Turkish Journal of Geriatrics
DOI: 10.31086/tjgeri.2018240429
2018;21 (2):279-284

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RESEARCH

HIP FRACTURE SURGERY IN PATIENTS OLDER THAN 90 YEARS: EVALUATION OF FACTORS THAT AFFECT 30-DAY MORTALITY IN A PARTICULARLY RISKY GROUP

Abstract

Introduction: To date, hip fracture-related mortality studies are generally conducted on patients over 65 years of age. In our study, we predicted that factors affecting hip injury-related mortality may differ from the current literature and aimed to determine these factors in patients over 90 years of age who were hospitalized due to hip fracture.

Materials and Method: The data of 118 patients who were operated for hip fracture at Karabük University Training and Research Hospital between 2011 and 2014 were retrospectively reviewed. Each patient's age, sex, preoperative period, American Society of Anesthesiologists (ASA) score, type of anesthesia, comorbid diseases, blood transfusion requirements, fracture type, and mortality time were recorded.

Results: The age difference between patients who died (death group) and survivors (survivor group) was statistically significant (p=0.004). The ejection fraction (EF) values of patients who died within the first 30 days after surgery were significantly lower (p=0.012) than those of the survivor group, and more comorbid diseases were seen in the death group (p=0.014). In addition, the median ASA score of the death group was higher than that of the survivor group (p=0.006).

Conclusions: The 30-day mortality rate in our study was 27.9%, which is significantly higher compared with previous studies. To cope with high mortality rates in elderly patients with hip fracture, the patients' general medical conditions should be assessed in detail before surgical intervention and medical problems should be stabilized as early as possible.

Keywords: Mortality; Hip Fractures; Arthroplasty, Replacement, Hip

ARAŞTIRMA

DOKSAN YAŞIN ÜSTÜNDEKİ HASTALARDA KALÇA KIRIĞI CERRAHİSİ: RİSKLİ BİR GRUPTA 30 GÜNLÜK MORTALİTEYİ ETKİLEYEN FAKTÖRLERİN BELİRLENMESİ

Öz

Giriş: Günümüzde kalça kırıkları ile ilişkili mortalite çalışmaları genellikle 65 yaş üstü hastalar üzerinde yapılmaktadır. Çalışmada, 90 yaş üstü kalça kırığı ile hospitalize olan hastalarda bu faktörlerin literatürle farklılıklar göstereceği öngörüldü ve bu faktörlerin belirlenmesi amaçlandı.

Gereç ve Yöntem: Karabük Üniversitesi Eğitim ve Araştırma Hastanesi'nde 2011 ile 2014 arasında kalça kırığı sebebiyle opere edilen 118 hastanın kayıtları retrospektif olarak incelendi. Her bir hastanın yaşı, cinsiyeti, ameliyat öncesi dönemi, Amerikan Anestezi Birliği puanı, anestezi tipi, komorbid hastalıkları, kan transfüzyon ihtiyacı, kırık tipi ve mortalite zamanı kaydedildi.

Bulgular: Ölen hastalar ile hayatta kalan hastalar arasındaki yaş farkı istatistiksel olarak anlamlıydı (p=0.004). Ameliyat sonrası ilk 30 günde ölen hastaların ejeksiyon fraksiyonları hayatta kalan hastalara göre daha düşüktü (p=0.012) ve komorbid hastalıklar daha çoktu (p=0.014). Ayrıca, ölen grupta median ASA skoru hayatta kalan gruba göre daha yüksekti (p=0.006).

Sonuçlar: Çalışmada otuz günlük mortalite oranı daha önceki çalışmalardaki oranlardan yüksek olarak %27.9'dur. Kalça kırığı olan yaşlılardaki yüksek mortalite oranları ile baş edebilmek için hastaların müdahale öncesi genel sağlık durumları ayrıntılı olarak değerlendirilmeli ve tıbbi problemler en hızlı şekilde stabilize edilmelidir.

Anahtar sözcükler: Mortalite; Kalça kırıkları; Replasman artroplasti, Kalça

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Received: 22/01/2018
Accepted: 17/05/2018

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INTRODUCTION

The geriatric population is growing worldwide because of an increase in expected lifetime. Hip fractures seen in the geriatric population have become a major health concern due to a decline in bone mass with age (1). Hip fracture is the leading cause of injury-related mortality in the elderly (2). Many studies conducted in the past five decades have reported that 1-year mortality rates vary between 15% and 30% (3,4). The highest mortality occurs in the first 6 months, and then the rate declines (5). An essential factor that affects mortality after hip fracture is other problems, besides the fracture, and the patient's general health status (6). Although many factors that increase the risk of death have been identified, there is no consensus on these factors (7). Some of these factors are age, gender, a high American Society of Anesthesiologists (ASA) score, low preoperative walking capacity, low daily activity level, mental status impairment, a low body mass index, anemia, malnutrition, and serum creatinine elevation (8,9). Identifying factors that increase the risk of death helps clinicians take precautions before and after surgery and to intervene when necessary.

