standardized and most extensively evaluated tissue repair, whereas other sutured approaches cannot be assumed to provide equivalent results [2,4]. Comparative studies should therefore define the tissue technique and report clinically relevant outcomes rather than group all non-mesh approaches together.

Evidence syntheses indicate lower recurrence with mesh-based surgery, but differences in long-term pain are less consistent. The 2023 HerniaSurge update recommends mesh repair for most adults and permits selected non-mesh repairs through

 © 2026 Dr. Mukesh Bansal et al. Open Access under the Creative Commons Attribution 4.0 International License.

shared decision-making where expertise is available [2,5]. Patient-centered recovery measures and early complications remain important alongside recurrence, particularly in local practice settings.

This study compared open Lichtenstein mesh repair with Shouldice tissue repair for primary inguinal hernias, examining operative duration, postoperative pain, hospital stay, return to activity and six-month complications. The primary outcome was time to return to normal daily activity, with recurrence and postoperative morbidity as secondary outcomes.

2. MATERIALS AND METHODS

2.1 Study design and setting

A single-centre, comparative observational study was conducted in the Department of General Surgery at Usha Bansal Nursing Home, Sri Muktsar Sahib, Punjab, between March 2024 and March 2026. Sixty adults undergoing elective open inguinal hernia surgery were included, with 30 patients in the mesh repair group and 30 in the tissue repair group. Procedure selection was based on clinical assessment and treatment preference rather than randomized allocation. The patient was the unit of analysis.

2.2 Eligibility and baseline evaluation

Adults aged 18 years or older with a clinically diagnosed, primary, unilateral, reducible inguinal hernia who were suitable for elective open repair were considered eligible. Patients with recurrent hernia, incarcerated or strangulated hernia requiring emergency surgery, known active groin infection, complicated scrotal hernia requiring a different operative approach, or inability to complete follow-up were excluded. Evaluation included history, physical examination, hernia laterality and type, body mass index, comorbidities, and routine preoperative investigations as clinically indicated.

2.3 Surgical procedures

All procedures were performed using an open anterior inguinal approach with standard perioperative antisepsis, anesthesia and analgesic care. For Lichtenstein repair, a polypropylene prosthesis was placed to reinforce the inguinal floor in a tension-free configuration, with mesh overlap and fixation protecting neurovascular structures. For tissue repair, the posterior wall was reconstructed using a multilayer Shouldice technique without prosthetic implantation. Hernial sac treatment and spermatic cord handling were determined by operative anatomy; postoperative care followed a uniform mobilization and discharge framework.

2.4 Outcome measures and follow-up

Operation duration was measured from skin incision to wound closure. Pain severity was recorded using an 11-point visual analogue/numeric rating scale from 0 (no pain) to 10 (worst pain) at 24 hours and postoperative day 7. Hospital stay was measured in days from surgery to discharge. Return to normal activity was defined as resumption of self-reported usual non-strenuous daily activities. Early complications included seroma, hematoma, superficial surgical-site infection and postoperative urinary retention. Sensory disturbance was recorded separately. Persistent groin pain was evaluated at three months, and clinically apparent recurrent hernia at six months. Follow-up comprised clinical examination and symptom review.

2.5 Statistical analysis

Continuous measurements are presented as mean ± standard deviation (SD), and categorical measurements as number and percentage. Between-group comparisons used Welch's independent-samples t tests for age, body mass index and operative duration, Mann–Whitney U tests for pain scores, hospital stay and days to normal activity, and two-sided Fisher's exact tests for binary outcomes. For selected continuous outcomes, mean differences and corresponding 95% confidence intervals were obtained using Welch's method. All P values are two-sided, and $P < 0.05$ was considered statistically significant. No adjustment for multiplicity was made for secondary endpoints, which were interpreted as exploratory. Complete-case analyses were performed for the displayed sample.

3. RESULTS

3.1 Patient characteristics

Sixty adults were included, with 30 patients in each surgical group. Mean age was 47.5 ± 9.8 years in the mesh group and 44.8 ± 10.1 years in the tissue repair group. The majority of patients were male (28/30 and 27/30, respectively). The distributions of age, BMI, hernia laterality and indirect hernia morphology were similar (Table 1).

