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Laparoscopic cholecystectomy: Assessing the operation outcomes of a single surgeon in his first two years

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Abstract

Laparoscopic cholecystectomy (LC) has solidified its role as the gold standard for managing symptomatic gallstones, acclaimed for its short hospital stay, quick recovery, minimal trauma, and less need for postoperative pain management. This study aims to address potential trust issues related to LC procedures and the surgeon by evaluating the overall conditions and outcomes of patients who underwent laparoscopic cholecystectomy at a single center by a single doctor within two years following the completion of their specialty training. The goal is to assess and establish the reliability of LC applications and the surgeon's competency in a practical setting. This retrospective study analyzed hospital records from 2021 to 2023, involving patients who underwent laparoscopic cholecystectomy performed by a single surgeon who completed his specialty training two years prior. The study comprehensively evaluated the medical files of 253 patients treated by this surgeon. Key findings reveal an average surgery time of 37.9 minutes-significantly less than commonly cited durations in medical literature. The study also reported a notably low conversion rate to open surgery at 2.4%, which underscores the safety and feasibility of LC even in complicated cases like acute cholecystitis. While complications were minimal, the occurrence of bile duct injuries at a rate of 3.1% suggests the need for improved training and preventive protocols. This research emphasizes the critical role of continual training and experience for young surgeons, aiming to bolster public confidence in their capabilities and promoting wider acceptance of minimally invasive surgical techniques.

Keywords: Laparoscopic cholecystectomy, gallbladder disease, surgical training, minimally invasive surgery, postoperative complications

Introduction

Laparoscopic cholecystectomy is the most frequently implemented treatment method for symptomatic gallbladder disease and biliary pathology and is recognized as the gold standard surgical procedure for gallbladder disease management [1]. Symptomatic gallbladder disease generally includes complications such as pain, infection, and other issues primarily caused by gallstones. Laparoscopic cholecystectomy is performed to alleviate these symptoms and enhance the patient's health status. This minimally invasive procedure utilizes small incisions and is aided by a camera. Unlike traditional open cholecystectomy, which requires larger incisions, the surgeon makes small cuts in the abdominal area to insert a laparoscope; a thin tube containing a camera and light. This setup allows the surgeon to view the inside of the abdomen clearly on a large monitor, facilitating precise

movements necessary for the removal of the gallbladder. Today, laparoscopic cholecystectomy (LC) is indicated for conditions including cholecystitis, symptomatic gallstone disease, biliary dyskinesia, acalculous cholecystitis, gallstone pancreatitis, and the treatment of gallbladder masses and polyps [2]. The use of small incisions reduces postoperative pain and lowers the risk of complications. Patients typically recover faster from LC compared to traditional open cholecystectomy and can return to their normal activities sooner. Most patients can go home the day after surgery. The smaller incisions also result in less visible scarring, which is cosmetically preferable [3].

Laparoscopic cholecystectomy is considered a safe and effective treatment method due to advanced surgical techniques and equipment. The reduced risks and improved recovery processes it offers make it the gold standard for the treatment of gallbladder

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disease, leading to its widespread use in Türkiye. However, it is well-known that public concerns about the reliability of LC practices and the competence of the surgeon are frequently raised. This study aims to address potential trust issues related to LC procedures and the surgeon by evaluating the overall conditions and outcomes of patients who underwent laparoscopic cholecystectomy at a single center by a single doctor within two years following the completion of their specialty training. The goal is to assess and establish the reliability of LC applications and the surgeon's competency in a practical setting.

Material and Methods

Study Design

This retrospective study analyzed hospital records from 2021 to 2023, involving patients who underwent laparoscopic cholecystectomy performed by a single surgeon who completed his specialty training two years prior. The study comprehensively evaluated the medical files of 253 patients treated by this surgeon.

