

# Comparison of Postoperative Pain between Lichtenstein's Repair and Laparoscopic Transabdominal Preperitoneal (TAPP) Repair of Inguinal Hernia

Muhammad Waleed khan, Shahid Majeed, Raheel Khan

## ABSTRACT

**Objectives:** To compare post-operative pain score between Lichtenstein's repair versus laparoscopic trans-abdominal preperitoneal (TAPP) repair for inguinal hernia.

**Study Design and Setting:** Comparative cross sectional study. "Combined Military Hospital, Lahore from July-2021 to July-2024".

**Methodology:** The current study was approved from the ethical committee of the hospital. For sample size calculation, Open Epi sample size calculator was used. Eighty patients who presented with inguinal hernia were included in the study. They were non-randomly assigned into two groups of 40 patients; group A (Lichtenstein's repair) and B (TAPP repair). Diagnosis of inguinal hernia was made using clinical assessment and ultrasound. Patients were allocated "Lichtenstein group" and "TAPP group" in two phases. From July 2021 to January 2023, 40 patients underwent "Lichtenstein hernia repair" while in second phase from January 2023 to July 2024, remaining 40 patients underwent "TAPP repair". The patients were assessed and compared for post-operative pain score. Data was analyzed using SPSS version 22.

**Results:** In this study, 80 patients were included. Mean age was  $48.10 \pm 5.05$  years. There were all 80 (100%) males. Median BMI was 27.00 (29.40 – 19.70) kg/m<sup>2</sup>. Median duration of hernia was 5.00 (12.00 – 2.00) months. Frequency of ASA status I was 29 (36.25%) and of ASA status II was 51 (63.75%). Median post-operative pain VAS in "Lichtenstein group" was 6.00 (6.00 – 5.00) while in "TAPP group" it was 4.00 (4.00 – 3.00), ( $p < 0.001$ ).

**Conclusion:** TAPP repair for inguinal hernia is associated with less postoperative pain as compared to Lichtenstein's repair.

**Keywords:** Inguinal Canal, Inguinal Hernia, Laparoscopy, Postoperative Pain, TAPP, Visual Analogue Scale.

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## INTRODUCTION

Hernia repair has a long history, and from ancient times, surgeons have worked to gradually improve it. It is really a surgical anatomy game, and the person who knows the anatomy of the groin will be able to do a flawless repair. One of the most popular general surgical procedures is herniorrhaphy; in the US, 700,000 hernia surgeries are carried out annually, and the number is continually growing. Due to advancements in prosthetic materials, surgical procedures, and comprehension of their usage, surgical

outcomes have significantly improved. Recurrence, extended hospital stays, and post-operative discomfort are frequent issues after hernia surgery. Centers that specialize in hernia surgery claim failure rates of fewer than 1%, whereas non-specialized clinics report substantially higher recurrence rates. The permanence of the procedure, the lowest number of problems, the lowest expenses, and the quickest return to regular activities are the main indicators of a successful groin hernia repair.<sup>1</sup> The surgeon's skills, preoperative patient selection and preparation, expertise in the efficient use of surgical procedures, and the availability of modern repair materials all play a major role in this achievement. One over the last ten years, the number of endoscopic hernia surgeries has grown dramatically due to the development of novel surgical procedures. In some facilities worldwide, day care open hernia surgery is regularly carried out. Patients are more concerned about a lengthy hospital stay and post-operative discomfort right after surgery. Comparing laparoscopic hernioplasty to open hernioplasty, surgeons report a shorter hospital stay and less postoperative discomfort.<sup>1"</sup> The traditional surgical approach for groin hernias involves ligating or reducing the hernia sac and reconstructing the posterior wall via an open incision. This

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operation may be conducted as a day care procedure in select cases using local anesthesia; however, open hernioplasty is presumed to be linked to heightened postoperative pain, extended hospital stays, increased recurrence rates, and a delayed return (four to six weeks) to full physical activity and employment. Literature indicates that hernia recurrence rates after open treatment are minimal (under 2 percent) in specialist facilities; nevertheless, regional studies of diverse populations reveal typical recurrence rates of 5 to 10 percent for original hernias and 5 to 30 percent for recurrent hernias. The challenges associated with traditional herniorrhaphy, along with the efficacy of laparoscopic cholecystectomy, motivated the development of a laparoscopic technique for hernia repair. Since the 1990s, laparoscopic inguinal hernia repair has been practiced.<sup>3</sup>

