Section: General Surgery



Original Research Article

CLINICAL PROFILE OF ADULT INGUINAL HERNIA AND COMPARATIVE OUTCOMES OF OPEN LICHTENSTEIN VERSUS LAPAROSCOPIC TAPP REPAIR: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: The management of symptomatic inguinal hernia is primarily surgical**.** Comparative studies have reported differences between laparoscopic and open repair with respect to operative time, postoperative pain, hospital stay, return to normal activity and complications. Systematic reviews and international guidelines support both open mesh and laparoscopic approaches, with selection influenced by patient characteristics, hernia type, surgeon expertise, available resources and patient preference. Despite extensive international evidence, prospective comparative data from Indian tertiary-care settings remain relatively limited, particularly regarding the relationship between clinical characteristics and early postoperative outcomes. **Objective:** To assess the clinical profile and predisposing factors of adult inguinal hernia and compare postoperative outcomes between open Lichtenstein and laparoscopic transabdominal preperitoneal (TAPP) mesh repair. **Material and Methods:** This prospective observational comparative study was conducted in the Department of General Surgery, Jawaharlal Nehru Institute of Medical Sciences, Imphal, from March 2024 to February 2026. Adult patients aged >18 years with inguinal hernia were included. Thirty-six patients were studied, comprising 12 patients undergoing TAPP repair and 24 undergoing open Lichtenstein repair. The choice of procedure was based on patient preference. Demographic and clinical characteristics, operative duration, postoperative pain assessed using the Visual Analogue Scale (VAS), complications, hospital stay, return to work and recurrence were evaluated. Statistical analysis was performed using appropriate comparative tests, with $p<0.05$ considered statistically significant. **Results:** The mean (SD) age was 50.83 (10.07) years, and all patients were male. Heavy lifting was the most frequently reported associated factor (72.22%), while indirect hernia was the predominant type (72.22%). TAPP required significantly longer operative time than open repair (134.25 ± 20.71 vs 72.38 ± 10.45 minutes; $p<0.001$). Postoperative VAS scores were significantly lower following TAPP at 8, 12, 24 and 48 hours ($p\leq0.002$). TAPP was associated with shorter hospital stay (2.33 ± 0.49 vs 4.04 ± 1.16 days; $p<0.001$) and earlier return to work (11.75 ± 3.91 vs 19.54 ± 3.50 days; $p<0.001$). Postoperative complications did not differ significantly between groups ($p=0.438$). **Conclusion:** Laparoscopic TAPP repair was associated with longer operative duration but significantly less early postoperative pain, shorter hospital stay and earlier return to work compared with open Lichtenstein repair. Both techniques demonstrated comparable postoperative complication rates during six months of follow-up.

INTRODUCTION

Inguinal hernia is one of the most common conditions encountered in general surgical practice. It represents a protrusion of abdominal contents through a defect in the groin region and is broadly classified into direct and indirect types according to the anatomical defect. Accurate classification is important for clinical assessment, operative planning and comparison of surgical outcomes.[1-3]

Inguinal hernia accounts for a substantial proportion of abdominal wall hernias and represents a major global surgical burden. The lifetime risk is considerably higher in men than in women, and the incidence increases with age because of progressive weakening of the abdominal wall and connective tissues.[4-6] The condition also has important socioeconomic consequences, particularly in low- and middle-income settings where delayed presentation and limited access to elective surgery may increase morbidity.[7,8]

The pathogenesis of adult inguinal hernia is multifactorial. Congenital persistence of the processus vaginalis contributes to indirect hernia, while abnormalities in collagen and extracellular matrix composition may weaken the transversalis fascia.[2,9] Increased intra-abdominal pressure associated with heavy lifting, chronic cough, constipation, urinary obstruction and obesity may further contribute to hernia formation.[10] Familial predisposition has also been reported, while smoking has been associated with impaired connective-tissue integrity and increased risk of recurrence.[11,12]

The management of symptomatic inguinal hernia is primarily surgical. Historically, tissue-based repairs such as Bassini and Shouldice procedures were widely used.[13,14] The introduction of tension-free mesh repair by Lichtenstein represented an important advancement and subsequently became one of the most widely used open techniques because of its reproducibility and favourable recurrence rates.[15]

