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From The Editor In Chief

Dear colleagues,

The details of the upcoming education activities and meetings of Turkish Geriatrics Society are below.

2nd Course on Scientific Researches in Geriatrics will be held in 27-28 Nov, 2015 in Çankaya Municipality 100+ Age Club-Ankara.

Trainers who are experienced in research methodology and scientific writing in geriatrics and gerontology will take part during this interactive course.

5th Geriatrics and Gerontology Course will be performed in 25-29 April, 2016 in Ankara.The course will be organized in collaboration with International Institute on Ageing-INIA, United Nations, Turkish Geriatrics Society and Hacettepe University Research and Application Center of Geriatric Sciences-GEBAM.

International and national trainers who are experienced in geriatrics and gerontology will take part during this interactive course.

All the details of these courses will be announced on the web site of Turkish Geriatrics Society and the board of directors are honored to invite you to these scientific courses.

Prof. Yesim GOKCE KUTSAL

Editor in Chief

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RESEARCH

AFFECTING FACTORS ON EARLY MORTALITY IN ELDERLY PATIENTS DIAGNOSED WITH PULMONARY EMBOLISM IN EMERGENCY DEPARTMENT

ABSTRACT

Introduction: The ratio of elderly people in Turkey is rapidly growing. It is known that pulmonary embolism and venous thrombolysis incidence increases with age. Despite the major advances in pulmonary embolism diagnosis and treatment, pulmonary embolism leads to higher mortality rates in the elderly. In the present study, evaluation of socio-demographic and clinical characteristics of elderly patients diagnosed with pulmonary embolism in the emergency department and determination of factors that affect early mortality have been targeted in order to decrease mortality.

Materials and Method: Between January 1, 2009, and September 30, 2014, patients who were 65 years of age and older who had been admitted through the emergency department with suspected pulmonary embolism and whose pulmonary embolism diagnosis was finalized via a computerized tomographic pulmonary angiography.

Results: In the study, 87 (61.8%) were female and 52 (38.2%) were male. Thirteen patients (9.4%) died during the follow-up period. The analysis of the relationship between pulmonary embolism in elderly patients and early mortality revealed that there is a statistical correlation among immobility, syncope, tachycardia, hypotension, elevated Troponin-T, coronary arterial disease, cerebrovascular disease, pulmonary embolism with massive dimension, bilateral pulmonary embolism, Wells-likely pulmonary embolism, and modified Geneva-likely pulmonary embolism were statistically related factors(p values, respectively, were 0.002; 0.033; 0.000; 0.000; 0.000; 0.037; 0.011; 0.000; 0.030; 0.023; 0.018).

Conclusion: Immobility, syncope, tachycardia, hypotension, elevated Troponin T, coronary arterial disease, cerebrovascular disease, pulmonary embolism with massive dimension, bilateral pulmonary embolism, Wells-likely pulmonary embolism, and modified Geneva-likely pulmonary embolism were determined as effective risk factors affecting the early mortality of elderly patients with pulmonary embolism.

Key Words: Aged; Mortality; Pulmonary Embolism.

ARAŞTIRMA

ACİL SERVİSTE PULMONER EMBOLİ TANISI KONULAN YAŞLI HASTALARDA ERKEN MORTALİTEYİ ETKİLEYEN FAKTÖRLER

ÖZ

Giriş: Tüm dünyada olduğu gibi Türkiye'de de yaşlı nüfus oranı hızla artmaktadır. Pulmoner emboli ve venöz tromboli insidansının yaşla birlikte arttığı bilinmektedir. Pulmoner emboli tanı ve tedavisindeki büyük ilerlemelere rağmen pulmoner emboli yaşlılarda daha yüksek oranda mortalite ile sonuçlanmaktadır. Bu çalışmada, acil serviste pulmoner emboli tanısı alan yaşlı hastaların sosyodemografik ve klinik özelliklerini değerlendirmek ve mortalitenin azaltılabilmesi için erken mortalite üzerindeki etkili faktörlerin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Bu çalışma 01.01.2009 tarihi ile 30.09.2014 tarihleri arasında acil servise başvuran 65 yaş ve üzeri olan ve pulmoner emboli şüphesi ile çekilen kompüterize tomografik pulmoner anjiografilerinde pulmoner emboli tanısı kesinleşen 139 hasta hastane bilgisayar kayıt sisteminden retrospektif olarak incelendi.

Bulgular: Bu çalışmada hastaların 87'si (%61,8) kadın, 52'si (%38,2)'si erkekti. Hastaların takibinde 13 kişi (9,4%) yaşamını kaybetti. Çalışmada pulmoner embolili yaşlı hastalarının acil başvuru anındaki özellikleri ile erken mortalite arasındaki faktörlerin araştırıldığı analizde immobilite, bayılma, taşikardi, hipotansiyon, Troponin T yükselmesi, koroner arter hastalığı, serebrovasküler hastalık, masif boyutlu pulmoner emboli olması, bilateral pulmoner emboli olması, Wells skorlamasında muhtemel pulmoner emboli olması ve Modifiye Genava skorlamasında muhtemel pulmoner emboli olmasının istatistiksel olarak ilişkili faktörler olduğu tespit edildi(p değerleri sırasıyla 0,002; 0,033; 0,000; 0,000; 0,006; 0,037; 0,011; 0,000; 0,030; 0,023; 0,018).

Sonuç: İmmobilite, senkop, taşikardi, hipotansiyon, Troponin T yükselmesi, koroner arter hastalığı, serebrovasküler hastalık, masif boyutlu pulmoner emboli olması, bilateral pulmoner emboli olması, Wells skorlamasında muhtemel pulmoner emboli olması ve Modifiye Genava skorlamasında muhtemel pulmoner emboli olması yaşlı pulmoner embolili hastalarda erken mortalite üzerine etkili faktörler olarak bulunmuştur.

Anahtar Sözcükler: Yaşlı; Mortalite; Pulmoner Emboli.

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Introduction

The elderly population rate is increasing rapidly in Turkey (1). It is observed that there has been a progressive increase in the number of elderly visiting Turkish emergency departments during the last ten years (2). Elderly patients make up 12–21% of all emergency admissions and 30–50% of elderly visitors to the emergency department who are subsequently admitted are hospitalized primarily in intensive care units (3).

It is known that pulmonary embolism (PE) and venous thrombolysis incidence increases with age (4). PE symptoms and findings may hide and lead to delays in diagnosis and treatment due to other accompanying cardiac and pulmonary diseases (5). Wells scores and Modified Geneva scores are among the most frequently used PE clinic probability rules for early diagnosis of patients with PE risk and suspicion (6). Despite the major advances in PE diagnosis and treatment, PE leads to higher mortality rates in the elderly (7). In the present study, evaluation of socio-demographic and clinical characteristics of elderly patients diagnosed with PE in the emergency department and determination of factors that affect early mortality have been targeted in order to decrease mortality.

Materials and Method

In the present study, after receiving ethical committee approval (2014/51), 139 patients 65 years of age and older who had been admitted through the emergency department with suspected PE from January 1, 2009, and September 30, 2014 and whose PE diagnosis was finalized via computerized tomographic pulmonary angiography (CTPA), were investigated retrospectively by using records available in the hospital computer recording system. The type of the study was a retrospective cross-sectional study. Patients who were dead on arrival, cases under 65 years of age, and patients whose information was unavailable were excluded from the study.

Socio-demographic and clinical characteristics such as age, gender, season during which the patient was admitted, presenting symptoms, accompanying diseases, arterial blood pressure, pulse, oxygen saturation, predisposing illnesses, laboratory values, and patient outcome were evaluated. The patients were divided into two groups based on their hospital outcomes as living and dead and factors that affect mortality were investigated. Early mortality in PE was accepted as death at the hospital or at home within 30 days after diagnosed PE.

Pulmonary embolism diagnosis was made through the determination of images consistent with CTPA pulmonary thromboembolism taken with computerized tomography equipment containing 64 detectors (Brilliance BT equipment, Philips Medical Systems, Cleveland, Ohio). Pulmonary embolism dimension was divided into three groups as massive (embolism in main pulmonary arteries), segmental, and subsegmental; in addition, it was divided into three groups according to PE settlement location as right, left, and bilateral.

Wells scores and Modified Geneva scores, which are the pulmonary embolism clinical probability rules, were estimated as two-level scoring and three-level scoring. D-dimer cut off value was accepted as > 279 ng/ml according to the HemosiL method and as 0.5 µg/ml as per the Tinaquant method; results exceeding these values were considered D-dimer positivity. Troponin was measured as T quantitative data by Bechman Coulter Access 2 equipment and the reference interval was 0–0.04 µg/l. A µg/l value ≥0.1 for troponin T was accepted as troponin T positivity.

Statistical analysis was performed using SPSS 18.0 (Statistical Package for Social Science, Chicago, IL, USA). Data were tested for normality using the Kolmogorov–Smirnov normality test. The results were expressed as means ± SD or number of patients. Categorical data were analyzed using the chi-square test. Multivariate logistic regression analysis (Backward-Wald Step-Wise Model) was used to detect risk factors for mortality. Odds ratios (OR) with 95% confidence intervals (CI) were estimated. A Student's *t*-test was used for normally distributed data. A p value of < 0.05 was considered significant.

Results

In the present study, out of 139 patients whose PE diagnoses were finalized by CTPA taken in the emergency department with PE suspicion, 87 (61.8%) were female and 52 (38.2%) were male. The clinical and socio-demographic characteristics of the patients are presented in Table 1, Table 2, Table 3, and Table 4. Thirteen patients (9.4%) died during the follow-up period.

In the study, in Table 5, factors between the characteristics of PE patients at the moment of emergency department application and mortality were investigated; it was determined that immobility, syncope, tachycardia, hypotension, elevated Troponin T, coronary artery disease (CAD), cerebrovascular disease (CVD), PE with massive dimension, bilateral

Table 1— Socio-demographic Characteristics of Elderly Patients with Pulmonary Embolism, and Predisposing Factors.

