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Outcomes of laparoscopic cholecystectomy in the elderly: A single-center study

Tuğrul Demirel,[1] Zeliha Türkyılmaz[2]

[1]Department of General Surgery, Trakya University, Faculty of Medicine, Edirne, Türkiye
[2]Department of General Surgery, Kirklareli University, Faculty of Medicine, Kirklareli, Türkiye

ABSTRACT

Introduction: The elderly population is at high risk for perioperative morbidity and mortality due to their disease profiles. This study aimed to evaluate the results of laparoscopic cholecystectomy (LC) performed in a single center in terms of young and elderly patients.

Materials and Methods: Patients who underwent LC between January 2022 and March 2023 were evaluated retrospectively. Two hundred and eighty-three patients were included in the study. Patients were divided into two groups: ≥65 years and <65 years, and perioperative findings were compared.

Results: Patients aged ≥65 had higher rates of heart disease, lung disease, kidney disease, and neurological disease; American Society of Anesthesiologists Score II–III; longer length of hospital stay (LOS); and longer length of intensive care unit (ICU) stay than patients aged <65. In addition, patients aged ≥65 had lower levels of hematocrit, hemoglobin, platelets, and albumin than patients aged <65, and patients aged ≥65 had higher levels of urea, creatinine, and total bilirubin than patients aged <65. High white blood cell count, C-reactive protein, aspartate transferase, and bilirubin values, as well as low hematocrit, hemoglobin, and albumin values, were associated with longer LOS and ICU stay. In addition, high aspartate transferase, alanine aminotransferase, alkaline phosphatase, direct bilirubin, and total bilirubin values were associated with increased development of complications. No mortality was observed during the study period.

Conclusion: LC is a safe method and has acceptable mortality and morbidity rates, even in patients with high comorbidities in elective conditions.

Keywords: Elderly, laparoscopic cholecystectomy, morbidity, mortality

Introduction

The population worldwide is rapidly aging, and the World Health Organization (WHO) estimates that the population over 60–65 will experience a significant increase, accounting for 22% of the world's population by 2050, outnumbering those under 15.[1] According to the March 2023 report of the Turkish Statistical Institute (TSI), there is a 22.6% increase in the population of people older than 65 years, from approximately 6.9 million in 2017 to 8.5 million in 2022. Projections estimate that the population of people over 65 will be around 25.6% of the total population.[2] Diseases such as cardiovascular, lung, and renal diseases, which affect surgical outcomes and lead to longer hospital stays, perioperative complications, and

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Correspondence: Tuğrul Demirel, M.D., Department of General Surgery, Trakya University, Faculty of Medicine, Edirne, Türkiye
e-mail: tugrul.demirel@gmail.com

higher mortality rates, are more common in the elderly.[3,4] Understanding the specific challenges that occur with age in surgery can help improve perioperative care.[5,6] To achieve the best possible surgical outcomes, risks should be carefully assessed and managed, taking into account the health profiles and comorbidities of the elderly population.[7]

Gallbladder diseases, such as acute cholecystitis (AC) or biliary colic, are among the most common surgical indications for hospitalization and gastrointestinal diseases in developed countries. The most common cause of AC is gallstones.[8] With the aging of the population, the likelihood of gallstones and other gallbladder diseases is also increasing.[9] Ten percent of men and 25% of women aged 60–69 years, and 24% of men and 35% of women aged 90 years and older, have been reported to have gallstones.[10] Cholecystectomy, the preferred treatment for AC, continues to be one of the most commonly performed procedures in the United States.[11] Laparoscopic cholecystectomy (LC), which is considered the gold standard treatment for AC, still has a 6–9% risk of severe complications and a 0.1–0.3% mortality rate.[12-14] AC is associated with a higher risk of postoperative complications in the elderly due to the presence of more comorbidities, decreased functional reserve, and poorer general condition.[15] However, it has been documented that elective LC (ELC) is better than conservative treatment in elderly patients with AC.[16] The treatment strategy for gallbladder diseases in elderly patients remains controversial. This study aimed to compare LC results in patients aged ≥65 and <65 years.

