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Results of laparoscopic cholecystectomy in the elderly.

Resultado da colecistectomia laparoscópica em idosos.

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A B S T R A C T

Objective: to evaluate the results of laparoscopic cholecystectomy in the elderly compared with younger patients. **Methods:** we retrospectively reviewed computerized medical records of all patients who underwent laparoscopic cholecystectomy for chronic or acute cholecystitis from January 1, 2011 to March 31, 2018 at a single teaching hospital. We stratified the patients into two groups: elderly (≥60 years of age) and younger (<60 years of age). **Results:** of 1,645 patients subjected to laparoscopic cholecystectomy, 1,161 (70.3%) were younger and 484 (29.7%) were elderly. The rate of male was higher in the elderly (n=185; 38.2%) group than in the younger (n=355; 30.6) (p=0.003). Jaundice was more common in the elderly (p=0.004). The rate of prior abdominal operation was also higher in the elderly (p<0.001). The percentage of patients with ASA score II, III, and IV was higher in the elderly group (p<0.001 in score II and III and 0.294 in score IV). Operative time was longer in the elderly (71.68±31.27) than in the younger group (p=0.001). The following perioperative data were higher in the elderly: acute cholecystitis (p<0.001), conversion rate (p=0.028), postoperative complications (p=0.042), and mortality (p=0.026). **Conclusion:** the operative time is longer and the rate of acute cholecystitis, conversion to open cholecystectomy and postoperative complications are higher in the elderly patients submitted to laparoscopic cholecystectomy when compared with younger individuals.

Keywords: Cholecystectomy. Cholecystectomy, Laparoscopic. Gallstones. Cholecystitis. Aged.

INTRODUCTION

Although gallstones occur in patients of any age, from newborn to the elderly, its prevalence increases markedly with age[1,2]. Cholelithiasis affects 25-40% of the population in the seventh decade of life and approximately 50% of the individuals over 80 years of age[1,3]. In 2017, the United Nations estimated the world population aged 60 years to be one billion, comprising 13% of the global population[4,5]. Globally, population aged 60 years is growing at a rate of about 3% per year, faster than all younger age groups[4,5].

With the increasing of the population longevity, acute and chronic cholecystitis has become a frequent problem in this group. Currently, cholecystectomy for calculous cholecystitis is the most common abdominal operation in the elderly[6,7]. The natural history of symptomatic biliary lithiasis in the elderly is more severe than in younger patients and needs special considerations[6,8]. The incidence of acute cholecystitis and its complications is higher in the elderly[9,10]. In addition, the surgical risk is increased due to comorbidities and reduced physiological reserve[10,11]. Complications of surgical treatment of chronic cholecystitis and acute cholecystitis are worse in the elderly[12,13]. The aim of this study is to compare the results of laparoscopic cholecystectomy (LC) in elderly patients with those of younger individuals.

METHODS

We retrospectively reviewed electronic medical records and study protocols of all patients subjected to either elective or emergency cholecystectomy for chronic and or acute cholecystitis from January 1, 2011 to March 31, 2018 at the

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Hospital Nossa Senhora das Graças. This institution is a private teaching hospital with surgical residency programs in General and Gastrointestinal Surgery certified by the Brazilian Ministry of Education. The same surgeon performed or supervised all operations. Surgical residents participated in all procedures.

As recommended by the World Health Organization (WHO), we divided patients into two groups: elderly (≥60 years of age) and younger (<60 years of age)[4,5]. We obtained and analyzed the following data: age, gender, clinical and diagnostic tests findings, American Society of Anesthesiology score (ASA), operative findings and complications, operative conversion, type of operation, postoperative complications and mortality, length of hospital stay, and hospital readmission.

Indications of cholecystectomy were history or presence of biliary colic, jaundice, cholangitis, or biliary pancreatitis. In all cases, the diagnosis of gallbladder stones had been made by ultrasonography.

As a protocol in our hospital, all patients with chronic or acute cholecystitis were initially subjected to laparoscopic procedure. We recorded indications for conversion to open cholecystectomy. If the patient's clinical condition precluded laparoscopy, we performed a percutaneous transparietohepatic cholecystostomy.

Patients returned for ambulatory follow-up at the seventh day and at one and three months after the operation. We extended follow-up as needed in presence of complications.