Table 1. Baseline characteristics of patients undergoing inguinal hernia repair

Characteristic	Mesh (n = 30)	Tissue (n = 30)	P value
Age, years	47.5 ± 9.8	44.8 ± 10.1	0.303
Male sex, n (%)	28 (93.3%)	27 (90.0%)	1.000
BMI, kg/m²	24.2 ± 2.3	24.2 ± 3.4	0.947

 © 2026 Dr. Mukesh Bansal et al. Open Access under the Creative Commons Attribution 4.0 International License.

Right-sided hernia, n (%)	17 (56.7%)	16 (53.3%)	1.000
Indirect hernia, n (%)	19 (63.3%)	20 (66.7%)	1.000
Diabetes mellitus, n (%)	5 (16.7%)	4 (13.3%)	1.000

Continuous values are mean ± SD. P values are two-sided exploratory comparisons.

3.2 Operative and recovery outcomes

Mean operative duration was 55.5 ± 8.2 versus 66.4 ± 9.7 minutes in the mesh and tissue groups, respectively (P = <0.001); the mesh-minus-tissue mean difference was -10.9 minutes (95% CI -15.5 to -6.2). Mean hospital stay was 1.5 ± 0.4 versus 1.7 ± 0.5 days (P = 0.107). Pain scores were lower in the mesh group at both 24 hours and day 7 (Table 2 and Figure 1).

Normal daily activity resumed after 9.7 ± 2.2 days with mesh repair and 14.4 ± 3.7 days with tissue repair (P = <0.001). The mean between-group difference was -4.6 days (95% CI -6.2 to -3.0); the comparative recovery times are shown in Figure 2.

Table 2. Operative characteristics and postoperative recovery

Outcome	Mesh (n = 30)	Tissue (n = 30)	P value
Operative duration, minutes	55.5 ± 8.2	66.4 ± 9.7	<0.001
Hospital stay, days	1.5 ± 0.4	1.7 ± 0.5	0.107
Pain score, 24 hours (0–10)	3.6 ± 0.7	4.7 ± 0.9	<0.001
Pain score, day 7 (0–10)	1.3 ± 1.0	2.0 ± 0.8	0.008
Return to usual activity, days	9.7 ± 2.2	14.4 ± 3.7	<0.001

Values are mean ± SD. Pain scores and duration outcomes were tested with Mann–Whitney U except operation time (Welch's t test).

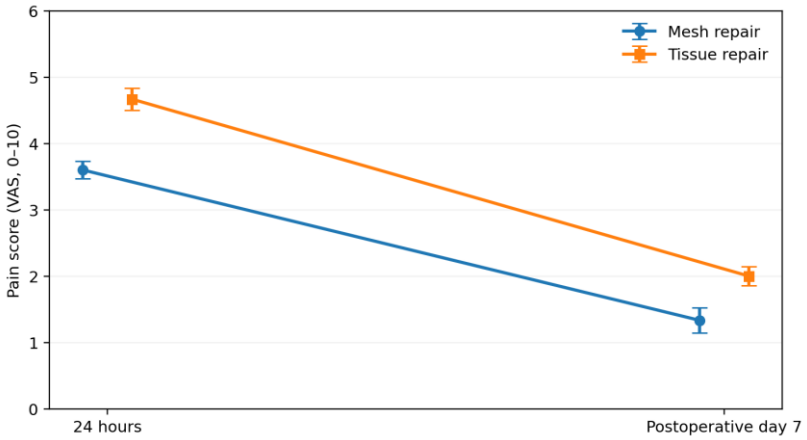


Figure 1. Postoperative pain scores at 24 hours and day 7 after mesh and tissue repair. Error bars indicate standard error of the mean.

3.3 Early postoperative complications

Early morbidity was infrequent in both groups (Table 3). Seroma occurred in 2 mesh recipients and 1 tissue-repair recipients, while superficial surgical-site infection occurred in 1 and 2, respectively. None of the individual complication rates differed significantly by surgical method.

