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ORIGINAL ARTICLE

Post-operative outcomes of trans-abdominal pre-peritoneal mesh repair (TAPP) for groin hernia

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ABSTRACT

Background: Transabdominal preperitoneal (TAPP) repair has established itself as an effective laparoscopic technique for the treatment of groin hernia. The aim of the current study was to evaluate the early outcomes of TAPP repair for groin hernia and to assess the postoperative complications.

Methods: This study enrolled 80 male patients with groin hernia over a 3-year period from January 2021 to December 2023. All patients underwent preoperative anesthesia assessment and gave written informed consent. A standard 3-port TAPP procedure was performed in which a 15x15 cm polypropylene mesh with absorbable pins was used in all cases and the peritoneal flap was closed with an absorbable continuous suture. Drains were placed in selected cases. Postoperative outcomes were assessed during the admission and readmission period.

Results: All 80 patients were male with a mean age of 51.97±13.5 years. Primary hernias were observed in 56 patients (70%) with 20 (25%) left-sided and 36 (45%) right-sided cases. Bilateral hernias were present in 12 patients (15%), with 8 (10%) operated on the left side and 4 (5%) on the right side. Recurrent hernias were found in 12 patients (15%), including 4 (5%) left recurrent and 8 (10%) right recurrent cases. Postoperative complications included fever in 10 patients (12.5%), abscess formation in 6 patients (7.5%), seroma in 8 patients (10%), constipation in 6 patients (7.5%), and dysuria in 4 patients (5%). Pain assessment using VAS demonstrated significant improvement from preoperative levels (6.8 ± 1.4) to postoperative day 1 (2.1 ± 0.9) and at discharge (1.2 ± 0.6), with $p<0.001$ for both comparisons.

Conclusion: Our experience with laparoscopic TAPP inguinal hernia repair demonstrates acceptable operative outcomes with low major complication rates.

Keywords: Hernia, Groin Hernia, Pain Measurement, Postoperative Complications

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Introduction

Inguinal hernia repair is a very common surgery. Annually, more than 800,000 repairs are performed in the United States, making it one of the most frequent surgical procedures (1). An inguinal hernia is an opening in the myofascial plane of the oblique and transversalis muscles that can allow for herniation of intra-abdominal or extra-peritoneal organs (2). The risk factors related to inguinal hernia can be grouped to patient related which include age, gender and external risk factors including physical work demand. Inguinal hernias are mostly symptomatic, and the only definitive cure is surgical intervention (3). This condition is notably more prevalent in men than in women, accounting for approximately two-

thirds of all adult hernias (4). Globally, more than 200 thousand individuals underwent surgery for inguinal hernia yearly, highlighting its significant burden on healthcare systems (5).

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Studies on inguinal hernia management has shown that watchful waiting is safe for asymptomatic hernias, but most patients eventually require surgery due to symptom development (6). In asymptomatic cases, operation results in less pain compared to watchful waiting (7). Surgical treatment is generally successful, with recurrence rates of 3.4% for tension-free repairs and 12.8% for non-mesh repairs after five years (8). However, long-term follow-up reveals that only 57.46% of inguinal hernia recurrences occur within 10 years post-operation, with some occurring even 50 years later (9). Chronic pain lasting over three months affects 1.7-7.7% of patients, depending on the surgical technique. These findings highlight the complexity of inguinal hernia management and the need for extended follow-up to accurately assess recurrence rates. Recent studies comparing laparoscopic techniques for inguinal hernia repair have shown mixed results and found that totally extraperitoneal (TEP) repair resulted in less postoperative pain and shorter operative time compared to transabdominal preperitoneal (TAPP) (10). There was no significant difference in complications between the two methods. Both studies noted similar recurrence rates for TEP and TAPP (11). When comparing TAPP to the open Lichtenstein technique, TAPP led to lower pain scores, earlier return to work, and better cosmetic outcomes, despite longer operative times for unilateral cases. However, TAPP was associated with higher costs (12). Overall, these studies suggest that both TEP and TAPP are safe and effective for inguinal hernia repair, with each technique having its own advantages and considerations depending on the specific case and surgeon expertise. The main objective was to evaluate the post-operative outcomes including hospital stay and adverse events in TAPP procedures for an elective presentation of a groin hernia.

