

Risk factors for elective laparoscopic cholecystectomy morbimortality in elderly.

Fatores de risco para morbimortalidade em colecistectomia videolaparoscópica eletiva em idosos.

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A B S T R A C T

Objective: to identify risk factors for the occurrence of postoperative complications in laparoscopic cholecystectomies (LC) in elderly patients. **Methods:** an observational study with analysis of medical records of patients aged 60 years and older, submitted to elective LC at Gaffree e Guinle University Hospital, from 2006 to 2018. Surgeries performed on an emergency basis or converted to the conventional technique were excluded from our study. **Results:** a total of 345 patients were included in our study, being 80% females and 62% aged 60-69 years. There were 39 cases of postoperative complications (11.3%), mostly (87%) classified as grades I or II of Clavien-Dindo surgical complication scale. There was only one death. The presence and the number of coexisting diseases and ASA II or III physical status classification of preoperative patients conferred a greater risk for the development of postoperative complications and mortality. **Conclusion:** our study identified the presence of coexisting diseases, as well as their severity, according to ASA classification, as risk factors for the development of postoperative complications of LC in elderly patients. However, LC proved to be a safe technique when used in these patients with low morbidity and mortality rates.

Keywords: Cholecystectomy, Laparoscopic. Health of the Elderly. Cholelithiasis. Gallstones. Postoperative Complications.

INTRODUCTION

The world has been undergoing a change in the demographic profile represented by the aging of the population, a phenomenon of great impact for contemporary society. Although scientific and technological advances have increased life expectancy, the cure for many chronic diseases has not been achieved yet. These conditions lead to different degrees of physical incapacity, as well as to the increase in health costs. In Brazil, between 2005 and 2015, there was a population increase from 9.8% to 14.3% in the age range of 60 years and above. According to the projections of the World Health Organization (WHO), Brazil will be the sixth country in the world with the largest number of elderly people by 2025¹⁻³.

Cholelithiasis is a common disease whose prevalence increases with age in both sexes^{4,5}.

Thus, in the seventh decade of life, 35% of women and 20% of men have gallbladder stones. Due to this high prevalence, cholelithiasis is the most common intra-abdominal disease in the operating room⁶, among elderly patients.

Despite some initial resistance in the use of laparoscopic technique for cholecystectomy in elderly, nowadays this type of treatment is considered the gold standard^{7,8}. Recent studies have shown that the advantages of the minimally invasive technique are also observed when it is applied in elderly patients⁹⁻¹². Thus, it is necessary to seek in the group of elderly patients the identification of peculiarities that may interfere on the operative result, when the laparoscopic technique is used.

The present study aims to identify possible risk factors for postoperative morbimortality in patients aged 60 years and

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older, submitted to laparoscopic cholecystectomy (LC) at a university hospital in Rio de Janeiro city, RJ state.

METHODS

Observational study with a case-series analysis of cases recruited between February 2006 and May 2018. The sample was defined by convenience, selecting all the patients that met the inclusion criteria: patients aged 60 years and older, submitted to elective LC which was not converted to conventional laparotomy, and operated by the team of "Clínica Cirúrgica A" ("Surgical Clinic A") of HUGG (Gaffree e Guinle University Hospital), located in Rio de Janeiro city, RJ state.

The following data were obtained from the medical records: age, gender, physical status classification according to the American Society of Anesthesiologists (ASA), number of coexisting diseases, duration of operation in minutes, time of postoperative hospitalization, presence of postoperative complications and their severity according to Clavien-Dindo Classification (CDC).

For data analysis, the proportion differences in the frequency distributions of categorical variables of interest were performed using the Chi-square test and Fisher's exact test (two-sided). For continuous variables, measures of central tendency (mean and median) and of dispersion (standard deviation, quartiles, and amplitude) were performed, calculating the statistical differences by means of the Student's t-test. For graphical presentation, the box-plot graph was chosen. Median differences were statistically evaluated using the non-parametric

Mann-Whitney test to compare two groups and the non-parametric Kruskal-Wallis test to compare three groups. Values of $p < 0.05$ were considered statistically significant. The association magnitude was examined by unconventional logistic regression, with *odds ratio* (OR) and their respective confidence intervals (95% CI) obtained. All analyzes were performed in SPSS 17.0 (Statistical Package for the Social Sciences, SPSS Inc., Chicago, IL, USA, 2008).