Demographic data, manifestations of acute pancreatitis, intraoperative findings, rates of conversion to open surgery, postoperative complications, and the term of lengths of hospital stay were systematically reviewed. It was noted that among the patients whose files were examined, 151 were referred from the gastroenterology clinic, 78 were scheduled as elective cases, and 24 were emergent admissions from the emergency department.

The research concentrated on analyzing patients' demographic profiles, surgical indications, physical status, duration of operations, the term of lengths of hospital stay, and both intraoperative and postoperative complications. Ethical clearance for this study was granted by the relevant the Non-interventional Clinical Researches Ethics Committee (Date: 12.06.2024, Decision No: 2024/6-6).

Evaluations/Statistical Analyses

The collected data were classified, assessed, and interpreted following the methodologies previously established in the literature, enhancing our understanding of surgical outcomes and patient care strategies.

Results

Patient Demographics and Surgical Outcomes

This study involved a detailed analysis of 253 patients, with a substantial female majority of 191, compared to 62 males. The average age of the patients who underwent surgery was 50.2 years-females averaged 47.3 years and males 59.3 years. The variability in surgery durations ranged from 16 to 118 minutes, with an average surgical time of approximately 37.9 minutes. These figures underscore the diverse patient demographics and the complex nature of the procedures undertaken.

Hospital Stay and Postoperative Recovery

Patients generally experienced a short hospital stay, with an average duration of 1.2 days. However, those who developed complications during the postoperative period had significantly longer stay, averaging 6.2 days, highlighting the impact of

surgical complications on recovery times. This correlation between complications and extended hospital stay is documented in Table 1, which also details the American Society of Anesthesiologists (ASA) classification, reflecting the preoperative health status of the patients.

Table 1. Demographic data and ASA

Average age	50.2 year (n=253)
Female	47.3 year (n=191)
Male	59.3 year (n=62)
Surgery duration	Mean=37.9 min (16-118)
Hospital stay	Mean=1.2 day (1-14)
Hospital stay for patients with complications	Mean=6.2 day (4-14)
ASA criteria	n=253
ASA I	54 (21%)
ASA II	99 (39%)
ASA III	69 (27%)
ASA IV	31 (13%)

ASA: American Society of Anesthesiologists

Preoperative Interventions and Diagnoses

A notable subset of 45 patients underwent Endoscopic Retrograde Cholangiopancreatography (ERCP) prior to their cholecystectomy, with an average interval of 5.2 days between the two procedures. The primary reasons for this intervention included cholestasis, choledocholithiasis, and acute pancreatitis, as detailed in Table 2. The pathological findings from the surgeries, such as chronic cholecystitis, acute cholecystitis, and cholelithiasis, are elaborately presented in Table 3. These insights are crucial for understanding the underlying health conditions that necessitate surgical intervention.

Table 2. Reasons for preoperative ERCP

Preop ERCP	n=45 (17.7%)
Choledocholithiasis	11
Acute pancreatitis	8
Signs of cholestasis	21
Cholangitis	2
Intrahepatic bile duct dilation without stones	3

ERCP: endoscopic retrograde cholangiopancreatography

Table 3. Pathological diagnoses of patients

Pathological diagnoses	n=269
Acute cholecystitis	39 (15%)
Cholelithiasis (no inflammation)	34 (13%)
Chronic cholecystitis	165 (65%)
Xanthogranulomatous cholecystitis	8 (3%)
Adenocarcinoma	1 (0.39%)
Intestinal metaplasia	7 (2.7%)
Pseudopyloric metaplasia	3 (1.1%)
Biliary intraepithelial neoplasia	3 (1.1%)
Adenomyoma	2 (0.7%)
Chronic follicular cholecystitis	2 (0.7%)
Benign polyp	5 (2%)

Complex Cases and Surgical Challenges

In one exceptional case, a patient diagnosed with adenocarcinoma underwent a subsequent operation for liver bed resection. This underscores the critical nature of pathological evaluations in surgical outcomes. Postoperative ERCP was necessary for 17 patients, indicating ongoing complications such as choledochal injuries. Notably, five patients suffered from Strasberg Type D choledochal injuries, necessitating the placement of stents, which were later removed after three months. The detailed nuances of these procedures are captured in Table 4, while reasons for converting from laparoscopic to open surgery in six cases are discussed in Table 5.

