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ORIGINAL ARTICLE

Morbidity and mortality of elderly patients with pancreaticobiliary disease according to age and comprehensive geriatric assessment: A prospective observational study

Mauricio Parrales-Mora[a,b,1], **Manel Cremades**[a,b,1], **David Parés**[b,*], **Rebeca D. García**[b], **Fernando Pardo Aranda**[b], **Alba Zárate Pinedo**[a,b], **Jordi Navinés López**[a], **Francisco Espin Alvarez**[a], **Joan-Francesc Julian-Ibanez**[b], **Esteban Cugat Andorra**[a]

[a] *Hepatobiliary and Pancreas Unit, Department of General and Digestive Surgery, Spain*
[b] *Department of General and Digestive Surgery, School of Medicine, Universitat Autònoma de Barcelona, Spain*

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KEYWORDS
Surgery;
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Abstract
Background: This study was designed to analyze the influence of age and comprehensive geriatric evaluation on clinical results of pancreaticobiliary disease management in elderly patients.
Methods: A prospective observational study has been undertaken, including 140 elderly patients (over 75 years) with benign pancreaticobiliary disease. Patients were divided according to age in the following groups: group 1: 75–79 years old; group 2: 80–84 years old; group 3: 85 years and older. They underwent a comprehensive geriatric assessment with different scales: Barthel Index, Pfeiffer Index, Charlson Index, and Fragility scale, at admission and had been follow-up 90 days after hospital discharge to analyze its influence on morbidity and mortality.
Results: Overall, 140 patients have been included (group 1 = 51; group 2 = 43 and group 3 = 46). Most of them, 52 cases (37.8%), had acute cholecystitis, followed by 29 cases of acute cholangitis (20.2%) and acute pancreatitis with 25 cases (17.9%). Significant differences has been observed on complications in different age groups ($p = 0.033$). Especially in patients with a Barthel Index result ≤ 60, which suggests that these less functional patients had more severe complications after their treatment ($p = 0.037$). The mortality rate was 7.1% (10 patients).
Conclusions: No significant differences were found between age, morbidity and mortality in elderly patients with pancreaticobiliary disease. Comprehensive geriatric scales showed some utility in their association with specific complications.

* Corresponding author.
E-mail address: dapares@gmail.com (D. Parés).
[1] These authors contributed equally as a first author for the manuscript.

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PALABRAS CLAVE
Cirugía;
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Adulto mayor;
Morbilidad;
Mortalidad

Morbilidad y mortalidad de pacientes de edad avanzada con enfermedad pancreaticobiliar con relación a su edad y la evaluación geriátrica integral: un estudio prospectivo observacional

Resumen
Antecedentes: Este estudio fue diseñado para analizar la influencia de la edad y la evaluación geriátrica integral en los resultados clínicos del manejo de la enfermedad pancreatobiliar en pacientes de edad avanzada.
Métodos: Se ha realizado un estudio observacional prospectivo en el que se incluyeron 140 pacientes de edad avanzada (mayores de 75 años) con enfermedad pancreatobiliar benigna. Los pacientes se dividieron según la edad en los siguientes grupos: Grupo 1: 75-79 años; Grupo 2: 80-84 años; Grupo 3: 85 años y más. Se les realizó una valoración geriátrica integral con diferentes escalas: Barthel Index, Pfeiffer Index, Charlson Index y Fragility scale, al ingreso y seguimiento 90 días después del alta hospitalaria para analizar su influencia en la morbimortalidad.
Resultados: En total, se incluyeron 140 pacientes (Grupo 1 = 51; Grupo 2 = 43 y Grupo 3 = 46). La mayoría de ellos, 52 casos (37,8%), presentaron colecistitis aguda, seguido de colangitis aguda con 29 casos (20,2%) y pancreatitis aguda con 25 casos (17,9%). Se han observado diferencias significativas en las complicaciones en diferentes grupos de edad ($p = 0,033$). Especialmente en pacientes con un índice de Barthel ≤ 60, lo que sugiere que estos pacientes menos funcionales tuvieron complicaciones más severas después de su tratamiento ($p = 0,037$). La tasa de mortalidad fue de 7,1% (10 pacientes).
Conclusiones: No se encontraron diferencias significativas entre la edad, la morbilidad y la mortalidad en pacientes ancianos con enfermedad pancreatobiliar. Las escalas geriátricas integrales mostraron cierta utilidad en su asociación con complicaciones específicas.