Socio-demographic Characteristics	Survival (n=126)	Nonsurvival (n=13)	Total (n=139)
Age (years, mean±sd)	72.7±6.4	71.5±5.8	72.5±6.4
Gender, n (%)			
Female	80(63.5)	7(53.8)	87(62.6)
Male	46(36.5)	6(46.2)	52(37.4)
Admission season, n (%)			
Winter	25(19.8)	5(38.5)	30(21.6)
Spring	46(36.5)	1(7.7)	47(33.8)
Summer	29(23.0)	5(38.5)	34(24.5)
Autumn	26(20.0)	2(15.4)	28(21.0)
Predisposing factors, n (%)			
Immobilization	22(17.5)	7(53.8)	29(20.9)
Previous history of PE or DVT	9(7.1)	1(7.7)	10(7.2)
Operation	27(21.4)	1(7.7)	28(20.1)
Varices ofleg	1(0.8)	1(7.7)	2(1.4)
Maligmancy	8(6.3)	–	8(5.8)
Prolonged travel	4(3.2)	–	4(2.7)
Thrombophilia	2(1.6)	–	2(1.4)
Hormone replacement therapy	1(0.8)	–	1(0.7)
Fracture of lower extremity	27(21.4)	2(15.4)	29(20.9)

PE: Pulmonary embolism, DVT: Deep venous thrombosis.

Table 2— Clinical Findings.

Exammation Parameter, n(%)	Survival (n=126)	Nonsurvival (n=13)	Total (n=139)
Presenting symptoms			
Shortness of breath	119(94.4)	13(100.0)	132(95.0)
Chest pain	90(71.4)	7(53.8)	97(69.8)
Syncope	5(4.0)	3(23.1)	8(5.8)
Palpitation	34(26.9)	13(100.0)	7(5)
Hemoptysis	29(23.0)	4(30.8)	33(23.7)
Weakness	11(8.7)	2(15.4)	13(9.4)
Limb pain	48(38.1)	6(46.2)	54(38.8)
Accompanying diseases			
Hypertension	46(36.5)	7(53.8)	53(38.1)
Diabetes Mellitus	26(20.7)	1/(7.7)	27(19.4)
Malignancy	8(6.3)	–	8(5.8)
CAD	41(32.5)	8(61.5)	49(35.3)
COPD	23(18.3)	3(23.1)	26(18.7)
Deep vein thrombosis	53(42.0)	1(7.7)	54(38.8)
CVD	6(4.8)	3(23.1)	9(6.5)
CRF	3(2.4)	–	2(2.2)
Others	50(39.7)	3(23.1)	53(38.1)
Haemodynamic parameters			
Systolic blood pressure <100 mmHg	7.0(5.6)	5(38.5)	12(8.6)
Tachypnea (>20/min)	90.0(71.4)	7(53.8)	97(69.8)
Tachyeardia (>100/min)	34.0(27.0)	13(100.0)	47(33.8)
Arterial oxygen saturation <90%	82.0(65.1)	13(100.0)	95(68.3)
Elevated D-dimer	119.0(94.4)	13(100.0)	132(95.0)
Elevated Troponin T	14.0(11.1)	13(100.0)	27(19.4)
Need for intensive care	25.0(19.8)	8(61.5)	33(23.7)

CAD: Coronary artery disease, COPD: Chronic obstructive pulmonary disease, CVD: Cerebrovascular disease, CRF: Chronic renalfailure.

Table 3— Degree and Localization of Pulmonary Embolism.

	Survival (n=126)	Nonsurvival (n=13)	Total (n=139)
Localization level of PE, n(%)			
Massive	23(18.3)	9(69.2)	32(23.0)
Segmental	82(65.1)	6(46.2)	88(63.3)
Sub segmental	55(43.7)	2(15.4)	17(13.7)
Localization side of PE, n(%)			
Right	38(30.1)	11(84.6)	45(32.3)
Left	40(31.7)	11(84.6)	37(26.7)
Bilateral	48(38.0)	9(69.2)	57(41.0)

PE: Pulmonary embolism.

Table 4— Multivariate Logistic Regression Results for Risk Factors Affecting Early Mortality in the Elderly Pulmonary Embolism.

Clinical Probability Rules	Survival (n=126)	Nonsurvival (n=13)	Total (n=139)
Wells Score (Mean±sd)	4.9±2.1	6.1±2.0	5.0±2.0
Three-level score, n(%)			
Low (<2 point)	9(7.1)	–	9(6.5)
Intermediate (2-6 point)	84(66.7)	7(53.8)	91(65.5)
High (>6 point)	33(26.7)	6(46.2)	39(28.0)
Two-level score, n(%)			
PE unlikely (<4 point)	50(39.7)	1(7.7)	51(36.7)
PE likely (>4 point)	76(60.3)	12(92.3)	88(63.8)
Modified Genava Score (Mean±SD)	8.6±4.4	12.7±4.2	9.0± 4.5
Three-level score, n(%)			
Low (0-3 point)	14(11.1)	–	14(10.1)
Intermediate (4-10 point)	71(56.3)	6(46.2)	77(55.4)
High (>11 point)	41(32.5)	7(53.8)	48(34.5)
Two-level score, n(%)			
PE unlikely (0-5 point)	39(31.0)	–	39(28.1)
PE likely (>6 point)	87(69.0)	13(100.0)	100(71.9)

Table 5— Multivariate Logistic Regression Results for Risk Factors Affecting Early Mortality in the Elderly Pulmonary Embolism.

Risk Factors	Ods Ratio	95% Confidence Intervals	p
Immobilization	0.23	0.08-0.62	0.002
Syncope	0.29	0.09-0.89	0.033
Tachycardia	0.09	0.01-1.71	<0.001
Hypotension	0.15	0.06-0.39	<0.001
Elevated Troponin T	0.25	0.09-0.69	0.006
CAD	0.34	0.12-0.98	0.037
CVD	0.23	0.08-0.69	0.011
PE with massive dimension	0.13	0.04-0.40	<0.001
Bilateral PE	0.31	0.10-0.96	0.030
Wells Likely PE	0.14	0.02-1.07	0.023
Modifiye Genava Likely PE	0.06	0.00-0.28	0.018

CAD: Coronary artery disease, CVD: Cerebrovascular disease, PE: Pulmonary embolism.



PE, Wells-likely PE, and modified Geneva-likely PE were statistically related factors (p values, respectively, were 0.002; 0.033; 0.000; 0.000; 0.000; 0.037; 0.011; 0.000; 0.030; 0.023; 0.018).

Discussion

Although pulmonary embolism is a major health problem, few effective studies are performed on mortality risk factors and prognosis in elderly patients with PE (8). PE mortality rates range between 10–30% (9,10). However, there was no significant difference in our study in the clinical and socio-demographic characteristics of the patients between the previous studies, immobility, syncope, tachycardia, hypotension, elevated Troponin T, CAD, CVD, PE with massive dimension, bilateral PE, Wells-likely PE, and modified Geneva-likely PE were determined as effective risk factors influencing early mortality for geriatric patients with pulmonary embolism.

In the Prospective Investigation of Pulmonary Embolism Diagnosis (PIOPED) study, immobility was determined to be one of the most frequently encountered risk factors for PE in all age groups (11). In another study, Masotti et al. (12) reported that among elderly patients diagnosed with acute PE, 65% had immobility. In our study, immobility was found to be one of the most frequent risk factors for PE and also a factor that affects mortality. We think that mortality due to PE can be decreased in immobile elderly patients by taking prophylactic precautions for PE and, when PE is suspected, by starting investigations and treatment rapidly.

In a study conducted by Punukollu et al. (13), it was indicated that the most frequent application complaint in elderly PE patients was syncope. Furthermore, syncope may be an indication of hemodynamic reserve in PE patients. In severe cases, shock and arterial hypotension are major indicators of mortality (6,14). One of the most frequent physical examination findings in PE patients is tachycardia (>100 beats/min) (15). On the other hand, a previous study reported that syncope, hypotension, and tachycardia may be seen in other cardiovascular comorbidities and that differential diagnoses for PE may be difficult in some elderly patients (16). Therefore, clinical practitioners should be attentive when diagnosing PE in elderly patients. However, in a previous study, patients' hemodynamic situation was determined to be the strongest indicator related to early-phase mortality in PE (14). In our study, parallel to this information, syncope as a presenting symptom-along with hypotension and tachycardia findings upon physical examination-was found to be the most significantly effective mortality factor in PE patients. Therefore, we think that mortality due to these factors can be decreased in PE patients through rapid hemodynamic support.

In PE, an increase in cardiac troponin levels is observed in 20–40% of the patients (17). High levels of cardiac troponin are directly proportional to the seriousness of the clinical state. In these patients, death rates while in the hospital increased 30-fold; therefore, there is need for more aggressive treatment in these patients (18). Cardiac troponin level increases in middle-and wide-diameter pulmonary embolism patients, and it is negative in almost all of the small-diameter pulmonary embolism patients. Mortality in PE patients depends on not only the cardiopulmonary reserve but also upon the embolism dimension (19). In our study, elevated Troponin T, PE with massive dimension, and bilateral PE were among the most effective mortality factors in PE patients. We think that Troponin T elevation occurs as a result of accompanying hypotension, right ventricular infarction, or hypoxemia associated with embolism size, and we consider main comorbid diseases to be a more direct sign of the size of PE than the level of embolism. Appropriate treatment should be started immediately to decrease mortality.

However in the previous studies, there was no relation between the presence of a comorbid disease and mortality due to PE (20,21). In the study by Bulbul et al. (22), mortality rate was found to be 9.6%, and it was observed that mortality was high, specifically in the patient group with additional illnesses. Also, Duru et al. (1) reported that the most common reason for both early and late mortality was the occurrence of comorbid diseases. In our study, CAD and CVD in patients with PE were found to be factors that also affected mortality. This situation can be explained by the higher risk of disturbing hemodynamic situations in elderly patients with CAD and more severe hemodynamic impairment. The presence of CVD can be explained by increased PE tendency, depending on immobility. In case of accompanying comorbid illnesses in PE patients, mortality can be decreased by closer hemodynamic observation and treatment.

