



## ORIGINAL ARTICLE

# Is It Safe to Perform Laparoscopic Cholecystectomy and Transabdominal Preperitoneal Hernia Repair Simultaneously?

## Laparoskopik Kolesistektomi ve Transabdominal Preperitoneal Fıtık Onarımını Eş Zamanlı Yapmak Güvenli midir?

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**ABSTRACT**

**Objective:** Cholecystectomy and inguinal hernia repair are some of the most commonly performed surgical operations in general surgery. The laparoscopic approach involves a lower risk of postoperative pain and infection, which allows patients to return to daily activities sooner and provides better cosmetic results. However, surgical procedures involving simultaneous laparoscopic cholecystectomy and transabdominal preperitoneal hernia repair (TAPP) are limited. This study investigates the safety of this simultaneous procedure.

**Methods:** The medical records of 38 patients who underwent simultaneous laparoscopic cholecystectomy and TAPP were retrospectively analyzed. Demographic characteristics of patients, indications for surgery, surgery-related parameters, and postoperative complications were recorded.

**Results:** The mean age of the patients was  $48 \pm 6.7$  years, the youngest patient was 32 years old and the oldest patient was 68 years old. The indications for cholecystectomy included gallstones in 32 patients, stones and sludge in five patients, and gallbladder polyp and adenomyomatosis in one patient. The indications for hernia repair included right inguinal hernia in 21 patients, left inguinal hernia in 12 patients, bilateral inguinal hernia in three patients, recurrent left inguinal hernia in two patients, and left femoral hernia in one patient. The mean operative time was  $124 \pm 26$  minutes and the mean length of postoperative hospital stay was  $2.1 \pm 0.4$  days. Intraoperative complications included bleeding due to double cystic artery in one patient and gallbladder perforation in one patient. Postoperative complications included seroma at the site of the hernia in one patient (in the patient with gallbladder perforation) and late recurrence at the site of the hernia in one patient.

**Conclusion:** The present study demonstrated that laparoscopic cholecystectomy and TAPP surgery could be safely performed simultaneously and found that performing cholecystectomy at the first place did not increase mesh infection rates. This finding should be supported by further prospective and randomized studies with larger samples.

**Keywords:** Surgery, herniorrhaphy, cholecystectomy, laparoscopic, surgical site infection.

**ÖZ**

**Amaç:** Kolesistektomi ve inguinal herni onarımı genel cerrahi alanında yapılan en sık operasyonlardır. Laparoskopik yaklaşımda postoperatif ağrı ve enfeksiyon riski daha azdır, hastalar günlük aktivitelerine daha kısa sürede dönebilir ve kozmetik görünüm daha iyidir. Buna rağmen laparoskopik kolesistektomi ve transabdominal preperitoneal herni onarımını (TAPP) eş zamanlı içeren cerrahi prosedürler sınırlıdır. Burada, bu prosedürün güvenliği sorgulanmaktadır.

**Yöntem:** Eş zamanlı laparoskopik kolesistektomi ve TAPP uygulanan 38 hastanın dosyası geriye dönük incelenerek, hastaların demografik özellikleri, operasyon endikasyonları, operasyon ile ilişkili parametreler ve postoperatif gelişen komplikasyonlar öğrenilmiş, arşiv kayıtlarından geç dönemde görülen komplikasyonlar hakkında bilgi sahibi olunmuştur.

**Bulgular:** Hastaların ortalama yaşı  $48 \pm 6.7$  yıl olup en genç hasta 32, en yaşlı hasta 68 yaşında idi. Safra kesesi operasyon endikasyonu olarak, hastaların 32 tanesinde safra kesesinde sadece taş, beş tanesinde taş ve çamur, bir tanesinde safra kesesi taşı dışında safra kesesi polipi ve adenomyomatosis saptanmıştır. Fıtık endikasyonu olarak 21 hastada sağ, 12 hastada sol, üç hastada bilateral, iki hastada nüks sol inguinal ve bir hastada sol femoral herni saptanmıştır. Hastaların ortalama ameliyat süresi  $124 \pm 26$  dakika olup, ameliyat sonrası ortalama hastanede kalış süresi  $2.1 \pm 0.4$  gün idi. İntraoperatif komplikasyonlar açısından bir hastada çift sistik arter nedeni ile kanama ve bir hastada safra kesesi perforasyonu görüldü. Postoperatif dönemde bir hastada fıtık bölgesinde seroma (safra kesesi perforasyonu gelişen hastada) ve bir hastada geç dönemde fıtık bölgesinde nüks saptanmıştır.