Introduction

Currently, the population is expected to live beyond 70 years. In low- and middle-income countries, this is mainly due to the significant reduction in morbidity and mortality in the early stages of life, especially during infancy and birth. In most developed countries, the sustained increase in life expectancy is mainly due to the decline in mortality among elderly patients.[1–3]

According to the United States Census Bureau, the number of American citizens aging over 65 years old is projected to double between 2010 and 2050. The percentage of Americans over the age of 65 will increase from 13% to more than 20% of the total population by 2030.[4] Moreover, the fastest-growing segment of this group (individuals aged 85 and over) will triple in the next four decades. The following implies an increase in hospital use by older people. In other countries, such as Spain, life expectancy is over 83 years (80.3 for men and 85.8 for women).[5–7,16]

Therefore, it is necessary to develop strategies to meet these growing demands and ensure higher-quality care for geriatric surgical patients.[2,3] Also, epidemiological profiles are changing daily, and some age-related diseases are becoming more prevalent.[4]

In developed countries, a person can be defined as an *older adult* at age of 65 years old.[2] However, in Western countries, the onset of old age tends to be delayed until 75–80 years[7] and, therefore, the cut-off point used for this study.

As the world's population ages, the frequency of benign and malignant diseases will continue to increase.[8] Cancer of the lung, prostate, liver, kidney, stomach, colon, and rectum represents the most common malignancies in the group. Some benign diseases stand out, such as cholelithiasis, cerebrovascular events, coronary diseases, or amputations. Many of these consider surgical treatment as a first line, which brings a series of problems in the peri-operative care of older people. All this determines that health-planning policies must rethink objectives, goals, programs, and budgets.[3,5–10]

The ultimate goal is to achieve the best quality of life with the most significant independence while limiting suffering.[6] From a clinical-surgical perspective, hepatobiliary diseases, especially gallbladder disease, are the primary surgical indication in the elderly and acute biliary disease increases morbidity and mortality by ten times compared to non-elderly people.[5] In malignant diseases, hepatic carcinoma is one of the most frequent and aggressive.[11] Some successful peri-operative programs and evaluations provide excellent results in service provision, peri-operative care, and improvement of clinical-surgical practice to improve surgical outcomes.[12]

Surgery continues to be a potentially curative therapy for liver and pancreatic malignant and benign diseases, while non-surgical treatments only provide relative benefits.[3] However, when surgery breaks into an individual's life, even in the absence of complications, he suffers a health deterioration that totally or partially disables him for a certain period. The duration of this period and the care that a person will require may depend on the patient's baseline characteristics, the magnitude of the surgery, and the peri-operative complications.[13,14]

For this reason, it is essential to develop comprehensive peri-operative programs focused on the specific characteristics of the elderly population. According to Kunze, the pre-operative evaluation that considers information from multiple sources, such as clinical history, interview, physical examination, and tests, allows identifying modifiable risk factors to develop the best anesthetic and surgical plan to decrease peri-operative morbidity and mortality. It also seeks to educate, improve satisfaction and reduce patient anxiety; avoid unnecessary delays or suspensions; coordinate inter-consultations if the patient requires additional studies; and obtain informed consent. It also leads to a decrease in costs, a lower rate of surgery suspension, and a decrease in the days of postoperative hospitalization.[15–17]

Several articles considered that with increasing age, there are a more significant number of situations that make surgical treatments not the first line of approach to a given diagnosis. Among these is the increase in comorbidities or physiological frailty.[17,18] However, through a comprehensive evaluation of the elderly patient with hepatobiliary-pancreatic diseases, it is possible to make a more appropriate treatment selection. This evaluation should include current assessment scales that delve into critical aspects such as care needs, psychological aspects, mental capacity, nutrition, social aspects, and dependency risks.[18–21]

The present study aims to analyze the clinical results (morbidity and mortality) of elderly patients with a benign hepatobiliary-pancreatic disease after implementing a comprehensive geriatric evaluation program through specific scales.

