

# Functional evolution in elderly individuals with hip fracture surgery\*

AVALIAÇÃO FUNCIONAL EM IDOSOS INTERVINDOS DE FRATURA DE QUADRIL

EVALUACIÓN FUNCIONAL EN ANCIANOS INTERVENIDOS DE FRACTURA DE CADERA

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## ABSTRACT

This prospective study was performed in patients aged 65 years or older who underwent hip fracture surgery. The objective was to determine the functional evolution in a group of patients three months after hospital discharge, to identify the variables related to this functional recovery and to describe the associated mortality and institutionalization process. We analyzed demographic variables such as age, sex, and living situation. Other aspects considered included: comorbidity, cognitive impairment, walking ability, dependency level according to Barthel's Index, institutionalization, and mortality. The information was collected on admission and three months after discharge. Considering the entire sample, 89.6% was female and the average age was 83.56 years; 40% of patients regained their prior independence and a 16.7% mortality rate was registered, together with a slight progression toward institutionalization. The functional capacity and cognitive impairment of patients before the fracture are determinants of functional recovery and subsequent recovery of independence.

## DESCRIPTORS

Aged  
Hip fractures  
Recovery of function  
Rehabilitation nursing

## RESUMO

Estudo prospectivo de observação, abrangendo doentes com idade superior a 65 anos, submetidos à intervenção cirúrgica por fratura do quadril. O objetivo deste trabalho foi conhecer a evolução funcional dos doentes três meses após a alta hospitalar, identificar as variáveis que influenciaram essa recuperação e descrever a mortalidade e institucionalização. Foram analisadas variáveis como idade, sexo e convívio. Outros aspectos: comorbilidade, deterioração cognitiva, capacidade para se deslocar, nível de dependência segundo índice de Barthel, institucionalização e mortalidade. A informação foi recolhida no momento da admissão e três meses após a alta. Da amostra, 89,6% foram constituídos por mulheres com idade média de 83,56 anos; 40% dos doentes recuperaram a independência anterior, registando-se uma mortalidade de cerca de 16,7% bem como uma ligeira tendência à institucionalização. A capacidade funcional e o grau de deterioração cognitiva antes da fratura condicionam posterior recuperação funcional e consequente nível de dependência.

## DESCRIPTORIOS

Idoso  
Fraturas do quadril  
Recuperação de função fisiológica  
Enfermagem em reabilitação

## RESUMEN

Estudio observacional prospectivo en pacientes mayores de 65 años intervenidos de fractura de cadera. El objetivo fue conocer la evolución funcional de los pacientes a los tres meses del alta hospitalaria, identificar variables relacionadas con dicha recuperación funcional, describir la mortalidad e institucionalización asociadas al proceso. Se analizaron variables demográficas como edad, sexo, convivencia. Otros aspectos registrados fueron: comorbilidad, deterioro cognitivo, capacidad para caminar, nivel de dependencia según índice de Barthel, institucionalización y mortalidad. Se recogió la información al ingreso y a los 3 meses del alta. El 89,6% de la muestra, fueron mujeres, la edad media fue de 83,56 años. El 40% de los pacientes recuperaron la independencia previa registrándose una mortalidad del 16,7% así como una leve progresión hacia la institucionalización. La capacidad funcional y el deterioro cognitivo del paciente, previos a la fractura condicionan su recuperación funcional y dependencias posteriores.

## DESCRIPTORIOS

Anciano  
Fracturas de cadera  
Recuperación de la función  
Enfermería en rehabilitación

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## INTRODUCTION

Population aging entails an important and progressive increase in morbidity levels associated with chronic, degenerative and frequently disabling processes. Hip fractures represent a health problem not only due to their high prevalence and attached morbidity and mortality levels, but also to their extent as a social problem. In this context, between 15 and 25% of people who survive this kind of process need hospitalization or institutionalization in the year after the fracture. Also, more than a third of these patients are victims of repercussions that entail partial or complete dependence for Basic Activities of Daily Living (BADL)<sup>(1)</sup>.

In general, incidence levels of hip fractures are higher in the white population. Approximately half of this kind of processes are registered in Europe, North America and Asia, possibly not only due to ethnical factor, but also to greater life expectancy<sup>(2)</sup>.

Women represent approximately 75% of hip fracture victims. Justifications include the increased longevity of the female population and the predominant incidence of osteoporosis in the same population after the post-menopausal period<sup>(1)</sup>.

Hospital mortality of elderly hip fracture victims ranges between five and eight percent<sup>(1)</sup>.

