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## Original articles

# Laparoscopic cholecystectomy in patients aged 80 and over

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A B S T R A C T

*Introduction:* The increasing aging of the population also increases the prevalence of symptomatic gallbladder diseases. It is important to analyse their surgical treatment in the elderly.
*Methods:* All the laparoscopic cholecystectomies performed in our surgery department on patients aged 80 years-old or over from 1992 to 2007 were included in this study.
*Results:* Laparoscopic cholecystectomy was performed on 133 patients 80 years-old and over, with 63% of them women, and an average age of 83.23 years. Biliary colic (29%) and acute pancreatitis (44%) were the main reasons for surgery. Associated diseases were found in 73% of them. Only 7.5% needed urgent surgery, even although 71% were admitted urgently. There were 13.5% conversions to open surgery, 17% morbidity, and 2.3% mortality.
*Conclusions:* Laparoscopic cholecystectomy can be recommended in symptomatic gallbladder disease in the elderly.



### Colecistectomía laparoscópica en pacientes mayores de 80 años

*Palabras clave:*
Colecistectomía laparoscópica
Cirugía laparoscópica
Enfermedad biliar
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R E S U M E N

*Introducción:* Con el aumento de la esperanza de vida de la población, aumenta la prevalencia de litiasis biliar sintomática. Es importante analizar su tratamiento quirúrgico en ancianos.
*Método:* Se incluyó en el estudio a todos los pacientes con edad ≥ 80 años intervenidos en nuestro servicio de cirugía general mediante colecistectomía laparoscópica entre 1992 y 2007.
*Resultados:* Se realizó colecistectomía laparoscópica a 133 pacientes mayores de 80 años (media, 83,23 años; el 63% mujeres); predominaban en ellos los diagnósticos de cólico biliar (29%) y pancreatitis aguda (44%). El 73% presentaba comorbilidades. Sólo el 7,5% precisó intervención quirúrgica urgente, a pesar de que el 71% ingresó de manera urgente. Hubo un 13,5% de conversiones, un 17% de morbilidad y un 2,3% de mortalidad.
*Conclusiones:* La colecistectomía laparoscópica puede ser recomendada en ancianos con colelitiasis sintomática.



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## Introduction

Aging of the population is a phenomenon occurring in all developed countries. The fastest growing sector in the population is persons over 65 years of age. In Japan[1] for example, it was 17% of the population in 2000 and will be 25% in 2014. Elderly patients usually present with comorbidities of varying importance, as well as a lower physiological functional reserve, which complicates their surgical treatment and perioperative care.

Additionally, the incidence of some already common diseases increases with age. Its prevalence in patients over 70 is 30% in women and 16% in men while in patients over 80 years, the prevalence varies from 38% to 53%.[2]

The purpose of this study is to present our experience with an intervention that is very common in all general surgery departments, laparoscopic cholecystectomy (LC), in a population that is now common in our environment: elderly patients in whom the complications of cholelithiasis (acute cholecystitis [AC], lithiasis in the common bile duct [CBD], etc) and a less favourable course are more common.[1,3] Included in this concept, in many articles and in a manner that may already be obsolete, are patients over 65 years of age who may not truly represent what it currently is considered elderly.[4] For our study, we focus only on surgical patients over 80 years of age.

## Material and Method

Included were all patients ≥80 years of age who underwent LC in our department between 1992 and 2007. The clinical information was obtained from a database designed by Access® in which all cases of LC in our department since the beginning of the laparoscopic surgery program in 1992 were included, as well as the patients' clinical records. Age has not been a contraindication for LC, though the availability of expert surgeons or the complexity of the biliary condition in the initial phase of our series was.

We have analysed clinical, diagnostic (laboratory and imaging), and operative data such as: age, gender, comorbidity, symptoms, previous laparotomies, type of admission and intervention, surgical time, conversion to open surgery, associated interventions, postoperative progress, and complications.

We have compared the group of patients over 80 years of age with 2 other groups with the same number of patients, one with ages between 66 and 79 and the other with subjects ≤65 years of age. These 2 groups correspond to consecutive cases obtained in our database from retrospective data since 2007.