The development of minimally invasive surgery led to the introduction of laparoscopic techniques, principally totally extraperitoneal and transabdominal preperitoneal repair. TAPP provides access to the preperitoneal space through the abdominal cavity and permits placement of a large mesh over the myopectineal orifice. Compared with open repair, laparoscopic approaches may provide advantages in terms of postoperative pain and early functional recovery, although they require general anaesthesia, specialised equipment and appropriate surgical expertise.[16,17]

Comparative studies have reported differences between laparoscopic and open repair with respect to operative time, postoperative pain, hospital stay, return to normal activity and complications.[18-20] Systematic reviews and international guidelines support both open mesh and laparoscopic approaches, with selection influenced by patient characteristics, hernia type, surgeon expertise, available resources and patient preference.[21-22]

Despite extensive international evidence, prospective comparative data from Indian tertiary-care settings remain relatively limited, particularly regarding the relationship between clinical characteristics and early postoperative outcomes. The present study was therefore undertaken to evaluate the clinical profile and associated factors of adult inguinal hernia and to compare open Lichtenstein and laparoscopic TAPP repair with respect to operative duration, postoperative pain, complications, hospital stay, return to work and short-term recurrence.

MATERIALS AND METHODS

This prospective observational comparative study was conducted in the Department of General Surgery, Jawaharlal Nehru Institute of Medical Sciences (JNIMS), Imphal, from March 2024 to February 2026. Adult patients aged >18 years presenting with clinically diagnosed inguinal hernia were considered for inclusion. Bilateral inguinal hernias were also included. The study protocol was approved by the Institutional Ethics Committee of JNIMS, Imphal, and written informed consent was obtained from all participants.

A total of 36 patients were included using purposive sampling at the 95% confidence level factor and pooled prevalence of inguinal hernea as 7.7% (Abebe MS et al).[23] The absolute allowable error taken here as 9% and 5% non-response rate. Twelve patients underwent laparoscopic transabdominal preperitoneal (TAPP) repair and 24 underwent open Lichtenstein tension-free mesh repair. The choice of operative technique was based on patient preference; therefore, allocation was not randomized.

Patients aged >18 years with clinically diagnosed inguinal hernia who provided consent were included. Patients who did not consent, those with recurrent or complicated hernias, pregnancy, or patients requiring combined abdominal or pelvic procedures were excluded. Complicated hernias included obstructed, strangulated and incarcerated hernias.

Surgical technique

TAPP repair: The procedure was performed under general anaesthesia with the patient in the supine position and placed in Trendelenburg position. Pneumoperitoneum was established, followed by insertion of a 10-mm camera port and two 5-mm working ports. After identification of the hernia defect, the peritoneum was incised approximately 5 cm above the defect and the preperitoneal space was dissected. The inferior epigastric vessels, Cooper's ligament, pubic tubercle, vas deferens and spermatic vessels were identified. The hernia sac was reduced and adequate dissection of the myopectineal orifice was performed. A polypropylene mesh measuring approximately 15 × 12 cm was placed and selectively fixed, followed by closure of the peritoneal flap.

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Open Lichtenstein repair: Under spinal or general anaesthesia, an approximately 6–8 cm oblique inguinal incision was made parallel to and approximately 2 cm above the inguinal ligament. The external oblique aponeurosis was opened and the spermatic cord was mobilized. The hernia sac was dissected and managed according to the type of hernia. A polypropylene mesh measuring approximately 7 × 15 cm was placed using the tension-free Lichtenstein technique, with fixation to the pubic tubercle, inguinal ligament and conjoint tendon. The external oblique aponeurosis, subcutaneous tissue and skin were subsequently closed.

Outcome assessment

Demographic and clinical characteristics included age, sex, occupation, laterality, type of hernia, and associated predisposing factors such as heavy lifting, smoking, obesity, chronic cough, benign prostatic hyperplasia-related straining and family history. Postoperative outcomes included operative time, postoperative pain, postoperative complications, duration of hospital stay and time taken to return to work.

Postoperative pain was assessed using the Visual Analogue Scale at 8, 12, 24 and 48 hours after surgery. Patients were followed clinically at the 10th postoperative day, 8 weeks and 6 months. Recurrence was assessed clinically by the presence of a groin bulge and/or positive cough impulse.