Methods

This prospective cohort study was conducted in the Surgery departments of Combined Military Hospital (CMH) Quetta and CMH Lahore after ethical approval from the institutional review boards of both hospitals via letter no. 588/2024. The duration of study was three years from January 2021 to December 2023. A total of 80 patients with groin hernia were enrolled upon their informed written consent. Sample size of the study was calculated based on expected complication rates with 95% confidence interval and appropriate margin of error using WHO formula. Patients with primary inguinal hernia (direct/indirect), recurrent hernia**, unilateral presentation,** physiologically fit patients, ASA classification I/II/III, male gender, elective procedures, and age between 20-75 years were included while patients unwilling for laparoscopic surgery, obstructed/incarcerated/strangulated hernia, patients unfit for anesthesia (ASA-IV), very large inguinoscrotal hernia, female gender, emergency operations, age >75 years,

and congenital hernia were excluded from the study.

After baseline investigations and preoperative anesthesia assessment, all patients were subjected to standard TAPP repair. The diagnosis of hernia type and laterality was confirmed through clinical examination and imaging when indicated. Patient demographics, hernia characteristics, operative details, and postoperative outcomes were systematically recorded.

Standardized three-port technique was used to perform the procedure. The first port (10 mm) was placed above the umbilicus for creating pneumoperitoneum and telescope insertion. Following peritoneal cavity inspection and hernia confirmation, on either side, two 5-mm apertures were positioned lateral to the rectus sheath. The contralateral port was positioned 2 cm below the ipsilateral port, which was aligned with the optical port. An endoscopic hook/scissor with monopolar cautery was used to make a peritoneal incision about 3–4 cm above the deep ring. Careful tissue dissection was used to generate the preperitoneal space, and the hernia sac was meticulously dissected. At the proper anatomical landmarks, a 15 x 15 cm polypropylene mesh was positioned in the preperitoneal area and fastened with absorbable tacks. To guarantee full mesh coverage, continuous absorbable sutures (Vicryl 2/0) were used to seal the peritoneal flap. Drains were placed selectively based on surgical findings. Skin closure was performed with Prolene 2/0 sutures. Postoperative outcomes including hospital stay and adverse events were assessed during admission and follow-up visits. The Visual Analog Scale (VAS), a validated 10-cm horizontal line with anchors at 0 ("no pain") and 10 ("worst possible pain"), was used to measure pain. Three time points were measured: before surgery, on the first postoperative day, and after discharge as per guidelines based on patient's stability. To reduce inter-observer variability, all assessments were carried out by qualified nursing staff following established procedures. Patients' ratings of the severity of their hernia-related pain were converted to numerical values (0–10). All data were entered and analyzed using SPSS version 22.0. Descriptive data were presented as mean ± SD and frequency (percentages). Chi-square test was performed to assess associations between variables, and p-value <0.05 was considered statistically significant.

Results

The mean age and BMI of the patients were 51.97 ± 13.5 years and 24.8 ± 3.2 kg/m² respectively as shown in table 1. In total 80 patients, primary hernias comprising 70% of cases, while recurrent and bilateral hernias each represented 15% as shown in figure 1. Mean operative time was 68.5 ± 12.4 minutes with an average hospital stay of 2.1 ± 0.8 days. The overall complication rate was 42.5% including grade I, II and III (Table 2), predominantly consisting of minor complications (Grade I: 30%) including fever and constipation, with only one major complication (Grade III: 2.5%) requiring surgical intervention for abscess drainage (figure 2). Most patients (75%) were discharged within 48 hours (Table 3), with extended stays primarily attributed to fever, seroma requiring drainage, patient preference and social factors including socioeconomic factors, education, lack of social support and transportation access (Table 4). Pain assessment using VAS demonstrated significant improvement from preoperative levels (6.8 ± 1.4) to postoperative day 1 (2.1 ± 0.9) and at

discharge (1.2 ± 0.6), with p<0.001 for both comparisons (Table 5).

