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Original Study

Factors Associated With Short-Term Functional Recovery in Elderly People With a Hip Fracture. Influence of Cognitive Impairment

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A B S T R A C T

Objectives: To assess factors associated with functional recovery and determine the influence of cognitive impairment.
Design: Prospective cohort study.
Setting: Orthogeriatric rehabilitation ward.
Participants: A total of 314 older adults (≥65 years) admitted for rehabilitation after a hip operation.
Measurements: Patients were stratified according to the Mini Mental State Examination into the following categories: severe cognitive impairment, scores 0 to 15; mild cognitive impairment, scores 16 to 23; and no cognitive impairment, scores ≥24. Their functional status, in terms of activities of daily living (ADLs), was recorded, and their ability to walk was measured with the Functional Ambulation Categories at 3 points in time: basal, on admission, and on discharge. We considered recovery of ADLs and ability to walk to be positive responses to rehabilitation treatment.
Results: Of the patients included, 285 finished the study (16 patients were moved to another hospital and 13 patients died) and 280 received rehabilitation treatment, with all 3 groups achieving functional gain ($P < .01$). Fifty-eight percent of patients recovered both the autonomy in ADLs they had before the fracture and the ability to walk (73.7% without cognitive impairment, 50% mild cognitive impairment, and 5% severe cognitive impairment) ($P < .001$). Previous walking ability (odds ratio [OR] 5.57, 95% confidence interval [CI] 2.41–12.74) together with the presence of pressure ulcers (OR 11.12, 95% CI 2.88–43.29) and delirium (OR 3.20, 95% CI 1.07–9.52) are sturdier predictive factors for functional recovery than the degree of cognitive impairment (OR 1.12, 95% CI 1.04–1.22).
Conclusion: Previous walking ability and the presence of complications, such as pressure ulcers or delirium, play a greater role in functional recovery than cognitive impairment. Not considering these aspects could lead to an overestimation of the impact of cognitive impairment in the recovery of these patients.

Hip fractures are the second most prevalent cause of hospitalization in people older than 65 and are associated with high comorbidity, disability, and institutionalization.[1–3] People with dementia have up to 20% higher risk, compared with people who are not suffering with dementia, of being admitted to hospital due to falls or fractures,[4,5] and approximately 40% of all elderly people with a hip fracture have some degree of cognitive impairment.[6,7] Patients with cognitive impairment are often excluded from rehabilitation programs.[8] Interpretation and extrapolation of the results of various studies that have attempted to demonstrate the importance of cognitive impairment for functional recovery is difficult. This difficulty stems from the differences in the methods used, the definition of outcomes, the exclusion criteria set, and the rehabilitation treatment used.[9,10] Some studies show that, after a hip fracture, people with cognitive impairment recover the ability to walk in a way similar to those without cognitive impairment,[11] whereas others show that only 20% of patients with cognitive impairment have recovered the ability to walk within their own homes.[12] Our hypothesis is that factors such as comorbidity, pharmacological treatment, previous functional status, social support, or pre- and postsurgery complications have a greater effect on the recovery of elderly people with hip fractures than the degree of cognitive impairment. The main

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objective of this study was to gain knowledge of the factors that have an influence, in the short term, on the recovery of functional status in the activities of daily living (ADLs) and in walking ability in elderly people with hip fractures, and to study the role played by cognitive impairment.

Methods

This was a prospective cohort study that included patients older than 65 with a low-impact hip fracture admitted to the Orthogeriatrics unit of the Hospital San Juan de Dios, Pamplona, between March 2008 and December 2012. Physical rehabilitation is begun in the hospital gymnasium and comprises exercises to strengthen the lower limbs, balance exercises, and ambulatory reeducation exercises. It is carried out during the mornings, 45 minutes a day, 5 days a week (Monday to Friday). A total of 314 patients were included after ruling out patients who were completely dependent for ADLs (Barthel index score <20) and those who were unable to walk (Functional Ambulation Categories [FAC] ≤2) before the fracture (n = 60), those with pathologic fractures (n = 4), poly-trauma (n = 21), acetabulum fracture (n = 7), fractures 2 cm or lower below the trochanter (n = 14), previous surgery on the same hip (n = 5), and patients who did not undergo surgery (n = 7). This study (19/2013) was approved by the Comité Ético de Investigación Clínica de la Comunidad Foral de Navarra (Clinical Research Ethics Committee of the Province of Navarre), and was designed in accordance with the European Union Guidelines on Good Clinical Practice and the current revision of the Declaration of Helsinki.

We took demographic data (age, sex), usual residence, and pharmacological history from patients' digitalized medical history and previous medical reports. The presence of comorbidities was assessed with the Charlson index, considering scores of 3 or more to be high comorbidity.[13] We recorded the date and kind of fracture, the date of admission to Accident and Emergency and the wait for surgery, the type of operation and complications, as well as the length of patients' stays. The number of rehabilitation sessions and destination on discharge also were registered.

