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ORIGINAL

Predictors of mortality in older adults with hip fracture

Predictores de mortalidad en adultos mayores con fractura de cadera

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ABSTRACT

The incidence of established mortality predictors that link patients with hip fracture older than 60 years with an increase in mortality, who underwent surgery at the General Hospital "Abel Santamaría Cuadrado" from 2020 to 2022, was determined. A descriptive, prospective and longitudinal study was carried out from clinical records, data collected through the Report Information System - FCA used in the National Hip Program, from outpatient follow-up, from reports from the statistics department of the General Hospital Abel Santamaría Cuadrado and the Provincial Health Directorate. With a universe of 764 patients of which 512 entered the study, of this 68 % of the sample was represented by the female sex, where the most representative age group were patients from 80 to 89 years old, which constituted 41 % of the sample. The most represented comorbidities were Arterial Hypertension (88 %) and Diabetes Mellitus (54 %); 74 % of patients underwent surgery within 24 hours and 72 % were independent before surgery. The age group was 80 to 89 years, with a predominance of females, with a wide range of comorbidities, including high blood pressure and diabetes mellitus. There was a close relationship between age and mortality. Validity and family support influenced the evolution, related to the appearance of complications such as infections, thromboembolism, among others. Evidencing concatenation between some of the predictors in elderly patients operated on.

Keywords: Hip Fracture; Predictors; Mortality.

RESUMEN

Se determinó la incidencia de predictores de mortalidad establecidos que vinculan a pacientes con fractura de cadera mayor de 60 años con un incremento de la mortalidad, que fueron intervenidos quirúrgicamente en el Hospital General "Abel Santamaría Cuadrado" del 2020 a 2022. Se realizó un estudio descriptivo, prospectivo y longitudinal a partir de historias clínicas, datos recogidos a través Sistema de Información Report- FCA utilizado en Programa Nacional de Cadera, del seguimiento en consulta externa, de informes del departamento de estadística del Hospital General Abel Santamaría Cuadrado y Dirección Provincial de Salud. Con un universo de 764 pacientes del cual entraron al estudio 512, de esta el 68 % de la muestra estuvo representada por el sexo femenino, donde el grupo etario más representativo fueron pacientes de 80 a 89 años que constituyó el 41 % de la muestra. Las comorbilidades con mayor representación fueron la Hipertensión Arterial (88 %) y la Diabetes Mellitus (54 %); el 74 % de los pacientes fueron intervenidos antes de las 24 horas y el 72 % eran independientes antes de la intervención. El grupo de edades 80 a 89 años, con predominio del sexo femenino, con amplia gama de comorbilidades destacando la hipertensión arterial y la diabetes mellitus. Íntima relación entre la edad y la mortalidad. El validismo y el apoyo familiar influyeron en la evolución, relacionadas con la aparición de complicaciones como infecciones, tromboembolismo, entre otras.

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Evidenciando concatenación entre algunos de los predictores en los pacientes ancianos operados.

Palabras claves: Fractura de Cadera; Predictores; Mortalidad.

INTRODUCTION

Hip fracture is considered a 'silent epidemic' in today's world, which has been on the rise over the years due to the increase in life expectancy, mainly in developed countries, being responsible for 20% of hospital admissions to any trauma service, according to Guallase.[1,2]

Our country, despite not being part of this group and sometimes not having all the necessary technology, has implemented a group of measures and programs that have increased accessibility and excellence in the National Health Service, bringing with it an increase in life expectancy, creating a positive balance towards those over 60 years of age, predicting that by 2025 our population will be the oldest in Latin America.

Our island is inhabited by 11 440 877 million people, of whom 22 197 784 are over 60. Statistically, it is justified that approximately 12 000 patients present with this traumatological condition every year. More specifically, in the province of Pinar del Río, an average of 363 patients are admitted annually to the General Hospital Abel Santamaría, 70 % of which are extracapsular and 30 % intracapsular fractures.