Table 1: Demographic characteristics of the study participants

Variable	Mean	SD	Range
Age (years)	51.97	13.5	28-72
BMI (kg/m²)	24.8	3.2	19.2-31.4
Operative time (minutes)	68.5	12.4	45-95
Hospital Stay (days)	2.1	0.8	1-4

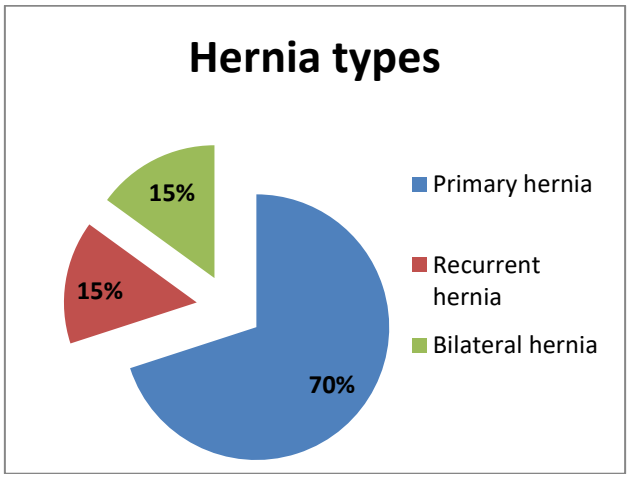

Figure 1: Hernia types

Table 2: Postoperative Complications

Total patients	**80**	**100%**
Complications	**N**	**%**
Fever	10	12.5%
Abscess	6	7.5%
Seroma	8	10.0%
Constipation	6	7.5%
Dysuria	4	5.0%
Total Complications	34	42.5%
No Complications	46	57.5%
Grand Total	80	100%

Table 3: Hospital stays Analysis

Hospital Stay	**N**	**Percentage (%)**
1 day	16	20.0
2 days	44	55.0
3 days	14	17.5
4 days	6	7.5
Total	**80**	**100**
≤48 hours discharge	**60**	**75.0**
>48 hours discharge	**20**	**25.0**

Table 4: Reasons for Extended hospital Stay (>2 days)

Reason	**N**	**% of Extended Stay**	**% of Total**
Fever	6	30.0	7.5
Seroma requiring drainage	4	20.0	5.0
Patient preference	6	30.0	7.5
Social reasons	4	20.0	5.0
Total Extended Stay	**20**	**100**	**25.0**

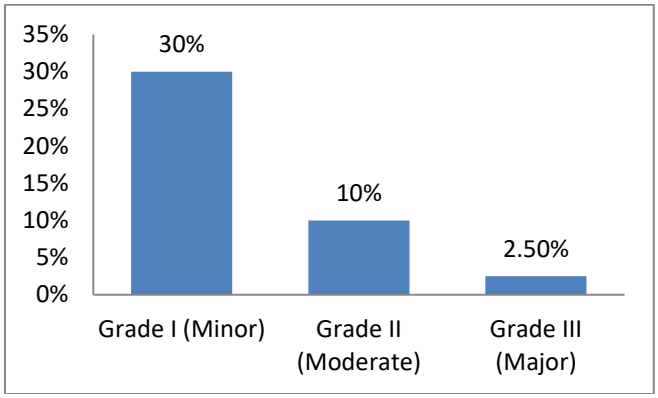

Figure 2: severity of complications

Table 5: Pain Assessment (VAS Scale)

Time Point	**Mean Pain Score**	**SD**	**p-value**
Preoperative	6.8	1.4	-
Postoperative Day 1	2.1	0.9	<0.001*
At Discharge	1.2	0.6	<0.001*

