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Original Research Article

A Prospective Comparative Study of Laparoscopic (TAPP Mesh Repair) Versus Open Hernia Repair: Surgical Outcomes in a Tertiary Care Centre in Bihar

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Conflict of interest: Nil

Abstract:

Background: Inguinal hernia repair remains a routine procedure in general surgical practice. While the open mesh repair technique has traditionally been the method of choice, laparoscopic approaches, particularly the transabdominal preperitoneal (TAPP) method, have gained traction in recent years. These two techniques differ not only in surgical approach but also in aspects such as duration of hospital stay, postoperative pain, and recovery time.

Objective: This prospective study was designed to assess and compare the short-term clinical outcomes of laparoscopic TAPP mesh repair with those of conventional open mesh repair in patients undergoing elective inguinal hernia surgery.

Methods: Over the course of 20 months, the study was carried out Jawaharlal Nehru Medical College and Hospital in Bhagalpur, Bihar. A total of 100 patients diagnosed with primary unilateral inguinal hernia were enrolled and randomized into two equal groups: Group A underwent laparoscopic TAPP mesh repair, while Group B received open mesh repair. Operative time, pain intensity (measured using the Visual Analogue Scale), length of hospitalization, time to resume routine activities, and postoperative complications were recorded and analyzed.

Results: Despite having a longer mean operative time, patients in the laparoscopic group reported far less discomfort six and twenty-four hours after surgery. They also experienced shorter hospital stays and returned to daily activities sooner than those in the open repair group. Minor issues such as superficial wound infection and seroma formation were observed in both groups, with no statistically significant difference.

Conclusion: Although laparoscopic TAPP repair requires a longer surgical duration, it provides measurable benefits regarding reduced postoperative discomfort, quicker recovery, and shorter hospitalization. These findings support its use as a suitable alternative to open repair in appropriate clinical scenarios.

Keywords: TAPP Repair, Open Mesh Repair, Inguinal Hernia, Laparoscopic Surgery, Postoperative Recovery.

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Introduction

One of the most frequent disorders seen in surgical practice is still inguinal hernia particularly affecting adult males. It occurs due to a weakness in the abdominal wall, allowing intra-abdominal contents to protrude through the inguinal canal. Although the condition may be asymptomatic in some patients, surgical repair is often advised to avoid issues like blockage or strangulation. Traditionally, open mesh repair—especially the Lichtenstein technique—has been the standard approach due to its simplicity, low recurrence rate, and suitability for regional anesthesia. This method continues to be widely practiced, especially in settings where access to advanced surgical tools is limited.

With the advancement of minimally invasive techniques, laparoscopic repair has emerged as a viable alternative to the conventional open method. The transabdominal preperitoneal (TAPP) approach, one of the commonly used laparoscopic techniques, involves entering the peritoneal cavity and placing a mesh within the preperitoneal space. Laparoscopic repair is associated with several postoperative benefits, including smaller incisions, reduced wound complications, lower pain scores, and quicker return to daily routines. However, it is technically more

demanding, requires general anesthesia, and depends on the availability of laparoscopic infrastructure and trained personnel, which can be challenging in low-resource environments.

The results of open and laparoscopic hernia procedures have been compared in numerous research, but many have originated from high-volume centers in well-resourced settings. As a result, the findings may not be fully applicable to institutions with limited infrastructure or in regions where patients often present late in the disease course. In such settings, practical challenges like cost, operating time, and postoperative follow-up significantly influence treatment choices. Therefore, it is important to assess the performance of these surgical options in real-world conditions, particularly in public hospitals that cater to economically diverse populations.

This prospective study was conducted at a tertiary government hospital in Bhagalpur, Bihar, to evaluate the outcomes of laparoscopic TAPP mesh repair compared to the open mesh technique in patients with primary unilateral inguinal hernia. The investigation focused on key clinical indicators such as surgical duration, postoperative pain, length of hospitalization, recovery time, and short-term complications. By analyzing these parameters, the study aims to provide context-specific evidence that may inform surgical decision-making in resource-constrained healthcare systems and support the choice of the most suitable method depending on both patient and institutional factors.

Materials and Methods

Study Design: Prospective, randomized comparative study

Study Location: Jawaharlal Nehru Medical College and Hospital's General Surgery Department, Bhagalpur, Bihar

Study Duration: 20 months (e.g., January 2024 – August 2025)

Sample Size: 100 patients with unilateral inguinal hernia

Group Allocation:

- **Group A (n = 50)**: Laparoscopic TAPP mesh repair
- **Group B (n = 50)**: Open mesh repair (Lichtenstein technique)

Inclusion Criteria:

- Diagnosed with primary unilateral inguinal hernia
- Age 18–65 years
- Fit for general or spinal anesthesia
- Provided informed consent

Exclusion Criteria:

- Recurrent hernias
- Bilateral hernias
- Complicated hernias (strangulated/incarcerated)
- Patients unfit for general anesthesia (TAPP group)
- Coagulopathy or severe comorbidities

Preoperative Workup: All patients underwent detailed history, physical examination, and routine investigations. Pre-anesthetic check-up was conducted.