Table 4. Postop ERCP causes	
Postop ERCP	n=17 (6.7%)
Bile duct injury	5
Minor hepatic duct injury	1
Postoperative acute pancreatitis	2
Postoperative cholestasis	9
ERCP: endoscopic retrograde cholangiopancreatography	

Table 5. Reasons for conversion to open surgery	
Reasons	n=6 (2.3%)
Bleeding	1
Mirizzi Type Va	1
Mirizzi Type 1	1
Excessive fibrosis in Hartmann's pouch	3

Mirizzi Syndrome

A rare but significant finding was the detection of Mirizzi syndrome in four patients, classified under the Csendes system-with three cases being Type 1 and one as Type Va. This condition led to the decision to convert from laparoscopic to open surgery in one patient due to severe gallbladder contraction and loss of the gallbladder lumen, as documented in Figure 1. This highlights the complexity of managing gallbladder diseases when they present with such anatomical challenges.

Mirizzi syndrome was detected in 4 of the 253 patients (Figure 1). Three patients with Mirizzi syndrome were classified as Type 1 according to the Csendes classification, while one patient was identified as Type Va. of these four, two underwent laparoscopic cholecystectomy while the other two were subjected to open surgery. A decision to convert to open surgery was made and implemented for the patient with Type Va diagnosed Mirizzi syndrome, where the gallbladder was fibrotic and contracted and the gallbladder lumen was noted as lost. Two approximately 2 cm stones fistulized in the common bile duct and the lesser curvature of the stomach were also recorded. Due to the full-thickness fistulization in the common bile duct, a hepaticojejunostomy was performed, and the patient was discharged on postoperative day 10. The survival rate for all operated patients was determined to be 100%. The number of patients with complications and the types of complications are presented in Table 6. A 56-year-old patient

with known coronary artery disease (bypass) and hypertension underwent laparoscopic cholecystectomy under ASA 4. Cardiac arrest occurred during the operation, but the patient was revived after 6 minutes of effective CPR. The patient was discharged on the second postoperative day after a day in intensive care. The cardiac arrest was hypothesized to have been possibly triggered by increased intra-abdominal CO₂ pressure.

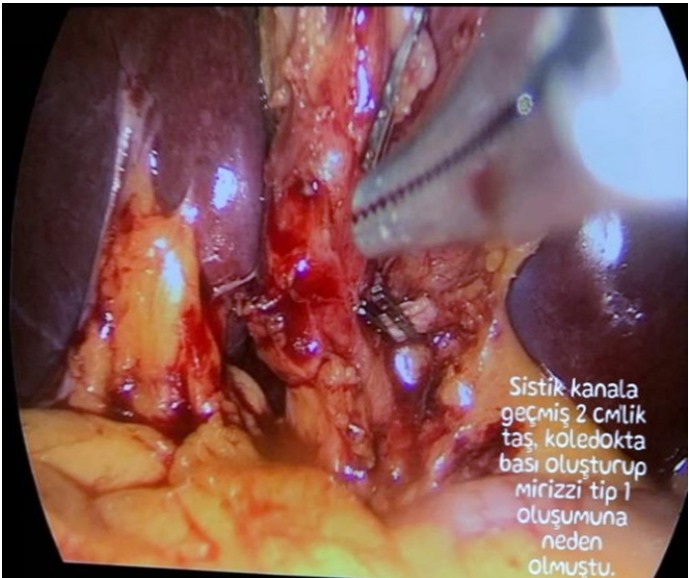


Figure 1. Mirizzi syndrome (original)