Considering the above, our National Health System has prioritized the National Programme of Care for the Elderly; a clinical practice guide indicates the clinical and surgical procedures to be imposed on this entity, which was officially implemented in 2009.

Due to the importance of this condition, many orthopedic surgeons have devoted their lives to studying it in different areas, carrying out studies ranging from prevention in primary care to procedures and complications, defining morbidities in patients who have undergone surgery and those who, for one reason or another, have been contraindicated for surgery, carrying out mainly descriptive longitudinal studies. Extensive statistical analysis has been carried out on the mortality presented in groups of patients, determining essential risk factors, always aided by the international standards governing the management of hip fracture, with many of them affirming that survival depends fundamentally on the presence of systemic affection in the patient, more than on the type of fracture, the type of implant that is decided to be placed, which does not mean that healthy patients are exempt from presenting complications.

To date, no study similar to this one has been identified in our environment. Hence, it is essential to determine elements that are predictors of mortality, such as comorbidities, age, the validity of the patient, and type of surgery, among others, which are present in patients over 60 years of age who are taken to surgery in our center, to try to improve the quality of life of the patient undergoing this rigorous procedure.

There are other factors such as age, sex, functional state, mental deterioration, type of fracture, characteristics of their habitual environment, as well as whether they live alone or accompanied, which determine mortality in many of the patients and are predictors of this.

Gordon, in studies carried out, established mortality rates as high as 30 %, with advanced age, intertrochanteric location, and low mobility before the fracture as direct causes of these figures.[2]

Likewise, authors such as Esmektala et al. found a relationship between the longer surgical waiting time and a higher risk of complications such as respiratory and urinary tract infections and other secondary to bed rest.[1,3]

The question arises as to whether the early identification and determination of the predictors of mortality established in this study can influence the reduction in the incidence of mortality in patients operated on for hip fractures.

The objective is to determine the incidence and behavior of established predictors that could be linked to an increase in mortality in patients over 60 years of age with hip fractures who undergo surgery at the 'Abel Santamaría Cuadrado hospital in the period from 2020 to 2022.

METHOD

A descriptive, prospective, and longitudinal study was conducted in the General Teaching Hospital 'Abel Santamaría Cuadrado' in the Province of Pinar del Río from 2020 to 2022.

Universe: 659 patients with a positive diagnosis of hip fracture, with an indication for surgical treatment.

The sample: of 512 patients selected by the non-probabilistic method who met the inclusion and exclusion criteria:

Inclusion criteria:

- Patients over 60 years of age.
- Patients with a diagnosis of hip fracture who survived the first 24 hours after surgery.

- Patients with imaging studies confirming hip fracture.
- No pathological fractures.

Exclusion criteria:

- Patients who, for one reason or another, do not have imaging studies confirming hip fracture.
- Patients who have not undergone surgical intervention and whose medical records do not have the information to determine the study variables.
- Patients who refuse to participate in the study and who maintain repeated absences from the consultation.

Methods used

Theoretical, historical, and logical methods of scientific research were used, based basically on the processes of analysis, synthesis, induction, and deduction. An exhaustive and up-to-date search of epidemiological studies was carried out to obtain an international and national overview of the object to be investigated. The empirical methods used were documentary analysis of individual medical records and surveys.

Summary measures for qualitative and quantitative variables were used for data analysis and processing.

Cases were evaluated in consultation one month, 3, 6, and 12 months after surgery. The sample of patients studied prospectively was surveyed according to the REPORT-FC Information System regulations. To study the variables framed in the objectives, the functional evaluation scale called the Katz Index of 6 functions (basic ADL scale) was used, following the regulations of the clinical practice guide for the Management of Hip Fracture in the Elderly. From an ethical point of view, this research complied with the moral foundations that appear in the Declaration of Helsinki 2008. Its essential aim was scientific, with no environmental impact or predictable risks

RESULTS

Table 1. Patients operated on for hip fracture by age group

Age groups	No.	%
60-69 years	103	20
70-79 years	159	31
80- 89 years	210	41
90 years or more	40	8
Total	512	100

Table 1 shows the patients operated on for hip fracture according to age group, with 41,1 % belonging to the 80-89 age group.