Materials and Methods

This study was conducted between January 2022 and March 2023 at the Department of General Surgery, Faculty of Medicine, Trakya University. Ethical approval was obtained from the Faculty of Medicine Ethics Committee, Trakya University. The study protocol was prepared in accordance with the Declaration of Helsinki. Inclusion criteria for the study were being over 18 years old and having undergone cholecystectomy. Exclusion criteria for the study were being under 18 years old, having undergone cholecystectomy secondary to another gastrointestinal surgery, and being pregnant. Two hundred and ninety-five patients were evaluated retrospectively, and 283 were included in the study.

The patients were divided into two groups: ≥65 years and <65 years old. Demographic data of the patients, including age, gender, history of hepatobiliary disease, laboratory findings, American Society of Anesthesiologists Score (ASA), need for perioperative endoscopic retrograde cholangiopancreatography (ERCP) or preoperative percutaneous transhepatic gallbladder drainage (PTGBD), type (laparoscopic or open approach) and setting (elective or emergency) of cholecystectomies, duration of surgery, length of hospital stay (LOS) and intensive care unit (ICU) stay, post-cholecystectomy complications, and mortality were compared between the age groups of 65 years and older and under 65 years.

Statistical Analysis

Statistical evaluation was performed using SPSS 20 statistical software. The Kolmogorov-Smirnov test was used to evaluate the conformity of the measured data to the normal distribution. Mean, standard error, median, minimum, and maximum values of continuous variables, as well as frequency and percentage values of categorical variables, were given. Fisher's Exact test was used for categorical data and the Mann-Whitney U test for continuous data in the comparison of data for patients under 65 and over 65 years of age. For statistical analysis results, a p-value of less than 0.05 was considered significant.

Results

Demographic and clinical data of the patients included in the study are presented in Table 1. One hundred and eighty-two (64.3%) of the patients were female and 101 (35.7%) were male, and the mean age was 57.50±14.14 (19–88) years. The mean length of stay in the ICU was 0.25±1.07 (0–12) days, and the mean LOS was 3.62±3.31 (0–28) days. The preoperative diagnosis was cholelithiasis in 231 (81.6%) patients, acute cholecystitis in 22 (7.8%) patients, and acalculous cholecystitis in 15 (5.3%) patients. When their clinical histories were examined, 164 (58.8%) patients had cholelithiasis, 48 (17%) patients had acute cholecystitis, and 32 (11.3%) patients had cholelithiasis + choledocholithiasis. Eighty-one (28.6%) of the patients had heart disease, 76 (26.9%) had hypertension, 39 (13.8%) had lung problems, 15 (5.3%) had kidney comorbidities, 14 (4.9%) had neurological comorbidities, and 14 (4.9%) had hematological comorbidities.

One hundred and seventeen (41.3%) patients were ASA I, and 140 (49.5%) were ASA II. Seventeen (5.5%) patients underwent PTGBD, 29 (10.2%) patients underwent preoperative ERCP, 6 (2.1%) patients underwent postoperative

Table 1. Demographic and clinical data of the patients participating in the study

Variables	Mean±SD Median (Min-Max)
Age, years	57.50±14.14 59 (19-88)
Surgery Time, minutes	82.32±33.35 75 (30-240)
ICU Stay, days	0.25±1.07 0 (0-12)
Hospital Stay, days	3.62±3.31 3 (0-28)
	n (%)
Gender	
Female	182 (64.3)
Male	101 (35.7)
Preoperative Diagnosis	
Cholelithiasis	231 (81.6)
Acute Cholecystitis	22 (7.8)
Acalculous Cholecystitis	15 (5.3)
GB Perforation	9 (3.2)
GB Polyp	5 (1.8)
Cholelithiasis + Choledocholithiasis	1(0.4)
Clinical History	
Cholelithiasis	164 (58.0)
Acute Cholecystitis	48 (17)
Cholelithiasis + Choledocholithiasis	32 (11.3)
Acalculous Cholecystitis	12 (4.2)
Acute Cholecystitis + Choledocholithiasis	7 (2.5)
Cholelithiasis+ Abdominal Wall Hernia	5 (1.8)
Cholecystitis + Choledocholithiasis	4 (1.4)
Cholelithiasis + Inguinal Hernia	3 (1.1)
Cholecystitis	2 (0.7)
GB polyp	2 (0.7)
Acalculous Cholecystitis + Umbilical Hernia	1 (0.4)
Cholelithiasis + Umbilical Hernia	1 (0.4)
GB polyp + Abdominal Wall Hernia	1 (0.4)
GB polyp + Umbilical Hernia	1 (0.4)
Cardiovascular Disease	
No	202 (71.4)
Yes	81 (28.6)
Hypertension	
No	207 (73.1)
Yes	76 (26.9)
Lung Disease	
No	244 (86.2)
Yes	39 (13.8)

