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## Original article

# Laparoscopic cholecystectomy in octogenarian patients. A comparative study between two geriatric population groups

Jesús Sánchez-Beorlegui,\* Pablo Soriano, Eduardo Monsalve, Nuria Moreno, Roger Cabezali, and Ana Navarro

Servicio de Cirugía General y Digestiva, Fundación Hospital de Calahorra, Calahorra, La Rioja, Spain

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## A B S T R A C T

**Introduction:** In the current article, we analyse the results and complications of laparoscopic cholecystectomy in octogenarian patients.

**Patients and method:** Retrospective study in patients older than 80 years, who underwent laparoscopic cholecystectomy between January 2002 and August 2007. Variables analysed were presentation, physical condition, anaesthetic risk, conversion rate, morbidity, and hospital stay. A comparison was made with patients aged between 70 and 79 years old. The  $\chi^2$  and Student t tests were used for statistical analysis. The level of significance was defined as a P value less than 0.05.

**Results:** A total of 64 patients were operated on, of which 39 (63%) were women and 25 men, with a mean age 83.7 years. Surgery was scheduled in 40 (62.5%) cases and urgent in 24 cases. The conversion rate to open cholecystectomy was 10.9% and the average hospital stay was 3.9 days. Two patients required re-intervention and 2 patients died.

**Conclusions:** Laparoscopic cholecystectomy is the treatment of choice for symptomatic cholelithiasis in octogenarians. The laparoscopic approach should be considered for the management of acute cholecystitis in the very old (except where contraindicated) before the development of complications.

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## Colecistectomía laparoscópica en pacientes octogenarios. Estudio comparativo entre dos poblaciones en edad geriátrica

## R E S U M E N

**Introducción:** En el presente artículo analizamos los resultados y complicaciones de la colecistectomía laparoscópica en octogenarios.

**Pacientes y método:** Estudio retrospectivo sobre pacientes con edad  $\geq 80$  años, sometidos a una colecistectomía laparoscópica entre enero de 2002 y agosto de 2007. Los parámetros analizados fueron: presentación, estado general, riesgo anestésico, tasa de conversión,

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Anciano

\*Author for correspondence.

E-mail address: js\_beorlegui@hotmail.com (J. Sánchez-Beorlegui).



Complicaciones quirúrgicas  
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morbilidad y estancia hospitalaria. Se realizó una comparación con pacientes geriátricos de entre 70 y 79 años. Para el análisis estadístico utilizamos la prueba de la  $\chi^2$  y la t de Student. La significación se estableció para valores de  $p < 0,05$ .

**Resultados:** Se intervino a 64 pacientes (el 63%, mujeres), con una media de edad de 83,7 años. La cirugía fue programada en 40 (62,5%) casos y urgente en 24. La tasa de conversión fue del 10,9% y la media de estancia hospitalaria, 3,9 días. Dos enfermos fueron reoperados y hubo dos decesos.

**Conclusiones:** La colecistectomía laparoscópica es la técnica de elección para el tratamiento de la colelitiasis sintomática en octogenarios. La colecistitis aguda del anciano debe ser tratada mediante abordaje laparoscópico, salvo contraindicación, preferentemente antes de que aparezcan complicaciones.

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## Introduction

An effect of the progress experienced by modern society is the increase in life expectancy, accompanied by an extraordinary improvement in quality of life in the elderly, who maintain their social activity and independence until very late in life. In addition to this, innovations in surgery (laparoscopy), anaesthetic techniques and postoperative resuscitation now permit octogenarians or nonagenarians to be considered surgical candidates, something that was unheard of just a few decades ago.<sup>1</sup> This situation evokes permanent discussion about surgery and its applications in geriatrics; a discourse in which several bioethical, economic, social interest, and strictly medical aspects are combined.<sup>2,3</sup>

A representative example of this issue is cholelithiasis. The incidence of cholelithiasis in the elderly is over 50% of the population and the rate increases progressively to over 80% as they advance to the ninth decade of life.<sup>4</sup> Many cases of cholelithiasis cause symptoms that are complicated over their course of development and they require primary or specialised medical attention, hospitalisation, and interventions. As opposed to the traditional view of the problem that advocated medical treatment (conservative), laparoscopic cholecystectomy (LC) now offers a therapeutic alternative for symptomatic cholelithiasis or cholecystitis. The benefits of this are a low morbidity rate and reduced hospital stay,<sup>5-8</sup> which have been demonstrated in prospective and meta-analysis studies.<sup>9</sup>

In this article, based on our analysis of LC cases, we evaluate the peculiarities, results, advantages, and inconveniences of LC in the octogenarian patient. Furthermore, we shall perform a comparison between 2 geriatric age brackets to establish the biological, surgical, and bioethical limits of the application of laparoscopy in the treatment of symptomatic and complicated cholelithiasis.