Wells and modified Geneva scores are among the PE clinical probability rules (CPR) that are most frequently used in the early diagnosis of patients with risk or suspicion of PE, and it is thought that they are not superior to one another (6,23). A change is not observed in the performances of these scoring methods with increased age (24). A large section of PE patients is included in the likely PE group in both scoring methods (6). In a prospective study that checked the achieve-

ment of these two CPRs, authors reported that selection of CPR should be dependent on institutional predilection and practice, as the results of this study were parallel for all CPRs (25). Although a large percentage of the patients were included in the likely PE group in both scoring methods in our study, inclusion of PE patients in these groups was also found to be due to factors that affect mortality. This situation can be explained by the patients in these groups having other factors that could also affect mortality. We consider that the application of any CPR seems to be far more significant than the selection of which specific CPR to practice, that CPR must be used carefully, and that close monitoring is necessary for the patients included in the PE-likely group.

One of the limiting factors in our retrospective study was the scanning data of some patients in the hospital computer system was inadequate, although the patients came to the emergency medical clinic and were treated. The other limiting factor was leaving patients who were suspected of PE but who died prior to diagnosis with CTPA and who had insufficient data out of the study.

In conclusion, immobility, syncope, tachycardia, hypotension, elevated Troponin T, CAD, CVD, PE with massive dimension, bilateral PE, Wells-likely PE, and modified Geneva-likely PE were determined as effective risk factors affecting the early mortality of elderly patients with PE. In light of the results of this study, we conclude that PE and mortality for PE can be decreased among elderly people-particularly those who are at risk for PE and have risk factors affecting mortality-by providing them with close hemodynamic monitoring and treatment.

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RESEARCH

THE EFFECTS OF ANEMIA AND RED CELL TRANSFUSION ON THE RISK OF MORTALITY AMONG GERIATRIC AND NON-GERIATRIC PATIENTS WITH HOSPITAL-ACQUIRED INFECTIONS IN AN INTENSIVE CARE UNIT

ABSTRACT

Introduction: This study aimed to investigate the effects of anemia and red blood cell transfusion on the risk of mortality in geriatric and non-geriatric Intensive Care Unit patients with Hospital-Acquired Infection.

Materials and Method: This study included 546 patients aged ≥18 years; from these, 112 patients had Hospital-Acquired Infection.

Results: Among the patients aged ≥65 years with Hospital-Acquired Infection who were treated in the medical Intensive Care Unit, the risk of mortality was significantly increased in patients with anemia or history of diabetes; in patients who were intubated or in patients with neurological disorders or respiratory failure. Although the abovementioned factors increased the risk of mortality in the elderly, the same relationship was not observed in patients aged<65 years. In addition, blood transfusion did not increase the risk of mortality in patients belonging to both the age groups.

Conclusion: We conclude that in geriatric Intensive Care Unit patients with Hospital-Acquired Infection, anemia increases the risk of mortality but red cell transfusion does not affect the risk of mortality.

Key Words: Intensive Care Unit; Cross Infection; Geriatrics; Anemia; Erythrocyte Transfusion.

ARAŞTIRMA

YOĞUN BAKIM ÜNİTESİNDEKİ HASTANE ENFEKSİYONLU GERİATRİK VE NON-GERİATRİK HASTALARDA, ANEMİ VE ERİTROSİT TRANSFÜZYONUNUN MORTALİTEYE ETKİSİ

ÖZ

Giriş: Bu çalışmada, hastane enfeksiyonlu, geriatrik ve geriatrik olmayan yoğun bakım hastalarında; anemi ve eritrosit transfüzyonunun mortaliteye etkisinin değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: On sekiz yaş ve üstü toplam 546 hastada gelişen 112 hastane enfeksiyonlu hasta çalışmaya alınmıştır.

Bulgular: Dahili yoğun bakım ünitemizde takip edilen hastane enfeksiyonu tanılı, 65 yaş ve üzeri yaşlı hastalarda; anemi varlığı, yatış tanısının nörolojik hastalık ve solunum yetmezliği olması, diyabet öyküsü olması, hastanın entübe edilmesi mortaliteyi anlamlı oranda artırmıştır. İleri yaş grubunda mortaliteyi artıran tüm bu faktörlerin, 65 yaş altı hastalarda mortalite artışı ile ilişkisi saptanamamıştır. Her iki grup için de, eritrosit transfüzyonu yapılmasının mortaliteye etkisinin olmadığı görülmüştür.

Sonuç: Yoğun bakımdaki hastane enfeksiyonlu geriatrik hastalarda anemi mortalite riskini artırmaktadır ancak eritrosit transfüzyonu mortalite riskini etkilememektedir.

Anahtar Sözcükler: Yoğun Bakım Ünitesi; Hastane Enfeksiyonu; Geriatrik; Anemi; Eritrosit Transfüzyonu.

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Introduction

Patients with serious problems are monitored and treated in intensive care units (ICUs). Most deaths in ICUs are commonly caused by cardiac, neurological, and respiratory disorders; sepsis; and pneumonia (1,2).

Hospital-acquired infections (HAIs) do not develop during the incubation period at the time of admission to a hospital but are acquired once a patient has been admitted to the hospital. HAIs are a concern that arise with medical improvements and have become a quality indicator for hospitals. HAIs frequently develop in ICU patients and are associated with a notable increase in mortality and morbidity, longer hospital stay, and increased hospital cost (3). In elderly patients admitted to medical ICUs, several factors increase the predisposition to HAIs. Of these comorbidity, age, multiple invasive procedures, and physical conditions are the important causes of multiple complications (4,5).

Anemia is a serious concern in ICU sand is associated with multiple risk factors such as sepsis, occult blood loss, decrease in erythropoietin production, malnutrition, hemolysis, and defective coagulation. Anemia increases the risk of mortality and morbidity because of its cardiovascular and cerebrovascular effects that result in tissue hypoxia (6-8). Treatment of anemia usually involves red blood cell transfusion. However, the ideal hemoglobin (Hb) level for transfusion is unknown. In literature some studies have shown that red blood cell transfusion may increases the risk of mortality, morbidity, and transfusion-related infections and extends hospital stay in ICU patients (3,9,10).

This study aimed to investigate the effects of anemia and red blood cell transfusion on the risk of mortality in geriatric and non-geriatric ICU patients with HAIs.

Materials and Method

This retrospective study was performed in a tertiary nine-bed ICU at our Department of Internal Medicine. This study included 546 patients aged ≥18 years that were monitored for two years; out of these, 112 had HAIs. Patients who were monitored for less than two days were excluded from the study.

The Centers for Diseases Control and Prevention defined HAIs as infections that are not acquired during incubation state at the time of admission to the hospital but that are present after a patient has been admitted to the hospital. HAIs rate and incidence density were calculated as follows: (1) HAIs rate (%) = number of infections developed in the ICU/number of patients in the ICU x 100; (2) incidence density =number of infections developed in the ICU/total number of days a patient has stayed in the ICU x 1000 (11). Blood, urine, and sputum (or deep tracheal aspiration) samples were taken from patients who developed HAIs; samples from wounds, upper respiratory tract, and catheter were taken if necessary. Based on the World Health Organization (WHO) criteria, patients aged ≥65 years were classified as geriatric patients and those aged<65 years were classified as non-geriatric patients

Based on the WHO definition, men with serum Hb level below 13 g/dL and women with serum Hb level below 12 g/Dl were classified as anemic. The decision to initiate transfusion was taken by patient's doctor after evaluating the patient's comorbidities, oxygen saturation, and other vital signs.

Statistical Analysis

Descriptive variables in the collected data were expressed as average ± standard deviation, number and percentage frequencies. Chi-square test was applied to evaluate factors related to mortality, and independent sample t test was applied to evaluate factors related to hospital stay. The probability of type 1 error (·) was taken as 5%. All the statistical analyses were performed using SPSS software (ver.18).

Results

During the two years, 546 patients included in the study were followed up for 5647 patient-days, and the average follow-up time was 47.07±51.29 (range, 4–372) days. HAIs were present in 112 patients, of which 57 (50.9%) were women and 55 (49.1%) were men. HAIs rate was 20.5%, and HAIs incidence rate was 19.8/1000 (1.98%) patient days. The average of age of 112 patients with HAIs was 71.12±13.41 (range, 19–97) years. Out of the 112 patients with HAIs, 27 (24.1%) were aged <65 years (37% female, 63% male) whereas 85 (75.9%) were aged ≥65 years (55.3% female, 44.7% male). The average age of patients aged <65 years was 53.15±12.44 years and that of patients aged ≥65 years was 76.84±7.27 years.

In all, 71 (63.4%) patients with HAIs died in the ICU; out of these, 13 patients were aged<65 years and 58 patients were aged ≥65 years. Patients in the two groups did not show significant differences in the risk of mortality (p=0.25).

Neurological disorders, respiratory failure, cardiovascular disorders, and infections (pneumonia, urinary tract infection, sepsis, etc.) were common reasons for admission to the ICU.

Table 1— Relationship Between Admission Diagnosis and Mortality in the Groups Aged <65 Years and Aged ≥65 Years.

		Aged <65			Aged ≥65 years		
		Discharge Number (Percent)	Exitus Number (Percent)	p	Discharge Number (Percent)	Exitus Number (Percent)	p
Admission diagnoses	Neurological disorder	1 (25.0)	3 (75.0)	0.41	4 (31.0)	9 (69.0)	0.41
	Respiratory failure	4 (44.0)	5 (56)		8 (22.2)	28 (77.8)	
	Infection (pneumonia, urinary system infection, septic shock)	1 (50.0)	1 (50.0)		4 (50.0)	4 (50.0)	
	Cardiovascular disease	3 (60.0)	2 (40.0)		1 (33.3)	2 (66.7)	

Respiratory failure and neurological disorders were more frequent than other conditions in patients aged ≥65 years; moreover, the patients in this group showed an increased risk of mortality (p = 0.03; Table 1).

