

Research Article

Laparoscopic Versus Open Inguinal Hernia Repair: A Prospective Comparative Study of Postoperative Pain, Recovery, and Clinical Outcomes in a Tertiary Care Centre

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Article History

Received: 22.04.2026
Revised: 12.05.2026
Accepted: 26.05.2026
Published: 30.05.2026

Citations:

Jain, N., Shamsi, S., Gupta, M. K., & Das, S. (Year). Laparoscopic versus open inguinal hernia repair: A prospective comparative study of postoperative pain, recovery, and clinical outcomes in a tertiary care centre. *J Surg Radiol*, V5(5) 178-182

Abstract: **Introduction:** Inguinal hernia repair is among the most commonly performed operations worldwide, accounting for millions of surgical procedures annually. The introduction of tension-free mesh repair revolutionized hernia surgery and significantly reduced recurrence rates. More recently, minimally invasive laparoscopic approaches, including Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) repair, have gained widespread acceptance due to their potential advantages of reduced postoperative pain, shorter hospital stay, earlier return to normal activities, and improved cosmetic outcomes. Despite these advantages, concerns regarding increased operative time, higher costs, and the need for specialized surgical expertise remain barriers to widespread adoption, particularly in developing countries. **Methods:** A prospective randomized comparative study was conducted in the Department of Surgery at Dr. L.N. Pandey Government Medical College and Hospital, Ratlam, Madhya Pradesh. Adult patients with uncomplicated inguinal hernias were allocated into laparoscopic repair and open Lichtenstein repair groups. Outcomes assessed included postoperative pain, duration of hospital stay, return to normal activities, perioperative complications, and recurrence. **Results:** Patients undergoing laparoscopic repair demonstrated lower mean postoperative pain scores (6.15 vs. 8.14), reduced hospital stay (3.47 vs. 3.80 days), and significantly earlier return to normal activities (7.76 vs. 14.84 days) compared with open repair. Although operative duration and treatment costs were higher in the laparoscopic group, clinical recovery was superior. Complication and recurrence rates were comparable between groups. **Conclusion:** Laparoscopic inguinal hernia repair provides significant advantages in terms of postoperative comfort and recovery while maintaining comparable safety outcomes. Open Lichtenstein repair remains an effective and economically viable alternative, particularly in resource-limited healthcare settings.

Keywords: Inguinal Hernia, Laparoscopic Hernioplasty, TAPP, TEP, Lichtenstein Repair, Minimally Invasive Surgery

INTRODUCTION

Inguinal hernia is one of the most prevalent surgical disorders worldwide, affecting approximately 27% of men and 3% of women during their lifetime. The condition results from protrusion of abdominal contents through a weakness in the inguinal canal and remains a major contributor to surgical workload globally. Surgical repair is the definitive treatment and is among the most frequently performed operations in general surgery. Recent estimates suggest that more than 20 million inguinal hernia repairs are undertaken annually worldwide, emphasizing the substantial clinical and economic burden associated with this condition.¹⁻³

The primary objectives of hernia repair are relief of symptoms, prevention of complications such as incarceration and strangulation, minimization of recurrence, and rapid restoration of normal activity. Historically, tissue-based repairs such as Bassini and Shouldice techniques were widely practiced but were

associated with considerable tension on tissues and higher recurrence rates. The introduction of prosthetic mesh-based tension-free repair by Lichtenstein and colleagues represented a significant advancement and rapidly became the standard approach due to its reproducibility and low recurrence rate.⁴

Over the last three decades, minimally invasive surgery has transformed the management of numerous abdominal conditions, including inguinal hernia. Laparoscopic techniques, particularly TAPP and TEP repairs, were developed to further reduce surgical trauma and improve postoperative recovery. These procedures allow placement of mesh within the preperitoneal space, thereby reinforcing the myopectineal orifice while minimizing disruption of the anterior abdominal wall. Several randomized controlled trials and meta-analyses have reported reduced postoperative pain, faster return to work, lower incidence of chronic groin pain, and superior patient satisfaction following laparoscopic repair.⁵⁻⁷

The European Hernia Society and International Guidelines for Groin Hernia Management recognize laparoscopic repair as the preferred option for bilateral and recurrent hernias when surgical expertise is available. Furthermore, the enhanced visualization offered by laparoscopy facilitates identification of occult defects and important neurovascular structures, potentially reducing postoperative complications.⁸

