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Comparison of mortality rate between patient with or without dementia following geriatric hip fracture surgery

Mehmet Ekinci, Mehmet Ersin, Erol Gunen, Murat Yilmaz

Haseki Education and Research Hospital, Department of Orthopaedics and Traumatology, Istanbul, Turkey

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Abstract

The aim of our study is to analyze the effect of dementia on postoperative survival in first month (early mortality), six months, first year and overall period following hip fracture surgery. This retrospective study analyzed 581 elderly patients with surgically treated hip fracture in a single Level 1 trauma center between January 2012 and January 2020. Patients were divided into two groups according to dementia. The demographic data of the patients and the survival curves of the two patient groups were compared. Mean age of all patients was 82.61±8.1 years. Seventy-nine patients (13.6%) had dementia. Mean age of the patients with dementia (PD) was 84.9±6.75 years. The average survival time of all patients was 28.64±26.3 months. The overall mortality rate was 11% (62/581) for the first month, 26% (153/581) for six month and 34% (200/581) for one-year following hip fracture surgery. The mortality rate of the PD for the first month, six month and one year was 10%, 33% and 53%, respectively. The first month and six-month survival of two patient groups were statistically similar (p:0.896 and p:0.157, respectively). But, the PD had significantly poorer survival following hip fracture surgery at one year and overall follow-up period (p<0.001 and p<0.001; respectively). It was found that the first and six-month survival of patients with dementia following osteoporotic hip fracture surgery were similar to the patients without dementia, but dementia patients had statistically significant higher one-year and overall mortality rate following osteoporotic hip fracture surgery than patients without dementia.

Keywords: Hip fracture, geriatric patients, dementia, survival, prognostic factors

Introduction

Hip fractures are one of the common fractures requiring surgical treatment in elderly population [1-3]. These fractures are also associated with higher morbidity and mortality rate, complications, financial cost for health-care systems [2,4-7].

As well as the incidence of hip fractures is high in elderly population, dementia risk increases with age, from 3.0% to 47.2% in patients aged over 85 years [8]. Patients with dementia (PD) are more prone to suffer hip fracture than others in elderly population because of impaired perception of safety, movement disorders and 2-3 times higher risk of falling [9,10].

There are conflicted results of the impact of dementia on survival following hip fracture. While some studies found cognitive disorders were associated with poorer outcome after hip fracture [11,12], some studies found no association [13-14]. The aim of our study was to compare the postoperative survival in first month (early mortality), six months, first year and overall period between patients with or without dementia on following hip fracture surgery. We hypothesized that PD had significantly higher mortality rate than patients without dementia.

Materials and Methods

This is an institutional review board approved retrospective study in accordance with the standards of the Declaration of Helsinki. Patients with hip fracture including femoral neck and intertrochanteric femur who were admitted to our hospital between January 2012 and January 2020 were reviewed retrospectively. Patients' survival was assessed according to the National Population Registry, which were checked for all patients in January 2021. The written informed consent was obtained from all the patients.

***Corresponding Author:** Mehmet Ekinci, Haseki Education and Research Hospital, Department of Orthopaedics and Traumatology, Istanbul, Turkey
E-mail: dr.ekincimehmet@gmail.com

Inclusion criterias were patients aged more than 65 years, low-energy (osteoporotic) hip fractures, acute fracture (within 14 day) and complete data of medical records.

Exclusion criterias were patients with pathological femoral fracture, subtrochanteric fracture, neglected fracture (more than 2 weeks), high energy trauma and lack of registry data.

All the patients were admitted and treated at a single level 1 trauma center. Patients diagnosed with intertrochanteric fracture (ITFF) were treated with intramedullary nail (IMN), hemiarthroplasty (HA) or dynamic hip screw (DHS). Patients with femoral neck fracture (FNF) were treated with total hip arthroplasty (THA) for active patients aged between 65-75 years in a good health status. If the patient had a lot of comorbidities and low health status, HA was used as a treatment method. HA was performed with bone cement. All the patients were operated as soon as possible to provide early mobilization following the fracture.

The demographic data of the patients (age, gender, type and side of the fracture), implant type, admission to intensive care unit (ICU), type of anesthesia, preoperative and postoperative hospital stay until discharge was noted. Preoperative ASA classification system was used to determine the preoperative health status of the patients. ASA scoring was performed by the anesthesiologists' preoperative evaluation and classified as low (ASA 1-2) and high (ASA 3-4).

The dementia status of the patients was obtained from the registry system of our hospital (patients records, consultation reports of the patients and therapy applied to the patients).

The primary outcome was survival of the patient, determined as the time from the surgery to death or the end of the study. Patients were divided into two groups according to dementia (patients with dementia/patients without dementia). The patients' survivals were compared between these two groups according to survival time: at the first month, six months, first year, and overall survival. Demographic data were also analyzed for validity as prognostic factors for each group.