**Sonuç:** Laparoskopik kolesistektomi ve TAPP operasyonlarının eş zamanlı olarak güvenli uygulanabileceği çalışmamızda gösterilmiştir. Safra kesesi operasyonunun öncelikli olarak yapılmasının mesh enfeksiyon oranlarını artırmadığı saptanmış olup, daha geniş katımlı, prospektif, randomize çalışmalarla desteklenmesi gerektiği düşüncesindedir.

**Anahtar Kelimeler:** Cerrahi, herniorafi, kolesistektomi, laparoskopik, cerrahi alan enfeksiyonu.

**Introduction**

Laparoscopic cholecystectomy is the standard surgical method of choice in symptomatic gallstone disease and other benign gallbladder diseases (1). The first laparoscopic cholecystectomy was performed by Phillip Mouret in 1987 and was further developed by

Dubois and Perissat in 1990 (2,3). The first laparoscopic hernia repair was performed by Ralph Ger in 1982 and transabdominal preperitoneal (TAPP) hernia repair was described in 1992 (4,5). Studies have proven TAPP to be superior to open hernia surgery in terms of

postoperative pain and subsequent complications (6). However, there is no consensus yet on the safety of performing these two procedures simultaneously. Only a few studies including a small number of patients have been conducted to investigate the simultaneous application of laparoscopic cholecystectomy and TAPP repair (7). These studies have reported concerns about mesh-related complications and surgical site infection, especially when a clean procedure such as TAPP repair was performed simultaneously with a clean-contaminated procedure such as cholecystectomy (8). However, given that patients prefer minimally invasive combined procedures using single anaesthesia, this issue should be investigated by larger studies to identify the key aspects of this combined procedure. The aim of this study is to investigate the complications of simultaneous laparoscopic cholecystectomy and TAPP repair performed in our clinic to analyze the safety of this procedure.

### Material and Methods

Between January 2015 and January 2022, 38 patients with concomitant gallbladder pathology and inguinal hernia underwent simultaneous laparoscopic cholecystectomy and TAPP repair in a tertiary care hospital. Characteristics of the patients were retrieved retrospectively from the review of patient files and late complications were checked using archival records. The study was conducted in accordance with the Declaration of Helsinki and received permission from the institution to access medical files and archival records. Patients provided informed consent for the combined procedure. The study received approval from the ethics committee (Ethics committee no. 2022-180. Document Date and No: 19.12.2022-256).

Each patient underwent preoperative hepatobiliary ultrasound examination, and those with signs of acute cholecystitis such as pericholecystic fluid and increased gallbladder wall thickness on ultrasound were excluded from the simultaneous procedure. The operations and postoperative follow-up were performed by the same general surgery team. Before surgery, all patients received cefazolin (Cezol, Deva Holding, Istanbul, Turkiye) as prophylactic antibiotic at an appropriate dose based on their weight. Patients were retrospectively analyzed in terms of age, sex, comorbidities, gallbladder pathology, type of hernia, length of hospital stay, operative time, and complications.

### Surgical Technique

All patients were placed in supine, reverse Trendelenburg, and left lateral position. The four-port American technique was used. The surgical operation was performed with a Stryker laparoscopic camera (Stryker, 1488 HD 3-Chip camera system, San Jose, CA, USA) placed on the right corner of the patient's head. The cystic duct and cystic artery were clipped, the gallbladder was dissociated off its bed, and the gallbladder was taken off the abdomen using an endo-bag through a 10-mm trocar in the epigastric region. Then a Jackson-Pratt drain (Cardinal Health,

McGaw Park, IL, USA) was placed in the gallbladder bed and closed with a clamp. The port sites except the umbilicus were closed, a 5-mm trocar was placed in the left lower quadrant in the umbilical region, and the endoscope was placed at the site of hernia beside the patient's foot. The patient was placed in a Trendelenburg position with lateral inclination opposite to the hernial defect, the myopectineal region was opened, and a 15 × 10-cm prolene mesh (3D Max™ Mesh, Bard, Warwick, USA) was fixed using an absorbable tacking staple (AbsorbaTack, Covidien Corp, Norwalk, CT). After the fixation of the mesh, the peritoneum was closed with absorbable sutures using a continuous technique. The clamp on the drain was then removed and the port sites were closed.

