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Dementia does not significantly affect complications and functional gain in elderly patients operated on for intracapsular hip fracture

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Abstract Fifty-three elderly patients with intracapsular hip fracture were hospitalized in the Department of Orthopaedics. Forty-two underwent operations: 38 hemiarthroplasty; 2 total hip replacements and 2 closed reduction interior fixation. They were followed up and assessed prospectively five times for 6 months post-fracture. Cognition was evaluated by the Mini-Mental State Examination. Pre-fracture functioning was determined by the Functional Independence Measure (FIM) and the Katz index of activities of daily living (ADL). The functional outcome was assessed by the FIM gain defined as the difference between FIM scores at 6 months and just prior to discharge. FIM gain, length of stay, complications and mortality rates were not significantly different between three cognitive groups: normal, moderately and severely demented patients. The majority of patients were independent and partially dependent in their ADL. We conclude that dementia does not significantly affect complications and functional gain in elderly patients operated on for intracapsular hip fracture if they were mobile before the fracture.

Introduction

Fractures of the hip remain one of the most common and potentially devastating injuries in the geriatric population [12]. The incidence is rising due to greying of the population and an increase in age-related fractures [19].

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Dementia, mostly Alzheimer's disease, affects 20%–40% of the elderly > 80 years of age [3, 4] and is associated with an increased rate of falls and fractures [1, 16, 18]. As the number of older patients continues to increase, the proportion of demented patients with hip fractures will grow and will require particular consideration. While extracapsular fractures are usually repaired by closed reduction and internal fixation, the approach to an intracapsular fracture remains controversial, especially in demented patients due to high percentages of complications, high mortality and poor recovery of mobility [16, 18]. Only a few investigators have compared functional improvement of demented and normal patients with a hip fracture during the rehabilitation period [6, 8].

Our main objective was to compare the functional gain and length of stay, complications and mortality during rehabilitation and 6 months post-intracapsular hip fracture in demented and normal elderly patients.

Patients and methods

From June 1996 to March 1998, 153 patients admitted for a hip fracture to the Department of Orthopaedics, Rabin Medical Center, Golda Campus, Petach Tikvah, Israel, were followed up at the Beit Rivka Geriatric Rehabilitation Hospital. A minority of patients were followed up at home or a nursing home. The only exclusion criteria were: age <65 years, multiple trauma such as vehicle accidents, and imminent death due to end-stage disease.

There were intertrochanteric, intracapsular and subtrochanteric hip fractures in 91 (59.5%), 53 (34.5%) and 9 (5.9%) patients, respectively. All patients were prospectively evaluated 5 times: (a) during the first days of hospitalisation; (b) just prior to discharge from the Department of Orthopaedics or immediately after transfer to the rehabilitation hospital; (c) after 1, 3 and 6 months following the beginning of the rehabilitation or discharge from the department.

On admission, data were collected regarding age, sex, chronic medical conditions, type of fracture, cognitive and pre-hospital functional status. Patients expected to improve within several weeks or months were transferred to the geriatric rehabilitation hospital. Those who improved quickly were sent for further physical intensive home care. Others went either to a nursing home or received home care.

The Functional Independence Measure (FIM) [7] was used to assess each patient's level of performance. The FIM was divided

into: (1) FIM-A (self care; feeding, grooming, bathing, dressing upper and lower body, going to the toilet and sphincter control) and (2) FIM-B (mobility and locomotion; bed/chair/wheelchair transfer; toilet/tub/shower transfer, walking and climbing stairs).

Ratings for individual items ranged from 1 (total assistance) to 7 (complete independence). For patients at home or living in a nursing home, the FIM assessment was done by telephone interview with both the patient and his family or caregivers. Thus, each patient had 5 FIM-A and 5 FIM-B scores (ranging from FIM-A1 or FIM-B1 to FIM-A5 or FIM-B5) and 2 FIM gain (the difference in the FIM-A and FIM-B scores prior to discharge from the department and at 6 months post-fracture).

We used the Katz index of ADL [9,10] to categorize the patients into 3 pre-fracture functional groups: independent, partially dependent and fully dependent patients if they received 10–12, 6–9 and 0–5 points of 12, respectively. This simple scale has 6 items, from 0 (total assistance) through 1 (partial assistance) to 2 (complete independence).