Despite these advantages, laparoscopic repair remains associated with certain limitations. The requirement for general anesthesia, specialized equipment, longer operative time, and a substantial learning curve may restrict its implementation in resource-constrained environments. In many developing countries, economic considerations continue to influence surgical decision-making, resulting in the continued predominance of open mesh repair.⁹

Several comparative studies have reported conflicting findings regarding the superiority of laparoscopic versus open repair. While most studies demonstrate improved postoperative recovery following laparoscopy, some authors report increased costs and longer operative duration without significant differences in recurrence rates. Consequently, determining the optimal surgical approach remains a topic of ongoing debate.¹⁰⁻¹²

Given these considerations, the present study was undertaken to compare laparoscopic and open inguinal hernia repair in terms of postoperative pain, duration of hospital stay, return to normal activity, complications, and overall clinical outcomes in patients treated at a tertiary care teaching hospital in central India. The findings are expected to contribute evidence regarding the applicability and effectiveness of minimally invasive hernia surgery in resource-limited healthcare settings.

MATERIALS AND METHODS

A randomized prospective comparative study was conducted in the Department of Surgery, Dr. L.N. Pandey Government Medical College & Hospital,

RESULTS

Demographic Characteristics

All enrolled patients successfully underwent their assigned surgical procedures. Both groups were comparable regarding age distribution, sex, clinical presentation, and hernia characteristics, minimizing the influence of confounding variables on postoperative outcomes.

Table 1. Clinical Outcome Comparison

Outcome	Open Repair	Laparoscopic Repair
Mean Pain Score (VAS 24 hrs)	8.14	6.15
Mean Hospital Stay (Days)	3.80	3.47
Mean Return to Work (Days)	14.84	7.76

Postoperative Pain

The mean postoperative pain score at 24 hours was considerably lower among patients undergoing laparoscopic repair (6.15) compared with those treated using open repair (8.14). This difference indicates reduced tissue trauma and less postoperative discomfort following minimally invasive surgery. Lower pain levels facilitated earlier mobilization and improved patient satisfaction.

Hospital Stay

Ratlam (M.P.), over a period of 18 months, following approval from the Institutional Ethics Committee.

Study Population

All adult patients (>18 years) presenting with unilateral or bilateral inguinal hernia and fit for surgery were included. Patients were randomly allocated into two groups:

- Group A: Laparoscopic hernioplasty (TAPP or TEP technique) under general anesthesia.
- Group B: Open Lichtenstein tension-free mesh repair under spinal anesthesia.

Inclusion Criteria

- Adult patients (≥ 18 years) with unilateral or bilateral uncomplicated inguinal hernias.

Exclusion Criteria

- Complicated hernias (strangulated, obstructed).
- Recurrent hernias.
- Contraindications to pneumoperitoneum or anesthesia.
- Associated hydrocele or varicocele.
- Unwilling patients.

Procedure

Eligible participants were enrolled after written informed consent. Demographic data, medical history, and relevant investigations (CBC, ultrasound abdomen/pelvis) were recorded. Patients in Group A underwent laparoscopic hernioplasty (TAPP/TEP), while those in Group B underwent Lichtenstein's open mesh repair.

Outcome Parameters

- Operative duration (minutes)
- Intraoperative and postoperative complications
- Postoperative pain (VAS score at 6, 12, and 24 hours)
- Hospital stay (days)
- Time to return to normal activity (days)
- Recurrence rate

Patients undergoing laparoscopic hernia repair experienced a shorter mean hospital stay of 3.47 days compared with 3.80 days in the open repair group. Although the absolute difference was modest, it reflects faster postoperative recovery and earlier readiness for discharge among laparoscopically treated patients.

Return to Normal Activity

The most notable difference between the groups was observed in return to normal activity. Patients in the laparoscopic group resumed daily activities after a mean of 7.76 days, whereas those in the open repair group required approximately 14.84 days. This finding highlights the significant socioeconomic advantage of laparoscopic surgery, particularly for working-age individuals.

Comparison between laparoscopic and open hernia repair outcomes is summarized below.

