**International Journal of Medical and Pharmaceutical Research**

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Website: https://ijmpr.in/

Original Article

# Recurrence Rates and Pain Scores in Inguinal Hernia Repair: Totally Extraperitoneal (TEP) Versus Open Lichtenstein Technique

**Dr Surbhi Soni[1], Dr Santosh Roshan[2], Dr Sanjeev Shrivastav[3]**

*[1]Assistant Professor, Department of General Surgery, Abhishek I Mishra Memorial Medical College & Research, Bhilai, Chhattisgarh*
*[2]Assistant Professor, Department of General Surgery, Abhishek I Mishra Memorial Medical College & Research, Bhilai, Chhattisgarh*
*[3]Assistant Professor, Department of General Surgery, Abhishek I Mishra Memorial Medical College & Research, Bhilai, Chhattisgarh.*



**Corresponding Author:**

**Dr. Santosh Roshan**
Assistant Professor, Department of General Surgery, Abhishek I Mishra Memorial Medical College & Research, Bhilai, Chhattisgarh.
**Email:** san05rosh27@gmail.com

*Received: 14-03-2026*
*Accepted: 06-04-2026*
*Published: 25-04-2026*



## ABSTRACT

**Background**: Inguinal hernia repair is one of the most commonly performed surgical procedures worldwide, with multiple operative techniques available. The open Lichtenstein tension-free mesh repair has long been considered the standard approach, whereas laparoscopic totally extraperitoneal (TEP) repair has emerged as a minimally invasive alternative. The choice between these techniques remains controversial, particularly with respect to recurrence rates and postoperative pain.
**Aim**: To compare recurrence rates and postoperative pain outcomes between totally extraperitoneal (TEP) repair and open Lichtenstein repair in patients with inguinal hernia.
**Methods**: A prospective randomized controlled trial was conducted on 100 patients diagnosed with primary inguinal hernia. Patients were randomly allocated into two groups: TEP repair (n=50) and open Lichtenstein repair (n=50). Outcomes assessed included postoperative pain (VAS score), chronic groin pain, recurrence rates, operative time, complications, and time to return to normal activity. Statistical analysis was performed using appropriate tests, with $p<0.05$ considered significant.
**Results**: Patients undergoing TEP repair demonstrated significantly lower postoperative pain scores and reduced incidence of chronic groin pain compared to the Lichtenstein group. Recurrence rates were comparable between the two groups. Operative time was longer in the TEP group, but recovery was faster with shorter return-to-work duration.
**Conclusion**: TEP repair offers superior outcomes in terms of postoperative pain and recovery, with recurrence rates comparable to open Lichtenstein repair, making it a preferable option in suitable patients.

***Keywords***: *Inguinal hernia, TEP repair, Lichtenstein repair, recurrence, postoperative pain.*

## INTRODUCTION

Inguinal hernia is one of the most frequently encountered conditions in general surgical practice, with an estimated lifetime risk of approximately 27% in men and 3% in women. Surgical repair remains the definitive treatment, and over the years, numerous techniques have been developed to optimize patient outcomes and reduce recurrence rates (1).

The open Lichtenstein tension-free mesh repair has been widely accepted as the gold standard technique due to its simplicity, reproducibility, and low recurrence rates. It involves placement of a prosthetic mesh over the posterior wall of the inguinal canal, providing reinforcement without tension. Despite its effectiveness, this approach is associated with certain drawbacks, including postoperative pain, wound complications, and risk of chronic groin pain due to nerve irritation (2).

With advancements in minimally invasive surgery, laparoscopic techniques such as totally extraperitoneal (TEP) repair have gained increasing popularity. The TEP approach avoids entry into the peritoneal cavity and allows placement of mesh in the preperitoneal space. This method has been associated with reduced postoperative pain, earlier mobilization, and quicker return to normal activities (3).

Postoperative pain remains one of the most important factors influencing patient satisfaction and recovery. Studies have consistently shown that laparoscopic approaches, particularly TEP, are associated with significantly lower early postoperative pain compared to open repair (4). Furthermore, long-term follow-up studies have demonstrated reduced incidence of chronic groin pain in patients undergoing TEP repair (5).

Recurrence is another critical outcome measure in hernia surgery. Historically, open mesh repair techniques such as Lichtenstein have demonstrated low recurrence rates. However, concerns have been raised regarding recurrence following laparoscopic repair, particularly during the initial learning curve. Meta-analyses of randomized trials have shown that recurrence rates between TEP and Lichtenstein repair are generally comparable, although some studies suggest slightly higher recurrence rates with TEP in less experienced hands (6,7).

In addition to pain and recurrence, other important considerations include operative time, complications, and cost-effectiveness. Laparoscopic TEP repair is often associated with longer operative time but offers advantages such as reduced wound infection and faster recovery (8,9). The balance between these factors plays a crucial role in determining the optimal surgical approach.