## Materials and methods

### Material

A retrospective study of patients aged  $\geq 80$  undergoing laparoscopic cholecystectomy (LC) over a period of 68 months (January 2002–August 2007) was performed. They were selected independently of the affectation (symptomatic cholelithiasis or acute cholecystitis) and of the type of surgery (emergency

or programmed). All cases diagnosed as choledocholithiasis in the preoperative stage were excluded.

For the study of the different surgical variables, patients aged between 70 and 79, both inclusive, were chosen under the same inclusion criteria as the previous group.

Lastly, the rest of the LC cases were presented in the control group, which grouped all the patients 69 and under.

### Methods

All of the cases were intervened in our hospital by a team of 7 surgeons, for which, by common agreement, a totally uniformity of the methods described was adopted. In acute cholecystitis and saving contraindications, the on call surgeon's intention was to perform an LC over a conservative or non-surgical treatment.

Patients with symptomatic cholelithiasis were studied using a preoperative standard, which included an electrocardiogram, simple thorax radiology, coagulation study (prothrombin and cephalin times), liver function tests (total bilirubin, aspartate transaminase, alanine transaminase, amylase, and alkaline phosphatase), and hepato-biliopancreatic sonography. In selected cases, other tests were requested, such as abdominal computerised tomography (CT), magnetic resonance cholangiography (MRC), or endoscopic retrograde cholangiopancreatography (ERCP). Antithrombotic prevention treatment with low molecular weight heparin (LMWH) and antibiotic treatment with second generation cephalosporin or a combination of penicillin and a beta-lactamase inhibitor were applied to all the patients.

In the programmed LC, patients under oral anticoagulation (acenocoumarol, warfarin) or antiplatelet treatment (salicylates, clopidogrel, trifusal, ticlopidine, and dipyridamole) received withdrawal guidelines based on the suppression of the medication and its substitution with LMWH. These guidelines and the preoperative analytical controls can be personalised according to the base disease, whether cardiac or not, depending on the anaesthesiology and the haematology suggestions. In the emergency surgery, the intention was to allow all the patients to enter the operating theatre with a prothrombin time value greater than 50% and the INR (International Normalized Ratio)  $< 1.5$ . To achieve this, we administered intravenous vitamin K and repeated the coagulation study 6 h later. When the operation could not be delayed, fresh frozen plasma at a dose of 10 mL/kg was transfused.



In our study, the risk of choledocolithiasis was established based on the preoperative evaluation of 4 predictive factors: duplicated values of alkaline phosphatase (ALP), transaminase (aspartate transaminase and alanine transaminase), total bilirubin, and sonography dilation of the bile duct over 8 mm (septuagenarians) or 10 mm (over 80 years old).<sup>10-12</sup> Three or more factors in one patient or the direct visualisation of bile duct lithiasis in the imaging tests implied a high risk of choledocolithiasis. A preoperative ERCP was requested for the high risk patients. In moderate risk cases in which all of the above criteria were not met or in which the bile duct could not be evaluated in the sonography, a CT with cholangiography or an MRC allowed us to select the candidates for presurgical ERCP. Intraoperative transcystic cholangiography (ITC) was never performed on the emergency or programmed LCs, the technique was reserved for moderate risk cases with no MRC.

The operations were performed under general anaesthesia and orotracheal intubation. The patient was placed in the French position for the endoscopic surgery cases, with the surgeon between the patient's legs and only one assistant on the right, in charge of the video laparoscope and traction of the bile duct. An open LC was performed with an umbilical Hasson trocar and 3 accessory ports, one of 10 mm on the left hypochondrium and two 5 mm, one located on the right side and on the epigastrium. Pneumoperitoneum is regulated at 10 mm Hg in order to maintain mid to low insufflation pressure. After clamping the cystic and the cystic artery, the dissection of the vesicular bed segment was performed with a hook clamp attached to electrocoagulation; then the surgical segment was removed in a bag, through the umbilical port. When it became necessary to convert the procedure, a right subcostal laparotomy was performed, the surgical bed placed in Pilé (roof) position and an automatic Ansabere® retractor used. Lastly, and always on the surgeon's criteria, a Jackson-Pratt subhepatic drain was placed, externalised through the 5 mm port on the right vacuum; then infiltration with local anaesthesia on all the entry ports was performed.