“Inguinal hernia” repair is a highly prevalent surgical procedure, with over twenty million repairs conducted each year by surgeons.<sup>1,2</sup> An “inguinal hernia” is a defect in the musculo-fascial plane of the “oblique” and “transversalis” muscles caused by weakness or laxity, permitting the protrusion of abdominal organs that are normally located within or outside the peritoneum.<sup>3</sup> Risk factors for the development of an “inguinal hernia” can be categorized into patient-related factors, including age and sex and external factors, such as physically strenuous occupations.<sup>4</sup>

Inguinal hernias are almost always symptomatic and the only cure is surgery but non-surgical approaches are also used in its management.<sup>5</sup> There is a subset of patients who do not exhibit any symptoms; yet, even following a watch-and-wait strategy will culminate in surgical intervention for the majority of these patients. In spite of the fact that surgical therapy is successful in the majority of instances, there is still a substantial risk of recurrence following inguinal hernia surgery if the appropriate precautions are not taken.<sup>6</sup> Another problem after inguinal hernia repair is chronic pain lasting for an extended period of time that can affect more than 17% of the patients with a small proportion of patients reporting such severity of chronic pain that results in long-term disability requiring treatment.<sup>7,8</sup>

One of the factors that has an impact on the occurrence of this chronic pain after patients undergo surgical repair of hernia is the type of surgical technique employed. In this instance, some literature on international level states that “Lichtenstein repair”, which is the well-reputed and frequently used approach on the global scale, may be associated with higher post-operative pain scores as compared to “trans-abdominal pre-peritoneal (TAPP) approach”.<sup>9</sup> However, at local level there is still a lack of reliable evidence for which it was imperative to conduct further studies in this regard. Therefore, present study was conducted to compare post-operative pain score between “Lichtenstein’s repair” versus “laparoscopic trans-abdominal pre-peritoneal (TAPP) repair” for inguinal hernia.

## METHODOLOGY

This “comparative cross sectional study” was conducted at “Combined Military Hospital, Lahore from July-2021 to July-2024” (ERB #: 587/204, Date: 18/06/2021). For sample size calculation, Open Epi sample size calculator was used. Appropriate sample size was calculated using following formula:

For calculations, following assumptions were used; level of significance at 5%, power at 80%, anticipated mean pain score in Lichtenstein group at  $6.23 \pm 1.87$ <sup>10</sup> and anticipated mean pain score in TAPP group at  $4.43 \pm 1.59$ .<sup>10</sup> This gave a total sample size of 80 (40 patients in each group).

Inclusion criteria: Patients aged 18-60 years, male gender, who underwent inguinal hernia repair with “American Society of Anesthesiology (ASA)” status I and II were included.

Exclusion criteria: Congenital hernia, female gender, patients with history of repair with mesh, those with prior pelvic surgery, trans-vesical prostatectomy and patients who were hepatitis B or C positive were excluded.

Patients were selected by using non-probability consecutive sampling technique. After acquisition of written informed consent from the patients for their inclusion in study, baseline characteristics of the patients including age, gender, BMI, ASA grade and duration of hernia were documented. Diagnosis of inguinal hernia was made using clinical assessment and ultrasound. Patients were allocated “Lichtenstein group” and “TAPP group” in two phases. From July 2021 to January 2023, 40 patients underwent “Lichtenstein hernia repair” while in second phase from January 2023 to July 2024, remaining 40 patients underwent “TAPP repair”. All the patients had same pre-operative management as per hospital protocol and all surgeries were performed as per standard procedural guidelines by same surgical team lead by consultant surgeon with minimum 8 years of experience. Following the procedure, the patient’s level of pain was evaluated using a “Visual Analogue Scale (VAS)” at a time interval of four hours after the operation. Immediately following surgery, all patients were given painkillers in the form of intramuscular injections of 75 milligrams of “diclofenac sodium”, and this procedure was repeated once after six hours. For every single patient, no pre-operative nor intra-operative analgesia was administered. Standardized postoperative instructions were given to each and every patient, stating that they should not restrict their activities unless the activities caused them to experience pain.