Table 6. Complications developed in patients	
Postoperative major complications	n=23 (9%)
Bleeding	6 (2.3%)
Bile duct injury	8 (3%)
Bilioma	3 (0.11%)
Perihepatic abscess	2 (0.7%)
Cardiac arrest	1 (0.39%)
Acute biliary pancreatitis	2 (0.7%)
Minor complications diagnosed intraoperatively	n=45 (17.7%)
Gallbladder perforation	34 (13.4%)
Spread of millimetric stones into the abdomen	11 (4.3%)
Minor complications diagnosed postoperatively	n=8 (3%)
Wound site infection	5 (1.9%)
Bleeding at the trocar site	3 (1.1%)

Survival and Postoperative Complications

The survival rate post-surgery was 100%, a testament to the efficacy of the surgical procedures and postoperative care. However, complications such as cardiac arrest during surgery in a high-risk patient and instances of biliary peritonitis requiring urgent surgical interventions underline the critical nature of postoperative monitoring and management. These complications and their management strategies are elaborately discussed, providing a comprehensive overview of the potential challenges in postoperative care.

Pancreatitis and Biliary Injuries

The incidence of pancreatitis before and after surgery also presents significant clinical interest. The proactive management of these conditions, including the use of ERCP to remove stones, is crucial in preventing severe outcomes. Additionally, intraoperative detection of Strasberg Type D biliary injuries in three patients necessitated immediate laparoscopic repairs, emphasizing the importance of vigilance during surgeries to prevent long-term complications (Figure 2). This comprehensive analysis not only provides insights into the surgical management of gallbladder diseases but also underscores the complexities involved in patient care before, during, and after surgery. This enriched narrative helps paint a detailed picture of the clinical landscape in which these surgeries occur, highlighting the need for precise surgical skills and meticulous postoperative care.

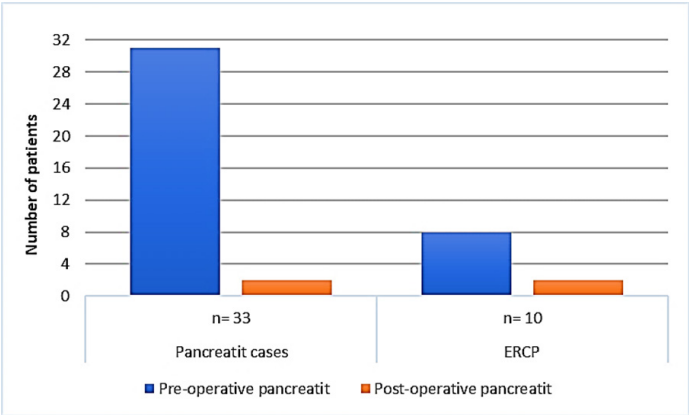


Figure 2. Pancreatitis cases and endoscopic retrograde cholangiopancreatography (ERCP)

Pancreatitis Management

In the study cohort, 31 patients experienced pancreatitis prior to surgery, and 2 developed the condition postoperatively. For the preoperative cases, 8 of the 31 patients received ERCP 1 to 2 days before undergoing laparoscopic cholecystectomy, highlighting the proactive management to mitigate the risk and complications associated with pancreatitis. The postoperative pancreatitis cases were also managed with ERCP, during which millimetric stones were successfully removed, as depicted in Figure 2. This strategy underscores the critical importance of preemptive and responsive interventions in the management of gallbladder and biliary tract diseases.

