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Clinical outcomes and feasibility of laparoscopic cholecystectomy in elderly patients

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ABSTRACT

Aims: Laparoscopic cholecystectomy (LC) is considered to be the gold standard treatment of symptomatic cholelithiasis and acute cholecystitis. However, there is still a controversy about this approach in elderly patients. In some cases, surgeons tend to postpone the LC in elderly patients due to a higher risk of complications. This study evaluated the feasibility of LC in elderly patients, in a comparative approach with adult age patients.

Methods: We retrospectively analyzed patients who were operated on with a diagnosis of cholelithiasis or acute cholecystitis at Samsun Training and Research Hospital, General Surgery Unit between December 2015 and December 2019. The patients were divided into two groups: adult age (<65 years of age) and elderly (≥65 years of age). Basic characteristics, American Society of Anesthesiologists (ASA) scores, preoperative ultrasonography (USG) findings and laboratory results, preoperative history of acute cholecystitis or pancreatitis attack, surgery type, complications, length of hospital stay, intensive care unit (ICU) admissions, operation time and mortality were compared between the groups.

Results: The study included 620 patients (age, mean±standard deviation; 52±14.9, female 73%), of whom 481 were in the adult group (age, mean±standard deviation; 46±11.5, female 74.7%) and 139 (age, mean±standard deviation; 71±5.8, female 67.7%) were in the elderly group. Patients in the elderly group had higher ASA scores compared with the adult age group (ASA 3; 27.3% vs. 5.8%, p<0.001). Preoperative acute cholecystitis findings on USG (3.7% vs. 7.1%, p=0.08) and history of previous cholecystitis/pancreatitis (19.1% vs. 26.6%, p=0.055) were comparable between the groups. Postoperative complication rates (2.5% vs. 5.7%, p=0.055) and severity of complications according to the Clavien-Dindo (CD) classification (CD 1-2; 1.6% vs. 2.8%, p=0.456) were similar in the two groups. The length of hospital stay (2.5±1.6 days vs. 3.2±2.2 days, p=0.028) and the rate of ICU admission (2.9% vs. 20.8%) were significantly higher in the elderly group compared with the adult age patients.

Conclusions: LC is overall a safe and feasible treatment strategy with low complication rates in elderly patients. However, the risk of longer hospital stay and ICU admission were found higher than adult age patients in the current study.

Introduction

Laparoscopic cholecystectomy (LC) is one of the most common abdominal surgeries in the world. It is superior to less pain and faster recovery times than primary open surgery. It also offers a safe and cost-effective procedure compared with open cholecystectomy (1). After German surgeon Erich Mühe performed LC for the first time in 1985, French surgeon Philip Mouret performed the first LC in 1987 (2). With the advances in surgical skills and technology, LC has become the gold standard surgery for gallstone diseases and acute cholecystitis (3,4).

The incidence of cholelithiasis and acute cholecystitis increases with age (4,5). The population of the world is aging, necessitating improvements in healthcare services and quality of life. While the global population is still growing, the number of people aged 65 or over is estimated to more than double between 2019 and 2050 (6). It is suggested that due to the comorbidities in the elderly patients, more complications can be

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observed especially when performing a laparoscopic operation (7). Age-related comorbidities are considered the most important factors that may increase postoperative morbidity and mortality (8). Also, there is still controversy about the feasibility of LC in elderly patients in the literature (9). This study investigated the feasibility of LC in elderly patients compared with adult age patients.

Methods

This retrospective study enrolled patients aged 18 years or older who underwent cholecystectomy (open, laparoscopic, or converted to open) in University of Health Sciences Türkiye Samsun Training and Research Hospital, General Surgery Unit between December 2015 and December 2019. A total of 661 records were initially identified. Patients who underwent primary open cholecystectomy (n=32) and patients with missing data (n=9) were excluded. The study protocol was approved by the Non-invasive Investigation Ethics Committee of our hospital.