Surgical Procedure:

- Group A: TAPP laparoscopic repair using standard 3-port technique with mesh placement in preperitoneal space, followed by peritoneal closure
- Group B: Open Lichtenstein mesh repair under spinal anesthesia

Outcome Measures:

- Operative time (minutes)
- Time to return to normal activity (in days)
- Postoperative pain (VAS score at 6, 12, and 24 hours)
- Duration of hospital stay (in days)
- Complications (seroma, hematoma, wound infection, recurrence)

Follow-up: Following surgery, patients were monitored for recovery and problems at 1 week, 1 month, and 3 months.

Statistical Analysis: SPSS version 25 was used to analyze the data. T-tests were used to compare continuous variables, which were represented as mean ± SD. Categorical data were evaluated using the Chi-square test. Statistical significance was defined as P-values below 0.05.

Results

Fifty of the 100 patients with primary unilateral inguinal hernias who were enrolled were placed in the laparoscopic TAPP group (Group A), and the remaining 50 to the open mesh repair group (Group B). The baseline demographic characteristics such as age, sex, and BMI were statistically similar between the two cohorts.

Table 1: Demographic and Baseline Characteristics

Variable	TAPP Group (n = 50)	Open Group (n = 50)	p-value
Mean Age (years)	43.8 ± 10.2	45.1 ± 9.6	0.48
Male: Female	48: 2	47: 3	0.64
BMI (kg/m²)	24.6 ± 2.1	24.9 ± 2.3	0.59
Comorbidities (%)	12 (24%)	15 (30%)	0.49

Table 2: Operative and Postoperative Parameters

Outcome	TAPP Group (n = 50)	Open Group (n = 50)	p-value
Operative Time (min)	78.4 ± 12.5	56.2 ± 10.1	<0.001*
VAS Pain Score at 6 hrs	3.8 ± 1.0	6.2 ± 1.1	<0.001*
VAS Pain Score at 24 hrs	2.2 ± 0.9	4.7 ± 1.0	<0.001*
Hospital Stay (days)	1.6 ± 0.5	3.1 ± 0.6	<0.001*
Return to Normal Activity (days)	5.4 ± 1.2	9.8 ± 1.7	<0.001*
Post-op Seroma	2 (4%)	3 (6%)	0.64
Wound Infection	1 (2%)	4 (8%)	0.17
Recurrence (3-months)	0	1 (2%)	0.31

*Statistically significant

Discussion

This study aimed to assess and compare two surgical techniques for managing primary unilateral inguinal hernia: laparoscopic transabdominal preperitoneal (TAPP) mesh repair and conventional open mesh repair. The parameters under observation included operative time, intensity of postoperative pain, length of hospital stay, time to return to routine activities, and short-term postoperative complications. Our findings suggest that although the laparoscopic method requires a longer operative duration, it offers distinct clinical advantages, particularly in terms of reduced pain, quicker recovery, and shorter hospitalization. Both procedures were performed safely, with no significant adverse events during surgery or in the immediate postoperative period. These outcomes align with the goal of improving patient-centered surgical care, especially in elective procedures where functional recovery and postoperative comfort are crucial. Importantly, the study provides data from a public-sector teaching hospital, offering real-world insights into the practical performance of these techniques in a resource-conscious setting, which is often underrepresented in surgical literature.

A key difference observed between the two groups was the duration of surgery. Patients who underwent laparoscopic TAPP repair experienced significantly longer procedures than those treated with the open method. This discrepancy is consistent with prior observations in similar studies and is largely attributed to the complexity of the laparoscopic setup, including establishing pneumoperitoneum, careful dissection of the preperitoneal space, mesh fixation, and peritoneal closure. In contrast, the open approach follows a more direct path, requiring less time to complete. While the longer duration might be seen as a limitation, it is important to interpret this in the context of postoperative benefits. Moreover, operative time tends to decrease as surgeons gain experience with laparoscopic techniques. In teaching institutions, where surgical training is an integral part of operative workflow, longer procedures may be expected and are acceptable if they contribute to better patient outcomes. Therefore, while operative time remains a factor, it should not overshadow the broader clinical advantages observed with the minimally invasive technique.