The Mini-Mental State Examination [5] was used to assess cognitive levels. Each patient was assessed during the first days of hospitalisation and reassessed prior to home discharge or transfer to the geriatric rehabilitation hospital, with the higher score being recorded. The patients were classified into two cognitive groups: demented if they received 17 points or less out of 30 and non-demented if they received more than 18 points. We expanded the classification into three cognitive groups: severely demented, moderately demented and normal, if they received less than 13, 15–23 and more than 24 points out of 30, respectively.

Complications encountered were: sepsis, pneumonia, urinary tract infection, wound infection, cardiac problems (myocardial infarction and arrhythmia), pulmonary embolism, severe delirium, cerebral vascular accident, pressure sores, prosthesis dislocation and others.

The length of stay in the Department of Orthopaedics and the geriatric rehabilitation hospital were calculated. Statistical analysis was done using the chi-square test for categorical variables such as complications and death and by one-way ANOVA or *t*-test for continuous variables such as FIM score, Mini-Mental Examination score and length of stay. The Pearson correlation test was used to examine the relationship between the variables and FIM gain.

Results

Fifty-three patients had an intracapsular fracture: 42 were operated on, while the other 11 were not due to medical contraindications and a very poor pre-fracture functioning level. Thirty-eight patients underwent hemiarthroplasty: Austin Moor, bipolar and Thompson prosthesis in 21, 13 and 4 cases, respectively. Two patients had closed reduction interior fixation and 2, total hip replacements. The age range of the operated patients was 65–96 years, mean age 79.6 years, and the median was 82 years. There were 30 (71%) women and 12 (29%) men.

The cognitive and functional groups, age ranges and discharge from the Department of Orthopaedics are summarized in Table 1. Chronic medical conditions are summarized in Table 2.

Fourteen (33%) operated and five (45%) non-operated patients suffered complications ($p = 0.4$). In the operated group, the complications included prosthesis dislocation (4), urinary tract infection (6), pneumonia (3), sepsis (3), cardiac problem, cerebrovascular event, severe delirium and wound infection (1 each).

No significant differences in complications were found between the three cognitive groups: 3 (37%), 6 (54%), 5 (28%) within the severely demented, moderately demented and normal patients, respectively. Five patients died, 3 in the Department of Orthopaedics and 2 in the geriatric rehabilitation hospital. There were no differences in mortality among the cognitive groups, and no differences were found when complications and mortality were analysed in the original two cognitive groups.

The mean length of stay (LOS) in the Department of Orthopaedics was 16.4 ± 10.4 days, versus 48±31.8 days in the geriatric rehabilitation hospital. No significant differences in LOS were found between the pre-fracture functional groups, in either the Department of Orthopaedics or in the rehabilitation hospital.

The severely demented patients had a borderline longer LOS in the Department of Orthopaedics: 23.7 ± 11.5 days compared with 13.2 ± 2.7 and 15.4 ± 11.4 days, respec-

Table 1 Epidemiological characteristics (*ADL* activities of daily living) ($n = 42$)

Variables	No. of patients (%)
Age (years)	
65–74	13 (31%)
75–84	16 (38%)
≥ 85	13 (31%)
Pre-fracture functional groups (Katz Index of ADL)	
Fully dependent (0–5)	2 (5%)
Partially dependent (6–9)	10 (24%)
Independent (10–12)	30 (71%)
Cognitive groups (Mini-Mental State Examination)	
Demented (≤ 17)	9 (21%)
Normal-mild dementia (≥ 18)	33 (79%)
Severely demented (≤ 14)	8 (19%)
Moderately demented (15–23)	11 (26%)
Normal (≥ 24)	23 (55%)
Discharge	
Rehabilitation	29 (69%)
Home	6 (14%)
Nursing Home	3 (7%)
Death	4 (10%)

Table 2 Chronic medical conditions ($n = 42$)

Condition	No. of patients (%)
Ischaemic heart disease	14 (33%)
Diabetes	13 (31%)
Hypertension	11 (26%)
Chronic obstructive pulmonary disorder	6 (14%)
Congestive heart failure	4 (10%)
Chronic renal failure	3 (7%)
Cardiac arrhythmia	2 (5%)
Cancer	1 (2%)
Other	26 (62%)
Two or fewer diseases	29 (69%)
Three or more diseases	13 (31%)

tively for the moderately demented and normal patients ($p = 0.07$). No differences were found in LOS of the three cognitive groups in the rehabilitation hospital.

