

Short-term and Long-term Outcomes Related to Mortality in 65-year-old Individuals with Hip Fracture

Abstract

Background: This study aimed to evaluate the effect of different factors on the prognosis of old patients with hip fractures in order to simplify the process of choosing a surgical or non-surgical treatment by a more accurate prognosis prediction.

Methods: This epidemiological research was performed on individuals aged above 65 years, who referred during a year with the diagnosis of hip fracture. The independent variables included gender, age, concurrent disorders, time elapsed from fracture to surgery, and type of anesthesia. In addition, the dependent variables were the Barthel index, postoperative mortality, and the type of treatment.

Results: We found that the mean age of the subjects (N=163) was 78.7 ± 7.7 years with a range of 65-97 years. Overall, 91 individuals (55.8%) were female and 72 participants (44.2%) were male. Most patients were in the age range of 76-85 years (48%). In the non-surgical group, three cases (11.5%) with femoral neck fracture and three patients (11.5%) with intertrochanteric fracture died in the first month. In the next 11 months, one person (3.8%) with femoral neck fracture and three patients (11.5%) with intertrochanteric fracture were deceased. Regarding postoperative mortality rate, seven (5.1%) and 10 participants (7.3%) with femoral neck fracture and intertrochanteric fracture were deceased in the first month, respectively. Moreover, four (2.9%) and 12 (8.8%) cases with the former and latter types of fracture died in the next 11 months, respectively.

Conclusion: According to the results of the current study, patients with the two types of fracture were not significantly different after the first and the next 11 months. Furthermore, the age of the cases was an important determinant of mortality so that aging increased mortality. Meanwhile, gender had no impact on the elevated mortality. The findings demonstrated no significant difference between the dead and alive patients in the surgical group regarding the time elapsed from fracture to surgery. Moreover, no difference was observed between one-month and one-year mortality rates in terms of anesthesia type. A decrease in the Barthel score led to a higher mortality rate in patients with hip fracture, which indicated the importance of using more efficient techniques for fracture fixation and faster rehabilitation of patients.

Keywords: Hip Fractures, Femoral Neck Fractures, Mortality, outcome studies, aged

Received: 5 months before printing; Accepted: 1 month before printing

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Introduction

Hip fracture, vertebral compression fracture, and distal radius fracture are the most common types of fracture in the elderly, also known as osteoporosis fractures. Among these fractures, the highest mortality rate is related to hip fractures (20%-30% yearly). In addition, only 50% of the cases return to the pre-hip fracture function⁽¹⁻³⁾. The risk of mortality following a hip fracture increases in the first year and may remain high for the following years⁽⁴⁻⁷⁾. Evidence shows that 23.8% of patients die within the first year after a hip fracture, and one-third of the surviving patients require a higher level of long-term care after hip fracture⁽⁸⁻¹³⁾. Compared to adults, hip fracture is associated with more complications in the elderly, including pneumonia, urinary tract infection, compression wounds, and thrombophlebitis of the lower limb⁽¹⁴⁻¹⁶⁾. Preliminary research suggests that surgical treatments can reduce the complications and mortality associated with hip fractures in the elderly^(9, 17, 18). Despite the remarkable advances in equipment manufacturing technology, surgical techniques, anesthesia, nursing care, and rehabilitation, hip fracture still leads to a high rate of complications, mortality, and disability^(9, 12, 19-23).

