Open or Laparoscopic Hernia Repair? A Comparative Prospective Study in the Turkish Population

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ABSTRACT

Objective: To investigate the impact of open (Lichtenstein) and laparoscopic techniques (transabdominal preperitoneal procedure (TAPP), and total extraperitoneal procedure (TEP)) for inguinal hernia repair, on quality of life within a heterogeneous patient population, and to compare the findings with the Turkish normative values.

Study Design: An experimental study.

Place and Duration of the Study: Department of General Surgery, Samsun University Training and Research Hospital, Samsun, Turkiye, from January to July 2023.

Methodology: Open and laparoscopic inguinal hernia repair techniques were prospectively compared using data from 128 patients, the SF-36 quality of life questionnaire. A comparison of the SF-36 questionnaire data was made with the normative physical and mental function values representative of the Turkish population.

Results: A total of 64 patients underwent open surgery, while another 64 received laparoscopic surgery through randomisation. No statistically significant differences were observed between the two groups regarding age, gender, complications, chronic pain, or quality of life. Compared to the normative values of the Turkish population, the laparoscopic technique demonstrated significantly better outcomes in women for physical functions ($p < 0.001$) whereas the open technique showed significantly better results in men regarding role limitation due to emotional problems ($p = 0.049$).

Conclusion: For inguinal hernia repair in the Turkish population, the open technique may be recommended for male patients, while the laparoscopic technique may be more suitable for female patients. However, surgical expertise and the patients' clinical condition should also be taken into account when determining the appropriate surgical approach.

Key Words: *Lichtenstein, Transabdominal preperitoneal procedure, Total extraperitoneal procedure, Inguinal hernia, Quality of life, Short form 36*.

How to cite this article: Avci MA, Akgun C, Polat S, Ciftci AB, Buk OF, Daldal E. Open or Laparoscopic Hernia Repair? A Comparative Prospective Study in the Turkish Population. *J Coll Physicians Surg Pak* 2025; **35(02)**:152-156.

INTRODUCTION

Inguinal hernia repair is among the most commonly performed surgical procedures globally, with over 20 million cases conducted annually.[1] The optimal surgical approach for primary inguinal hernia remains a topic of ongoing research, and no consensus on the best technique has yet been established. The Lichtenstein technique continues to be regarded as the gold-standard open, tension-free surgical method, widely employed for both primary and recurrent hernia repairs due to its favourable outcomes in terms of postoperative pain and recurrence.[2]

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Received: October 14, 2024; Revised: November 22, 2024; Accepted: January 20, 2025
DOI: https://doi.org/10.29271/jcpsp.2025.02.152

With advancements in technology, new techniques have emerged and gained prominence. Although laparoscopic repair methods (transabdominal preperitoneal procedure (TAPP) and total extraperitoneal procedure (TEP)) are becoming increasingly popular, the Lichtenstein mesh herniorrhaphy remains the most commonly employed technique, primarily due to its ease of learning. These techniques have been the subject of numerous comparative studies. A research suggests that laparoscopic approaches provide advantages over open techniques in terms of recurrence rates, postoperative recovery, return to work, and pain management.[3] However, randomised controlled trials and meta-analyses have demonstrated no significant differences between open and laparoscopic techniques regarding safety, efficacy, or early postoperative outcomes.[4,5]

The primary goal of inguinal hernia repair is to prevent complications such as obstruction and strangulation, while also alleviating pain to enhance the patients' quality of life. The SF-36 questionnaire is among the most widely used tools for assessing the quality of life.[6] However, the number of prospective randomised studies that provide detailed comparisons of

quality of life remains limited in the literature. Furthermore, certain shortcomings have been identified, including the heterogeneity of patient groups involved in these studies and insufficient analyses of the SF-36 questionnaire's subscales in the evaluation of quality of life.

This prospective study aimed to compare the effects of the Lichtenstein and laparoscopic techniques (TAPP and TEP) on patients' quality of life using the SF-36 questionnaire, focusing on a heterogeneous patient population treated by experienced surgeons. Additionally, the study seeks to compare the findings with the normative standards of the Turkish population.

METHODOLOGY

In this prospective randomised study, patients aged 18 to 90 years with primary unilateral or bilateral inguinal hernias, diagnosed from January to July 2023 at the General Surgery Clinic of the Samsun University Training and Research Hospital, Samsun, Turkiye, were included. The sample size was determined as 128 through a power analysis. Patient selection was performed using a simple technique with the assistance of a computer. Elective inguinal hernia surgeries were considered, while cases involving emergency, recurrent, or massive scrotal hernias, high-risk patients (ASA III-IV), and those with a history of major abdominal-pelvic operations were excluded.

Patients were randomly allocated into two groups using a computer system: Open (Lichtenstein) hernia repair and laparoscopic (TAPP and TEP) hernia repair. The patients were informed about the surgical technique to be performed, and informed consent was obtained. The procedures were conducted by four surgeons with expertise in both open and laparoscopic inguinal hernia repair, each performing over 150 hernia repairs annually and practising both techniques for more than eight years. Ethical approval for the study was obtained from the University's Clinical Research Ethics Committee.

The power analyses were performed to compare open Lichtenstein hernia repair with laparoscopic hernia repair. The sample size calculation was conducted using the G*Power software. The analyses were based on an effect size of 0.5, a significance level of 0.05, and a power of 0.8 for the two groups. Based on the results, 64 patients were allocated to the open group and 64 patients to the laparoscopic group.

Open Lichtenstein hernia repair and laparoscopic hernia repairs were standardised by performing under general anaesthesia. Additionally, 1 gram of Cefazolin was administered to each patient in all three groups one hour prior to the operation.

The Lichtenstein technique was performed using a tension-free approach, as originally described by Lichtenstein *et al*.[7] Dissection of the hernial sac and high ligation were carried out. A 7.5 × 10 cm polypropylene mesh (Marlex) was trimmed and shaped appropriately, then applied and secured to the posterior wall.

The TAPP and TEP hernia repair techniques were performed using the three-port method. In the TEP technique, the preperitoneal space was accessed directly, whereas in the TAPP technique, the peritoneum overlying the hernia sac was incised to visualise the defect and mobilise the peritoneum. A 10 × 15 cm polypropylene mesh (Marlex) was appropriately trimmed and shaped before placing in the preperitoneal space. The mesh was secured at three or four points using a tacker (Auto Suture Protack), with one edge anchored to Cooper's ligament.

All patients were hospitalised overnight following surgery and were discharged the next day. During their hospital stay, 500 mg of paracetamol was administered every 12 hours. After discharge, patients were prescribed 500 mg of paracetamol at every 12 hours. A follow-up clinic visit was scheduled 10 days post-discharge for suture removal and assessment of complications. Patients were advised to resume all daily activities from the 10th day after discharge and to wait at least 30 days post-surgery before engaging in physical exercise.

The patients' gender, age, side of the inguinal hernia, ASA score, type of surgery performed, type of anaesthesia administered, duration of surgery, early postoperative VAS score, and complications were documented in a digital format. Quality of life was evaluated using the SF-36 questionnaire (Turkish version)[8] on preoperative day 1, and at postoperative months 6 and 12. The SF-36 scale consisted of two main components assessing physical and mental function, encompassing parameters such as physical functioning (PF), role limitations-physical health (RLP), role limitations-emotional problems (RLE), energy / vitality (EV), mental health (MH), social functioning (SF), pain (P), and general health (GH).

One individual, blinded to the study details, was assigned to administer the SF-36 questionnaire. It was conducted face-to--face on preoperative day 1 and *via* telephone at postoperative months 6 and 12. Detailed scoring and documentation followed each administration.

Chronic pain was defined as pain persisting for at least three months postoperatively following inguinal hernia repair. During the telephone interview at postoperative month 12, chronic pain scores were recorded by the patients as none (0), minor (1), moderate (2), or severe (3).

