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Research

Hemiarthroplasty or Internal Fixation in Intertrochanteric Fractures? Let's Ask the Caregivers

İntertrokanterik Kırıklarda Hemiartroplasti mi Yoksa İnternal Tespit mi? Bakıcılara Soralım

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ABSTRACT

Objective: Intertrochanteric femur fractures (ITFs) in the elderly are most often treated with internal fixation or hemiarthroplasty. The contribution of caregivers in the recovery process of these patients is also important. Previous studies have generally examined these two treatment options on the basis of their functional results in patients. This study aimed to compare the two procedures in terms of their effects on patients' caregivers.

Methods: This prospective study included caregivers of patients with ITFs between May 2021 and April 2022. Caregivers were categorized into two groups according to the received treatment: those who underwent hemiarthroplasty and those who received internal fixation. The Zarit Caregiving Burden Interview (ZBI) was used to evaluate and compare the burden score of the caregivers between groups at the beginning and end of the study.

Results: Caregivers of 120 patients who underwent hemiarthroplasty (60) and internal fixation (60) were included in the study. The time to the first mobilization of the hemiarthroplasty group was significantly shorter than that of the internal fixation ($p<0.001$). Caregivers in both groups had a significant increase in ZBI values at 6-month follow-up visits ($p<0.01$) There was no statistically significant difference between the pre-operative and postoperative 6th month scores and the amount of increase between groups ($p=0.178$, 0.629, 0.372, respectively).

Conclusion: Compared with the pre-operative period, caregiver burden increased significantly in both groups, but there was no significant difference between the changes in caregiver burden. The type of surgery performed has no impact on caregiver burden.

Keywords: Hemiarthroplasty, internal fixation, caregiver, Zarit Burden Interview

ÖZ

Amaç: Yaşlılarda intertrokanterik femur (İTF) kırıkları çoğunlukla internal fiksasyon veya hemiartroplasti ile tedavi edilir. Bu hastaların iyileşme sürecinde bakım verenlerin katkısı da önemlidir. Önceki çalışmalarda genellikle bu iki tedavi seçeneği hastalardaki fonksiyonel sonuçlara göre incelenmiştir. Bu çalışma, iki prosedürü hastaların bakım verenleri üzerindeki etkileri açısından karşılaştırmayı amaçlamaktadır.

Gereç ve Yöntem: Bu prospektif çalışma, Mayıs 2021 ile Nisan 2022 arasında İTF kırığı olan hastaların bakım verenlerini içermektedir. Bakım verenler uygulanan tedaviye göre hemiartroplasti ve internal fiksasyon yapılanlar olarak iki gruba ayrıldı. Bakım verenlerin çalışmanın başında ve sonunda gruplar arasında yük puanlarını değerlendirmek ve karşılaştırmak için Zarit Bakım Verici Yükü (ZBVY) ölçeği kullanılmıştır.

Bulgular: Çalışmaya hemiartroplasti (60) ve internal tespit (60) uygulanan 120 hastanın bakım verenleri dahil edildi. Hemiartroplasti grubunda ilk mobilizasyona kadar geçen süre internal fiksasyon uygulanan gruba göre anlamlı olarak daha kısaydı ($p<0,001$). Her iki grupta da bakım verenlerin 6. ay kontrollerinde ZBVY değerlerinde anlamlı artış saptandı ($p<0,01$) Ameliyat öncesi ve sonrası 6. ay puanları ve gruplar arası artış miktarı arasında istatistiksel olarak anlamlı fark yoktu ($p=0,178$, sırasıyla 0,629, 0,372).

Sonuç: Ameliyat öncesi döneme göre her iki grupta da bakım veren yükü anlamlı olarak arttı ancak bakım veren yükündeki değişimler arasında anlamlı bir fark yoktu. Yapılan ameliyatın çeşidinin bakıcı yükü üzerinde etkisi yoktur.

Anahtar Kelimeler: Hemiartroplasti, internal fiksasyon, bakıcı, Zarit Yük görüşmesi

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INTRODUCTION

Intertrochanteric femur fractures (ITFs) are common injuries that cause significant morbidity and mortality in elderly (1). The incidence has increased worldwide as life expectancy increases. Although epidemiologic data vary between countries, it is estimated that hip fractures currently affect approximately 18% of females and 6% of males globally (2). ITFs in the elderly cause physical dysfunction with the loss of independent mobility and place a significant burden on patients and caregivers.

