



Feasibility of totally extraperitoneal inguinal hernia repair in patients with previous prostatectomy

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ABSTRACT

Objective: Laparoscopic totally extraperitoneal inguinal hernia repair (TEP) surgery technique includes three key steps: reaching the preperitoneal space, reducing hernias, and placement of mesh. However, reaching the preperitoneal space can be complicated in patients with previous lower abdominal surgeries. This study aimed to assess the feasibility of laparoscopic inguinal TEP in patients with previous prostatectomies.

Material and Methods: Inguinal hernia patients who underwent laparoscopic TEP between January 2015 and February 2021 at Koç University Faculty of Medicine, Department of General Surgery, were included in this retrospective study. The operations were performed by five senior surgeons experienced in laparoscopy. Patients were divided into two study groups, as the radical prostatectomy (RP) group which included patients with previous prostatectomy non-RP which included patients without previous radical prostatectomy. Operative time (OT), length of hospital stay (LOS), and postoperative complications were compared within two groups.

Results: Three hundred and forty-nine patients underwent laparoscopic TEP, and 27 had previous prostatectomies. Among them, 190 patients had unilateral inguinal hernias, and 159 had bilateral inguinal hernias. Mean age of the patients in the non-RP and RP groups was 58.1 ± 14.7 and 73.9 ± 9.6 years, respectively. Only one (3.7%) case was complicated with urinary tract infection in the RP group, and 10 (3.1%) were complicated in the non-RP group. Complications for the non-RP group include hematomas in six cases, urinary tract infection in three cases, and urinary retention in one case. No significant difference in mean operative time was seen between non-RP and RP groups ($p=0.43$). There was no significant difference in the means of the length of hospital stay between the two groups ($p=0.7$).

Conclusion: Laparoscopic TEP in patients with a previous prostatectomy can be performed safely without prolonging the operative time and increasing the length of hospital stay.

Keywords: Inguinal hernia, laparoscopic inguinal hernia surgery, benign prostate hyperplasia, totally extraperitoneal hernia repair

INTRODUCTION

Inguinal hernia (IH) is the most prevalent type of abdominal wall hernia, accounting for 75% of all cases. It is a frequent part of daily general surgery practice, with the lifetime risk of developing an IH standing at 27% for men and 3% for women (1). Risk factors include male sex, advanced age, patent processus vaginalis, chronic cough-induced increases in intraabdominal pressure, systemic connective tissue disorders, benign prostatic hyperplasia, constipation, smoking, and lower midline incision surgery (2-4).

Prostate cancer ranks one of the most common cancers among men worldwide, including Türkiye, where 19.444 new cases were diagnosed in 2020 (5). Open-laparoscopic or robotic radical prostatectomy (RP) is the primary treatment for non-metastatic prostate cancer (6). Due to its proximity and shared anatomy, there is an inevitable causal relationship between RP and IH. Previous studies have revealed that RP can quadruple the long-term incidence of IH, with incidence rates varying based on the surgical approach: 13.7% post-open surgery, 7.5% post-laparoscopic surgery, and 7.9% post-robotic surgery (7,8).

Recent guidelines highlight the laparo-endoscopic technique, incorporating totally extraperitoneal (TEP), and transabdominal preperitoneal (TAPP), as one of the most effective approaches to treat IH (9). These techniques have replaced open techniques due to advantages such as lower risk of postoperative pain and numbness, shorter recovery time, and earlier return to work (10-12). However, studies have indicated that patients with a history of abdominal surgery, such as prostatectomy, may face a higher risk of post and perioperative complications when

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undergoing endo-laparoscopic surgery (13-15). On the other hand, some studies attempted to prove the feasibility of endo-laparoscopic techniques in a patient with previous lower abdominal surgery (16,17).