“Statistical package for Social Sciences version 20 was used to conduct the statistical analysis of the data that was obtained. The Shapiro-Wilk test was used to check if the data was distributed normally or not. Normality of data was checked by Shapiro-Wilk test. Age was distributed normally and was represented using mean  $\pm$  standard deviation while BMI,

duration of hernia and post-operative pain score were not distributed normally and was represented using median interquartile range (IQR). Qualitative data (gender and ASA grade) was represented by using percentage and frequency. Comparison of post-operative pain score between groups was performed using Mann Whittney U- test. A p-value of = 0.05 was considered statistically significant”.

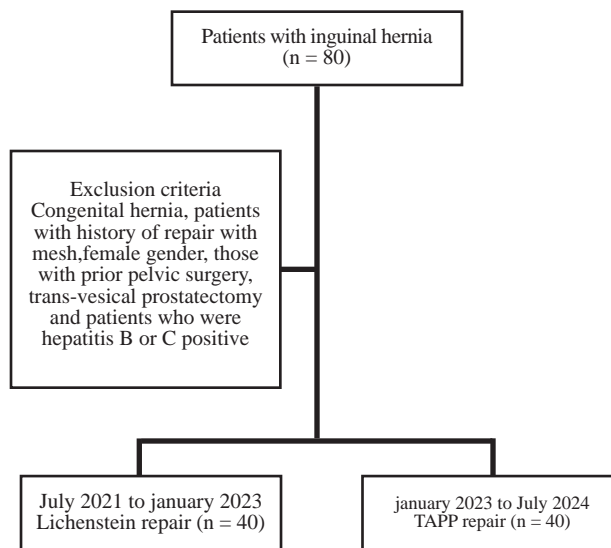
**RESULTS**

In this study, 80 patients were included. Mean age was 48.10 ± 5.05 years. There were 80 (100%) males. Median BMI was 27.00 (29.40 – 19.70) kg/m2. Median duration of hernia was 5.00 (12.00 – 2.00) months. Frequency of ASA status I was 29 (36.25%) and of ASA status II was 51 (63.75%). Comparison of these baseline characteristics between groups is given below in Table-I: Median post-operative pain VAS in “Lichtenstein group” was 6.00 (6.00 – 5.00) while in “TAPP group” it was 4.00 (4.00 – 3.00), (p < 0.001). This comparison of median post-operative pain VAS between groups is given below in Table-2

**DISCUSSION**

The surgical history of inguinal hernias originates from ancient Egypt. Three significant milestones in hernia care are Bassini's tissue repair in 1888, Lichtenstein's mesh repair in 1984, and Ger's laparoscopic mesh repair in 1990. In the late 20th century, the tension-free repair established by Irving Lichtenstein significantly reduced recurrence rates

Figure-1: Consort diagram of patient selection and group allocation (n = 80)



and became the preferred treatment. The advent of a laparoscopic approach by Ralf Ger in the early 1990s ignited a renewed discussion over the optimal procedure for inguinal hernia repair. Inguinal and femoral hernias are the predominant conditions for which primary care providers recommend patients for surgical intervention. The primary cause of postoperative discomfort and recurrence is tension-

Table-1: Comparison of these baseline characteristics between groups (n = 80)

Parameter	Lichtenstein group (n = 40)	TAPP group (n = 40)	p-value
<b>Mean age</b>	49.62 ± 4.44 years	46.57 ± 5.22 years	0.006
<b>Age group</b>			
< 40 years	1 (2.50%)	3 (7.50%)	0.305
> 40 years	39 (97.50%)	37 (92.50%)	
<b>Gender</b>			
Male	40 (100.00%)	40 (100.00%)	0.785
Female	0 (00.00%)	0 (00.00%)	
<b>Median BMI</b>	28.70 (29.40 – 19.70) kg/m2	26.40 (29.40 – 19.70) kg/m2	0.657
<b>BMI group</b>			
< 25kg/m2	12 (15.00%)	15 (37.50%)	
> 25kg/m2	28 (85.00%)	25 (62.50%)	
<b>Median duration of hernia</b>	5.00 (7.00 – 2.00) months	5.00 (12.00 – 2.00) months	0.149
<b>ASA status</b>			
I	18 (45.00%)	11 (27.50%)	0.104
II	22 (55.00%)	29 (72.50%)	

Table-2: Comparison of median post-operative pain VAS between groups (n = 80)

