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Original study

The analysis of the effects of laparoscopic total extraperitoneal (TEP) and Liechtenstein surgery on the long-term quality of life in the treatment of inguinal hernia

İnguinal herni tedavisinde laparoskopik total ekstraperitoneal (TEP) ve Liechtensteın cerrahisinin uzun dönem yaşam kalitesine etkilerinin değerlendirilmesi

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ABSTRACT

Approximately 27-43% of men and 3-6% of women suffer from inguinal hernia during their lives. Surgery is the only viable treatment for inguinal hernia. As such, more than 20 million people worldwide are operated for inguinal hernia annually. Treatment indications and surgical procedures for inguinal hernia repair have always been discussed from a medical point of view. Along with the development of minimally invasive techniques, laparoscopic methods are frequently used in inguinal hernia surgery. In this study, we aimed to evaluate how both open and laparoscopic tension-free mesh repair methods, both of which are widely used, affect the quality of life in the long-term post-operative period.

This study was designed as a retrospective survey. Short Form-36 (SF-36) questionnaire was used as a postoperative quality of life (QoL) assessment scale. 69 (67.6%) of them underwent open surgery, while 33 (32.4%) of them underwent laparoscopic TEP. The demographic data, complications, SF-36 scale and chronic pain were evaluated, and no significant differences were found between the two groups.

In conclusion, our study compared laparoscopic and open methods and observed no significant differences between the long-term results in two different groups.

Keywords: Inguinal hernia; Laparoscopy; Short form 36

ÖZET

Erkeklerin yaklaşık %27-43'ü ve kadınların %3-6'sı yaşamları boyunca kasık fıtığı sorunuyla karşı karşıya kalmaktadır. Ameliyat, kasık fıtığı için tek geçerli tedavi yöntemidir. Bu nedenle, dünya çapında her yıl 20 milyondan fazla kişi kasık fıtığı nedeniyle ameliyat edilmektedir. Kasık fıtığı onarımında tedavi endikasyonları ve

cerrahi prosedürler her zaman tıbbi bir bakış açısıyla tartışılmıştır. Minimal invaziv tekniklerin gelişmesiyle birlikte, kasık fıtığı cerrahisinde laparoskopik yöntemler sıklıkla kullanılmaktadır. Bu çalışmada, yaygın olarak kullanılan açık ve laparoskopik gerilimsiz yama onarım yöntemlerinin, her ikisi de ameliyat sonrası uzun dönemde yaşam kalitesini nasıl etkilediğini değerlendirmeyi amaçladık.

Bu çalışma retrospektif bir anket olarak tasarlanmıştır. Ameliyat sonrası yaşam kalitesi değerlendirme ölçeği olarak Kısa Form-36 (SF-36) anketi kullanılmıştır. 69 (%67,6) hastaya açık cerrahi uygulanırken, 33 (%32,4) hastaya laparoskopik TEP uygulandı. Demografik veriler, komplikasyonlar, SF-36 skalası ve kronik ağrı değerlendirildi ve iki grup arasında anlamlı bir fark bulunmadı.

Sonuç olarak, çalışmamızda laparoskopik ve açık yöntemler karşılaştırılmış ve iki farklı grupta uzun dönem sonuçlar arasında anlamlı bir fark gözlenmemiştir.

Anahtar kelimeler: Kasık fıtığı; laparoskopi; Short form-36.