The variables under study were: background, clinical presentation method, risk of hospital infection using the NNIS index (National Nosocomial Infections Surveillance System), assessment of the physical state, and anaesthetic risk using the ASA classification (American Society of Anaesthesiology), conversion rate, intra-abdominal drain placement, morbidity-mortality (Clavien scale<sup>13</sup>), hospital stay, and pathological diagnosis.

To compare the different clinical variables and the results obtained, we used the  $\chi^2$  test (Fisher's exact test) for the qualitative variables and Student t distribution of mean comparison for the quantitative variables. In both tests, we assumed a significance for the probability values of  $P < .05$ ; a value of  $P < .01$  was considered highly significant. Data was statistically treated with the G-Stat 2.0® computer program.

## Results

Over the 68 months of the study, 557 LCs were performed, 64 (11.5%) of which met the inclusion criteria for octogenarian patients and 125 (22.4%) for septuagenarians.

Thirty-nine (63%) women and 25 men, averaging 83.7 (3.3) years of age (maximum, 94) were intervened. The registered medical histories were: excess weight (40.6%), high blood pressure (32.8%), gastroduodenal ulcer and/or hiatus hernia (23.4%), diabetes (20.3%), obstructive pulmonary disease (19%), and cardiovascular diseases (15.6%). There was a clinical history of hospitalisation due to cholecystitis in 17% of the cases, and in 31% of the cases, biliary colic.

The clinical presentation in which we based the operative indications was: symptomatic cholelithiasis, with or without cholecystitis history (56.3%), Mirizzi syndrome (4.7%), jaundice (9.4%), acute lithiasic cholecystitis (23.4%), and acute pancreatitis of biliary origin (6.2%).

The anaesthetic and infection risks using the ASA and NNIS scales are detailed on Table 1.

The programmed LC operations were performed on 40 (62.5%) cases and 24 were emergency interventions; Table 2 shows the diverse surgical parameters and the comparison of the septuagenarian patients with the control group.

Difficulty in identifying the elements of Calot's triangle was the cause of conversion in 5 cases and in the remaining 2; one was due to intraoperative haemorrhaging of the cystic artery and the other to lateral section of the main bile duct.

The postoperative complications are described in detail in Table 3.

Two patients were re-intervened, one due to a high output biliary fistula (cystic stump overflow in the immediate postoperative with acute peritonitis symptoms) and the other due to an exenteration of the subcostal laparotomy with symptoms of obstruction (jejunum loop interposition). Both patients survived.

The 2 deaths were in cases of acute cholecystitis under emergency intervention due to severe postoperative cardiopulmonary decompensation which led to a multiorganic insufficiency.

The definitive anatomopathologic results showed cancer of the gallbladder in 2 (3.1%) patients. The tumours were an unexpected finding, since there were no clinical, complementary or symptomatic signs; nor were they identified

**Table 1 – Patient distribution according to anaesthetic (ASA I-IV) and infectious (NNIS 0-3) risk**

	Control group, <70 years (n=368)	70-79 years (n=125)	>80 years (n=64)	P <sup>a</sup>
ASA				
I	59.8%	12.4%	7.8%	NS
II	34.1%	55.2%	43.8%	NS
III	5.8%	27.4%	32.8%	NS
IV	0.3%	5%	15.6%	.03
NNIS				
0	67.9%	45%	29.7%	NS
1	22.5%	36%	24.3%	NS
2	7.4%	12%	32.4%	
.009				
3	2.2%	7%	13.6%	.04

NS indicates not significant.

<sup>a</sup>70-79 years versus over 80 years old.