Parameter	Lichtenstein group (n = 40)	TAPP group (n = 40)	p-value
<b>Median post-operative pain VAS</b>	6.00 (6.00 – 5.00)	4.00 (4.00 – 3.00)	< 0.001

based hernia repair. This resulted in the advancement of tension-free hernioplasty. Currently, tension-free hernioplasty with mesh has become the gold standard technique. Mesh replacement may be performed either open surgery or minimally invasive surgery. Laparoscopic treatment of inguinal hernias has achieved significant popularity in recent years. The benefits of laparoscopic surgery support its use in many surgical interventions. The advantages of the TAPP technique include enhanced patient comfort and aesthetic outcomes, facilitating tension-free repair with improved visibility of groin anatomy, less postoperative discomfort, abbreviated hospital stay, and expedited return to daily activities.

Inguinal hernias are almost always symptomatic and the only cure is surgery but non-surgical approaches are also used in its management.<sup>5</sup> There is a subset of patients who do not exhibit any symptoms; yet, even following a watch-and-wait strategy will culminate in surgical intervention for the majority of these patients. In spite of the fact that surgical therapy is successful in the majority of instances, there is still a substantial risk of recurrence following inguinal hernia surgery if the appropriate precautions are not taken.<sup>6</sup> When it comes to the care of symptomatic hernia, surgical repair of the “inguinal hernia” is a relatively popular procedure utilized all over the world. “Indirect hernias”, also known as “lateral hernias”, are more common and are connected with complications. On the other hand, “medial hernias”, also known as “direct hernias”, are associated with a higher chance of recurrence after correction.<sup>11,12</sup> In spite of the fact that there are differences in the age, gender, and recurrence rates that have been described in prior research, surgical intervention is frequently used to treat both medial and lateral hernias in order to achieve the same results.<sup>13</sup> The traditional surgical approach for groin hernias involves ligating or reducing the hernia sac and reconstructing the posterior wall via an open incision. This operation may be conducted as a day care procedure in select cases using local anesthesia; however, open hernioplasty is presumed to be linked to heightened postoperative pain, extended hospital stays, increased recurrence rates, and a delayed return (four to six weeks) to full physical activity and employment. Literature indicates that hernia recurrence rates after open treatment are minimal (under 2 percent) in specialist facilities; nevertheless, regional studies of diverse populations reveal typical recurrence rates of 5 to 10 percent for original hernias and 5 to 30 percent for recurrent hernias. The challenges associated with traditional herniorrhaphy, along with the efficacy of laparoscopic cholecystectomy, motivated the development of a laparoscopic technique for hernia repair. Since the 1990s, laparoscopic inguinal hernia repair has been practiced. One of the more difficult to manage complication associated with surgical hernia repair is chronic post-procedural pain.<sup>14</sup> Several factors contribute to the development of this complication including type of surgery,

surgery performed with or without mesh and size of the hernia.<sup>15,16</sup> Therefore, present study focused on one of the aspect impacting the post-operative pain by comparing post-operative pain score between “Lichtenstein’s repair” versus “TAPP repair” for inguinal hernia.

In present study, average age of the patients suffering from “inguinal hernia” was forty eight years with majority of patients aged more than 40 years and of male gender. This can be explained by the findings reported in multiple previous studies reported “inguinal hernia” to be much more common in older men.<sup>17,18</sup> Average BMI of the study participants was 27kg/m<sup>2</sup> with majority of patients having BMI in overweight range. It is explainable by the previously reported strong association between higher BMI and “inguinal hernia”.<sup>19,20</sup>

In terms of median post-operative pain, it was observed that patients who were managed by “Lichtenstein inguinal hernia repair” suffered with much higher degree of pain as compared to those who had “TAPP repair” ( $p < 0.001$ ). Similar to the results of present study, Rayamajhi et al.<sup>21</sup> reported that the average pain VAS score in inguinal hernia patients in “Lichtenstein group” was significantly higher as compared to “TAPP group” ( $p = 0.037$ ). Similarly, Sofi et al.<sup>22</sup> reported that patients who had “TAPP repair” suffered from significantly lesser pain as compared to those who underwent “Lichtenstein repair” ( $p < 0.05$ ). In another study conducted by Ashrafi et al.<sup>23</sup>, significantly less pain scores were reported among patients who underwent their inguinal hernia repair by “TAPP repair” rather than “Lichtenstein repair”.