INTRODUCTION

Inguinal hernia is a health problem which affects almost one out of every three men (27-43%) and 3-5% of women at any period of their lives (1) and can treated via surgical intervention. Therefore, approximately 20 million people worldwide are operated for inguinal hernia every year (1). Treatment indications and surgical procedures for inguinal hernia have always been controversial. Although non-operative follow-up is recommended for asymptomatic hernia, nearly 70% of the patients display symptoms within the next five years (2). Since the 16th century, inguinal hernia has been treated using different surgical approaches and techniques. However, thanks to the introduction of prosthetic patches called mesh, it has become the most widely preferred method in hernia surgery with a rate of 95% due to its feasibility, easy learning curve and significantly reduced recurrence (3). The most preferred method worldwide is open mesh repair (Liechtenstein procedure). Nevertheless, along with the developments in laparoscopic surgery, laparoscopic mesh surgical methods have been used in hernia treatment to maintain the advantages of minimally invasive procedures. Total extraperitoneal (TEP) and transabdominal pre-peritoneal (TAPP) hernia repair are the most common laparoscopic surgical methods for laparoscopic hernia repair (4). Despite the prevalence of mesh, the concept of 'ideal repair method' is still a matter of debate. Although mesh prosthesis reduces recurrence, it leads to various medical complications such as chronic pain, adhesion and seroma that affect postoperative functionality and perception of treatment. In our clinic, we perform treatment through both open and laparoscopic surgical methods, and thus, in this study, we aim to explore the effects of our frequent surgical methods on the quality of life during a long-term follow-up.