We compared the FIM-A (self care) and FIM-B (mobility/locomotion) gains in the different cognitive groups. The mean FIM-A gain was 10.4 ± 7.2 points, but no significant differences were found. The mean FIM-B gain was 8.2 ± 5.6 points. Again, no significant difference was found between the cognitive groups, although there was a trend towards a higher functional gain in the moderately demented and normal patients: 9.7 ± 5.3 and 8.7 ± 5.7 points, respectively, compared with the severely demented patients, 4.2 ± 4.7 points ($p = 0.1$).

No correlation was found between age, sex, Katz and the Mini-Mental Examination Scores, and the FIM-A or FIM-B gains.

Discussion

For most patients with hip fractures, the primary goal of treatment is the return to their pre-fracture functional level, which is best accomplished with surgery followed by early mobilisation [23]. Despite advances in anaesthesia, nursing care and surgical techniques, the outcome of treatment is often poor, and hip fractures remain a significant source of morbidity and mortality [14].

Our study shows mainly the same functional gain (self-care and motor), mortality and complication rate in demented and cognitively normal elderly patients with an intracapsular hip fracture. Other authors have shown a higher rate of mortality and complications in demented patients with an intracapsular hip fracture, in particular [20, 21], and in demented hip fracture patients in general [11, 13].

These studies, contrary to ours, describe hundreds of patients followed up for years and thus have a higher commutative number of complications and deaths. There can also be some bias in our mortality and complication results since we did not operate on 21% of the intracapsular hip-fractured patients whose medical and functioning levels were very low pre-fracture.

It is thought that the absence of dementia and postoperative confusion are associated with recovery of walking [14, 22], but the rehabilitation outcome of cognitively impaired patients measured by a precise instrument such as the FIM [7] was poorly investigated.

Goldstein et al. [6] found that patients with a hip fracture who were cognitively impaired could achieve positive outcomes as defined by functional improvement and discharge destination. Heruti et al. [8] found that impaired cognitive status upon admission lowered the rehabilitation outcome of elderly hip-fractured patients, although absolute motor gain appeared to be independent of cognitive status. Diamond et al. [2] reported that orthopaedic and neurological patients who were cognitively impaired geriatric rehabilitation patients evidenced an intervention response (change in FIM) comparable with cognitively unimpaired patients.

The current study supports these favourable results in demented patients and highlights the potential functional gain in demented intracapsular hip-fractured patients in whom rehabilitation is more demanding and additional cooperation is needed. Moreover, 90% of the patients had hemiarthroplasty, a major operation with more complications than closed reduction internal fixation.

Although almost half of the patients were demented, 95% were partially dependent and independent, indicating that they were not in a very advanced state of dementia and therefore could achieve the same functional gain as the non-demented patients through the postoperative rehabilitation period.

A similar point of view is presented by Marottoli et al. [15], who followed 120 elderly hip-fractured patients previously living in the community and found that only the premorbid physical and mental function predicted their physical function 6 months post-fracture.

We used the Mini-Mental State Examination [5] which can fail to identify mild cognitive impairment [17] but on the other hand is a brief and simple tool which permitted us to classify the patients in three cognitive groups and thereby minimize its false-positive and -negative results.

Although the number of patients included in the present study was limited, they were not selected. We included the majority of hospitalized hip-fracture cases during a given period of time. Thus, the results illustrate the functional outcome in self-care and motor area of a heterogeneous functional and cognitive cohort.

We conclude that dementia does not significantly affect LOS, complications and functional gain of elderly patients operated on for intracapsular hip fracture if they were mobile prior to the fracture. We argue for surgical approaches and hemiarthroplasty in partially dependent, demented, intracapsular hip-fractured patients, followed by adequate rehabilitation.

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