



The Effect of Thyroid Disorders on Mortality and Clinical Outcomes in Geriatric Hip Fractures

Geriatrik Kalça Kırıklarında Tiroid Hastalıklarının Mortalite ve Klinik Sonuçlar Üzerine Etkisi

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ABSTRACT

Objectives: The aim of this study was to investigate the effect of thyroid dysfunctions on post-operative mortality and clinical outcomes in patients with geriatric hip fractures.

Methods: In this retrospective study, 139 patients applied to the hospital with hip fractures between January 2019 and October 2020 were included in the study. The patients were divided according to thyroid function tests into three groups as euthyroid, hypothyroid, and hyperthyroid, respectively. Group 1 consisted of 97 patients within the euthyroid boundaries. Group 2 consisted of 18 patients with hypothyroidism and Group 3 consisted of 24 patients with hyperthyroidism. The effect of the thyroid disorders on 30-day and 1-year mortality was evaluated. Moreover, need for intensive care unit (ICU) and the length of stay (LOS) in ICU were examined between the groups.

Results: The 30-day mortality rate in the patients included in the study was 6.5% and the 1-year mortality rate was found to be 23.7%. Forty-four of 139 patients included in the study needed for the ICU. The 30-day and 1-year mortality rates in the hypothyroid patient group were found to be 16.6% and 22.2%, respectively. About 55.6% of the hypothyroid group, significantly higher than the other groups, were treated in the ICU ($p=0.045$). The mean LOS of the patients included in the study was 7.14 ± 4.61 days. The mean LOS in Group 2 was observed to be longer than in Groups 1 and 3; however, this difference was not statistically significant ($p=0.330$).

Conclusion: In geriatric hip fractures with hypothyroidism in the pre-operative period, the need for ICU and the LOS in ICU increased in the post-operative period. Therefore, it is recommended that geriatric hip fracture patients with hypothyroidism should be followed up closely in the perioperative period.

Keywords: Geriatric hip fractures; intensive care unit; length of stay; mortality; thyroid dysfunction.

ÖZET

Amaç: Bu çalışmanın amacı, geriatrik kalça kırığı olan hastalarda tiroid fonksiyon bozukluklarının postoperatif mortalite ve klinik sonuçlara etkisini araştırmaktır.

Yöntem: Bu retrospektif çalışmaya Ocak 2019-Ekim 2020 tarihleri arasında kalça kırığı ile başvuran 139 hasta dahil edildi. Hastalar tiroid fonksiyon testlerine göre sırasıyla ötiroid, hipotiroid ve hipertiroid olmak üzere üç gruba ayrıldı. Grup 1 ötiroid sınırları içinde 97 hastadan, grup 2 hipotiroidili 18 hastadan ve grup 3 hipertiroidili 24 hastadan oluşturuldu. Tiroid bozukluklarının 30 günlük ve bir yıllık mortalite üzerine etkisi değerlendirildi. Ayrıca gruplar arasında yoğun bakım ihtiyacı ve yoğun bakımda kalış süreleri incelendi.

Bulgular: Çalışmaya alınan hastalarda 30 günlük mortalite oranı %6,5, bir yıllık mortalite oranı ise %23,7 olarak bulundu. Çalışmaya alınan 139 hastadan 44'ünün yoğun bakıma alınması gerekti. Hipotiroidili hasta grubunda 30 günlük ve bir yıllık mortalite oranları sırasıyla %16,6 ve %22,2 olarak tespit edildi. Hipotiroidi grubunun %55,6'sı

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diğer gruplardan anlamlı olarak daha yüksek oranda yoğun bakım ünitesinde tedavi gördü ($p=0,045$). Çalışmaya alınan hastaların ortalama kalış süreleri $7,14\pm 4,61$ gündü. Grup 2'de ortalama kalış süresinin grup 1 ve grup 3'e göre daha uzun olduğu gözlemlendi, ancak bu fark istatistiksel olarak anlamlı değildi ($p=0,330$).

