

Analysis of Outcomes of Laparoscopic Techniques for Inguinal Hernia Repair: A Cerrahpaşa Experience

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Cite this article as: Özkaya G, Kutluk F, Akıncı O, Özçelik MF. Analysis of outcomes of laparoscopic techniques for inguinal hernia repair: A cerrahpaşa experience. *Cerrahpaşa Med J*. 2023;47(1):51-54.

Abstract

Objective: The aim of this study is to compare the early and late postoperative outcomes of total abdominal preperitoneal and total extraperitoneal techniques.

Methods: A retrospective analysis was made of 148 patients who underwent total extraperitoneal (n = 99) and total abdominal preperitoneal (n = 49) inguinal hernia repair between July 2016 and July 2019. The demographic characteristics of the patients, length of hospital stay, intraoperative and postoperative complications, postoperative chronic pain, and recurrence were examined.

Results: The study sample consisted of 136 male (91.9%) and 12 female (8.1%) patients, with a mean age of 51.6 ± 14.9 years. Of the patients, 89.8% had primary and 71.6% had unilateral inguinal hernia. The mean follow-up was 19.2 (12–30) months. The rates of intraoperative and postoperative complications were similar in the groups ($P > .05$). The length of hospital stay was significantly longer in the total abdominal preperitoneal group (1.5 ± 1.04 days) than in the total extraperitoneal group (1.16 ± 0.53 days) ($P = .024$). The rate of postoperative chronic pain was 8.1% (n = 4) in the total abdominal preperitoneal group and 7.07% (n = 7) in the total extraperitoneal group ($P = .811$). Recurrence developed in 2 patients in the total extraperitoneal group and in 1 patient in the total abdominal preperitoneal group ($P = .706$).

Conclusion: Both total abdominal preperitoneal and total extraperitoneal techniques are safe for inguinal hernia repair. The hospital stay was shorter in the total extraperitoneal group. There was no significant difference in intraoperative postoperative complications, intraoperative conversion to another technique, postoperative chronic pain, and recurrence between the 2 techniques.

Keywords: Inguinal hernia, laparoscopic surgery for hernia, total abdominal preperitoneal, total extraperitoneal

Introduction

The definitive treatment for inguinal hernias, with a lifetime prevalence of 27% in men and 3% in women, is surgery.¹ The modern era of inguinal hernia repair began in the late 1800s with the method developed by Bassini. Later, Lichtenstein introduced the concept of tension-free repair. The first laparoscopic inguinal hernia repair was reported by Ger et al² in 1990. Currently, laparoscopic inguinal hernia repairs are performed mostly by placing a synthetic mesh into the preperitoneal space after reducing the hernia sac. The total abdominal preperitoneal (TAPP) and total extraperitoneal (TEP) approaches were described in the 1990s and are commonly used techniques today. Laparoscopic inguinal hernia repairs offer advantages such as less postoperative pain, shorter hospital stay, shorter return to daily activities, and minimal invasiveness.

Inguinal hernia repairs aim at a tension-free repair usually using a prosthesis. Tissue repair is performed when the prosthesis is contraindicated. A laparoscopic inguinal hernia repair requires a posterior approach to the abdominal wall. Indications for laparoscopic inguinal hernia repair are similar to those for open repair. Most surgeons argue that the laparoscopic approach to bilateral or recurrent inguinal hernias is superior to an open approach.³ According

to the International Endohernia Society guideline, TEP and TAPP repairs have been the preferred alternatives to Lichtenstein repair due to recurrence of hernia after open anterior repair.⁴

The advantages and disadvantages of laparoscopic techniques for inguinal hernias are controversial. The aim of the present study is to compare the early and late postoperative outcomes of TAPP and TEP techniques.

Material and Method

A retrospective analysis was made of 148 patients who underwent TEP and TAPP inguinal hernia repair between July 2016 and July 2019. Ethics committee approval was received for this study from İstanbul University-Cerrahpaşa, Cerrahpaşa Medical Faculty Clinical Research Ethics Committee (approval no.: 83045809-604.01.02). The written informed consent was obtained from all patients prior to participating in this study. All patients over 18 years of age who had elective TEP and TAPP repairs for recurrent or primary inguinal hernias were included in the study. Patients under 18 years of age who had an open inguinal hernia repair or had an operation for emergency indications such as obstruction or strangulation were excluded.