### Statistical Analysis

Statistical analysis was performed using NCSS (Number Cruncher Statistics System) 2007 and PASS 2008 Statistical Software (Utah, USA). Descriptive statistical methods (mean, standard deviation, frequency, ratio) were used.

### Results

#### Patient Characteristics

Twenty-two patients were male and 16 were female in the study. The mean age was  $48 \pm 6.7$  years (range, 32–68 years). The mean body mass index of the patients was  $28.4 \pm 3.2$  kg/m<sup>2</sup>. Comorbidities included hypertension in nine patients (23.6%), diabetes mellitus in four patients (10.5%), coronary artery disease in two patients (5.2%), and asthma in one patient (2.6%). Two patients had a history of previous abdominal surgery; one of them had undergone laparoscopic sleeve gastrectomy and the other had an umbilical median incision scar due to peptic ulcer perforation. The indications for cholecystectomy were gallstones in 32 patients, stones and sludge in five patients, and gallbladder polyp and adenomyomatosis (retrieved from the postoperative pathology report) in one patient. The indications for hernia repair were right inguinal hernia in 21 patients, left inguinal hernia in 12 patients, bilateral hernia in three patients, recurrent left inguinal hernia in two patients (previous Lichtenstein repair), and left femoral hernia in one patient (Table 1).

#### Operative Findings and Complications

The mean operative time was  $124 \pm 26$  minutes and the volume of intraoperative bleeding was  $154 \pm 22$  ml. After the surgery, patients received injections of 75-mg diclofenac sodium (Dikloron, Deva Holding, Istanbul, Turkey) every 12 hours as analgesic but no antibiotherapy. On day one after surgery, the fluid coming from the drain was assessed, and the drain was removed when the serous volume dropped below 50 ml. The mean length of hospital stay was  $2.1 \pm 0.4$  days (Table 2).

Intraoperative complications included bleeding due to double cystic artery in one patient, which was controlled with immediate intervention. One patient had gallbladder perforation. This patient

received copious isotonic irrigation and suction, which prevented contamination. Postoperative complications included seroma at the site of hernia, which developed two weeks after surgery due to recurrent left inguinal hernia (in the patient who developed gallbladder perforation). In this patient, abdominal ultrasonography detected adhesion in the myopectineal orifice attributable to contamination with bile. Markers of infection (leukocytosis or C-reactive protein) were not elevated in this patient. Another patient who was operated for right inguinal hernia presented to the outpatient clinic three months after surgery with right groin swelling and was found to have recurrent inguinal hernia on superficial tissue ultrasound. The same patient underwent open Lichtenstein repair of hernia. This may be due to inadequate dissection independent of combined surgery. Records of other patients in the last six months detected no other late complications.

**Table 1-** Clinical characteristics of patients

Characteristics	
Patients, n	38
Age (years), mean $\pm$ SD	48 $\pm$ 6.7
Male, n (%)	22 (57.9)
BMI (kg/m <sup>2</sup> ), mean $\pm$ SD	28.4 $\pm$ 3.2
History of abdominal surgery, n (%)	2 (5.2)
Co-Morbidity, n (%)	16 (42.1)
Hypertension, n (%)	9 (23.6)
Diabetes mellitus, n (%)	4 (10.5)
Coronary artery disease, n (%)	2 (5.2)
Asthma bronchiale, n (%)	1 (2.6)
Hernia classification	
Right Unilateral, n (%)	21 (55.2)
Left Unilateral, n (%)	12 (31.5)
Bilateral, n (%)	3 (8.1)
Left recurrence, n (%)	1 (2.6)
Femoral, n (%)	1 (2.6)
Gallbladder classification	
Gallbladder Stones, n (%)	32 (84.2)
Gallbladder stones with mud, n (%)	5 (13.2)
Gallbladder polyps with Stones, n (%)	1 (2.6)

**Table 2-** Surgical outcomes and complications of patients

Surgical outcomes and complications	
Operation time (min), mean $\pm$ SD	124 $\pm$ 26
Blood loss (mL), mean $\pm$ SD	154 $\pm$ 22
Postoperative hospital stay (days), mean $\pm$ SD	2.1 $\pm$ 0.4
Intraoperative complications, n (%) *	2 (5.2)
Postoperative complications, n (%)	1 (2.6)
Late complications, n (%)	1 (2.6)