Biliary Injuries

During the surgeries, three patients were identified with Strasberg Type D biliary injuries, featuring lesions ranging from 0.1 to 0.5 cm. These injuries were promptly addressed with laparoscopic primary repair, showcasing the agility and precision required in modern surgical practices. The absence of drainage by the fifth postoperative day facilitated their discharge, with follow-up checks confirming full recovery without further complications. The etiology of these injuries was traced back to technical factors, specifically the inadvertent severing by

metallic clips at the junction of the cystic and common bile ducts. The affected gallbladders and cystic ducts were noted to be unusually edematous and fragile, indicating a predisposition to such complications, as detailed in Figure 3. Postoperatively, an additional five patients were observed to have bile leakage on the first day, necessitating further ERCP interventions. These patients, who all sustained lateral wall injuries of the common bile duct between 0.5 to 1 cm, were treated with stents to ensure bile duct integrity. All five were categorized under Strasberg Type D injuries. Successful management of these complications was confirmed as no drainage fluid was observed by the fifth day post-operation, and the patients were discharged. Subsequent medical follow-ups revealed the development of biliomas in three patients and perihepatic abscesses in two, which were medically managed over a month. Ultimately, their recovery was uneventful, and stents were removed via ERCP three months later, marking a successful resolution to a potentially complex situation. These findings illustrate the intricate challenges and adept responses in managing pancreatitis and biliary injuries within the surgical setting, emphasizing the role of vigilant perioperative care and advanced surgical techniques to mitigate risks and enhance patient outcomes.

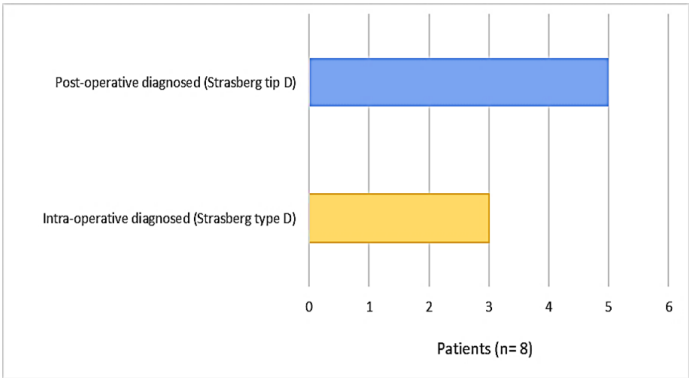


Figure 3. Biliary injuries

Discussion

LC has replaced open cholecystectomy as the gold standard for the treatment of symptomatic gallstones. Its proven advantages, such as shorter hospital stay, rapid return to full activity, minimal surgical trauma, reduced need for postoperative analgesia, and better cosmetic results, have increased its popularity among surgeons worldwide [4].

The majority of patients reviewed in our files (75.4%) were female; this is consistent with other studies worldwide. This reflects a higher incidence of gallbladder disease among women in the patient population studied [5,6]. The demographic limitation, with a female-majority population (75.4%), necessitates future multisite studies to enhance representativeness.

In cases of acute cholecystitis, the duration of LC has been evaluated. Kanat et al. reported that the average operation time was 62 minutes [7]. In the studies by Hu et al., the average

surgery time was 65 minutes when cholecystectomy was performed within the first 24 hours after ERCP, and 66 minutes on the third day post-ERCP [8]. Our study has found the average surgery time to be significantly shorter at 37.9 minutes compared to the literature.

The short stay in hospital and rapid recovery associated with laparoscopic surgery are some of its most appealing aspects. This is particularly important in low-income countries with limited bed capacity. In our study, the average hospital stay was 1.2 days, with most patients being discharged within 24 hours. Patients who developed complications had longer hospital stay, averaging 6.2 days.

Our conversion rate of 2.4% was lower compared to the 4% to 7% rates reported from high-volume centers. Conversion rates tend to be higher, particularly when operating on patients with acute cholecystitis [9,10]. The main reason for conversion in our study was dense adhesions in the Calot's triangle, distorting the anatomy and hindering safe laparoscopic dissection.

The incidence of major common bile duct injuries reported in the literature varies between 0.08% and 0.3%. When "minor" bile duct injuries are included, the reported cases can vary between 0.3% and 1.5% [11].

