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Comparison of Surgical and Non-Surgical Approaches on Mortality in Hip Fracture Patients

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Abstract

Aim: Hip fractures are a prevalent and severe health issue, especially in the elderly population. The incidence of hip fractures is expected to increase globally, posing a significant public health challenge. Surgical intervention is traditionally the standard treatment, though the effectiveness of surgical versus non-surgical management in reducing mortality remains unclear. This study aimed to evaluate the effects of surgical and non-surgical approaches on one-month and one-year mortality rates in patients with hip fractures.

Materials and Methods: A prospective, single-center study was conducted at Manisa Celal Bayar University Faculty of Medicine Hospital, including 113 patients diagnosed with hip fractures. Patients were classified based on whether they received surgical intervention or not.

Results: The mean age of patients was 67.91±19.95 years, with 63 (55.8%) women. Among the patients, 94 (83.2%) underwent surgery, and 19 (16.8%) did not. The one-month and the one-year mortality rates were 13.3%, and 22.1%, respectively. For surgical patients, one-month and one-year mortality rates were 8.5% and 16%, respectively. In contrast, non-surgical patients had higher mortality rates, with 36.8% one-month and 52.6% one-year mortality. The difference in mortality between surgical and non-surgical patients was statistically significant ($p<0.001$ for both).

Conclusion: Surgical treatment for hip fractures significantly reduces both one-month and one-year mortality compared to non-surgical management. While surgery is beneficial, the decision should be individualized, considering patient comorbidities and overall health. For frail, high-risk patients, non-surgical approaches may be more appropriate. This study emphasizes the importance of timely surgical intervention to improve survival outcomes in hip fracture patients.

Keywords: Hip fractures, surgical approach, non-surgical approach

Introduction

Hip fractures are a significant global health problem that especially affects older adults in their eighties (1). As life expectancy increases world-wide, the incidence of hip fractures is expected to increase in the coming years. The likelihood of suffering a hip fracture increases with age; over the age of 50, the incidence doubles with each passing decade. The increase in the incidence of the disease, along with the aging of the population, has reached widespread, even epidemic proportions, creating a major public health problem. This situation has been called a "massive public health crisis", consuming a large portion of healthcare resources along with a huge burden of suffering for patients and their family members. It is estimated that the incidence of hip fractures world-wide will increase to 6.3 million per year by 2050 (2). Hip fractures have a higher mortality rate in older adults, with a 30-day cumulative mortality rate of 14%. This rate can reach 30% in the first year postoperatively (3,4). Additionally, serious postoperative complications occur in approximately 20% of patients (5,6). Hip fractures have historically been treated with surgery. However, mortality and morbidity outcomes after surgery are poor, especially in elderly patients with certain risk factors (7,8). These risk factors include older age, American Society of Anesthesiologists score greater than 3 or 4, low mobility, and cognitive impairment. In the context of palliative care, non-surgical treatments are increasingly being offered as an alternative to the operative approach in these

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frail geriatric hip fracture patients with very limited life expectancy (9). The incidence of hip fracture is approximately three times higher in women than in men (10). A number of other risk factors, such as a history of previous hip fracture, poor diet, white race, alcohol and caffeine consumption, physical inactivity, tall stature, and visual impairment, play a role in the distribution of specific risk ratios in different subpopulations. A typical fracture occurs in an elderly patient with weakened and osteoporotic bones (90% of hip fractures occur in patients over 65 years of age), following a simple and relatively minor fall (e.g., falling from a bed or chair or from a standing position) (10,11). The management of such fractures depends on the characteristics of the fracture (location, displacement, comminution, and bone quality) and the patient's age and condition (12). However, there is general agreement that hip fractures should be treated surgically, either with internal fixation or endoprosthetic replacement. However, especially in bedridden and nursing patients, no surgical intervention is justified. An increased risk of death after hip fracture surgery has been previously recognized (13-15). A recent large study found that the acute inpatient mortality rate was approximately 3.1% (16). Estimates of mortality in elderly patients 1 year after hip fracture vary between 14% and 36% in different studies (17). Hip fracture mortality has been found to be higher in men than in women (10). Other risk factors for death after hip fracture include severe systemic disease, psychiatric illness, postoperative complications, and residence in a nursing home (18). The aim of this study was to evaluate the effects of surgical repair and non-surgical approaches on one-month and one-year mortality in hip fracture cases.

Materials and Methods

Study Design and Population

This prospective, single-center study was carried out at the Manisa Celal Bayar University Faculty of Medicine Hospital, a tertiary care academic medical center. The research received ethical approval from the Health Sciences Ethics Committee at Manisa Celal Bayar University Faculty of Medicine (desicion number: 20478486/1969, date: 31.08.2023). Informed written consent was obtained from the patients or their immediate family members who volunteered to participate in the study. Patients diagnosed with hip fractures who agreed to participate in the study were included. Unstable patients and those under the age of 18 were excluded from the study. The patients' demographic characteristics, mechanisms and timing of the injury, associated injuries, and fracture types were recorded in the study form. The Injury Severity score (ISS), and the 1-month and 1-year mortality rates were compared between patients based on whether they underwent surgery or not.