Material and methods

A prospective observational study[22,23] has been carried out on 140 elderly patients (age up to 75 years old) diagnosed with benign hepatobiliary-pancreatic disease. Patients were divided into three groups according to their age: group 1: 75–79 years old; group 2: 80–84 years old and group 3: 85 years and older. They underwent a geriatric-comprehensive assessment at admission and completed a follow-up minimum of 90 days after hospital discharge to analyze its influence on clinical results.

Currently, the decision of the type of treatment given to an elderly patient with hepatobiliary-pancreatic disease in our hospital depends strictly on the criteria and judgment of the treating physician in the case of patients admitted.

Study setting

The study was developed in the Hepatobiliopancreatic Surgery Unit (UCHBP) of the Surgery Department at Germans Trias i Pujol University Hospital (HUGTP) located in Badalona (Barcelona, Spain). It is a university, tertiary care, and reference hospital for highly complex care for 800,000 citizens. In the Surgery area, around 4000 surgeries are performed annually in the General Surgery Department.

Inclusion and exclusion criteria

Patients aged 75 years or older of both sexes, admitted for benign hepatobiliary-pancreatic disease, have been eligible for the study. The study excluded patients with severe health conditions who cannot apply the assessment scales, with severe cognitive impairment, or who refuse to sign informed consent. All patients were informed and signed the written informed consent to be included in the study.

Comprehensive geriatric evaluation scales

- *The American Society of Anesthesiologists Physical Status (ASA-PS)* Classification System was created in 1941 as a tool for the compilation of statistical data. Since then, anesthesiologists and non-anesthesiologists have used it in areas such as resource allocation, billing, and *peri-operative risk assessment*.[32]
- *Charlson Comorbidity Index: Comorbidities*. The Charlson or combined comorbidities index predicts mortality by ranking or weighting comorbid conditions. Health researchers have widely used it to measure disease burden and case mix. The Charlson Comorbidity Index predicts 1-year mortality for a patient who may have a variety of comorbid conditions, such as heart disease, AIDS, or cancer (a total of 22 states), consistently showing that the Charlson Index is a valid prognostic indicator of mortality.[25]
- *Frailty Scale of the American College of Anesthesiologists. Level of frailty, morbidity prediction, and mortality prediction*. These scales, made of 5 questions, evaluate the physical function of older people. Whether they obtain a score between 0 and 1, they are considered not frail, between 1 and 3, moderately weak, and between 3 and 5, brittle.
- *Barthel Functionality Index*, which assesses the *degree of autonomy and functionality of the patient*. Ten characteristics are evaluated, and a higher score is related to a greater likelihood of being competent to live at home with greater independence.[24]
- *Pfeiffer Index: level of cognitive impairment of the patient*. This test detects the presence of cognitive impairment by assessing short- and long-term memory, orientation, data on daily life, and calculation. It is helpful for the detection of cognitive impairment in patients with suspected cognitive impairment. An average of more than two errors suggests cognitive impairment, and it is advisable to carry out longer and more specific cognitive tests to assess cognitive functions.
- *Clavien-Dindo Classification* is an approach to classify *operative complications*. This classification grades the complications based on the medical intervention needed to treat the complications after operative procedures. This tool allows a ranking in a standardized and reproducible way while avoiding subjective interpretation. Even though some patients did not receive surgical treatment, as standard classification this scale has been decided to be used for study purposes.[31] Also the Comprehension Complication Index or CCI has been added to the results. This scoring system ranges complications of each patient from 0 (uneventful complication) to 100 (death).[33]

Table 1 Characteristics of patients in each age group.