The screened indications for surgery were acute cholecystitis, biliary pancreatitis, symptomatic cholelithiasis, and gallbladder polyposis. The patients who underwent emergency surgery due to gallbladder perforations and gangrenous cholecystitis were also included in the study. The patients who were operated on 72 h after emergency admission were categorized as the emergency surgery group. Patients who underwent percutaneous cholecystostomy were excluded from this study. The diagnosis of acute cholecystitis was made by clinically right upper quadrant pain, Murphy sign, and 38 °C or higher body temperature, leukocytosis, gallbladder wall thickening, gallbladder distention, and pericholecystic fluid collection on ultrasonography (USG) or computed tomography.

The participants were classified into two groups: <65 years of age (adult group) and ≥65 years of age (elderly group). Age, gender, American Society of Anesthesiologists (ASA) scores, preoperative USG findings (acute cholecystitis, cholelithiasis, and gallbladder polyposis), preoperative laboratory tests [complete blood counts, aspartate aminotransferase (AST), alanine aminotransferase, albumin, and bilirubin levels], comorbidities, type of surgery (laparoscopic and conversion to open), complications, length of hospital stay, intensive care unit (ICU) admission and mortality were recorded. Clavien-Dindo (CD) classification was used to determine the severity of complications (10). CD score ≥3 was compared with a CD score <3 in the two groups.

LC technique applied in our surgery clinic in the examined period of the study was the standard North American four ports technique (11). Pneumoperitoneum in this approach is established using a Veress needle or Hasson cannula according to the surgeon's choice and the patient's history of past abdominal surgery. After careful dissection, the cystic duct and artery are clipped and cut. An epigastric port site is used to retrieve the gallbladder. Routine intraoperative cholangiography is not used. The use of drain tubes is chosen by the surgeon on demand. Dense adhesions, evidence of common bile duct injury, and uncontrollable hemorrhage are the main reasons for conversion to open surgery. When conversion to open cholecystectomy is needed a subcostal incision is used. Prophylactic antibiotics are used in all operations.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS) Statistics for Windows, version 25.0 (IBM Corp., Armonk, NY) was used for all statistical analysis. Quantitative variables were presented as means±standard deviation (SD) and medians (1st quartile-3rd quartile). Categorical variables were expressed as percentages. When comparing two groups the chi-square test was used to compare nominal variables. The Student's t-test was used for normally distributed data and the Mann-Whitney U test for non-normally distributed data. P<0.05 was considered the level of statistical significance.

Results

A total of 620 patients (age, mean±SD; 52±14.9, female 73%) were eligible for the study. Of these, 481 (77.5%) (age, mean ± SD; 46±11.5, female 74.7%) were adult patients and 139 (22.5%) (age, mean±SD; 71±5.8, female 67.7%) were elderly (Table 1). There was no gender difference between the two groups. A significant difference was observed in terms of ASA classification. While the proportion of ASA grade 3 and grade 4 in the elderly patient group was 27.3% and 1.4% respectively, this rate was 5.8% and 0.2% in the adult age group. Similar to this finding, the number of of comorbidities was higher in the elderly group. The most common comorbidity was hypertension in both groups (5.4% vs. 15.1%, respectively).

The proportion of patients with preoperative acute cholecystitis on USG was similar between the groups (p=0.08) (Table 1). Preoperative white blood cell count, hemoglobin, AST, and direct bilirubin levels were also similar (Table 2).

Postoperative complication rate was higher in the elderly patient group, however, the difference was marginally nonsignificant (2.5% vs 5.7%, p=0.055). There was no significant difference in the degree of complications between the groups (Table 3). The list of complications are listed in Table 4. While postoperative bleeding was more frequent in the adult age group, bile leakage, wound infection, and other surgery-related complications were similarly recorded in the two groups.