Patients' demographic characteristics, hernia type, operation technique, preoperative primary or recurrent hernia, length of hospital stay, intraoperative and postoperative complications, postoperative chronic pain, and recurrence were examined. Early and late postoperative outcomes were compared statistically.

The operations were performed by surgeons who were specialized in laparoscopic inguinal hernia repair and had completed the learning curve. In all cases, the laparoscopic inguinal

Received: August 16, 2022 Accepted: November 4, 2022

Publication Date: March 23, 2023

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DOI: 10.5152/cjm.2023.22070



hernia repair was performed using 3 trocars with the patient in the supine position after endotracheal intubation under general anesthesia. The patients were administered first-generation cephalosporin prophylaxis (intravenous, 1 g). All patients were mobilized at postoperative 4 hours, and oral intake was started at postoperative 6 hours. The operating room layout was the same in all laparoscopic techniques and the video screen was placed at the foot level of the patients. The surgeon was positioned on the side contralateral to the hernia and the assistant was positioned opposite to the surgeon. A 30-degree telescope was used in the operations.

In TAPP repair, peritoneal insufflation was performed using a Veress needle to an intra-abdominal pressure of 12 mmHg. The patient was placed in the Trendelenburg position with the side of the hernia up. Then, a total of 3 trocars were used to access the abdomen; one 10-mm trocar was inserted just beneath the umbilicus and two 5-mm trocars were inserted lateral to each rectus muscle. The umbilical trocar was used for the laparoscope, while the other trocars were used for dissection and mesh fixation. The dissection was started from the medial umbilical level, and peritoneal flaps, into which the mesh could be easily placed, were created. Medially, the Retzius space was opened and the bladder flap was released. Laterally, the adipose tissue was stripped from the peritoneum. Following reduction and cord dissection depending on the type of hernia, a 15 × 10-cm polypropylene mesh was placed to cover potential hernia sites in all cases. After the mesh placement, the transverse aponeurotic arch, Cooper's ligament, pubis, and iliopubic tract were fixed with staples (Tacker, Origin Medsystems, San Francisco, Calif, USA). The opened peritoneum was closed using a stapler.

In TEP repair, a small horizontal incision was made under the umbilicus, and the subcutaneous tissue was dissected until the anterior rectus sheath. The anterior rectus sheath was incised, the rectus muscle was retracted to the lateral superior side, and the dissection balloon was advanced to the pubic symphysis through the posterior rectus sheath. After creating sufficient space, the balloon was removed, and a 12-mm trocar was inserted through the same incision. Two more 5-mm trocars were inserted into the infra-umbilical median line, and the patients were placed in the Trendelenburg position. After dissection, the placed mesh was fixed using a spiral stapler (Tacker, Origin Medsystems).

In case of bleeding that could not be controlled and impaired camera vision, or in the presence of advanced adhesions, conversion to open technique (Lichtenstein repair) was performed.

Statistical Analysis

The normality of the variables was assessed using histogram analysis and the Kolmogorov–Smirnov test. Descriptive statistics were presented using mean, SD, median, and minimum–maximum values. Normally distributed variables were compared with each other using Pearson's, Chi-square and Fisher's exact tests. The Mann–Whitney *U*-test was used to assess non-normally distributed (non-parametric) variables between groups. A *P*-value of <.05 was considered statistically significant for all analyses.

Results

The study sample consisted of 136 male (91.9%) and 12 female (8.1%) patients, with a mean age of 51.6 ± 14.9 years. Of the patients, 89.8% had primary and 71.6% had unilateral inguinal hernia. There were 99 patients in the TEP group and 49 patients in the TAPP group (Table 1). There was no significant difference in age, gender, type of hernia, and primary/recurrence hernia between the groups (*P* > .05). The TEP technique was preferred

Table 1. Demographic and Clinical Data of Patients

	n (%)
Age*	51.59 (18–88)
Gender (female/male)	136/12 (91.89/8.11)
Primary/recurrence	133/15 (89.86/10.14)
Lateralization (right/left/bilateral)	44/62/42 (29.73/41.89/28.38)
Surgery technique (TAPP/TEP)	49/99 (33.11/66.89)
Length of follow-up*	19.2 (12–30)
*Mean value given. TAPP, total abdominal preperitoneal; TEP, total extraperitoneal.	

more frequently for bilateral hernias (*P* = .018). The mean follow-up was 19.2 (12–30) months.