Statistical analysis

Data were entered and initially processed using Microsoft Excel and analysed using SPSS version 27. Categorical variables were expressed as mean, standard deviation, frequencies and percentages. Comparisons between groups were performed using the independent-samples *t* test for normally distributed continuous variables and the Chi-square test or Fisher's exact test for categorical variables, as appropriate. A *p* value <0.05 was considered statistically significant.

RESULTS

A total of 36 patients were included in the study, of whom 33.3% (12 Nos.) underwent laparoscopic TAPP repair and 66.7% (24 Nos.) underwent open Lichtenstein repair. The overall mean (SD) age was 50.83 (10.07) years. The mean (SD) age was 54.92 (8.56) years in the TAPP group and 48.79 (10.31) years in the open group, with no statistically significant difference between the groups (p=0.085). All participants were male.

Indirect hernia was more common than direct hernia, occurring in 72.22% (26 patients) compared with 27.78% (10 patients). The distribution of hernia type was comparable between the groups (p=0.188). Right-sided hernia was present in 55.55% (20 patients), left-sided hernia in 38.88% (14 patients), and bilateral hernia in 5.56% (2 patients). [Table 1]

Table 1: Demographic and Clinical Characteristics of the Study Population

Variable	Overall (n=36)	TAPP (n=12)	Open Lichtenstein (n=24)	*p* value
Age, years	50.83 ± 10.07	54.92 ± 8.56	48.79 ± 10.31	0.085
Sex, male	36 (100)	12 (100)	24 (100)	—
Hernia type				
Direct	10 (27.78)	5 (41.67)	5 (20.83)	0.188
Indirect	26 (72.22)	7 (58.33)	19 (79.17)	
Laterality				—
Right	20 (55.55)	7(58.33)	13 (54.17)	0.543
Left	14 (38.88)	3 (25.00)	11 (45.83)	
Bilateral	2 (5.56)	2 (16.67)	0	

Heavy lifting was the most frequently reported associated factor, present in 72.22% (26 patients), followed by smoking in 33.33% (12 patients), obesity in 30.56% (11 patients), chronic cough in 16.67% (6 patients), family history in 8.33% (3 patients), and benign prostatic hyperplasia-related straining in 5.56% (2 patients). These factors were not mutually exclusive. [Table 2]

Table 2: Reported Predisposing Factors for Inguinal Hernia

Predisposing factor	Overall (n=36), n (%)
Heavy lifting	26 (72.22)
Smoking	12 (33.33)
Obesity (BMI ≥25 kg/m²)	11 (30.56)
Chronic cough	6 (16.67)
Family history	3 (8.33)
BPH-related straining	2 (5.56)

The mean operative time was significantly longer with TAPP than with open repair (134.25 ± 20.71 vs 72.38 ± 10.45 minutes; p<0.001). No intraoperative complications, major bleeding, visceral injury, anaesthetic-related adverse events, or conversion to open surgery were recorded. Postoperative pain was significantly lower in the TAPP group at all assessed time points. The mean VAS scores at 8, 12, 24 and 48 hours were 4.17 ± 0.94, 3.42 ± 1.08, 1.67 ± 0.78 and 0.75 ± 0.45, respectively, compared with 5.50 ± 1.18, 4.88 ± 1.30, 3.50 ± 0.98 and 2.38 ± 0.88 in the

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open group. The differences were statistically significant at each time point (p≤0.002).

Postoperative complications occurred in 33.33% (12 patients). Seroma and surgical-site infection were the principal complications. The difference in overall postoperative complications between the two groups was not statistically significant (p=0.438). No hematoma, urinary retention or neuralgia was recorded.

Hospital stay was significantly shorter following TAPP repair than open repair (2.33 ± 0.49 vs 4.04 ± 1.16 days; p<0.001). Patients undergoing TAPP also returned to work significantly earlier (11.75 ± 3.91 vs 19.54 ± 3.50 days; p<0.001). [Table 3]

Table 3: Comparison of Operative and Postoperative Outcomes

Outcome	TAPP (n=12)	Open Lichtenstein (n=24)	*p* value
Operative time, min	134.25 ± 20.71	72.38 ± 10.45	<0.001*
VAS at 8 h	4.17 ± 0.94	5.50 ± 1.18	0.002*
VAS at 12 h	3.42 ± 1.08	4.88 ± 1.30	0.002*
VAS at 24 h	1.67 ± 0.78	3.50 ± 0.98	<0.001*
VAS at 48 h	0.75 ± 0.45	2.38 ± 0.88	<0.001*
Hospital stay, days	2.33 ± 0.49	4.04 ± 1.16	<0.001*
Return to work, days	11.75 ± 3.91	19.54 ± 3.50	<0.001*
Post-operative complication			
• Seroma	2 (16.67)	4 (16.67)	
• Surgical-site infection	-	6 (25.00)	

All patients were followed for six months. No recurrence was observed in either group, with all 36 patients remaining recurrence-free during the study period. No chronic groin pain, mesh-related complication or late postoperative morbidity was documented during follow-up.