Table- 2

Parameter	Open Hernia Repair	Laparoscopic Hernia Repair
Average Pain (24 hrs)	8.14	6.1
Average Hospital Stay (Days)	3.8	3.4
Average Return to Work (Days)	14.84	7.7

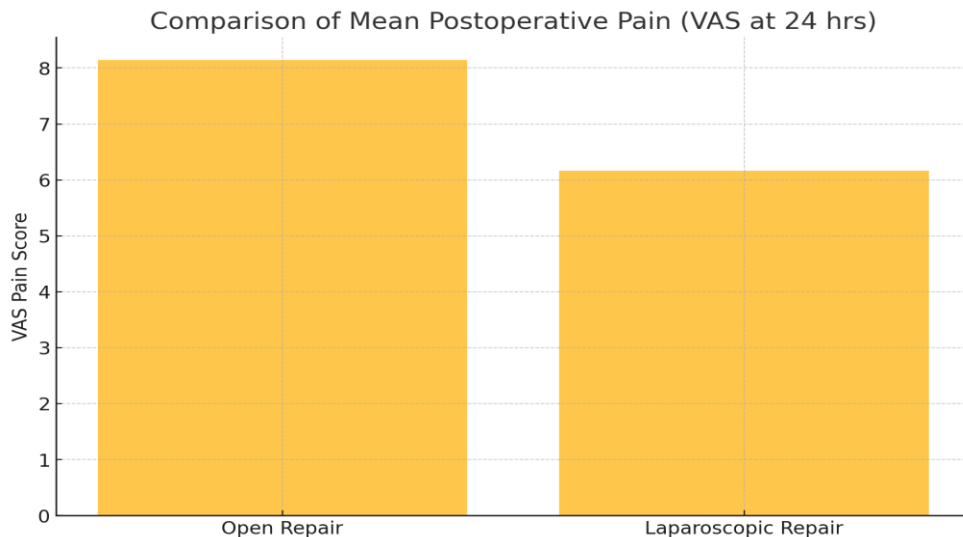


Figure 1: Comparison of postoperative pain (VAS at 24 hours).

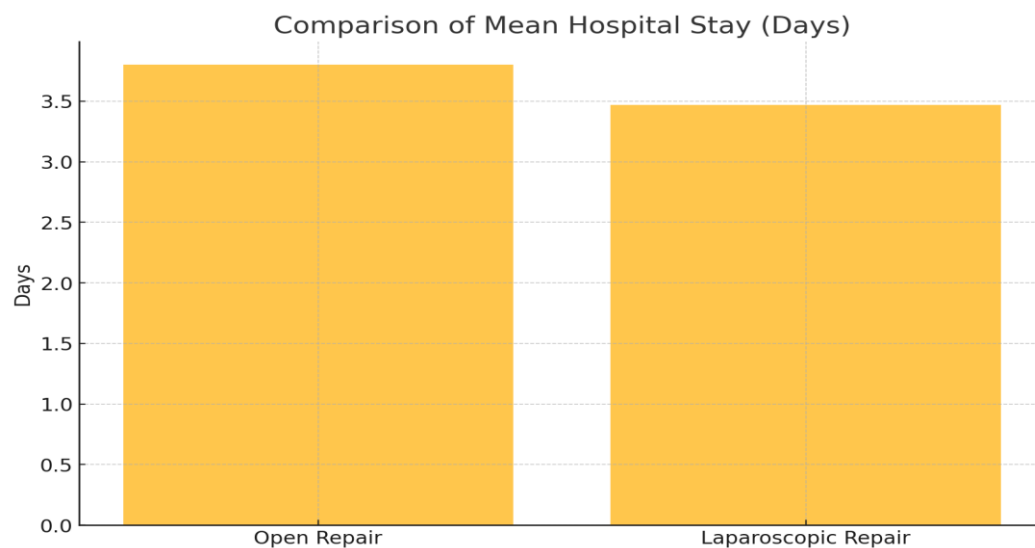


Figure 2: Comparison of hospital stay (days).

