



Dependence for basic and instrumental activities of daily living after hip fractures



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ABSTRACT

The objective of the study is to determine basic activities of daily living (Barthel Index) and instrumental activities of daily living (Lawton-Brody Index) before and after hip fracture. Follow-up study of patients ($n = 100$) with hip fracture, operated at Complejo Hospitalario Universitario de A Coruña (Spain). Period January/2009–December/2011. Demographic characteristic of the patients, Charlson Index, Glomerular filtration rate, Barthel index, Lawton index, type of proximal femur fracture and surgical treatment delay were recorded. Multivariate regression was performed. Informed patient consent and ethical review approval were obtained. Before fracture were independent for activities of daily living (ADL) a 38.0%, at 90 days were 15.4%. The Barthel index score decreased from 75.2 ± 28.2 to 56.5 ± 31.8 ($p < 0.0001$). If we consider the age, gender, comorbidity (Charlson index), renal function, fracture type and surgical delay objectify the only independent variable to predict dependency effect is age. If we also consider the Barthel score objectify the variable that significantly modifies that score at 90 days is the baseline value of the index. The prevalence of independence for instrumental activities of daily living (IADL) at the baseline moment is 11% and at 90 days is decreased to 2.2%. There is a decrease in the independence effect in all activities. The variable predictor of independence for all activities after taking into consideration age, sex, comorbidity, fracture type, surgical delay and renal function is the baseline score of the Barthel and Lawton index.

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1. Introduction

During the last 30 years there have been produced a progressive increase in hip fracture incidents in European countries. Wallace has denominated this phenomenon as “Orthopaedic Epidemy” (Wallace, 1983).

Major risk factors for hip fractures among elderly patients include osteoporosis and falls. Each year, around one third of people over 65 years and half of people over 80 years experience one or more falls (Oliver, 2009). It is estimated that approximately 30 to 60 percent of community-dwelling older adults fall each year (Brennan et al., 2011; Rubenstein & Josephson, 2002). Women sustain hip fractures more often due to their higher rates of osteoporosis. Low socioeconomic status is associated with an increased incidence of hip fracture (Brennan et al., 2011; Quah,

Boulton, & Moran, 2011). Cardiovascular disease may also be associated with an increase in the risk of hip fracture among older patients (Sennerby et al., 2009), as may some endocrine disorders (diabetes, hyperthyroidism) and a number of medications. Di Monaco et al. (Di Monaco, Vallero, Di Monaco, & Tappero, 2011) describes like musculoskeletal factor like sarcopenia and reduced leg muscle mass have also been associated with hip osteoporotic fracture.

Complexity of patients after hip fracture can be demonstrated by the immediate complications. The most common postoperative complications are: urinary tract infection, surgical wound infection, and pneumonia (Gold, Sever, Lerman, Salai, & Justo, 2012). Other potential complications following surgical repair include infection, thromboembolism, chronic pain, dislocation, nonunion, avascular necrosis, delirium and posttraumatic arthritic changes (Katherine Walker Foster, 2014).

Fractures produce a significant impairment of independence for all basic and instrumental activities of daily living compared to the previous situation (Poór, Atkinson, Lewallen, O’Fallon, & Melton,

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1995). This dependency in daily living activities persists even after 9–10 years in more than a third of survivors (Jette, Harris, Cleary, & Campion, 1987). The lack of independence was bigger among older patients in life activities like: moving, feeding, drinking, expelling, personal sanitation and dressing (Baczyk & Adamek, 2010).

Among the core activities most affected after fracture in elderly with a good cognitive function is included the independence capacity in the bathroom and dressing themselves. In those they have a cognitive alteration the most affected are the transferences, dressing, and also the walking capacity (Cree, Carriere, Soskolne, & Suarez-Almazor, 2001).

The ability to get back the activity independence differs by the valued function. Some studies describes that among survivors, only 33% and 21% regained their prefracture function in five basic and six instrumental activities of daily living. Twenty-six percent regained their prefracture level of social/role functioning (Jette et al., 1987). 29% of patients with proximal femur fracture did not regain a level of independence similar to the previous (Bertram, Norman, Kemp, & Vos, 2011). Activities with less chance of recovery were up and down stairs, go to the bed, ambulation, dressing, bathing and using the service (recovery between 67 and 76%). The best recovery activities were grooming, feeding and toilet training (86–95%) (Aларcon, Gonzalez-Montalvo, Gotor, Madero, & Otero, 2011).

Some authors pointed out that pre-fracture health and functional ability of the patient have an impact in the prognosis. Gender differences in functional recovery may affect therapeutic and rehabilitative decision making. Functional recovery after traumatic hip fracture was better in men in comparison with women (Arinzon, Shabat, Peisakh, Gepstein, & Berner, 2010).