\*Double cystic artery hemorrhage and gallbladder perforation

## Discussion

Cholecystectomy and inguinal hernia repair are some of the most common surgical operations performed by general surgeons. Although the years 1990 and 1992 are the milestones for both operations, laparoscopic cholecystectomy has gained general acceptance as a minimally invasive procedure and cholecystectomy operations are now routinely performed laparoscopically. Laparoscopic cholecystectomy can be performed using a four-, three-, or single-port technique, and hernia repair can also be performed laparoscopically using a TAPP or total extraperitoneal (TEP) technique. Simultaneous single-port laparoscopic cholecystectomy and TAPP surgery was investigated by Kroh and Rosenblatt (9), who reported that the routine use of the procedure was limited due to the length of the operative time. However, increased use of the robotic approach in the future can result in this procedure being used more widely.

Although the four-port technique is generally accepted in laparoscopic cholecystectomy, TEP is more popular in hernia surgery because of its distance from large vessels and postoperative peritoneal integrity. Savita et al., who performed laparoscopic cholecystectomy combined with TEP and TAPP, found no difference between TEP and TAPP in terms of mesh infection risk (10). Sarli et al. found an inpatient complication rate of 33% and a recurrence rate of 3.3% and suggested that this procedure should be performed by experienced surgeons (11). Lehmann et al., on the other hand, found this procedure to be a safe and useful surgical approach (12). In the present study, the procedure was performed by surgeons with at least five years of experience and it was found safe.

TAPP is still practiced by a limited number of surgeons and simultaneous TAPP and laparoscopic cholecystectomy is thought to cause complications due to bile contamination. The prevalence of *Escherichia coli*, *Klebsiella pneumoniae*, and other microorganisms due to bile contamination was found high (13,14). Despite this, studies investigating combined TAPP and laparoscopic cholecystectomy with a follow-up period of 40 months and 47 months found no mesh-related complications (15,16). A meta-analysis by Liang et al. revealed that use of prophylactic antibiotics for bacteria in normal flora effectively reduced postoperative infections (17). The data in our study consists of archival records, which precluded assessment of long-term complications. Only one patient who was operated for right inguinal hernia had recurrent hernia three months after surgery, and this patient underwent open Lichtenstein repair of hernia.

In the literature Hayakawa et al. reported the length of hospital stay as 3.2  $\pm$  0.6 days by (15). Sarli et al., on the other hand, a length of hospital stay of 2.1 days while Lehmann et al. reported a hospital stay of 3.6 days (11,12). In our study, length of postoperative hospital stay was 2.1  $\pm$  0.4 days. A study by Claus et al., which

included 46 patients, found the mean operative time 111 minutes (60–210 minutes), and 45 patients (97.9%) were discharged 24 hours after surgery (16). In our study, the mean operative time was  $124 \pm 26$  minutes and the volume of intraoperative bleeding was  $154 \pm 22$  ml. The length of hospital stay, operative time, and volume of bleeding in the present study are similar to values reported in previous studies.

Most patients consider a minimally invasive method with a single anaesthesia for the treatment of both pathologies, with a single process of recovery. This issue was investigated by Claus et al. who administered a questionnaire to the patients and found that all of them preferred simultaneous procedure (16). The present study did not find any information that a questionnaire was applied to the patients in our study, but results support the data reported by Claus et al.

The only study comparing intraoperative and postoperative complications with open hernia surgery was performed by Sarli et al; they did not recommend a simultaneous procedure in an acute setting such as acute cholecystitis or incarcerated hernia (11). Those studies usually involved inguinal hernia repair performed before cholecystectomy (7,12,15,16). The common idea of the authors in these studies is to prevent contamination of the mesh by surgical instruments and bile leakage. They encouraged hernia repair at a later time if there was bile leakage. Despite this, Arafat et al. performed cholecystectomy first (18). In the present study, unlike other studies, cholecystectomy was performed first probably because patients originally presented to the outpatient clinic for gallbladder disease and they were primarily concerned about the treatment of this disease.

### Study Limitations

This research has some limitations. First, the data for the study were retrieved from archival records and review of files. Second, the results cannot be generalized due to the small number of patients. The strength of the study is that, unlike most other studies, cholecystectomy was performed first.

In conclusion, the present study achieved results similar to other studies, which suggests that combined laparoscopic cholecystectomy and TAPP operations can be safely performed. In this study, unlike most other studies, laparoscopic cholecystectomy was performed first and the mesh was not infected. However, this result cannot be generalized due to the lack of reports on long-term complications. This issue warrants more prospective and randomized studies with larger samples.

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