ORIGINAL ARTICLE

Does Rehabilitation Matter in Patients With Femoral Neck Fracture and Cognitive Impairment? A Prospective Study of 246 Patients

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ABSTRACT. Al-Ani AN, Flodin L, Söderqvist A, Ackermann P, Samnegård E, Dalén N, Sääf M, Cederholm T, Hedström M. Does rehabilitation matter in patients with femoral neck fracture and cognitive impairment? A prospective study of 246 patients. Arch Phys Med Rehabil 2010;91:51-7.

Objective: To identify factors associated with preserved walking ability and Katz activities of daily living (ADLs) index at 4-month and 12-month follow-up in cognitively impaired patients with femoral neck fracture.

Design: Population-based cohort study.

Setting: A multicenter study of the Stockholm Hip Fracture Group including 4 university hospitals.

Participants: Consecutive patients (N=246) with femoral neck fracture, older than 65 years (mean, 84y; 72% women) with cognitive impairment (known dementia or low [0–2 points] score) in Short Portable Mental Status Questionnaire [0–10 points]) and able to walk before the fracture.

Interventions: Not applicable.

Main Outcome Measure: Walking ability and ADLs index at 4-month and 12-month follow-up.

Results: Significant predictors of preserved walking ability at 12-month follow-up were discharge to rehabilitation unit (odds ratio [OR]=2.83; confidence interval [CI], 1.1–7.26; *P*=.03) and walking ability before the fracture (OR=8.98; CI, 3.52–22.93; *P*<.001), while type of surgery was not (*P*=.197). Analyses were adjusted for age, sex, American Society of Anesthesiologists score, fracture type, and surgical method. Corresponding predictors of preserved Katz ADLs index at 12-month follow-up, after adjustment for age and sex, were discharge to rehabilitation unit (OR=5.33; CI, 1.44–19.65;

P=.012) and ADLs index before fracture (OR=2.51; CI, 1.8–3.5; *P*<.001), while type of surgery was not (*P*=.376).

Conclusions: Discharge to rehabilitation unit, a factor we can influence, was associated with preserved walking ability and ADLs index in cognitively impaired patients with hip fracture.

Key Words: Activities of daily living; Dementia; Hip fractures; Rehabilitation; Walking.

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PATIENTS WITH COGNITIVE impairment have a higher rate of falls and fractures.[1-3] As the number of elderly increases worldwide, the number of patients with impaired cognitive function will also increase.[4] Previous studies have shown that impaired cognitive function is an important predictor of poor prognosis after hip fracture regarding walking ability, ADLs, and return to independent living.[5-7] However, a few recent studies have reported that cognitive impairment per se does not significantly affect the functional gain in elderly patients with hip fracture if they were referred to rehabilitation.[8-10] Limitations of these studies include the small number of patients and the short follow-up periods. Others have studied whether the type of surgical procedure affects functional outcome in patients with hip fractures and cognitive impairment.[11,12] Nonetheless, prospective studies investigating other potential predictors of long-term functional outcome in patients with hip fracture and cognitive impairment are lacking.

Our objective was to include a large number of consecutive patients with femoral neck fracture and cognitive impairment in an observational study to find factors associated with preserved walking ability and ADLs index at 4-month and 12-month follow-up.

METHODS

Setting and Study Population

All patients admitted for hip fracture to the 4 university hospitals in Stockholm (Danderyd Hospital, Söder Hospital, Karolinska University Hospital, Huddinge, and Karolinska

List of Abbreviations

ADLs	activities of daily living
ASA	American Society of Anesthesiologists
CI	confidence interval
HA	hemiarthroplasty
MMSE	Mini-Mental State Examination
OR	odds ratio
SPMSQ	Short Portable Mental Status Questionnaire

University Hospital, Solna) during 1 year (2003) were consecutively included in the Stockholm Hip Fracture Group study (n=2213). Patients older than 65 years with nondisplaced Garden I to II or displaced Garden III to IV femoral neck fractures,[13] cognitive impairment defined as previously diagnosed dementia or low score—that is, 0 to 2 points according to the SPMSQ (see procedures below)[14]—and who were able to walk were considered for the study. A total of 246 patients met these criteria. The study was performed in accordance with the Helsinki declaration,[15] and protocols were approved by the local ethics committee.

