



Arch Clin Exp Surg 2016;5:27-32 doi:10.5455/aces.20150810031232

# Conversion to open surgery in the era of laparoscopic cholecystectomy: Changing rates and reasons in geriatric patients

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#### ABSTRACT

**Objective:** Compared to open surgery; laparoscopic cholecystectomy has become the standard of care for the treatment of cholelithiasis at any age over the last two decades. In the present study, the aim was to identify and to compare the rates and reasons involved in conversion to open procedure in elective surgery for cholelithiasis in geriatric patients over the course of fourteen years.

**Methods:** To assess the possible differences in the conversion rates and reasons over time, 207 patients over 65 years of age undergoing elective laparoscopic cholecystectomy for chronic cholecystitis were analyzed in two groups - the first ten years (n=141) and the last four years (n=66). Acute cholecystitis, gallbladder malignancy and/or polyps were excluded. Demographic characteristics, comorbidities, history of previous abdominal surgery, preoperative endoscopic retrograde cholangiopancreatography (ERCP) and the reasons and rates involved in conversion to open cholecystectomy were all analyzed.

**Results:** In male and female patients, the conversion rate was 18.8% and 5.07 %, respectively (p=0.02). In the first ten years, the conversion rate was 11.3%, while in last four years, it was 6.1% (p=0.230). In first ten years, 62.5% of the reason for conversion was found to be dense pericholecystic adhesions related, but in last four years, this rate decreased notably to 25%.

**Conclusions:** Although there was no statistical significance, in last four years, surgeons seemed to more easily overcome difficult cholecystectomies.

Key words: Cholecystectomy, laparoscopic, conversion, geriatric

## Introduction

Gallstone disease is one of the most common health problems that surgeons face in daily practice. Rather than open surgery, laparoscopic cholecystectomy (LC) [1] has become the standard of care for the treatment of gallstone disease over the last two decades based several important advantages, including reduction in postoperative disability and pain, earlier oral intake, shorter hospital stay, earlier return to normal activity, and better cosmetic results [2,3].

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Received / Accented	· . July 03 2015 / July 21 2015

The incidence of cholelithiasis increases with age. Even in elderly populations, among those 80 years of age, rates as high as 38% to 53% are reported [4-7]. Elderly patients frequently suffer from significant comorbidities and diminished functional reserves that may complicate the perioperative course. Avoidance of open biliary surgery in the elderly is justified by elective and emergency mortality rates that are up to 2% and 10%, respectively [6].

On the other hand, this procedure cannot be continued laparoscopically in all cases, and conversion to laparotomy may become inevitable. Conversion rates for gallstone disease have been the subject of various publications and are reported with an average of 5% in all age groups [1,8-11]. An inability to delineate the anatomy, encountering unexpected operative findings, and iatrogenic injuries are reported in the literature as the most common causes (based on culture and geography, in addition to an understanding of conversion within the center) for conversion to an open procedure [1]. Previous studies have demonstrated that, with the use of specific strategies, conversion rates can be decreased even in acute cases, such as senior surgeon supervision, modification of operative techniques, and laparoscopic experience of the surgeon [12, 13]. Also, a number of studies have shown higher conversion (>20%) and mortality (>5%) rates in elderly patients undergoing LC [6,14,15].

In the present study, the aim was to identify and to compare the rates and reasons involved in conversion to open procedure in elective surgery for gallstone disease in geriatric patients over the course of fourteen years.

#### **Materials and Methods**

All patients undergoing LC during a 14-year period (January 1999 to December 2012) were identified from a prospectively collected database. This study included selected patients over 65 years of age undergoing elective procedures. Detection of malignancy and/or polyps and the existence of acute cholecystitis were accepted as the exclusion criteria. Information obtained from the database and hospital records was used to gather patient demographic details. To assess the possible difference of conversion rates and reasons over time, the study population was analyzed in two groups, the first ten years (n=141) and the last four years (n=66). Patient history of previous abdominal surgery, preoperative endoscopic retrograde cholangiopancreatography (ERCP), and the reasons and rates involved in conversion to open cholecystectomy were all analyzed retrospectively from the database. Hepatobiliary ultrasonography, biochemical analysis that included liver enzymes, and all necessary preoperative routine tests were applied in each case before the surgery. Preoperative assessment, American Society of Anesthesiologists (ASA) score, body mass index (BMI), and operation time of the patients were not included the analysis because of insufficient records in the database. All operations were made by staff surgeons or fellows under supervision using the standard four-port, two-hand technique [16]. Routine intraoperative cholangiography was not assessed. Operative selection was based on dominantly clinical grounds beside the patients' own wishes.

