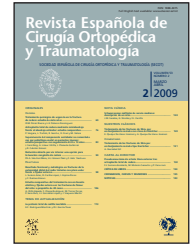


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ORIGINAL PAPERS

Emergency surgical treatment of hip fractures: a 7-year study

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KEYWORDS

Hip;
Hip fracture;
Osteosynthesis;
In-hospital mortality

Abstract

Purpose: To find out the incidence of hip fractures in patients over 15 years of age in Cuba. Analyze the relationship between admission into hospital and emergency surgical treatment, the frequency of postsurgical complications and the actual mortality rate.

Materials and methods: A descriptive retrospective study was carried out of patients admitted for a hip fracture in a university clinical-surgical hospital in the Granma province (Cuba) between January 2001 and December 2007. The inclusion criteria were: age over 15 and fracture in the proximal third of the femur; the exclusion criteria were having received previous treatment of the fracture, a subtrochanteric fracture line distal to the lesser trochanter of more than 5 cm, multiple trauma or a pathological fracture.

Results: Of the 660 patients selected, the most severely affected groups were women (66.9%), white skin (59.1%), age over 71 (72.6%). Trochanteric fractures prevailed (404 patients). 91% received surgical treatment, of which 83.2% was administered in the emergency department. The preferred fixation device used was a 130o AO nail-plate for trochanteric fractures and partial prosthetic replacement plus cancellous screws for femoral neck fractures. The most frequent post-surgical complications were of a respiratory and metabolic kind, with an aggregated in-hospital mortality rate of 7.2%

Conclusions: In Cuba, emergency (within 24 hours) surgical treatment of fractures of the upper third of the femur reduces the appearance of complications resulting from long hospital stays and decreases mortality. This underscores the importance of acting as soon as possible. We believe that fractures of the proximal third of the femur should be treated early and by means of osteosynthesis whenever possible. We recommend an appropriate postoperative primary-care management of geriatric patients by a multidisciplinary team in order to achieve a better and faster functional recovery.

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PALABRAS CLAVE

Cadera;
Fractura de cadera;
Osteosíntesis;
Mortalidad
intrahospitalaria

Tratamiento quirúrgico de urgencia en la fractura de cadera: estudio de siete años**Resumen**

Objetivo: conocer la incidencia de fracturas de cadera en mayores de 15 años de edad en el medio cubano, valorar la relación entre ingreso hospitalario y tratamiento quirúrgico de urgencia y la frecuencia de complicaciones posquirúrgicas, así como su tasa de mortalidad real.

Material y método: se realizó un estudio descriptivo retrospectivo de los pacientes ingresados por fractura de cadera en un hospital clínico-quirúrgico docente de la provincia de Granma (Cuba) entre enero de 2001 y diciembre de 2007. Los criterios de inclusión fueron edad mayor de 15 años con fractura del tercio proximal de fémur; los de exclusión, que hubieran recibido tratamiento previo por esa fractura, trazo subtrocantéreo distal al trocánter menor más de 5 cm, politraumatizado o con fractura patológica.

Resultados: de los 660 pacientes seleccionados, los grupos más afectados fueron el de mujeres (66,9%), piel blanca (59,1%) y mayores de 71 años (72,6%) de edad. Prevalcieron las fracturas trocantéricas, con 404 pacientes. El 91% recibió tratamiento quirúrgico, de los que en el 83,2% lo fue de urgencias. Como osteosíntesis, preferentemente se utilizó el clavo-placa AO de 1301 en las fracturas trocantéricas y en las cervicales, la sustitución protésica parcial y los tornillos de esponjosa. Las complicaciones posquirúrgicas más frecuentes fueron respiratorias y metabólicas; se obtuvo una mortalidad acumulada intrahospitalaria del 7,2%.