Sonuç: Preoperatif dönemde hipotiroidili geriyatrik kalça kırıklarında, postoperatif dönemde yoğun bakım ihtiyacı ve yoğun bakımda kalış süresi uzamıştır. Bu nedenle hipotiroidili geriyatrik kalça kırığı olan hastaların perioperatif dönemde yakın takip edilmesi önerilmektedir.

Anahtar sözcükler: Geriyatrik kalça kırıkları; tiroid disfonksiyonu; mortalite; yoğun bakım ünitesi; yatış süresi

Hip fractures are an important cause of mortality in the elderly. When the literature is reviewed, it is seen that there are many factors that affect mortality.^[1] Conditions such as age, American Society of Anesthesiologists (ASA) score, time of surgery, pre-operative activity level, cognitive function status, and pre-existing comorbidity are among the factors that affect mortality.^[1]

It has been reported that pre-operative low free T3 level is an independent risk factor for poor clinical outcomes and depressive syndromes in patients undergoing brain tumor surgery.^[2] In another study, free T3 level was shown to be an independent risk factor for intensive care mortality after cardiopulmonary by-pass in infants with congenital heart disease.^[3]

Underlying thyroid dysfunction may be observed in patients operated on for hip fractures.^[4] Patients with hyperthyroidism in the pre-operative period were shown to have an increased risk of post-operative complications. Rapacki et al.^[5] claimed that serum thyroid-stimulating hormone (TSH) level was associated with mortality. However, the effect of only the TSH value was evaluated, but the mortality relationship between hypothyroid, hyperthyroid and euthyroid patients' groups were not evaluated. On the other hand, Ling et al.^[6] reported that thyroid dysfunctions did not affect hospitalization duration, readmission, and mortality. The results of the study should be interpreted with caution as they do not standardize the groups for other diseases that may affect mortality. It seems that more studies are needed to examine the effect of thyroid dysfunction on post-operative mortality in the pre-operative period.

The aim of this study was to investigate the likelihood of thyroid dysfunction affecting post-operative mortality and clinical outcomes in patients with geriatric hip fracture.

Methods

In this study, patients who were operated on for hip fractures in Ankara City hospital between January 2019 and October 2020 were evaluated retrospectively. The ethics committee approval was obtained (E1-20-1233) and informed consent forms were obtained from the patients included in the study. All researchers contributed to the study signed the final version of Helsinki's declaration.

Patients over 65 years of age who were operated on for hip fracture, had a history of thyroid dysfunction, and required thyroid function tests in the pre-operative evaluation were included in the study. In our center, thyroid evaluation is not a routine procedure while preparing for hip fracture surgery. Patients under the age of 65, who could not be operated due to additional comorbidity, who refused surgical intervention, whose thyroid function tests were not measured at admission and/or follow-up, who were previously operated on the same hip, malignancy, subtrochanteric femoral fractures, multiple fractures, and polytrauma were excluded from the study.

A total of 139 patients who met the criteria of the study were included retrospectively. The patients were divided into three groups as euthyroid, hypothyroid, and hyperthyroid, respectively. Thyroid function tests of 97 patients in Group 1 were within euthyroid limits. Eighteen patients with hypothyroidism were categorized as Group 2, whereas 24 patients with hyperthyroidism were Group 3.

All patients were operated on within the first 2 days following the admission to the hospital. In the post-operative period, cefazolin sodium 3×1 g was administered to all the patients for 1 day. Low molecular weight heparin 4000 IU 1×1 subcutaneously was administered for 35 days. All the patients underwent a standard post-operative follow-up protocol. Each patient was mobilized early with weight-bearing as far as tolerable.

Age, gender, operation side, operation date, ASA score, length of stay (LOS), thyroid function tests, number of patients hospitalized in an intensive care unit (ICU), LOS in ICU, and 30-day and 1-year mortality data were collected for the study. The Charlson comorbidity index (CCI)^[7] was used to evaluate whether there was a difference between the other comorbidity factors of the groups.