In Spain, a report by the *Instituto de Información Sanitaria*, affiliated with the Ministry of Health and Social Policies, shows an incidence level of hip fractures in 2008 corresponding to 103.76 cases per 100,000 inhabitants. Likewise, in the same report, hospital mortality levels related to this process are estimated at between 4.71% and 5.85% in the period 1997-2008<sup>(3)</sup>.

A direct relation has been verified between mortality and the period subsequent to the fracture. Thus, the collected information shows that, at 30 days, mortality ranges between four and 13%; at six months, this reaches 15-25% and, after one year, 25-30% and even higher<sup>(1)</sup>.

Fractures in general and specifically hip fractures in the elderly negatively affect victims' functional capacity<sup>(4)</sup>. This process slows down and impedes walking in the socio-communitarian and domestic environment and, at the same time, increases the need to use instrumental help<sup>(5)</sup>. Consequently, a close relation exists between walking abilities and the degree of functional recovery for basic and instrumental activities of daily living. Moreover, this decreased ability to walk psychologically influences patients and reduces their self-esteem. In many cases, this situation contributes to social isolation and increases the possibility of further falls.

Functional assessment in the elderly provides important signs of this population's quality of life. Nowadays, the performance of Basic Activities of Daily Living is a widely accepted and acknowledged parameter. It grants

health professionals and particularly nurses a more precise view on the severity of the disease and its sequelae.

Different studies underline the importance of clinical, socio-demographic, functional, mental and care factors in the functional recovery of elderly patients after hip fracture surgery<sup>(6)</sup>. Moreover, the scientific community takes clear interest in the elaboration and adoption of intervention strategies related to physical, functional and psychosocial aspects after hip surgery in elderly patients<sup>(7-9)</sup>.

In hip fracture processes, treatment is always surgical, except in patients in critical general conditions, when surgery is contraindicated. In this last case, extended bedriddenness entails multiple complications, with harmful consequences.

Nowadays, the evolution in surgical techniques and materials guarantee the effectiveness of hip fracture surgery, leading to a trend to evaluate treatment success based on the obtained functional outcomes.

This study was developed to get to know the functional evolution of patients over 65 years of ages after hip fracture surgery at three months after hospital discharge. The proposed aims were to determine the functional evolution (ability to walk and Barthel index) at three months after hospital discharge, as well as to identify mortality and institutionalization associated with the process and identify variables related with functional evolution after these fractures within the investigated period.

## METHOD

A prospective observational study was developed, involving hip fracture patients who received surgical treatment. The study period was from February 1<sup>st</sup> until March 31<sup>st</sup> 2010.

Study participants included all patients hospitalized at *Hospital de Rehabilitación y Traumatología (HRT) Virgen de las Nieves* in Granada who complied with all inclusion criteria. These criteria were: over 65 years of age, diagnosed with hip fracture, having received surgical treatment and able to walk before the fracture with or without the help of instruments or people.

The following exclusion criteria were considered: metastatic origin of the fracture, as well as the simultaneous presence of other types of fractures, given the variability of the functional recovery protocol. Finally, other reasons for exclusion were the non-availability of a phone to permit post-discharge monitoring, as well as the patients or families' refusal to participate in the study.

### Variables

Demographic variables were collected, related to age and gender. Other aspects were also registered, such as background illnesses and comorbidities (Charlson Index), cogni-

Hip fractures represent a health problem not only due to their high prevalence and attached morbidity and mortality levels, but also to their extent as a social problem.

tive decline, days of hospital stay and mortality. The family situation (alone, partner, family, residence) and functional evolution were measured before the fracture and at three months. The ability to walk (with or without help) and to perform Basic Activities of Daily Living (Barthel Index) was used for the functional assessment. Mortality data were collected during the hospitalization process and at three months.

#### **The following measures were used:**

Charlson's Comorbidity Index<sup>(10)</sup> predicts the one-year mortality for a patient who can suffer from a range of comorbidity conditions (heart disease, AIDS or cancer), totaling 22 conditions. A score of 1, 2, 3 or 6 is attributed to each condition, depending on the death risk associated with this condition. Later, scores are added up and a total score is obtained, which predicts mortality.

Pfeiffer Test, Spanish version of Pfeiffer's Short Portable Mental State Questionnaire (SPMSQ)<sup>(11)</sup>. This test includes ten simple questions to determine the patient's orientation in time and space, memory and calculus. This instrument to determine cognitive decline is highly used in clinical practice.

Barthel's Index<sup>(12)</sup>, used to assess basic activities of daily living necessary for independence in self-care (feeding, bathing, dressing, grooming, bowels, bladder, toilet use, transfers bed to chair and back, mobility, stairs), whose decline implies the need for help from another person. The evaluation of activities is not dichotomous, which permits assessing situations of intermediary help. The total score for maximum independence is 100 and for maximum dependence 0. Distinct dependence levels are considered, according to the following scores: <20 total dependence, 20-35 severe dependence, 40-55 moderate dependence, >60 mild dependence and 100 independence. Information can be collected through direct observation or verbally from the patient or the main caregiver. It is a validated tool for clinical use by health professionals and permits measuring people's functional status and ability to live in the community independently. Likewise, it is useful to evaluate progress in a rehabilitation program and to predict mortality.