The most commonly diagnosed HAIs were pneumonia, urinary tract infections, and bacteremia (in the given order). However, these factors did not significantly increase the risk of mortality in the two groups

Presence of comorbidities such as neurological disorders, respiratory failure, cardiovascular diseases, and nephrological disorders did not significantly increase the risk of mortality among patients aged <65 years (p = 0.68) and those aged ≥65 years (p = 0.75). However, presence of diabetes significantly increased the risk of mortality, with 2 out of 5 patients with diabetes aged <65 years (p = 0.99) and 20 out of 22 patients with diabetes aged ≥65 years (p = 0.004) dying during the study period (Table 2).

Acinetobacter, *Pseudomonas*, *Staphylococcus*, and *Escherichia coli* (in the given order) were found to be the most common causes of HAIs. However, infection with these pathogens did not

Table 2— Comparison of Effect of Diabetes Mellitus and other Comorbidities as well as Latest Isolated Infectious Pathogen on Mortality in Both Groups

		Aged <65			Aged ≥65 years		
		Discharge Number (Percent)	Exitus Number (Percent)	p	Discharge Number (Percent)	Exitus Number (Percent)	p
Diabetes mellitus	Diabetic	3 (60.0)	2 (40.0)	0.99	2 (9.1)	20 (90.9)	0.004
	Non-Diabetic	11 (50.0)	11 (50.0)		25 (39.7)	38 (60.3)	
Comorbidities	Neurological disorder	1 (50.0)	1 (50.0)	0.68	7 (70.0)	3 (30.0)	0.75
	Respiratory failure	1 (50.0)	1 (50.0)		- (-)	2 (100.0)	
	Cardiovascular disorder	4 (66.7)	2 (33.3)		7 (58.3)	5 (41.7)	
Latest isolated infectious pathogen	Acinetobacter	2 (25.0)	6 (75)	0.088	3 (15.0)	17 (85.0)	0.024
	Pseudomonas	3 (100.0)	- (-)		3 (30.0)	7 (70.0)	
	Staphylococcus	2 (50.0)	2 (50.0)		1 (16.7)	5 (83.3)	
	E. coli	- (-)	1 (100.0)		7 (63.6)	4 (36.4)	



Table 3— Comparison of Anemia Rates and Transfusion Need in Both Groups.

		Anemia			Transfusion		
		(-) Number (Percent)	(+) Number (Percent)	p	(-) Number (Percent)	(+) Number (Percent)	p
Age	**<65 years**	14 (51.9)	13 (48.1)	0.39	21 (77.8)	6 (22.2)	0.70
	≥65 years	36 (42.4)	49 (57.6)		63 (74.1)	22 (25.9)	

increase the risk of mortality in patients aged <65 years (p = 0.08). However, infection with *Acinetobacter*, *Pseudomonas*, and *Staphylococcus* significantly increased the risk of mortality in patients aged ≥65 years (p=0.02; Table 2).

Out of the 112 patients with HAIs, 62 (13 patients aged<65 years and 49 patients aged ≥65 years) had anemia and 28 (6 patients aged<65 years and 22 patients aged ≥65 years) needed red blood cell transfusion. Rates of anemia and blood transfusion were not significantly different between patients in the two groups (p=0.39 for the rate of anemia and p=0.70 for the rate of blood transfusion; Table 3). In patients aged <65 years, effects of anemia and blood transfusion on the risk of mortality were not significantly different between anemic and non-anemic patients (p=0.57) and between patients receiving and not receiving blood transfusion (p=0.65). However, in patients aged ≥65 years, presence of anemia significantly increased the risk of mortality (p=0.03), but blood transfusion had no effect on the risk of mortality (p=0.60; Table 4).

When the association of intubation, another important mortality-related factor in the ICU, with mortality was analyzed, it was observed that 80 out of 112 patients with HAIs required intubation. Of these, 21 patients were aged<65 years and 59 patients were aged ≥65 years. Therefore, it was concluded that intubation was an important cause of mortality in patients aged ≥65 years (p=0.02) but not in patients aged<65 years (p=0.99).

Discussion

In this study, we observed that low Hb levels during admission, latest isolated HAIs pathogen, presence of neurological disorders or respiratory failure during admission, intubation, and history of diabetes strongly increased the risk of mortality in patients with HAIs aged ≥65 years who were admitted to our medical ICU. None of these factors were associated with mortality in patients aged<65 years.

HAIs rate and HAIs incidence density reported in this study were similar to those reported in other studies performed in our country (12,13). Pneumonia, urinary tract infection, and bacteremia are the most common causes of HAIs worldwide (12,14,15).

Acinetobacter, *Pseudomonas*, *Staphylococcus*, and *E. coli* were the most frequently isolated microorganisms in our study, which was consistent with the findings of previous studies performed in our country (12,16). A study by Avci Met. al. evaluating HAIs frequency, infection type and microbiological characteristics in all hospital patients aged <65 years and those aged ≥65 years showed that HAIs were more fatal in elderly patients than in younger patients (17). Although our study included only ICU patients, our findings showed significantly higher mortality in elderly patients than in younger patients with HAIs caused by the most common pathogens.

Not many studies have determined evaluating the underlying disorders affecting mortality in ICU patients. A study

Table 4— Comparison of Effect of Anemia and Blood Transfusion on Mortality Between Two Groups.

		Aged <65 years			Aged ≥65 years		
		Discharge Number (Percent)	Exitus Number (Percent)	p	Discharge Number (Percent)	Exitus Number (Percent)	P
Anemia	**(-)**	8 (57.1)	6 (42.9)	0.57	16 (44.4)	20 (55.6)	0.03
	(+)	6 (46.2)	7 (53.8)		11 (22.4)	38 (77.6)	
Transfusion	**(-)**	10 (47.6)	11 (52.4)	0.65	21 (33.3)	42 (66.7)	0.60
	(+)	4 (66.7)	2 (33.3)		6 (27.3)	16 (72.7)	

evaluating the incidence of HAIs, risk factors, and mortality-related conditions in the ICU showed no relationship between underlying disorders and infections; however, presence of more than two underlying disorders increased the risk of mortality (18). In our study, although no significant relationship was observed between mortality and presence of comorbidities, except diabetes, in patients belonging to the two age groups, history of diabetes increased the risk of mortality in patients aged ≥65 years.

Different results were obtained from studies investigating the effects of anemia and red blood cell transfusion on the risk of mortality. A broad study evaluating the effects of anemia and blood transfusion in ICU patients showed that anemia did not increase the risk of ICU mortality (6); however, patients receiving blood transfusion showed an increased risk of mortality. A study by Sakr et.al. on patients admitted to surgical ICU showed that mortality and morbidity were significantly higher in anemic patients and were significantly lower in patients with high Hb levels after blood transfusion (19). A study evaluating the effect of red blood cell transfusion on 213 patients with septic shock showed that 90-day mortality was high among patients with low Hb levels, which decreased after blood transfusion (20). A study by Nieves et. al. evaluating risk factors in ICU patients with hospital-acquired pneumonia showed that anemia increased the risk of pneumonia along with factors such as malnutrition, chronic kidney failure, and extended hospital stay (21). A study involving 428 patients with non-bleeding anemia of which half of the patients received blood transfusion whereas the remaining half did not showed that blood transfusion did not have favorable effects on both mortality and morbidity (22). Another study evaluating factors affecting mortality in 456 elderly ICU patients (age, >74 years) with community-acquired pneumonia showed that anemia increased the risk if mortality (23). Two separate studies showed that anemia increased the risk of mortality and morbidity in medical and surgical ICU patients (24,25). In our study, the risk of mortality increased in anemic geriatric patients with HAIs but not in patients receiving blood transfusion.

We conclude that in geriatric ICU patients with HAIs, anemia increases the risk of mortality but red cell transfusion does not increase the risk of mortality. Red cell transfusion may prevent the unfavorable effects of anemia on the risk of mortality.

Further studies evaluating the effects of anemia and blood transfusion on the risk of morbidity and mortality should be performed on a larger sample of patients and by better grouping of patients with different Hb levels; in addition, these studies should consider scoring systems and organ failures in detail.

Conflict of Interest

The authors declare that they have no conflict of interest.

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RESEARCH

LAPAROSCOPIC CHOLECYSTECTOMY IN GERIATRIC PATIENTS

ABSTRACT

Introduction: Postoperative morbidity and mortality are more frequent among older patients due to reasons such as decreased organ function and accompanying disorders and malnutrition. Laparoscopic interventions in the elderly patients can also contribute to morbidity and mortality. The purpose of this study was to assess the safety of laparoscopic cholecystectomy in the aged and very aged patients.

Materials and Method: The patients were divided into three groups based on age. Groups 1, 2 and 3 comprised patients aged <65, 65–79 and ≥80 years, respectively. Each group included 50 consecutive patients who had undergone laparoscopic cholecystectomy.

Results: The groups were different from each other in terms of pre-operation albumin level, American Society of Anesthesiologist (ASA) score, existence of hypertension, coronary artery disease and chronic obstructive lung disease, duration of the operation, emergency operation ratio, morbidity rates. Morbidity was observed in 13 (8.7%) patients, with pulmonary complications in six, cardiac complications in five and infectious complications in two. There was no mortality in the study groups. The rate of morbidity was significantly higher in patients aged>80 years than other patients. Incidence of coronary artery disease, chronic obstructive pulmonary disease, low hemoglobin and albumin levels and high ASA score occurred more frequently in patients with morbidity. Logistic regression analysis showed that presence of chronic obstructive pulmonary disease and low albumin levels was associated with morbidity.

Conclusion: In the very aged patients, for whom cholecystectomy has been planned, laparoscopic cholecystectomy can be performed safely. However, laparoscopic cholecystectomy should be performed only after thorough patient evaluation and presurgical preparation because the most important factors associated with morbidity and mortality are co-existing disorders and nutritional status.

Key Words: Geriatrics; Cholecystectomy, Laparoscopic; Morbidity.