**Table 2 – Casuistry of the series: demographic features and surgical variables**

	Control group, <70 years	70–79 years	>80 years	P
Cases, n	368	125	64	–
Males / females, n	109/259	47/78	25/39	NS
Age, mean (SD), y	49.8 (12.5)	76.4 (5.2)	83.7 (3.3)	–
Elective LC	326 (88.5%)	109 (87%)	40 (62.5%)	.004
Emergency LC	42 (11.5%)	16 (13%)	24 (37.5%)	.002
Surgery duration, min	59.8 (33.2)	65.9 (45.2)	67.6 (30.4)	NS
Patients with abdominal drainage	31 (8.5%)	20 (16%)	26 (40.6%)	.005
Total conversions	18 (4.9%)	11 (8.8%)	7 (10.9%)	NS
Programmed LC conversions	15 (4.6%)	8 (7.3%)	5 (12.5%)	NS
Emergency LC conversions	3 (7.1%)	3 (18.7%)	2 (8.3%)	NS
Patients with surgical morbidity	39 (10.6%)	27 (21.6%)	14 (30.4%)	NS
Re-intervened patients	9 (2.5%)	5 (4%)	2 (2.9%)	NS
Postoperative hospital stay, d	2.1 (12.5)	3.3 (6.4)	3.9 (4.4)	NS
Patients staying 24 h	221 (60%)	59 (47%)	19 (29.6%)	.009

LC indicates laparoscopic cholecystectomy; NS, not significant.

The data express n (%) or standard mean (deviation).

<sup>a</sup>70–79 years versus over 80 years old.**Table 3 – Postoperative complications**

Clavien scale	Complication description	<70 years (n=368)	70–79 years (n=125)	>80 years (n=64)
Grade I	Surgical wound infection	7	4	2
	Wound haematoma/seroma	4	3	3
	Ileus	4	5	1
	Urinary tract infection	2	1	
	Others	4	2	1
	Total <sup>a</sup>	21 (5.7)	15 (12)	7 (10.9)
Grade IIA	Respiratory failure	1	2	2
	Acute renal failure		1	1
	Heart failure/angina			3
	Diabetes decompensation	4	2	
	Sepsis	4	1	1
	Digestive haemorrhaging			1
	Cholangitis	1	1	
	Biliary fistula		1	2
	Total <sup>a</sup>	10 (2.7)	8 (6.4)	10 (15.6)
Grade IIB	Biliary fistula	3	2	1
	Biloma/bile leakage	1	1	
	Residual choledocolithiasis	2		
	Intra-abdominal haemorrhaging	4		
	Perforated ulcer	1		
	Residual abscess	1		
	Evisceration			1
	Total <sup>a</sup>	12 (3.3)	3 (2.4)	2 (3.1)
Grade III	Colic fistula	1		
	Main bile duct section		1	
	Small intestine fistula		1	
	Total <sup>a</sup>	1 (0.3)	2 (1.6)	
	Grade IV	Death	3 (0.8)	2 (1.6)
				2 (3.1)

<sup>a</sup>Number of complications (coefficient: complication/cases×100).



during surgery. In both cases, the LC was completed without incidents, since the interventions were programmed. Death by local or metastatic dissemination occurred approximately 1 year following the intervention (11 and 14 months).

## Discussion

A pending discussion in medicine is to establish the start of the geriatric age. This consideration is not a minor issue given that, in order to compare the published studies, it would be fundamental to associate the conclusions with a population group. Keeping in mind the current standards of health and quality of life, it does not seem appropriate to talk about the elderly when dealing with patients aged 60 or 65,<sup>14</sup> since it has been proven that it is in octogenarians when physical deterioration is accelerated and the hazards of surgery are increased: greater rate of complications, morbid-mortality and conversions in laparoscopic surgery.<sup>15-18</sup>

For this reason, we have decided to take 80 years of age as the break-off point to evaluate if LC is a valid choice versus other options for the treatment of cholelithiasis. In addition, we think it is interesting to compare the results with those obtained in septuagenarian patients, establishing differences even within the geriatric age population.

According to our experience, a significant higher number of LCs was performed on octogenarians with acute cholecystitis and as emergency or differed emergency surgery. This fact coincides with the observations of other authors,<sup>19-21</sup> although we should point out that the reason for elective and emergency LC among the different age groups tends to even out (Table 2). We think that it is due to the progressive extension of the indications and to greater open-mindedness in recommending surgery to over 80 years old.

