

# Laparoscopic Cholecystectomy in Elderly Patients

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## ABSTRACT

**Background and Objective:** In this study, we investigated whether laparoscopic cholecystectomy, a minimally invasive procedure, is advantageous in elderly patients.

**Methods:** Data from 595 patients who underwent laparoscopic cholecystectomy between January 2003 and December 2007 were prospectively collected in a database. The patients were separated into 2 groups; patients >70 years of age (group A), and patients <70 years of age (group B). Group A was further divided into 3 subgroups, ages 70 to 74, 75 to 79, and 80 and above. Comparison between the groups was made with Mann-Whitney U and chi-square tests where appropriate.

**Results:** ASA scores increased in conjunction with increased age ( $P < 0.001$ ). Of patients with an operative time longer than one hour, 26 patients aged 70 or older, and 152 patients aged 69 or younger had no difference with respect to PaCO<sub>2</sub> and pH measurements ( $P > 0.05$ ). In patients aged 80 or older, the rates of acute cholecystitis, conversion to open surgery, and postoperative complications were significantly higher than in other groups ( $P > 0.05$ ).

**Conclusion:** We believe that in elderly patients, laparoscopic surgery can be applied safely without further increasing the surgical risks. The complications can be minimized by carefully selecting the patients aged 80 or older and by experienced teams with high technical capabilities operating on such patients.

**Key Words:** Laparoscopic cholecystectomy, Cholelithiasis, Elderly, Octogenarians.

## INTRODUCTION

Longer life expectancies together with a higher incidence of gallbladder stones increasing in conjunction with increasing age has resulted in a greater number of elderly patients being operated on today for symptomatic gallbladder stones.<sup>1</sup> Limited functional reserves and the presence of associated chronic comorbidities increase the operative morbidity and mortality of these patients. Although laparoscopic cholecystectomy has become the gold standard for the treatment of gallbladder stones, its safety in elderly patients is still questioned.<sup>2,3,4</sup> Our study aimed to assess the outcome of laparoscopic cholecystectomy in patients aged 70 years and older.

## METHODS

Data from 595 patients who underwent laparoscopic cholecystectomy between January 2003 and December 2007 were prospectively collected in a database. The patients were first separated into 2 age groups: Age 70 or older (group A), and age 69 or younger (group B). Patients in the first group were further divided into 3 groups: Age 70 to 74 (group A1), age 75 to 79 (group A2), age 80 or older (group A3). Results obtained from groups A1, A2, and A3 were compared amongst each other as well as with the results of group B.

Laparoscopic cholecystectomy was performed using a standard 4-port technique. Preoperative endoscopic retrograde cholangiopancreatography (ERCP) was utilized in patients with common bile duct stones. Routine intraoperative cholangiography was not performed.

The following patient data were recorded: age, sex, American Society of Anesthesiologists (ASA) classification, indication for surgery, preoperative ERCP, conversion to open surgery, postoperative length of hospital stay, morbidity, and mortality. Also, as a part of our routine protocol, an arterial blood gas sampling was made in all patients with an operative length of more than 1 hour.

SPSS version 10 (SPSS, Chicago, IL, USA) was used for all statistical analyses. Differences between the groups were determined by Mann-Whitney U and Pearson chi-square

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tests where appropriate. Values with  $P < 0.05$  were considered significant.

## RESULTS

Of 595 patients enrolled in the study, 68 were between ages 70 and 84 (Group A). Mean age in this group was  $75.02 \pm 4.0235$ . Thirty-three of these patients were between ages 70 and 74 (Group A1), 24 were between 75 and 79 (Group A2), and 11 were 80 or older (Group A3). The remaining 527 patients (Group B) were  $\leq 69$  years with a mean age of  $45.46 \pm 11.22$ . Evaluation of the patients according to sex showed that 64.7% and 69.8% of the patients were female in Groups A and B, respectively. When the subgroups of Group A (patients  $\geq 70$ ) were evaluated, it was seen that in the 2 subgroups with patients above age 75, the proportion of females were noticeably lower. The proportion of females was 75.8% in group A1, compared with 54.2% and 54.5% in groups A2 and A3, respectively.

