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Research Article

A Prospective, Comparative Study on Postoperative Outcomes and Chronic Pain in Lichtenstein Open Repair Versus Laparoscopic Transabdominal Preperitoneal (TAPP) Repair for Primary Unilateral Inguinal Hernia

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Abstract

Background: Inguinal hernia repair is one of the most common general surgical procedures. The Lichtenstein tension-free repair is the gold standard open technique, while the laparoscopic Transabdominal Preperitoneal (TAPP) approach is a widely adopted minimally invasive alternative. The choice between them often hinges on postoperative recovery and the risk of chronic groin pain.

Aim: To compare the Lichtenstein and TAPP techniques regarding operative time, early postoperative pain, return to normal activities, and the incidence of chronic groin pain.

Methods: A prospective comparative study was conducted from [July 2015] to [December 2015]. Fifty-eight patients with primary unilateral inguinal hernia were allocated into two groups: Group L (Lichtenstein repair, n=29) and Group T (TAPP repair, n=29). Operative time, postoperative pain using the Visual Analogue Scale (VAS) at 6 hours, 24 hours, and 7 days, time to return to normal activities, and the incidence of chronic pain at 3 and 6 months were assessed and compared.

Results: The mean operative time was significantly shorter in Group L (48.2 ± 8.1 min) compared to Group T (65.5 ± 10.3 min) ($p < 0.001$). Early postoperative pain (VAS) was significantly lower in Group T at 6 and 24 hours ($p < 0.05$), but this difference was not significant at 7 days. Patients in Group T resumed normal activities significantly earlier (7.2 ± 2.1 days) than those in Group L (12.5 ± 3.4 days) ($p < 0.001$). The incidence of chronic groin pain at 3 months was 17.2% (5/29) in Group L and 6.9% (2/29) in Group T. At 6 months, it was 10.3% (3/29) in Group L and 3.4% (1/29) in Group T, with no statistically significant difference at either interval ($p > 0.05$).

Conclusion: While the Lichtenstein repair offers a shorter operative time, the TAPP repair is associated with significantly less early postoperative pain and a quicker return to normal activities. Although not statistically significant in our cohort, a trend towards a lower incidence of chronic groin pain was observed in the TAPP group. The choice of procedure should be individualized, considering patient priorities and surgical expertise.

Keywords: Inguinal Hernia, Lichtenstein Repair, TAPP Repair, Chronic Groin Pain, Postoperative Outcomes, Laparoscopic Hernia Repair.

Introduction

Inguinal hernia repair represents a cornerstone of general surgery, with millions of procedures performed annually worldwide [1]. The primary goals of surgical intervention are the safe and effective repair of the hernia defect, minimization of recurrence, and optimization of patient recovery and quality of life. The introduction of the Lichtenstein tension-free mesh repair in the 1980s revolutionized open hernia surgery, establishing a new gold standard due to its low recurrence rates and technical simplicity [2].

With the advent of minimally invasive surgery, laparoscopic techniques, particularly the Transabdominal Preperitoneal (TAPP) repair, have gained prominence. The TAPP approach involves entering the peritoneal cavity, reducing the hernia, and placing a large mesh in the preperitoneal space, covering the myopectineal orifice of Fruchaud [3].

A critical outcome measure beyond recurrence is chronic postoperative inguinal pain (CPIP), defined as pain persisting for more than 3 months after surgery. CPIP can be debilitating and has been reported to affect 10-15% of patients, sometimes with a significant impact on quality of life [4]. The etiology of CPIP is multifactorial, involving nerve injury, mesh-related inflammation, and staple fixation [5].

The debate between open and laparoscopic repairs often centers on the trade-off between operative efficiency and postoperative recovery. While meta-analyses of large trials have shown advantages for laparoscopic techniques in terms of early pain and return to work, data from smaller, real-world settings remain valuable [6]. This study aims to prospectively compare the Lichtenstein open repair and the TAPP laparoscopic repair in a controlled cohort of 58 patients, focusing specifically on postoperative recovery parameters and the crucial endpoint of chronic groin pain.