#### **Data collection**

Patients' clinical files were collected and patients or caregivers were interviewed during the first days of hospitalization to collect information, obtaining retrospective and current data. Also, the abovementioned measures were applied. After hospital discharge, the primary investigator contacted the study subjects by telephone to collect patient information after a three-month post-intervention monitoring period. A record file was completed for each patient.

#### **Analysis**

SPSS software version 15.0 was used for statistical analysis. Descriptive analysis was applied to all variables: means

and standard deviations for quantitative, and frequencies and percentages for qualitative variables. To associate the variables, bivariate analysis and contingency tables were developed. Chi-square or Fisher's test for non-parametric samples were applied to qualitative variables. To associate the dependence level before the fracture with the dependence level at three months, this variable was recoded in two categories and McNemar's test for related variables was used. Mann-Whitney's test was performed for qualitative and quantitative variables. When both variables were quantitative, Spearman's correction was used. For two related quantitative variables, the Wilcoxon test was applied. Significance was set at  $p < 0.05$ .

#### **Ethical considerations**

The project received approval from the hospital's ethics committee. Also, authorization to participate in the study was obtained through the patients' informed consent. In case patients were unable, the main caregiver's informed consent term was requested.

## **RESULTS**

During the study period, 79 patients diagnosed with hip fracture were hospitalized at the unit. From this total group, seven were excluded because they were younger than 65 years, two due to metastatic processes, three with multiple fractures, 11 who were unable to walk before hospitalization and four who died before surgical treatment. No informed consent could be obtained from two patients. Two other patients could not be contacted. Thus, the study sample comprised 48 patients.

The patients' mean age was 83.56 years, with a standard deviation of 6.28 and an age range from 67 to 101 years. When distributed per age, 21 (43.8%) patients were younger than 85 years and 27 (56.3%) were 85 years or older.

In terms of gender, five (10.4%) were men and 43 (89.6%) women.

The study variables are described in Table 1.

Regarding mortality in the study sample, six patients died during their hospital stay (12.5%). Two more patients had died at three months after discharge, so that the total mortality rate of patients included in the study corresponded to 16.7%. Thus, functional recovery could be analyzed in 40 patients.

The seven (17.5%) patients in the study sample who had been institutionalized before hospitalization returned to their place of origin upon discharge. At three months, nine (22.5%) patients lived in a retirement home, which means a 5% increase in the institutionalization level.

Results for the functional recovery of patients at three months after hip surgery are displayed in Table 2.

**Table 1** – Study variables - Hospital de Rehabilitación y Traumatología. Virgen de las Nieves – Granada, February/March, 2010

Characteristics	n(%) *Mean (SD)
Cognitive decline upon hospitalization (1)	13 (27.1)
<b>Background illnesses:</b>	
Arterial hypertension	28 (58.3)
Diabetes	13 (27.1)
Cardiopathy	13 (27.1)
Dementia	9 (18.8)
CVA	
Others	6 (12.5)
No background illness	4 (8.3)
I. Charlson:*	1,71 (1,01)
Mean Stay*	11,02 (4,19)
<b>Life before hospitalization:</b>	
Alone	10 (20.8)
Partner	9 (18.8)
Family	22 (45.8)
Home	7 (14.6)
I. Baseline Barthel*	80.94 (22.91)

(1) Pfeiffer Test score of 5 or higher

**Table 2** – Functional evolution at three months after discharge - Hospital de Rehabilitación y Traumatología Virgen de las Nieves – Granada, February/March, 2010

Variables	Before the fracture		Three months (post)	p
	n (%)	n (%)	n (%)	
<b>Ability to walk (1)</b>				
Independent	30 (75.0)	11 (27.5)	0.000*	
With help	10 (25.0)	24 (60.0)		
Does not walk		5 (2.5)		
<b>Dependence Level (2)</b>				
Independence	15 (37.5)	3 (7.5)	0.004**	
Mild Dep.	18 (45.0)	21 (5.5)		
Moderate Dep.	4 (10.0)	8 (20.0)		
Severe Dep.	3 (7.5)	1 (2.5)		
Total Dep.	0 (0.0)	7 (17.5)		
<b>Barthel</b>	Media (DT)	Media (DT)	p ***	
	80.88 (23.55)	59.63 (29.01)	0.000	

(1) "Independent", includes the use of a cane or crutches. "With help" includes the use of a walking frame or people

(2) Assessed using Barthel's Index: <20 total, 20-35 severe, 40-55 moderate, >60 mild, 100 independent

\* Association between walking independently and with help according to McNemar's Test

\*\* Remodification: Dependence (Barthel 0-55) and Independence or mild dependence (Barthel 60-100). Mc Nemar's Test

\*\*\* Wilcoxon's Test

When applying the contingency table to the functional status before the fracture and at three months, it is observed that 18 (45%) patients recovered the ability to walk

before the fracture and 16 (40%) returned to the same dependence level they had before the fracture.