The research was authorized by the Research Ethics Committee of HUGG-UNIRIO, CAAE 54448316.5.0000.5258.

RESULTS

A total of 345 patients underwent LC during the evaluated period. Regarding gender, 80% of the sample were females. The majority of the patients were concentrated in the age group of 60-69 years (62%). The elderly group aged 80 years or above represented only 7.8% of the sample (Table 1).

Regarding the presence of coexisting diseases, 292 patients (84.6%) presented, at least, one comorbidity. Present in 259 patients (75%), systemic arterial hypertension (SAH) was the most frequent coexisting disease. Although there had been a high prevalence of comorbidities, most patients were classified as ASA II (77.4%) and no patient was classified as ASA IV. The majority of the patients (91%) were hospitalized for a maximum of 24 hours postoperatively. Only eight patients (2.3%) were hospitalized for three days or more. The group with surgical duration between 61 and 90 minutes concentrated the majority of the patients (39.7%) (Table 1).

Table 1. Epidemiological variables of patients submitted to laparoscopic cholecystectomy

Variable	n (%)
Gender	
Female	276 (80.0)
Male	69 (20.0)
Age (years)	
60-69	214 (62.1)
70-79	104 (30.1)
≥80	27 (7.8)
Number of morbidities	
0	53 (15.4)
1	184 (53.3)
2	90 (26.1)
≥3	18 (5.2)
ASA	
I	53 (15.4)
II	267 (77.4)
III	25 (7.2)
Surgical complications	
No	306 (88.7)
Yes	39 (11.3)
Hospitalization period (days)	
1	314 (91.0)
2	23 (6.7)
≥3	8 (2.3)
Surgery duration (minutes)	
≤30	1 (0.3)
31-60	79 (22.9)
61-90	137 (39.7)
91-120	66 (19.1)
>120	62 (18.0)

The frequency of complications was low, occurring in only 11.3% of the cases. The majority were grades I and II, according to CDC scale. During the study period, there was only one death, caused by acute myocardial

infarction. There was no statistically significant difference when comparing patients' gender and the presence of complications ($p=0.73$), nor when comparing age and the presence of complications ($p=0.36$) (Table 2).

When analyzing patients with coexisting diseases, it was possible to identify a higher prevalence in the group of complications (100%) when compared to the group without complications (82.7%), being this difference statistically significant ($p=0.04$). It was also possible to observe significant differences between the groups with and without complications and ASA classification ($p=0.01$) (Table 2).

When the association magnitude was evaluated, we observed a statistically significant increase in complication risk with ASA II patients (OR=7.6; CI:1.02-56.7) and ASA III patients (OR=13.1; CI:1.43-118.3) when compared to ASA I patients (Table 3). Estimates were also positive for the number of comorbidities and the presence of complications, with the chance being increased 7.6 and 8.9 times for the groups of patients with one and two comorbidities, respectively, when compared to the group of patients without coexisting diseases. Surgical duration also presented statistically significant positive risk estimates (Table 3). The median surgical duration of the group with complications was greater (105 minutes) than that of the group without complications, being this difference statistically significant ($p=0.02$). When comparing the median surgical durations of the age groups, there was no statistically significant difference ($p=0.16$) among the three evaluated strata (Figure 1).

Table 2. Comparison between surgical complication and selected variables.

Variable	Surgical complication		p-value*
	No (%)	Yes (%)	
Gender			
Female	244 (79.7)	32 (82.1)	0.73
Male	62 (20.3)	7 (17.9)	
Age (years)			
60-69	190 (62.1)	24 (61.5)	0.36
70-79	90 (29.4)	14 (35.9)	
≥80	26 (8.5)	1 (2.6)	
ASA			
I	53 (17.4)	0 (0.0)	0.01
II	233 (76.1)	34 (87.2)	
III	20 (6.5)	5 (12.8)	
Number of morbidities			
0	53 (17.3)	0 (0.0)	0.04
1	160 (52.3)	24 (61.5)	
2	77 (25.2)	13 (33.3)	
≥3	16 (5.3)	2 (5.2)	
Hospitalization period (days)			
1	292 (95.4)	22 (56.4)	<0.001
2	14 (4.6)	9 (23.1)	
≥3	0 (0.0)	8 (20.5)	
Total	306 (100)	39 (100)	

* Chi-square test or Fisher's exact test. Statistically significant values: $p < 0.05$.