The correct evaluation of surgical risk is decisive, since they are patients with limited vital reserves, sensitive to morbidity and to operative trauma. This data is basic for the establishment of a correct surgical procedure, whether for a symptomatic cholelithiasis or a complicated one.<sup>22</sup> In our experience (Table 1), the risk is significantly higher in octogenarians. Other factors should also be considered, such as lifestyle (confined to bed, total dependence) and the cognitive state (senility); given that with highly deteriorated patients the medical treatment of gallstones could be the most appropriate from a bioethical viewpoint.<sup>1,5</sup> Nevertheless, each patient should receive a multidisciplinary and individualised evaluation, even in emergency situations and those of vital risk, when the decision to operate is pressing.<sup>3</sup>

An added problem is the handling of the choledocolithiasis, in 20% of the symptomatic cholelithiasis in the elderly there is a passing of gallstones. We value the diverse clinical and analytical predictive factors and the imaging tests accepted in the documentation on the subject and described in the methods.<sup>10-12</sup> The object of classifying patients according to degree of risk, aimed at determining the application of ERCP, MRC and ITC<sup>23</sup>; especially the ERCP, since this is an invasive technique which requires trained personnel and presents a significant morbid-mortality.<sup>24</sup> According to our experience, 18.5% of the patients over 70 with symptomatic biliary lithiasis

or cholecystitis were considered high or moderate risk. The false positives, on completion of the ERCP or MRC studies were 23%. As far as false negatives are concerned (unexpected choledocolithiasis), 2 cases were recorded in the control group, but none among the elderly (Table 3), which shows the good distinguishing ability of the cholelithiasis prediction scale.

Insofar as the LC technique, we applied an insufflation pressure of 10 mm Hg in the older group and attempted to limit the surgical duration within the safety margins.<sup>25</sup> Both measures, despite there being no conclusive evidence, seem effective in the prevention of cardiovascular and respiratory alterations linked to the pneumoperitoneum and to prolonged anaesthesia.<sup>26</sup> No differences were found between the population groups in the surgical duration variable. There is also little difference with the control group, which seems more significant (Table 2). As far as we are concerned, we do not consider conversion as a technical failure (Table 2),<sup>15,16</sup> especially in the cholecystitis, when inflammation and adherent fibrosis alters the anatomy of Calot's triangle, which could mask a Mirizzi syndrome.<sup>27</sup> Undoubtedly, to be set on concluding the LC by all means could prolong the anaesthetic time outside of the recommended limits or predispose the patient to an extrahepatic bile duct lesion.

Lastly, the decision to leave in an abdominal drain is the personal choice of the surgeon. It is used in greater numbers with the elderly if we compare these to the control group (Table 2). In emergency surgery or in anticoagulants, they have been used systematically, although our study shows that the haemorrhaging is not a relevant complication (Table 3). However, 2 of the 3 low output biliary fistulas in octogenarians healed without incidents due to the drain.

As was to be expected, morbidity was higher in the elderly with respect to the control group, but there were no differences between the septuagenarians and those over 80, neither were there any differences in reinterventions and postsurgical stays (Table 2).<sup>6,16</sup> It should be kept in mind that our register of complications is comprehensive, which includes those with little clinical weight (Table 3). There is no relationship between the severity of the complications (Clavien grades IIb and III) and age (Table 3), as does seem to occur with emergency LC,<sup>8,18</sup> although our data is reduced for a reliable statistical analysis. We believe our data show a good selection of candidates for the LC and that the indications were correctly applied. Lastly, we consider it quite beneficial that 41% of all the elderly remained in the hospital for 24 h after the intervention (Table 2).<sup>14</sup>

In conclusion, LC is a technique applicable to octogenarians. In order to establish the application, an individualised and interdisciplinary assessment of the patient is vital which should include the risks, benefits and repercussions in their quality of life.

In acute cholecystitis, the decision of the on call team is of prime importance; by applying the principles of medicine based on evidence,<sup>28</sup> it should weigh up multiple aspects, such as the patient's base situation, decompensation of the disorders, evolutive days, complications underway, etc.<sup>2</sup> If emergency or differed emergency LC were possible, this would be the best resulting option, which would avoid morbidity and prolonged stays. When, for medical, bioethical or therapeutic denial



reasons surgery is not recommended, conservative treatment with antibiotic therapy and drainage of the gallbladder (echo-guided percutaneous or via minilaparotomy) is a valid option that can cure the patient.<sup>29</sup>

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