ARAŞTIRMA

YAŞLI HASTALARDA LAPAROSKOPİK KOLESİSTEKTOMİ

ÖZ

Giriş: Yaşlılarda azalış organ fonksiyonları, yandaş hastalıklar ve malnütrisyon sebebiyle operasyon sonrası morbidite ve mortalite gençlere göre daha yüksektir. Yaşlılarda laparoskopik girişimler morbidite ve mortaliteyi daha da arttırabilir. Bu çalışmanın amacı yaşlı ve çok yaşlı hastalarda laparoskopik kolesistektomi güvenliği değerlendirmektir.

Gereç ve Yöntem: Hastalar yaşlarına göre 3 gruba ayrıldı. Grup 1, 65 yaş altı, grup 2, 65-79 yaş arası, grup 3, 80 yaş ve üstü olarak belirlendi. Her grupta laparoskopik kolesistektomi uygulanan ardışık 50 hasta incelendi. Hasta dosyaları kayıt edilerek 3 grup arasında operasyon öncesi ve sonrası bulgular karşılaştırıldı.

Bulgular: Gruplar arasında operasyon öncesi albumin seviyesi, Amerikan Anestezistler Derneği (ASA) skoru, hipertansiyon varlığı, koroner arter hastalığı, kronik obstrüktif pulmoner hastalık, operasyon süresi, acil operasyon oranı ve morbidite sıklıkları farklı idi. Morbidite 13 hastada görüldü. Bunların 6'sı pulmoner, 5'i kardiyak ve 2'si enfeksiyöz komplikasyonlardı. Mortalite izlenmedi. Seksen yaş ve üzeri hastalarda morbidite diğer gruplardan yüksek idi (p=0,001). Kronik obstrüktif pulmoner hastalık varlığı, koroner arter hastalığı varlığı, düşük hemoglobin seviyesi, düşük albümin seviyesi, yüksek ASA skoru oranları morbiditesi yüksek hastalarda aha çoktu. Lojistik regresyon analizinde kronik obstrüktif pulmoner hastalık varlığı ve düşük albümin seviyesi morbidite ile ilişkili bulundu.

Sonuç: Eğer çok yaşlı hastalarda laparoskopik kolesistektomi planlandı ise bu girişim güvenle yapılabilir. laparoskopik kolesistektomi yapılacak ileri yaşlı hastalarda morbidite ile ilişkili en önemli parametreler yandaş hastalık ve beslenme durumu olduğu için hastalarının operasyon öncesi iyi değerlendirilmesi ve hazırlanması gereklidir.

Anahtar Sözcükler: Geriatri; Laparoskopik Kolesistektomi; Morbidite.

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Introduction

As observed worldwide, Turkey has also experienced an increasing rate of life expectancy, leading to an increased ageing population. In Turkey, in the year 2000, the median age was 24.8 years and the rate of individuals aged 65 years and over was 5.7%, whereas in 2012, the median age was 30.1 years and the rate of individuals aged 65 years and over was 7.5%. It is predicted that in the years 2023 and 2050, the rates of individuals aged 65 and over would be 10.2% and 20.8%, respectively. For women and men, the expected life span was 79.2 and 74.7 years, respectively, in 2013 and it will be 80.2 and 75.8 years, respectively, in 2023 (1).

As the ageing population increases, the number of surgical interventions within this demographic also increases. However, postoperative morbidity and mortality are more frequent in the aged than in the younger population due to reasons such as decreased organ function and accompanying disorders and malnutrition (2,3). Laparoscopic interventions in elderly patients can escalate morbidity and mortality because of increases in intra-abdominal pressure that may negatively affect the respiratory system, circulatory system and intra-abdominal organs (4). The purpose of this study was to assess the safety of laparoscopic cholecystectomy (LC) in the aged and very aged patients.

Materials and Method

This retrospective study, which included aged patients who had undergone LC, was approved by Antalya Training and Research Hospital, Clinical Ethics Committees (52/6, 08.01.2015). The patients were divided into three groups based on age. For the purpose of our study, patients 65 years and over were considered 'aged'. Patients aged 80 years and over were separately grouped as very old patients. Groups 1, 2 and 3 comprised patients aged <65, 65–79 and ≥80 years, respectively. Each group included 50 consecutive patients who had undergone LC in our clinic. Time intervals for operations were years 2009 to 2014 in first group, years 2013 to 2014 in second group and year 2014 in the third group. Patients were operated by different surgeons.

The patients' files were retrospectively screened, according to the following criteria: sex; age; history of preoperative hypertension (HT), diabetes mellitus (DM), coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), cancer, any co-existing disorder, chronic renal insufficiency (CRI), myocardial infarction (MI) and previous abdominal surgery; hemoglobin, albumin, bilirubin, aspartate aminotransferase (AST) and creatine levels; ASA score; length of hospitalization; length of surgery; operational data; morbidity and mortality.

All obtained data were analyzed via the Statistical Package for Social Science (SPSS Inc., Chicago, USA) 18.0 software program. In comparing the groups, the Pearson's chi-square test and Fisher's exact test were used for the categorical data and the Kruskal–Wallis test and Mann–Whitney *U* test were used for numerical data. The logistic regression test was performed to find the factors affecting morbidity. Because there were three groups, in the Kruskal–Wallis test $p < 0.017$ was accepted as statistically significant, whereas in other tests, the $p < 0.05$ was accepted as statistically significant.

Results

The study included a total of 150 patients in three age groups: <65, 65 – 80, and >80. Distribution of patients according to age, sex and operational indications are presented in Table 1. The surgery was converted to open cholecystectomy in three (2%) patients due to acute cholecystitis with severe fibrotic adhesions in two patients and obscure anatomy in one patient.

Differences were observed among the groups in preoperative haemoglobin and albumin levels; ASA score; presence of HT, CAD and/or COPD; length of hospitalization and rate of emergency cholecystectomy and morbidity (Table 2).

Morbidity was observed in 13 (8.7%) patients, with pulmonary complications in six, cardiac complications in five and infectious complications in two. There was no mortality in the study groups. Morbidity rate was significantly higher in patients aged over 80 years than in the other patients ($P = 0.001$). The rates of COPD, CAD and low haemoglobin and albumin levels along with high ASA score were all found to be greater in patients with morbidity (Table 3). Logistic regression analysis showed that presence of COPD and low albumin levels were associated with morbidity (Table 4).

Discussion

In ageing population, there has been an increase in disorders such as cardiovascular disease, COPD and hypertension, negatively affecting the outcome of surgical interventions. Accordingly, there has been an increase in postoperative morbidity and mortality in the aged patients. With the introduction of laparoscopic interventions, it was accepted that this procedure increased complications in the elderly patients by inhi-

Table 1— Demographic Characteristics of the Patients.

	Group 1 (≤65 age)	Group 2 (66-79 age)	Group 3 (>80 age)	p
Age (mean)	45.3	71.0	84.1	0.001
Sex				
Women	42	34	36	0.160
Men	8	16	14	
Indicaiton of surgery				
Symptomatic Cholelithiasis	49	45	40	0.014
Acute Cholecystitis	1	5	10	

Table 2— Age-Related Differences Among the Groups.

	Group 1 (≤65 age)	Group 2 (66-79 age)	Group 3 (>80 age)	p
Hemoglobin (mg/dl) mean ± SD (range)	13.3±1,3 (10.0-16.5)	13.2±1,6 (9.9-16.6)	12.1±1.8 (7.9-16.6)	0.001
Albumin (mg/dl) mean ± SD (range)	4.1±0.2 (3.2-4.8)	3.8±0.3 (2.6-4.3)	3.3±0.4 (2.1-4.0)	0.001
ASA score (1/2/3/4/5)	36/13/1/0/0	3/35/12/0/0	2/23/21/4/0	0.001
HT	6	27	28	0.001
KAH	1	7	19	0.001
KOAH	1	2	7	0.016
Operation Time (min) mean ± SD (range)	38.7±23.1 (25-145)	60.8±26.7 (23-120)	63.8±35.0 (28-195)	0.001
Lenght of Hospital Stay (mean, day) (range)	1.4±0.7 (1-4)	2.0±1.7 (1-10)	2.2±1.4 (1-6)	0.001
Morbidity	-	2	11	0.001

Table 3— Factors Affecting Morbidity.

	Morbidity		p
	Yes	No	
Hemoglobin (mg/dl) mean ± SD (range)	11.1±2.1 (8.7-16.2)	13.0±1.5 (7.9-16.6)	0.001
Albumin (mg/dl) mean ± SD (range)	3.2±0.4 (2.3-3.8)	3.8±0.4 (2.1-4.8)	0.001
ASA score (1/2/3/4/5)	41/69/27/0/0	0/2/7/4/0	0.001
KAH (%)	46.2	15.3	0.014
KOAH (%)	38.5	3.6	0.001

Table 4— Morbidity-Associated Factors by Logistic Regression Analysis.

	p	Odds ratio
KOAH	0,003	16,777
KAH	0,444	1,811
Hemoglobin	0,092	0,671
Albumin	0,011	0,144

biting myocardial and pulmonary functions; therefore, such interventions had been contraindicated for the aged (5). With increased experience in laparoscopic surgery and better understanding of the pathophysiological changes that occur during laparoscopy, this conception was eliminated. The negative effect of laparoscopy on cardiac and pulmonary functions has been minimized by initiating a pneumoperitoneum under a pressure of <12 mmHg. With more experience, the duration of laparoscopic intervention has shortened. In addition, some studies have reported that cardiopulmonary complications are less common in laparoscopic interventions than in laparotomy (6,7). Therefore, laparoscopic interventions can be performed safely in the aged patients (5,8). Studies have shown that different procedures such as cholecystectomy, abdominal wall hernia repair, reflux surgery and colorectal operations can be performed safely with laparoscopy in the elderly as well (9-12).