The general characteristics of the study groups were described using descriptive statistics. Quantitative variables were presented as mean and standard deviation (SD), while qualitative variables were expressed as numbers (n) and frequencies (%). Relationships between categorical variables were analysed using Chi-Square test. Differences in SF-36 mean scores compared to normative values[8] were assessed with a one-sample t-test, and differences between independent groups were evaluated using an independent samples t-test. The p-values less than 0.05 were considered statistically significant. Statistical analyses were conducted using IBM SPSS Statistics version 22 (SPSS Inc., an IBM Company, Somers, NY).

Table I: Distribution of descriptive variables according to surgical technique.

Parameters		Techniques		p-value
		Open (n = 64)	Laparoscopic (n = 64)	
Age		58.38 ± 10.65	56.09 ± 13.50	0.469
Gender	Male	52 (81.2)	46 (71.9)	0.297
	Female	12 (18.8)	18 (28.1)	
Complications	None	59 (92)	61 (95.2)	0.419
	Local complications	4 (6.4)	2 (3.2)	
	Recurrence	1 (1.6)	1 (1.6)	
Chronic pain	None	26 (40.6)	39 (60.9)	0.130
	Minor	22 (34.4)	13 (20.3)	
	Moderate	13 (20.3)	9 (14.1)	
	Severe	3 (4.7)	3 (4.7)	

The data are presented as n (%). p: Chi-square test. Age p-value is determined by sample t-test. p-value is significant at 0.05 level.

Table II: Distribution of SF-36 scale sub-dimensions by surgical technique.

SF-36 Scale sub-dimensions	Preoperative			Postoperative 6 month			Postoperative 12 month		
	Technique								
	Open (n = 64)	Lap (n = 64)	p-value	Open (n = 64)	Lap (n = 64)	p-value	Open (n = 64)	Lap (n = 64)	p-value
PF	59.92 ± 27.87	63.83 ± 27.02	0.422	83.98 ± 13.19	86.09 ± 16.32	0.423	92.66 ± 6.84	90.66 ± 13.89	0.305
RLP	43.36 ± 42.08	39.84 ± 42.89	0.641	80.08 ± 30.27	71.88 ± 39.97	0.193	96.09 ± 11.97	89.84 ± 23.02	0.057
RLE	55.21 ± 44.14	47.92 ± 45.19	0.357673	84.9 ± 31.39	78.65 ± 34.82	0.288	96.36 ± 10.48	89.06 ± 27.25	0.049
EV	61.72 ± 15.82	60.16 ± 19.25	0.617	67.34 ± 15.53	63.75 ± 18.19	0.232	69.53 ± 10.94	72.34 ± 12.08	0.170
MH	55.81 ± 10.61	61.37 ± 12.08	0.006	60.12 ± 9.75	61.94 ± 9.61	0.292	65 ± 6.95	63.81 ± 8.45	0.387
SF	64.84 ± 18.75	60.55 ± 23.38	0.254	82.03 ± 16.5	81.05 ± 21.01	0.770	90.43 ± 14.04	86.13 ± 17.83	0.132
P	60.31 ± 21.4	54.18 ± 21.8	0.111	81.64 ± 17.17	80.9 ± 16.72	0.805	88.67 ± 12.38	91.17 ± 15.09	0.307
GH	62.34 ± 17.46	66.17 ± 15.63	0.194	69.14 ± 16.46	68.98 ± 16.86	0.958	73.83 ± 12.9	70.16 ± 18.21	0.191

The data are presented as mean ± standard deviation. p: Independent samples t-test. p-value is significant at the 0.05 level. Physical functioning (PF), role limitations-physical health (RLP), role limitations-emotional problems (RLE), energy / vitality (EV), mental health (MH), social functioning (SF), pain (P), and general health (GH).

Table III: Comparison of open and laparoscopic group SF-36 values with in the Turkish community normative values.