The study was approved by the Ethics in Research Committee of the Positivo University, Curitiba, Brazil (protocol number 5890). We expressed values as mean ± standard deviation (SD). We performed statistical analysis using the IBM SPSS Statistics software version 23.0 (IBM Inc., Armonk, NY, USA). We employed the Student's t-test to determine the difference between the means, and the chi-square test to assess the difference between the expected frequencies and the observed frequencies of the two groups. We considered results with p-value=0.05 (5%) as statistically significant.

RESULTS

Of 1,645 patients who underwent laparoscopic cholecystectomy, 1,161 (70.3%) were younger (group 1) and 484 (29.7%) were elderly (group 2). Table 1 shows the comparison of patients' demographic and clinical characteristics. Patients' age varied from 12 to 59 years (42.55±10.78) in the younger group and from 60 to 100 years (68.65±7.03) in the elderly group. The proportion of males was higher in the elderly (n=185; 38.2%) than in the younger group (n=355; 30.6) (p=0.003). The clinical presentation of both groups were biliary colic, fever and/or jaundice. Jaundice was more common in the elderly than in younger group (p=0.004). The rate of prior abdominal operation was also higher in the elderly (<0.001). Table 1 also shows the preoperative ASA score distribution of patients in the two groups. The percentage of normal healthy patients (score I) was higher in the younger group (p<0.001); The percentage of patients with score II (mild systemic disease), III (severe systemic disease that is not life-threatening), and IV (patient with severe systemic disease that is a constant threat to life) was higher in the elderly group (p<0.001 in score II and III and 0.294 in score IV).

Table 2 brings the intraoperative and postoperative data. Operative time was longer in the elderly (71.68±31.27 - p=0.001). The rate of acute cholecystitis was also higher in the elderly than in the younger group (14.5% vs. 8.4% - p<0.001). The conversion rate to open cholecystectomy was higher in the elderly than in the younger group (0.8% vs. 0.09% - p=0.028). The causes for conversion in the elderly patients were failure to adequately identify

the biliary tract anatomy due to intense gallbladder fibrosis and adherence to adjacent structures (n=3) and intraoperative bleeding uncontrolled by laparoscopy (n=1). The single conversion in the younger group was due to a lesion of the transverse colon during insertion of the trocar in a patient with intense abdominal adhesions due to prior abdominal operation.

There was no difference in the rate of intraoperative complications between the two groups (p=1.0). Intraoperative complications in the younger group were severe bronchospasm at extubation (n=2), colonic perforation (n=1), and small bowel perforation (n=1). Intense bleeding due to liver laceration (n=1) and lesion of the right hepatic artery (n=1) occurred in the elderly group.

Table 1. *Demographic and clinical characteristics.*

Characteristics	Younger group (<60 years) N (%)	Elderly group (≥60 years) N (%)	p
Number	1,161 (70.3%)	484 (29.7%)	
Age (years)			
Range	12-59	60-100	
Mean ± SD	42.55±10.78	68.65±7.03	
Males	355 (30.6%)	185 (38.2%)	0.003
Clinical presentation			
Biliary colic	1,161 (100)	484 (100)	
Fever	4 (0.3)	5 (1.03)	0.085
Jaundice	4 (0.3)	9 (1.9)	0.004
Prior abdominal surgery	228 (19.6%)	138 (28.5%)	<0.001
ASA score			
I	616 (56.4)	159 (32.8)	<0.001
II	539 (46.4)	310 (64.0)	<0.001
III	11 (0.9)	14 (2.9)	<0.001
IV	0	1	0.294

Table 2. *Intraoperative and postoperative data.*

Characteristics	Younger group (<60 years) N (%)	Elderly group (≥60 years) N (%)	p
Operative time (min)			
Range	25 to 220	25 to 360	
Mean ± SD	66.12±23.72	71.68±31.27	0.001
Acute cholecystitis	98 (8.4)	70 (14.5)	<0.001
Conversion to open cholecystectomy	1 (0.09)	4 (0.8)	0.028
Intraoperative complications	4 (0.3)	2 (0.4)	1.0
Postoperative complications	55 (4.7)	35 (7.2)	0.042
Postoperative mortality	0	3 (0.6%)	0.026
Hospital stay (days)	1.08±1.14	1.13±0.99	0.385

The postoperative complication rate was higher in the elderly than in the younger group (7.2% vs. 4.7% - p=0.042). Table 3 displays the postoperative complications of the two groups. The most common complications in both age groups were related with the wound at the umbilicus, namely hematoma, infection, and incision hernia.