Non-surgical treatments should be considered for patients with chronic dementia, no motor ability, fatal diseases, a life expectancy of shorter than six weeks, incurable diseases that prevent surgery, and active infectious diseases, for whom the use of surgical tools is forbidden⁽²⁴⁾. However, accurate nursing care, non-surgical treatment, frequent position change to prevent bedsores, attention to nutrition, as well as pain control with adequate analgesics and medications are necessary for non-surgical treatment. Callus formation in three weeks can considerably reduce mobility-related pain, and most patients can sit on a wheelchair in six weeks. The non-surgical method might be chosen due to a high risk of mortality caused by anesthesia and surgery or the lack of access to modern medical facilities. In such situations, it is recommended that patient movement, wheelchair movement, and vertical chest position be used immediately^(10, 25). In general, many hip fractures have the potential to heal without surgery within a few months. However, the role of factors that increase the risk of surgery or determine the prognosis in patients undergoing surgery is not known. For instance, the role of heart blocks in elevating surgical complications is not clear, other than the age of the patients. Therefore, physicians and patients refrain from surgery in most cases where there are multiple risk factors due to old age. It is notable that the augmented population of the elderly in recent years has led to a higher incidence of hip fractures. Moreover, systematic and national protocols are not sufficient for preventing and treating osteoporosis. As a result, increased problems and costs will be incurred to the healthcare system because of this fracture. With this background in mind, the present study aimed to evaluate the role of diverse factors in the prognosis of old patients with hip fractures. This could simplify the process of selecting the surgical or non-surgical treatment by a more accurate prediction of prognosis.

Methods

This epidemiological descriptive-analytical research was performed on patients aged above 65 years diagnosed with hip fracture, who were referred to Imam Reza Hospital, Birjand, Iran for a year. The inclusion criteria were age above 65 years and hip fracture caused by falls and not a traffic accident. The exclusion criteria entailed the presence of simultaneous fractures, a previous history of hip fracture, pathological fracture due to metastasis, bilateral hip fracture, subtrochanteric fracture, and fractures of the femoral shaft. A total of 297 patients were referred to Imam Reza Hospital due to hip fractures, 163 of whom remained in the study due to the impossibility of follow-up for some of the patients for at least one year after the fracture. The individuals were divided into two groups of femoral neck fracture (N=61) and intertrochanteric fracture (N=103). The medical history of all cases was assessed in terms of concurrent disorders. In the case of previous surgery, the type of surgery, anesthesia, disease, and the time elapsed from fracture to surgery were recorded for all patients. Afterwards, patients were followed up through phone calls at the end of the first month and the first year after the surgery to ask about their daily activities based on the Modified Barthel Index (MBI) (Table 1). In addition, the physical condition of patients was assessed in follow-ups. The time of death was recorded for the deceased cases⁽²⁶⁾. In this study, the independent variables included gender, age, recurrent disorders, the time elapsed from fracture to surgery, and the type of anesthesia. On the other hand, postoperative mortality and the type of treatment were the dependent variables. Data were analyzed by the Chi-square test using the SPSS software version 19. Furthermore, P-value<0.05 was considered statistically significant.

Table 1. Barthel Index for level of daily activities

Activity	Score	Characteristics
Control of intestinal activity	0	Incontinence/need for laxative
	1	Incontinence once a week
	2	No incontinence
Bladder control	0	Incontinence/continuous catheterization
	1	Incontinence once a day
	2	No incontinence
Hygiene	0	Needing help with personal care
	1	No need for help with personal care
Using the toilet	0	Dependent
	1	A minor need for help
	2	Independent
Eating	0	Dependent
	1	A minor need for help/cutting the food
	2	Independent
Moving/from bed to chair and vice versa	0	Cannot
	1	With a lot of help/1-2 people, physical
	2	With partial/verbal or physical assistance
	3	Independent
Mobility	0	Lack of mobility
	1	Dependent on a wheelchair
	2	Walking with the help of a person/verbally or physically
	3	Independent
Wearing clothes	0	Dependent
	1	Needing help/able to do some things
	2	Independent
Climbing stairs	0	Unable
	1	Needing help/verbal or physical or cane
	2	Independent in going up and down the stairs
Bathing	0	Dependent
	1	Independent

Results

In this study, the mean age of the participants (N=163) was 78.7 ± 7.7 years with a range of 65-97 years. Most patients (48%) were in the age range of 76-85 years (Table 2).