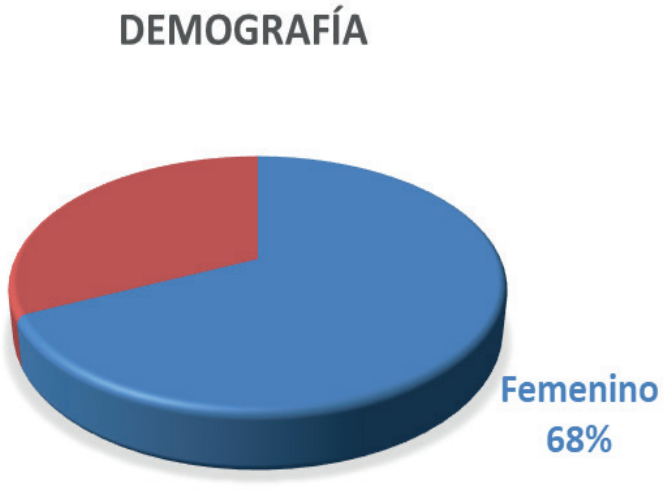

Figure 1. Patients operated on for hip fracture by sex

Gender was represented in figure 1, where it can be seen that the female gender is represented by 68 %.

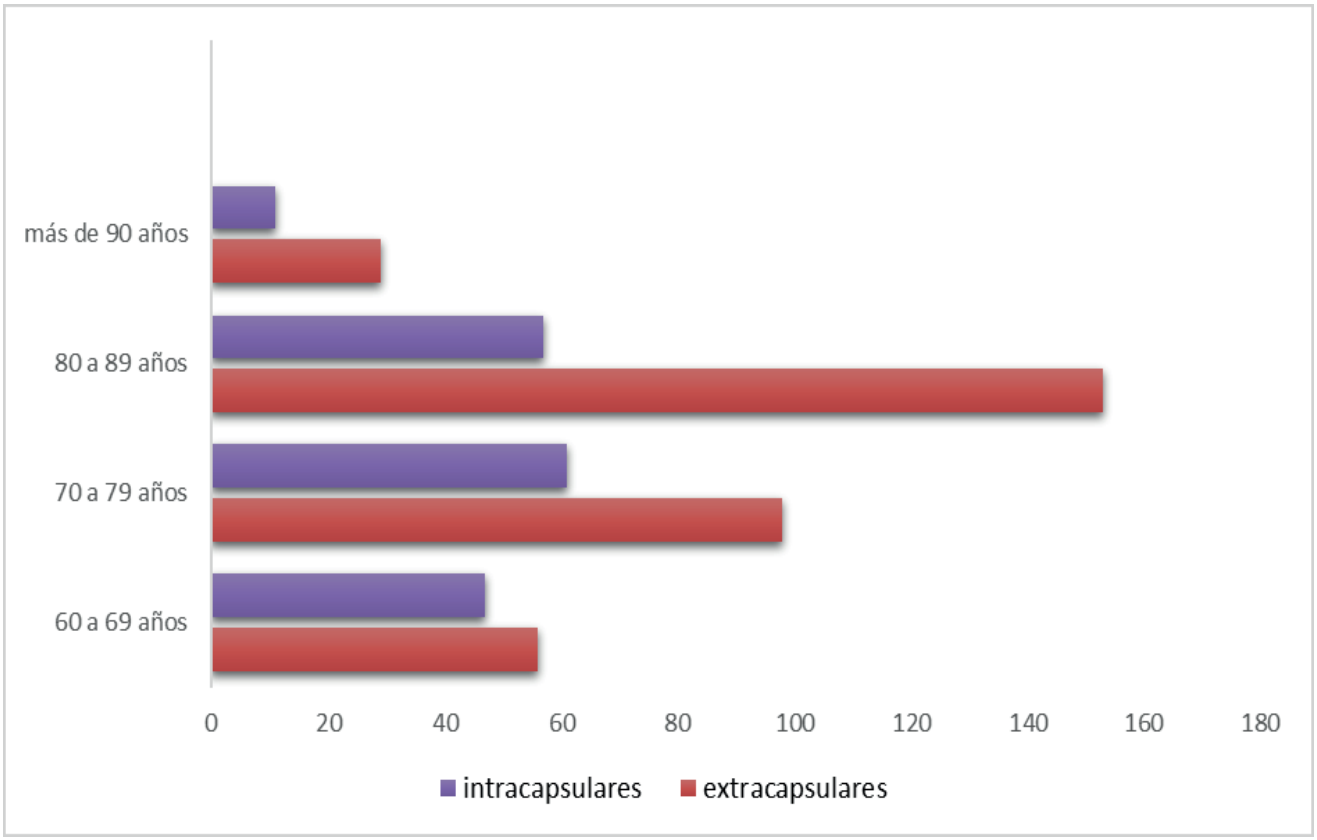

Figure 2. Representation of the type of fracture according to age group

Trochanteric (extracapsular) fractures were identified as the most frequent type of fracture, mainly seen in women over 80 years of age. (figure 2).

Table 2. Comorbidities in hip fracture surgery patients

Comorbidities	No.	%
Senile dementia	112	22
Bronchial Asthma	163	32
AVE	87	17
Ischemic Heart Disease	286	55
Liver Cirrhosis	15	3
Diabetes Mellitus	276	54
COPD	133	26
Gout	20	4
HYPERTENSION	409	88
Heart Failure	209	41
Renal Lithiasis	61	12
Obesity	189	37
Parkinson's	15	3
Osteoporosis	345	67
Health	61	12

Several diseases were detected in the study, of which Hypertension (88 %), Diabetes Mellitus (54 %), Heart Failure (85 %) and Ischaemic Heart Disease (55 %) were the most frequent co-morbidities