Table 3. Early postoperative morbidity

Complication	Mesh (n = 30)	Tissue (n = 30)	P value
Seroma	2 (6.7%)	1 (3.3%)	1.000
Hematoma	1 (3.3%)	2 (6.7%)	1.000
Superficial surgical-site infection	1 (3.3%)	2 (6.7%)	1.000
Urinary retention	1 (3.3%)	1 (3.3%)	1.000
Groin sensory disturbance	2 (6.7%)	3 (10.0%)	1.000

Values are n (%); two-sided Fisher's exact test was used for each comparison. Individual categories are not mutually exclusive.

 © 2026 Dr. Mukesh Bansal et al. Open Access under the Creative Commons Attribution 4.0 International License.

3.4 Three- and six-month outcomes

At three months, persistent groin pain was reported by 2 patients in the mesh group and 3 in the tissue group (P = 1.000). By six months, clinically apparent recurrence was recorded in 0 mesh patients compared with 2 tissue-repair patients (P = 0.492). Neither comparison established a statistically significant difference (Table 4).

Table 4. Follow-up outcomes

Outcome	Mesh (n = 30)	Tissue (n = 30)	P value
Persistent groin pain at 3 months	2 (6.7%)	3 (10.0%)	1.000
Clinical recurrence at 6 months	0 (0.0%)	2 (6.7%)	0.492

Values are n (%); Fisher's exact test. Six-month recurrence assessment is insufficient to characterize long-term durability.

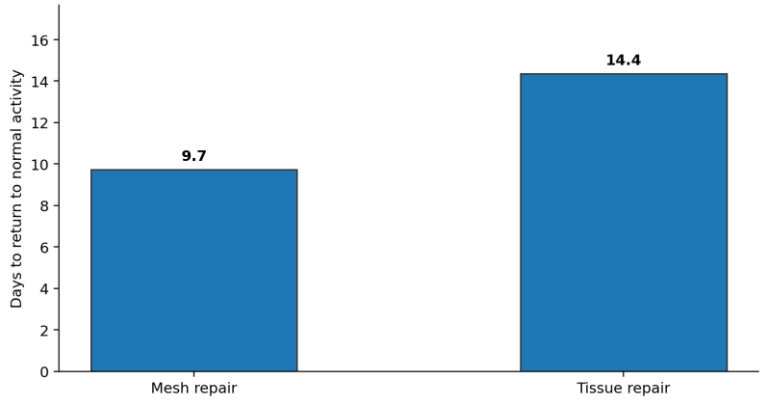


Figure 2. Mean number of days required to resume usual non-strenuous daily activities after inguinal hernia repair.

4. DISCUSSION

The comparison showed a shorter mean operation duration and earlier return to usual activity after Lichtenstein mesh repair than after Shouldice tissue repair. Differences in early pain scores also favored mesh repair, whereas individual postoperative complications occurred at low frequency in both groups. No statistically significant group difference in recurrence or persistent groin pain could be established during the short observation period.

These patterns are broadly compatible with the established evidence supporting tension-free mesh reconstruction for many adult inguinal hernias. Lichtenstein and colleagues emphasized the avoidance of excessive suture-line tension, which remains a central technical rationale for prosthetic reinforcement [6]. Randomized trials and individual-patient meta-analyses have reported reduced recurrence after mesh repair, although effect estimates differ across settings, surgical expertise and non-mesh methods [7–10].

Choice of tissue technique is especially important when comparing non-mesh operations. The Shouldice approach uses multilayer anatomical reconstruction and has lower recurrence than many alternative suture repairs. Nevertheless, the 2024 meta-analysis of randomized trials reported lower recurrence following Lichtenstein than Shouldice repair, with no clear difference in chronic pain or several common complications [4]. The present sample was too small, and follow-up too short, to test comparable differences in durable repair failure.

Postoperative pain is multifactorial. It depends on preoperative pain, dissection, nerve handling, tissue injury, mesh characteristics, fixation and individual pain susceptibility. A network meta-analysis of randomized trials did not find a consistent advantage of non-mesh techniques for moderate-to-severe chronic pain [11]. The observed differences in early pain in the present cohort therefore should not be equated with a long-term pain benefit. Early pain and persistent pain represent distinct clinical outcomes.