Conclusiones: en el medio cubano, la intervención quirúrgica de urgencia (antes de 24 h) de las fracturas del tercio superior del fémur reduce la aparición de complicaciones por estancia hospitalaria prolongada y disminuye la mortalidad, esto pone de mani esto la importancia por la cual realizamos dicho proceder. Pensamos que las fracturas del tercio proximal del fémur deben ser tratadas mediante osteosíntesis siempre que sea posible y de manera precoz, y recomendamos la necesidad de un adecuado manejo postoperatorio del paciente geriátrico por un equipo multidisciplinario en la atención primaria para conseguir una mejor y rápida recuperación funcional.

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Introduction

Every year, far more than one million hip fractures occur in the world. These fractures cost developed countries 3 billion dollars a year and, according to WHO experts, the expense of treating these fractures in the next few decades could cause the health system of many a developing country to collapse.¹⁻³ The number of patients with a hip fracture increases every year. The number of people sustaining a hip fracture was estimated at 1.66 million in the nineties; this figure is expected to soar to 6.26 million by 2050.⁴

The expected increase in life expectancy of the Cuban population, as well as the growing percentage of people with ages equal to or higher than 60, make it necessary to develop efficient treatment methods to deal with what has come to be called the "silent epidemic". These methods should also be efficient from the point of view of their cost and possibilities of implementation, taking into account the specifics of Cuba and the characteristics of the country's health system.⁵

Osteoporosis is one of the worst problems facing elderly persons of both sexes.⁶ Studies conducted in several regions and countries report annual hip fracture incidence rates ranging between 219.6-318.2/100,000 inhabitants in males over 50 years; these rates increase threefold in the case of

females.⁷ Other authors⁸ point out that 10% of these patients come from old people's homes or medical institutions, that 84% of hip fractures occur at home and that around 80% require surgery; they also state that the urban population is more prone to these fractures than people living in rural areas.

It has been shown that early surgical intervention improves the prognosis of these fractures. It must be said, however, that the health status of these patients, most of whom are affected with chronic diseases, may preclude early surgery and make previous compensation mandatory.⁸⁻¹¹

Cuba has a population of 11 million inhabitants, with slightly over 12% in their "third age", i.e. over age 60. Of a total 1.3 million elderly persons in Cuba, one-third are over 75 years of age (1998 Annual Report. National Statistics Authority, MINSAP, Cuba; 1999), an age many call the "fourth age", since people at this stage in their lives are characterized by greater biopsychosocial fragility and are more prone to health problems, which could lead to complications and eventually to death.¹²

The purpose of this article is to understand the incidence of hip fractures in people over 15 years of age in Cuba, as well as the relationship between hospital admissions and emergency surgical treatment, frequency of postoperative complications and the actual mortality rate.

Materials and methods

We performed a descriptive retrospective study of 660 patients older than 15 years with a diagnosis of hip fracture treated at the Celia Sánchez Manduley Teaching Hospital of the city of Manzanillo (Cuba) between January 2001 and December 2007. Hip fractures were defined as fractures occurring between the femoral head and a point up to 5 cm distal to the lesser trochanter. Patients under 15 years of age (20 cases) were excluded from the study; as well as those that had been treated for their hip fracture before being referred to our hospital (11 cases); patients with fractures secondary to other conditions (12 cases); multi-trauma patients with a hip fracture (8 cases), and patients with subtrochanteric fractures or with fractures with a diaphyseal component beyond 5 cm from the lesser trochanter. The total sample comprised 711 patients, of which a net of 660 patients were included in the study group.

Information was collected in 2 phases: firstly, from the surgical records of our Department and, subsequently, from the clinical records of the patients in the sample, which were made available to us by the Archives and Documentation Department of our Hospital; these clinical records provided the remaining data relevant to our study. We studied the patients' age (classifying them into decades), gender, race (Caucasian and others) and any concomitant chronic disease. An anatomic fracture line classification was used, without taking into consideration its stability or degree of comminution; conventional x-rays were used to classify the fractures. Time-to-surgery was classified into 2 groups: less than 24 hours (emergency surgery) or more than 24 hours (elective surgery). Data were collected regarding the type of surgery performed, any postoperative complications and deaths while in hospital.

Care on admission to the Emergency Trauma Department included, in addition to hip radiographs, lab tests (full hemogram, glycemia and basic coagulation tests), chest x-ray and ECG; depending on their concomitant conditions, some patients required some kind of specific complementary analysis.