Therefore, data in the literature about the feasibility of laparoscopic TEP in patients with prostatectomy is still controversial, and there is no consensus on the optimal technique. In addition, reported data in the literature come from studies with surgeons at various levels of expertise, which might impact the results of such a technically challenging procedure (13,18-20). In this study, it was aimed to present the results of TEP done by experienced surgeons on patients with a previous history of prostatectomy and compare the outcomes to those without a prostatectomy.

MATERIAL and METHODS

This single-center, retrospective study was conducted at the Department of General Surgery, Koç University Faculty of Medicine, between January 2015 and January 2021. Male patients who underwent TEP due to IH in the study period were included in this study. Patients undergoing concurrent surgery and those found to have other concomitant groin hernias (femoral, sportsman) intraoperatively were excluded. Five experienced laparoscopic surgeons (>50 cases/year) performed all operations. Patients with a history of prostatectomy and those without a history of prostatectomy or any other abdominal surgery (non-RP) were compared.

Patient demographics (sex, age, BMI and comorbidities), perioperative outcomes (hernia location, operative time, and intraoperative complications), and postoperative results (length of the hospital stay, recurrence of the hernia, postoperative complications such as hematoma formation, urinary tract infection, and mesh infection) graded in Clavien-Dindo classification were noted for both groups. The primary outcome was peri/postoperative complications; the secondary outcome was the length of the hospital stay (LOS) and operative time (OT). Operative time is defined as the duration from the initiation of anesthesia until extubation.

The study protocol was approved by the local institutional review board of Koç University (approval code: 2022.440. IRB1.166). This study was conducted in accordance with the 1964 Helsinki Declaration. Written informed consent was obtained from all subjects before their participation, and all methods were carried out per our institutional review board's relevant guidelines and regulations.

Descriptive statistics were used to identify the mean and standard deviation groups. Operative time and LOS were tested for normality using the Shapiro-Wilk test, and both parameters were non-normally distributed. Non-parametric Mann-Whitney U test was used to compare two groups in means of LOS and

OT separately for bilateral and unilateral IH. The Chi-square test was used to compare postoperative complications between the two groups. A p-value <0.05 was considered statistically significant.

The surgical procedure was performed as follows: A short oblique incision just inferolateral to the umbilicus on the hernia site was made, and the anterior rectus sheath was opened with the help of S retractors. Ten mm trocar was inserted, and a 30° 10 mm laparoscope was introduced. Two 5 mm operating ports were placed in the lower abdominal midline just above the pubis and in-between via the linea alba. Telescopic dissection under direct vision was used to reduce the possibility of peritoneal tearing due to scarring. The surgical technique was similar, independent of the prior history of prostatectomy. A combination of sharp and blunt dissection was employed to clear the area until reaching the subumbilical area superiorly, space of Retzius inferiorly, and psoas muscle inferolateral. Iliac vessels were carefully dissected. A polypropylene mesh of appropriate size was fixed to the periosteum of the superior pubic ramus using penetrative titanium tacs. Lateral fixation was not employed to allow any subsequent mesh contraction without impediment. The decision for drain placement was based on the surgeon's experience and the risk of bleeding.

RESULTS

From 2014 to 2021, 414 patients underwent laparoscopic IH repair at our single-center institution. Among them, 36 (8.6%) patients were treated directly with TAPP procedures, while 378 (91.4%) initially underwent TEP. During the TEP procedure, the operation was converted to open or TAPP in 29 (5.2%) patients, specifically 17 to open and 12 to TAPP. There was no significant difference between the two groups in conversion rate ($p=0.72$). Successful TEP was carried out from initiation to completion in 349 patients. Subsequently, these TEP patients were classified as right-sided ($n=107$, 32.4%), left-sided ($n=82$, 22.9%), and bilateral ($n=160$, 44.7%).

The first group, RP, comprised 27 (7.5%) patients, whereas the control group, non-RP, encompassed 322 (92.5%) patients. Of the 27 patients in the RP group, 20 underwent minimally invasive surgery while seven patients underwent open prostatectomy. For the 20 patients (out of the 27) for whom data is available, the average duration between radical prostatectomy and inguinal hernia repair is 44.5 months, with a standard deviation of 20.51 months. The RP group demonstrated a significantly higher mean age compared to the non-RP group, while a higher BMI was notably prevalent in the non-RP group (Table 1).