Table 1. CONT.

Variables	n (%)
Renal Disease	
No	268 (94.7)
Yes	15 (5.3)
Neurological Disease	
No	251 (95.1)
Yes	14 (4.9)
Hematological Disease	
No	269 (95.1)
Yes	14 (4.9)
PTGBD	
No	266 (94.5)
Yes	17 (5.5)
Complication	
No	272 (96.1)
Biliary Drainage	10 (3.5)
Subhepatic Hematoma	1 (0.4)
ASA	
0	3 (1.1)
I	117 (41.3)
II	140 (49.5)
III	22 (7.8)
4	1 (0.4)
Surgical Method	
Laparoscopy	264 (93.3)
Laparotomy	19 (6.7)
ERCP	
No	244 (86.2)
Preop	29 (10.2)
Postop	6 (2.1)
Preop+Postop	4 (1.4)
Surgery	
Emergency	21 (7.4)
Elective	262 (92.6)

ASA; American Society of Anaesthesiologists Score; ERCP; Endoscopic Retrograde Cholangiopancreatography; GB; Gallbladder; ICU; Intensive Care Unit; PTGBD; Preoperative Percutaneous Gallbladder Drainage.

ERCP, and 4 (1.4%) patients underwent both preoperative and postoperative ERCP. Two hundred and sixty-two (92.6%) patients underwent elective surgery, while 21 (7.4%) underwent emergency surgery. Laparoscopic surgery was initiated in 272 patients; eight patients were converted to open surgery, while 264 (93.3%) underwent laparoscopic surgery. No complications were observed in 272 patients. Biliary drainage was observed in 10 (3.5%) patients, and subhepatic hematoma was observed in 1 (0.4%) patient. Postoperative ERCP was applied to 10 patients with biliary drainage, and percutaneous drainage was applied to one patient with subhepatic hematoma.

The comparison of data for patients aged ≥65 years and <65 years is presented in Table 2. When clinical history

Table 2. Comparison of data of patients over 65 years of age and under 65 years of age