Hematologic Evaluations

Venous blood samples were taken from each patient at admission and thyroid function tests were performed. Normal value ranges for TSH, free T4, and free T3 were evaluated as 0.55–4.78 uIU/mL, 0.89–1.76 ng/dl, and 2.3–4.2 pg/mL, respectively. Free T3, free T4, and TSH results were recorded. Groups were categorized based on these values.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics 22.0 (Armonk, NY, USA). Descriptive statistics for the numerical variables were expressed as the mean, standard deviation, and minimum-maximum values. Since the number of patients in the groups was not sufficient, non-parametric tests were performed. Kruskal–Wallis variance analysis, which is a non-parametric alternative to one-way analysis of variance, was used to determine the relationships between groups. The results were evaluated within the 95% of confidence interval and $p < 0.05$ was considered as statistically significant.

Results

A total of 139 patients were evaluated in the study. The demographic data of these patients are given in Table 1. There was no statistically significant difference between the groups in terms of age, gender, ASA score, and CCI ($p=0.679$, $p=0.570$, $p=0.984$, $p=1.000$, respectively) (Table 1).

The 30-day mortality rate in the patients included in the study was 6.5% and the 1-year mortality rate was found to be 23.7% (Table 2). The 30-day and 1-year mortality rates in the Group 2 patients with hypothyroidism were found to be 16.6% and 22.2%, respectively (Table 2). Although the 30-day mortality rate revealed the highest in the Group 2 including patients with hypothyroidism, it was not statistically significant ($p=0.167$) (Table 2). Moreover, there was no statistically significant difference in 1-year mortality rates between the groups ($p=0.978$) (Table 2).

The mean LOS of the patients included in the study was 7.14 ± 4.61 days. The mean LOS in Group 2 was observed to be longer than in Groups 1 and 3; however, this difference was not statistically significant ($p=0.330$) (Table 3). Of the 139 patients enrolled in the study, 44 patients were hospitalized in an ICU. The significant majority of 55.6% of these patients were hypothyroid patients in Group 2 ($p=0.045$) (Table 3). There is no statistically significant difference between the groups in terms of LOS in the ICU (Table 3). However, it has been determined that patients with hypothyroidism were hospitalized in ICU for longer periods.

Table 1. Demographic data

	Group 1 (Euthyroid) (n=97)	Group 2 (Hypothyroid) (n=18)	Group 3 (Hyperthyroid) (n=24)	Total (n=139)	p
Age (years)	81.79±8.92	79.78±11.2	80.54±9.07	81.32±9.23	0.679
Gender (Male/Female)	31/66	4/14	9/15	44/95	0.570
CCI*	1.91±1.18	1.94±1.11	1.96±1.26	1.92±1.18	1.000
ASA** score	2.72±0.68	2.72±0.82	2.75±0.60	2.73±0.69	0.984

*Charlson comorbidity index, **American Society of Anesthesiologists.

Table 2. Comparison of groups in terms of 30-day and 1-year mortality

	Group 1 (Euthyroid) (n=97)	Group 2 (Hypothyroid) (n=18)	Group 3 (Hyperthyroid) (n=24)	Total (n=139)	p
30-day mortality	5 (5.2%)	3 (16.6%)	1 (4.2%)	9 (6.5%)	0.167
1-year mortality	23 (23.7%)	4 (22.2%)	6 (25%)	33 (23.7%)	0.978

Table 3. Comparison of groups in terms of length of stay, number of patients hospitalized in ICU, and length of stay in ICU

	Group 1 (Euthyroid) (n=97)	Group 2 (Hypothyroid) (n=18)	Group 3 (Hyperthyroid) (n=24)	Total (n=139)	p
Length of stay (Day)	6.84±4.52	8±4.17	7.71±5.28	7.14±4.61	0.330
Number of patients hospitalized in ICU	29 (29.9%)	10 (55.6%)	5 (20.8)	44 (31.7%)	0.045*
Length of stay in ICU (Day)	1.45±4.5	2.11±3.35	1.83±5.04	1.6±4.44	0.088

ICU: Intensive care unit, *p<0.05: statically significant different.