In terms of perioperative complications, the RP group exhibited a statistically significant increase in peritoneal tear rates (33.3%) compared to the non-RP group (11.2%) (Figure 1).

Table 1. Patient characteristics

Parameters	Non-RP (n= 322)	RP (n= 27)	p
Age	58.1 ± 14.7	73.9 ± 9.6	<0.001
BMI	26.5 ± 3.4	25.5 ± 2.1	0.024
ASA score			
1	174 (53.9%)	7 (25.9%)	0.018
2	130 (40.5%)	17 (63%)	
3	18 (5.6%)	3 (11.1%)	
Clavien-Dindo score			
1	311 (96.5%)	25 (92.6%)	0.481
2	10 (3.1%)	2 (7.4%)	
3	1 (0.3%)	0	
Comorbidities			
COPD presence	7 (2.2%)	2 (7.4%)	0.099
DM presence	62 (19.3%)	9 (33.3%)	0.081
Hypertension presence	111 (34.5%)	14 (51.9%)	0.070
Repair location			
Unilateral	175 (54.2%)	15 (55.6%)	0.892
Bilateral	147(45.8%)	12 (44.4%)	
Postoperative complication	10 (3.1%)	1 (3.7%)	0.869
Hematoma	6	0	
Urinary tract infection	3	1	
Urinary retention	1	0	
Conversion	27 (8.3%)	2 (%7.4)	0.722
Length of hospital stay	1.1	1.2	0.673
Operative time	82.4 ± 40.4	83.7 ± 36.5	0.438

ASA: American Society of Anesthesiologists, BMI: Body mass index, COPD: Chronic obstructive pulmonary disease, DM: Diabetes mellitus.

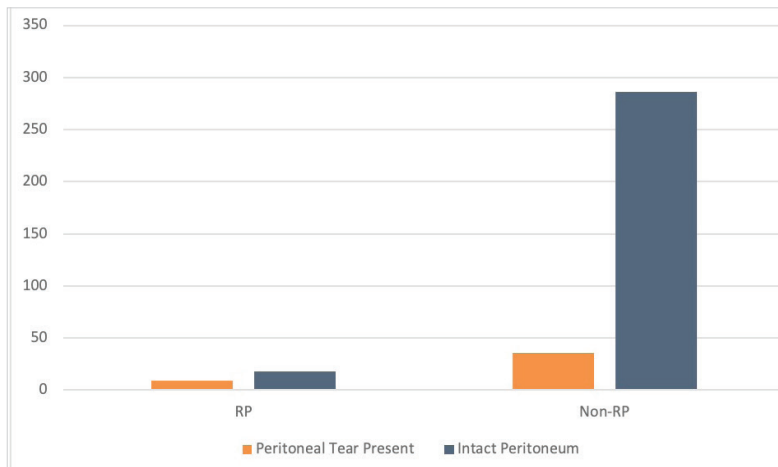


Figure 1. Peritoneal tear was found statistically correlated with the presence of prior prostatectomy (p< 0.001).
 RP: Radical prostatectomy, Non-RP: Non-radical prostatectomy.

Table 2. Operative time comparison in terms of prostatectomy and peritoneal tear

	Peritoneal tear	Intact peritoneum	p
RP	104 ± 47	73 ± 26	0.022
Non-RP	133 ± 54	76 ± 33	<0.001

RP: Radical prostatectomy, Non-RP: Non-radical prostatectomy.

Postoperative complication rates were comparable between the two groups, with rates of 3.1% in the non-RP group and 3.7% in the RP group, respectively ($p=0.869$).