Postoperative pain is an essential consideration in hernia surgery, as it affects patient comfort, early mobility, and the need for analgesics. In this study, patients in the laparoscopic group reported consistently lower pain scores within the first 24 hours following surgery. This finding reflects the reduced surgical trauma associated with TAPP repair, where small incisions and minimal dissection result in less tissue injury and nerve irritation. The open mesh repair method, while effective, typically involves wider dissection of the inguinal canal, which can affect nearby nerves such as the ilioinguinal and genitofemoral nerves. This anatomical manipulation may contribute to greater immediate postoperative discomfort. The lower pain scores in the laparoscopic group likely supported earlier mobilization and may have reduced the requirement for postoperative pain management. From a patient's perspective, reduced pain enhances the overall surgical experience and can influence their willingness to consider similar procedures in the future. Minimally invasive approaches, therefore, have the potential to improve not only clinical outcomes but also patient satisfaction.

One of the practical benefits of laparoscopic repair observed in this study was the shorter duration of hospitalization. Most patients in the TAPP group were discharged within 48 hours, in contrast to the longer average stay seen in the open repair group.

Early discharge is desirable not only from a patient comfort perspective but also in terms of hospital logistics, particularly in high-volume public health facilities where bed availability is often limited. Faster discharge reduces the risk of hospital-acquired infections and allows better turnover in surgical wards. Additionally, patients who underwent TAPP repair returned to their usual daily activities in a significantly shorter time. This rapid functional recovery is especially important in working individuals whose livelihoods depend on physical labor or uninterrupted work schedules. Faster return to normal life not only improves personal well-being but also reduces indirect economic losses, which is a relevant factor in low- to middle-income populations. These findings suggest that while TAPP may require more surgical time and resources initially, it offers postoperative efficiencies that may benefit both patients and healthcare providers.

The occurrence of postoperative complications was low in both groups, with no statistically significant differences between them. Minor complications, such as seroma formation and superficial wound infections, were slightly more frequent in patients who underwent open repair. These outcomes are likely related to the larger incision and increased exposure of tissues in the open method, which may promote local fluid collection and raise the risk of microbial contamination. In contrast, the laparoscopic approach, with its small incisions and internal mesh placement, offers a more controlled environment, reducing the likelihood of superficial complications. No serious adverse events—such as hemorrhage, deep infection, or bowel injury—were recorded in either group, and there were no instances requiring reoperation. One early recurrence was identified in the open group, but given the limited follow-up period, no definitive conclusions regarding recurrence risk can be drawn. These results affirm that both procedures are safe when performed under standard guidelines by trained personnel. Long-term studies would be useful to evaluate delayed complications, including chronic pain or mesh-related issues.

While the clinical advantages of laparoscopic hernia repair are evident, the broader application of this technique in public healthcare systems comes with certain limitations. The TAPP procedure demands advanced infrastructure, including laparoscopic equipment, general anesthesia support, and trained surgical teams. In many district and rural hospitals, these resources may not be consistently available. Additionally, the cost of laparoscopic consumables and maintenance can be substantial, potentially affecting the economic sustainability of such procedures when performed on a large scale. From a training perspective, the learning curve for TAPP repair is steeper, and adequate supervision and skill-building are essential to ensure safety and consistency. Therefore, the decision to adopt laparoscopic hernia repair in public institutions must be guided by resource availability, institutional readiness, and patient priorities. In well-equipped tertiary care centers like the one involved in this study, the laparoscopic approach can be safely and effectively implemented, but broader integration across the healthcare system requires strategic planning and policy-level support.

The outcomes of this study support the view that laparoscopic TAPP mesh repair is a viable alternative to open hernioplasty, offering several short-term benefits with comparable safety. Reduced postoperative pain, early mobilization, shorter hospital stays, and faster return to activity are meaningful advantages, especially for patients who seek a quicker recovery and improved surgical experience. However, the study's limitations—such as a relatively small sample size and short follow-up duration—must be acknowledged. These factors restrict the ability to assess long-term outcomes like chronic pain, recurrence, and cost-effectiveness. Future investigations with extended observation periods, multicenter involvement, and larger patient populations are recommended to validate these findings. Additionally, qualitative parameters such as patient satisfaction and quality of life post-surgery should be included in future research. Such data would provide a more comprehensive understanding of how different surgical techniques impact patients beyond clinical endpoints, thereby contributing to more informed and patient-centered surgical care.

Conclusion

Laparoscopic TAPP mesh repair offers distinct advantages over conventional open hernia repair, including reduced shorter hospital stays, quicker return to normal activities, and postoperative discomfort, despite requiring a longer operative time. Both techniques are safe and effective, but TAPP may be the preferred approach for patients prioritizing early recovery and improved postoperative comfort. Further studies with extended follow-up are recommended to evaluate long-term recurrence and cost-effectiveness.

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