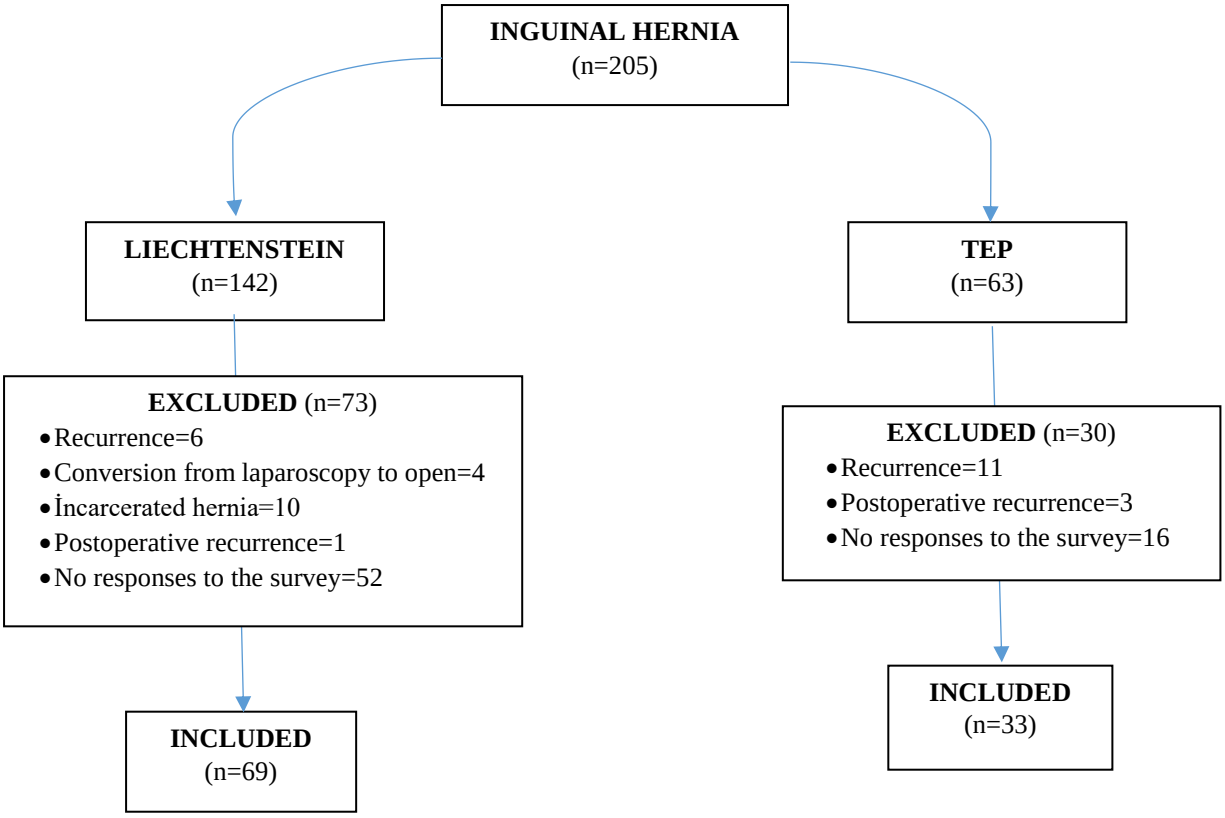
MATERIAL and METHOD

Following the approval of Kahramanmaraş Sütçü İmam University (KSÜ) Board of Ethical Committee (date: 05.04.2024, session: 2024/03, decision no: 04), the study focused on patient cases between December 2020 and December 2023 at the Department of General Surgery at Faculty of Medicine at Kahramanmaraş Sütçü İmam University (KSÜTF). Adhering to the 1975 Declaration of Helsinki, a retrospective study was conducted on the patients who underwent open Liechtenstein procedure (LH) and laparoscopic TEP for inguinal hernia. Our study was planned as a retrospective questionnaire to measure the quality of life for patients who did not suffer from recurrence in at least one-year period of postoperative follow-up. The patients were requested to sign a consent form without any pressure or manipulation for the survey data. The operations were performed by the same general surgery specialist team. Referring to the study by Sachin et al., the effect size was calculated as 0.66 in the analysis performed with a G power 3.1.10, and the sample size was estimated as 42 (n1+n2) when alpha error was 0.20 and power was 0.8 (5). According to the preferred surgical method, the patients were divided into groups as TEP and LH technique.

Demographic data, surgical method, preoperative and postoperative complications, recurrence status, chronic pain complaint, and quality of life index questionnaire (SF-36) were recorded as the obtained data. The patients aged 18 years or older with at least one-year period of postoperative follow-up were included in the study. The patients who were re-operated due to recurrence, urgently incarcerated or strangulated hernias, patients who were switched from laparoscopy to open laparoscopy, patients who suffered from recurrence in the postoperative period, and patients who refused to answer the questionnaire were excluded from the study. The flowchart for the patient groups is shown in Figure 1. Short Form-36 (SF-36) questionnaire was used as a postoperative quality of life (QOL) scale. It includes 36 questions under eight main headings which evaluate physical function, social function, pain, vitality, restricted usual role activities due to emotional problems, restricted usual role activities due to physical health problems, mental health, and general perception of health in terms of the patients' quality of life. The questionnaire was administered once for each patient. Patients who experienced at least one-year period of postoperative follow-up were invited to our clinic, and SF-36 was used to evaluate the surgical

effects on the perception of quality of life for the patients who did not suffer from any recurrence following the control examination. The presence of any pain that would affect the patients' daily life in the post-operative period was questioned to evaluate chronic pain.

Figure 1: Patient flowchart



Surgical techniques

The same type of polypropylene mesh was used in both surgical repair methods. While spinal anesthesia was preferred for LH repair, TEP repair was performed under general anesthesia. A mesh size of 6*11 cm and 13*9 cm was preferred for LH and TEP repair, respectively. Preoperative bladder catheterization was not performed in any patients. In LH repair, the mesh was fixed with a 3/0 prolene suture between the inguinal ligament and transverse muscle aponeurosis. A long-line incision was applied in an appropriate length to include the spermatic cord. This incision was resized as 2 and 4 cm on the inguinal ligament and medial side, respectively. Depending on the diameter of the spermatic cord, the tails were joined again using prolene sutures in a width to wrap the cord without strangling them. The mesh was fixed to the pubic margin on the inferior border, Poupart's ligament on the lateral border and transverse muscle aponeurosis on the medial border.