The standard therapy for symptomatic gallbladder stone is LC. Compared with traditional open surgery, the advantages of LC include a shorter (and less expensive) hospital stay, earlier mobilization, less pain, less time away from work and better cosmetic outcomes(13). These benefits hold true for the elderly as well. As confirmed by our study, LC can be performed safely on patients aged 65 years and over. Although rate of morbidity and length of hospitalization in patients over 80 years were higher than those in the other groups, there was no mortality, proving that laparoscopic cholecystectomy could be safely performed. The most important factors determining morbidity and mortality in elderly patients, in addition to advanced age, are co-existing disorders and general health of the patient (5,10,14). Our study showed that presence of COPD and CAD along with a high ASA score are associated with morbidity. Hoekstra et al. (15) have reported that advanced age is not the only negative factor associated with surgical results but that co-existing disorders and immunocompromise are also responsible for increased rates of morbidity and mortality. Another factor affecting morbidity and mortality in the elderly is nutrition. Malnutrition increases postoperative complications by delaying wound healing and compounding infection risk (16). In our study, in the advanced age groups-those aged between 65 and 70 years and over 80 years-we found lower levels of albumin. Hence, low albumin levels, indicating malnutrition, were associated with morbidity. All of these mentioned factors may increase morbidity and mortality in elderly patients undergoing open surgery or LC. Leardi et al. (5) reported that morbidity and mortality rates in open surgery or LC were higher in patients aged over 80 years than those in patients aged 70–80 years. Accordingly, the risk of increased morbidity and mortality in elderly patients is not directly associated with the type of surgery, be it open or laparoscopic.

In conclusion, we suggest that, in very old patients, for whom cholecystectomy has been planned, LC can be performed. But high rates of mortality and morbidity of operation must be considered by the surgeon and patients must be informed about this high rates before the operation. LC should be performed only after the patient has been thoroughly evaluated and all presurgical preparations are completed, while considering that the most important factors associated with morbidity and mortality are co-existing disorders and nutritional status.

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RESEARCH

INVESTIGATION OF OBESITY AND DEPRESSION IN A SAMPLE OF TURKISH ELDERLY ADULTS

ABSTRACT

Introduction: The prevalence of obesity has grown in Turkish elderly adults. This study aimed to investigate the relationship between obesity and depression in elderly people. The study also examined demographic data and the relationship between depression and obesity.

Materials and Method: This case-control study was conducted at the University of Kafkas, Kars, Turkey. We included 161 adults (≥65 years old). The body composition of the participants was evaluated with the bio-electrical impedance analysis (BIA). The Hamilton Depression Rating Scale (HDRS) was used to assess the depression status.

Results: Participants were between 65 and 87 years of age (mean, 70.80±5.42 years); 50.9% of them were females, and 82 of them were obese. The depression rate was 54.9% in the obese group, and 49.4% in the non-obese group, and the association between obesity and depression approached the level of statistical significance in women. In this study, 60.9% of the participants had not completed elementary school. The depression rate was higher in participants with low education levels, 98.8% participants lived with at least one other person, and 55.9% had a monthly income of ≥501 Turkish Liras. There is significant association between depression and living alone and low monthly income.

Conclusion: We found that more than half of the participants (including obese and non-obese) were depressed and that living alone and having a low monthly income were higher risk factors for depression than obesity in elderly adults. Thus, our results demonstrated that obesity was not a main risk factor for depression; however, economic status and living arrangements posed a risk.

Key Words: Obesity; Depression; Body Mass Index; Aged.

ARAŞTIRMA

TÜRK YAŞLILARI ÖRNEĞİNDE OBEZİTE VE DEPRESYONUN İNCELENMESİ

ÖZ

Giriş: Obezite sıklığı Türkiye'de yaşlılarda artmaktadır. Bu çalışma, yaşlılarda obezite ve depresyon arasındaki ilişkiyi incelemeyi amaçlamıştır. Çalışma ek olarak demografik değişkenlerin depresyon ve obeziteyle ilişkisini de incelemiştir.

Gereç ve Yöntem: Bu, olgu-kontrol tipindeki çalışma, Kafkas Universitesi, Tıp Fakültesi'nde yapılmıştır. Altmış-beş yaş ve üzeri 161 yetişkin çalışmaya alınmıştır. Katılımcıların beden bileşimleri, Biyo-Elektrik-İmpedans (BEİ) ile değerlendirilmiştir. Depresyon durumunun değerlendirilmesinde, Hamilton Depresyon Derecelendirme Ölçeği (HDDÖ) kullanılmşıtır.

Bulgular: Katılımcıların yaş aralığı 65-87 (ortalama, 70.80±5.42 yıl), %50.9'u kadın ve 82'si obezdi. Depresyon sıklığı obez grupta %54.9, obez olmayan grupta %49.4 tür, ve depresyon ile obezite ilişkisi kadınlarda, istatistiksel anlamlılık sınırına yakın bulunmuştur. Bu çalışmada katılımcıların %60.9'u ilkokulu bitirmemiştir. Depresyon sıklığı, öğrenim düzeyi düşük katılımcılarda yüksektir, katılımcıların %98.8'i en az bir kişiyle birlikte yaşamaktadır ve %55.9'unun aylık geliri ≥501 TL dır. Depresyon, yalnız yaşam ve düşük aylık gelir arasında istatistiksel olarak anlamlı fark vardır.

Sonuç: Bu çalışmada, katılımcıların (obez ve obez olmayan) yarıdan fazlasının depresyonda olduğu, yaşlılarda, yalnız yaşam ve düşük aylık gelirin, depresyon için obeziteden daha yüksek risk unsurları olduğu bulunmuştur.

Anahtar Sözcükler: Obezite; Depresyon; Beden Kütle İndeksi; Yaşlılık.

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Introduction

Obesity and depression have both been associated with many health problems ranging from cardiovascular diseases and diabetes to disability (1,2). It has been shown that an increase in the prevalence of obesity in the elderly could lead to disability, frailty, and premature death by a decline in age-related physical activity (3). The results of a European study, which included Turkey, showed that the predicted prevalence of obesity was 20%–30% in the elderly during 2015 (4). It has been reported that socioeconomic, demographic, and lifestyle factors can contribute to obesity and depression in older adults (5). A longitudinal U.S. study (over a span of 16 years) determined that being overweight orobese elevated the risk of future depression in middle-aged and older adults (6). Many international studies have reported that the prevalence of overweight and obesity increased with age, and obesity-associated diseases commonly appeared in the middle and older ages (7-9). It has also been shown that obese individuals had a significantly lower health-related quality of life (HRQL) (5,10).

The purpose of this study was to compare the rates of depression in obese and non-obese elderly adults. Additionally, this study investigated the relationship between the socio-demographical characteristics of the participants and depression and obesity.

Materials and Method

Setting

The study was conducted at the Obesity Polyclinics of Kafkas University Medical Faculty between November 2014 and January 2015. A total of 161 adults (≥65 years old), including 82 obese and 79 non-obese participants according to body composition analyses, were included in the study. The obese participants were matched by age, gender, educational level, economical level, marital status, and living arrangements with the non-obese participants. The Kafkas University Medical Faculty Ethics Committee approved the study (protocol number: 354-050-99/13), and the participants provided verbal informed consent. The demographic characteristics and measurements were obtained through face-to-face interviews performed at the polyclinics.

Exclusion Criteria

Participants with diabetes mellitus, severe physiological diseases, anti-depressant use, or significant cognitive impairment were excluded from the study.

Potential Confounders

Potential confounders were dichotomized by matching. Ages were classified into 65–74 years and ≥75 years. Educational status was dichotomized into 0–3 years and ≥4 years. Economic status was ascertained by enquiring the mean individual monthly income of the household. Statistical evaluations of the economic status were based on the subjects' average monthly income categories: 500 TRY and less-501 TRY and more. Marital status was dichotomized as either single or married. Living arrangements were dichotomized as none (living alone) andone or more.

Measurements

The Hamilton Depression Rating Scale (HDRS) was used to assess the depression status of the participants because of the broad coverage of the scale (11). The bio-electrical impedance analysis (BIA) (The Jawon X-Scan Plus II®, Hospital Body Composition Analyzer was used for the BIA) was performed for the body composition measurements (12).

Hamilton Depression Rating Scale (HDRS)

The Turkish translation of HDRS was implemented by physicians for the obese and non-obese participants (11). The scale scores were calculated as follows: 0–7 as normal, 8–13 as mild depression, 14–18 as moderate depression, 19–22 as severe depression, and ≤ 23 as very severe depression. The depression scores were dichotomized for analysis as ≤7 (not depressive) and ≥8 (mildly depressive) (11).

Bio-electrical Impedance Analysis

The measuring method of BIA: BIA involved the tetra-polar measurements performed using touch electrodes and the use of these electrodes simultaneously .Among 12 electrodes by selecting plate and hand electrode or ankle and hand electrode at system set op when using ankle electrode option (12). Measurements included BMI, lean body mass (LBM), soft lean mass (SLM), skeletal muscle mass (SMM), total body water (TBW), intra-cellular water (ICW), extra-cellular water (ECW), percent body fat (PBF), visceral fat area (VFA), waist-to-hip ratio (WHR), visceral fat mass (VFM), subcutaneous fat mass (SFM), body fat over (BFO), and odem. The boundaries of the device were 110–200 cm for length, and 10–250 kg for weight, with an applicable age of use of 7–89 years (12). Measures of body composition were conduted in the morning time before feeding and without shoes or socks and with one layer of light clothing



Body Mass Index (BMI)

The BMI was classified according to the World Health Organization guidelines.The five categories of BMI were underweight (<18.5kg/m^2), normal weight (18.5–24.9kg/m^2), preobese/overweight (25–29.9kg/m^2), obesity class I/moderate obesity (30–34.9 kg/m^2), and obesity class II/severe obesity (≥35kg/m^2). For comparison, the BMIs in this study were classified as non-obese (≤ 29.9) and obese (≥30.0) (13). Therefore, an increase in body weight and the decrease in height with age could lead to an overestimation of obesity; the BFO was also examined to compare depression with BMI (14).

Data Analysis

SPSS 20.0 (IP number: 194.27.41.6) software was used for data analysis. The percentage of distributions, frequencies, arithmetic means, and standard deviations (sd) were examined as descriptive statistics. The chi-squared test was used to analyze categorical data. The Spearman's rank correlation analysis was used to evaluate the correlation between the variables. The odds ratio (OR) values were calculated between the categorical variables for risk evaluation; the 95% confidence interval (CI) of the OR values were also given. The threshold for statistical significance was set at $p<0.05$.