	Age <65 (n:182)	Age ≥65 (n:101)	
Gender, n (%)			
Female	120 (65.9)	62 (61.4)	X2= 0.585
Male	62 (34.1)	39 (38.6)	p= 0.444
Clinic History, n (%)			
Cholelithiasis	104 (57.1)	60 (59.4)	X2= 21.225
Acute Cholecystitis	32 (17.6)	16 (15.8)	p= 0.021
Cholelithiasis + Choledocholithiasis	16 (8.8)	16 (15.8)	
Acalculous Cholecystitis	12 (6.6)	0 (0)	
Acute Cholecystitis + Choledocholithiasis	5 (2.7)	2 (2)	
Cholelithiasis+ Abdominal Wall Hernia	3 (1.6)	2 (2)	
Cholecystitis + Choledocholithiasis	4 (2.2)	0 (0)	
Cholelithiasis + Inguinal Hernia	1 (0.5)	2 (2)	
Cholecystitis	2 (1.1)	0 (0)	
GB polyp	0 (0)	2 (2)	
Acalculous Cholecystitis + Umbilical Hernia	1 (0.5)	0 (0)	
Cholelithiasis + Umbilical Hernia	1 (0.5)	0 (0)	
GB polyp + Abdominal Wall Hernia	0 (0)	1 (1)	
GB polyp + Umbilical Hernia	1 (0.5)	0 (0)	
Preop Diagnosis, n (%)			
Cholelithiasis	144 (79.1)	87 (86.1)	X2= 14.656
Acute Cholecystitis	16 (8.8)	6 (5.9)	p= 0.005
Acalculous Cholecystitis	15 (8.2)	0 (0)	
GB Perforation	4 (2.2)	5 (5.0)	
GB Polyp	2 (1.1)	3 (3.0)	
Cholelithiasis + Choledocholithiasis	1 (0.5)	0 (0)	
Cardiovascular Disease, n (%)			
No	142 (70.3)	60 (49.4)	X2= 11.018
Yes	40 (29.7)	41 (50.6)	p= 0.001
Hypertension, n (%)			
No	137 (75.3)	70 (69.3)	X2= 1.178
Yes	45 (24.7)	31 (30.7)	p= 0.278
Lung Disease, n (%)			
No	166 (91.2)	78 (77.2)	X2= 10.686
Yes	16 (8.8)	23 (22.8)	p= 0.001
Renal Disease, n (%)			
No	176 (96.7)	92 (91.1)	X2= 4.079
Yes	6 (3.3)	9 (8.9)	p= 0.043
Neurological Disease, n (%)			
No	169 (92.9)	82 (81.2)	X2= 8.819
Yes	13 (7.1)	19 (18.8)	p= 0.003
Hematological Disease, n (%)			
No	170 (93.4)	99 (98.0)	X2= 2.940
Yes	12 (6.6)	2 (2)	p= 0.086

Table 2. CONT.

	Age <65 (n:182)	Age ≥65 (n:101)	
PTGBD, n (%)			
No	172 (94.5)	94 (93.1)	X2= 0.233
Yes	10 (5.5)	7 (6.9)	p= 0.629
ASA, n (%)			
I	112 (61.5)	8 (7.9)	X2= 77.236
II	62 (34.1)	78 (77.2)	P<0.001
III	8 (4.4)	15 (8.2)	
Complication, n (%)			
No	174 (95.6)	98 (97)	X2= 0.353
Yes	8 (4.4)	3 (3.0)	p= 0.552
Surgery, n (%)			
Emergency	11 (6.0)	10 (9.9)	X2= 1.407
Elective	171 (94.0)	91 (90.1)	p= 0.236
ERCP, n (%)			
No	161 (88.5)	83 (82.2)	X2= 7.328
Preop	13 (7.1)	16 (15.8)	p=0.062
Postop	4 (2.2)	2 (2.0)	
Preop+postop	4 (2.2)	0 (0.0)	
Surgery Duration, minutes	83.59±2.36	80.08±3.56	Z= -1.848
	75 (30-240)	75 (35-230)	p= 0.065
ICU Stay, days	0.07±0.03	0.59±0.16	Z= -4.656
	0 (0-5)	0 (0-12)	P<0.001
Hospital Stay, days	3.09±0.21	4.57±0.37	Z= -6.999
	2 (0-28)	3 (1-25)	P<0.001

X^2: Fischer's exact test, Z Mann-Whitney U test, ASA: American Society of Anaesthesiologists Score, ERCP: Endoscopic Retrograde Cholangiopancreatography, GB: Gallbladder, ICU: Intensive Care Unit, PTGBD: Preoperative Percutaneous Gallbladder Drainage.

was evaluated, acalculous cholecystitis was significantly more common in patients <65 years of age than in patients ≥65 years of age, and cholelithiasis accompanied by choledocholithiasis was significantly more common in patients ≥65 years of age than in patients <65 years of age (p=0.021). Heart disease (p=0.001), lung disease (p=0.001), kidney disease (p=0.043), and neurological diseases (p=0.003) were significantly more common in patients aged ≥65 years compared to patients aged <65 years. The number of ASA II and ASA III patients in the group aged ≥65 was significantly higher than in the group aged <65 (p<0.001). The length of ICU stay and LOS were significantly longer in patients aged ≥65 years compared to patients aged <65 years (p<0.001). No significant differences were observed between the two groups in terms of other data.