Statistical analysis was performed using the SPSS (Statistical Package for Social Sciences for Microsoft, version 22.0, SPSS Inc., Chicago, IL, USA) statistics software program. Descriptive statistical methods (mean, standard deviation, median, frequency, ratio, minimum, and maximum) were used to evaluate the study data. Kaplan-Meier survival analysis was used to evaluate the survival of the patients. We analyzed the effect of dementia in first, 6, 12 months and overall survival, adjusting for covariates including demographic factors (age, gender), disease characteristics (fracture site, surgery type), ASA score, and medical treatment data (time-to-surgery, hospital stay). Furthermore, log rank test was used for comparison of survival curves. A p value <0.05 was accepted as statistically significant.

Results

Five hundred and ninety-nine patients were treated in our institution with the diagnosis of hip fracture during the study period. Eighteen patients were excluded from the study because of the missing data. Finally, 581 patients were included in the study. Mean age of all patients was 82.61±8.1 years. Two hundred and one patients (34.6%) were male, 380(65.4%) patients were female. Three hundred and fifty patients suffered intertrochanteric femoral fracture, while 231 patients were diagnosed femoral neck fracture. Two hundred and thirteen patients were treated using intramedullary nailing, 242 patients were operated using cemented hemiarthroplasty, 106 patients were operated using dynamic hip screw (DHS) and 20 patients were performed total hip arthroplasty (THA). There was no difference between the groups(p:0.46) (Table 1).

Table 1. Demographic data of all patients

	Patients with hip fracture aged more than 65 years
Age, years (Mean±SD, Min-Max)	82.6 ± 8.1 (65-104)
Gender, Female/Male	380/201
Side, Right/Left	301/280
Fracture type Int/C	350/231
Treatment method IMN/HA/DHS/THA	213/242/106/20
Mortality	
In First Months, n (%)	62 (10.7%)
In Six Months, n (%)	153 (26.3%)
In First Years, n (%)	200 (34.4%)
Overall, n (%)	402 (69.2%)
Survive, months (Mean±SD, Min-Max)	28.64 ± 26.3 (0.03-113.4)
Type of anesthesia G, R	90/491
ASA Score	
Low (1-2), n (%)	339 (58.3%)
High (3-4), n (%)	242 (41.7%)
Age groups of patients (years)	
65-74.9	98(16.9%)
75-84.9	258(44.4%)
>85	225(38.7%)
Dementia(yes/no)	79/502(13.6%/86.4%)
Time to surgery (days)	5.85±3.54(1-20)
Hospital stays (days)	12.1±7.5(2-74)

SD: Standard deviation; Min: Minimum; Max: Maximum; Int: Intertrochanteric fracture; C: Collum fracture, IMN: Intramedullary nailing, HA: Hemiarthroplasty, THA: Total Hip Arthroplasty, G: General, L: Regional

Seventy-nine patients (%13.6) had dementia. Mean age of the PD was 84.9±6.75 years.

The average survival time of all patients was 28.64±26.3 months. The overall mortality rate was 11% (62/581) for the first month, 26% (153/581) for six month and %34 (200/581) for one-year following hip fracture surgery. The mortality rate of the PD for the first month, six month and one year was 10%, 33% and 53%, respectively (Table 2). The first month and six-month survival of two patient groups were statistically similar (p:0.896 and p:0.157, respectively). But, the PD had significantly poorer survival following hip fracture surgery at one year and overall follow-up period (p<0.001 and p<0.001; respectively) (Figure 1).

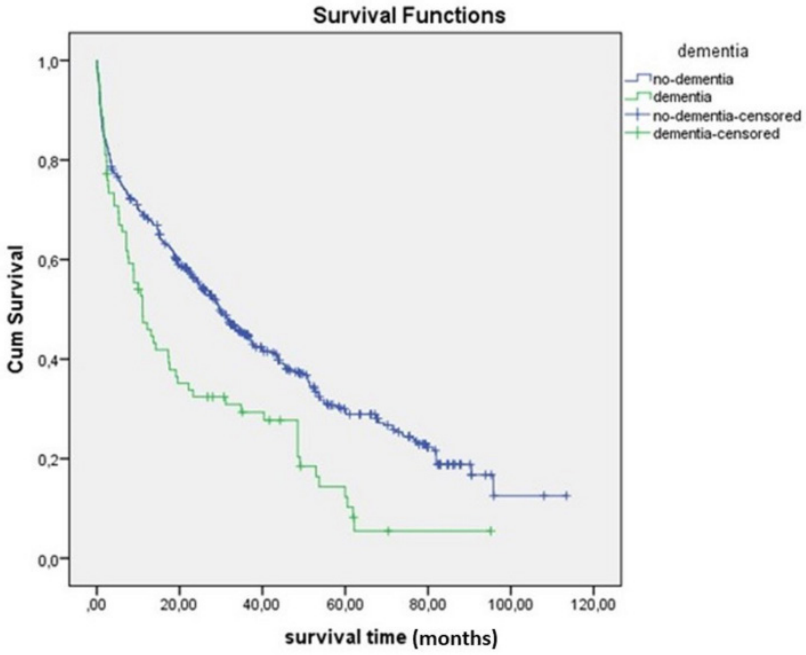

Figure 1. Comparison of survival curves of both patients with dementia and patients without dementia