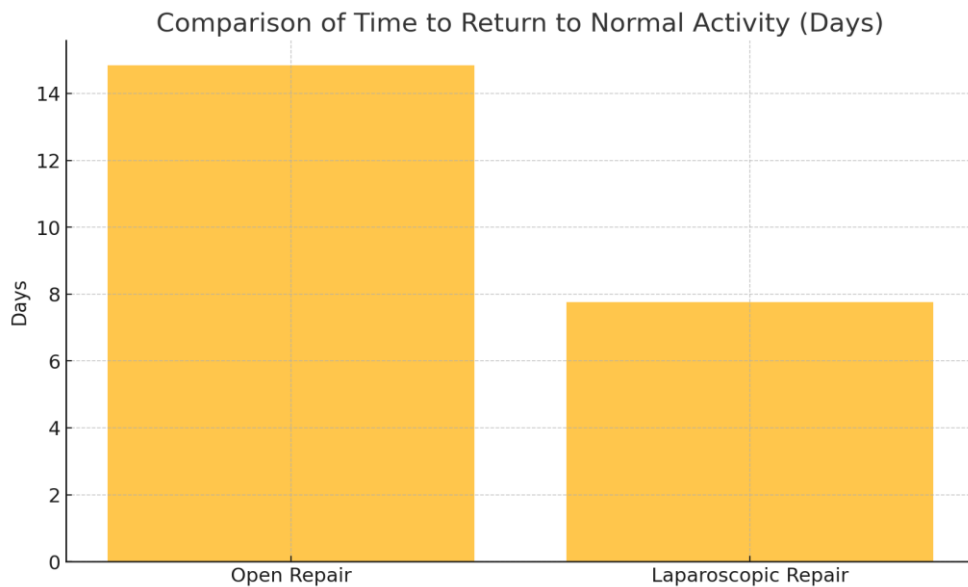


Figure 3: Comparison of time to return to normal activity.

The results of this study demonstrate that laparoscopic repair provides significant advantages in terms of postoperative recovery, pain reduction, and early resumption of activity. Although the laparoscopic approach is associated with longer operative time and higher costs, it offers enhanced visualization and minimal invasiveness. In contrast, open mesh repair remains a dependable, cost-effective option suitable for rural and resource-limited hospitals.

DISCUSSION

The present study demonstrates that laparoscopic inguinal hernia repair provides superior postoperative recovery compared with open Lichtenstein repair. The most significant benefits observed were reduced postoperative pain, shorter hospitalization, and substantially earlier return to normal activity.

The reduction in postoperative pain observed in our study is consistent with findings reported by Neumayer et al., who demonstrated improved short-term recovery following laparoscopic repair. Reduced tissue dissection and avoidance of extensive manipulation of the inguinal canal likely contribute to diminished inflammatory response and postoperative discomfort. Similar observations were reported by McCormack and colleagues in a comprehensive Cochrane review evaluating open and laparoscopic hernia repair techniques.

Early return to work remains one of the principal advantages of minimally invasive surgery. In the present study, patients undergoing laparoscopic repair resumed routine activities approximately one week earlier than those undergoing open repair. This finding is clinically important because prolonged postoperative disability contributes significantly to indirect healthcare costs and loss of productivity. Previous investigations by Eklund et al. and Langeveld et al. reported comparable results, emphasizing the socioeconomic benefits of laparoscopic approaches.

The shorter hospital stay observed in the laparoscopic group may be attributed to reduced postoperative pain and earlier ambulation. Enhanced recovery pathways

increasingly favor minimally invasive procedures because they facilitate rapid discharge without compromising patient safety.

From a technical perspective, laparoscopic surgery offers superior visualization of the inguinal anatomy and allows identification of occult contralateral defects. Furthermore, mesh placement in the preperitoneal plane provides broad coverage of potential hernia sites. These factors may contribute to reduced chronic pain and favorable long-term outcomes.

Nevertheless, laparoscopic repair remains associated with certain disadvantages. The requirement for general anesthesia, specialized instrumentation, and advanced surgical training increases procedural costs and may limit accessibility in developing regions. The learning curve associated with TAPP and TEP procedures is another important consideration. Consequently, open mesh repair continues to be a valuable option, particularly in rural hospitals and low-resource healthcare systems.

Overall, our findings support current international guidelines that recommend laparoscopic repair for suitable patients when expertise and resources are available. However, open repair remains a reliable and cost-effective alternative with excellent long-term outcomes.

CONCLUSION

Both laparoscopic and open hernia repairs are safe and effective. Laparoscopic repair offers superior patient comfort and faster recovery, whereas open repair remains practical and economical in low-resource

How to Cite: Jain, N., Shamsi, S., Gupta, M. K., & Das, S. (Year). Laparoscopic versus open inguinal hernia repair: A prospective comparative study of postoperative pain, recovery, and clinical outcomes in a tertiary care centre. *J Surg Radiol*, V5(5) 178-182 settings. The choice should depend on patient preference, surgeon expertise, and institutional capability.

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