ASA score assessment of the groups revealed that these scores increased with age. The percentage of patients with ASA scores  $\geq 3$  was 15.9% in the group of patients 69 years or younger, and increased to 39.4% in the 70 to 74 age group, 66.7% in the 75 to 79 age group, and 81.8% in the group above 80. The differences between the ASA scores were statistically significant ( $P < 0.001$ ) (Table 1).

Arterial blood samples were taken from patients whose operations lasted longer than one hour, corresponding to 26 patients in groups A1, A2, A3 (patients 70 years or older) and 152 patients in group B (patients 69 years or younger). The PaCO<sub>2</sub> and pH values in these samples were compared. Mean PaCO<sub>2</sub> was found to be  $34.13 \pm 8.36$  mm Hg in the 70 to 74 age group (Group A1),  $39.37 \pm 4.92$  mm Hg in the 75 to 79 age group (group A2),  $38.01 \pm 10.2$  mm Hg in patients 80 years or older (group A3). Mean pH values in groups A1, A2, and A3 were  $7.419 \pm 0.062$ ,  $7.393 \pm 0.068$ , and  $7.433 \pm 0.076$ , respec-

tively. In group B, mean PaCO<sub>2</sub> was  $39.22 \pm 10.05$  mm Hg and mean pH was  $7.385 \pm 0.087$ . The differences between the groups with respect to mean PaCO<sub>2</sub> and pH measurements were not significant ( $P > 0.05$ ).

The majority of the patients in all study groups who were operated on had a diagnosis of chronic cholecystitis. Patients operated on for acute cholecystitis constituted 16.2% and 14.8% of all patients in groups A and B, respectively. This difference with respect to acute cholecystitis was not statistically significant between the 2 groups ( $P = 0.765$ ). However, subgroup analysis of patients  $\geq 70$  revealed that the rate of acute cholecystitis was 45.5% in patients aged  $\geq 80$ , which was significantly higher ( $P = 0.029$ ).

Patients in all groups with clinical or biochemical suspicion of choledocolithiasis were further evaluated with ultrasonography or magnetic resonance cholangiopancreatography (MRCP), and among these patients 14 who were diagnosed with bile duct stones underwent preoperative sphincterotomy with ECRP and stone extraction.

Conversion to open cholecystectomy was required in 10 of the 68 (14.7%) patients in the group of patients  $\geq 70$ , and 42 of the 527 patients (8%) in the group  $\leq 69$ . Although the conversion rate was higher in the older age group, the difference was not statistically significant ( $P = 0.765$ ). Subgroup evaluation in group A revealed that conversion rates were 12.1%, 12.5%, and 27.2% in patients aged between 70 and 74, between 75 and 79, and 80 and above, respectively. The conversion rate in patients aged 80 or above was significantly higher than that in the other groups ( $P > 0.05$ ). In all age groups, the most common reason for conversion was failure to adequately visualize the biliary tract anatomy due to intense fibrosis around the gallbladder and Calot's triangle. Other reasons for conversion to open surgery in this study were intraoperative bleeding uncontrollable by laparoscopy, dense adhesions due to prior laparotomy that prevented a laparoscopic

**Table 1.**  
Patients Characteristics by Group

	Group A1 Age 70-74	Group A2 Age 75-79	Group A3 Age $\geq 80$	Group B Age $\leq 69$
Patients n	33	24	11	527
Female n(%)	25 (75.8%)	13 (54.2%)	6 (54.5%)	368 (69.8%)
ASA $\geq 3$ n(%)	13 (39.4%)	16 (66.7%)	9 (81.8 %)	84 (15.9%)
Acute cholecystitis n (%)	3 (9.1%)	3 (12.5%)	5 (45.5%)	78 (14.8%)

approach, injury to the main bile duct, and suspected gallbladder cancer. The indications for conversion according to age groups are given in **Table 2**.