The comparison of laboratory results of patients aged ≥65 years and <65 years is given in Table 3. Hematocrit (Hct) (p=0.025), hemoglobin (Hb) (p=0.008), platelet (PLT) (p=0.021), and albumin (p<0.001) levels of patients aged ≥65 years were significantly lower than those of patients aged <65 years. However, urea (p<0.001), creatinine (p=0.003), and total bilirubin (p=0.033) levels of patients aged ≥65 years were significantly higher than those of patients aged <65 years. No significant differences were observed between the two groups in terms of other laboratory results.

The relationship between the clinical information of the patients and the LOS, the length of stay in the ICU, and complications is presented in Table 4. No relationship was observed between comorbidities and LOS, ICU stay, and complications. High WBC count, CRP, AST, total biliru-

Table 3. Comparison of laboratory results of patients under the age of 65 and those aged 65 and over.

Variables	Age < 65 (n:182)	Age ≥ 65 (n:101)	Test Statistics
WBC	8.01±0.16	8.71±0.53	Z= -0.096
	7.81 (3.39-17.59)	7.80 (3.17-50.88)	p= 0.923
HCT	40.19±0.33	39.02±0.511	Z= -2.242
	41 (26-51)	39 (26-55)	p=0.025
Hb	13.38±0.12	12.78±0.18	Z= -2.671
	13.35 (8.10-18.0)	12.90 (8.0-17.40)	p=0.008
PLT	283.74±6.05	263.98±8.40	Z= -2.308
	274 (82-678)	254 (107-630)	p= 0.021
CRP	9.95±1.91	14.80±3.79	Z= -1.550
	3.55 (0.2-200)	4.35 (0.3-313.2)	p= 0.121
Urea	29.00±0.88	35.06±1.43	Z= -4.125
	27 (12-128)	33 (11-89)	P<0.001
Creatinine	0.88±0.06	0.93±0.04	Z= -3.013
	0.75 (0.44-9.05)	0.82 (0.54-4.05)	p= 0.003
Albumin	4.48±0.03	4.11±0.05	Z= -6.608
	4.55 (2.70-5.30)	4.15 (2.10-5.00)	P<0.001
AST	23.28±1.53	26.65±1.76	Z= -1.438
	18 (2-169)	19 (9-99)	p= 0.150
ALT	28.40±1.96	21.45±1.49	Z= -1.872
	18 (6-163)	18 (4-79)	p= 0.061
ALP	102.49±7.66	87.76±4.55	Z= -0.757
	82 (25-920)	79 (30-343)	p= 0.449
GGT	52.46±4.49	44.26±6.34	Z= -0.937
	27 (8-386)	26.5 (10-437)	p= 0.349
Total Bilirubin	0.57±0.08	0.65±0.07	Z= -2.131
	0.5 (0.1-14.8)	0.5 (0.1-7.2)	p= 0.033
Direct Bilirubin	0.24±0.03	0.32±0.07	Z= -1.183
	0.2 (0-6.5)	0.2 (0- 6.9)	p= 0.237

Z Mann-Whitney U test; WBC: White Blood Cell; HCT: Hematocrit; Hb: Hemoglobin; PLT: Platelet; CRP; C-Reactive Protein; AST: Aspartate Transferase; ALT: Alanine Aminotransferase; ALP. Alkaline Phosphatase; GGT: Gamma-Glutamyl Transferase.

bin, and direct bilirubin values, and low Hct, Hb, and albumin values were associated with longer LOS and ICU stays (p<0.001). High AST (p=0.011), ALT (p=0.005), ALP (p=0.008), direct bilirubin (p=0.026), and total bilirubin (p=0.036) values were associated with the development of complications. The patients who needed PTGBD had longer hospital stays (p<0.001).