Statistical Analysis

Data analyses were conducted using the Statistical Package for the Social Sciences Software (version 26.0). Descriptive statistics, including frequency, percentage, mean, standard deviation (SD), median, minimum, and maximum values, were used to summarize the data. The normality of the data was assessed using the Kolmogorov-Smirnov test. In univariate analysis, continuous variables with a normal distribution were presented as mean ± SD and compared using the t-test. Categorical variables were analyzed using the Pearson chi-square test, while Fisher's exact test was applied when the frequency of categories was less than five. A p value of <0.05 was considered statistically significant.

Results

A total of 113 patients were included in the study, with a mean age of 67.91±19.95, and 63 (55.8%) were women. Upon examining the comorbidities of the patients, hypertension was the most common (58.4%), followed by diabetes mellitus (29.2%). The majority of patients presented to our emergency department due to falls from the ground level (77.9%) and between the hours of 23:00-07:00, (54%). Trochanteric fractures were identified in 62 (54.9%) patients, while femoral neck fractures were identified in 51 (45.1%) patients. A total of 94 (83.2%) patients underwent surgery. The one-month mortality rate was 13.3%, while the one-year mortality rate was 22.1% (Table 1). In the majority of patients (n=94) an isolated hip fracture was detected, while 19 patients (16.8%) had associated injuries. When the associated trauma regions were examined, the most common injury was to the thorax (n=11), followed by head and neck injuries (Table 2). The mean age of 94 (83.2%) patients who underwent surgery and 19 (16.8%) patients who did not undergo surgery was 65.82±20.90 and 78.26±9.25, respectively ($p<0.001$), while the mean ISS score was 10.40±4.24 and 12.32±6.16, respectively ($p=0.210$). When evaluating the one-month and one-year mortalities of patients who underwent surgery and those who did not, the one-month mortality for patients who underwent surgery was 8.5%, and the one-year mortality was 16%, while the one-month mortality for patients who did not undergo surgery was 36.8%, and the one-year mortality was 52.6%. In patients who underwent surgery, both the one-month and one-year mortality rates were significantly lower ($p<0.001$, $p<0.001$, respectively) (Table 3). When evaluating the one-year mortality rates according to the type of fracture, mortality was observed in 17 out of 62 patients (27.4%) with trochanteric fractures, and in 8 out of 51 patients (15.7%) with femoral neck fractures ($p=0.135$).

Table 1. Demographic and clinical data of the patients		
	Mean ± SD	
Age	67.91±19.95	
ISS score	10.72±4.64	
		n (%)
Gender	Female Male	63 (55.8%) 50 (44.2%)
Comorbidities	Hypertension Diabetes mellitus Ischemic heart disease Stroke Dementia Parkinson's disease	66 (58.4%) 33 (29.2%) 16 (14.2%) 9 (8%) 9 (8%) 6 (5.3%)
Mechanism of injury	Fall from ground level Fall from a height In-vehicle traffic accident Motorcycle accident	88 (77.9%) 10 (8.8%) 8 (7.1%) 7 (6.2%)
Time of injury	23:00-07:00 07:00-15:00 15:00-23:00	61 (54%) 23 (20.3%) 29 (25.7%)
Type of fracture	Trochanteric fracture Femur neck fracture	62 (54.9%) 51 (45.1%)
Surgery	Yes No	94 (83.2%) 19 (16.8%)
One-month mortality	Yes No	15 (13.3%) 98 (86.7%)
One-year mortality	Yes No	25 (22.1%) 88 (77.9%)
ISS: The injury severity score, SD: Standard deviation		

Table 2. Associated injuries	
Trauma region	**n (%)**
Head and neck	9 (8%)
Thorax	11 (9.7%)
Abdomen	5 (4.4%)
Pelvic	5 (4.4%)
Vertebra	4 (3.5%)
Upper extremity	5 (4.4%)
Lower extremity	4 (3.5%)

Discussion

Hip fractures, particularly in the aging population, represent a significant challenge for healthcare systems globally. As the global life expectancy continues to rise, the incidence of hip fractures is expected to increase, further complicating the management of these patients. Traditionally, surgical intervention has been considered the standard treatment for hip fractures. However, there is growing recognition that treatment decisions should be individualized based on patient factors, particularly in regard to their risk of mortality (19). The primary aim of this study was to assess the impact of surgical versus non-surgical treatment on both short-term (one-month) and long-term (one-year) mortality outcomes in patients with hip fractures. The findings suggest that surgical treatment is associated with a substantial reduction in mortality at both one month and one year. Specifically, the one-month mortality rate for patients who underwent surgery was 8.5%, in contrast to 36.8% for non-surgical patients. Similarly, the one-year mortality rate was 16% for surgical patients compared to 52.6% for non-surgical patients. These results are in line with previous studies, which have shown a significant reduction in mortality following surgical intervention, particularly among patients who are not terminally ill or excessively frail to undergo surgery (20-22). However, it is essential to recognize that not all patients with hip fractures are candidates for surgery. Decisions regarding surgical intervention should be made on a case-by-case basis, taking into account the patient's overall health status, comorbid conditions, and life expectancy. Literature suggests that frail patients with severe comorbidities, such as advanced dementia or significant cardiovascular disease, are at a heightened risk of complications post-surgery, which may contribute to poorer outcomes (23,24). In these cases, non-surgical management focused on pain relief and comfort, as well as palliative care, may be more appropriate to optimize quality of life. The mortality rates observed in our study align closely with those seen in other researches, underscoring the significant impact of hip fractures on the elderly population (20). A systematic epidemiological review indicates that the