Cognitive Assessment and Functional Recovery

Cognitive assessment was carried out using the Mini Mental State Examination (MMSE), which sets scores between 0 and 30.[14] The MMSE was carried out by a nurse, who had received specific training, during the first 2 weeks after admission to hospital. Patients were classified as having severe cognitive impairment when they had MMSE scores of 0 to 15, mild cognitive impairment with MMSE scores between 16 and 23, and no cognitive impairment with scores 24 or higher.[15,16] Quantification of cognitive impairment was carried out when patients were clinically stable and once absence of delirium was established. On clinical suspicion of delirium, diagnoses were carried out by a geriatrician according to the validated algorithm used in the Confusion Assessment Method,[17] throughout patients' entire stay in hospital (traumatology unit and orthogeriatrics unit).

Functional ability was assessed using the Barthel activity of daily living score (BI),[18] carried out by direct interview (with patients without cognitive impairment) or interviews with carers (in patients with cognitive impairment). The BI sets scores between 0 (completely dependent) and 100 (completely independent). We recorded previous BI scores (15 days before the fracture) on admission (within the first 48 hours since admission) and on discharge (24 hours before discharge). Patients were classified into 4 functional categories depending on their score: totally dependent for BI, lower than 20; severely dependent for BI, 20 to 35; mildly dependent for BI, 40 to 55; and independent for BI, higher than 60. We considered there was a recovery of ADLs when, on discharge, patients achieved the same functional category they had before admission. Other measurements of functional response recorded were functional gain (difference between BI on discharge and on admission) and efficiency (the quotient of functional gain and mean stay).

Ambulation capacity was assessed using the FAC, which classifies patients from 0 (cannot walk) to 5 (an independent ambulator who can walk freely on level surfaces or steps).[19] We considered patients had recovered the ability to walk if at the time of discharge they had an FAC score of 3 or more (dependent ambulator who requires verbal supervision/guarding). To evaluate the functional response to rehabilitation therapy, we considered 3° of recovery: (1) complete, whenever patients achieved their previous functional status in ADLs and their walking ability; (2) partial, if they achieved only 1 of the 2 (functional status or ability to walk); and (3) no recovery, when patients achieved neither.

Statistical Assessment

Baseline characteristics were compared according to cognitive status using the χ^2 test, analysis of variance, Student *t* test, or Kruskal-Wallis method. Univariable analysis was used for the detection of factors associated with functional recovery and, so as to define the various predictive factors, we used multivariable analysis with binary and ordinal logistic regression (corrected for the possible confusing factors obtained in the univariable analysis). *P* values less than .05 were considered significant. All tests were bilateral. The odds ratio (OR) is shown with a 95% confidence interval (CI). Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS), version 21.0 (SPSS, Inc, Chicago, IL).

Results

The patients excluded for being completely dependent in ADLs or for not being able to walk before the fracture were the older group (89.0 ± 5.2 years); they presented a higher incidence of severe cognitive impairment (65%), high comorbidity (75%), severe hypoalbuminemia (28% albuminemia <2.5 mg/dL), high levels of institutionalization (61% of discharges to nursing homes), and higher intrahospital mortality (10%) ($P < .05$). Sixteen patients were excluded due to complications that required their being moved to another hospital (of which 2 had mild cognitive impairment, 13 without cognitive impairment, and 1 severe cognitive impairment); 13 patients (4%) died during their stay (1 without cognitive impairment, 10 with mild cognitive impairment, and 2 with severe cognitive impairment) ($P < .003$). The basal characteristics of the population according to their degree of cognitive impairment are shown in Table 1. Their average age was 84.0 ± 6.3 years (ranging between 66 and 99). Patients' average stay was 36 days, with slightly longer stays in the group with severe cognitive impairment ($P = .184$).

Delirium was a frequent complication, present in 40.8% of cases. Patients with delirium were older (87.0 ± 5.2 years) and had higher basal impairment scores (Barthel index median 75, interquartile range [IQR] 60–80); 70% had cognitive impairment, higher comorbidity (54.7%), greater use of neuroleptics (27%), and longer stays (median 42 days) ($P < .05$) than those without delirium. Moreover, 19% of the population had pressure ulcers. The patients with pressure ulcers were older (87.7 ± 5.7 years), had greater comorbidity (59.3%), higher baseline functional impairment (Barthel Index median 75, IQR 55–90), lower albumin concentration (median 2.4 mg/dL, IQR 2.2–2.7 mg/dL) and hemoglobin (median 10.8 mg/dL, IQR 9.8–12.1 mg/dL), longer stays (median 45 days, IQR 32–54), and presenting cognitive impairment in 78% of cases ($P < .05$).