A significant benefit of the laparoscopic technique is the capacity to identify and rectify a contralateral problem during the same procedure with just a little extension of operating time. In this limited research of 40 laparoscopic TAPP repairs, two hernias (5%) were identified on the contralateral side. The repairs were conducted in the same session. The duration of hospital stay did not vary across groups, as shown by the Cochrane database, which aligns well with the findings of this research. The TAPP group resumed daily living activities sooner than the open group, a finding corroborated by multiple studies that offset the expenses associated with laparoscopic repair. Complications associated with expertise and technological advancements in laparoscopic surgery are now negligible, and studies suggest comparable complication rates between open and laparoscopic procedures.<sup>18,19</sup> A separate meta-analysis addressing this issue included 29 prospective randomized trials including 5,588 people. A total of 3,017 hernias were fixed laparoscopically, whereas 2,972 were corrected by an open technique. Six outcome factors were examined: operation time, hospital discharge time, resumption of normal activities, return to work, postoperative problems, and recurrence rate. The study preferred laparoscopic inguinal hernia surgery over open repair. This research examined four parameters: surgical

time, postoperative discomfort, infection, and hospital stay, with outcomes favoring laparoscopic repair. Because disposables are used during the procedure, laparoscopic hernioplasty is more expensive and has a longer learning curve. Additionally, it is simpler to assess both groins, especially incidental defects, using the laparoscopic technique. Both defects can be repaired in the same procedure without requiring additional surgical incision, resulting in minimal postoperative discomfort and very little dissection. As a result, bilateral inguinal hernias are an ideal option for laparoscopic repair; however, as our research was a pilot, we did not include patients with bilateral hernias due to the TAPP's viability in our context. The majority of laparoscopic hernioplasties nowadays are carried out using either the transabdominal preperitoneal (TAPP) or total extraperitoneal (TEP) approach. According to a previous study intraoperative complications associated with laparoscopic hernioplasties include bleeding, technical failure, conversion, damage to the vas deferens, damage to vessels, damage to the viscus, and major vascular injury. There were no intraoperative issues with any of the study's subjects. They found no variation in intraoperative complications between the two groups.<sup>24</sup>

Currently, recurrence rates after the laparoscopic preperitoneal prosthetic-patch procedure have been minimal; nevertheless, the duration of follow-up has been brief. As the majority of recurrences after traditional herniorrhaphy occur five or more years post-operation, the long-term recurrence rates may be unacceptably elevated, particularly when conducted by an unskilled surgeon. A recent experiment by Brandt and colleagues indicated a recurrence rate of 8.5% for initial hernias and 10.8% for recurrent hernias after 13 years following endoscopic complete extra-peritoneal hernia repair, resulting in an overall recurrence rate of 8.9%.<sup>24</sup> Consequently, more assessment in controlled clinical studies is required prior to the broader use of laparoscopic herniorrhaphy.

Laparoscopic hernia repair necessitates general anesthesia, along with its inherent hazards, for a treatment that may be performed normally with local anesthetic in some instances. A minor but distinct risk of severe harm to intra-abdominal organs exists, which is not linked to conventional inguinal herniorrhaphy. Furthermore, expenses may increase due to the need for costly equipment and additional supplies associated with laparoscopic instrumentation.<sup>9, 18</sup> In contrast to laparoscopic cholecystectomy, the elevated costs associated with hernia operations are not mitigated by reduced hospital fees, since hernia surgeries are often conducted as outpatient procedures irrespective of the repair technique used. A recent comparison of conventional and laparoscopic herniorrhaphy revealed an average cost increase of 135 percent associated with the laparoscopic method. The potential for these direct expenses to be somewhat mitigated by a swifter return to work remains uncertain.<sup>18, 22</sup>

Present study shares the opinion of previous researchers that in terms of early pain after having surgical repair of inguinal hernia, "TAPP repair" is a much better surgical intervention as compared to the "Lichtenstein repair".

Limitations: Limitations of present study included limited sample size, single center study and small follow up period.

## CONCLUSION

TAPP is associated with significantly less early post-operative pain scores as compared to "Lichtenstein inguinal hernia repair".

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### Authors Contribution:

**Muhammad Waleed khan:** Conception, design, interpretation and corresponding author

**Shahid Majeed:** Interpretation, Literature Review

**Rabheel Khan:** Analysis, Conception, final approval

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