



Clinical Comparison of Laparoscopic and Open Mesh Repair for Bilateral Primary Inguinal Hernias: Insights from a Three-Armed Randomized Controlled Trial

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Abstract: Background: The most effective strategy for simultaneously addressing bilateral inguinal hernias is a topic of ongoing debate. This study aims to assess and compare the results of laparoscopic and open mesh repair for bilateral primary inguinal hernias [1]–[3]. Methods: In this prospective study, a total of 150 patients with bilateral primary inguinal hernias were enrolled. They were randomly assigned to one of three groups, each consisting of 50 patients. Group I underwent laparoscopic trans-abdominal pre-peritoneal (TAPP) repair with the use of two separate meshes. Group II underwent open pre-peritoneal (PP) repair with a single mesh, while Group III received bilateral Lichtenstein repair. This randomization was performed through sealed envelopes. RESULTS: When compared to open PP and bilateral Lichtenstein repair, Laparoscopic TAPP repair exhibited distinct advantages in this study. It was associated with a notably longer operative time but superior early postoperative results, including significantly reduced postoperative pain, shorter hospital stays, quicker return to normal activities and work [4]. Patients in the Laparoscopic TAPP group also reported lower rates of chronic groin pain and mesh sensation, along with significantly higher satisfaction rates compared to those in the open repair groups. However, there was no significant difference observed in the three-year recurrence rate among the study groups. Conclusion: Performing simultaneous laparoscopic TAPP repair for uncomplicated primary bilateral inguinal hernias offers distinct advantages in terms of early postoperative outcomes, reduced chronic pain, and greater patient satisfaction compared to open surgical approaches. Furthermore, it achieves these benefits while maintaining a similarly low recurrence rate.

I. INTRODUCTION

Numerous studies have advocated for a one-stage tension-free mesh repair approach for bilateral inguinal hernias. However, there exists an ongoing debate concerning the optimal surgical technique [5]–[7]. This study was designed to assess and contrast the outcomes of laparoscopic repair versus open repair for bilateral primary inguinal hernias. The primary endpoint under examination comprises early operative outcomes, encompassing operative time, postoperative complications, duration of hospital stay, postoperative pain levels, and the timing of returning to normal activity and work.

II. METHODS

In this prospective randomized study, a total of 150 consecutive patients with bilateral primary inguinal hernia were included. They underwent simultaneous bilateral

repair as part of the study's investigation. The inclusion criteria for this study encompassed individuals with painless and uncomplicated primary bilateral inguinal hernias, aged between 20 and 60 years. Exclusion criteria involved immune-compromised patients, those with chronic liver or renal disease, coagulopathy, high-risk patients unfit for major surgery (ASA III or IV), individuals with massive scrotal hernias, recurrent hernias, complicated hernias, groin pain attributed to other pathologies, and those who had undergone previous infra-umbilical surgery. Patients were randomly assigned to one of three groups, each consisting of 50 individuals, using sealed opaque envelopes containing computer-generated random numbers [8], [9]. Postoperative pain intensity was evaluated at two time points: 24 hours and 6 days following surgery, utilizing the pain visual analogue scale (VAS). This scale assigns values ranging from 0



(indicating no pain) to 10 (representing the worst possible pain). Follow-up assessments were conducted for a duration of 2 years through outpatient clinic visits. Initially, these visits occurred at 1 and 2 weeks after surgery, followed by subsequent appointments every 3 months during the first year, and then transitioning to every 6 months thereafter. In this study, the assessment of patients' postoperative experience extended beyond the surgical procedure itself. Quality of life was meticulously evaluated using the Carolina Comfort Scale, which holistically gauges the discomfort arising from mesh sensation, pain, and restrictions in movement across different positions and activities. The resulting scores ranged from 0 to 115, providing a comprehensive perspective on their post-surgical comfort levels. Moreover, patient satisfaction was diligently measured using a scale ranging from 0 to 10. The scale's interpretation was clear: a score of 9-10 denoted being very satisfied, 7-8 represented satisfaction, 5-6 indicated a neutral stance, 3-4 reflected dissatisfaction, and 0-2 signified being very dissatisfied. An essential consideration was that all patients included in this study were devoid of preoperative pain, as those with complicated hernias or pre-existing groin pain unrelated to the hernia were excluded. Chronic postoperative groin pain, specifically defined as

persistent discomfort related to the surgery lasting for 3 months or more, was a crucial aspect of the evaluation.