No statistically significant association was identified between the location of the IH and a history of radical prostatectomy ($p=0.892$). Furthermore, no statistical significance was found in LOS and OT, with respective p -values of 0.673 and 0.438. For patients with a history of prostatectomy: mean operative time for unilateral hernia repairs was 75.5 ± 34.6 minutes, and for bilateral hernia repairs, it was 90.9 ± 44.5 minutes. The difference between these times was found to be statistically significant ($p=0.023$).

A separate analysis for the presence of a peritoneal tear in both RP and non-RP groups showed statistical significance with respect to OT. In the RP group, OT was 104 ± 47 minutes with a peritoneal tear and 73 ± 26 minutes without ($p=0.022$). Similarly, in the non-RP group, OT was significantly longer in the presence of a peritoneal tear (133 ± 54 minutes) than without (76 ± 33 minutes) ($p<0.001$) (Table 2).

DISCUSSION

Endo-laparoscopic hernia repair approaches typically fall into two categories: TEP and TAPP procedures. Prior studies comparing the two techniques have shown that each procedure has advantages and disadvantages, yet there is no clear indication of superiority based on outcomes (21,22). At our institution, we have primarily chosen TEP as the preferred technique for IH repair due to its lower invasiveness, non-exposure of intra-abdominal organs, and more accurate anatomical visualization. While TEP and TAPP are accepted as suitable options for hernia recurrence and chronic pain, many surgeons often choose TEP to avoid peritoneal entry (23).

However, performing TEP can present challenges in patients with a history of lower abdominal surgery, such as RP, due to extensive preperitoneal scarring and adhesion. This has resulted in the ongoing discourse on the appropriateness of minimally invasive IH repair in patients with prior RP (18-20). A study by Prassas et al. has demonstrated inferior outcomes in intra- and postoperative complications for patients with a history of abdominal surgery undergoing TEP compared to those without such a history, suggesting a possible preference for open techniques due to higher complication rates (14). Our findings also indicated an increased perioperative complication risk in

patients with a history of prostatectomy, although it did not achieve statistical significance. However, this heightened risk may not solely result from the previous prostatectomy; mean age of the RP group was 73, and advancing age is a recognized risk factor for peri- and postoperative complications following any surgery. Our results regarding postoperative complications were in alignment with the study by Trawa et al (15). In comparison to our findings, the variability in surgeon familiarity and experience, along with the number of experienced surgeons, could partially explain discrepancies in the results. These factors contribute to the diversity of outcomes and increase the likelihood of external validation. Further, recent studies have validated the feasibility of TEP in patients with a history of prostatectomy, suggesting that experienced surgeons can effectively perform the TEP procedure in this population (13,15,16,18-20).

Studies have also indicated that OT is significantly longer in patients with a history of prostatectomy (21,22,24). Compared to reported operative times of 82.4 ± 40.4 and 83.7 ± 36.5 for non-RP and RP groups, respectively, our operative times were more protracted. This discrepancy may be attributed to our recording of OT from the initiation of anesthesia to extubation. Additionally, consistent with Prassas et al., we note that a wide range of operative times is documented in the literature (14,18,19). However, we were able to corroborate findings from previous studies demonstrating longer operative times in patients experiencing peritoneal tears during surgery (16,17,19).

The incidence of peritoneal tear during surgery appears to be elevated in patients with a history of prostatectomy. Moreover, if a peritoneal tear occurs during the TEP procedure, it is likely to extend the OT, regardless of the patient's prostatectomy history. Peritoneal tears during TEP repair can introduce complications, and the altered anatomy and scarring in the pelvic region of patients with a history of prostatectomy may heighten this risk (25). The presence of adhesions and fibrosis in the pelvic area can make the dissection of the preperitoneal space more challenging and increase the risk of inadvertent peritoneal tear (25). In addition, a peritoneal tear can be a marker of underlying factors that contribute to increased OT. For example, peritoneal tears may be more common in patients with a history of prostatectomy due to altered anatomy and scarring in the pelvic region. These factors can make the dissection and repair of peritoneal tears more challenging, leading to increased OT.