When faced with one or several criteria that are suspicious for lithiasis in the CBD, preoperative cholangiopancreatography (ERCP) was performed, with or without endoscopic sphincterotomy (ES), according to the findings and the endoscopist's judgement. Recently in these cases, magnetic resonance cholangiography (MRC) is performed in order to confirm choledocolithiasis and to reduce the number of non-therapeutic preoperative ERCPs. Electively, and still not by protocol, we now have available the addition of endoscopic ultrasound. In acute pancreatitis, the ERCP was performed electively once that was overcome, with the patient in a normal clinical and analytical situation. After a minimum of 24 hours after ERCP, but as soon as possible based on the availability of an operating room, LC was performed in the same admission. Laparoscopic treatment for CBD lithiasis was performed when the surgeon's experience allowed for it.

We performed LC with 4 trochars in the American position,[5] with a hospital admission of at least 24-48 hours. Intraoperative cholangiography (IC) was performed electively based on the surgeon's judgement.

The statistical analysis was performed using SPSS 16.0 for Windows® using the $\chi^2$, ANOVA, and Student *t* tests, and values of $P<.05$ were considered statistically significant.

## Results

Of the 2380 patients who underwent LC in our hospital between 1992 and 2007, 133 were 80 years of age or older, which is 5.6% of patients, and they are the focus of this analysis. Eighty-six percent were operated on in the last 7 years. Of those, 84 (63%) were women and 49 (37%) were men; the median (range) age was 83.23 (80-94; median, 82) years. Thirteen point five percent (18 patients) were ASA I; 94 (71%) were ASA II; and 21 (16%) were ASA III. Thirty-three (25%) patients had a history of previous laparotomy, infraumbilical in 28 (21%).

Seventy-one percent (95 cases) were admitted to the hospital on an emergency basis, but only 10 (7.5%) underwent emergency surgery. Seventeen (13%) patients had already been admitted to our hospital for a biliary condition.

The clinical diagnosis consisted of: biliary colic in 39 (29%), acute biliary pancreatitis in 58 (44%), acute cholecystitis in 14 (10.5%), obstructive jaundice in 13 (10%), and cholangitis in 6 (4.5%). Cholecystectomy was performed incidentally in 3 (2.3%) patients. Seventy-three percent (97) patients presented with some type of comorbidity (Table 1).

The macroscopic pathology of the gallbladder consisted of: a normal wall in 67 (50%) cases; chronic cholecystitis in 23 (17%); AC in 31 (23%); and scleroatrophic gallbladders in 12 (9%). No case of gallbladder cancer was seen.

Clinically, the 31 cases of acute "operative or macroscopic" cholecystitis consisted of: 1 cholangitis, 5 cases of obstructive cholangitis, 7 cases of acute pancreatitis, and 14 cases of clinically acute cholecystitis (45% of those that underwent operation). Four cases were uncomplicated biliary colic (biliary colic) with scheduled admission for LC. Surgery was performed on an emergency basis in 9 (29%) cases out of the 31 and 6 (43%) of the "true" clinically acute cases of cholecystitis.

Fifty-two (39%) patients underwent preoperative ERCP. Lithiasis in the CBD was identified in 35 (26%) and with ERCP-ES in 67%. Twenty-eight (21%) patients underwent IC and postoperative drainage was used in 61 (46%). Table 2 lists the criteria for suspicion of choledocolithiasis.

The duration of the surgeries completed laparoscopically was 72 (31) (25-210) minutes, without variations based on age subgroups (Table 3).

**Table 1. Comorbidities**

| Author | Age | Hypertension | Heart Disease | Diabetes | Lung Disease | Complicated Biliary Disease |
|---|---|---|---|---|---|---|
| Kwon[1] | >80 | 42% | 22% | 16% | 5% | – |
| Tagle[3] | >65 | 44% | 44% | – | 7% | 38% |
| Tambyraja[2] | >80 | – | – | – | – | 47% |
| Hazzan[4] | >80 | 59% | 52% | 34% | 2% | 56% |
| Pérez[6] | >80 | 30% | 26% | 16% | 11% | – |
| CHUS | >80 | 51% | 26% | 16% | 26% | 68% |

CHUS indicates Hospital Clínico Universitario de Santiago's study.