*Statistically significant improvement from preoperative levels

Discussion

Repair in inguinal hernia is seen in last two decade around world increasing the surgeon's interest in performing TAPP. IPOM, TEP repair, and TAPP repair are the three procedures used for the last many years because of its minimum invasiveness. TEP repair and TAPP repair have become more popular in inguinal hernia repair. Although open Lichtenstein mesh repair is still considered gold standard in the management of inguinal hernias but laparoscopic

technique is gaining popularity. TEP repair & TAPP repair are the most common techniques used for abdominal repairs but TAPP has an advantage of more clear view of the anatomy and more space in the abdominal cavity. Both has long learning curves but TAPP repair is being practiced more frequently than TEP repair, especially by beginners. In our study of 80 male patients undergoing laparoscopic TAPP inguinal hernia repair, the mean age was 51.97 ± 13.5 years, which aligns with the typical demographic profile reported in contemporary literature for inguinal hernia patients (13). The mean BMI of 24.8 ± 3.2 kg/m² indicates that most patients were within the normal to slightly overweight range, which is favorable for laparoscopic procedures as obesity can increase technical difficulty and complication rates (14). Our series demonstrated a predominance of right-sided hernias (45%) compared to left-sided hernias (25%), which is consistent with the established epidemiological pattern where right inguinal hernias are more common due to the delayed descent of the right testis during embryological development (15). Primary hernias comprised 70% of our cases, while recurrent and bilateral hernias each represented 15%. This distribution is comparable to other TAPP series, where primary hernias typically account for 65-75% of cases (16). Our mean hospital stay of 2.1 ± 0.8 days compares favorably with reported series, and importantly, 75% of patients were discharged within 48 hours. This early discharge rate is superior to many open repair techniques and demonstrates one of the key advantages of the laparoscopic approach (17).

The overall complication rate of 42.5% in our series requires careful interpretation. While this appears higher than some reported series, the majority (30%) were Grade I minor complications including fever and constipation, which are typically self-limiting and do not significantly impact long-term outcomes (18). The complications observed included fever (12.5%), seroma (10.0%), abscess (7.5%), constipation (7.5%), and dysuria (5.0%). These rates are consistent with published literature, where seroma formation ranges from 5-15% and is often related to extensive dissection or inadequate hemostasis (19). One of the most significant findings in our study was the dramatic improvement in pain scores using the Visual Analog Scale (VAS). Pain decreased from preoperative levels of 6.8 ± 1.4 to 2.1 ± 0.9 on postoperative day 1, and further to 1.2 ± 0.6 at discharge ($p<0.001$ for both comparisons). This substantial pain reduction demonstrates one of the primary advantages of laparoscopic TAPP repair over open techniques. Our statistical analysis revealed no significant correlations between hernia type, patient age, or BMI with complications or operative time ($p>0.05$). This finding suggests that TAPP repair can be safely performed across different patient demographics and hernia types without significantly increased risk. However, the highly significant pain improvement ($p<0.001$) validates the effectiveness of the minimally invasive approach in providing superior pain control compared to traditional open repairs.

Conclusion

Our experience with laparoscopic TAPP inguinal hernia repair demonstrates acceptable operative outcomes with low major complication rates and excellent pain control. The technique offers significant advantages in terms of postoperative recovery and patient comfort. While the

overall complication rate appears higher than some series, the predominance of minor, self-limiting complications supports the safety profile of this approach. The dramatic improvement in pain scores and the lack of correlation between patient factors and complications suggest that TAPP repair can be safely offered to appropriately selected patients across different demographics.

Limitations and Future Directions

The relatively limited sample size of 80 patients limits the statistical power for detecting rare complications. Additionally, long-term follow-up data regarding recurrence rates and chronic pain would strengthen the conclusions. Future multicenter studies with a larger sample size with extended follow-up periods to better assess the long-term efficacy and safety of TAPP repair.

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Data acquisition, analysis and interpretation	MWK, MT,SM,RK
Manuscript writing and approval	MWK,SM,RK

All the authors agree to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed.