



Effectiveness and Results of the Laparoscopic Total Extraperitoneal Repair (Tep) Method Applied in Inguinal Hernia Surgery: 10 Years of Experience

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Abstract

Objective: Laparoscopic Total Extraperitoneal (TEP) hernia repair is frequently performed around the world. Our goal here was to evaluate preoperative radiologic findings, intraoperative and postoperative conditions of cases, together with their demographic characteristics, in unilateral, bilateral primary and recurrent cases undergoing hernia operation.

Methods: Between 2011 and 2021, 512 patients were operated for hernia with laparoscopic TEP method. Age, gender, BMI, hernia type, radiologic or peroperative type of hernia, defect size measured during surgery, hernia side, content of hernia, postoperative complications (seroma) of these patients were evaluated retrospectively. Additionally to the expressive statistical procedures (mean, standard deviation) in interpreting and calculating the input, the allocations of the variables were analyzed by the Shapiro-Wilk normality test. Also the independent t test, chisquare test, and logistic regression analysis used. The outcome spicked up were analyzed with $p < 0.05$ meaningful level.

Results: Of 512 cases, 484 (94.53%) underwent unilateral laparoscopic TEP hernia repair and 28 (5.47%) underwent bilateral laparoscopic TEP hernia repair. 467 of the cases were primary and 45 were recurrent. The average ages was 47.28 ± 12.41 years. 321 were men (62.70%) and 191 were women (37.30%). The differentiation related to allocation of BMI of Recurrence(-) and Recurrence(+) groups was meaningful ($p = 0.019$). The distinction absolutely was not remarkable between the side allocation of the Recurrence(-) with Recurrence(+) groups ($p = 0.217$). The presence of indirect hernia (ID) was mostly seen in the Recurrence(+) group ($p = 0.014$). The mean defect size (mm) of the Recurrence(+) group was measured statistically more than the Recurrence(-) group ($p = 0.015$).

Conclusion: The TEP technique is sufficient when performed by experienced surgeons in primary and recurrent cases.

Keywords: laparoscopy, inguinalhernia, TEP, unilateral, bilateral, recurrence

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İnguinal Herni Cerrahisinde Uygulanan Laparoskopik Total Ekstraperitoneal Onarım Yönteminin Etkinliği ve Sonuçları: 10 Yıllık Deneyimimiz

Öz

Amaç:Laparoskopik kasık fıtığı onarımı (TEP) tüm dünyada sıklıkla yapılmaktadır. Buradaki amacımız tek taraflı, iki taraflı primer ve nüks fıtık ameliyatı geçiren olgularda preoperatif radyolojik bulguları, intraoperatif ve postoperatif durumlarını demografik özellikleriyle birlikte değerlendirmektir.

Yöntemler: 2011-2021 yılları arasında 512 hasta fıtık nedeniyle laparoskopik TEP yöntemiyle ameliyat edildi. Bu hastaların yaşı, cinsiyeti, BMI, fıtık tipi, radyolojik veya peroperatif fıtık tipi, ameliyat sırasında ölçülen defekt boyutu, fıtık tarafı, fıtığın içeriği, postoperatif komplikasyonları (seroma) retrospektif olarak değerlendirildi. Verilerin yorumlanması ve hesaplanmasında kullanılan anlamlı istatistiksel prosedürlere (ortalama, standart sapma) ek olarak, değişkenlerin dağılımları Shapiro-Wilk normallik testi ile analiz edildi. Ayrıca bağımsız t testi, ki kare testi ve lojistik regresyon analizi kullanıldı. Elde edilen sonuçlar $p<0,05$ anlamlı düzeyde analiz edildi.

Bulgular: 512 olgunun 484'üne (%94,53) tek taraflı laparoskopik TEP fıtık onarımı, 28'ine (%5,47) ise iki taraflı laparoskopik TEP fıtık onarımı uygulandı. Vakaların 467'si primer, 45'i nüks vakalardı. Yaş ortalaması $47,28\pm 12,41$ yıldır. Bu kişilerin 321'i (%62,70) erkek, 191'i (%37,30) kadındı. Nüks(-) ve Nüks(+) grupların BMI dağılımına ilişkin farklılaşma anlamlıydı($p=0,019$). Nüks(-) ile Nüks(+) grupların taraf dağılımı arasındaki fark kesinlikle dikkate değer değildi ($p = 0,217$). İndirektfıtık(ID) varlığı en çok Nüks(+) grubunda görüldü($p=0,014$). Nüks(+) grubunun ortalama defekt boyutu (mm), Nüks (-) grubuna göre istatistiksel olarak daha fazla ölçüldü ($p=0,015$).

Sonuç: TEP tekniği primer ve nüks olgularda deneyimli cerrahlar tarafından uygulandığında yeterlidir.

Anahtar kelimeler: laparoskopi, kasık fıtığı, TEP, tek taraflı, iki taraflı, nüks.

INTRODUCTION

Inguinal hernias are the most common type of hernia and can affect people of all ages, including infants, children, and adults. They are more common in men than in women. An inguinal hernia occurs when tissue, such as a part of the intestine or omentum, protrudes through a weak spot in the abdominal muscles in the groin area. This can cause pain, swelling, and a visible bulge in the abdomen or groin.

The prevalence of inguinal hernias worldwide is estimated to be around 27 million cases, with higher rates in industrialized countries¹. The prevalence tends to increase with age, with older adults more likely to develop this condition (33% in men, 10-12% in women)². Surgical treatment is the only choice.

TEP method, is a minimally invasive surgical technique used to repair inguinal hernias. In this approach, the hernia is repaired using a laparoscope and specialized instruments inserted through small incisions in the

abdominal wall. During a TEP repair, the surgeon works in the space between the muscle layers of the abdominal wall, known as the preperitoneal space, avoid entering into the abdomen so that reducing the risk of injury to internal organs and can lead to faster recovery times compared to traditional open surgery³. Advantages of laparoscopic TEP repair include decreased postoperative pain without longer hospitalization, back to normal activities earlier, and lower risk of developing complications such as wound infections and hernia recurrence³.

The goal of this study is to present the findings obtained regarding the demographic characteristics, hernia type and side, hernia content, and defect size of the patients treated with laparoscopic TEP inguinal hernia application, in the light of the literature, and to evaluate the recurrence and complications.

METHODS

The research protocol was approved by our institution's Ethics' Committee (E-10840098-202.3.02-2054). All procedures in the study were performed in accordance with ethical principles and the Declaration of Helsinki. This study was a single-center study conducted retrospectively on 512 cases operated with TEP method by three surgeons who have more than 20 years of hernia surgery experience, between 2011 and 2021. After receiving ethics committee approval for the study, the surgical procedure, intraoperative findings and postoperative complications were evaluated in terms of recurrence and recovery criteria. No financial support was received for the conduct of this study and there is no conflict of interest between the authors. The inclusion of the patients in the study was determined by an inguinal hernia detected during physical examination or with ultrasonography. Written informed consent was obtained from the patients for inclusion of their information in this study.

Patients who had lower abdominal/pelvic surgery, who could not receive general anesthesia, or who had a high risk of ASA IV were excluded from the study except patients who had previously undergone TEP due to inguinal hernia. Belonging to patients; age, gender, operation side, hernia content, radiologic or peroperative type of hernia, defect size measured during surgery and postoperative seroma parameters were evaluated retrospectively at the 1st week, 1st and 3rd month postoperatively by querying hospital records or calling them by phone.

Since all patients' examinations and consultations were completed on an outpatient basis before the operation, all patients were hospitalized on the day of the surgery. Urinary bladder catheterization was not done. Before the operation, the patients urinated. Preoperative prophylactic cefazolin was

administered to patients undergoing surgery. During the surgery, an 11mm balloon trocar was entered by lateralizing the rectus muscle from the right or left lateral at the subumbilical level. With air insufflation, the extraperitoneal area was dissected and then a 0° camera was placed, and two 5mm ports were entered from the sub-umbilical midline. Pubic tubercle, epigastric vessels and spina iliaca were determined as superior landmarks. After the hernia sac dissection, self-adhering mesh or 10X15 cm 3D mesh was used by fixing it with 2 or 3 absorbable tacker. The median postoperative hospital stay was 1 day.

In this study, statistical examination conducted by the NCSS 2007 Statistical Software programme. In the evaluation of the results, in addition to descriptive statistical methods (mean, standard deviation), the distribution of variables was analyzed with the Shapiro-Wilk normality test. The independent t test was employed for pairs of normally distributed variables, and also the chi-square test was used for qualitative data. Logistic Regression analysis was performed to find the factors affecting the presence of recurrence and seroma. The results at a significance level of $p < 0.05$, indicating that findings with a p-value below this threshold were considered statistically significant.

RESULTS

The study was conducted on the results of laparoscopic TEP hernia repair applied to 512 hernia patients, 484 (94.53%) of which were unilateral and 28 (5.47%) were bilateral, between 2011 and 2021. 467 of the cases were primary and 45 were recurrent. Data for the recurrent group were from before the second surgery. Indirect hernia was detected in the majority of patients. The BMI of 24 of the patients we operated on was over 30.

The ages of the cases ranged between 23 and 84, and the mean age was 47.28 ± 12.41 years. The age group where hernia most common was 41-

50 years old. 321 were men (62.70%) and 191 were women (37.30%). While 487 of them (95.12%) were 70 years of age or younger, 25 of them (4.88%) were over 71 years of age. The dispersion of demographic properties of surgery candidates, operation side, hernia content, radiologic or peroperative type of hernia, defect size measured during surgery and postoperative seroma parameters is shown in Table 1 and average of all patients' age, BMI and defect diameters at the time of operation are shown in Table II.

Table I: The distribution of demographic characteristics of the patients, operationside, herniacontent, radiologi corperoperative type of hernia, defect size measured during surgery and postoperative seroma parameters

	n	%
Age	20-30 age	35 6,84
	31-40 age	125 24,41
	41-50 age	176 34,38
	51-60 age	81 15,82
	61-70 age	70 13,67
	>71 age	25 4,88
Gender	Men	321 62,70
	Women	191 37,30
BMI	18,5-24,99	239 46,68
	25- 29,99	249 48,63
	>30 Obese	24 4,69
Herniaside	Right	211 41,21
	Left	273 53,32
	Bilateral	28 5,47
Recurrence	No	467 91,21
	Yes	45 8,79
Herniatype (US)	IndirectHernia(ID)	478 93,36
	Direct hernia(D)	33 6,45
	ID+D	1 0,20
Herniatype (OP)	ID	419 81,84
	D	50 9,77
	ID+D	43 8,40
Defectnumber	Singledefect	484 94,53
	2 Defects	28 5,47
Omentum+Intestine presence	No	376 73,73
	Omentum	100 19,61
	Omentum+Intestine	34 6,67
PostopSeroma	No	475 92,77
	Yes	37 7,23

Table II: Average of patients' age, BMI and defect diameters at the time of operation

	N	Mean±SD	Minimum	Maximum
Age	512	47,28±12,41	23	84
BMI	512	25,23±2,62	18,71	36,33
Defect size (OP) (mm)	512	26,65±10,35	10	50

The average ages, gender distribution, and BMI averages of the recurrence (-) and recurrence (+) groups was not meaningful(p=0.654) (p = 0.246) (p = 0.174) (p=0.212) (Table III). However The distributions of BMI groups in Recurrence (-) and Recurrence (+) groups were significantly different with higher prevalence of BMI 25-29.99 and >30 in the recurrence (+) group according to the recurrence (-) group(p=0.019) (Table III).The presence of individuals with BMI 25-29.99 and >30 were higher in the recurrence (+) group, indicating a potential association between higher BMI and hernia recurrence.

There was no difference on US related to the distrubition of hernia types between the two groups (p=0.217) (p = 0.065). However, hernia types based on operative findings (OP) were statistically significant, with a higher prevalence of certain types in the recurrence (+) group (p=0.014) (Table III). The presence of ID was more common in the Recurrence (+) group than in the Recurrence (-) (Table III).

The mean defect size (mm) of the Recurrence (+) group was having discovered statistically more than the Recurrence (-) (p=0.015) (Table III). The difference between the defect number, Omentum+Intestinal presence, and postoperative seroma presence distributions, of the Recurrence (-) and Recurrence (+) groups was not meaningful(p=0.091) (p = 0.411) (p = 0.292) (Table III).

Table III: The distribution of demographic characteristics, operationside, herniacontent, radiologi calorperoperative hernia type, defect size measured during surgery, and postoperative seroma parameters in primary(recurrence -) and recurrent(recurrence+) patient groups.

		Allgroups		Recurrence (-) n:467		Recurrence (+) n:45		p
Age	Mean±SD	47,28±12,41		47,36±12,46		46,49±11,97		0,654*
	20-30	35	6,84	32	6,85%	3	6,67%	0,246+
	31-40	125	24,41	113	24,20%	12	26,67%	
	41-50	176	34,38	160	34,26%	16	35,56%	
	51-60	81	15,82	77	16,49%	4	8,89%	
	61-70	70	13,67	60	12,85%	10	22,22%	
	>71	25	4,88	25	5,35%	0	0,00%	
Gender	Men	321	62,7	297	63,60%	24	53,33%	0,174+
	Women	191	37,3	170	36,40%	21	46,67%	
BMI	Mean±SD	25,23±2,62		25,18±2,63		25,69±2,51		0,212*
	18,5-24,99	239	46,68	227	48,61%	12	26,67%	0,019+
BMI	25- 29,99	249	48,63	219	46,90%	30	66,67%	
	>30	24	4,69	21	4,50%	3	6,67%	
Herniaside	Right	211	41,21	190	40,69%	21	46,67%	0,217+
	Left	273	53,32	249	53,32%	24	53,33%	
	Bilateral	28	5,47	28	6,00%	0	0,00%	
Herniatype (US)	ID	478	93,36	434	92,93%	45	100,00%	0,065+
	D	33	6,45	33	7,07%	0	0,00%	
Herniatype (OP)	ID	1	0,2	375	80,30%	44	97,78%	0,014+
	D	419	81,84	50	10,71%	0	0,00%	
	ID+D	50	9,77	42	8,99%	1	2,22%	
Defektsize (mm)	Mean±SD	26,65±10,35		26,31±10,33		30,24±9,93		0,015*
Defectnumber	SingleDefect	484	94,53	439	94,00%	45	100,00%	0,091+
	2 Defects	28	5,47	28	6,00%	0	0,00%	
Omentum+Intestine Presence	Yok	376	73,73	345	74,19%	31	68,89%	0,411+
	Omentum	100	19,61	88	18,92%	12	26,67%	
	Omentum+Intestine	34	6,67	32	6,88%	2	4,44%	
PostopSeroma	No	475	92,77	435	93,15%	40	88,89%	0,292+
	Yes	37	7,23	32	6,85%	5	11,11%	

*Independent t test+ chi-square test

In order to determine the factors that influence the presence of a recurrence, a logistic regression analysis was carried out with the variables;BMI, Defect size and Hernia type (OP), which were found to be statistically significant in univariate tests(Table IV). Hernia type (OP) was found to be statistically insignificant

(p=0.298), presence of >30 BMI (p=0.019) and increased defect diameter (mm) (p=0.026) were determined to be statistically significant and these factors found to be affecting the presence of Recurrence (Table IV).

Table IV: Factors Affecting the Presence of Recurrence

	OR (%95 OR)	P
BMI		0,048
25- 29,99 BMI	2,35 (0,61-4,10)	0,217
>30 BMI	2,33 (1,15-4,19)	0,019
Defect size (OP -mm)	1,03 (1,00-1,52)	0,026
Herniatype (OP)		0,298
ID	1,93 (0,56-2,69)	0,119
D	0,20 (0,03-1,51)	0,998

*Logistic Regression Analysis

Table V: Local complication-seroma

		Postop Seroma (-) n:475		Postop Seroma (+) n:37		P
Age	Mean±SD	46,94±12,26		51,68±13,59		0,025*
Age	20-30	32	6,74%	3	8,11%	0,297+
	31-40	121	25,47%	4	10,81%	
	41-50	164	34,53%	12	32,43%	
	51-60	74	15,58%	7	18,92%	
	61-70	62	13,05%	8	21,62%	
	>71	22	4,63%	3	8,11%	
Gender	Men	294	61,89%	27	72,97%	0,180+
	Women	181	38,11%	10	27,03%	
BMI	Mean±SD	25,22±2,65		25,29±2,2		0,882*
BMI	18,5-24,99 BMI	223	46,95%	16	43,24%	0,713+
	25- 29,99 BMI	229	48,21%	20	54,05%	
	>30 BMI	23	4,84%	1	2,70%	
Herniaside	Right	197	41,47%	14	37,84%	0,905+
	Left	252	53,05%	21	56,76%	
	Bilateral	26	5,47%	2	5,41%	
Recurrence	No	435	91,58%	32	86,49%	0,292+
	Yes	40	8,42%	5	13,51%	
Herniatype (US)	ID	444	93,47%	34	91,89%	0,002+
	D	31	6,53%	2	5,41%	
	ID+D	0	0,00%	1	2,70%	
Herniatype (OP)	ID	392	82,53%	27	72,97%	0,056+
	D	47	9,89%	3	8,11%	
	ID+D	36	7,58%	7	18,92%	
Defect size (mm)	Mean±SD	26,41±10,11		30,27±12,77		0,029*
Defektnumber	SingleDefect	449	94,53%	35	94,59%	0,986+
	2 Defects	26	5,47%	2	5,41%	
Omentum+Intestine presence	No	352	74,42%	24	64,86%	0,386+
	Omentum	91	19,24%	9	24,32%	
	Omentum+Intestine	30	6,34%	4	10,81%	

*Independent t testi + chi-square test

The disparity of the BMI averages and BMI distributions of the PostopSeroma (-) and Postop Seroma (+) groups was not important(p=0.882) (p=0.713). Hernia side was not a significant factor on Postop Seroma (-) and Postop Seroma (+) groups (p=0.905). The

The average of the postoperative Seroma (+) group was evaluated significantly higher than the Postop Seroma (-) (p=0.025) (Table V). The differentiation between the age and gender of patients in Postop Seroma (-) and Postop Seroma (+) groups was not noteworthy (p=0.297) (p=0.180) (Table V).

presence or absence of postoperative seroma did not affect recurrence (p = 0.292). The difference between the HerniaType (US) in Postop Seroma (-) and Postop Seroma (+) groups was meaningful(p=0.002) (Table V).

The presence of ID in the Postop Seroma (+) group was more common (Table V). The average defect size (mm) of the Postop Seroma (+) group was found to be statistically meaningful than the Postop Seroma (-) group ($p=0.029$) (Table V). Defect size distributions was not effective on the Postop Seroma (-) and Postop Seroma (+) groups ($p=0.986$). The contents of the hernia sac did not effect on post-operative seroma formation or non-formation. ($p=0.386$).

To determine the factors affecting the presence of seroma, Logistic Regression analysis was performed with the variables; Age, Defect Size and HerniaType (US), which were found to be statistically significant in univariate tests (Table VI). HerniaType (US) ($p=0.974$) and Age ($p=0.057$) were found to be statistically insignificant, and Defect Size ($p=0.031$) was determined to be statistically meaningful and is a main factor affecting the presence of Seroma (Table VI).

Table VI: Factors Affecting the Presence of Seroma

	OR (%95 OR)	p
Age	1,03 (1,00-1,15)	0,057
Defect size OP (mm)	1,44 (1,03-2,09)	0,031
Herniatype (US)		0,974
ID	0,84 (0,19-1,07)	0,819
D	0,75 (0,08-0,98)	0,998

*LogisticRegression Analysis

There was no significant difference in pain scoring between the primary and recurrent groups ($5,75\pm 1,05$ - $5,90\pm 0,95$ respectively).

DISCUSSION

Laparoscopic Total extraperitoneal (TEP) hernia repair is a minimally invasive surgical technique used for treating inguinal hernias. The Hernia Surgery Group recommends endoscopic repair for primary unilateral, bilateral and recurrent inguinal hernias by experienced surgeons^{1,3}. Laparoscopic surgery

for hernia was first performed by Ger et al.⁴ in 1990.

TEP technique takes less time than other methods because of self-adhesive mesh and the dissector used to create the preperitoneal space. It is considered an important advance in hernia surgery because it offers several advantages over open methods, including less post-operative pain, faster recovery and a lower risk of complications such as infection. The frequency of use of the laparoscopic TEP method in hernia treatment has been increasing over the years as more surgeons are trained in laparoscopic techniques⁵⁻⁷.

Inguinal hernias are more common in men than in women. The most common age for inguinal hernias is typically between 30 to 60 years old, although they can occur at any age. In our study inguinal hernias were mostly seen in men ($n=382$) between 30-60 years of age. In terms of the side, inguinal hernias are most on the right side, but they can also occur on the left side or bilaterally (on both sides). The advantage of the laparoscopic method in the treatment of bilateral hernia is the ability to reach the contralateral groin simultaneously through the same incisions. In our patients hernias were mostly on the left-side (53.32%). Krishna et al. reported that majority of the hernias (62.3%) in their study were right sided⁸. The more common type of inguinal hernia is the indirect inguinal hernia as in our study ($n=478$) (93.36%). It occurs when the abdominal contents protrude through the inguinal canal, into the lower abdomen.

The recurrence rate after TEP procedure is generally low, informed to be around 1-2%^{9,10}. However, this rate can vary based on factors such as the surgeon's experience, patient characteristics, and the specific technique used. Risk factors for recurrent hernia after TEP surgery may include; technical errors during surgery, inadequate mesh fixation, use of inappropriate mesh size or type, patient factors

such as obesity (BMI>30), smoking, chronic cough, or other situations increasing intra-abdominal pressure, complications like hematoma or seroma formation and an infection at the surgical site. It is important for patients to follow their surgeon's recommendations for post-operative care and attend follow-up appointments to monitor for any signs of recurrence.

The relationship between obesity and inguinal hernia formation and recurrence is still unclear. TAPP procedure will be more difficult in obese patients because the abdominal wall thickness is thicker than in normal people. Therefore, the TEP process is more advantageous.

TEP and TAPP are shown as equivalent procedures in the European Hernia Society (EHS) and International Endohernia Society (IEHS) Guidelines for the treatment of recurrent hernias^{3,11,12}. Performing a repeat TEP surgery in patients who have had a recurrence of a hernia after a previous TEP surgery can be successful in many cases. In recurrent cases operation time was a little longer than primary cases.

However, the success of the procedure may be related to different parameters such as the reason for disease recurrence, the presence of comorbidities in the patient, with skill and experience of the surgeon. Although repeat procedures are related to higher rates of postoperative problems, pain and relapse, contrary to this popular belief, laparoscopic repair of recurrent hernias does not cause a high rate of chronic pain and patients can return to their normal daily activities more quickly. Pisanu et al¹³. also had the same conclusion in their own study. In our study, 45 of our patients were recurrent patients who had previously undergone laparoscopic TEP repair in another center. We reoperated these patients with the TEP method. The most difficult point during the operation was space creation difficulty. In 8 of these patients, peritoneal tear (PT) of less than

5cm, the most common complication of TEP (10% to 64%)¹⁴, occurred during dissection but this did not prevent us from completing the surgery laparoscopically. Patients recovered quickly without chronic pain. There was no vascular injury and conversion.

The expected recurrence rate after inguinal hernia surgery is 11%¹⁵. Approximately 60% of all relapses occur within 10 years of previous hernia surgery. Female gender is an important risk factor in cases of hernia recurrence¹⁶. In recurrent cases, surgeons require good experience to master the narrow preperitoneal space and its anatomy^{1,3,17}. It is important for the patient to undergo a thorough evaluation by a healthcare provider to determine the cause of the recurrence and to assess whether they are a suitable candidate for a repeat surgery.

After TEP; seroma, hydrocele, hematoma, surgical emphysema, vascular injury especially to inferior epigastric vessels can be seen as local complication^{14,18}. Seroma is the most common among them as in our study. The incidence of seroma after TEP surgery for inguinal hernia ranges from 0% to 24%, with most studies reporting rates around 10-15%¹⁸. The occurrence of seroma formation after TEP surgery mainly associated with surgical technique used, surgeon's experience, characteristics of candidates for surgery (such as age, obesity, and comorbidities), and postoperative care practices. Additionally, factors like tissue handling during surgery, the extent of dissection, and the use of drains can also influence the likelihood of seroma formation. Proper patient selection, meticulous surgical technique, and adherence to best practices in postoperative care can help minimize the risk of seroma formation after laparoscopic TEP surgery. Krishna et al. reported that seroma, which was seen in 28% of the TEP group after the first postoperative week, decreased in a short time without requiring intervention⁸.

Chronic pain may also occur aftersurgery. Fixing the mesh with a sufficient number of absorbable pieces alleviates post-operative pain. There was no severe pain in our patients on the post-operative 1 stday. Chen et al.¹⁰ and Pisanu et al.¹³ analyzed the results of TEP and TAPP repair in their meta-analysis and found that the pain score in the early postoperative stage was considerably lower in the TEP group and they turned back to daily activities earlier. Overall, the laparoscopic TEP method is considered to be an important and effective option for the treatment of primary and recurrent inguinal hernias.

The limitations of our study may be the small number of cases, the fact that the primary and recurrent cases did not belong to a single center because the recurrent cases had previously undergone surgery in another center, wide age range, and the lack of more parameters in addition to the retrospective nature of the study.

Ethics Committee Approval: The research protocol was approved by our instution's Ethics' Committe (E-10840098-202.3.02-2054). All procedures in the study were performed in accordance with ethical principles and the Declaration of Helsinki.

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