Four patients, two of each group, presented with fever and abdominal pain and loss of appetite. Following identification of subhepatic abscess by tomography, we successfully treated the collections with broad-spectrum intravenous antibiotics in two patients and with ultrasound-guided percutaneous drainage and parenteral antibiotics in the other two. We diagnosed biliary fistula in one patient of each group. Both presented with subhepatic fluid collection, which we treated conservatively with ultrasound-guided percutaneous tube drainage.

Postoperative mortality was higher in the elderly than in the younger group (p=0.026). Three patients (0.6%) died in the elderly group, one of myocardial infarction, one of pneumonia, and one of *Pseudomonas* sepsis following embolectomy and fasciotomy due to postoperative tibial artery embolism. No death occurred in the younger patients. There was no difference in the length of hospital stay between groups (p=0.385).

DISCUSSION

LC has gained rapid acceptance worldwide as the gold standard treatment for symptomatic gallstones[14,15]. This procedure has several advantages when compared with open cholecystectomy, including less postoperative pain, a short recovery period, a rapid return to normal activities, and better cosmetic results[11,16]. Although LC is considered safe, the rate of morbidity and mortality may be significant in some groups of patients, such as elderly, morbidly obese and immunosuppressed patients[9,17].

LC perioperative morbidity and mortality are usually considered higher in the elderly due to low physiologic reserve and associated diseases[18-21].

Table 3. *Postoperative complications.*

Complication	Younger group (<60 years) N (%)	Elderly group (≥60 years) N (%)
Pulmonary atelectasis	7 (12.7)	4 (11.4)
Surgical site infection	9 (16.4)	4 (11.4)
Incisional hernia	5 (9.1)	5 (14.3)
Subcutaneous hematoma	5 (9.1)	3 (8.6)
Venous thrombosis	5 (9.1)	4 (11.4)
Subhepatic abscess	2 (3.6)	2 (5.7)
Urinary retention	5 (9.1)	3 (8.6)
Urinary infection	2 (3.6)	1 (2.9)
Pneumonia	2 (3.6)	1 (2.9)
Cardiac arrhythmia	1 (1.8)	3 (8.6)
Biliary fistula	1 (1.8)	1 (2.9)
Intestinal fistula	1 (1.8)	-
Skin burning	1 (1.8)	-
Others	9 (16.4)	4 (11.4)
Total	55	35

In addition, the elderly present with more severe forms of gallbladder disease, such as acute cholecystitis, common bile duct stones, cholangitis and gallbladder carcinoma[22-24].

The chronological age used to define an elderly or old person ranges in the medical literature from 60 to 80 years[7,9,18,25]. We used the World Health Organization (WHO) recommendation, in which the definition of elderly depends on the development stage of the countries[4,5]. In developed countries, the individual is considered elderly when over 65 years of age, and in developing countries, such as Brazil, over 60 years of age.

Similar to recent reports, our study has shown that the rate of intraoperative morbidity in the elderly was similar to that of younger patients subjected to LC[10]. Technological advances in the laparoscopic equipment and increased surgical experience are the main reasons for reduction in the rate of intraoperative complications in laparoscopy in the last years[8,26]. Carbon dioxide pneumoperitoneum may cause important cardiovascular and ventilatory complications, mainly in old patients[8,26]. Adequate patient monitoring is pivotal to reduce intraoperative complications. Maintenance of pneumoperitoneum pressure between 10mmHg and 12mmHg avoids additional surgical risks in the elderly.

Our findings are also in agreement with previous studies, which have shown that the rate of males, jaundice, prior abdominal operations, and ASA scores II, III, and IV were higher in the elderly than in the younger group[1,8,11,26,27]. These preoperative clinical characteristics may have contributed to increment the rate of postoperative complications in this age group.

Overall, the prevalence of gallstones is two to four times higher in females than in males due to sex hormones differences[1]. However, this difference between genders decreases gradually after the sixth or seventh decade of live[1], which may have importance in the rate of perioperative mortality in older patients. Several studies have shown that males have higher conversion rates from LC to open cholecystectomy and operative complications than females[8,15]. Males tend to be operated later and to present with more severe gallstone disease than females[8]. It has been suggested that males are more likely to delay seeking medical assistance and therefore present with a more severe disease when subjected to surgical treatment[8]. Thus, the reduction of the female/male ratio in the elderly may have contributed to increase the risk of LC in this age group.