Table 3. Risk estimates for surgical complication in patients submitted to laparoscopic cholecystectomy.

Variable	Surgical complication		Gross odds ratio (95% CI)*
	No (%)	Yes (%)	
ASA			
I	53 (17.4)	0 (0.0)	1.00
II	233 (76.1)	34 (87.2)	7.6 (1.02-56.7)
III	20 (6.5)	5 (12.8)	13.1 (1.43-118.3)
Number of morbidities			
0	53 (17.3)	0 (0.0)	1.00
1	160 (52.3)	24 (61.5)	7.6 (1.02-57.8)
2	77 (25.2)	13 (33.3)	8.9 (1.14-70.5)
≥3	16 (5.3)	2 (5.2)	6.6 (0.56-77.9)
Hospitalization period (days)			
1	292 (95.4)	22 (56.4)	1.00
2	14 (4.6)	9 (23.1)	8.5 (3.31-21.8)
≥3	0 (0.0)	8 (20.5)	105.8 (12.66-884.7)
Total	306 (100)	39 (100)	

* Risk estimates calculated through unconditional logistic regression.

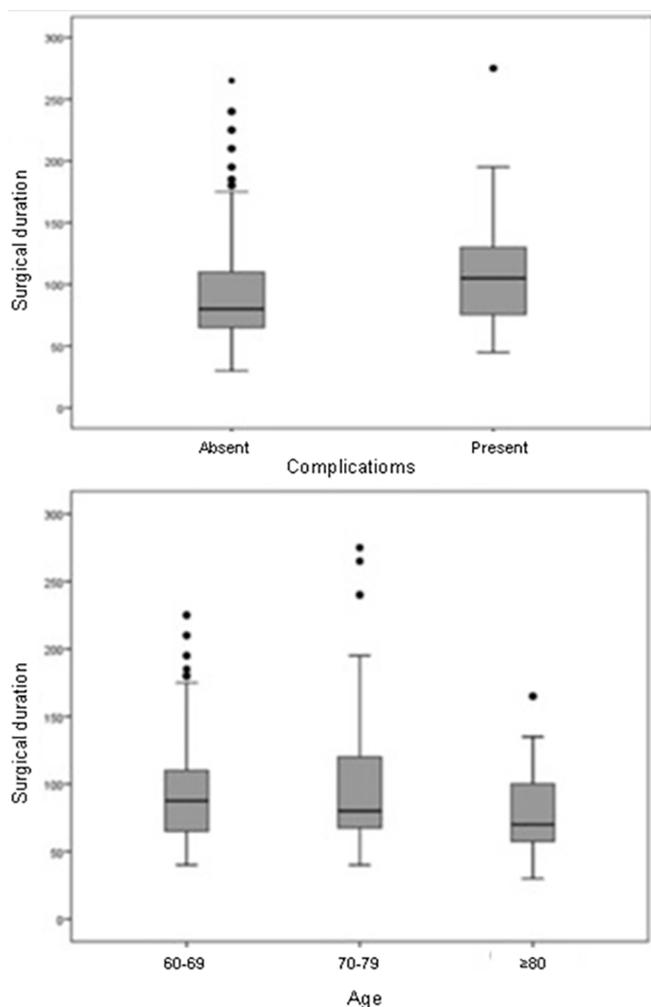


Figure 1. Relationship between surgical complication/ age and surgical duration in patients submitted to video-laparoscopic cholecystectomy. Sample comparison - non-parametric Mann-Whitney test ($p=0.02$) for surgical duration \times complications and non-parametric Kruskal-Wallis test ($p=0.16$) for surgical duration \times age.