Intraoperative complications were identified in 2 (1.35%) patients, and postoperative complications were observed in 9 (6.08%) patients. There was no significant difference in intraoperative and postoperative complications between the groups (Table 2).

In the TEP group, 1 patient had vascular injury, 1 patient had subcutaneous emphysema, 1 patient had seroma, 2 patients had epididymitis, and 1 patient had postoperative urinary retention. In the patients with inferior epigastric vessel injury, the vessel was ligated with LigaSure, and bleeding control was achieved. In the TAPP group, 1 patient had visceral injury (colonic perforation), 1 patient had postoperative urinary retention, 2 patients had postoperative ileus, and 1 patient had trocar-site hernia. The iatrogenic colonic perforation was repaired with laparoscopic primary suturing. In

Table 2. Comparison of Clinical Outcomes Between the TAPP and TEP Groups

	TAPP, n (%)	TEP, n (%)	<i>P</i>
<i>Intraoperative complications</i>			>.05 ^a
Vascular injury	–	1 (0.67)	n/a
Visceral injury	1 (0.67)	–	n/a
Diffuse subcutaneous emphysema	–	1 (0.67)	n/a
<i>Postoperative complications</i>			.440 ^a
Urinary retention	1 (0.67)	1 (0.67)	.825 ^a
Seroma	–	1 (0.67)	n/a
Epididymitis	–	2 (1.35)	n/a
Postoperative ileus	2 (1.35)	–	n/a
Trocar-site hernia	1 (0.67)	–	n/a
<i>Length of hospital stay (days)</i>	1.51 ± 1.04	1.16 ± 0.53	.024 ^b
Recurrence	1 (0.67)	2 (1.35)	.706 ^a
Postoperative chronic pain	4 (8.16)	7 (7.07)	.811 ^a
Intraoperative conversion to another technique	2 (4.08)	7 (7.07)	.473 ^a

^aFisher's exact test.

^bMann–Whitney *U*-test.

addition, the TEP repair was converted to TAPP repair in 4 patients and to open technique (Lichtenstein repair) in 3 patients, while the TAPP repair was converted to open technique in 2 patients. The TEP repair was converted to the TAPP repair or open technique (Lichtenstein repair) due to irreducible hernia in 3 patients, peritoneal rupture in 3 patients, and insufficient view in 1 patient. No statistical relationship was found between the intraoperative conversion to another technique and the operation technique (TAPP or TEP) ($P = .473$).

The length of hospital stay was significantly longer in the TAPP group (1.5 ± 1.04 days) than in the TEP group (1.16 ± 0.53 days) ($P = .024$). Recurrence developed in 1 patient in the TAPP group and in 2 patients in the TEP group ($P = .706$). The rate of postoperative chronic pain was 8.1% ($n = 4$) in the TAPP group and 7.07% ($n = 7$) in the TEP group ($P = .811$).

Discussion

The repair of inguinal hernia, which accounts for 75% of all abdominal wall hernias, is one of the most performed surgeries worldwide.⁵ The history of modern inguinal hernia repair began with Bassini. The evolution of the minimally invasive approach to the repair of inguinal hernias commenced with the revolution in laparoscopic surgery in the early 1990s. The laparoscopic technique started with the intraperitoneal onlay mesh repair.⁶ The TAPP approach was reported in 1992 and followed by the TEP approach. The TEP approach aimed to minimize the risk of intestinal injury and the risk of adhesion formation between the mesh and the intestines by allowing the surgeon to avoid intra-abdominal dissection.