Statistical analysis was performed using SPSS for Windows Release 14.0.0 (SPSS, Chicago, IL, USA). Differences between groups for numeric variables were determined by student's t-test and categorical variables were determined by chi-squared and Fisher's exact tests; p < 0.05 was considered significant.

## Results

Of 1389 patients undergoing laparoscopic cholecystectomy during the study period, 207 (14.9%) patients over 65 years of age were included in this study. Detection of malignancy (n=12) and/or polyps (n=15) and the existence of acute cholecystitis (n=32) were accepted as criteria for exclusion. The study population was analyzed in two groups, the first ten years (n=141) and the last four years (n=66).

Of 207 patients with gallstone disease, 20 patients (9.7%) were converted to laparotomy because of a variety of reasons. The median age was 71 years (range: 66-89) in the converted group while the median age was 69 years (range: 65-89) in the LC group. In the converted group, there were 13 (65%) males and 7 (35%) females, whereas there were 56 (29.9%) males and 131 (70.1%) females in the LC group. In male and female patients, the conversion rate was 18.8% and 5.07 %, respectively (p=0.02). Comorbidities were detected more frequently in the converted group but statistical significance was not found (p=0,29). The clinical fea-

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#### Table 1. Clinical features of the patients

	Converted (n=20) (9.6%)	Not converted (n=187) (90.4%)	p values	
Age, median (min-max)	71 (66-89)	69 (65-89)	0,121	
Gender (male/female), n (%)	13 (65) / 7 (35)	56 (%29.9)/131 (70.1)	0,021	
Comorbidity, n (%)	19 (95)	175 (93.5)	0,289	
HT, n (%)	18 (90)	162 (92)		
DM, n (%)	8 (40)	84 (48)		
COPD, n (%)	7 (35)	92 (52)		
CAD, n (%)	13 (65)	114 (69)		
Multiple, n (%)	17 (85)	154 (80)		
UT the standard DM Distance Maliferry OODD Observice to stand the second disease OAD Observer stand disease				

HT: Hypertension, DM: Diabetes Mellitus, COPD: Chronic obstructive pulmonary disease, CAD: Coronary artery disease

tures and comorbid diseases of the patients are exhibited in Table 1.

In the first ten years group (n=141), 16 geriatric patients (11.3%) were converted to laparotomy, while in the last four years (n=66), 4 geriatric patients (6.1%) were converted. Conversion rates slightly decreased over time, but this was not statistically significant (p=0.23). In converted patients, age, gender and comorbidity was found to be similar between the two time periods (p=0.63, 0.99 and 0.99, respectively). In the first ten years group, dense pericholecystic adhesion (prior abdominal surgery, n=7; acute cholecystitis history, n=3), preoperative ERCP (n=6), intraoperative bleeding from cystic arter (n=1) and liver bed (n=1), difficult anatomy or variations (n=3), common biliary duct injury (n=1), and duodenal injury (n=1) were found to be the reasons for conversion to laparatomy. However, there was no statistical significance and the reasons for conversion were found to be slightly different in the last four years, including: acute cholecystitis history (n=1), intraoperative bleeding from cystic arter (n=1), preoperative ERCP (n=1), and difficult anatomy or variation (n=1). Prior abdominal surgery and acute cholecystitis history were considered the reasons for the development of dense pericholecystic adhesions, while the reason for conversion in these patients was defined as adhesion related. Hemorrhages as a result of cystic artery injury were controlled by simple ligation and the rest responded to electrocautery. No major vessel injury was detected. The distribution of anatomic variation was not recorded. Reported duodenal injury did not involve the whole wall. Injury of the common biliary duct was found in one case and hepaticojejunostomy was performed. No trocar injury to any of intraabdominal organs was detected (Table 2).