**Table 2. Criteria for Suspicion of Choledocolithiasis: Incidence and Prognostic Value. Diagnostic Methods Used**

| Indication | No. | IC | Preoperative ERCP | CBDL | PPV |
|---|---|---|---|---|---|
| Cholangitis | 7 | 5 | 7 | 6 | 85.7 |
| Jaundice | 19 | 6 | 19 | 13 | 68.4 |
| Acute pancreatitis | 24 | 1 | 24 | 15 | 62.5 |
| Elevated LFTs | 49 | 11 | 49 | 33 | 67.3 |
| US, dilated CBD | 28 | 8 | 28 | 25 | 89.3 |
| US, CBDL | 19 | 8 | 19 | 17 | 89.5 |

CBDL indicates choledocolithiasis; ERCP, endoscopic retrograde cholangiopancreatography; IC, intraoperative cholangiography; LFT, liver function test; PPV, positive predictive value (percentage); US, CBDL, ultrasound diagnostic of choledocolithiasis; US, CBD, bile duct ultrasound. The levels are expressed in absolute values.

There were 18 (13.5%) conversions to open surgery, 3 (16% of conversions) in emergency operations. The causes were 1 massive gallbladder rupture, 1 cholecystoduodenal fistula, 1 case where IC was not possible, 1 technical problem with the pneumoperitoneum, 3 haemorrhages, 3 cases of lithiasis in the CBD, and 8 cases of difficult anatomical dissection-identification (5 cases of acute inflammation, 2 scleroatrophic gallbladders, and 1 case of adhesions). Conversion occurred in 4.5% of patients under 65 years of age ($P<.05$).

Median hospital stay was longer in patients who required conversion to open surgery (10.11 vs 5.45 days; $P=.001$) and was similar in the 3 age subgroups ($P<.05$).

Eleven (8%) patients underwent other operations simultaneously with LC: 6 hernioplasties, 2 hepatic cystectomies, 2 laparoscopic right hemicolectomies, and 1 hepatic node biopsy.

ERCP was necessary following surgery in 5 (3.8%) patients. All had residual lithiasis in the CBD (3.8%). The incidence of lithiasis in the CBD has been 39 (29%) cases.

In 20 (17%) patients, there were 23 postoperative complications: 7 cases of haemoperitoneum, 3 wound infections, 2 wound haematomas, 3 biliary fistulas (2 from the cystic stump), 2 cases of multiple organ failure, 2 cases of postoperative jaundice, 1 subphrenic abscess, 1 persistent haematic drainage, 1 pneumonia, and 1 case of urinary retention. There were no CBD injuries.

Three (2.3%) deaths occurred in the first month after surgery (2 due to biliary sepsis with emergency surgery and 1 scheduled LC with postoperative haemoperitoneum).

Table 3 shows the comparative data in LC in the 3 age groups studied. Seventy-one percent of patients over 80 years of age were admitted to hospital on an emergency basis, significantly more than in the other groups (11% and 7.5%), which is a reflection of the greater complexity of the biliary lithiasis and poorer overall clinical situation. Compared to patients under 65 years of age, those over this age and octogenarians have a greater comorbidity (25% vs 69%-73%), as well as the presentation of biliary lithiasis with some sort of complication (38% vs 68%), especially acute pancreatitis and cholangitis. This also leads to a higher rate of conversion to open surgery (4.5% vs 13.5%-16.5%). We have ordered preoperative ERCP more often ($P<.05$) in elderly patients because there is a higher suspicion and higher incidence of CBD lithiasis.

## Discussion

Octogenarian patients are undergoing surgery more and more often in the United States[7] and in the West. Hepatobiliary disease, especially the gallbladder, is the main indication for surgery in the elderly, a group in which the incidence of acute biliary disease increases their morbidity and mortality tenfold versus the non-elderly.[1] Analysis of the results of LC in these patients appears to be needed.[8] For both the surgeon as well as the patient, it is important to have precise data on LC available when making treatment decisions.[4] Obtaining the advantages that minimally invasive surgery has to offer is especially desirable in elderly patients[2] because advanced age is itself a risk factor for surgery.[9]

Different publications analyze LC in elderly patients, in some with patients >65-70 years of age[3,6,10] and in others, such as our study, including only patients >80 years of age[2,4,9]