Results

The study group ranged in age from 65–87 years old (mean, 70.80±5.42 years) for all participants. The age range in the obese participants was 65–85 years (mean, 70.49±4.96), and in the non-obese participants (mean, 70.95 ± 5.80 years) was 65–87 years. The gender distribution was homogenous (50.9% women, 49.1% men). The age of the women ranged from 65–82 years (mean, 69.89±4.87 years) and age of the men ranged from 65–87 (mean, 71.56±5.85 years). The frequency and distribution results are summarized in Table 1, as the case and control groups (Table 1).

It was found that depression rate was 52.2% in all participants. The depression rate was 54.9% in the obese group and 49.4% in the non-obese group. The percentage of depression was higher in women than in men within the obese group (62.2% of obese women were depressed, while 37.8% of obese men were depressed). It was found that the difference in depression rates between genders within the obese group approached statistical significance level ($p=0.070$). In the non-obese participants, the depression rates were similar in both genders The non-obese male group had a higher depression rate (48.7%) than the obese men (37.8%). According to the HDRS, the depression rate was 4-fold higher in the age group of 65–74 years than in the age group ≥75 years in both the obese and non-obese groups (Table 1). However, this difference was not statistically significant.

Over 60% (60.9%) of participants had <3years of education. The percentage of participants with education levels of<3years was 57.1% in the obese participants and 42.9% in the non-obese participants (Table 1). It has been observed that less educated obese women were more depressed; however, there was no statistically significant relationship between the level of education and depression according to gender in this study. More than half of the elderly adults were married (65.2%). It was determined that the percentages of obesity and depression were approximately 2-folds higher in married participants than in single ones. This difference was not statistically significant.

We found that 44.1% of the study groups had a monthly income of< 500 TRY; the depression rate was higher in the low monthly income group regardless of gender and obesity rates. The relationship between depression and monthly income was not statistically significant. We also observed that 98.8% of participants lived with at least one other person in this study group. There was a statistically significant relationship between living alone and depression in both the obese and non-obese groups (Table 1).

The body composition scale results of the participants (as mean and SD according to gender) are summarized in Table 2. The mean BMI of the obese group was 35.48±3.2 for women and 34.39±4.1 for men. In the non-obese group, the mean BMI was 23.66±3.1 for women and 24.41±3.3 for men (Table 2). There was a statistically significant relationship between the obese and non-obese participants according to gender in all of the BIA segments (Table 2). In Table 2, it has been shown that the consistency of the whole body analysis for the assessment of obesity. The BMI was chosen for comparison because it's one of the most widely used segment. In addition to BMI, the BFO was also examined to compare depression and obesity, therefore an increase in body weight and the decrease in height with age could lead to an overestimation of obesity. It was observed that there was a strong correlation between LBM, SLM, PBF, VFA, WHR, VFM, and SFM according to BMI and BFO to evaluate the obesity (Table 3).

We found a non-statistically significant relationship and correlation between HDRS and BMI and BFO (Tables 3,4) and a negative correlation was found between HDRS and LBM and SLM. But these correlations were not statistically significant (Table 3).

Table 1— Socio-demographic Characteristics of the Obese and Non-obese Groups and Their Relationship with the HDRS.

Characteristics		Obese ≥30		Non-obese <30		Total	Non-Obese HDRS ≤7		Non-Obese HDRS ≥8		Obese HDRS ≤7		Obese HDRS ≥8		HDRS*
		n	%	n	%	n	n	%	N	%	n	%	n	%	p**
Gender	Female	41	50.0	41	50.0	82	20	50.0	20	51.3	13	35.1	28	62.2	0.070
	Male	41	51.9	38	48.1	79	20	50.0	19	48.7	24	64.9	17	37.8	
Age	65-74	66	80.5	56	70.9	122	24	60.0	32	82.1	30	81.1	36	80.0	0.109
	≥75	16	19.5	23	29.1	39	16	40.0	7	17.9	7	18.9	9	20.0	
Educational Level	≤3 years	56	57.1	42	42.9	98	20	51.3	22	56.4	19	51.4	40	66.7	0.258
	≥4 years	31	49.2	32	50.8	63	19	48.7	19	49.9	18	48.6	15	33.3	
Marital Status	Married	54	65.9	51	64.6	105	26	65.0	25	64.1	25	67.6	29	64.4	0.795
	Single	28	34.1	28	35.4	56	14	35.0	14	35.9	12	32.4	16	35.6	
Monthly Income	≤500 TRY	35	42.8	36	45.6	71	7	17.5	29	74.4	5	13.5	30	66.7	**0.003**
	≥501 TRY	47	57.2	43	54.4	90	33	82.5	10	25.6	32	86.5	15	33.3	
Living Arrang.	Not alone	81	98.8	78	98.7	159	40	100.0	38	97.4	37	100.0	44	97.8	**0.040**
	Alone	1	1.2	1	1.3	2	-	-	1	2.6	-	-	1	2.2	
Total		**82**	**50.9**	**79**	**49.1**	**161**	**40**	**50.6**	**39**	**49.4**	**37**	**45.1**	**45**	**54.9**	

n: frequency; %: percentage; *HDRS: Hamilton Depression Rating Scale; **p: Level of Significance.

Table 2— Mean Values of the Bio-Electrical Impedance Segments According to Gender.

		Women					Men				
		Min	**Max**	**Mean**	**sd***	**p****	**Min**	**Max**	**Mean**	**sd***	**p****
BMI	Obese	30.40	41.20	35.48	3.251	**0.000**	30.10	45.00	34.39	4.197	**0.000**
	Non-Obese	18.00	29.60	23.66	3.119		18.00	29.80	24.41	3.391	
LBM	Obese	26.80	87.80	54.36	11.782	**0.005**	36.70	78.40	57.75	8.254	**0.000**
	Non-Obese	38.60	58.60	48.24	5.595		40.20	58.60	50.21	5.133	
SLM	Obese	23.90	82.00	49.80	11.176	**0.011**	33.50	72.20	53.14	7.763	**0.000**
	Non-Obese	35.30	54.30	44.72	5.189		37.50	54.30	46.57	4.719	
SMM	Obese	4.90	60.70	27.17	10.693	**0.029**	16.40	46.70	31.00	7.475	**0.000**
	Non-Obese	16.90	32.20	22.66	5.016		16.90	32.20	24.17	4.716	
TBW	Obese	19.30	63.20	39.13	8.478	**0,005**	26.40	56.40	41.57	5.939	**0.000**
	Non-Obese	27.80	42.20	34.74	4.028		28.90	42.20	36.15	3.699	
ICW	Obese	2.70	37.00	22.47	6.011	**0.040**	15.60	33.50	24.67	3.531	**0.000**
	Non-Obese	16.60	25.40	20.69	2.424		17.10	25.40	21.46	2.270	
ECW	Obese	8.10	26.20	15.94	3.469	**0.004**	10.80	22.90	16.90	2.444	**0.000**
	Non-Obese	11.20	17.30	14.05	1.646		11.80	17.30	14.69	1.493	
PBF	Obese	10.40	49.70	32.39	9.371	**0.000**	13.00	41.80	28.10	6.927	**0.000**
	Non-Obese	10.30	34.50	20.21	4.825		10.30	29.10	19.32	4.574	
VFA	Obese	55.00	373.00	165.22	66.770	**0.000**	25.00	319.00	146.29	57.579	**0.000**
	Non-Obese	54.00	145.00	102.98	17.530		54.00	173.00	103.33	24.661	
WHR	Obese	0.80	1.12	0.96	0.059	**0.000**	0.71	1.13	0.96	0.078	**0.000**
	Non-Obese	0.80	0.98	0.91	0.038		0.80	1.01	0.91	0.046	
VFM	Obese	1.10	8.50	4.14	1.678	**0.000**	1.00	7.30	3.59	1.501	**0.000**
	Non-Obese	0.60	3.00	1.73	0.580		0.60	3.60	1.75	0.724	
SFM	Obese	9.10	39.90	21.83	7.156	**0.000**	8.10	38.70	19.23	5.991	**0.000**
	Non-Obese	4.50	17.70	10.68	3.186		4.50	17.50	10.57	3.355	
BFO	Obese	10.20	48.40	25.98	8.760	**0.000**	11.20	46.00	22.82	9.376	**0.000**
	Non-Obese	1.80	20.30	12.07	4.072		1.80	21.10	11.96	4.365	

*SD: Standard Deviation; **p: Level of Significance; data are shown as the mean ± 1SD.

BMI: Body Mass Index; LBM: Lean Body Mass; SLM: Soft Lean Mass; SMM: Scelateal Muscle Mass; TBW: Total Body Water; ICW: Intra Celluler Water; ECW: Extra Cellular Water; PBF: Percent Body Fat; VFA: Visceral Fat Area; WHR: Waist to Hip Ratio; VFM: Visceral Fat Mass; SFM: Subcutaneous Fat Mass; BFO: Body Fat Over.

Table 3— Correlations Among the Bio-Electrical Impedance Segments According to BMI and BFO.

		BMI	LBM	SLM	PBF	WHR	VFM	SFM	BFO	HDRS
BMI	Rho*		.519	.487	.527	.725	.878	.907	.902	0.197
	p**		.000	.000	.000	.000	.000	.000	.000	0.123
LBM	Rho			.998	.990	.234	.332	.333	.322	**-0.077**
	p			.000	.000	.003	.000	.000	.000	0.330
SLM	Rho				.989	.209	.299	.299	.288	**-0.076**
	p				.000	.008	.000	.000	.000	0.340
PBF	Rho					.209	.317	.328	.319	0.061
	p					.008	.000	.000	.000	0.443
WHR	Rho						.898	.824	.823	0.065
	p						.000	.000	.000	0.410
VFM	Rho							.982	.973	0.074
	p							.000	.000	0.349
SFM	Rho								.985	0.047
	p								.000	0.558
BFO	Rho									0.181
	p									0.136

*Rho: Spearman's rank correlation coefficient; **p: Level of Significance.