Table 2. Baseline characteristics of patients according to dementia

	Dementia	No dementia	
Number of the patients	79(13.6%)	502(86.4%)	
Age, years	84.87±6.75	82.26±6.75	p:0.008
Gender, Female/Male	53/26	327/175	p:0.735
Side, Right/Left	30/49	271/231	p:0.008
Fracture type Int/C	44/35	306/196	p:0.375
Treatment method IMN/HA/DHS/THA	27/39/11/2	186/203/95/18	p:0.455
Mortality			
In First Months, n (%)	8(10.1%)	54(11%)	p:0.896
In Six Months, n (%)	26(32.9%)	127(25.3%)	p:0.157
In First Years, n (%)	42(53.2%)	158(31.5%)	p<0.001
Overall, n (%)	66(83.5%)	336(67%)	p<0.001
Survive, months	20.07±21.82	30±26.71	
Type of anesthesia G, R	70/9	81/421	p:0.279
ASA Score			
Low (1-2), n (%)	38(48.1%)	301(60%)	
High (3-4), n (%)	41(51.9%)	201(40%)	p:0.047
Time to surgery(days)	5.9±3.4	5.8±3.6	p:0.88
Hospital stays (days)	12.8±10.5	12±6.9	p:0.35

SD: Standard deviation; Min: Minimum; Max: Maximum; Int: Intertrochanteric fracture; C: Collum fracture, IMN: Intramedullary nailing, HA: Hemiarthroplasty, THA: Total Hip Arthroplasty, G: General, L: Regional

Discussion

Hip fractures in the elderly are a major health problem with the increasing lifetime period and will be one of the important economic cost for the health systems because of longer hospitalization periods [15-17]. PD are more challenging to follow the rehabilitation and mobilization protocols. They also have less activity, poor self-care status and nutrition. So, they may be more prone to have postoperative complications following hip fracture surgery [18]. In the present study, PD are found to have significantly poorer one year and overall survival rate following hip fracture surgery. However, the first month and six-month mortality were similar for

both patient groups.

High mortality rates of the patients with osteoporotic hip fracture are well-known data [19-20]. Also, cognitive disorders, such as dementia and Parkinson disease, are shown to be a risk factor for poorer survival rates in the literature [21-24]. Tolppanen et al. [25] reviewed relatively high patients' cohort with hip fracture and showed that 49.6 of PD died following surgery and PD had significantly higher risk for mortality. Herskovitz et al. [26] analyzed 376 patients with hip fracture and declared that dementia was one of the independent predictors of mortality in this group. In the present study, we found that PD had poorer one year and overall survival rates while comparing with the patients without cognitive impairment.

In our study, PD had statistically significant more patients with high ASA scores. The prospective study of Paksima et al. [27] declared that high ASA class was significantly related to higher mortality rates. Richmond et al. [28] found the patients with ASA class 3 and 4 had significantly poorer postoperative survival after hip fracture surgery. We believe that PD might tend to have higher ASA score so that having high ASA score could be one of the factors to explain for their worse survival rates.

Main findings of our study that differs from other studies are those survivals of the PD and those without were not statistically different on first and sixth month following osteoporotic hip fracture surgery. Bai et al. [29] and Jantzen et al. [24] reported PD had higher mortality rate in the first month following hip fracture surgery. As well as Bai et al. [29], Holmes et al. [30] and Hannan et al. [31] showed PD had significantly poorer six-month survival rate following hip fracture surgery. On the contrary, first- and six-month mortality for PD was 10% and 33%, while it was 11% and 25.3% for patients without dementia, and the survivals for both patient groups were statistically similar. This data of our study was different from the general knowledge of the literature. We believe that good-nursing services and well-care of the patients with hip fracture in our institution might have provided these results.

Our study has several limitations. Firstly, this is a retrospective study. Secondly, the patients did not undergo routine examination of cognitive disorders. Therefore, we could not classify the severity of the dementia and low grade, or undiagnosed cognitive disorders might be overlooked. Thirdly, our study has a low number of patients. Multi-centric, prospective studies with many patients are needed.

As a conclusion, the incidence of dementia and hip fractures will gradually increase as the life expectancy increases. In our study, it was found that the first and six-month survival of patients with dementia following osteoporotic hip fracture surgery were like patients without dementia, but dementia patients had statistically significant higher one-year and overall mortality rate following osteoporotic hip fracture surgery than patients without dementia.

Conflict of interests
The authors declare that they have no conflict of interests.

Financial Disclosure
All authors declare no financial support.

Ethical approval
This is an institutional review board approved retrospective study in accordance with the standards of the Declaration of Helsinki (Number: 2020-221).

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