	Group 1 (75–79 years) $n = 51$	Group 2 (80–84 years) $n = 43$	Group 3 (85 years and older) $n = 46$	p
Age (years)	76.5 ± 1.4	81.9 ± 1.5	87.8 ± 2.6	0.001[a]
Gender				
Male	30 (58.8)	25 (58.1)	24 (52.2)	0.775[b]
Female	21 (41.2)	18 (41.9)	22 (47.8)	
Anesthetic risk (ASA)				
1 or 2	27 (52.9)	21 (50.0)	19 (41.3)	0.516[b]
3 or 4	24 (47.1)	21 (50.0)	27 (58.7)	
Clinical assessment				
Charlson Index	7.7 ± 3.9	8.0 ± 2.7	7.9 ± 2.2	0.945[a]
Frailty Score	3.5 ± 1.7	4.2 ± 1.2	4.1 ± 1.5	0.059[a]
Pfeiffer Index	1.24 ± 2.2	1.9 ± 2.3	3.1 ± 2.9	0.001[a]
Barthel Index	85.4 ± 16.9	76.4 ± 19.7	65.9 ± 24.3	0.001[a]

Data are presented as mean ± standard deviation, absolute numbers (%) or median (range).
[a] ANOVA test.
[b] Chi-square test.

For the analysis of the effect of geriatric assessment, the results of Barthel and Pfeifer evaluate the functional assessment and the index of cognitive development, respectively, according to the literature,[28] with an established cut-off point of the Barthel <60 and Pfeiffer ≥3.

Demographics and clinical results

Demographic, mortality, morbidity, and length of stay were analyzed for all the included patients. Morbidity has been classified using the Clavien-Dindo Scale and CCI.

Apart from determining the means between alive and dead concerning the results of the different scales, cut-off points were also established, set by the literature, specifically for the Barthel Index and the Pfeiffer Scale. They were correlated directly with mortality.

According to the literature, cut-off points were established with the Barthel Index. Two subgroups were created: one with scores lower than 60 and one with higher than 60. In addition, patients were stratified according to the Pfeiffer Index: patients with a score higher than three and those with a score less than three.[28]

Ethical considerations

The study was reviewed and approved by the independent ethics committee of our institution. The Clinical Research Ethics Committee of the Germans Trias i Pujol University Hospital accepted the study protocol. The research team declares no conflict of interest.

Sample size

Accepting an alpha risk of 0.05 and a beta risk of 0.2 in a two-sided test, 122 subjects are necessary to find a statistically significant proportion difference in mortality of 15% among elderly patients according to age groups. It has been anticipated a drop-out rate of 2%.

Statistical analysis

Continuous variables are presented as mean with standard deviation and ranges, while categorical variables are presented as absolute numbers and percentages. Chi-square tests were used to compare categorical variables and Student's *T* and ANOVA tests for continuous variables. All reported ''*p*'' values were two-sided, and statistical significance was considered when the ''*p*'' value was equal to or less than 0.05. These statistical analyses were performed using the SPSS® program.

Results

Characterization of the study population

A cohort of 184 patients over 75 years of age has been studied. Of the patients, 76.1% (140) had a benign disease and 23.9% (44) had a malignant disease.

Overall, our study included 140 patients from March 2020 to July 2022. The ratio between men and women was 56.4% vs. 43.6% but without significant differences ($p = 0.775$). Types of admissions, 93.6% were admitted through the emergency department and 6.4% through scheduled access. Regarding the treatment received, 111 (79.3%) patients received only medical treatment and 29 (20.7%) an additional surgical procedure.

We divided patients according to age. Of the 51 patients aged between 75 and 79 (group 1), 43 patients aged between 80 and 84 (group 2), and 46 patients aged equal to or greater than 85 years (group 3). Table 1 describes the general characteristics of the patients and the average scores of the different scales used for the comprehensive geriatric assessment.

Table 2 Classification by diagnosis of the cohort.

Diagnostic	*n*	(%)[a]
Acute cholecystitis	52	37.8
Cholangitis	29	20.2
Pancreatitis	25	17.9
Choledocholithiasis	15	10.7
Cholelithiasis	10	7.1
Primary sclerosing cholangitis	3	2.1
Gallstone ileus	1	0.7
Liver cyst	2	1.4
Pancreatic cyst	1	0.7
Liver abscess	1	0.7
Gallbladder polyp	1	0.7
Total	140	100

[a] Variable frequencies: primary diagnosis.