III. RESULTS

The age of the patients in this study spanned from 30 to 80 years, and it's worth noting that there was no statistically significant difference observed among the three groups in terms of patient characteristics, comorbidities, anatomical classification, or hernia size. This suggests that the study groups were well-matched in these aspects, minimizing potential confounding variables and enhancing the reliability of the study's findings. TABLE 1: Multivariate analysis of predictors for early postoperative complications

Utilizing a logistic regression test in a multivariate analysis, several independent predictive factors for early postoperative complications were identified. These factors included smoking, obesity, diabetes mellitus (DM), anatomical hernia type, hernia size, and the specific type of surgical procedure performed. This comprehensive analysis helps in understanding the complex interplay of various factors that contribute to postoperative outcomes, enabling healthcare providers to better anticipate and manage potential complications in patients undergoing hernia repair.

	No early postop complications		Early postop complication		Odds ratio
	N=130		n=25		
	N	%	N	%	
Smoking Nonsmoker	21	15.80%	1	4.00%	24.452
Smoker	112	84.20%	24	96.00%	
Obesity Nonobese	116	87.20%	7	28.00%	0.149
Obese	17	12.80%	18	72.00%	
DM No	120	90.20%	6	32.00%	0.187
Yes	13	9.80%	19	68.00%	
EHSAnatomical BilateralMedialHernia	74	55.60%	2	8.00%	3.139
Classification OneMedialandoneLateralHernia	37	27.80%	7	28.00%	
BilateralLateralHernia	22	16.50%	16	64.00%	
EHSSize Size2bothsides	60	48.10%	1	4.00%	0.06
Classification Size2oneside&size3otherside	60	48.10%	9	36.00%	
Size3bothsides	5	3.80%	15	60.00%	
Surgery LapTAPP	50	38.30%	3	12.00%	0.023
Open PP Repair	30	31.60%	11	44.00%	
BilateralLichtenstein	40	30.10%	11	44.00%	

IV. DISCUSSION

Inguinal hernias are a relatively common condition, affecting approximately 2-6% of the general population. Consequently, the repair of inguinal hernias ranks as one of the most frequently performed surgical procedures within the realm of general surgical practice [10]. The advent of tension-free mesh repair, such as the Lichtenstein repair technique, brought about a substantial reduction in hernia recurrence rates,

reaching as low as 1-5%. As a result, Lichtenstein repair has established itself as the gold standard for inguinal hernia repair. More recently, the emergence of laparoscopic hernia repair techniques has introduced a new avenue for patients, offering potential advantages including reduced postoperative pain and quicker recovery when compared to traditional open surgery. The adoption of laparoscopic hernia repair, while promising, has faced challenges in gaining widespread