Despite numerous randomized controlled trials and systematic reviews, the choice between TEP and Lichtenstein repair remains debated. Variability in outcomes across studies may be attributed to differences in surgical expertise, patient selection, and study design. Therefore, further randomized studies are necessary to provide context-specific evidence, particularly in resource-limited settings (10).

The present study was undertaken to compare recurrence rates and pain outcomes between TEP and open Lichtenstein repair in patients with inguinal hernia. By evaluating both early and late postoperative outcomes, this study aims to contribute to the growing body of evidence and assist in determining the most effective surgical approach.

## MATERIALS AND METHODOLOGY

### Study Design

A **prospective randomized controlled trial** was conducted to compare outcomes between TEP repair and open Lichtenstein repair.

### Study Setting

The study was carried out in the Department of General Surgery at a tertiary care hospital over a period of **18–24 months**.

### Sample Size

A total of **100 patients** were included:

- **Group A (TEP): 50 patients**
- **Group B (Lichtenstein): 50 patients**

Sample size was determined based on expected differences in postoperative pain scores and recurrence rates, with 80% power and 5% significance level.

### Inclusion Criteria

- Age 18–65 years
- Primary unilateral inguinal hernia
- Elective surgical cases
- Willing to provide informed consent

### Exclusion Criteria

- Recurrent or bilateral hernia
- Complicated hernia (strangulated/obstructed)
- Previous lower abdominal surgery
- Severe comorbid illness
- Patients unfit for general anesthesia

### Randomization

Patients were randomized using a **computer-generated randomization sequence** into two groups. Allocation concealment was ensured using **sealed opaque envelopes**.

**Surgical Procedure**

**TEP Repair**

- Performed under general anesthesia
- Creation of preperitoneal space using balloon or blunt dissection
- Mesh placement without entering peritoneal cavity

**Open Lichtenstein Repair**

- Performed under spinal/general anesthesia
- Standard inguinal incision
- Mesh placed over posterior wall of inguinal canal

**Outcome Measures**

**Primary Outcomes**

- Postoperative pain (VAS score at 24 hrs, 1 week, 1 month)
- Recurrence rate (follow-up up to 6–12 months)

**Secondary Outcomes**

- Operative time
- Chronic groin pain
- Postoperative complications (seroma, infection)
- Duration of hospital stay
- Time to return to normal activity

**Data Collection**

Data were collected using a **pre-structured proforma**, including demographic details, intraoperative findings, and postoperative follow-up.

**Statistical Analysis**

- Data analyzed using **SPSS software**
- Continuous variables: Mean ± SD
- Categorical variables: Percentage (%)
- Tests used:
  - Student's t-test
  - Chi-square test
- **$p < 0.05$ considered statistically significant**

**RESULTS**

A total of **100 patients** were enrolled and randomized equally:

- **TEP group (n = 50)**
- **Lichtenstein group (n = 50)**

Both groups were comparable in baseline characteristics, ensuring validity of comparative outcomes.

**Table 1: Baseline Demographic and Clinical Profile**

| Variable | TEP (n=50) | Lichtenstein (n=50) | p-value |
|---|---|---|---|
| Mean Age (years) | 41.2 ± 12.5 | 42.8 ± 11.9 | 0.54 |
| Male (%) | 46 (92.0%) | 45 (90.0%) | 0.74 |
| Right-sided Hernia | 28 (56.0%) | 30 (60.0%) | 0.68 |
| Duration of Symptoms (months) | 7.8 ± 3.1 | 8.2 ± 3.5 | 0.61 |

The baseline demographic and clinical parameters were comparable between the two groups (**$p > 0.05$**). The mean age was similar (41.2 vs 42.8 years), and there was a predominance of male patients in both groups (>90%). Right-sided hernia distribution and duration of symptoms also showed no statistically significant difference, confirming homogeneity of study population.

**Table 2: Operative and Postoperative Outcomes**

| Outcome | TEP (n=50) | Lichtenstein (n=50) | p-value |
|---|---|---|---|
| Operative Time (min) | 72.5 ± 14.2 | 54.3 ± 12.1 | <0.001* |
| VAS Pain (24 hrs) | 3.1 ± 1.2 | 5.4 ± 1.5 | <0.001* |
| VAS Pain (1 week) | 1.8 ± 0.9 | 3.2 ± 1.1 | <0.001* |

| Outcome | TEP (n=50) | Lichtenstein (n=50) | p-value |
|---|---|---|---|
| Hospital Stay (days) | 2.1 ± 0.7 | 3.8 ± 1.1 | <0.001* |
| Return to Work (days) | 9.5 ± 2.3 | 15.6 ± 3.8 | <0.001* |

Operative time was significantly longer in the TEP group (**72.5 vs 54.3 minutes, p < 0.001**), reflecting the technical complexity of laparoscopic repair.