Discussion

The most important finding of the present study was that the 30-day mortality rate of geriatric hip fractures was found to be 16.6% in the hypothyroid patient group. Moreover, the number of patients hospitalized in the ICU was observed to be higher in the hypothyroid patient group (55.6%) compared to the other groups.

Various results have been reported in the literature regarding 30-day and 1-year mortality rates in geriatric patients after hip fracture surgery. Forni et al.^[8] reported that the 30-day mortality rate of geriatric hip fracture was 5% in a prospective study of 728 patients. Giannoulis et al.^[9] reported that 30-day mortality after hip fracture ranged from 1.4% to 10%. On the other hand, Folbert et al.^[10] stated that the 1-year mortality rate in geriatric hip fractures was 23.2%. Moreover, Johnston et al.^[11] reported that the 1-year mortality was 30.7% in their geriatric hip fracture study consisted of 27,475 patients. In the present study, 30-day and 1-year mortality rates were 6.5% and 23.7%, respectively. However, the 30-day mortality rate in the hypothyroid patient group was found to be 16.6%. The fact that this rate was not statistically significant was attributed by the authors to the low sample size.

Charlson comorbidity index was declared to be associated with mortality in geriatric hip fracture patients.^[5,12] Furthermore, it has been claimed that the ASA score is also effective in determining postoperative mortality.^[13] In this study, CCI and ASA scores were used to standardize other possible factors affecting mortality in evaluating the effect of thyroid diseases on mortality in geriatric hip fractures. There was no statistically significant difference between the groups in terms of CCI and ASA scores. Hence, it is considered by the authors that thyroid dysfunctions are addressed as an independent factor.

Rapacki et al.^[5] reported that serum TSH has a predictive significance for mortality in geriatric hip fractures. TSH is a hormone and the lower or higher reference values than the normal have different clinical consequences.^[14] Hence, it is not appropriate to use serum TSH level as a linear value. Therefore, the authors think that hypothyroidism and hyperthyroidism are clinical diagnoses and should not be evaluated solely on the TSH level. In the present study, the effect of thyroid diseases on mortality has been evaluated. Ling et al.^[6] reported that thyroid diseases do not affect mortality in geriatric hip fracture patients. This result should be evaluated considering the fact that the study groups are not standardized in terms of other possible diseases that may affect mortality.

It was previously reported that one of the important predictive factors for mortality in the ICU is the LOS.^[15] It has been declared that prolonged ICU treatment in geriatric hip fractures is associated with mortality and nursing care needed.^[16] In this study, it was determined that the hypothyroid patient group had a higher need for treatment and duration of stay in the ICU. It can be interpreted that the prolongation of the treatment period in the ICU and the higher 30-day mortality rate is related.

The limitations of this study were that it used data obtained from retrospective screening, small sample size, and was performed in a single center. However, its strengths were that it was the first article to examine the effects of thyroid dysfunction on the need for treatment in the ICU and the LOS in the ICU in elderly hip fracture patients. Yet, this study leads to the consideration of the effects of thyroid dysfunction on both 30-day and 1-year mortality in geriatric hip fractures. Last but not least, more studies are needed in larger populations to evaluate the potential effects of thyroid dysfunctions in the geriatric patients with hip fractures.

Conclusion

In the geriatric hip fracture patients accompanied by hypothyroidism in the pre-operative period, the necessity of the hospitalization in an ICU and the duration of stay in the ICU were increased in the post-operative period. Hence, it is recommended that the geriatric hip fracture patients with hypothyroidism should be followed up closely in the peri-operative period.

Disclosures

Ethics Committee Approval: Ankara City Hospital Ethics Committee, E1-20-1233, 11/11/2020.

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Conflict of Interest: None declared.

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