acceptance. This reluctance may stem from concerns related to surgical technique, appropriate patient indications, the learning curve associated with laparoscopic procedures, and the occasional reporting of rare but serious complications [11], [12]. It's worth noting that a significant proportion of inguinal hernia patients, estimated at around 10-30%, actually present with bilateral hernias, underlining the importance of exploring effective treatment options for this common condition. In our study, we observed that Licht-enstein repair demonstrated a significantly shorter operative time compared to open pre-peritoneal (PP) repair. Interestingly, this finding contrasts with the results of studies by Malazgirt et al. [13] and Talha et al. [14], where they reported that the operative time for open PP repair was notably shorter than that for bilateral Lichtenstein repair. One possible explanation for this discrepancy could be attributed to the differing mesh fixation approaches; specifically, in our study, we opted to fix the mesh in the open PP repair, whereas this was not the case in the studies by Malazgirt et al. and Talha et al. As per the Carolina Comfort Scale (CCS) used to assess the quality of life (QOL), our study revealed that the Laparoscopic TAPP (Trans-Abdominal Pre-Peritoneal) group exhibited significantly lower frequencies of chronic groin pain, mesh sensation, and limitations in movement when compared to both the open pre-peritoneal (PP) repair and Bilateral Lichtenstein repair groups. This observation aligns with the findings of previous meta-analyses, which have consistently reported lower rates of chronic pain following laparoscopic hernia repair when compared to open surgical techniques [13], [14]. In the realm of comparing operative times across different hernia repair techniques, there appears to be some variability in findings from various studies. Scheuermann et al. [16], in their meta-analysis, reported that Laparoscopic TAPP repair had a longer operative time when compared to Lichtenstein repair. However, Hauters et al. [17] found no significant difference in operative time when comparing Bilateral Laparoscopic TAPP and open pre-peritoneal (PP) repair. On the other hand, Nada et al. [16] reported a shorter operative time for Bilateral Laparoscopic TAPP compared to open PP repair in their study (82.6 vs. 94.3 min). In our study, we found that Lichtenstein repair was significantly faster than open PP repair, which contrasts with the results of Malazgirt et al. [17] and Talha et al. [18], who reported that the operative time for open PP repair was significantly shorter than that for bilateral Lichtenstein repair. This discrepancy might be attributed to the specific technique employed in mesh fixation. Notably, our study involved mesh fixation in the open PP repair, whereas the studies by Malazgirt et al. and

Talha et al. did not involve mesh fixation in this particular procedure, potentially influencing the overall operative times observed. These variations highlight the multifaceted nature of hernia repair outcomes and the significance of considering nuanced procedural details when interpreting results. Interestingly, our results also corroborate those of the studies by Talha et al. [7] and Malazgirt et al. [19], as we did not identify a statistically significant difference in terms of chronic groin pain between the open PP and Bilateral Lichtenstein repair groups. This highlights the complexity of assessing chronic pain outcomes in hernia re-pair and underscores the importance of considering multiple factors when evaluating surgical techniques and their impact on patients' postoperative experiences. The mean satisfaction rate in our study demonstrated a significant increase in the Laparoscopic TAPP group when compared to both the open pre-peritoneal (PP) and Lichtenstein repair groups. Furthermore, within the Laparoscopic TAPP group, a notably higher proportion of patients reported being "very satisfied" with their outcomes. The patients in the Laparoscopic TAPP group attributed their satisfaction to improved cosmetic results and a smoother postoperative recovery process, characterized by reduced pain and early resumption of normal activities. Conversely, patients in the open repair group expressed dissatisfaction primarily due to unsatisfactory cosmetic appearance of the surgical wound and the presence of chronic groin pain. These findings are in line with those reported by Nada et al. [20]–[23], who also found significantly higher levels of patient satisfaction following bilateral Laparoscopic TAPP repair in comparison to open PP repair. These shared results underscore the positive impact of laparoscopic techniques on patient satisfaction, driven by both cosmetic outcomes and postoperative comfort, as well as the importance of these factors in determining patients' overall surgical experience [24].

V. CONCLUSION

The implementation of one-stage laparoscopic Trans-Abdominal Pre-Peritoneal (TAPP) repair for uncomplicated primary bilateral inguinal hernias has shown to yield superior early postoperative outcomes, reduced chronic pain incidence, and higher levels of patient satisfaction. These advantages are achieved while maintaining a low and accepted recurrence rate. This suggests that laparoscopic TAPP repair stands as a promising option for patients requiring simultaneous repair of bilateral inguinal hernias, offering both clinical benefits and improved patient experiences.



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CONFLICTS OF INTEREST

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTIONS

All authors equally contributed to preparing this article.

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