DISCUSSION

The present study evaluated the clinical profile of adult inguinal hernia and compared short-term outcomes following laparoscopic TAPP and open Lichtenstein repair. The study population was predominantly middle-aged men, with indirect hernia being the most common type. These findings are consistent with the established epidemiological and anatomical pattern of inguinal hernia.[1,5,6]

Heavy lifting was the most frequently reported associated factor, followed by smoking, obesity and chronic cough. These findings support the multifactorial nature of inguinal hernia, in which increased mechanical stress may contribute to hernia formation in a susceptible abdominal wall. Similar associations have been reported previously.[7,10-12] However, because this was an observational study, these factors should be regarded as associated characteristics rather than independent causal factors.

TAPP repair required significantly longer operative time than Lichtenstein repair (134.25 ± 20.71 vs 72.38 ± 10.45 minutes; *p*<0.001). The longer operative duration may be related to pneumoperitoneum, preperitoneal dissection, identification of anatomical landmarks, mesh placement and peritoneal closure. Previous comparative studies have also reported longer operative times with laparoscopic repair.[18-20]

Despite the longer operative duration, postoperative pain was significantly lower following TAPP at 8, 12, 24 and 48 hours. This finding is consistent with previous comparative evidence showing better early postoperative pain outcomes following laparoscopic repair.[18-20] Reduced tissue dissection and less manipulation of the inguinal canal may contribute to this advantage. Chronic postoperative pain following open repair has also been associated with injury or entrapment of the inguinal nerves.[21,22]

TAPP was associated with a significantly shorter hospital stay and earlier return to work. These findings are consistent with the recognised early recovery advantage of laparoscopic repair.[18-20] Earlier functional recovery may be particularly relevant in this population because a substantial proportion of patients were involved in manual or physically demanding occupations.

Postoperative complications occurred in 33.33% of patients, mainly seroma and surgical-site infection. There was no statistically significant difference between the two groups, and no major intraoperative complication or conversion was recorded. Previous comparative evidence indicates that both TAPP and open mesh repair have acceptable short-term safety profiles when performed by appropriately trained surgeons.[17-20]

No recurrence or chronic groin pain was documented during the six-month follow-up. Although these findings indicate satisfactory short-term outcomes with both techniques, they should be interpreted cautiously. Recurrence and chronic postoperative pain may become evident beyond six months, and therefore longer follow-up is required to establish long-term comparative outcomes.[17,18,21,22]

The study has several limitations. The sample size was small and the study was conducted at a single centre. Allocation to TAPP or open repair was based on patient preference rather than randomization, and purposive sampling may limit generalizability. In addition, the six-month follow-up period was relatively short for assessing recurrence and chronic groin pain. Cost-effectiveness was also not evaluated.

Overall, TAPP repair was associated with longer operative time but significantly less early postoperative pain, shorter hospital stay and earlier return to work compared with open Lichtenstein repair. The two techniques demonstrated comparable

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short-term postoperative complication rates and no recurrence during the six-month follow-up.

CONCLUSION

Laparoscopic TAPP and open Lichtenstein repair both provided satisfactory short-term outcomes in adults with inguinal hernia. TAPP required a significantly longer operative time but was associated with significantly lower early postoperative pain, shorter hospital stay and earlier return to work. Postoperative complication rates were comparable between the two techniques, and no recurrence or chronic groin pain was documented during six months of follow-up.

TAPP may therefore be considered a useful alternative to open Lichtenstein repair in appropriately selected patients when adequate laparoscopic expertise and infrastructure are available. However, the small sample size, non-randomized allocation and short follow-up limit definitive conclusions regarding long-term recurrence and chronic pain. Larger studies with longer follow-up are warranted.

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Data Availability: The data supporting the findings of this study are available from the corresponding author on reasonable request, subject to institutional and ethical considerations.

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