Postoperative pain scores were significantly lower in the TEP group:

- **24 hours:** ~42.6% lower pain
- **1 week:** ~43.7% lower pain

Hospital stay was reduced by approximately **44.7%** in the TEP group, and return to work was faster by approximately **39.1%**, both highly significant (**p < 0.001**). These findings strongly favor TEP in terms of postoperative recovery and patient comfort.

**Table 3: Complications and Recurrence**

| Outcome | TEP (n=50) | Lichtenstein (n=50) | Total (%) | p-value |
|---|---|---|---|---|
| Seroma | 4 (8.0%) | 6 (12.0%) | 10.0% | 0.50 |
| Wound Infection | 1 (2.0%) | 7 (14.0%) | 8.0% | 0.03* |
| Chronic Pain | 3 (6.0%) | 10 (20.0%) | 13.0% | 0.04* |
| Recurrence | 2 (4.0%) | 3 (6.0%) | 5.0% | 0.64 |
| Overall Complications | 10 (20.0%) | 20 (40.0%) | 30.0% | 0.02* |

Wound infection rates were significantly lower in the TEP group (2.0% vs 14.0%, p = 0.03), indicating an ~85% reduction. Chronic groin pain was also significantly reduced in TEP (6.0% vs 20.0%, p = 0.04), representing a 70% reduction, which is clinically important.

Recurrence rates were slightly lower in the TEP group (4.0% vs 6.0%), but the difference was not statistically significant (p = 0.64), indicating comparable long-term efficacy.

Overall complication rates were significantly lower in TEP (20% vs 40%, p = 0.02), demonstrating its safety advantage.

**Overall Results Summary**

- **TEP repair results in significantly lower postoperative pain**
- **Faster recovery and earlier return to work**
- **Lower complication rates, especially wound infection and chronic pain**
- **Comparable recurrence rates to Lichtenstein repair**
- **Longer operative time in TEP**

**DISCUSSION**

The present randomized controlled trial compared totally extraperitoneal (TEP) repair and open Lichtenstein repair in 100 patients with inguinal hernia. The findings demonstrate that TEP repair offers superior postoperative outcomes, particularly in terms of pain reduction and recovery, while maintaining comparable recurrence rates.

Baseline characteristics in both groups were comparable, similar to previously published randomized trials [2]. This ensures that differences in outcomes are attributable to surgical technique rather than confounding factors.

Operative time was significantly longer in the TEP group, which is consistent with findings from multicenter trials and meta-analyses [4]. The increased duration is attributed to the technical demands of laparoscopic dissection and the learning curve associated with TEP repair. However, as surgeons gain experience, operative time tends to decrease significantly [5].

Postoperative pain was significantly lower in the TEP group at both 24 hours and 1 week. This finding is consistent with previous studies demonstrating reduced tissue trauma and nerve handling in laparoscopic repair [7]. Reduced postoperative pain is a major determinant of patient satisfaction and contributes to early mobilization and recovery.

Hospital stay was significantly shorter in the TEP group, aligning with findings from large cohort studies. Early discharge not only benefits patients but also reduces hospital burden and healthcare costs. Similarly, the time to return to work was significantly shorter in TEP patients, which has important socioeconomic implications [9].

One of the most significant findings of this study was the reduced incidence of chronic groin pain in the TEP group. Chronic pain following hernia repair is a well-recognized complication, often attributed to nerve entrapment or mesh-related

fibrosis. Laparoscopic approaches avoid extensive dissection of the inguinal canal, thereby reducing nerve injury [11]. Our findings are consistent with systematic reviews reporting lower chronic pain rates in TEP repair.

Wound infection rates were significantly lower in the TEP group, which is expected due to smaller incisions and minimal tissue exposure. Similar findings have been consistently reported in the literature [4,12].

Recurrence remains a critical outcome in hernia surgery. In our study, recurrence rates were comparable between the two groups, with no statistically significant difference. This finding is supported by multiple randomized trials and meta-analyses [13,14], which conclude that when performed by experienced surgeons, TEP repair has recurrence rates similar to open Lichtenstein repair.

The overall complication rate was significantly lower in the TEP group, reinforcing its safety and efficacy. These findings are consistent with modern surgical guidelines, which increasingly favor laparoscopic repair in suitable patients [15].

From a clinical perspective, TEP repair offers several advantages, including reduced postoperative pain, lower complication rates, and faster recovery. However, it requires specialized training and equipment, which may limit its widespread adoption in resource-limited settings.

The strengths of this study include its randomized design and comprehensive evaluation of outcomes. However, limitations include relatively short follow-up duration and single-center design. Long-term studies with larger sample sizes are required to further validate recurrence outcomes.

## CONCLUSION

Totally extraperitoneal (TEP) repair is a safe and effective technique for inguinal hernia repair, offering significant advantages over open Lichtenstein repair in terms of reduced postoperative pain, lower complication rates, and faster recovery. Recurrence rates are comparable between the two techniques. Therefore, TEP repair should be considered a preferred approach in suitable patients, consistent with current surgical evidence

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