SF-36 Scale sub-dimensions	Postoperative 6 month								Postoperative 12 month							
	Female (n = 30)				Male (n = 98)				Female (n = 30)				Male (n = 98)			
	Open (n = 12)	p-value	Lap (n = 18)	p-value	Open (n = 52)	p-value	Lap (n = 46)	p-value	Open (n = 12)	p-value	Lap (n = 18)	p-value	Open (n = 52)	p-value	Lap (n = 46)	p-value
PF	81.25 + 13.67	0.872	90.83 + 9.59	<0.001	84.62 + 13.13	0.162	84.24 + 18.04	0.272	92.08 + 8.91	<0.001	95.28 + 6.52	<0.001	92.79 + 6.37	<0.001	88.86 + 15.56	0.473
RLP	77.08 + 39.11	0.617	73.61 + 41.54	0.356	80.77 + 28.27	0.025	71.2 + 39.78	0.003	89.58 + 19.82	0.268	97.22 + 8.08	0.001	97.6 + 8.94	<0.001	86.96 + 26.21	0.466
RLE	80.55 + 36.13	0.435	83.33 + 30.79	0.446	85.9 + 30.5	0.109	76.81 + 36.43	0.005	94.45 + 12.96	0.173	98.15 + 7.85	0.010	96.8 + 9.91	<0.001	85.51 + 31.15	0.119
EV	62.08 + 16.16	0.783	63.06 + 23.77	0.952	68.56 + 15.29	0.184	64.02 + 15.8	0.475	65 + 7.69	0.486	75.83 + 10.74	0.001	70.58 + 11.36	0.003	70.98 + 12.41	0.006
MH	58.33 + 12.82	0.009	62.22 + 10.91	0.007	60.54 + 9	<0.001	61.83 + 9.19	<0.001	61 + 6.63	0.001	64.67 + 6.76	0.003	65.92 + 6.74	<0.001	63.48 + 9.07	<0.001
SF	82.29 + 14.56	0.090	82.64 + 23.93	0.203	81.97 + 17.04	<0.001	80.43 + 20.01	<0.001	91.67 + 13.41	0.694	86.81 + 16.86	0.419	90.14 + 14.29	0.436	85.87 + 18.37	0.037
P	82.92 + 21.47	0.763	82.36 + 19.88	0.775	81.35 + 16.26	0.102	80.33 + 15.52	0.043*	88.54 + 12.59	0.062	94.17 + 9.24	<0.001	88.7 + 12.46	0.042	90 + 16.77	0.054
GH	67.5 + 16.58	0.744	71.39 + 17.3	0.582	69.52 + 16.58	0.082	68.04 + 16.78	0.030	67.92 + 8.65	0.645	71.39 + 19.76	0.629	75.19 + 13.39	0.395	69.67 + 17.78	0.141

The data are presented as mean ± standard deviation. p: Independent samples t-test. p-value is significant at the 0.05 level. Physical functioning (PF), role limitations-physical health (RLP), role limitations-emotional problems (RLE), energy / vitality (EV), mental health (MH), social functioning (SF), pain (P), and general health (GH).

RESULTS

Surgical treatment was performed on 128 patients with inguinal hernias, with 64 undergoing the Lichtenstein technique and 64 receiving laparoscopic surgery (32 TAPP and 32 TEP). The mean age of the patients was 57.73 ± 12.98 years. Local complications, including seroma, haematoma, infection, and scrotal oedema, were observed in six patients, while recurrence was identified in two patients. Regarding chronic pain, 35 patients reported mild pain, 22 reported moderate pain, and six experienced severe pain. No statically significant differences were observed between the two groups regarding age, gender, complications, and chronic pain (Table I).

When the preoperative, postoperative 6th-month, and postoperative 12th-month SF-36 subscale scores were analysed based on the open and laparoscopic surgical techniques, no statistically significant differences were found between the two groups, except for the role limitations due to emotional problems (RLE) subscale at the postoperative 12th month (p = 0.049, Table II).

When the postoperative 6th and 12th-month SF-36 results of patients who underwent open and laparoscopic surgery were compared with the normative values of the Turkish population, the mental health (MH) subscale scores were significantly lower than the normative values in both genders across both groups. In the 6th month, the physical function (PF) subscale score in the laparoscopic group among women was significantly higher than the Turkish normative values (p <0.001). Conversely, in men, most subscale scores in the laparoscopic group were significantly lower than the normative values.

In the 12th month, most subscale scores in the laparoscopic group among women were significantly higher than the normative values, whereas in men, most subscale scores in the open surgery group exceeded the normative values (Table III).