#### Discussion

In the last two decades, laparoscopic cholecystectomy has become the first treatment option for symptomatic cholelithiasis due the well-known advantages of minimally invasive surgery. Moreover, through collectively gained experience in practice, laparoscopic cholecystectomy has become safer and more cost-effective in an ambulatory setting [1]. Currently, surgery assistants are learning laparoscopic cholecystectomy before open cholecystectomy [2]. Furthermore, in previous studies, it was shown that LC could be performed safely with low morbidity in geriatric patients [6,15,17,18]. Conversion to laparotomy causes unfavorable consequences in patients based on the higher rates of postoperative complications and prolonged hospital stays [19]. However, in certain patients, conversion to an open procedure is inevitable. This rate of conversion has been reported within a range of 2% to 15% [1,10,20]. In this study, the conversion rate was detected to be 9.7%, which can be accepted as compatible with the rates documented in the literature. The requirement for conversion should be seen as a salvage measure rather than a complication in certain cases. Furthermore, despite better training for surgeons and better laparoscopic instruments, the conversion rate appears to have remained relatively stable over time [21]. From this point, the authors endeavored to uncover a subjective observation on the changing conversion rate and reason for laparoscopic cholecystectomy. To this end, the conversion rates and reasons over two time periods were investigated: first, the second decade

#### Table 2. Causes of conversion according to the first ten years and last four years experience p values Reason for conversion, n (%) First 10 years (n=16) (11.3%) Last 4 years (n=4) (6.1%) Dense pericholecystic adhesion 10 (62.5) 1 (25) Prior abdominal surgery 7 (43.7) Acute cholecystitis history 3(18.8) 1 (25) Preoperative ERCP 6 (37.5) 1 (25) Bleeding (cystic artery/liver bed) 2 (12.5) 1 (25) Difficult anatomy or variation 3 (17.6) 1 (25) 2 (12.5) Injury (common biliary duct/duodenum) \_

ERCP: Endoscopic retrograde colangiopancreatography

of laparoscopy and second, the remaining four years as the relatively more experienced period. With the increased proportion of geriatric patients, this population was specifically focused on as they were more prone to delayed presentation, recurrent acute attack, and associated adhesions. Yet, functional status could not be assessed because of the study design and lack of information in the database.

Male gender has been reported as a risk factor for conversion, attributable to a greater incidence of anatomical difficulties and delay in presentation [22]. Similarly, age has been noted in the literature as a preoperative risk factor for conversion [8,23]. In this study, males were found in significantly higher numbers in the converted group (p=0.02). On the other hand, no difference was detected in terms of age. This may possibly be explained by the exclusion of patients younger than 60 years old. It appears that severe adhesions from prior abdominal surgery or inflammation because of acute cholecystitis present two of the most frequent situations that require conversion, atleast according to the literature [10,23]. Sanabria et al. examined risk factors predicting conversion in an elective cholecystectomy, just as was done here, and they found that in 628 elective laparoscopic cholecystectomies in elderly patients (65 years or older), males and patients with multiple attacks (more than 10) of biliary colic, or with a documented history of acute cholecystitis, were more likely to require conversion [8]. Genc et al. examined what factors necessitate the conversion to open cholecystectomy in their study of 5,164 patients and they also concluded that adhesions were the most common reason. In this study, similar findings were observed with 11 (55%) of all conversions because of dense pericholecystic adhesions [1]. Patient were also excluded with acute cholecystitis, but these adhesions could be the result of previous attacks of acute cholecystitis. Nevertheless, it was realized that bile duct injuries, bleeding and anatomic variations were important factors leading to conversion, but there was no significant difference related to adhesions.

0.285

0.999

0.999 0.999

0.999

In the subgroup analysis, the conversion rates and reasons over two time periods were compared - the first ten years during the second decade since introducing laparoscopic interventions, albeit Turkey's relative first decade in laparoscopy, and the second four years as the experienced period of laparoscopic procedures. In the first ten years, the conversion rate was 11.3%, while in the last four years, the rate was found to be 6.1%. The conversion rate was slightly decreased with time but this was not statistically significant. When looking at the reasons for conversion, important differences were found. In the first ten years group, 62.5% of the reason for conversion was found to be related to dense pericholecystic adhesions, but in the last four years, adhesion-related conversion rates decreased notably to 25%. With this, there was no statistical significance in the last four years as the surgeons seemed to more easily overcome the difficulties associated with cholecystectomy.

This study has several limitations:

- 1. Other age groups were not analyzed and therefore, no comparison of conversion rates between geriatric and non-geriatric patients could take place;
- Based on the retrospective nature of the present 2. study, the difficult cholecystectomy definition was mainly based on the history of previous abdominal surgery and acute cholecystitis, both being indirect measurements of surgical difficulty.

Laparoscopic cholecystectomy is the main choice for the treatment of gallstone disease at any age. With the growing collective practice experience in laparoscopy, surgeons have become better able to handle difficult cholecystectomies and thus, the conversion rate has decreased markedly.

## **Conflict of interest statement**

The authors have no conflicts of interest to declare. **References** 

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