Functional recovery is relevant to clinical counseling and local healthcare use. Earlier return to daily activity after a shorter procedure may be beneficial to patients, but interpretation requires attention to employment type, analgesic use, surgeon advice and baseline activity levels. Operative duration and recovery differences may also reflect case selection rather than a causal effect of the procedure. These considerations are central to observational comparative research [12].

The principal limitations were the small cohort of

60 patients, single-centre context, nonrandomized selection of surgery, potential residual confounding, and six-month surveillance. Rare adverse events and long-term recurrence require larger samples and more extended follow-up. The estimates for infrequent events were imprecise, and a nonsignificant P value should not be interpreted as proof of equivalence. More rigorous studies should prospectively standardize pain assessment, document mesh characteristics, surgeon experience and analgesic protocols, and assess recurrence beyond 12 months.

5. CONCLUSION

Open Lichtenstein mesh repair was associated with shorter operative duration and earlier return to normal daily activities compared with Shouldice tissue repair in the reported 60-patient comparative cohort. Early complication rates were low in both groups, and no clear short-term difference in recurrence or persistent groin pain was detected. The findings support individualized surgical decision-making, with consideration of anatomical suitability, patient preferences, technical expertise and long-term follow-up.

REFERENCES

1. HerniaSurge Group. International guidelines for groin hernia management. Hernia. 2018;22(1):1–165. doi:10.1007/s10029-017-1668-x.
2. Stabilini C, van Veenendaal N, Aasvang E, et al. Update of the international HerniaSurge guidelines for groin hernia management. BJS Open. 2023;7(5):zrad080. doi:10.1093/bjsopen/zrad080.
3. Simons MP, Aufenacker T, Bay-Nielsen M, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. Hernia. 2009;13(4):343–403. doi:10.1007/s10029-009-0529-7.
4. Pompeu BF, Pasqualotto E, Marcolin P, et al. Shouldice versus Lichtenstein inguinal hernia repair: A meta-analysis of randomized controlled trials. World J Surg. 2024;48(11):2604–2614. doi:10.1002/wjs.12352.
5. Lockhart K, Dunn D, Teo S, et al. Mesh versus non-mesh for inguinal and femoral hernia repair. Cochrane Database Syst Rev. 2018;(9):CD011517. doi:10.1002/14651858.CD011517.pub2.
6. Lichtenstein IL, Shulman AG, Amid PK, Montllor MM. The tension-free hernioplasty. Am J Surg. 1989;157(2):188–193. doi:10.1016/0002-9610(89)90526-6.
7. Nordin P, Bartelmess P, Jansson C, Svensson C, Edlund G. Randomized trial of Lichtenstein versus Shouldice hernia repair in general surgical practice. Br J Surg. 2002;89(1):45–49. doi:10.1046/j.0007-1323.2001.01960.x.
8. Vrijland WW, van den Tol MP, Luijendijk RW, et al. Randomized clinical trial of non-mesh versus mesh repair of primary inguinal hernia. Br J Surg. 2002;89(3):293–297. doi:10.1046/j.0007-1323.2001.02030.x.
9. Grant AM; EU Hernia Trialists Collaboration. Open mesh versus non-mesh repair of groin hernia: meta-analysis of randomised trials based on individual patient data. Hernia. 2002;6(3):130–136. doi:10.1007/s10029-002-0073-1.
10. Amato B, Moja L, Panico S, et al. Shouldice technique versus other open techniques for inguinal hernia repair. Cochrane Database Syst Rev. 2012;(4):CD001543. doi:10.1002/14651858.CD001543.pub4.
11. Öberg S, Andresen K, Klausen TW, Rosenberg J. Chronic pain after mesh versus nonmesh repair of inguinal hernias: A systematic review and a network meta-analysis of randomized controlled trials. Surgery. 2018;163(5):1151–1159. doi:10.1016/j.surg.2017.12.017.
12. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLoS Med. 2007;4(10):e296. doi:10.1371/journal.pmed.0040296.

 © 2026 Dr. Mukesh Bansal et al. Open Access under the Creative Commons Attribution 4.0 International License.