Others authors, Radosavljevic et al. (2013) shown as male sex, increased comorbidity and age over 85 years could be considered with lower functional recovery capacity potential after hip fracture.

We performed this study to determine which variables modify the dependence for the basic and instrumental activities of daily living after hip fracture, taking into account at the same time: patients's comorbidity, age, sex, fracture type, surgical delay, renal function and their previous baseline situation.

2. Materials and methods

2.1. Setting

This is a follow up study performed in the trauma unit (unit C) at Complejo Hospitalario Universitario de A Coruña during the period 2009–2011. The inclusion criteria for inclusion were patients operated at the center said above with osteoporotic proximal femur fracture and having provided informed consent during the period of study. *Sample size justification:* the 100 patients included make possible to estimate the parameters of interest with a confidence of 95% ($\alpha = 0.05$) and a precision of $\pm 9.8\%$.

2.2. Measurements

The following variables were study: Demographic characteristic of the patients (age, gender), comorbidity (Charlson Index), estimation of Glomerular filtration rate (GFR), quality of life (SF-36 questionnaire), basic activities of daily living (Barthel index), instrumental activities of daily living (Lawton index), types of proximal femur fractures (intracapsular and extracapsular) and surgical treatment delay was recorded.

The Charlson Index contains 19 categories of comorbidity, which are primarily defined using ICD-9-CM diagnosis codes. Each category has an associated weight, taken from the original Charlson paper (Charlson, Pompei, Ales, & MacKenzie, 1987), based on the adjusted risk of one-year mortality. The overall

comorbidity score reflects the cumulative increased likelihood of one-year mortality; the higher the score, the more severe the burden of comorbidity.

An estimated glomerular filtration rate GFR (eGFR) calculated from serum creatinine using the Modification of Diet in Renal Disease (MDRD) Study equation was computed (Levey et al., 2007).

In order to study quality of life, the SF-36 health questionnaire was used, adapted and validated for Spain by Alonso, Prieto, and Antó (1995). Barthel index and Lawton index were recorder (Graf, 2008; Mahoney, 1965) to study basic and instrumental activities of daily living previous to the fracture and 90 days after fracture. Lawton and Brody's questionnaire generates a score from 0 to 8 points which depending on the patient's gender allow them to be classify as dependents or independents. Independence for women is achieved with a score of 8 and for men with a score of 5. Ratings below these values are considered dependents.

To determinate the dependence situation and functionality at baseline the patients were interviewed and/or family members at the hospital room during admission. At 90 days of the fracture we use the same interviewer (nurse) previously trained who has interviewed these patients and/or family members by telephone.

2.3. Statistical analysis

The quantitative variables are expressed as a mean (Standard Deviation); the qualitative variables are expressed as an absolute value (n) and the percentage, with the estimation of the 95% confidence interval (CI). Comparisons for quantitative variables were made using the Student- T , Mann–Whitney test, or Wilcoxon test. Qualitative variables associations were analysed using Pearson's Chi-Square test or McNemar's test. In order to account for different variables a logistic and lineal regression analysis was used to examine factors associated with events of interest.

2.4. Ethics

The study complies with the principles laid down in the Declaration of Helsinki. Informed consent was obtained from all the participants in the study. Confidentiality was preserved in accordance with the current Spanish Data Protection Law (15/1999). The study has received written approval from the regional Ethics Committee for Clinical Research (code 2010/120 CEIC Galicia).

3. Results

The average age of the studied patients is 82.5 ± 8.4 years with a median of 84 years and a 83% of patients are older than 75 years old. There is a predominance of women (82.9%). The average score of comorbidity of Charlson was 6.1 ± 2.3 with a median of 6. A 46.2% of patients present an estimated creatinine clearance by MDRD < 60 mL/min/1.73 m².

In 60.1% of cases the fracture is extracapsular, being the most common the extracapsular fracture Evans type 2 (26.9%). In patients with an intracapsular fracture (39.9%) the most common type has been the Garden type III (46.8%). Accordingly to the type of fracture the most common type of treatment has been the osteosynthesis (59.5%) while the arthroplasty is performed in the remaining cases. During the follow-up period 9 patients died. These patients were older (86.3 ± 4.7 years) than the total sample studied, with higher level of dependency in Barthel index (88.9%) and Lawton index (100.0%).

The dependence level for the basic activities of daily living (Barthel Index) at baseline and 90 days after the fracture is shown in Table 1. The average Barthel index score decreased significantly between baseline and at 90 days of fracture going from

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