Discussion

This study compared the clinical data of patients aged ≥65 who underwent cholecystectomy between January 2022 and March 2023 with those aged <65. Acalculous cholecystitis was more common in patients aged <65, while cholelithiasis accompanied by choledocholithiasis was more common in patients aged ≥65. In patients aged ≥65, heart disease, lung disease, kidney disease, neurological disease, the number of ASA II and ASA III patients, the LOS, and the length of ICU stay were higher than in patients aged <65. In addition, Hct, Hb, and PLT levels of patients aged ≥65 were significantly lower than those in patients aged <65, while urea, creatinine, and total bilirubin levels were significantly higher. Lower Hct, Hb, and albumin levels; higher WBC, CRP, AST, total bilirubin, and direct bilirubin values; and higher ASA were associated with LOS and the length of ICU stay.

Table 4. Relationship of clinical information of patients with length of hospital stay, length of stay in intensive care unit, and complications

	Hospital Stay		ICU Stay		Complication	p
	r	p	r	p	OR (95% CI)	
Cardiovascular Disease	0.074	0.215	0.001	0.990	1.447 (0.412-5.084)	0.564
Hypertension	0.030	0.615	0.107	0.073	1.564 (0.278-8.786)	0.612
Lung Disease	0.051	0.389	0.114	0.055	1.621 (0.228-11.546)	0.630
Renal Disease	0.032	0.598	0.002	0.974	3.141 (0.305-32.350)	0.336
Hematological Disease	-0.009	0.885	-0.024	0.682	2.048 (0.219-19.122)	0.529
PTGBD	0.235	<0.001	0.113	0.058	5.157 (0.886-30.007)	0.068
ASA	0.138	0.20	0.132	0.026	1.045 (0.116-9.388)	0.968
WBC	0.257	<0.001	0.365	<0.001	1.037 (0.631-1.157)	0.507
HCT	-0.209	<0.001	-0.215	<0.001	0.877 (0.778-0.989)	0.032
Hb	-0.173	0.003	-0.217	<0.001	0.749 (0.533-1.052)	0.095
PLT	0.163	0.006	-0.008	0.894	1.004 (0.998-1.010)	0.211
CRP	0.245	<0.001	0.299	<0.001	1.009 (0.997-1.020)	0.137
Urea	-0.054	0.369	0.033	0.578	1.187 (0.799-0.961)	0.875
Creatinine	0.016	0.790	0.014	0.821	1.113 (0.616-2.009)	0.723
Albumin	-0.295	<0.001	-0.256	<0.001	0.505 (0.180-1.414)	0.193
AST	0.220	<0.001	0.189	0.001	1.022 (1.005-1.039)	0.011
ALT	0.076	0.271	0.009	0.876	1.022 (1.007-1.038)	0.005
ALP	0.111	0.062	0.053	0.377	1.004 (1.001-1.008)	0.008
GGT	0.047	0.434	0.032	0.599	1.003 (0.995-1.010)	0.461
Total Bilirubin	0.448	<0.001	0.396	<0.001	1.409 (1.022-1.943)	0.036
Direct Bilirubin	0.409	<0.001	0.466	<0.001	1.642 (1.062-2.538)	0.026

WBC: White Blood Cell; HCT: Hematocrit; Hb: Hemoglobin; PLT: Platelet; CRP: C-Reactive Protein; AST: Aspartate Transferase; ALT: Alanine Aminotransferase; ALP: Alkaline Phosphatase; GGT: Gamma-Glutamyl Transferase; ICU: Intensive Care Unit.

Bile duct disorders are among the most common reasons for surgical intervention in elderly patients, who more often seek emergency medical observation for diseases such as AC.[17] LC, the gold standard treatment for symptomatic gallstones, has several advantages compared to open cholecystectomy, such as a shorter recovery time, less postoperative pain, and a rapid return to normal activities.[18,19] However, caution should be exercised in LC in certain patient groups, such as those with morbid obesity, immunocompromised patients, and the elderly, due to risks of morbidity and mortality.[20,21]

The incidence of AC increases with advancing age. Therefore, the average age of patients undergoing cholecystectomy is higher, and increasing age raises the risk of complications related to gallstones.[22] Moreover, elderly patients may present with more severe forms of gallbladder disease, such as AC, cholangitis, common bile duct stones, and gallbladder carcinoma.[23,24] However, there is no consensus on the definition of patient groups at high surgical risk, which scales should be used for risk assessment, and whether age is important. No well-defined indications and contraindications exist for treatment choices, especially in the older age group. In these cases, the choice depends on the expertise and preference of the treating surgeon.[25]

According to the WHO recommendation, patients aged ≥65 are considered elderly in developed countries.[1] Therefore, in this study, patients aged ≥65 were considered elderly, and the demographic data of patients aged <65 were compared with those aged ≥65.