The results for other variables related to functional recovery are shown in Table 3.

**Table 3** - Variables related to functional recovery at three months - Hospital de Rehabilitación y Traumatología Virgen de las Nieves – Granada, February/March, 2010

Variables	Walking	Dependence level	Barthel I.
	3 months (post)	3 months (post)	3 months (post)
	p	p	p
Age	0.448*	0.524*	0.779***
Life	0.006**	0.018**	0.003*
Cognitive Decline	0.002**	<0.001**	<0.001*
Charlson I.	0.060*	0.002*	< 0.001***

\* Mann-Whitney's non-parametric test

\*\* Fisher's contingency tables

\*\*\* Spearman's correction

## DISCUSSION

Our study population coincides with the evidence found, confirming that most hip fracture records are for women aged 80 years or older. Our patients' mean age is 83.56 years while, in other studies, the mean age figures between 80.17 and 82.3 years<sup>(13-17)</sup>, except in one Brazilian study<sup>(18)</sup>, with a mean age of 77.3 years.

The hospital mortality found in our study (12.5%) differs from other Spanish studies, which showed 6%<sup>(14)</sup> and 5.2%<sup>(15)</sup>. This difference can be attributed to the higher mean age of our study population, although global mortality at three months (16.7%) agrees with other Spanish studies (13.9% and 14.8%)<sup>(2,16)</sup>, but exceeds the 9.9% found in a European study at four months<sup>(18)</sup>.

The bibliographic review showed different results regarding the proportion of patients who lived in asylums. Also, institutionalization at one year after the hip fracture process ranges from 9% to 29%<sup>(2,13,17-19)</sup>. The result obtained in our sample (22.5%) at three months is in agreement with another author who observed no significant changes in the place of residence as from four months after the fracture<sup>(20)</sup>. Nevertheless, it is important to appoint that socioeconomic and cultural components exist which condition patients' institutionalization.

Concerning the functional evolution, although some patients in our sample displayed a very well adjusted autonomy level for walking, at three months after discharge, 87.5% are again able to walk with or without help. These

results coincide with other studies in which patients walked totally independently or with help before the fracture<sup>(2,13-14)</sup>. Also, a greater proportion of patients who can walk independently is observed when patients have participated in a rehabilitation program<sup>(2,13)</sup>. In the same context, a bibliographic review on the ability to walk after hip fracture shows that 54% of patients in one study and 76% in another need technical help to walk at one year after the fracture<sup>(5)</sup>. In this respect, it should be highlighted that, in our study, no distinction was made between walking at home or in the street, nor in the type of help received (walking frame, one or two people).

Results on the recovery of the ability to perform BADL at three months after the hip fracture (40% in our study) also coincide with other studies reviewed<sup>(2,5,14)</sup>. A 21-point drop in the Barthel Index score is observed across the study period, similar to other studies<sup>(13-14)</sup>.

No significant differences were found between age and functional recovery, in line with some studies<sup>(7,13)</sup>. This can be due to the high age and homogeneity of the sample, in which 56% were older than 85 years.

In accordance with other studies, significant differences were found between patient variables, such as cognitive decline and illnesses and life at three months, and their functional evolution.

The study limitations are due to the sample size; the existence of three men does not permit any relations with

the gender variable. Also, in this study, the rehabilitation variable could not be registered.

Further research is needed to study the specific characteristics of walk, detailing the type of help used (walking frame or people) and also identifying other factors involved, specifically the accomplishment of rehabilitation. In this study, different authors appoint nurses' role in the rehabilitation of disabled people<sup>(21-22)</sup>.

Another future research problem would be to identify the efficiency of social health interventions involving these fractures in the post-fracture period, measured through these patients' quality of life.

## CONCLUSION

Elderly people's hip fractures entail negative functional connotations, affecting both Basic and Instrumental Activities of Daily Living, besides institutionalization and/or mortality. Also, patients' ability to walk and perform Basic Activities of Daily Living before the fracture, besides cognitive decline, comorbidities and whom the persons live with, are significant variables that determine functional recovery at three months.

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