Postoperative complication rates were 9.7% in patients  $\leq 69$  and 13.2% in patients  $\geq 70$ ; however, this difference was not statistically significant ( $P=0.359$ ). Subgroup analysis in group A revealed that patients aged 80 or older (group A3) had a 36.4% complication rate, which was significantly higher than that in all other groups ( $P=0.027$ ). The distribution of the complications according to age groups is given in **Table 3**. Mean hospitalization was  $1.53 \pm 1.21$  days in the group A and  $2.50 \pm 1.84$  in group B, which was statistically significant ( $P<0.01$ ). Subgroup analysis in group A revealed that the length of hospital stay increased as age increased. No deaths occurred in either group.

## DISCUSSION

Biliary tract disorders are one of the most common reasons for surgery in older patients. Fifty percent of women and 16% of men in their 70s have been shown to have gallbladder disease.<sup>5</sup> Laparoscopic cholecystectomy has been shown to provide a shorter hospital stay, less postoperative physiologic dysfunction, and an earlier return to daily activities than open cholecystectomy. The attainment of such goals is particularly desirable in the elderly patient.<sup>6</sup> Advanced age is frequently associated with significant comorbidity and limited functional reserve, which may complicate a postoperative course. Preoperative assessment of cardiovascular risk factors and adequate monitoring of the patients is necessary for detection and treatment of possible complications.<sup>7</sup> In this study, the evaluation of ASA scores showed a parallel increase with age. In the 69 or younger age group, patients with ASA 3

	Age <70 years (n = 527)	Age >70 years (n = 68)
Inability to display anatomy safely	28	6
Intraoperative bleeding	7	2
Adhesions after previous laparotomy	4	1
Bile duct injury	2	0
Suspicion of cancer	1	1

Complication	Age <70 Years (n = 527)	Age >70 Years (n = 68)
Related to the Surgical Site		
Bile duct injury	2	0
Bile leak	5	1
Subhepatic collection	8	2
Postoperative bleeding	2	0
Retained bile duct stone	4	0
Wound infection	7	2
Not Related to the Surgical Site		
Myocardial ischemia	3	1
Arrhythmia	7	1
Atelectasis/chest infection	9	3
Urinary tract infection	4	0

or higher constituted 15.9% of the group, while the percentage of these patients were 39.4% in the age 70 to 74 subgroup, 66.7% in the age 75 to 79 subgroup, and 81.8% in the age 80 and above subgroup. These differences were significant ( $P<0.001$ ). Despite high ASA scores, no perioperative complications occurred in the elderly groups (patients  $\geq 70$ ).

In laparoscopic cholecystectomy, carbon dioxide pneumoperitoneum has potentially harmful intraoperative circulatory and ventilatory effects because of absorbed carbon dioxide and elevated intraabdominal pressure. Although not clinically significant for healthy patients, these effects are assumed to be deleterious for patients with a high risk for anesthesia (ASA 3 and 4).<sup>8,9</sup> Therefore, all patients with an operative period >1 hour (26 patients in groups A1, A2, and A3 and 152 patients in group B) had assessment of PaCO<sub>2</sub> and pH values in blood samples drawn at the end of the first hour of the operation. The difference between the groups was not statistically different ( $P>0.05$ ). These results were consistent with the findings of Koivusola et al<sup>10</sup> who reported that during laparoscopic cholecystectomy the pneumoperitoneum induced with 10mm Hg to 12 mm Hg pressure in patients with ASA scores 3 or 4 did not pose additional risks in elderly patients.

Previous studies have shown that the incidence of acute cholecystitis is higher in elderly patients.<sup>5,11</sup> In our study, although the acute cholecystitis was more frequent in

patients aged 70 or older compared with younger individuals, this difference was not statistically significant. On the other hand, subgroup analysis of patients older than 70 revealed that the rate of acute cholecystitis was 45.5% in patients aged 80 or older, and this was significantly higher than that in the other groups ( $P=0.029$ ). We believe this finding explains the higher complication rates in patients above age 80 reported in the literature.<sup>12,13</sup>