It is known that the risk of mortality increases with age. To date, hip fracture-related mortality studies are generally conducted on patients over 65 years of age. In our study, we predicted that factors affecting hip injury-related mortality may differ from the current literature and aimed to determine these factors in patients over 90 years of age who were hospitalized due to hip fracture.

MATERIALS AND METHOD

The study was planned as a retrospective evaluation of elderly patients (>90 years) who were admitted to Karabük University Training and Research Hospital with hip fractures from 2011 to 2014. Inclusion criteria were as follows: 1) being over 90 years of age, 2) being admitted to hospital due to hip fracture, 3) accepting to participate in the study, 4) being clinically operable and accepting surgery. Exclusion criteria were: 1) presence of osteomyelitis or any type of malignant neoplasm/tumor, 2) having previously undergone arthroplasty, 3) being inoperable due to any cause, 4) having a more critical injury which would require treatment priority at time of admittance.

A total of 182 patients who were older than 90 years applied to our center with hip fracture during the study period. Among these, 43 patients did not consent to surgery because of a high risk of death and 21 patients died during the preoperative period. Thus, in total, 64 patients were excluded. The data of the remaining 118 patients who were operated for hip fracture were retrospectively reviewed.

Surgical approach and method was determined according to the type of fracture and the clinical and physiological state of the patient. Each patient's age, sex, preoperative period, ASA score, type of anesthesia (general, spinal, and sciatica), comorbid diseases (diabetes, hypertension, heart failure, renal insufficiency, coronary artery disease, chronic obstructive pulmonary disease [COPD]), blood transfusion requirements, type of fracture, and mortality time were recorded.

The patients were classified preoperatively according to the ASA's six-category physical status classification system. These categories are (i) ASA I: a normal healthy patient; (ii) ASA II: a patient with a mild systemic disease; (iii) ASA III: a patient with a severe systemic disease; (iv) ASA IV: a patient with a severe systemic disease that is a constant threat to life; (v) ASA V: a moribund patient who is not expected to survive with or without the operation; and (vi) ASA VI: a patient who is declared brain-dead and whose organs are being removed for donor purposes (10).

Statistical analysis

All analyses were performed using SPSS Statistics V20.0. The Shapiro–Wilk test was used to test for normality. Continuous variables were given as mean±standard deviation for normally distributed data and median (minimum–maximum) for non-normally distributed data. Comparisons between groups were made with the Mann–Whitney U test.

Analysis of categorical variables was made with the Chi-square test. A *p* value below 0.05 was accepted as statistically significant.

RESULTS

We included 118 patients (32 women, 86 men) over 90 years of age in our study; mean age was 94.19±4.18 years. Thirty-three (27.9%) of these patients died within 30 days. Therefore, the 30-day mortality rate was 27.9%.

Median age among those who died (death group) was 94 years (90–112 years) and that of the survivors (survivor group) was 92 years (90–109 years). The age difference between the death group and the survivor group was statistically significant (p=0.004). There was no significant difference between men and women in terms of 30-day mortality (p=0.344). The ejection fraction (EF) values of patients who died in the first 30 days after surgery were significantly lower (p=0.012) than those in the survivor group, and more comorbid diseases were seen in the death group (p=0.014). In addition, the median ASA score of the death group was higher than that of the survivor group (p=0.006). The causes of death according to medical records were as follows: 12 due to respiratory failure, 7 due to heart failure, 9 due to pulmonary infections in the ICU, 2 due to acute renal failure, and 3 were reported as spontaneous cardiopulmonary arrest.

No statistically significant difference was found between the two groups in terms of the types of anesthesia used (p=0.326), duration of surgery (p=0.481), and fracture localization (p=0.538) in the study. The patients' demographics and characteristics regarding postoperative life status are presented in Table 1 and patients' characteristics regarding operation and anesthesia are presented in Table 2.

<<Please insert Table 1 and 2 here.>>

Table 1. Patients' demographics and characteristics regarding postoperative life status.

	Survivors (n=85)	Exitus in first 30 days (n=33)	p
Age	92 (90–109)	95 (90–112)	0.004
Gender			
Male	21 (24.7%)	11 (33.3%)	0.344
Female	64 (75.3%)	22 (66.7%)	
White blood cell count (×1000)	9.20 (3.24–21.43)	8.50 (3.90–17.00)	0.300
Red cell distribution width	14.20 (10.50–22.60)	13.70 (10.40–17.60)	0.061
Hemoglobin (mg/dL)	10.95 (7.95–14.10)	10.35 (8.10–12.50)	0.228
Length of stay in hospital (day)	12 (2–43)	10 (2–36)	0.272
Ejection fraction (%)	60 (40–70)	60 (35–65)	0.012
Blood Tx (unit)	2 (0–8)	1 (0–6)	0.361
Comorbidities	36 (42.4%)	23 (69.7%)	0.014
Diabetes Mellitus	12(14.1%)	5(15.1%)	0.885
Chronic Kidney Failure	-	5(15.1%)	NA

Data are given as median (minimum–maximum) or frequency (percentage), NA: not available

Table 2. Patients' characteristics regarding operation and anesthesia.