Several other studies have also demonstrated a higher rate of prior abdominal operations in the elderly compared with younger groups[8]. Previous abdominal operations may prolong surgical time in order to divide adhesions. In addition, adhesiolysis may increase the rate of perioperative complications, such as abdominal bleeding and intestinal perforation.

Many publications have shown higher surgical complications and laparoscopic conversion rates in patients with elevated preoperative comorbidity as determined by ASA score[8,26].

Our study has shown that LC in the elderly is associated with longer operative time and higher rates of acute cholecystitis, conversion from laparoscopic to open cholecystectomy, and postoperative complications. These findings are consistent with the results of Kim *et al*.[6] and Loozen *et al*.[7,9], who) reported that these prognostic factors are mainly due to higher complicated gallbladder disease in the elderly. A longer history of cholelithiasis and an elevated number of episodes of cholecystitis increase the rate of complicated cholecystitis[8,28].

Several studies have demonstrated that the incidences of complicated gallstone diseases, including acute cholecystitis, Mirizzi syndrome and biliary fistula, are higher in the elderly[8,10,28,29]. Intense inflammation and firm adhesions of the gallbladder with the common bile duct, duodenum or even the colon due to complicated cholecystitis make dissection and identification of the anatomy very difficult. Bleeding during dissection further hinders the safe identification of anatomy. This may impose conversion to open surgery or cause lesions to adjacent structures, such as the common bile duct, vessels, and the gastrointestinal tract. Conversion to open cholecystectomy increases operative time, length of hospital stay, rate of perioperative complications, hospital costs, recovery time, and hospital readmission rate[6,28].

The longer operative time observed in the elderly in our study, and reported by several other authors, was secondary to increased technical difficulties due to adhesions from previous operations and more severe gallstone disease.

Our postoperative morbidity and mortality rates were higher in the elderly than in the younger group. These findings are also in agreement with the medical literature and are due to various preoperative clinical characteristics and operative features that are more common in the elderly, as previously discussed[10,15,30].

In our study, most patients of both groups were discharged on the same operative day and there was no difference in length of hospital stay between the elderly and the younger group. Several studies have documented the safety of short hospital stay in old patients who underwent LC[15,26,27,31].

The major limitation of our study is the retrospective data evaluation. This is minimized because all surgical procedures were coordinated and supervised by only one surgeon and the data were retrieved from electronic medical records and study protocols.

We concluded that LC is a relatively safe procedure in the elderly and it may be performed with acceptable morbidity and mortality rates. The operative time is longer and the rate of acute cholecystitis, conversion to open cholecystectomy and postoperative complications are higher in the elderly when compared with younger patients subjected to laparoscopy cholecystectomy. Severity of gallbladder disease, instead of chronological age, is the most important prognostic factor of LC.

R E S U M O

Objetivo: *avaliar os resultados da colecistectomia laparoscópica em idosos comparados com pacientes mais jovens.* **Métodos:** *revisamos os prontuários médicos informatizados de todos os pacientes submetidos à colecistectomia laparoscópica para colecistite crônica ou aguda, de 1º de janeiro de 2011 a 31 de março de 2018, em um único hospital de ensino. Os pacientes foram estratificados em dois grupos: idosos (≥60 anos de idade) e mais jovens (<60 anos de idade).* **Resultados:** *de 1645 pacientes submetidos à colecistectomia laparoscópica, 1161 (70,3%) eram mais jovens e 484 (29,7%) eram idosos. A taxa de homens foi maior nos idosos (n=185, 38,2%) do que no grupo mais jovem (n=355, 30,6%, p=0,003). Icterícia foi mais comum em idosos do que no grupo mais jovem (p=0,004). A taxa de operação abdominal prévia também foi maior nos idosos (<0,001). A porcentagem de pacientes com escore ASA II, III e IV foi maior no grupo de idosos (p<0,001 no escore II e III e 0,294 no escore IV). O tempo de operação foi maior nos idosos (71,68±31,27) do que no grupo mais jovem (p=0,001). Os seguintes dados perioperatórios foram maiores nos idosos: colecistite aguda (p<0,001), taxa de conversão (p=0,028), complicações pós-operatórias (p=0,042) e mortalidade (p=0,026).* **Conclusão:** *o tempo operatório é maior e a taxa de colecistite aguda, conversão para colecistectomia aberta e complicações pós-operatórias são maiores em idosos quando comparados com pacientes mais jovens submetidos à colecistectomia laparoscópica.*

Descritores: *Colecistectomia. Colecistectomia Laparoscópica. Cálculos Biliares. Colecistite. Idoso.*

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