Table 3. Comparison of patients who underwent surgery and those who did not					
Surgery	**Yes (n=94)**		**No (n=19)**		**p value**
Age (mean ± SD)	65.82±20.90		78.26±9.25		<0.001
ISS score (mean ± SD)	10.40±4.24		12.32±6.16		0.210
1-month mortality (n, %)	**Pozitive**	**Negative**	**Pozitive**	**Negative**	<0.001
	8 (8.5%)	86 (91.5%)	7 (36.8%)	12 (63.2%)	
1-year mortality (n, %)	**Pozitive**	**Negative**	**Pozitive**	**Negative**	<0.001
	15 (16%)	79 (84%)	10 (52.6%)	9 (47.4%)	
ISS: The injury severity score, SD: Standard deviation					

one-year mortality rate following surgically treated hip fractures ranges from 8.4% to 36%, depending on various risk factors, including age, comorbidities, and the presence of postoperative complications (25). In our study, surgical patients had a lower one-year mortality rate (16%) compared to non-surgical patients (52.6%), suggesting that surgical intervention offers a substantial survival benefit, particularly when performed in a timely manner. Our study also observed that patients with trochanteric fractures experienced a higher mortality rate (27.4%) compared to those with femoral neck fractures (15.7%). While this difference did not reach statistical significance (p=0.135), it raises the question of whether fracture type influences long-term survival outcomes. Femoral neck fractures are often more complex and associated with a higher risk of complications, such as non-union and infection, which could contribute to higher mortality rates (26,27). Nonetheless, the findings from our study suggest that the type of fracture may play a role in mortality, but further research is needed to better understand the underlying mechanisms and potential treatment implications. Comorbid conditions significantly influence the prognosis of hip fracture patients (28). In our study, hypertension was the most prevalent comorbidity (58.4%), followed by diabetes mellitus (29.2%). These chronic conditions are known to complicate the treatment and recovery process, especially in older adults. Prior research has shown that comorbidities, such as cardiovascular disease, diabetes, and respiratory illnesses, are associated with higher mortality rates following hip fractures (28,29). Moreover, patients who underwent surgery in our study were significantly younger than those who did not (65.82 years vs. 78.26 years), which may explain the better outcomes observed in the surgical group. Our findings also reflect the common mechanism of injury for hip fractures in the elderly, with 77.9% of patients sustaining their fractures from ground-level falls. Osteoporosis, which increases fracture risk, along with the physical frailty of older adults, contributes to the high incidence of hip fractures (30,31). Preventive measures, such as osteoporosis management, fall prevention programs, and modifications to home environments, may help reduce the frequency of hip fractures and their associated complications in the future.

Study Limitations

While the study provides valuable insights, it has several limitations. The single-center design and relatively small sample size (113 patients) may limit the generalizability of our findings. Larger, multicenter studies are needed to validate these results and further explore the relationship between surgical interventions, fracture type, and mortality outcomes. Additionally, we did not assess functional outcomes or quality of life after treatment, which are important factors when evaluating the overall success of treatment strategies for hip fractures. Future studies should incorporate these endpoints to provide a more comprehensive view of the effectiveness of surgical versus non-surgical approaches.

Conclusion

In conclusion, our study reinforces the significant role of surgical intervention in improving survival outcomes for patients with hip fractures. Despite the potential benefits of surgery, it is essential to evaluate each patient individually, considering their overall health, comorbidities, and functional status. For frail patients with limited life expectancy, non-surgical management, including palliative care, may be more appropriate. Ultimately, this study underscores the need for timely surgical intervention, combined with careful postoperative management, to optimize outcomes for hip fracture patients. Future research should focus on refining treatment strategies and identifying patient subgroups who would benefit most from either surgical or non-surgical approaches.

Ethics

Ethics Committee Approval: The research received ethical approval from the Health Sciences Ethics Committee at Manisa Celal Bayar University Faculty of Medicine (desicion number: 20478486/1969, date: 31.08.2023).

Informed Consent: Informed written consent was obtained from the patients or their immediate family members who volunteered to participate in the study.

Footnotes

Author Contributions

Concept: D.B., M.İ.Ş., B.D., Design: M.İ.Ş., B.D., Data Collection or Processing: D.B., Analysis or Interpretation: M.İ.Ş., Literature Search: D.B., B.D., Writing: M.İ.Ş., B.D.

Conflict of Interest: The authors declare that they have no conflict of interest.

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