Materials and Methods

Study Design and Population

A prospective comparative study was conducted after obtaining institutional ethical committee approval. Between [July 2015] and [December 2015], 58 consecutive adult patients (age >18 years) diagnosed with a primary unilateral inguinal hernia were enrolled. Written informed consent was obtained from all participants.

Inclusion Criteria: Primary, unilateral, reducible inguinal hernia (direct or indirect).

Exclusion Criteria: Recurrent hernia, bilateral hernias, irreducible/strangulated hernia, contraindications to general anesthesia, American Society of Anesthesiologists (ASA) class IV or V, and patient refusal.

Group Allocation and Surgical Technique

Patients were allocated into two groups based on a combination of patient preference after detailed counseling and surgical slot availability:

- **Group L (n=29):** Underwent Lichtenstein tension-free open repair under spinal anesthesia.
- **Group T (n=29):** Underwent Laparoscopic TAPP repair under general anesthesia.

All procedures were performed by two senior surgeons, each proficient in both techniques. In Group L, a polypropylene mesh was fixed with non-absorbable sutures, with careful identification and preservation of the ilioinguinal, iliohypogastric, and genitofemoral nerves. In Group T, a standard three-port technique was used. The peritoneum was incised, the hernia sac reduced, a large polypropylene mesh was placed in the preperitoneal space, and the peritoneum was closed with absorbable tacks/sutures.

Outcome Measures

Primary outcome measures were:

1. **Operative Time:** Measured from skin incision to skin closure/suture.
2. **Postoperative Pain:** Assessed using a 10-point Visual Analogue Scale (VAS) at 6 hours, 24 hours, and 7 days postoperatively.

3. **Return to Normal Activities:** Defined as the patient's self-reported ability to resume all pre-operative daily routines, including work (in days).
4. **Chronic Groin Pain:** Assessed at 3 and 6 months post-surgery during a follow-up visit. Pain was characterized using a verbal rating scale (none, mild, moderate, severe) and its impact on daily activities was noted.

Secondary outcome measures included intraoperative and postoperative complications (e.g., seroma, hematoma, urinary retention, port-site infection).

Statistical Analysis

Data were analyzed using SPSS software version 25.0. Continuous variables (e.g., operative time, VAS scores) were presented as mean ± standard deviation and compared using the Student's t-test. Categorical variables (e.g., incidence of chronic pain, complications) were presented as numbers and percentages and compared using the Chi-square test or Fisher's exact test as appropriate. A p-value of < 0.05 was considered statistically significant.

Table 1: Patient Demographics and Baseline Characteristics

Characteristic	Group L (Lichtenstein) (n=29)	Group T (TAPP) (n=29)	p-value
Mean Age (years ± SD)	52.4 ± 11.7	54.1 ± 12.3	0.58
Mean BMI (kg/m² ± SD)	24.8 ± 2.5	25.1 ± 2.8	0.66
Gender (Male / Female)	26 / 3	27 / 2	0.64*
Hernia Side (Right / Left)	17 / 12	15 / 14	0.61

Characteristic	Group L (Lichtenstein) (n=29)	Group T (TAPP) (n=29)	p-value
Hernia Type (Direct / Indirect)	11 / 18	13 / 16	0.60

The demographic and baseline characteristics of the two groups were well-matched and comparable. The mean age in the Lichtenstein group (Group L) was 52.4 ± 11.7 years, compared to 54.1 ± 12.3 years in the TAPP group (Group T) (p=0.58). Similarly, the mean Body Mass Index (BMI) was 24.8 ± 2.5 kg/m² in Group L and 25.1 ± 2.8 kg/m² in Group T (p=0.66). The distribution of gender, hernia side (right/left), and hernia type (direct/indirect) also showed no statistically significant differences, ensuring that the groups were homogeneous for subsequent outcome comparisons.