Table 2. Frequency distribution of age range in the participants

Total	N	%	Age Range
	51	31.3	65-75 years
	78	47.9	76-85 years
	34	20.9	More than 86 years
	163	100%	

Overall, 59 subjects (55.8%) were female and 72 (44.2%) were male.

We found that the mean age of the participants with femoral neck fracture and

the intertrochanteric fracture was 78 and 79 years, respectively. According to the results, there was no significant relationship between the type of fracture and the mean age of patients ($P > 0.05$).

Among the participants, 137 (84%) cases, including 48 patients with femoral neck fracture and 89 individuals with intertrochanteric fracture underwent surgery. On the other hand, 26 (16%) cases, including 12 patients with femoral neck fracture and 14 cases with intertrochanteric fracture received non-surgical treatments due to the lack of consent despite suggesting surgery and due to the fear of post-operative complications and mortality.

In terms of surgical methods, the most frequently taken measures for femoral neck fracture in 37 subjects (61.7%) and

intertrochanteric fracture in 87 participants (84.5%) encompassed prosthesis and dynamic hip screw (DHS), respectively (Table 2). In a year since fracture, 43 out of 163 patients (26.4%) were deceased and 120 (73.6%) were alive. In addition, 10 individuals (38%) in the non-surgical group and 33 subjects (24%) in the surgical group were deceased within a year since fracture. Nevertheless, the mortality status of the participants was not significantly correlated with the type of treatment ($P < 0.05$).

In the surgical group, the time elapsed from fracture to operation was 4.4 ± 2.4 days in deceased patients and 3.8 ± 3.4 days in non-deceased cases during a year. In comparison, the mean time elapsed from hospitalization to surgery was not significantly different between the two groups ($P\text{-value} > 0.05$).

In the surgical group, the time passed from fracture to surgery was 4.4 ± 2.4 days in deceased patients and 3.8 ± 3.4 days in alive patients. According to our results, the deceased and alive patients were no significantly different regarding the time elapsed from hospitalization to surgery ($P > 0.05$). In terms of non-surgical treatment, three patients (11.5%) in the femoral neck fracture group and three (11.5%) in the intertrochanteric fracture group were deceased in the first month, whereas one person (3.8%) in the former and three individuals (11.5%) in the latter died in the next 11 months. On the other hand, seven patients (5.1%) with femoral neck fracture and 10 individuals (7.3%) with intertrochanteric fracture were deceased in the first month, while four cases (2.9%) in the former and 12 participants (8.8%) in the latter died in the next 11 months. Our findings revealed no significant relationship between the two surgical and non-surgical groups and

two types of fracture regarding mortality status ($P < 0.05$). Overall, 23 female patients (14.1%) and 20 (12.3%) male participants were deceased. In this respect, there was no significant difference between male and female genders regarding mortality in the first year ($P > 0.05$). The mean age of the deceased cases was 81.5 ± 7.8 years, while alive patients had a mean age of 77.8 ± 7.5 years. A significant relationship was observed between the mean age and the life state of the participants ($P > 0.05$). The mean time elapsed from fracture to surgery was 4.5 ± 2.4 days in deceased patients and 3.8 ± 3.5 days in alive people. However, no significant difference was observed between the participants regarding the time elapsed from fracture to surgery ($P > 0.05$). In the surgical group, 24 participants (17.5%) underwent general anesthesia, whereas 113 individuals (82.5%) received spinal block. Our findings demonstrated no significant relationship in this regard ($P > 0.05$). The mean Barthel score after fracture was reported to be 15.3 and 1.8 in the alive and deceased patients, respectively in the first month, and 6.9 in the deceased individuals in the next 11 months. The results were indicative of a significant relationship between the mean Barthel score and the mortality of participants ($P < 0.05$) (Table 3).

In the present research, 76 alive patients (46.6%), 20 participants (12.3%), who were deceased in the first month, and 17 subjects (10.4%) who died in the next 11 months had concurrent disorders, namely diabetes, a history of MI or cardiac failure, and cardiac arrhythmia under medical treatment. We found a significant relationship between the presence of concurrent disorders and mortality ($P < 0.05$) (Table 4).