Modern treatment methods aim for rapid mobilization and low complication rates. According to recent reports, there is diversity among orthopedic surgeons concerning the optimal treatment of ITF fractures and the changing trends in management (3). Most patients are treated surgically unless they have comorbidities that preclude surgery or a low life expectancy (4). Surgical procedures for treatment also increase in parallel with the incidence of fractures (5). They can be roughly divided into arthroplasty and internal fixation methods that preserve the hip bone stock; however, there were no significant differences in functional outcome (6). The method to be used depends on the location and type of fracture and surgeon's preference. Proximal femoral nailing (PFN) is the most common internal fixation method. The success of PFN in early weight bearing is lower than that of hemiarthroplasty (1). The postoperative inability to bear weight and therefore immobilization reduces the quality of life of patients in the early postoperative period.

The clinical outcomes and quality of life of the patients during the postoperative period also affect the care processes and the quality of life of caregivers. Many studies have been conducted on the effects of surgical methods on clinical outcomes, but the number of studies examining the effects of these methods on the caregivers of patients is limited. Pre-identifying caregivers who are probably overburdened by patient care and evaluating and preventing problems related to stressful caregiving situations throughout the care process will be helpful in enhancing the quality of caregiving and avoiding the need for a long-term care facility for hip fracture patients (7).

This study aimed to evaluate and compare the effects of internal fixation and hemiarthroplasty on the quality of life of caregivers for treating ITFs in the elderly.

METHODS

This prospective study included caregivers of patients admitted to the emergency department of our hospital with a diagnosis of ITF and operated between May 2021 and April 2022. All participants' consent was obtained. Our study was submitted to the Clinical Research Ethics Committee of University of Health Sciences Türkiye, Trabzon Kanuni Training and Research Hospital and started after approval was obtained (decision no: 2021/74, date: 02.05.2021). To evaluate the burden score of the primary caregiver at the beginning and end of the study period and its association with the surgical intervention method, a prospective cohort study was conducted using a questionnaire. A total of 120 patient caregivers were enrolled in the study.

Internal fixation or hemiarthroplasty was performed in patients who underwent surgery for hip fracture. PFN was used as the internal fixation method. Postoperatively, patients and participants were followed up for at least 6 months.

Inclusion criteria were as follows: the patient had a family member or a non-family member who was responsible for the patient's care, the patient was not in need of care in the pre-operative period and could mobilize on his/her own, the patient was followed up for at least 6 months post-discharge, while bone union was completed, and the patient was over 60 years of age. Exclusion criteria were the presence of peripheral arterial disease, dementia, neurologic diseases such as Parkinson's disease and rheumatologic diseases, postoperative complications such as delayed union, nonunion, infection, embolism, and termination of follow-up before the 6th month.

In 1985, Zarit et al. (8) developed the Zarit Burden Interview (ZBI) to subjectively assess the level of caregiving burden in chronic diseases. A validity study of the scale in Türkiye was conducted by İnci in 2006. The scale comprises 22 questions and has a Likert-type rating ranging from 0 to 4 on a scale of never, rarely, sometimes, frequently, often, or almost always (9). The evaluation of the ZBI, in which all items are expressed in plain language, is based on the total score. The higher the score, the higher the care burden, and the maximum score is 88. 0-21 is interpreted as little or no burden, 21-40 as mild to moderate burden, 41-60 as moderate to severe burden, and 61-88 as severe burden.

Data Collection

The ZBI form was completed immediately before and six months after surgery. Patients were divided into two groups: those who underwent internal fixation and those who underwent hemiarthroplasty. The age, gender, educational level of the caregiver, duration of care (years), number of hours spent together per day, presence of any diagnosed physical or psychological illness, age, gender, educational level, and immobilization time until the first partial weight bearing after surgery of the care recipient were recorded

using a sociodemographic data form. The groups were compared before and six months after surgery, and comparisons between groups were also made.

Statistical Analysis

This article's statistical analyses were performed using WisdomEra's statistical tool, Wanalyzer v1.4.53, a data analytics platform using the SciPy v1.2.3 library. SciPy (pronounced "Sigh Pie") is a Python-based ecosystem of open-source software for mathematics, science, and engineering. Using descriptive analysis, the mean, minimum-maximum (min-max), and standard deviation values of the data were obtained. The difference between the two independent groups was examined by applying the t-sample test for normally distributed data. When there was a group that did not show a normal distribution between the groups, the Kruskal-Wallis method was used to test the significance of the difference between the means of three or more groups. This method is the non-parametric equivalent of one-way ANOVA. The normal distribution of the data was evaluated under the condition that the p-value was higher than 0.05. At the same time, a normal distribution range of the data was observed for -1.5/+1.5.

RESULTS

In total, caregivers of 120 patients who underwent 60 (50%) hemiarthroplasty and 60 (50%) internal fixation were included in the study.

Caregiver Characteristics

Of the 120 caregivers [mean age, 49.2 (min: 20, max: 76)], 73 (61%) were female and 47 (39%) were male. Of the caregivers, 47% were adult children of the patients (21% boys, 26% girls), 7% were spouses, and 46% were others. The mean time spent by caregivers for patients was 4.82 months (Table 1).