It is known that advanced age is significantly associated with an increased risk of surgical complications. Serban et al.[26] reported an increased rate of postoperative complications in patients over 50 years of age, while Bass et

al.[27] and Kamarajah et al.[28] reported higher postoperative complications in patients over 65 years of age. Escartín et al.[29] and Lorenzon et al.[6] reported that increased AC severity was associated with higher comorbidities and increasing complications. Elderly patients exhibit more comorbidities compared to younger patients, and these comorbidities are associated with a higher frequency of complications. The most common comorbidities observed in elderly patients are cardiovascular disease, lung disease, and diabetes.[30]

Serban et al.[26] performed a comparative analysis of patients who underwent LC for AC according to age groups. They determined that patients aged <50 years had no significant comorbidities, short postoperative stays, and no significant complications. Patients aged 50–64 years also had a low anesthesia-surgery risk, though those with diabetes and chronic kidney disease were at risk of major cardiovascular complications in the early postoperative period. Patients aged 65–79 years exhibited increased anesthesia-surgery risk, a significant increase in biomarkers of inflammation, and more severe cases according to the Tokyo Guidelines criteria compared to patients aged <50. Patients aged >80 years demonstrated clinical features similar to those aged 65–79 years but had late presentation, increased anesthesia-surgery risk with comorbidities, a higher frequency of severe forms, a higher conversion rate, and major postoperative systemic complications compared to patients aged <50.

Elderly patients exhibit a higher ASA score distribution, and the number of patients with ASA III and above is higher in the elderly group.[26] Ramirez-Giraldo et al.[31] observed that patients with benign biliary tract disease and ASA classifications III–IV had higher mortality rates than those with ASA classifications I–II. Kubat et al.[32] determined that patients aged ≥65 years had a longer length of hospital stay, a greater need for open surgery, and a greater need for emergency surgery. Coelho et al.[33] showed that LC in the elderly was associated with longer operative times, higher rates of acute cholecystitis, more conversions, and higher postoperative complications.

Kamarajah et al.[28] documented that advancing age was associated with conversion to open cholecystectomy in a systematic review and meta-analysis of 53 studies with 59,173 patients. Researchers found that increasing age raised overall complication rates by 2.37 times, significant complication rates by 1.79 times, conversion rates to open cholecystectomy by 2.17 times, bile leak rates by 1.50 times, length of hospital stay by 2.21 times, and postoperative mortality rates by 7.20 times.[28]

In a recent study that included 567 patients and compared those over 75 years of age with those under 75 years of age, patients over 75 had more comorbidities, such as diabetes, hypertension, and ischemic heart disease, and more ASA III–IV patients. However, no differences were observed between the groups in terms of intraoperative and postoperative complications. The study reported that no patients required reoperation, and no deaths were recorded.[34]

Lee et al.[16] demonstrated that elective laparoscopic cholecystectomy (ELC) after percutaneous transhepatic gallbladder drainage (PTGBD) is a safe option for managing acute cholecystitis (AC). In a retrospective study involving 202 octogenarian patients treated with PTGBD for AC without common bile duct stones, patients were categorized into three groups: those who underwent ELC after PTGBD, those managed conservatively with PTGBD maintained for more than three weeks (PTGBD-M), and those with PTGBD removed within three weeks after decompression (PTGBD-R). While no significant difference in mortality was observed between the ELC and conservative management groups, the incidence of biliary events (e.g., cholecystitis and cholangitis) was markedly higher in the conservatively managed groups compared to the ELC group. The ELC group had a postoperative major complication (POMC) rate of 8.5%, while the cumulative incidence of biliary events in the PTGBD-R group was 22.2%. Furthermore, PTGBD-related complications were notably frequent in the PTGBD-M group, with a cumulative incidence of 70.8%.