Researchers have shown that bile duct injuries occur more frequently during laparoscopic cholecystectomies compared to open surgeries, which initially caused some hesitation in adopting this technique. Bile duct injuries can be recognized intraoperatively or suspected postoperatively in patients presenting with bile peritonitis, biloma, or bile leaks if a drain is placed. The diagnosis can be confirmed by endoscopic retrograde cholangiopancreatography and treated via sphincterotomy. Repairs can be treated with an open procedure involving a biliary-enteric anastomosis [12].

In our study, bile duct injuries were observed during surgery in 3 patients and noticed postoperatively in 5, totaling 8 patients (3.1%). The higher incidence of bile duct injuries in our patients may be attributed to most being complex cases referred from the gastroenterology clinic. While the higher bile duct injury rate (3.1%) in our study compared to the literature is likely attributable to the substantial number of complex cases referred from the gastroenterology clinic, addressing this issue necessitates the implementation of advanced training protocols and preventive strategies aimed at refining anatomical precision and enhancing intraoperative decision-making processes.

Bleeding is a common complication during laparoscopic cholecystectomy and a frequent reason for conversion. The literature highlights that clinically significant bleeding can occur in about 0.5% of laparoscopic cholecystectomies. Factors contributing to operative site bleeding include acute inflammation, portal hypertension, adhesions, coagulopathy, and rough technique. The sources of bleeding vary, but the cystic

artery and minor accessory vessels in the gallbladder fossa are the most common [13]. Only one patient (0.4%) in our study required intervention for significant bleeding, while others were managed medically. Our results show a slightly lower incidence of bleeding at 0.1% compared to the previous declarations.

Compared to open surgery, wound complications (such as wound sepsis, dehiscence, and late incisional hernia) are generally less frequent in laparoscopic cholecystectomy. Infection at the umbilical port site can be more common when the gallbladder is removed without a retrieval bag [14]. In our study, wound site infections were identified in 5 patients and were managed with simple medical treatment, aligning with findings in the literature. Complications such as bleeding and wound site infections, observed in this study, align with reported rates in the literature. These findings underscore the importance of rigorous intraoperative techniques and postoperative care.

Acute pancreatitis is a common cause of acute abdomen in the emergency department and is associated with significant morbidity and even mortality. Acute biliary pancreatitis accounts for about 30-55% of acute pancreatitis cases, with approximately 80% of these patients experiencing acute mild biliary pancreatitis. It has been suggested that cholecystectomy significantly reduces the recurrence of acute biliary pancreatitis, as well as the incidence of related biliary events such as cholecystitis and cholangitis [14]. Of our patients, 31 experienced preoperative pancreatitis, and two had postoperative pancreatitis. Of the 31 with preoperative pancreatitis, 8 underwent ERCP 1-2 days before laparoscopic cholecystectomy. The two patients with postoperative pancreatitis also underwent ERCP, and microliths were cleared. Our findings on pancreatitis are consistent with previous studies.

Conclusion

Laparoscopic cholecystectomy is among the most frequently performed surgical procedures. Like all surgical practices, experience and expertise are certainly important in laparoscopic cholecystectomy. This study reviewed laparoscopic cholecystectomy cases performed by a single surgeon at a single center within the first two years after completing specialist training. Our findings indicate that the average surgery duration, the number of the hospital stay days, and the rate of conversion to open surgery were lower compared to the literature; however, the incidence of bile duct injuries was found to be higher. No significant differences were observed in other complications and assessments. Our results suggest that young surgeons acquire good knowledge, experience, sensitivity, and developable expertise during general surgery training. Future research should focus on structured multicenter studies to mitigate complications and enhance the generalizability of outcomes. Incorporating long-term follow-up data will strengthen the evidence for the safety and efficacy of laparoscopic cholecystectomy performed by young surgeons.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The study was carried out with the permission of the Non-interventional Clinical Researches Ethics Committee (Date: 12.06.2024, Decision No: 2024/6-6). Uploaded in document of Ethics Committee permission in pdf formatting.

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