In the TEP technique, the first 10-mm port entry for the camera was performed through a 1-cm oblique incision from the lower line of the umbilicus to the side of the hernia, lateralizing the rectus muscle to enter the preperitoneal space under the rectus muscle. The preperitoneal space was inflated without exceeding a CO_2 pressure of 10 mmHg. Other two pieces of 5-mm trocars were placed on the midline with a distance of 5 cm between the umbilicus and pubis. Following the dissection, the mesh was sent into the preperitoneal space through the camera trocar. Mesh fixation was only detected with 1 or 2 absorbable endo-tackers on the Cooper ligament. When the mesh was carefully laid under the rectus in a position that covers the herniation defect, internal inguinal ring and femoral canal. Only the skin was sutured at all ports.

Statistical analysis

The Windows-compatible IBM Statistical Package for the Social Sciences version 20.0 (IBM Corp., Armonk, NY, USA) was used to analyze the statistical data. Numerical data were presented as mean values, ± standard deviations (SD) and minimum-maximum values, while categorical data were presented in frequencies, numbers (n) and percentages (%). The normality of the data distribution was tested by Kolmogorov-Smirnov test, and Mann-Whitney U test and Chi-Square test were used to analyze nonparametric data. Pearson's correlation test was used to analyze the suitability of numerical

data for parametric tests, whereas Spearman correlation test was applied for those which could not meet parametric criteria. $p<0.05$ values were considered to be statistically significant.

RESULTS

A total of 205 cases were evaluated in our study, and 102 patients were included according to the exclusion criteria. The number of patients who underwent open surgery and laparoscopic TEP was 69 (67.6%) and 33 (32.4%), respectively. 95 patients were male (93.1%), while 7 of them were female. The mean age was 52.2 (±14.9) years (min*max: 16-80). The mean length of hospitalization was 25.6 (±6.09) hours (min-max: 24-48). 60 patients (58.8%) suffered from right and 34 patients (33.3%) suffered from left inguinal hernia, and 8 of them (7.8%) experienced bilateral inguinal hernia. The most common complication was seroma with 17 patients. Medical complications are summarized in **Figure 2**. The mean postoperative follow-up period was 28.4408 ±7.3 months (min: 15.80 months-max: 41.03 months). When demographic data, chronic pain, length of hospitalization (p: 0.825 (Mann Whitney U test)) and complication results were compared between LH and TEP groups, no significant differences were observed between them, except for age (Table 1). In addition, in laparoscopic surgery, trocar entries were closed only through skin suture, and no complications related to trocar sites were encountered in the follow-up. The mean age was 42.03±14.9 years in the TEP group and 56.8±12.3 years in the open surgery group (p=0.0001). Short Form-36 (SF-36) questionnaire was used to assess the postoperative quality of life with respect to surgical techniques in different aspects, namely physical functioning (p=0.983), restricted usual role activities due to physical health problems (p=0.298), restricted usual role activities due to emotional problems (p=0.983), energy/fatigue (p=0.368), emotional well-being (p=0.317), social functioning (p=0.109), pain (p=0.280), and general health (p=0.205) (Table 2).

Table 1: Medical complications

Complication	**Type of repair**				**p**
	Open-LH (n:69 (%67.9))		TEP (n:33 (%32.4))		
	n	%	n	%	
Hematoma	3	4.34	1	3.03	1.000*
Seroma	14	20.2	3	9.09	0.156**
Epididymitis	0	0	1	3.03	0.324*
Vasdeferens damage	0	0	0	0	
Surgigal site infection	0	0	0	0	
Testicular torsion	1	1.4	0	0	1.000**
Chronic pain	15	21.7	11	33.3	0.209**
Fisher's Exact Test*, **Chi-Square Test					

Table 2: Short Form-36 (Mann-Whitney Test)

	TEP	**Open-LH**	**p**
Physical functioning	25.4+-5.8	86.3+-20.1	0.983
Restricted usual role activities due to physical health problems	85.7+-21.3	78.5 37.3	0.298
Restricted usual role activities due to emotional problems	66.9+-46.1	77.6+-38.6	0.728
Energy/fatigue	73.4 13.8	71.2+-14.1	0.368
Emotional well-being	74.06 14.42	72.5+-13.7	0.317
Social functioning	75.0 19.0	67.9+-17.4	0.109
Pain	76.8 22.6	71.8+-24.2	0.280
General health	71.2 16.6	68.5+-12.5	0.205
The data obtained from the comparison of complications between the two groups using Fisher's Exact Test* and **Chi-Square test are given in Table 2.			