Table 2 shows the classification of the population according to hospital admission diagnosis. Most of them, 52 cases (37.8%), had acute cholecystitis, this being the most prevalent diagnosis, followed by 29 cases of acute cholangitis (20.2%) and acute pancreatitis with 25 cases (17.9%), without differences among groups.

Morbidity and mean hospital stay

For the analysis of in-hospital complications, the Clavien-Dindo Classification and CCI was applied. Table 3 shows the results by age group, demonstrating an increased rate of significant complications (by Clavien-Dindo) in group 2 ($p = 0.033$). These differences were not significant according to CCI in each group (CCI in group 1 = 23.23; in group 2 = 36.06 and in group 3 = 27.87 with $p = 0.06$).

Overall the mean length of stay was 10.53 days (range 1–141). Hospitalization lengths according to primary diagnosis were established in three groups: biliary, pancreas, and liver, but no statistical differences were found ($p = 0.609$). In addition, a comparison of the average stay among the age groups found no statistical differences ($p = 0.485$).

Fig. 1 shows the relationship between the different scale mean values used during the clinical assessment of the patients and the morbidity grouped in Clavien-Dindo ≥2 or <2. Again, no statistical differences were found.

However, when patients with mild and severe complications are compared to the level of independence and functionality and cognitive impairment using the defined cut-off points described in the literature (Fig. 2), significant statistical differences ($p = 0.037$) are observed, especially in the group of patients with a Barthel ≤60.

Mortality

The overall mortality rate was 7.1% (10 patients); 91.8% (9 patients) corresponded to the medical treatment group, and 8.10% (only one) to the group of patients who underwent surgery. There were no significant differences ($p = 0.68$) in mortality concerning the type of treatment offered to the patient or the type of admission ($p = 1.00$).

The relationship between mortality and age group is shown in Fig. 3; the mortality rate was 1/51 (1.9%), 5/43 (11.66%), and 4/46 (8.69%) for the different ages groups without significant differences ($p = 0.17$).

Comprehensive geriatric assessment, length of stay, and mortality

The Barthel Index for the group of dead patients was 64.00, while for live patients was 77.25 ($p = 0.065$). Regarding Charlson Comorbidity Index, there were no significant differences ($p = 0.516$) between dead patients (7.85) and living patients (8.50). American College of Anesthesiologists Frailty Scale alive patients was 3.95 and the deceased 4.30, without statistically significant differences ($p = 0.504$).

There were also no significant differences ($p = 0.369$) between the result in the Pfeiffer Scale in the group of deceased patients (2.80) and in those alive (2.02) (Fig. 4). Finally, Fig. 5 shows a direct association between mortality 90 days after discharge and patients with Barthel scores <60 ($p = 0.406$) and Pfeiffer ≥3 ($p = 0.056$).

Discussion

The purpose of this study was to analyze the clinical results, in terms of morbidity, mortality, and length of stay, of elderly patients with benign HPB diseases who underwent a comprehensive evaluation using scales. We have observed that in terms of morbidity, 79.1% of the patients received conservative treatment. In terms of complications and the different age groups, statistically significant differences can be seen ($p = 0.033$); even those of grade I are the ones that mainly occur in the three age groups (Table 3).

Table 3 Complications according to Clavien-Dindo Classification in each group.

Clavien-Dindo complications	Group 1	Group 2	Group 3	*p*[a]
Grade 0	13 (25.5)	5 (11.6)	10 (21.7)	
Grade I	28 (54.9)	20 (46.5)	25 (54.3)	
Grade II	2 (3.9)	9 (20.9)	6 (13.0)	0.033
Grade III	7 (13.7)	3 (7.0)	1 (2.2)	
Grade IV	0 (0.0)	1 (2.3)	0 (0.0)	
Grade V	1 (2.0)	5 (11.6)	4 (8.7)	

Data are presented as absolute numbers (%).
Group 1: 75–79 years old; group 2: 80–84 years old; group 3: 85 years and older.
[a] Chi-square test–Fisher exact test.