Most operations were completed laparoscopically in both groups (98.3% versus 95.6%). However, 8 (1.7%) patients in the adult age group and 6 (4.4%) patients in the elderly group required conversion to open cholecystectomy, mainly because of the difficulty in gallbladder exposure with unclear anatomy and safety issues. The conversion rate between the groups was statistically similar (p=0.064). No deaths were recorded in the whole sample.

Table 1. Basic demographic and clinical characteristics

	Age <65 years (n=481)	Age ≥65 years (n=139)	p
Age, years, mean ± SD	46.39±11.57	71.82±5.82	<0.001
Sex			
Female, n (%)	359 (74.7)	94 (67.7)	0.101
ASA classification, n (%)			
ASA1	174 (36.1)	32 (23)	**<0.001**
ASA2	278 (57.7)	67 (48.2)	
ASA3	28 (5.8)	38 (27.3)	
ASA4	1 (0.2)	2 (1.4)	
Preoperative USG findings, n (%)			
Acute cholecystitis	18 (3.7)	10 (7.1)	0.08
Cholelithiasis	421 (87.5)	127 (91.3)	
Gallbladder polyps	42 (8.8)	2 (1.4)	
Previous cholecystitis/pancreatitis, n (%)	92 (19.1)	37 (26.6)	0.055
Comorbidities, n (%)			
Hypertension	26 (5.4)	21 (15.1)	**<0.001**
CAD/CHF	17 (3.5)	19 (13.6)	**<0.001**
Diabetes mellitus	16 (3.3)	10 (7.1)	**0.044**
COPD/asthma	22 (4.5)	6 (4.3)	0.898

SD: Standard deviation, ASA: American Society of Anesthesiologists, USG: Ultrasonography, CAD: Coronary arterial disease, CHF: Congestive heart failure, COPD: Chronic obstructive pulmonary disease

Table 2. Preoperative laboratory results

	Age <65 years (n=481)	Age ≥65 years (n=139)	p
WBC count (1,000/mL)	7.4 (6.2-8.8)	7.0 (6.0-8.9)	0.971
Hb value (g/dL)	13.3 (12.2-14.4)	13.0 (12.1-14.1)	0.161
Albumin (g/dL)	4.2 (4.0-4.5)	4.0 (3.8-4.3)	**<0.001**
AST (U/L)	22 (18-27)	22 (19-27)	0.841
ALT (U/L)	20 (15-30)	18 (14-26)	**0.049**
Total bilirubin (mg/dL)	0.5 (0.4-0.7)	0.6 (0.4-0.8)	**0.047**
Direct bilirubin (mg/dL)	0.1 (0.1-0.1)	0.1 (0.1-0.2)	0.102

Values are presented as median (1st quartile-3rd quartile).
WBC: White blood cell, Hb: Hemoglobin, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase

Table 3. Surgical outcomes

	Age <65 years (n=481)	Age ≥65 years (n=139)	p
Surgery type, n (%)			
Laparoscopic	473 (98.3)	133 (95.6)	0.064
Conversion to open	8 (1.7)	6 (4.4)	
Complication, any, n (%)	12 (2.5)	8 (5.7)	0.055
Clavien-Dindo classification, n (%)			
Grade 1-2	8 (1.6)	4 (2.8)	0.456
Grade 3-5	4 (0.8)	4 (2.8)	
Length of hospital stay, days, mean±SD*	2.5±1.6	3.2±2.2	**<0.001**
Intensive care unit requirement, n (%)	14 (2.9)	29 (20.8)	**<0.001**
Operation time, minutes, median (1st quartile-3rd quartile)	49 (39-59)	49 (39-60)	0.450
Mortality, n (%)	0	0	

SD: Standard deviation

Table 4. Major complications

Complications, n (%)	Age <65 years (n=12)	Age ≥65 years (n=8)
Bile duct injury	2 (16.6)	0
Bile leak	2 (16.6)	2 (25.0)
Postoperative bleeding	3 (25.0)	1 (12.5)
Wound infection	2 (16.6)	2 (25.0)
Surgery related to other complications (ileus, trocar hernia)	2 (16.6)	2 (25.0)
Pulmonary complications (atelectasis, pneumonia)	1 (8.3)	1 (12.5)