DISCUSSION

In summary, no statistically significant differences were identified between the open and laparoscopic techniques regarding quality of life, chronic pain, or complications. When the patients' 6th and 12th-month outcomes were compared to the Turkish normative values, no significant differences were observed among women at the 6th month with either technique. However, in men, most subscale scores in the laparoscopic group were below the normative values. By the 12th month, most subscale scores in the laparoscopic group among women were significantly higher than the normative values, whereas in men, most subscale scores were significantly higher in the open surgery group.

Inguinal hernia repair necessitates careful patient selection and surgical expertise, which are widely recognised as the most critical factors in determining the optimal technique. Although technological advancements have introduced various methods for inguinal hernia repair, the debate over the superiority of open *versus* laparoscopic techniques—both in terms of postoperative outcomes and their impact on quality of life continues.

The literature presents conflicting findings regarding complication rates following open inguinal hernia repair. Decker *et al*. reported higher complication rates with open surgery,[9] whereas another study observed no significant differences apart from severe complications.[10] Furthermore, some studies have emphasised very low complication rates following laparoscopic repair.[11] In the present study, no statistically significant differences were identified between the two groups concerning complications.

Chronic pain is a significant concern following open inguinal hernia repair, with reported rates reaching up to 30%. Some studies have even proposed a potential association between postoperative seroma or haematoma and the development of chronic pain.[12] Cardinali *et al*. suggested that laparoscopic repairs lead to less chronic pain compared to open repairs.[13] However, in this study, no statistically significant differences were observed between the groups in terms of chronic pain.

Data regarding the impact of open and laparoscopic inguinal hernia repair techniques on quality of life remain inconclusive. Some studies suggest that laparoscopic hernia repair offers better quality of life and facilitates an earlier return to work compared to the open technique,[14,15] while others report no significant differences between the two approaches.[16,17]

In this study, analyses of SF-36 subscales for patients undergoing open and laparoscopic hernia repairs revealed no statistically significant differences between the two groups. Castro *et al*. noted particularly lower mental health and general health subscale scores in patients undergoing laparoscopic techniques (TEP and TAPP).[18] Similarly, in the present study, the postoperative 6th and 12th-month SF-36 results compared with the Turkish population's normative values showed that mental health (MH) subscale scores were significantly lower in both groups and genders, consistent with prior findings.

When comparing SF-36 outcomes of the open and laparoscopic groups to Turkish normative values, it was observed that by the 12th month, laparoscopic surgery yielded significantly better results for women, whereas open surgery produced better outcomes for men. These results align with the studies suggesting superior quality of life outcomes with laparoscopic hernia repair compared to the Lichtenstein technique.[14,15,19] However, the observed superior outcomes of open surgery in male patients, which contradict the findings of many studies, may be influenced by the social dynamics and cultural structure of the Turkish population, making these results both plausible and justifiable.

This study has several limitations. The single-centre design, relatively small patient population, and short follow-up period are among the most notable limitations. This necessitates further research with larger and multicentre studies to validate the presently reported results.

CONCLUSION

In this study, no significant differences were identified between the open (Lichtenstein) and laparoscopic (TAPP and TEP) techniques in terms of quality of life, chronic pain, or complications. When compared to the normative values of the Turkish population, the open technique appeared to be more suitable for male patients, whereas the laparoscopic technique was more appropriate for female patients. It is recommended that surgeons carefully consider factors such as their surgical expertise and the patient's clinical condition when determining the most appropriate surgical technique.

ETHICAL APPROVAL:
Ethical approval was granted by the Samsun University's Non-Interventional Research Ethics Committee (No: 2022 12/14) on November 14, 2022.

PATIENTS' CONSENT:
Patient consent was waived as per the guidelines of the Non-Interventional Research Ethics Committee.

COMPETING INTEREST:
The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:
MAA: Designed the study and prepared the manuscript.
CA, OFB: Contributed to data collection.
SP: Performed the data analysis.
ABC, ED: Reviewed the final manuscript.
All authors approved the final version of the manuscript to be published.

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