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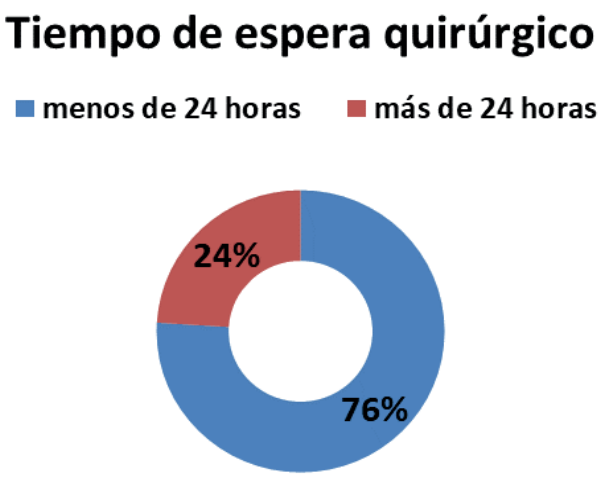

Figure 3. Surgical waiting time in patients with hip fracture

Of the total sample, 76 %, representing 389 patients, were operated on within the first 24 hours (figure 3).

Mortality related to surgical waiting time showed at 6 months, higher mortality in those patients whose surgery was postponed for more than 24 hours; 46 patients were found in this situation, and only 14 deaths were recorded in those who underwent timely surgery before 24 hours.

Finally, at one year, mortality in patients in the first group was higher, with 78 patients representing 15 % of the study sample, with only 52 patients (10 %). Of 114 patients in total representing the mortality of the study, 77 were women (67 %), and of these, 38 were within the first 6 months of entering the study; of the deceased patients, 88 had extracapsular trochanteric fractures.