Table 3. A comparison of mean Barthel score and mortality status of the participants			
	N	Mean Barthel score after fracture	Standard deviation
Alive	120	15.3	4.9
Deceased in the first month	23	1.8	3.8
Deceased in the next 11 months	20	6.9	5
Total	163	12.4	7
df=2 F=89.653 P-value=0.000			
df=1 P-value=0.908			

Table 4. A comparison between the presence of concurrent disorders and mortality in patients under study

Presence of a concurrent disorder		Alive	Deceased		Total
			In the first month after fracture	In the next 11 months	
No	N	44	3	3	50
	%	27	1.8	1.8	30.7
Yes	N	76	20	17	113
	%	46.6	12.3	10.4	69.3
Total	N	120	23	20	163
	%	73.6	14.1	12.3	100
df=2		P-value=0.021			

Discussion & Conclusion

Hip fracture has become a major medical, social, and economic problem due to increased life expectancy in the population and the exacerbation of osteoporosis with age. In general, the lifetime risk of a hip fracture is 18% in women and 5% in men. In addition, the annual incidence of this type of fracture worldwide will exceed seven million in the next 40 years^(4, 11). In the present study, we evaluated 163 patients with hip fracture to determine mortality rate, Barthel score, and factors affecting mortality based on two models of femoral neck fracture and intertrochanteric fracture. In various studies, one-year mortality of hip fracture after surgical treatment has been reported as 15%-36%. In the current investigation, 26.4% of the patients died after surgery⁽⁷⁾. The mortality rate for both types of fractures during the first month after fracture was higher among patients, compared to the next 11 months (14.1% vs. 12.3%). However, this difference was not statistically significant. Moreover, there was no significant difference between femoral neck fracture and intertrochanteric fracture in terms of mortality in the first month after fracture and the next 11 months, as well as the overall mortality rate. In this respect, our findings are in line with the results of other studies⁽⁷⁾. In the present research, the age of patients was an important determinant of mortality as mortality increased with age. However,

gender had no impact in this regard. According to our results, the mean time elapsed from fracture to surgery was longer in deceased patients, compared to those who were alive one year after the surgery (3.8 vs. 4.4 years). Nevertheless, the difference between the groups was not significant in this regard. Consistent with other studies, a significant relationship was observed between the presence of concurrent disorders and the mortality of patients in the present study. The presence of one or multiple concurrent disorders elevated mortality in patients with hip fractures⁽¹³⁾.

Similar to other studies, the one-month and one-year mortality of patients in the surgical group was not significantly different between the different types of anesthesia used for patients (general anesthesia vs. spinal block). Therefore, it was concluded that surgery could be performed with any type of anesthesia with no difference in post-surgical mortality⁽¹³⁾. The evaluation of the Barthel score revealed that a rise in this index led to higher mortality in patients with hip fracture demonstrating the importance of finding better techniques for better fracture fixation and more rapid recovery of patients (27). According to the results of the present research, age and decrease in the Barthel score affected the mortality rate. On the other hand, fracture type, gender, anesthesia type, and the time elapsed from fracture to surgery had no impact on mortality. Moreover, the mortality rate was significantly higher in the non-surgical group despite the general culture of the fear of surgery at older ages. Given the high mortality and morbidity rates, hip fracture is recognized as an important public health issue in the community. The leading causes of hip fracture are falls and osteoporosis. As a result, proper approaches must be adopted in the elderly to prevent these issues. In addition, attempts should be made to raise the awareness of patients of the necessity of surgical treatment after fracture even in the presence of concurrent diseases or at old age.

The exact effect of concurrent heart diseases, such as heart blocks and ischemic heart disease on the results of surgical or non-surgical treatments was not determined in

this study due to the limited number of patients. However, the presence of these disorders is important in increasing the desire of patients and even physicians to avoid surgical treatment. Therefore, further studies are recommended to determine the impact of these issues on hip fracture outcomes.

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