Care of these patients was provided by a multidisciplinary team, made up of orthopedists, geriatricians, anesthesiologists, angiologists, cardiologists and intensivists so as to compensate them clinically and subject them to surgery as

soon as possible, provided that there was full consensus among the members of the group. Cases that, in the Head of the Emergency Trauma Department, required a hemiarthroplasty, were deferred for elective surgery.

Current concepts were applied regarding antibiotic prophylaxis (500 mg intravenous cephazoline in patients over than 50 and 1 g in those below 50, and 1 g intravenous vancomycin in patients allergic to betalactamic drugs); sodium heparin was used to prevent deep venous thrombosis. Patients spent their early postoperative period in the intermediate intensive care unit, where they were given special medical and nursing care for the first 24 hours. Subsequently, if no complications were observed, they were taken to the Trauma Department, following the National Prioritized Health Care Program for the Elderly.

After discharge, patients were followed up by their family doctor in an outpatient trauma clinic.

After gathering the information, tables were drawn up with the results obtained and the data was statistically processed on the basis of measurements from summaries.

The protocol for this research was approved by the Hospital's Scientific Committee. The purpose was to find out the impact that hip fractures have on the elderly population.

Results

Table 1 shows distribution of patients as per age and gender groups. Patients in the 80–90 years-old group had the highest incidence (35%); followed by the group of patients between 71 and 80 years of age (26.4%). Females, with 442 (66.9%) patients, prevailed over males. Caucasian patients (54,1%) were more numerous than the others. The side fracture most prone to fracture was the right side (58.1%).

Table 2 shows distribution of patients as per fracture type and gender. Note that 404 (61.2%) patients has sustained a trochanteric fracture.

With respect to the type of treatment administered, it was conservative in 59 (8.9%) patients and surgical in 601 (91.1%). In the latter group, 500 (83.1%) patients were subjected to an emergency procedure (maximum time to surgery 24 h) and the remainder to elective surgery. Time to elective surgery was less than 3 days in 48.5% of patients, 4 to 7 days in 28.7% and more than 7 days in 22,8%. As regards

Table 1 Males and females in the different age groups, with the number and percentage of hip fractures sustained

Age group, years	Males, no. (%)	Females, no- (%)	Total, no. (%)
≥ 15	11 (5)	16 (3.6)	27 (4.1)
51–60	20 (9.2)	31 (7)	51 (7.7)
61–70	31 (14.2)	72 (16.3)	103 (15.6)
71–80	57 (26.1)	117 (26.5)	174 (26.4)
81–90	72 (33)	159 (35.9)	231 (35)
> 90	27 (12.4)	47 (10.6)	74 (11.2)
Total	218 (30)	442 (66.9)	660 (100)

Source: Personal clinical record. Archive and Statistics Department, Celia Sánchez Manduley Teaching Hospital, Granma (Cuba).

Table 2 Anatomic diagnosis of the fracture

Fracture type	Males, no. (%)	Females, no. (%)	Total, no. (%)
Head	2 (0.9)	2 (0.4)	4 (0.6)
Femoral neck	67 (30.7)	143 (32.3)	210 (31.8)
Trochanteric region	137 (62.8)	267 (31)	404 (61.2)
Subtrochanteric region	12 (5.5)	30 (6.8)	42 (6.4)
Total	218 (33)	442 (66.9)	660 (100)

Source: Personal clinical record. Archive and Statistics Department, Celia Sánchez Manduley Teaching Hospital, Granma (Cuba).