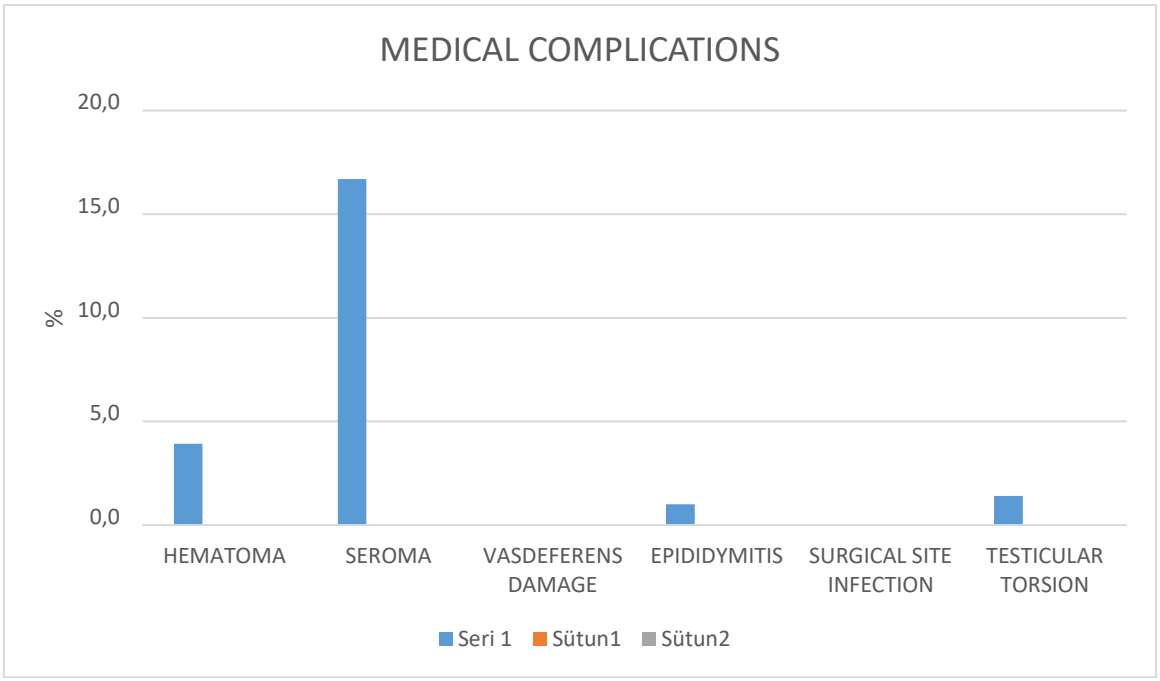


Figure 2: The patients SF-36 results o two groups using Mann- Whitney U are given in Table 1.

DISCUSSION

While recurrence is the biggest problem in meshless repair techniques in hernia repair, tension-free hernia repair techniques developed using mesh prevent recurrence to a great extent. Thanks to the technological developments and surgical experience, it is aimed to eliminate the disease and improve the quality of life altogether along with aesthetic results and lower costs. Our aim in this study was to investigate the long-term results of laparoscopic TEP technique and open LH technique.

When the demographic data between the groups were analyzed, a statistically significant difference was found only in terms of age (p=0.0001). The mean age was significantly higher in the group operated using the LH technique compared to the laparoscopic TEP. According to S Xi, Z Chen et al., laparoscopic surgery is safe among the geriatric population (5). However, in our cases, LH was preferred with a higher rate due to spinal anesthesia to reduce anesthesia-related complications in the advanced age group. At the same time, both surgical methods and anesthesia in our clinic may have caused age differences due to the patients who rejected general anesthesia.