**Table 3. Results od Laparoscopic Cholecystectomy by Age Group**

| Age, y | >80 | 66-79 | <65 | *P* |
|---|---|---|---|---|
| Patients, n | 133 | 133 | 133 | NS |
| Women, % | 63 | 57 | 68 | <.05[a] |
| ASA I, % | 13.5 | 2 | 14 | <.05 |
| ASA II, % | 71 | 89.5 | 81 | <.05 |
| ASA III, % | 16 | 7 | 4.5 | <.05 |
| ASA IV, % | 0 | 1.5 | 0 | NS |
| Age, median, y | 83 | 73 | 47 | <.05 |
| Emergency admission, % | 71 | 11.3 | 7.5 | <.05 |
| Comorbidity, % | 73 | 69 | 25 | <.05 |
| Emergency surgery, % | 7.5 | 7.5 | 4.5 | NS |
| Complicated biliary lithiasis, % | 68 | 68 | 38 | <.05 |
| Biliary colic, % | 29 | 31 | 56 | <.05[a] |
| Dyspepsia, % | 0 | 1.5 | 6 | <.05[a] |
| Acute pancreatitis, % | 44 | 41 | 20 | <.05[a] |
| Obstructive jaundice, % | 10 | 10 | 8 | NS |
| Cholangitis, % | 4.5 | 5 | 1.5 | <.05 |
| Acute cholecystitis, % | 10.5 | 11 | 7.5 | NS |
| Preoperative ERCP, % | 39 | 25 | 8 | <.05 |
| IC, % | 21 | 22 | 14 | NS |
| Conversion, % | 13.5 | 16.5 | 4.5 | <.05[a] |
| Surgery time, median (SD), min | 72 (31) | 73 (35) | 67 (22) | NS |
| Postoperative ERCP, % | 4 | 1.5 | 0 | NS |
| Morbidity, % | 17 | 2.3 | 1.5 | <.05[a] |
| Mortality, % | 2.3 | 1.5 | 0 | NS |
| Hospital stay, median, d | 5.5 | 6.3 | 3.4 | <.05 |

[a]Not significant between some of the groups.
ERCP indicates endoscopic retrograde cholangiopancreatography; IC, intraoperative cholangiography; NS, no significant differences.

with or without comparative analysis of their experience in younger groups.[1]

We present our results with LC in 133 patients over 80 years of age and we compare them with the results obtained in patients between 65-80 years and in those under 65 years. From a methodological point of view, there is certainly bias because the analysis is not prospective, does not have random treatment assignments and not all cholecystectomies in the period studied (1992-2007) have been performed laparoscopically. The selection and exclusion criteria used have been based not on age, but rather on the availability of surgeons with experience in LC and in the complexity of the biliary lithiasis disease, at least in the initial phase of laparoscopic surgery in our department. These limitations have similarly affected non-elderly patients in our general study of LC[11] and they have been corrected as experience is gained and greater application of LC is used. On the other hand, considering how LC has been implemented and developed around the world, we believe that this is a limitation that exists in many other studies and that, with appropriate reservations, allows us to draw valid practical conclusions on the application of laparoscopic biliary surgery in the elderly.

The safety and efficacy of LC has been shown in large studies, especially in elective surgery for chronic biliary disease, with very few geriatric patients.[4] Lujan et al,[12] in patients over 65 years of age, found fewer complications and shorter hospitalisation in LC than in AC. Maxwell et al,[13] in 18 500 octogenarians in 11 hospitals in the United States, found a mortality rate of 1.8% in LC and 4.4% in AC.

The American College of Surgeons National Surgical Quality Improvement Program[7] found a morbidity rate of 28% and mortality rate of 2.3% in LC, which increases to 51% and 7% in patients over 80 years of age. Morbidity and mortality increases with age (between 20 and 100 years of age, mortality increases 0.71% per year).[7] In our series, morbidity and mortality are similar to those referred by other authors (Table 4).

Comorbidities in the elderly also contribute to higher postoperative morbidity.[3] Predictive factors of morbidity in octogenarians are: perioperative transfusion, emergency surgery, duration of the operation and COPD,[7] factors that are otherwise frequent in this subgroup of the surgical population. Comorbidities are seen in 73% of our patients over 80 years of age, versus 25% in patients under 65 years of age (*P*<.05) (Table 1). This correlates with a significant increase in patients with ASA III: 16% of octogenarians versus 7% between 65 and 80 years of age and 4.5% in patients under 65 years of age (*P*<.05).

Geriatric patients also have a higher risk of local perioperative complications following LC: 12% more for each additional decade.[14] In the Swiss national registry of cholecystectomies (LC and open cholecystectomy), the risk of iatrogenic injury of the CBD is almost 2.5 times greater in patients over 70 years of age than in those under 30 years of age.[15] However, none of our patients have suffered this serious complication.