Table 2: Primary Operative and Postoperative Outcomes

Outcome Measure	Group L (Lichtenstein) (n=29)	Group T (TAPP) (n=29)	p-value
Operative Time (min, mean ± SD)	48.2 ± 8.1	65.5 ± 10.3	**<0.001**
Postop Pain VAS (mean ± SD)			
At 6 hours	5.8 ± 1.2	4.1 ± 1.4	**<0.01**
At 24 hours	4.5 ± 1.1	3.2 ± 1.0	**<0.05**
At 7 days	2.1 ± 0.8	1.8 ± 0.7	0.12
Return to Normal Activities (days, mean ± SD)	12.5 ± 3.4	7.2 ± 2.1	**<0.001**

Table 2, revealed significant differences between the techniques. The mean operative time was considerably shorter for the Lichtenstein repair at 48.2 ± 8.1 minutes, compared to 65.5 ± 10.3 minutes for the TAPP procedure, a difference that was highly statistically significant ($p < 0.001$). Conversely, the assessment of early postoperative pain using the Visual Analogue Scale (VAS) favored the laparoscopic approach. Patients in Group T reported significantly lower pain scores at both 6 hours (4.1 ± 1.4 vs. 5.8 ± 1.2, $p < 0.01$) and 24 hours (3.2 ± 1.0 vs. 4.5 ± 1.1, $p < 0.05$). However, by post-operative day 7, this difference in pain scores was no longer statistically significant ($p=0.12$). A major finding was the time to return to normal activities, which was significantly faster for the TAPP group, with patients resuming daily routines at a mean of 7.2 ± 2.1 days, versus 12.5 ± 3.4 days for the open group ($p < 0.001$).

Table 3: Incidence and Severity of Chronic Groin Pain

Time Point & Pain Severity	Group L (Lichtenstein) (n=29)	Group T (TAPP) (n=29)	p-value
At 3 Months			0.22*
No Pain	24 (82.8%)	27 (93.1%)	
Mild Pain	4 (13.8%)	2 (6.9%)	
Moderate Pain	1 (3.4%)	0 (0%)	
Severe Pain	0 (0%)	0 (0%)	
Total with Pain	**5 (17.2%)**	**2 (6.9%)**	
At 6 Months			0.30*
No Pain	26 (89.7%)	28 (96.6%)	
Mild Pain	3 (10.3%)	1 (3.4%)	

Time Point & Pain Severity	Group L (Lichtenstein) (n=29)	Group T (TAPP) (n=29)	p-value
Moderate Pain	0 (0%)	0 (0%)	
Severe Pain	0 (0%)	0 (0%)	
Total with Pain	**3 (10.3%)**	**1 (3.4%)**	

At the 3-month mark, 5 patients (17.2%) in the Lichtenstein group reported chronic pain, with the majority being mild (4 patients) and one case of moderate pain. In contrast, only 2 patients (6.9%) in the TAPP group reported pain, and in both cases, it was mild. By 6 months, the incidence had decreased in both groups, but a numerical difference remained: 3 patients (10.3%) in Group L reported mild, persistent pain, compared to only 1 patient (3.4%) in Group T. While this trend consistently indicated a lower incidence of chronic pain in the TAPP group, the differences did not reach statistical significance at either the 3-month (p=0.22) or 6-month (p=0.30) assessment.

Table 4: Postoperative Complications

Complication	Group L (Lichtenstein) (n=29)	Group T (TAPP) (n=29)	p-value
Seroma	2 (6.9%)	1 (3.4%)	0.55*
Hematoma	0 (0%)	0 (0%)	-
Urinary Retention	1 (3.4%)	0 (0%)	0.31*
Wound/Port-site Infection	0 (0%)	0 (0%)	-
Transient Neuralgia	0 (0%)	1 (3.4%)	0.31*

Complication	Group L (Lichtenstein) (n=29)	Group T (TAPP) (n=29)	p-value
Total Patients with Complications	**3 (10.3%)**	**2 (6.9%)**	0.64*

The overall complication rate was low and comparable between the two cohorts. In the Lichtenstein group, there were 2 cases of seroma (6.9%) and 1 case of urinary retention (3.4%). In the TAPP group, complications included 1 case of port-site seroma (3.4%) and 1 case of transient neuralgia (3.4%) that resolved spontaneously. There were no instances of hematoma, surgical site infection, mesh infection, or hernia recurrence in either group within the 6-month study period. The total number of patients experiencing any complication was 3 (10.3%) in Group L and 2 (6.9%) in Group T, a difference that was not statistically significant (p=0.64).