Today, minimally invasive techniques provide more benefits for both the surgeon and patient compared to many conventional surgery methods. At the same time, it reduces the length of hospitalization and minimizes complications (6). However, this is a controversial issue in inguinal hernia surgery. In our study, no statistically significant differences were observed between the two groups in terms of complication rates and length of hospitalization, overlapping with the results of meta-analyses performed by A. Aiolfi and Mr. Cavalli (7).

Up to 31% of the patients may complain about chronic pain up following inguinal hernia surgery (8). While recurrence was an important problem in patchless techniques such as Bassini, Shouldice or McVay, it has been largely prevented by the use of patches. However, chronic pain has become the new focal point (9). There is no clear consensus among surgical techniques to prevent chronic pain. In some meta-analyses, it was argued that laparoscopic surgery reduced chronic groin pain complaints (3, 10, 11). On the other hand, there are also studies reporting similar results between both methods in terms of chronic pain, particularly in the 6th postoperative month (12-14). In our study, the rate of chronic pain was 21.7% in the LH group and 33.3% in the TEPP group. At the end of at least one-year period of postoperative follow-up, we obtained results compatible with the findings in the existing literature in terms of chronic pain, and no significant differences were found between the groups (p=0.209). In addition, it was observed that the rate of chronic pain was higher in the TEPP group, contrary to other similar studies in the existing literature. This may be attributed to a lack of randomization among different age groups, because, in a prospective study by Myers et al., it was observed that younger patients suffered from chronic pain more compared to the elderly patients (15). Therefore, surgical treatment may be preferred following the retirement with a careful follow-up process in appropriate patients to reduce their risk of chronic pain.

Medical treatments do not only aim to eliminate the disease but also prevent the patient from encountering another problem in the post-treatment period. When determining the optimal treatment method, the safest and most appropriate approach for the patient should be preferred rather than popular approaches. There are also many surgical methods for inguinal hernia surgery. When we present different surgical methods to our patient, we basically seek an answer to "which treatment is more suitable for me?" Surgical options should be critically evaluated in terms of their early and long-term postoperative outcomes. To find a satisfying answer to this question, we aim to evaluate the effects on life by comparing long-term surgical outcomes. SF-36 is the most widely used post-treatment assessment questionnaire. It enables to take patient opinions into account in decision-making for their treatment process, and its impact on the patient' life in the post-treatment period can be also evaluated (16). Although some studies argue that SF-36 does not provide adequate scaling for hernia surgery, we preferred using it in our study due to its feasibility (8). The patients' quality of life in the post-operative period for hernia repair using polypropylene mesh is often evaluated via SF-36 (8). It offers eight different headings with a percentage unit between 0 and 100. Lawrence K. et al., Isil RG and Castro GRA et al. observed no statistically significant differences between open and laparoscopic surgeries in terms of SF-36 and chronic pain in the long-term follow-up after the third month (12, 13, 17). According to the results in our study, SF-36 and chronic pain were similar between the two groups following at least one-year period of postoperative follow-up.

There are some limitations in our study. Since it was a retrospective study, preoperative and early postoperative periods could not be evaluated. Therefore, it was not possible to determine whether the surgery led to change in the patients' quality of life in the preoperative treatment-free period and in the postoperative period. Furthermore, as it was a single-center study, homogeneous age distribution could not be achieved.

In conclusion, according to our study, there were no differences between laparoscopic and LH methods in inguinal hernia surgical repair in terms of long-term chronic groin pain and quality of life index. Considering the risk of chronic pain in younger patients, surgery can be performed at an older age under close medical monitoring. However, the findings must be supported by prospective studies with a higher number of cases. In conclusion, both surgery methods utilize a tension-free technique and mesh. Despite the popularity of minimally invasive surgery, the optimal surgical method should be determined individually for each patient.

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