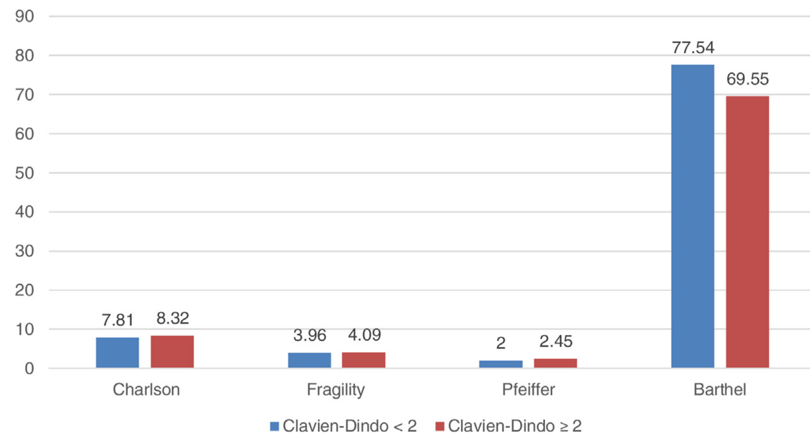

Figure 1 Comparison between scale scores and complications using Clavien-Dindo.

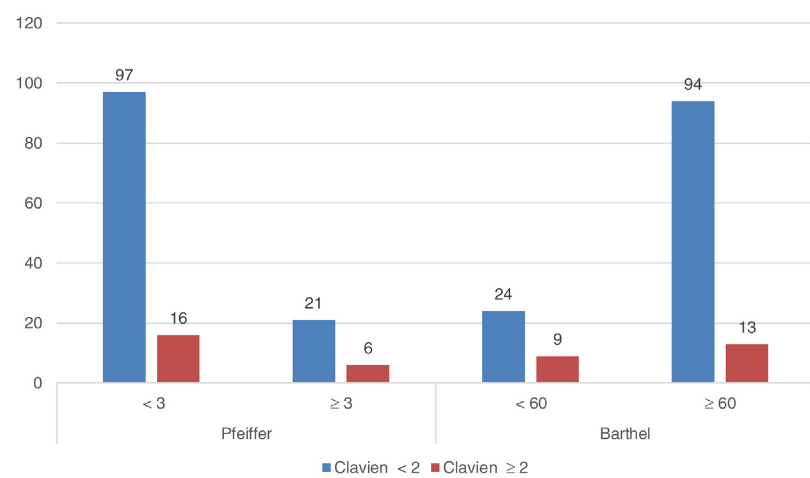

Figure 2 Comparison between Clavien-Dindo grouped vs. Pfeiffer and Barthel scales.

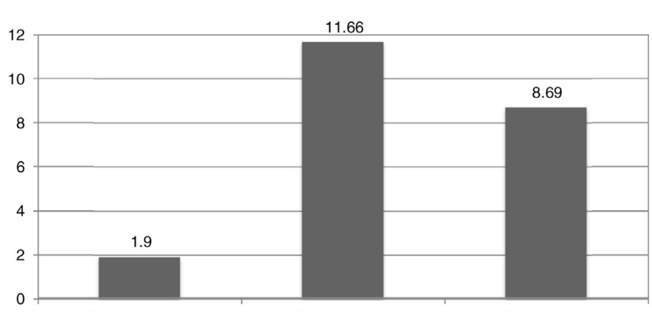

Figure 3 Mortality in different age groups.

Complications were grouped into major and minor and those with a Barthel <60 and Barthel ≥60, it is observed that there is a statistically significant difference ($p = 0.037$) that leads to the conclusion that in this specific cohort, the patients who have a significant functional decline, they present major complications (Fig. 5). When the scores of the scales were obtained. They were compared between the living and the dead; it was possible to observe that the trend is that the exitus have much lower means than the group of the living without yet establishing statistically significant differences.