DISCUSSION

The progressive increase of the elderly population is also reflected in the operating rooms¹³. Although advanced age in itself has never been considered contraindication for surgical procedures¹⁴, it is natural to attribute to the elderly patient an increased risk of perioperative complications. The reduction of physiological reserves, generating or not generating fragility syndrome, as well as the increase in the prevalence and severity of coexisting diseases, turn the elderly patient into a more vulnerable target to stress triggered by acute events and traumas¹⁵.

Studies demonstrate that the endocrine-metabolic and inflammatory response to surgical trauma is high in the elderly, with a consequent increase in the systemic inflammatory response in the post-LC period¹⁶.

A study conducted in Italy⁴ with patients aged 60 years or older, corroborated other studies^{17,18}, which confirmed the presence of gallstones associated with age increase, being more evident in females when compared to males. In the present study, the majority of individuals were between 60 and 69 years of age, with a predominance of females in the three age groups. Clinical presentation in elderly patients is usually not very symptomatic or even silent, with the elderly seeking medical treatment when cholelithiasis already presents complications, such as biliary pancreatitis or acute cholecystitis. Periods of acute gallbladder inflammation can be catastrophic for elderly patients, generating cases of great intraoperative technical difficulty, many times leading to conversion to traditional surgery, using the conventional technique¹⁹. In addition, surgeries in the elderly are associated with higher rates of mortality and length of hospital stay, especially in patients in the older age group^{20,21}.

Surgery is the best form of cholelithiasis treatment, and the laparoscopic technique is currently considered the gold standard⁷. Two decades ago, when laparoscopic surgeries began to be performed in Brazil, there was some fear of performing this procedure in the elderly. At that time, the need for pneumoperitoneum and the prolonged surgical duration were challenges for these patients. With the diffusion of LC, shortening of surgical time, improvement of the available anesthetic technique, and better knowledge of the physiological changes resulting from this procedure, it was possible to extend the age limits of the patients and the indication for laparoscopy.

Antoniou *et al.*²² performed a meta-analysis that demonstrated a trend towards better outcomes related to morbimortality when LC was the used technique to treat cholelithiasis in the elderly.

In the present study, we sought to identify possible risk factors associated with morbimortality in elderly patients undergoing LC. The prevalence of complications was low (11.3%), following world's statistics^{5,23-25}. Only one death was observed (0.29%), representing a low mortality rate, similar to other studies^{10,24,26,27}. The severity of the complications was assessed using CDC²⁸. Initially described for cholecystectomies, this classification has already been adapted for numerous surgical procedures, proving to be an easy-to-use and understand tool. In this work, 39 cases with complications were identified, of which 34 were classified to grade I (51%) or grade II (36%) in CDC, that is, those represented by episodes such as vomiting, urinary retention, surgical wound infection, and postoperative delirium, among others, and that did not interfere in the patients' postoperative result. Only four patients (10%) presented complications classified to grade IIIa, none of them requiring treatment under general anesthesia. The death occurred due to acute myocardial infarction in the immediate postoperative period, evolving to a fatal outcome within the first 72 hours (grade V in CDC).

None of the patients classified as ASA I presented complications, that is, all complications occurred in patients with at least one comorbidity. The presence of associated diseases is extremely common in the elderly²⁹. According to the results of a study carried out in our institution³⁰, 87% of the elderly surgical population presented one or more coexisting diseases, a fact also found in our results (84.6%). The majority of participants with complications were assessed as ASA II (87.2%), that is, mild systemic disease, without significant limitations. However, ASA III physical

status classification had an even greater chance of complication. In the present study, there was no patient classified as ASA IV, although this had not been an exclusion criterion. Perhaps those patients with worse general health conditions were taken to surgery only in emergency situations, using conventional technique, or were submitted to conservative treatment. The simplicity of ASA classification and its use by other medical specialties besides anesthesiology overlap with its intrinsic subjectivity, expanding its use worldwide, in several studies that seek to evaluate the risk of perioperative morbimortality.