Discussion

This prospective comparative study adds to the ongoing dialogue regarding the optimal surgical approach for primary unilateral inguinal hernia. Our findings illuminate a clear clinical trade-off: the Lichtenstein technique offers procedural efficiency, while the TAPP repair provides superior early recovery metrics, a distinction that aligns with the broader narrative in the surgical literature.

The significantly shorter operative time for the Lichtenstein repair (48.2 vs. 65.5 minutes) is a consistent and expected finding. This can be attributed to the technical simplicity of the open approach, which avoids the time required for laparoscopic setup, peritoneal access, and the intricate dissection and closure of the peritoneum. This efficiency makes the Lichtenstein repair a robust and practical choice in high-volume settings or where resources for laparoscopy are limited. Our results are strongly supported by the large-scale meta-analysis by McCormack et al. (2003),

which concluded that open mesh repairs are consistently faster to perform than laparoscopic techniques.

Beyond operative time, however, the priorities of modern surgery increasingly focus on patient-centered outcomes. In this domain, the TAPP approach demonstrated distinct advantages. Our data revealed significantly lower pain scores in the immediate postoperative period (6 and 24 hours) and a markedly faster return to normal activities (7.2 days vs. 12.5 days) for the laparoscopic group. This is a critical finding, as it translates directly into reduced postoperative suffering and significant socioeconomic benefits for working patients. The mechanism is logical: the TAPP technique avoids a large incision in the groin, minimizing trauma to the muscles, fascia, and most importantly, the superficial sensory nerves. This aligns with the findings of a study by Eklund et al. (2010) from the Swedish Multicentre Trial, which reported less pain during the first postoperative week and a quicker return to daily activities for patients undergoing laparoscopic repair compared to the Lichtenstein technique.

Perhaps the most debated outcome in inguinal hernia surgery is the incidence of chronic groin pain. In our cohort, we observed a clear, though not statistically significant, trend favoring the TAPP repair, with incidences of 10.3% vs. 3.4% at 6 months in the Lichtenstein and TAPP groups, respectively. The smaller sample size of our study likely limited the power to detect a statistically significant difference for this specific outcome. Nevertheless, the numerical trend is clinically suggestive and finds strong biological and clinical rationale. The Lichtenstein repair necessitates dissection in an area rich with sensory nerves (ilioinguinal, iliohypogastric, genital branch of the genitofemoral), which are at risk for injury, entrapment, or irritation by sutures or mesh. In contrast, the TAPP approach places a large mesh in the preperitoneal space, posterior to these nerves,

thereby largely avoiding direct contact. This pathophysiological explanation is corroborated by the long-term follow-up data from the trial by Eklund et al. (2010), which found a significantly lower rate of chronic pain and numbness five years after surgery in the laparoscopic group compared to the Lichtenstein group.

Conclusion

In conclusion, the choice between the Lichtenstein and TAPP repairs for primary unilateral inguinal hernia is not a matter of identifying a superior technique, but rather of matching the procedure to the patient's priorities and the clinical context. The Lichtenstein repair remains a highly efficient, reliable, and technically straightforward operation. In contrast, the TAPP repair, despite a longer operative time, provides tangible benefits in the form of less early postoperative pain, a dramatically faster return to normal life, and a favorable trend towards reducing chronic groin pain. Therefore, a tailored approach through shared decision-making, where the patient is informed of these trade-offs, is the paradigm for optimal care.

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