Conversion to open surgery was 14.7% in the elderly group. This figure is concordant with the numbers reported in the literature, which range between 5% and 25%.<sup>5,14,15</sup> The conversion rate was 8% in the younger age group. Although the conversion rates were higher in the elderly group of patients  $>70$ , this did not reach statistical significance ( $P=0.765$ ). However, subgroup analysis of group A (70 or older) revealed that patients aged 80 or older had a significantly higher conversion rate than that in other subgroups ( $P<0.01$ ), a finding which is also in agreement with the literature. Increased age has been noted in the literature as a preoperative risk factor for conversion, perhaps due to a longer history of gallstones and increased number of cholecystitis attacks.<sup>16,17</sup>

The most important advantage of laparoscopic cholecystectomy in elderly patients is the associated reduction in morbidity and mortality rates. The reported incidence of morbidity and mortality with open cholecystectomy in the geriatric population is approximately 23% to 28% and 1.5% to 2% respectively.<sup>18,19</sup> In the elderly who underwent laparoscopic cholecystectomy, complication rates of 5% to 15% and an overall mortality rate of 0% to 1% have been observed.<sup>2,11,20</sup> There was no mortality in our study. Although the complication rates were slightly higher in the group aged 70 or older compared with the younger group of patients (13.2% vs 9.7%,  $P=0.359$ ), these figures are still lower than the reported complication rates for open cholecystectomy. Subgroup analysis of elderly patients showed that complication rates increase significantly in the group aged 80 or older. Another important point is the lack of pneumoperitoneum-dependent complications in the perioperative period. Higher complication rates observed in patients aged 80 or older seem to be resulting from more difficult cholecystectomies (acute cholecystitis, fibrotic gallbladder, mirizzi syndrome, and others). Therefore, we believe that patients aged 80 or older should preferentially be operated on by experienced surgical staff with good technical equipment, which will help to decrease complication rates.

To identify bile duct stones before laparoscopic cholecystectomy, we routinely evaluate the patients clinically and

with ultrasonography. In case the patient has clinical, biochemical, or radiological findings suspicious of the presence of bile duct stones, we perform MRCP (Magnetic Resonance Cholangiopancreatography), which is a non-invasive and rather sensitive method. Using our algorithm, only 0.7% (4/595) of the stones were missed in our study, all of which could be removed with ERCP after the operation, which may be due to the high sensitivity of MRCP. In the study of Charfare et al<sup>21</sup> preoperative ERCP was performed, and postoperatively retained stones were present in 1.2% of these patients, similar to our rate. In another study by Collins et al,<sup>22</sup> among 997 laparoscopic cholecystectomy patients, clinically silent choledocholithiasis was present in 3.4%, one-third of which passed spontaneously within 6 weeks of the operation. Based on these previous findings and the results of Nugent et al,<sup>23</sup> we believe that selective biliary imaging like MRCP not only represents a safe and effective tool for preoperative identification of bile stones, but also reduces the need for unnecessary ERCP and intraoperative cholangiography procedures.

Additional support for the benefit of the laparoscopic approach is demonstrated in the decreased length of stay in the hospital. In this study, although the length of hospitalization was shorter in all groups compared with that in open cholecystectomy, it was significantly longer in the elderly group compared with that in the younger patients. These results made us believe that elderly patients also benefited from the shorter hospital stay offered by the laparoscopic technique; however, due to higher complication rates and more frequent conversion to the open technique, they required longer hospitalization periods compared with younger patients.

Most studies use the ages 65 or 70 as the cut-off line for the elderly patients.<sup>1,5,20,24</sup> In our study, patients aged 70 or older were included in the elderly group, and this group was further analyzed by separation into 3 subgroups. In the elderly patient group, it was seen that patients aged 80 or older had different characteristics compared with the remaining elderly patients, and patients in the 70 to 74 or 75 to 79 age groups had characteristics more like those of the younger group of patients.

## CONCLUSION

Based on the findings of this study, we believe that laparoscopic cholecystectomy in elderly patients is a reliable approach that allows patients to benefit from the advantages of minimally invasive surgery without further increasing the risks of surgery.



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