Among the coexisting diseases, SAH is the most frequent one. In the present study, 259 patients (75% of the evaluated individuals) had SAH, an expressive prevalence among patients with and without complications. Among the individuals with complications, 35 (89.7%) presented SAH diagnosis. Massie *et al.*²⁹ identified that SAH was the most frequent disease in patients undergoing cholecystectomy. Diabetes mellitus was the second most common comorbidity in this study, although present only in seven patients with complications (18%). Since all patients with complications presented some comorbidity, it is suggestive to consider that the presence of coexisting diseases is a risk factor for morbidity^{23,25}. In the results of this study, there was a progressive increase in the chance of complications, with the increase in the number of comorbidities. However, when analyzing the presented complications, it was not possible to necessarily verify the relationship between the occurrence of postoperative complication and the type of comorbidity present. This fact may suggest that the presence of coexisting diseases indicate a fragile organism, more subjected to the effects of the surgical trauma, regardless of the type of associated disease.

After analyzing the data, it was observed that a greater severity, classified as ASA III, and

a greater number of associated diseases gave a higher risk for postoperative complications. It is known that the presence of diseases makes the organism of the elderly even more susceptible to imbalances that can be caused by trauma and to the consequent endocrine-metabolic and inflammatory response to surgical trauma. Although LC, due to its minimally invasive characteristics, results in a lower endocrine-metabolic and inflammatory response, the elderly still present high inflammation markers in the immediate postoperative period¹⁶.

Another factor that may play a role in the appearance of complications is surgical duration¹⁹. In our study, this parameter did not differ among the three age groups. However, the cases with postoperative morbimortality had longer surgical time. One possible explanation is the fact that prolonged surgical duration generates more trauma, what leads to the appearance of complications.

Of the total number of studied cases, most of the patients (91%) required a 24-hour postoperative hospitalization. However, when we observed patients who presented complications, 46.6% had hospitalization time of two or more days. This fact demonstrates the economic importance of tracking patients who are more likely to develop complications in order to avoid them or

at least minimize this risk. There are studies already demonstrating the feasibility and safety of LC in aged outpatients²⁵.

In the elderly, morbidity after LC is apparently more associated with the operation and severity degree of previous biliary disease than with chronological age itself^{12,21}. Elderly patients are among those who most benefit from the minimally invasive characteristic of the laparoscopic approach, with its low systemic repercussion, lower potential for pain perception, and faster and more effective return to daily activities. The elderly population submitted to LC in our hospital presented a behavior that did not differ from that found in medical literature^{12,22}.

In view of the results, this study was able to identify the presence and number of coexisting diseases, as well as their severity according to ASA classification, as risk factors for the development of complications in elderly patients after LC. When used in these patients, LC was shown to be a safe technique since the incidence of morbimortality was low and the presented complications were classified as low-severity. Thus, it may be recommended that efforts be aimed at optimizing the control of the associated diseases in the preoperative period, in order to minimize the possibility of developing complications.

R E S U M O

Objetivo: identificar fatores de risco para a ocorrência de complicações pós-operatórias em colecistectomias videolaparoscópicas (CVL) em pacientes idosos. **Métodos:** estudo observacional com análise de prontuários médicos de pacientes com idade igual ou superior a 60 anos, submetidos à colecistectomia videolaparoscópica eletiva no Hospital Universitário Gaffrée e Guinle, entre os anos de 2006 e 2018. Cirurgias realizadas em regime de emergência ou convertidas para a técnica convencional foram excluídas do estudo. **Resultados:** foram incluídos no estudo 345 pacientes, sendo 80% do sexo feminino e 62% com idade entre 60 e 69 anos. Houve 39 casos de complicações pós-operatórias (11,3%), em sua maioria (87%) classificadas como tipo I ou II da escala de complicações cirúrgicas de Clavien-Dindo. Houve somente um caso de óbito. Presença e quantidade de doenças coexistentes e classificação de estado físico ASA II ou III conferiram risco maior para o desenvolvimento de complicações e mortalidade pós-operatórias. **Conclusão:** o estudo identificou a presença de doenças coexistentes e a gravidade das mesmas, segundo a classificação ASA, como fatores de risco para o desenvolvimento de complicações no pós-operatório de colecistectomias videolaparoscópicas em pacientes idosos. Entretanto, a CVL se mostrou uma técnica segura quando empregada nestes pacientes com taxas de morbimortalidade baixas.

Descritores: Colecistectomia Laparoscópica. Assistência a Idosos. Colelitíase. Cálculos Biliares. Complicações Pós-Operatórias.

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