Despite its limitations, our study offers valuable insights. It is a single-center, retrospective observational study with a relatively limited patient number (n= 349), and the three-month follow-up period may not be sufficient for detecting postoperative IH recurrence, a significant complication. Subgroup analysis could not be performed due to the limited number of previous prostatectomies. Nevertheless, this study's robustness derives from the IH repairs performed by experienced surgeons, which enhances the variability and external validation of peri- and postoperative complications. Further studies with more cases are needed to evaluate the safety and feasibility.

CONCLUSION

This study demonstrated that laparoscopic TEP IH repair in patients with a prior prostatectomy history is safe, effective, and efficient when performed by experienced laparoscopic surgeons.

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Ethics Committee Approval: This study was approved by Koç University Ethics Committee (Decision no: 2022.440.IRB1.166, Date: 05.12.2022).

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ORJİNAL ÇALIŞMA-ÖZET

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Daha önce prostatektomi yapılmış hastalarda total ekstraperitoneal kasık fıtığı onarımının uygulanabilirliği

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ÖZET

Giriş ve Amaç: Laparoskopik total ekstraperitoneal kasık fıtığı onarımı (TEP) üç temel adımı içerir: preperitoneal boşluğa ulaşmak, fıtık kesesini düşürmek ve mesh yerleştirmek. Ancak daha önce alt karın ameliyatı geçirmiş hastalarda preperitoneal boşluğa ulaşmak karmaşık olabilir. Bu çalışma, daha önce prostatektomi geçirmiş hastalarda laparoskopik TEP ameliyatının uygulanabilirliğini değerlendirmeyi amaçladı.

Gereç ve Yöntem: Koç Üniversitesi Tıp Fakültesi Genel Cerrahi Anabilim Dalında Ocak 2015 ile Şubat 2021 tarihleri arasında laparoskopik TEP ameliyatı yapılan kasık fıtığı hastaları bu retrospektif çalışmaya dahil edildi. Operasyonlar laparoskopik konusunda deneyimli beş kıdemli cerrah tarafından gerçekleştirildi. Hastalar, daha önce radikal prostatektomi yapılmamış grup (non-RP) ve prostatektomi geçirmiş grup (RP) olarak iki çalışma grubuna ayrıldı. Ameliyat süresi (OT), hastanede kalış süresi (LOS) ve ameliyat sonrası komplikasyonlar iki grup arasında karşılaştırıldı.

Bulgular: Üç yüz kırk dokuz hastaya laparoskopik TEP uygulandı ve 27 hastanın daha önce prostatektomi öyküsü vardı. Bunların 190'ında tek taraflı kasık fıtığı, 159'unda ise iki taraflı kasık fıtığı vardı. RP olmayan ve RP grubundaki hastaların yaş ortalaması sırasıyla $58,1 \pm 14,7$ ve $73,9 \pm 9,6$ yıldı. RP grubunda sadece bir (%3,7) olguda idrar yolu enfeksiyonu gelişirken, RP olmayan grupta 10 (%3,1) olguda komplikasyon gelişti. RP dışı grup için komplikasyonlar arasında altı olguda hematoma, üç olguda idrar yolu enfeksiyonu ve bir olguda idrar retansiyonu yer almaktadır. RP olmayan ve RP grupları arasında ortalama ameliyat süresi açısından anlamlı fark görülmedi ($p=0,43$). İki grup arasında hastanede kalış süresi ortalamaları açısından anlamlı fark yoktu ($p=0,7$).

Sonuç: Prostatektomi geçirmiş hastalarda laparoskopik TEP, ameliyat süresini ve hastanede kalış süresini uzatmadan güvenle yapılabilir.

Anahtar Kelimeler: Kasık fıtığı, laparoskopik kasık fıtığı cerrahisi, benign prostat hiperplazisi, total ekstraperitoneal fıtık onarımı

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