Biliary disease is more severe in the elderly: complicated biliary lithiasis in 38% of patients under 65 years of age versus 68% in patients over 80 in our hospital; a very high level in other groups' experience as well: 47%[2] and 56%[4] (Table 1). This

**Table 4. Results of the Published Series**

| Author | Conversion | IC | Morbidity | Mortality | Postoperative ERCP | Postoperative Stay | Year | Age > | No. | Median Age | Preoperative ERCP | Emergency Surgery | Surgery Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tagle[3] | 3% | – | 5% | 2% | 3% | 3 | 1997 | 65 | 90 | 74 | 19% | – | 111 (43) |
| Uecker[16] | 17% | – | 19% | 6% | – | – | 2001 | 80 | 44 | – | – | – | – |
| Brunt[17] | 16% | – | 13% | 3% | – | – | 2001 | 80 | 70 | – | – | – | – |
| Hazzan[4] | 7.4% | 9% | 18% | 0 | – | 5.3 | 2003 | 80 | 76 | 84 | 34% | – | 94 (20) |
| Tambyraja[2] | 5% | – | 22% | 0.9% | 4.3% | 2 scheduled/ 5 emergency | 2004 | 80 | 117 | – | 32% | 33% | – |
| Kauvar[10] | 22% | – | 17% | – | – | – | 2005 | 65 | 59 | – | – | – | 108 (55) |
| Pérez[6] | 11% | 43% | 17% | 0.6% | – | 1.3 | 2006 | 70 | 176 | 75 | – | 3% | – |
| Kown[1] | 2% | 96% | – | – | 9% | 6 (1.8) | 2006 | 80 | 45 | 83 | 22% | 4% | 122 (42) |
| Costi[9] | 14% | – | 15% | 0 | – | 2.8 | 2007 | 80 | 27 | – | – | – | 79 |
| CHUS | 14% | 21% | 17% | 2.3% | 3.8% | 5.5 | 2008 | 80 | 133 | 83 | 39% | 7.5% | 72 (31) |

CHUS indicates Hospital Clínico Universitario de Santiago de Compostela; ERCP, endoscopic retrograde cholangiopancreatography; IC, intraoperative cholangiography.

may be reflected in the higher rate of conversion to laparotomy in this age group (11%-22%),[1,2,10] which is 14% in patients over 80 years of age in our study and 10% in patients over 65 in the study by Tagle et al, versus 4%-4.5% in patients under 65 years of age in their experience as well as in ours.

Preoperative ERCP was performed in a high number of patients (39%), somewhat higher than the published studies (Table 4) and significantly higher than in patients under 65 years of age (8%; $P<.001$); they were therapeutic in 2/3 of cases. The incidence of CBD lithiasis (29%) is also higher, with preoperative diagnosis and treatment predominating.

Costi et al[9] compared LC following ERCP-ES in 2 groups: 133 under 80 years of age and 27 over 80 years of age, with significantly better results in the younger patients in surgical time, morbidity, mortality, and postoperative hospital stay. Afterwards, the group of 27 patients with LC was compared with another group of 27 patients without LC following ERCP-ES. Surgery offers significant advantages: less need for additional ERCP, avoids urgent surgical intervention (it was necessary in 30%), less morbidity and a shorter hospitalisation. There are no predicting factors for OC following ES that allow for patient selection, which is why early elective LC following ES is recommended.[9]

Elective surgery in octogenarians shows good results.[1,9] Many elderly patients, simply because of their age, are "victims" of the "wait and see" policy while they have mild symptoms and are not submitted to surgery until they reach more complicated phases of the disease.[4] On the contrary, it is recommended that surgery be planned when faced with mild symptomatic cholelithiasis before complications develop.[2,4] For patients with serious comorbidity and high surgical risk, other alternatives to LC such as ERCP-ES or percutaneous cholecystectomy should be considered.[4]

The primary focus of our study is elderly patients over 80 years of age. Comparison with other age groups is secondary due to the methodological limits of the study, which is not prospective and lacks patient selection when choosing the laparoscopic approach. The time period in which the patients over 80 years and the other 2 groups underwent surgery is also not the same. Because of all this, the results are only useful for orientation and do not allow for definitive conclusions to be drawn. Nevertheless, in general, it appears that there is not a big difference in the results of LC between patients over 65 and those over 80 except for a higher postoperative morbidity.

Adequate patient selection is very important as is time of the progression of the disease at the moment when applying surgical treatment. One should take into account: a careful preoperative evaluation with attention to risk factors and comorbidities and optimal execution of the surgical procedure.[7] With these considerations, we believe that LC may be recommended as the treatment of choice for symptomatic cholelithiasis in octogenarians.

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