Procedures

All assessments, except the ASA classification[16] and fracture classification, were carried out by specially trained research nurses. The following variables were recorded at inclusion: age, sex, prior diagnosis of dementia, ASA score, and number of medical diagnoses. Living situation, walking ability, and ADLs status during the last week before fracture were assessed by proxy—that is, from close relatives or caregivers.[17] We also recorded whether patients were discharged to rehabilitation units. Living situation was recorded as either independent (own home or service apartment) or institutionalized (nursing home or residential care home). Walking ability was recorded as able to walk outdoors, only indoors, or unable to walk. ASA score[16] was assessed by the attending anesthesiologist. ASA score classifies the physical status of patients into 5 categories ranging from 1 (healthy) to 5 (moribund). ADLs status was assessed according to the Katz index[18]—that is, independence or dependence in bathing, dressing, going to the toilet, transferring, continence, and feeding. ADLs index A indicates independence in all 6 functions, while index B indicates independence in all but 1 of the 6 functions. Indexes C through G indicate dependence in bathing and at least 1 other function.

A total of 963 patients sustained femoral neck fractures. The SPMSQ was used to assess 803 patients; 85 patients had already been diagnosed with dementia and were included in the current study without an SPMSQ assessment. The remaining 75 patients (8%) were not assessed by SPMSQ and were not included in this study (missing). The SPMSQ is a 10-item questionnaire that assesses the patient's cognitive function. It has good validity and reliability, and it is easy and quick to administer.[19] The SPMSQ classified the patients as having severe cognitive impairment with 0 to 2 correct answers (n=178), moderate cognitive impairment for 3 to 5 correct answers (n=111), mild cognitive impairment for 6 to 7 correct answers (n=119), and intact cognitive function for 8 to 10 correct answers (n=395).

Hip fractures were classified by orthopedists with extensive surgical experience in hip fractures. During the primary hospital stay, treatment modality, number of deaths prior to discharge, and postoperative complications were recorded. Three treatment modalities were used at the 4 hospitals: internal fixation using 2 cannulated screws,[a] uncemented HA using Austin Moore implant, and cemented HA. HA was carried out using either an anterolateral approach or posterior approach, depending on the preference of the surgeon.

Patient Care

The 4 hospitals had in general the same care program. All patients received some physiotherapy directly after operation until discharge—that is, patients were encouraged to stand up on the first postoperative day. In the next few days, patients were assisted by physiotherapists to take a few steps using a walking table and with personal support when necessary. The decision to transfer patients to rehabilitation units was made by the attending physician in cooperation with the ward staff—for example, nurses and physiotherapists. A general routine of all 4 participating hospitals was that patients that were admitted from institutions—that is, nursing homes and residential care homes—would be discharged back to the institution as soon as they were medically stable.

Residential care provided by the communities is governed by another legislation act, the Social Services Act, in contrast with health care, including rehabilitation, that is provided by the County Councils (Health and Medical Services Act). In general, physiotherapists are few in community-provided care, and they are seldom involved in the caretaking of the residents. On the other hand, there are various rehabilitation units for old adults. Most of them are run by or in agreement with the Stockholm County Council. The County Councils are responsible for health care, including rehabilitation for all inhabitants. Physiotherapists and occupational therapists are involved in daily rehabilitation activities of patients referred to such units. The main goal for rehabilitation is to restore patients' walking ability in order to allow patients to return to their previous living condition.

Follow-Up

Patients were followed up at 4 and 12 months via telephone interviews with the proxy. All patients reporting problems were scheduled for a recheck, including radiographic studies. Date of death was registered when appropriate. Walking ability, ADLs index, healing complications, reoperation, general major complications (pneumonia, heart failure, myocardial infarction, pulmonary embolism, renal failure, cerebrovascular accident, gastrointestinal bleeding), and place of residence were recorded. Walking ability (outdoors, indoors, or unable to walk) at 4-month and 12-month follow-ups was compared with walking ability at admission and categorized as "preserved walking ability" if no change had occurred. ADLs index at follow-up was compared with ADLs index at admission and similarly categorized. Length of stay, including stay at the rehabilitation unit, was registered.

Statistical Methods

We used SPSS 16.0 for Windows[b] as statistical software. Normally distributed independent variables were tested for differences using the Student t test. We used the Kruskal-Wallis test to compare nonparametric variables. Contingency tables were tested for differences with the chi-square test. The Pearson chi-square exact test was used if some cells in contingency tables had fewer than 5 expected counts. We used logistic regression analysis[20] to adjust dichotomous variables. A P value less than .05 was considered statistically significant.

Multivariate Analysis

Stepwise multiple logistic regression analyses were performed to investigate which factors could predict walking ability, ADLs index, and discharge to rehabilitation. Independent variables were age, sex, ASA score, number of comorbidities, walking ability before fracture, ADLs index before fracture, type of fracture, surgical method, discharge to rehabilitation units, living situation, major complications, and reoperation. Significant variables were kept in the models, while factors previously shown to be important independent predictors of the tested outcome were used for adjustment if they did not jeopardize the prediction ability of the model.