Table 3 Distribution of patients according to the surgical technique used

Surgical technique	Fracture type		Total, no. (%)
	Intracapsular, no. (%)	Extracapsular, no. (%)	
Etropol nail	18 (10.2)		18 (2.9)
AO cancellous screw	44 (25)		44 (7.3)
Smith-Petersen nail	22 (12.5)		22 (3.6)
Knowles nail	5 (2.8)	2 (0.4)	7 (1.2)
130° AO nail-plate		363 (85.4)	363 (60.4)
95° AO nail-plate		38 (8.9)	38 (6.3)
Hemiarthroplasty	82 (46.5)		82 (13.6)
Ender nail		21 (4.9)	21 (3.5)
Hanging hip operation	5 (2.8)	1 (0.2)	6 (1)
Total	176 (29.2)	425 (70.7)	601 (100)

Source: Personal clinical record. Archive and Statistics Department, Celia Sánchez Manduley Teaching Hospital, Granma (Cuba).

the surgical technique used (table 3), 130° AO nail-plate fixation was the most widely used technique for extracapsular fractures (363 [60.4%] cases), and hemiarthroplasty for intracapsular fractures (82 [13.6%] patients).

There were 202 postoperative complications, the most frequent ones being bronchopneumonia (57 cases), metabolic complications (46), anemia (32) and sepsis (18). The first two were the main causes for in-hospital death.

On processing all the information gathered throughout 7 years by our Trauma Department, we found that patient aggregate mortality along their clinical history up until hospital discharge was 7.42% (49 patients).

Discussion

Hip fractures are infrequent before age 50, with their incidence among the young population accounting for a mere 2% of all fractures.¹³ Our data show that only 78 (11.8%) patients were less than 60 years old when they sustained their hip fracture. The most widely affected group in our study was that between 80 and 90 years of age (35%), which coincides with the findings of numerous other series.^{3,10-17} In a study carried out in 2000 in Ciego de Ávila province, Collazo et al¹⁸ found the highest incidence in patients between 71 and 80 years of age (35.7%), while in our study that group came in second in terms of frequency.

Our study, in line with others published internationally,^{3,7-10,12-19} shows a 2:1 predominance of females, although some authors^{20,21} report a 3:1 ratio. This predominance can be attributed to the greater longevity of females worldwide and to the high prevalence of osteoporosis in that population (postmenopausal period).¹⁹⁻²³

When evaluating skin color, while skin prevailed over the rest (54.1%). However, we consider this variable of little interest for our country because of the high degree of crossbreeding among the population. Other authors^{10,14-16} have found similar figures in Cuba. Escarpanter Buliés,³ for example, in an assessment of a five-year period, reported 89.2% of Caucasians in his total sample.

Nevertheless, we did not find the greater incidence of left-sided fractures found by other authors,^{3,22-26} in fact, most fractures in our study occurred on the right side, although this difference was not significant.

Intra- and extracapsular fractures have differential features in terms of their epidemiology, their repercussion on the patient's general health status and of their complications, as well as in terms of their evolution and prognosis. Analyzing the topographic diagnosis of hip fractures we observe that trochanteric fractures were most frequent than the rest (61.2%), which coincides with the findings of other authors.^{10,15,16,19,27}

Currently, surgical treatment seems to be mandatory for hip fractures in the elderly, except for patients with very

poor health status. These patients cannot be on bedrest since this would have deleterious consequences for their health status and result in such complications as decubitus ulcers, deep venous thrombosis, potential secondary pulmonary embolism, among others, which could cause their death.²⁸ Sisk²⁹ claims that indication of osteosynthesis is reversely proportional to the patient's general health status; for some authors, surgical treatment sometimes constitutes the only chance of patient survival.

Surgical treatment has gradually prevailed over conservative treatment. Nowadays it is considered that "any hip fracture should be operated provided that such a procedure does not entail any risk for the patient's life". This is our guiding principle when approaching these fractures. In 91% of our cases, we carried out this type of treatment, in line with most other Cuban and foreign authors.^{1,12,14-16,19}