The participation of family support in the patient's evolution and recovery was also evaluated, and a close link was found between the two. Twenty-three patients in the sample were included in nursing homes or with relatives who did not provide the necessary care. Of these, five suffered complications that led to their death in the first 6 months, and a total of 9 deaths were found after one year.

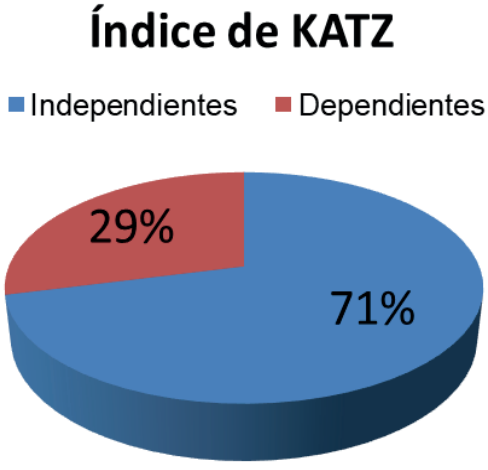

Figure 4. Representation of validism prior to surgery

The validity of each participant was assessed using the KATZ Index. In the interview with these patients, this qualitative functional scale evaluated six basic activities to be performed before surgery (bathing, dressing, toileting, mobility, feeding, and continence). The results showed that 71 % qualified themselves as independent by being able to perform at least four of the six activities (figure 4).

DISCUSSION

The increase in age in the world population increases the incidence of fractures in elderly patients every year; fracture of the proximal end of the femur is the most common; it is associated with high morbidity and mortality.[4]

Regarding gender, it was found that mortality was higher in the female sex, this value being significant, agreeing with the literature consulted, which reported the direct proportionality between these results and hormonal changes, obesity, and a decrease in physical activity, which cause poor bone quality; and with the presence of the comorbidities typical of these patients over 60 years of age such as Arterial Hypertension and Diabetes Mellitus, chronic diseases which were identified most frequently in the study.

These data coincide with the literature reviewed. According to Holmberg's study, based on the statistics of 3053 cases, the risk of these injuries increases exponentially above the age of 50, and it is estimated that one in two women over the age of 50 is at risk of suffering a hip fracture during the rest of their lives.[5,6] In contrast, the risk for men is half that of women.

Thorngrenen in Sweden published 18 000 hip fractures per year for a population of 9 million. Fractures occurred in 67 % of women and are at higher risk in people over 80 years of age. The incidence of hip fractures varies according to geographical area; in Sweden, the incidence is higher than in the USA but lower than in Southern European countries.[6,7]

Hypotheses that attempt to justify regional variability as a risk factor are still unclear. On the contrary, differences in the prevalence of these lesions by sex are partially explained by morphological patterns of the skeleton. It is an apparent fact that bone mass is highest in Africans, whose hip fracture rate is lowest, while Caucasian women with the lowest bone mass have the highest rate. These differences in bone mass between the different races are related to diet and physical activity patterns.

The age range in which our sample presented the highest incidence of this traumatological condition was in the second age group, from 80 to 89 years of age. However, taking into account the results of this study, we agree with the authors consulted that the mortality of these patients is higher the older they are, taking into account the low physiological reserves of each of these patients. Observing that the most significant number of deaths occurred in the first 6 months, especially in patients over 80 years of age, in which mortality predictors such as comorbidity, type of fracture, functional status, and family support accelerated the process of death, disagreeing with some of the literature in which it was found that the most significant mortality occurred one year after surgery.

Other studies have found no significant differences between sex and mortality rate, especially when adjusting the mortality rate between men and women when controlling for other risk factors.[8,9] However, this was not done in the present study, so perhaps the results in this regard are different.