The current improvements in medicine have made it possible to considerably reduce surgical morbidity, making surgery a safer process and applicable to an excellent range of the population. This means that with increasing frequency, complex and older patients are proposed to undergo aggressive surgeries. However, one of the biggest problems currently faced is the decision to operate on older adults because this population has three times more mortality than younger people. Other reasons are the lack of scientific evidence since studies do not usually include all age groups within the geriatric spectrum, generally missing the oldest ages.[13,14]

Focusing on characterization of the population, the average age in this cohort is 81.73 years, close to the global average life expectancy in Spain, which is stipulated at 83 years.[6,7,16] In our experience, the cohort of 140 patients corresponds to diagnoses of benign HPB disease, acute cholecystitis being the leading cause of admission. Although the overall mean age of the cohort is above 80 years, it is in group 1 (75–84) that we find the most significant number of patients (Table 1). When we compare the three groups, we

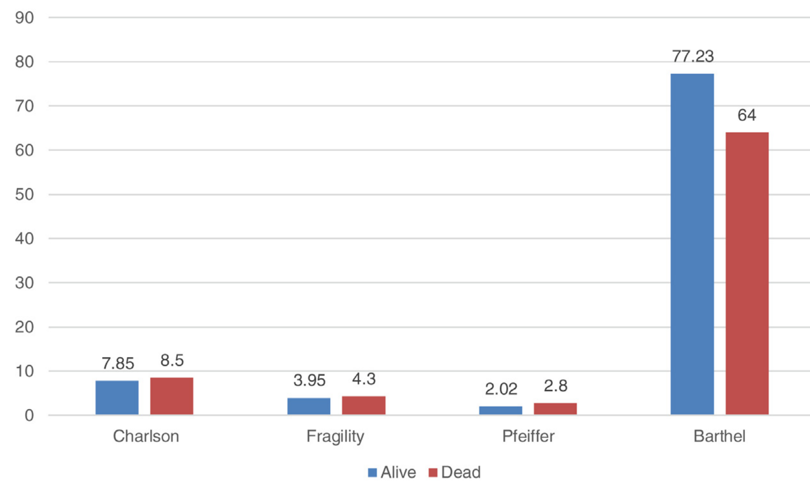

Figure 4 Comparison of scale scores and mortality at 90 days after discharge.

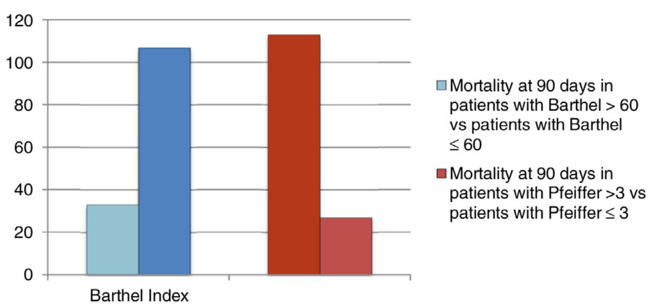

Figure 5 Comparison of 90-day mortality and pooled Barthel or Pfeiffer scores.

see apparent statistically significant differences ($p = 0.001$). Regarding the comparisons made with gender and anesthetic risk (ASA classification), we did not find statistically significant differences between the three groups. On the other hand, when we look at the clinical assessment scales, we see that except for the Charlson, cognitive impairment (Pfeiffer), frailty, and the degree of independence (Barthel) are associated with an increase in older groups.

Pancreaticobiliary benign disease are very common in advanced ages. Acute cholecystitis, choledocholithiasis, and cholelithiasis, are the ones that mainly occur in aged patients. The literature supports this since it is known that some diseases, such as cholelithiasis, increase with age. In those over 70, its prevalence is 30% of women and 16% of men, while in those over 80, the prevalence ranges from 38% to 53%.[5]