Patient Characteristics

Of the 120 patients [mean age, 77.45 years (min: 55, max: 97)] included in the analysis, 61.7% were females and 38.3% were males. In the hemiarthroplasty group, the mean age of the 60 patients (34 females and 26 males) was 78.65 years. In the internal fixation group, the mean

Table 1. Demographic data of patients and caregivers

	Patients with hemiarthroplasty	Patients with internal fixation	Total patients
	n (%)	n (%)	n (%)
Patients	60 (50%)	60 (50%)	120 (100%)
Sex			
Male	26 (43%)	20 (33%)	46 (38%)
Female	34 (57%)	40 (67%)	74 (62%)
Age (years)	78.6	76.2	77.4
Time to first mobilization after fracture (days)	2.2 (1-5)	6.5 (3-12)	4.4
Caregivers, sex			
Male	24 (40%)	23 (38%)	47 (39%)
Female	36 (60%)	37 (62%)	73 (61%)
Age (years)	50.1	48.4	49.3
Education level			
Primary school	15 (25%)	12 (20%)	27 (22%)
Secondary school	11 (18%)	10 (17%)	21 (18%)
High school	22 (37%)	28 (47%)	50 (42%)
University	6 (10%)	6 (10%)	12 (10%)
Illiterate	6 (10%)	4 (6%)	10 (8%)
Duration of care (months)	4.73	4.9	4.8
Duration of daily maintenance time (hours)	21.4	20.6	21
Relationship			
Spouse	3 (5%)	5 (9%)	8 (7%)
Son	11 (19%)	14 (23%)	25 (21%)
Daughter	14 (23%)	17 (28%)	31 (26%)
Other	32 (53%)	24 (40%)	56 (46%)

age of the 60 patients (40 men and 20 women) was 76.25 years. No significant difference was found between the groups in terms of patient age (p=0.078). A statistically significant difference was found between the groups in terms of immobilization times until the first partial weight bearing after surgery (p<0.001). The mean immobilization time until the first partial weight bearing after surgery was 2.2 days in the hemiarthroplasty group and 6.5 days in the internal fixation group (Table 1).

Caregiver Burden

In the hemiarthroplasty group, the mean preoperative ZBI value was 25.25 (range, 19-40) and 24.22 (range, 19-40) in the internal fixation group; both groups were not significantly different (p=0.178). The mean ZBI values at 6 months postoperatively were 41.15 (range, 26-58) and 42.25 (range, 10-85) in the hemiarthroplasty and internal fixation groups, respectively. Both groups were not significantly different (p= 0.629) (Table 2).

Caregivers in both groups had a significant increase in ZBI values at the 6-month follow-up visits (p<0.01) (Table 2). The Kruskal-Wallis test was used to test whether there was a statistical difference between the Zarit score increase percentage variables in the hemiarthroplasty and internal fixation groups (p-value: 0.374). No statistically significant difference was found between the groups.

DISCUSSION

The second most common cause of hospital admission in the elderly population is hip fractures (10). Treatment methods for hip fractures vary according to the location of the fracture, age of the patient, and surgeon's preference. Providing care for people with hip fractures is complicated and difficult because patients are often elderly and have comorbidities. The burden assumed by caregivers of patients with hip fracture can negatively affect the caregiver's quality of life, relationships, and decision to care for the patient (7). In this study, we investigated and compared the burden of caregivers in the pre-operative and postoperative periods according to surgical methods in patients who underwent hip hemiarthroplasty and internal fixation surgery after hip fracture. There was no significant difference between the changes in caregiver burden. The type of surgery performed has no impact on caregiver burden.

One month post-operative mortality rate after hip fracture surgery is approximately 10%. In patients surviving for up to 30 days, there is a significant disability risk, which can result in loss of independent mobility. Loss of independence has previously been shown to increase caregiver burden by causing difficulty in activities of daily living (11). A significant group of caregivers of elderly patients with hip fractures experience relational, physical, and mental health problems resulting from intensive caregiving in the first six months (12). There have been many studies comparing internal fixation and hemiarthroplasty as surgical treatment methods for hip fractures in different aspects, but there are no studies on the impact of these methods on the burden of caregivers.

While non-surgical conservative treatment methods are generally preferred in non-displaced fractures and in patients with comorbidities that prevent surgery, hip fractures are mostly treated with surgical methods. Internal fixation is the treatment of choice for patients with non-displaced femoral neck fractures (Garden type I or II). Arthroplasty is generally preferred to internal fixation for treating displaced femoral neck fractures in patients aged 65 years and older. Functional outcome and quality of life were achieved within 1 year after total hip arthroplasty and hemiarthroplasty and were found to be better than internal fixation (13,14). Because the blood supply to the femoral head is usually intact, intertrochanteric hip fractures are primarily stabilized by internal fixation with a sliding hip screw or intramedullary nail (15). Some surgeons also perform hemiarthroplasty for the treatment of intertrochanteric fractures.