There is no consensus as to whether a longer time-to-surgery or a different surgical technique are significant mortality risk factors. Other authors^{10,12,15,16,18,30,31} have pointed out that early surgery in these patients improves prognosis provided that their preoperative health status is sufficiently stable (a high percentage of these patients present with chronic diseases). In our study, emergency procedures prevailed over elective surgery with a ratio of 5:1 (500/101); we tend to prefer the former since the morbidity rates associated to it are lower. Other authors, like Davis et al,³² state that delaying surgery by more than 24 h leads to an increased mortality rate over the 28 days following fracture; but others do not agree with performing this surgery as an emergency procedure. Escarpanter Buliés,³ in Pinar del Río, used an emergency procedure in 30.1% of patients, which means that almost 70% of his patients were operated 72 hours after admission. This author prefers compensating for any underlying diseases before surgery rather than subjecting patients to an emergency procedure. Fbos et al³³ define "delayed surgery" as a delay longer than 3 days from admission and state that a surgical procedure could be a mortality risk factor, perhaps

because patients experiencing such a delay tend to require more diagnostic tests or medical stabilization before surgery.

With respect to elective surgery (101 patients), we found—in line with other authors^{31,34}—that the patients who died were those for whom time-to-surgery was the longest. The most often used surgical technique was fixation with a 130° AO nail-plate, as is also reported by other series.^{3,15,18} In femoral neck fractures we prefer to use osteosynthesis rather than a hemiarthroplasty, although other authors think differently (Escarpanter Buliés³ [41 arthroplasties in 73 patients], Collazo et al¹⁸ [201 arthroplasties in 250 patients] and others.^{12,13,15-17,24,30}

In line with other series,^{10,16,18} bronchopneumonia and metabolic problems were among the most usual postoperative complications in our patients, taken together they accounted for 44.4% of all complications in the sample.

Since the 1960s, different authors have reported mortality rates ranking between 4.6% (Fbos et al³³) and 13.3% (Barnes et al).³⁵ It should be pointed out that some authors³⁶ found a mortality rate 7 times higher than expected. Our sample, followed throughout 7 years, had an in-hospital mortality rate of 7.2% whereas those of other authors^{3,12,18,19,33,37-41} have obtained different figures (table 4).

On the whole, the mortality rate obtained in our study is in line with the findings of other Cuban authors and falls within the same range as the rates of some developed countries like Spain⁴², where mortality in elderly patients with the same condition is of 5% (range: 2.3-7.8%⁴³⁻⁴⁶

To conclude, the main interest and the purpose of this study was to show that, in a Cuban city like ours, mortality caused by fractures in the distal third of the femur decreased after an emergency surgical procedure (within 24 h). In addition, early surgery prevented complications as well and deaths caused by long-term hospitalization, which shows the importance of early intervention. We recommend that femoral neck fractures be treated by means of osteosynthesis whenever possible. For all hip fractures in elderly patients

Table 4 Mortality rates for patients with a hip fracture as published in the literature

Authors	Year	No. of deaths	%
Escarpanter Buliés ³ (Pinar del Río, Cuba)	1991-1995	9/176	5.1%
Collazo ¹⁸ (Ciego de Ávila, Cuba)	1991-1999	47/788	5.9%
Perera Rodríguez ¹⁹ (Sancti Spiritus, Cuba)	1990-1999	47/1.730	2.7%
Vega Ojeda ¹² (Havana, Cuba)	1996	38/519	7.3%
Vega Ojeda ¹² (Havana, Cuba)	1998	27/423	6.3%
Vega Ojeda ¹² (Havana, Cuba)	2001	32/721	4.4%
Torrijos et al ³⁷ (Madrid, Spain)	1992	26/311	8.3%
Fbos ³³ (Winnipeg, Canada)	1982	—	5.2%
Fbos ³³ (Winnipeg, Canada)	1986	—	4.6%
Fbos ³³ (Winnipeg, Canada)	1980-1986	—	8.1%
Bredahl ³⁸ (Aalborg, Denmark)	1992	—	10%
Pitto ³⁹ (Florence, Italy)	1994	—	6%
Diamond ⁴⁰ (Sydney, Australia), males/ females	1997	—	14%/6%
Magaziner ⁴¹ (Baltimore, USA)	1997	—	6.8%

we recommend appropriate patient management by a multidisciplinary team in primary care, where hospital treatment is as important as achieving a good functional recovery that guarantees an optimal health status.

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Conflict of interests

The authors have declared that they have no conflict of interests.

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