Analysing mortality, there were no statistical significance depending on the type of treatment ($p = 0.688$); in our cohort, 79.3% of the cases received medical treatment, while 20.7% of the remaining underwent surgery. These results make it evident that advanced age is not currently an exclusion criterion when deciding to operate on a patient since the success of surgery for this population has been demonstrated in different studies, especially in reducing hospital stays and serious complications secondary to repetitive episodes.[26] It is exciting to analyze what happens in benign pathologies, such as acute cholecystitis (AC), where laparoscopic cholecystectomy is the treatment of choice according to current guidelines for the treatment of mild or moderate AC.[27]

However, although the safety and efficacy of surgery have been widely described, a significant number of these patients follow conservative treatment due to advanced age, even though recurrence rates are not negligible.[28] Related morbidity, there were statistically significant differences ($p = 0.033$) when complications were generally compared to the different age groups (Table 3). However, these differences disappear when a post hoc analysis between specific age groups is performed.

The most significant number of these complications was grade I (minor complications). These complications are more directly related to factors such as the severity of the clinical picture, the start of antibiotic therapy, or admission to the operating room rather than to the biological age of the patients.[6] Regarding the average hospital stay, there are no statistically significant differences between the age groups ($p = 0.485$), treatment ($p = 0.151$), and clinical diagnosis ($p = 0.609$), as we can see in other pathologies such as colorectal surgery.[28] However, the patients of group 1 (biliary pathology), with an average of 9.8 days, record the shortest hospital stay, and the surgical group also have a shorter mean stay (6.9 vs. 11.4 days).

There was no statistical significance in mortality rate according to clinical and functional assessment scales. In this cohort, all those patients who present a Barthel with a score less than 60 are considered dependent, and we almost reached significant differences ($p = 0.056$) between this group and mortality. As established in the literature, this value can be used as a predictive factor for an increase in this population's mean hospital stay and mortality.[28] Especially in the group of patients with a Barthel $\leq$60, these less functional patients had more severe complications after their treatment ($p = 0.037$).

Something similar happens with the Charlson Comorbidity Index. Although there is no statistical significance regarding mortality ($p = 0.066$), it is remarkably close. This result is congruent with the literature, as Charlson Index is one of the most widely used comorbidity indexes today and has been described as a helpful tool for evaluating the impact of comorbidity on mortality in a series of populations. However, its prognostic impact on mortality and survival is almost always long-term, so it allows the medical team to have greater clarity when making decisions regarding specific treatment, which can be surgical or medical for this population.[29]

In case of frailty, it underlies 25–46% of patients admitted to surgical services.[30] In our cohort, we did not find any differences between fragile and non-fragile patients (Fig. 4). This contrasts with other series where it is associated with higher postoperative complications, mortality, readmission rates, and extended hospital stays, lengthy and greater need for institutionalization.[30]

The mean Pfeiffer score in living individuals of this population was 2.02. When making the cut-off points, we found that a Pfeiffer of more than 3 points increases the chances that the patient will find a more significant number of times hospitalized compared to those who obtain less than three points in colorectal surgery. Therefore, according to the literature,[28] we did not find the same results in HPB diseases. An elevated Pfeiffer is considered a frailty criterion in the older adult population.

This study analyzed a cohort of elderly patients affected by hepatobiliary and pancreatic benign diseases. The main strength is that the patients were assessed in real-time and by the same person, reducing the variability in the measurements. However, there are some limitations. First, we used Clavien-Dindo and CCI for the description of complications. However, this methodology had been used firstly for postoperative patients, and in our cohort, not all patients had been surgically treated. Another limitation of the present study was the effects of the COVID-19 pandemic on patient inclusion, which was slow and complex in the first year (and some of the deaths were due to complications secondary to this disease). Finally, we have to take into account the small sample size that would not allow in some cases, to achieve significant results in some of the studied variables.

Conclusions

Age itself is not a condition to avoid offering surgical therapeutic options to elderly patients. Functional assessment and comorbidities, using Barthel Index and Charlson scales respectively, have been the most appropriate evaluation for identifying a higher risk of mortality and morbidity in elderly patients with benign pancreaticobiliary disease. No significant differences were found between the Pfeiffer values and the Fragility scale regarding morbidity, mortality, and average hospital stay in this group of patients.

Conflict of interests

The authors declare that they have no conflict of interest.

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