In our study, cardiovascular, lung, renal, and neurological comorbidities, as well as the number of ASA II–III patients, were significantly higher in patients aged ≥65 years than in those aged <65 years. In addition, the LOS and length of ICU stay were higher in patients aged ≥65 years compared to those aged <65 years. This study also determined that as age increased, cardiovascular, lung, and hematological comorbidities, LOS, length of ICU stay, and the number of ASA II–III patients increased significantly. The LOS and length of ICU stay for ASA II patients were considerably longer than those for ASA I patients, but there was no significant difference between ASA III and ASA I patients. This may be due to the more careful perioperative evaluation of ASA III patients.

Although comorbidities were observed more frequently in patients aged ≥65 years, comorbidities were not associated with LOS, length of ICU stay, or complications, contrary to previous studies. We preferred to treat the patients conservatively in the acute setting, using PTGBD to decompress the inflamed or perforated gallbladder and antibiotics to relieve the inflammation where possible, in order to postpone the surgery to a time when the inflammation had decreased to ease the surgery. Therefore, patients who needed PTGBD were those with acute inflamed gallbladders, and they had significantly higher LOS after the postponed surgery ($p<0.001$). Since mortality was not observed in our study, the effect of age and other data on mortality could not be evaluated.

Investigating preoperative predictive factors for LC is essential to identify high-risk procedures and optimize the surgical plan and efficiency of the operating room. Regarding the inflammatory process, WBC, neutrophil, and CRP values may be observed to be higher than normal in AC patients. CRP is the most important inflammatory marker for conversion to advanced AC and open surgery.[35] Kubat et al.[32] determined that AC patients had higher WBC, neutrophil, and immature granulocytes at presentation. Moreover, they documented that these values were higher in patients requiring delayed emergency cholecystectomy. Nidoni et al.[36] noted a WBC count >11,000/mm³ as a predictive factor for difficult LC. Bourgouin et al.[37] determined a statistically significant relationship between ALP, ALT, and bilirubin values and difficult LC. On the contrary, Di Buono et al.[38] did not observe a relationship between ALP, ALT, and bilirubin values and difficult LC.

In our study, WBC, CRP, AST, ALT, ALP, and GGT values in patients aged ≥65 years were not different from those in patients aged <65 years. However, Hct, Hb, PLT, albumin, urea, and creatinine values of patients aged ≥65 years were different from those of patients aged <65 years. This difference is likely due to the comorbidities of patients aged ≥65 years. High WBC, PLT, CRP, AST, and bilirubin levels, as well as high ASA scores, and low Hct, Hb, and albumin levels were associated with longer LOS and longer ICU stays. High AST, ALT, ALP, and bilirubin levels increased the risk of complications.

The current study had several limitations. First, the study was retrospective, single-center, and had a small sample size due to the short time period. Therefore, the generalizability of the results may be limited. Second, there was selection bias, as only patients who underwent surgical treatment were included in the study. Third, the study evaluated only the short-term outcomes of surgery. Therefore, prospective studies with longer durations, larger sample sizes, and assessments of patients' quality of life are needed.

Conclusion

In this study, data from patients with gallbladder disease aged over 65 years were compared with those from patients aged under 65 years. Comorbidities were higher in patients over 65 years of age, the numbers of ASA II and ASA III patients were greater, and hospital stay and intensive care unit stay were longer in patients over 65 years of age, depending on comorbidities. However, no mortality was observed during the study period, and the total complication rate was only 4%. Laparoscopic cholecystectomy is a safe method with acceptable mortality and morbidity rates, even in patients with high comorbidities under elective conditions.

Disclosures

Ethichs Committee Approval: The Faculty of Medicine Ethics Committee, Trakya University, approved this study under the decision dated 22.05.2023, numbered TUTF-GOBAEK 2023/200.

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