Nevertheless, sex has been considered an essential factor affecting mortality after hip fracture in a multitude of articles, providing, as in the present study, a higher mortality rate in women compared to men.[6,7]

Likewise, the study was able to determine how the predictor of mortality, surgical waiting time, plays a determining role in the favourable evolution of these patients. It found that the longer the surgical waiting time, the faster complications will appear, which will cause greater mortality in these patients. This corresponds to the literature consulted.[8]

A study found that the average age of trochanteric fractures in women was 82 and 78 in men. The increase in the incidence of trochanteric fractures with age suggests that osteoporosis is more related to trochanteric fractures than cervical ones.[9]

As for the comorbidities accompanying the hip fracture on admission, such as arterial hypertension, diabetes mellitus, senile dementia, and ischaemic heart disease, they are in correspondence with the leading causes of non-communicable diseases in this age group.

This result is essential, as it can be seen that the older adult patient with hip fracture is generally a previously ill patient, in whom the underlying disease can act as a debilitating factor that predisposes to the fall and fracture. It can also make the evolution more torpid both from the biological point of view of tissue restoration, as it can compromise the supply of nutrients and oxygen for repair, and in the family environment, also affecting the carers of these patients.

Such is the role of comorbidities that mortality has been reported to increase from 11 % to 25 % in the presence of four or more comorbidities.[10] The author of this paper recognizes the incalculable value of detecting and controlling the effect of comorbidities.

Surgical waiting time of less than 24 hours is an essential factor in avoiding complications, especially those associated with bed rest, such as pneumonia, urinary sepsis, pulmonary thromboembolism, and others that favor mortality in patients with this type of fracture.

As a result of this, the variable of family support was found to be a significant predictor of mortality in the study, since after joint surgery, considered to be major, the presence of caregivers is a determining factor for the correct evolution of these patients, since secondary to this, they become dependent on their families or the people designated to care for them, This being deficient or incorrect in some cases, it hinders the evolution of the patient due to the appearance of complications such as systemic and local infections, loss of fixation which generally leads the patient to a reoperation, weakening him much more due to all the anesthetic and surgical stress that this fact represents, and increasing the probability of the appearance of serious complications such as pulmonary thromboembolism. These variables are closely related to each other and are of particular

importance.

The type of fracture had a vast influence on the morbidity and mortality of these patients, with the presence of extracapsular fractures having a worse prognosis, as they cause greater bone injury and, as a consequence, cause greater losses,[9] in addition to the fact that the patient is subjected to a greater surgical procedure in terms of exposure and instrumentation, more surgical risk, also the convalescence period is longer, which causes the appearance of perioperative complications and makes recovery more difficult.

Regarding validity before surgery, the evaluation of these patients was carried out using the KATZ index. They were independent when carrying out at least 4 of these activities by their means, which allowed them to have a certain degree of autonomy, which was affected after suffering a hip fracture and having to depend on family members after the fracture.

In an individual analysis of each of the predictors analyzed in the study, it was found that some of these, such as surgical waiting time, validity, family care, and complications secondary to age, are highly modifiable by following programs currently in force in the Cuban national health system, the most important being the Programme of care for the elderly and care for climacteric women, among others, which would provide better control and prophylaxis for this entity known by some as 'THE KISS OF DEATH'.[2]

CONCLUSIONS

It was concluded that knowledge and correct management of these predictors, from primary care to patient discharge, are essential elements that modify their evolution. The individual analysis of each predictor shows the concatenation that exists between them in elderly patients operated on for hip fractures in the Abel Santamaría Cuadrado Hospital".

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

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Formal análisis: Rafael and Guillermo Reyes,
Research: Rafael and Luis Racirt.
Methodology: Rafael and Guillermo Reyes.
Supervision: Racirt and Guillermo Reyes.
Validation: Rafael and Guillermo Reyes.
Visualization: Racirt and Guillermo Reyes.
Writing - original draft: Emmanuel, Bruno Raúl and Rafael.
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