The type of surgery performed affects the time required to return to activities of daily living and therefore the quality of life. There are studies showing that patients with fractured femoral neck treated with hip prostheses are superior to those treated with osteosynthesis in terms of quality of life (16,17). Moerman et al. (17) found that patients with hip fractures treated with osteosynthesis had a greater loss in health-related quality of life (HRQoL) in the first three

Table 2. Zarit score change value

	Preoperative Zarit score		6th month Zarit score		Zarit score increase amount			Zarit score increase rates (%)			Total
	Mean	Min-max	Mean	Min-max	Mean	Min-max	p-value	Mean	Min-max	p-value	
Hemiarthroplasty	25.2	19.0-40.0	41.1	26.0-58.0	15.9	2.0-29.0	<0.001	63.9	5.0-126.0	<0.001	60
Internal fixation	24.2	19.0-40.0	42.2	19.0-85.0	18.0	0.0-46.0	<0.001	70.3	0.0-166.0	<0.001	60
Total	24.7	19.0-40.0	41.7	19.0-85.0	16.9	0.0-46.0	<0.001	67.1	0.0-166.0	<0.001	120

Min-max: Minimum-maximum

months compared with those treated with arthroplasty, whereas those who underwent osteosynthesis had a greater improvement in HRQoL between 3 months and 1 year. They found an equal loss of HRQoL between osteosynthesis and prosthesis in the first year (17). Kim et al. (18) investigated reoperation rates, mortality, and changes in walking ability in patients who underwent bipolar hemiarthroplasty and internal fixation after intertrochanteric fracture and showed that hemiarthroplasty was associated with a lower reoperation rate and a lower rate of decreased walking ability compared with internal fixation. Because postoperative loading after arthroplasty may be faster than internal fixation in femoral neck fractures, there are studies supporting the preference of arthroplasty over internal fixation, particularly in people aged 65 years and older (15). It is an advantage for patients to get up and walk early and return to their daily life activities early. In this study, the immobilization time from surgery to the time of the first partial weight bearing was found to be shorter in the hemiarthroplasty group.

In their study, Parry et al. (7) evaluated the caregivers of 29 patients treated for hip fracture with a total follow-up of 6 months. Depressive mood was associated with high caregiver burden. The authors found that 20% of hip fracture caregivers experienced a high degree of burden and had a higher likelihood of considering placing the patient in a long-term care facility. They stated that risk factors for high caregiver burden need to be identified to prevent this (7). Nahm et al. (19) reported that despite hospital costs and all its challenges, caregiving is a positive opportunity for caregivers to spend more time with their loved ones. In contrast, overburdened caregivers have a negative impact on patient recovery (20). Therefore, it can be concluded that caregiver burden is also related to the treatment provided. Considering caregivers of hip fracture patients as part of the treatment during the patient's recovery process and providing education on patient care, transportation, and walking support of patients during their time in hospital can be helpful to reduce caregiver burden. Considering the effect of the surgical method applied on the early walking of the patients, it can be considered that there may be a relationship between the surgical treatment method and the quality of life of the caregivers. Caregivers of elderly patients, those with low pre-fracture functional status, and those with postoperative complications should receive more attention before hospital discharge and more help at home to reduce caregiver burden (21).

The present study had some limitations: the sex, educational level, and relationship with the patients in the caregiver groups were not homogeneous. Patients treated with PFN as an internal fixation method were included in the study, whereas those treated with compression plate and screws, cannulated screws, and dynamic hip screws were not. Another limitation was the short follow-up period of 6 months.

CONCLUSION

In our study, we examined the change in the burden of caregivers of patients with hip fracture treated with two different surgical methods. Patients' postoperative decreased ability to load and walk negatively affects their independent mobility and increases the burden on caregivers to meet their needs. Compared with the pre-operative period, caregiver burden increased significantly in both groups, but there was no significant difference between the changes in caregiver burden. The type of surgery performed has no impact on caregiver burden.

ETHICS

Ethics Committee Approval: Our study was submitted to the Clinical Research Ethics Committee of University of Health Sciences Türkiye, Trabzon Kanuni Training and Research Hospital and started after approval was obtained (decision no: 2021/74, date: 02.05.2021).

Informed Consent: All participants' consent was obtained.

Authorship Contributions

Concept: G.P., Design: G.P., Data Collection or Processing: G.P., O.V., Analysis or Interpretation: G.P., O.V., Literature Search: G.P., O.V., Writing: G.P., O.V.

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