Laparoscopic repair was shown to be superior to open repair by providing less postoperative pain and earlier return to work.^{7,8} The high cost, prolonged operative time, a more difficult learning curve, and higher recurrence and complication rates after the first experience of the surgeon have been considered as disadvantages of laparoscopic techniques compared to open surgery.^{7,8}

Surgeons advocating TAPP repair argue that this technique is safer and more understandable as it provides a panoramic view of the myopectineal orifice with regard to its surroundings, compared to the narrow view provided during TEP repair. The TEP repair, on the other hand, is considered an alternative to the TAPP repair due to the intraperitoneal violation and the risk of bowel injury caused by TAPP, as well as the risk of trocar injury.⁹ A randomized controlled study of 52 patients comparing the TAPP and TEP repairs established no significant difference in perioperative complications between the 2 techniques.¹⁰ We found a complication rate of 9.46% in our study, and in line with the literature, we did not establish a significant difference in complications between TEP and TAPP repairs.

Chronic pain is defined as pain that lasts for over 3 months and affects daily activities and occurs in 1%-16% of patients after laparoscopic hernia repairs.¹¹ Eklund et al¹² identified moderate or severe chronic pain in 1.9% of the patients who underwent TEP repair and 3.5% of those who underwent open repair at postoperative 5 years. A study by Neumayer et al¹³ showed postoperative neuralgia and recurrence to be factors that negatively affected patient satisfaction after open and laparoscopic mesh repair for inguinal hernia. Similarly, Hawn et al¹⁴ reported less early and chronic postoperative pain after laparoscopic repair compared to open repair. The reports in the literature indicate that the rate of postoperative chronic pain is higher after the TAPP repair compared to the TEP repair.^{15,16} Conversely, in our study, there was no significant difference in postoperative chronic pain between the 2 techniques.

The number of surgeries required to gain competency in laparoscopic techniques for hernia repair is important. A randomized controlled study reported that the 2-year recurrence was 10.1% in patients undergoing laparoscopic repair and that the outcomes of laparoscopic repairs improved after each surgeon performed at least 250 operations.¹³ Lal et al¹⁷ reported that they reduced the postoperative recurrence rate from 9% to 2.9% after 100 TEP operations. In our study, all of the surgeons performing laparoscopic inguinal hernia surgery were surgeons who were specialized in hernia surgery and who performed more than 100 TAPP or TEP surgeries before, and the overall recurrence rate was 2%. No significant correlation was found between the operation technique and recurrence.

Due to the nature of the technique, TEP can often be converted to TAPP or open technique and TAPP to open technique. The TEP technique involves challenges for surgeons in patients with previous lower abdominal surgeries such as radical prostatectomy and cesarean section. The study by Misra et al¹⁸ that performed TEP on 185 patients reported that the rate of conversion to TAPP or open technique was 10.5%. Khan et al¹⁹ in turn, reported that the rate of conversion from TEP to TAPP was 13.9%. The reasons for the conversion include peritoneal rupture, irreducible hernia, narrow working field, bleeding, prolonged operative time, and instrumental failure.^{18,19} Our study found that the operation technique did not have a significant effect on the intraoperative conversion to another technique.

In conclusion, we believe that a competent hernia surgeon should have more than 1 option to offer to the patient. In the present study, we determined that TAPP and TEP techniques can be used safely for inguinal hernia repair. There was no significant difference in intraoperative postoperative complications, intraoperative conversion to another technique, postoperative chronic pain, and recurrence between the 2 techniques, while the hospital stay was shorter after TEP repair.

Ethics Committee Approval: Ethics committee approval for this study was received from Istanbul University-Cerrahpaşa, Cerrahpaşa Medical Faculty Clinical Research Ethics Committee (Approval number: 83045809-604.01.02).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – G.Ö., M.F.Ö.; Design – G.Ö., F.K., M.F.Ö.; Supervision – M.F.Ö.; Materials – G.Ö., O.A.; Data Collection and/or Processing – G.Ö., F.K.; Analysis and/or Interpretation – O.A.; Literature Review – O.A., G.Ö.; Writing – G.Ö., O.A.; Critical Review – O.A., M.F.Ö.

Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declared that this study has received no financial support.

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