Discussion

Although LC is considered the gold standard method for treating gallbladder diseases, it remains a challenge for surgeons in elderly patients. Owing to the high-risk comorbidities and reduced physiological reserves, elderly patients are likely to have more complications after surgery (7,12-15). Recent publications have reported almost 30% of elderly patients who have gallbladder diseases are not operated due to the fear of age-dependent comorbidities (16). However, it is also well known that non-operative treatment options may cause recurrent biliary problems.

In this study, we observed significantly higher ASA scores in the elderly patients who underwent LC. However, preoperative USG findings, sex distribution, and preoperative history of acute cholecystitis or pancreatitis were similar between the adult age and elderly groups. These findings were comparable with the literature (5,7,14,17).

When the adult age and elderly groups were compared for the postoperative outcomes, the length of hospital stay and the rate of ICU admission were higher in the elderly group. However, conversion to open surgery, operation time and the rates of complications were similar in our study. In parallel to our findings, Bhandari et al. (18) found no significant differerences in the mean operation time and complication rates between the age groups. On the other hand, despite the similarities in overall complication rates, elderly patients had slightly more severe complications (grade 3 or higher) than adult patients according to the CD classification. The severity of complications and preoperative comorbid conditions could be linked to longer length of hospital stay and higher ICU admission rates in the elderly group.

In a retrospective study, van Heesewijk et al. (3) found more complication rates in the elderly patients. In our study, we also found more complication rates in elderly patients (2.5% vs 5.7%) but the difference was not statistically significant. According to the CD classification system, low severity complications (grade 1-2) were more common in our total study group. This finding is consistent with the existing literature (13,16).

The reported conversion rates in previous studies varied from 1.5% to 20% in elderly patients (16). We found a 4.4% conversion rate in the older age group, which was not significantly different from the adult age group. In our study, we did not analyze the patients with primary open cholecystectomy mainly to demonstrate the safety of laparoscopic cholecystectomy in elderly patients. On the other hand, Fukami et al. (14) included primary open cholecystectomies in their study and reported a higher rate of primary open cases in the octogenarian group. They stated that in high-risk patients (i.e., severe cardiac disease) their choice was not LC.

Previous studies have reported mortality rates between 0 and 1.6% after LC in elderly patients (8,19). In octogenarian patients, the rate of mortality increases beyond 6% (3,14,18,20). However, no mortality was recorded in our study.

This study has some limitations. First, the design of this study was retrospective. Therefore, a selection bias and missing data may not be neglicable. Second, we excluded patient who were treated with percutaneous cholecystostomy. This treatment method is not commonly used in our surgery department due to the lack of experienced interventional radiologists. And lastly, we did not analyze the long-term effects of complications, as we focused on early complications. Bile duct injury and bile leaks can lead to further operations and interventions like endoscopic retrograde cholangiopancreatography (ERCP) and nasobiliary tube placement. These patients may have benign biliary strictures or past cholangitis events. Therefore, their quality of life may have been impaired.

Conclusion

This study revealed statistically similar rates of postoperative complications and conversion rates between elderly and adult patients who underwent LC. The results overall suggest that LC in elderly patients is safe and feasible with acceptable complication rates.

Ethics

Ethics Committee Approval: The study was approved by the Samsun Training and Research Hospital of Non-invasive Investigation Ethics Committee (protocol number: GOKA/2019/3/12, date: 25.12.2019).

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.B.Ç., A.C.S., Concept: A.B.Ç., Design: A.B.Ç., Data Collection or Processing: A.B.Ç., S.O., A.B.Ç., Analysis or Interpretation: A.B.Ç., S.O., A.B.Ç., Literature Search: A.B.Ç., A.B.Ç., Writing: A.B.Ç.

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