	Survivors (n=85)	Exitus in first 30 days (n=33)	p
Anesthesia type			
Spinal	58 (68.2%)	18 (54.5%)	
Sciatic nerve block	5 (5.9 %)	3 (9.1%)	0.376
General	22 (25.9%)	12 (36.4%)	
ASA score	3 (1–5)	4 (1–5)	0.006
Duration of surgery (minutes)	36.8 (30-62)	38.3 (30-49)	0.313
Surgery timing			
Before 24 hours	13 (15.3%)	7 (21.2%)	
24–48 hours	31 (36.5%)	14 (42.4%)	0.481
After 48 hours	41 (48.2%)	12 (36.4%)	
Infection after surgery	5 (7.8%)	3 (17.6%)	0.355
Fracture location			
Femoral neck	33 (38.8%)	12 (36.4%)	
Trochanteric	45 (52.9%)	20 (60.6%)	0.538
Subtrochanteric	7 (8.2%)	1 (3.0%)	

Data are given as median (minimum–maximum) or frequency (percentage)

DISCUSSION

The increase in life expectancy has made the chronic disease burden heavier. This burden has become a leading health concern in today's world. In the elderly, protection and avoidance functions are weakened because of diminished physical abilities, systemic diseases, loss of sight and hearing, and debilitated reflexes. Therefore, simple trauma exposure rates are increasing in the elderly, which in turn leads to an increase in fracture risk due to a reduction in bone density (11).

Hip fractures are common skeletal system injuries in the elderly and are accompanied by high mortality and morbidity rates. The 30-day mortality rate is a good indication of hospital care for patients with hip fractures. In the literature, the 30-day mortality rate varies widely. William et al. reported a 30-day mortality rate of 8.2% in their study which was conducted on individuals over 65 years of age. They emphasized that independent risk factors are associated with 30-day mortality (12). Kirkland et al. reported a 30-day mortality rate of 8% and that being aged above 90 years was associated with increased mortality (13). Carretta et al. found a 30-day mortality rate of 3.5% (14), whereas in another study, it was reported as 9.6%, which increased to 33% in the 1-year period (15).

In our study, the 30-day mortality rate was 27.9%. In addition, the mean age of the death group was statistically higher than the survivors'. The fact that the patients who comprised our study group were over 90 years old may explain the high mortality rate compared with the literature. Many studies in

this area have shown that age is an independent risk factor for increased mortality.

Many individuals with hip fractures have multiple chronic conditions, which affect mortality (16). The comorbid diseases found in this study were diabetes, hypertension, heart failure, renal insufficiency, coronary artery disease, and COPD. Patients with at least one of these comorbid diseases had a higher 30-day mortality rate compared with the others. In addition, mortality was significantly higher in patients with a low EF. A meta-analysis investigated the causes of delaying and unstabilizing surgery, and the most common ones were identified as cardiac problems, infections, diabetes, and electrolyte abnormalities (17). Roche et al. reported that after adjusting for age and sex, 2.5-fold greater 30-day mortality was observed in patients with three or more comorbidities (15). Similar results have been reported in other studies (18,19).

The ASA classification is used before surgery to assess how systemic diseases affect the patient's general condition. It is known that mortality increases as accompanying diseases increase. In parallel, with advancing age, the ASA score also increases (20). The ASA score is used as a marker of long-term mortality (21). Hamlet et al.'s study on the relationship between surgery and ASA scores indicated that the ASA score itself is a good indicator of mortality (22). In our study, the ASA score of the death group was significantly higher (similar to the literature) than the survivors'. This suggests that ASA scoring is a useful system for determining postoperative mortality risk.

The use of regional anesthesia in hip fracture surgery may reduce the patient's length of stay in the hospital and thus reduce mortality. However, Neuman et al. reported that this method does not affect mortality, even though there is a significant decrease in the duration of hospitalization after surgery using regional anesthesia (23). Similarly, in our study, there was no significant relationship between the type of anesthesia used for surgery and mortality. In addition, surgery duration and fracture localization did not affect mortality.

This was a retrospective study which brings the usual limitations seen in retrospective studies. another limitation is the fact that we did not perform further analyses according to cause of death. Finally, we may include the relatively low number of subtrochanteric fracture cases as a limitation. To our knowledge, this is the first study which aimed to identify factors affecting 30-day mortality in hip fracture patients older than 90 years.

In conclusion, the results of our study did not differ from the literature, except for the 30-day mortality rate, which in our study was 27.9%, significantly higher compared with previous studies. This difference was due to the fact that age limit in our study was 90 years, whereas previous studies usually set this limit to 65 years (which is considered the limit of aging). ASA scores, age, the EF, and the presence of accompanying chronic diseases were found to be factors associated with 30-day mortality. To cope with the high mortality rates of hip fractures in the elderly, each patient's general medical condition should be assessed in detail before surgical intervention and any medical problems should be stabilized as early as possible. In addition, further studies should be undertaken to better understand the underlying causes of increased mortality.

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