The effect of obesity on depression risk according to gender has been given in Table 4. Obesity elevated the risk of depression in women (OR=1.419, 95% CI: 1.645–2.723) but this result was not significant for CI, including the "1" value. It has been observed that low monthly income and living alone posed a risk of depression in both genders of elderly adults. Low monthly income elevated the risk of depression by 3.7-fold, and living alone elevated the risk of depression by 4.8-fold in elderly adults regardless of obesity, gender, education level,and marital status (Table 4).

Discussion

In this study, it was determined that obesity was a small risk factor for depression in elderly women. However, living alone and low economical levels had a higher risk of depression than obesity in elderly adults of both genders. Different results have been reported in the literature about the association between obesity and depression. In many national and international studies, it has been reported that obesity was associated with depression (6,14,15). In one meta-analysis, the authors determined that there was a reciprocal link between obesity and depression; they showed that obesity increased depression and depression was predictive of the development of obesity (16). Lasserre *et al* reported that a major depressive disorder was a strong predictor of obesity (17). However, Roberts *et al* revealed that obesity increased the risk of depression at baseline, but depression did not increase the risk of future obesity (18). In a study that investigated the association between depression, anxiety, and physical fitness parameters in Turkish obese adults, the authors determined that there was no significant difference in the depression and anxiety scores between the obese and control groups in women. However, the authors stated that there were higher anxiety scores in obese men (19). These reports suggested that the relationship between obesity and depression needed to be further investigated.

In the current study, it was found that the depression rates were 2-fold higher in obese elderly women than in obese elderly men. This result was consistent with the study reported from Arterburn *et al* that demonstrated that the prevalence of depression increased 4-fold in women with severe obesity (1). Pratt *et al* reported that adults with depression were more likely to be obese than adults without depression, and they determined that among individuals with depression, women were more likely to be obese than men (2). In the current study groups, obesity and depression rates were higher in women than in men, and it was determined that obese women were more depressed. However, there was no relationship observed between obesity and depression in the male participants. Moreover, there was a higher rate of depression in non-obese men.

Table 4— The Depression Risk of Characteristics According to Gender.

Characteristics	Categorization	Women	Men	Total	HDRS		
		n (%)	n (%)	n (%)	p	OR*	(95% CI)**
Age	65-74	64 (79.0)	58 (72.5)	122 (75.8)	0.696	1.022	(0.928-1.105)
	≥75	18 (21.0)	21 (27.5)	39 (24.2)			
Educational Level	≤3	55 (65.4)	43 (55.0)	98 (60.9)	0.125	1.526	(1.092-2.213)
	≥4	28 (34.6)	36 (45.0)	64 (39.3)			
Marital Status	Married	46 (56.8)	59 (73.8)	105 (65.2)	0.767	1.071	(0.834-1.956)
	Single	36 (43.2)	20 (26.2)	56 (34.8)			
Monthly Income	≤500 TRY	40 (48.1)	31 (40.0)	71 (45.4)	**0.003**	3.725	**(3.008-4.117)**
	≥501 TRY	42 (51.9)	48 (60.0)	88 (54.6)			
Living Arrangement	Alone	0 (0.0)	2 (2.5)	2 (1.2)	**0.033**	4.826	**(3.074-5.102)**
	Not alone	82 (97.5)	77 (100.)	159 (98.8)			
Body Mass Index	≥30	42 (50.6)	40 (49.4)	82 (50.3)	0.076	1.401	
	(1.114-1.902)						
	<30	40 (51.2)	39 (48.8)	79 (49.7)			
Body Fat Over	≥10	42 (50.6)	40 (49.4)	82 (50.3)	0.081	1.397	(1.087-1.763)
	<9	40 (51.2)	39 (48.8)	79 (49.7)			

*OR: Odds Ratio; **CI: Cluster Interval.

The most striking result of this study was the higher rate of depression than in the results of previously-reported studies in Turkey. Yaka *et al* determined that the prevalence of depression was 18.5% in an urban area (15). Kulaksızoğlu *et al* also reported that the depression rate was 16% in another urban area and demonstrated higher depression rates among women in the community-dwelling elderly population (20).

The current study was conducted in a rural area of Turkey. It is well known that regional and economic disparities affect the mental and physical health of elderly adults (21). In several studies, it has been stated that psycho-social, socio-economic, and demographic issues can contribute to obesity and depression in elderly adults (5,14).

This study focused on understanding how two common health problems (obesity and depression) were associated in elderly adults, but it found that there was a need to determine the prevalence of depression and obesity in elderly adults living in this region. In our current small sample group, we found that living alone and low economicstatus were higher risk factors for depression than obesity in elderly adults. Parlar *et al* also reported that depression was higher in the elderly population that lived alone (22). Yaka *et al* determined that 80% of the depressed elderly adults had at least one chronic disease, including diabetes mellitus (18.3%) (15). They showed that female gender, low educational status, chronic disease, perceived economic inadequency, and dependency on someone were major risk factors for depression in the community-dwelling elderly population (15).Yaka *et al* stated that higher education level was associated with lower rates of depression in their study. (15). Also in our study, it was seen that less educated obese women were more depressed. Although a higher depression rate was associated withthe female gender and a low educational level in our study, this relationship was not significant statistically.

The main limitation of the study was that this was a small sample group in a cross-sectional survey. A longitudinal study could be more valuable for determining the relationship between obesity and risk of depression. In addition to the demographics, the individual, social, and environmental factors should be investigated to determine the relationships between obesity and depression. The strength of the study was that this was the first study to investigate an association between obesity and depression in elderly adults living in a relatively undeveloped region of Turkey.

Our results demonstrated that depression was a more common health problem than expected among the elderly adults living in this region. Public health policies should be established to provide reachable, effective, and sustainable health services for elderly adults according to the needs of the region. The physical activity and healthy eating behaviors among the older adults need to be supported to prevent and

manage obesity and depression. The public and geriatrics services should be strengthened in this region to promote healthy aging.

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RESEARCH

ASSOCIATION OF SLEEP QUALITY AND DAYTIME SLEEPINESS WITH COGNITION IN THE ELDERLY

ABSTRACT

Introduction: The association between sleep problems and cognitive dysfunction is not reported in Turkey. The aim of the study was to evaluate the association between sleep quality and daytime sleepiness with cognitive functioning and to identify factors that influence cognitive state in the elderly.

Materials and Method: Using a simple random sampling method, 500 individuals, aged ≥60 years, living in the city of Sivas were recruited into our study. Standardized mini mental test, Pittsburgh Sleeping Quality Index and Epworth Sleepiness Scale tests were used to evaluate overall cognition, sleep quality, and daytime sleepiness, respectively.

Results: Lower cognitive functions were found to be significantly associated with age, female gender, living alone, low level of education and socioeconomic status. Impaired cognition was found in 53.8% of individuals with sleep quality disorder and 63.7% of individuals with daytime sleepiness ($p < 0.05$). According to logistic regression analysis, the risk of cognitive dysfunction in participants with a sleep quality disorder and daytime sleepiness were 4.17 and 3.48 times higher compared to individuals without the disorder respectively.

Conclusion: Sleep quality disorders were found to be prevalent in the elderly. A close relationship was found between cognitive dysfunction with poor sleep quality and daytime sleepiness.

Key Words: Aging; Sleep; Cognition.

ARAŞTIRMA

YAŞLI BİREYLERDE UYKU KALİTESİ VE GÜNDÜZ UYKULULUK HALİNİN KOGNİSYONLA İLİŞKİSİ

ÖZ

Giriş: Yaşlı bireylerde uyku problemleri ile kognitif bozukluk arasındaki ilişki Türkiye'de bildirilmemiştir. Çalışmanın amacı yaşlı bireylerdeki uyku kalitesi ve gündüz uykululuk halinin kognitif fonksiyonlar ile ilişkisini belirlemek ve yaşlıların kognitif durumlarını etkileyen faktörleri araştırmaktır.

Gereç ve Yöntem: Basit seçkisiz örnekleme yöntemi ile Sivas il merkezinde yaşayan 60 yaş ve üzeri toplam 500 birey çalışmaya alınmıştır. Veri toplama aracı olarak Standardize Mini Mental Test, Pittsburg Uyku Kalitesi İndeksi ve Epworth Uykuluk Ölçeği kullanılmıştır.

Bulgular: İleri yaş, kadın cinsiyet, yalnız yaşama, düşük eğitim düzeyi ve düşük sosyoekonomik düzey ile düşük kognitif fonksiyon arasında anlamlı ilişki bulunmuştur. Gece uyku kalitesi bozuk olan katılımcılarda kognitif fonksiyon bozukluğu olanların oranı % 53,8 bulunmuştur ($p<0,05$). Gündüz uykululuk hali olanlarda kognitif fonksiyon bozukluğu olanların oranı % 63,7'tür ($p<0,05$). Lojistik regresyon analizine göre, uyku kalitesi bozuk olanlarda kognitif fonksiyon bozukluğu olma riski olmayanlara göre 4,17 kez fazla bulunmuştur. Gündüz uykululuk hali olanlarda kognitif fonksiyon bozukluğu görülmesi riski olmayanlara göre 3,48 kez fazla bulunmuştur.

Sonuç: Yaşlı bireylerde uyku kalitesinde bozukluk sıktır. Uyku kalitesi kötü olan ve gündüz uykululuk hali yaşayan yaşlılarda kognitif fonksiyon bozukluğunun daha fazla olduğu saptanmıştır.

Anahtar Sözcükler: Yaşlılık; Uyku; Kognisyon.

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INTRODUCTION

Sleep is an active process that is structured into cycles of various psychophysiological states. It ensures the normal functioning of the endocrine and immune systems, regulates the mood, and affects the mental and cognitive functions (1). Sleep consists of periodic transitions between wakefulness and five sleep periods. Rapid eye movement (REM) sleep is thought to play a role in the restoration of the brain, whereas non-REM (NREM) sleep is responsible for restoration of vegetative somatic tissues. When REM sleep is deprived, intense REM for the consecutive nights is necessary to cope with the deficiency of the previous night's sleep (2).

The REM period, during which 80% of dreams occur, regulates cognitive processes, especially the memory function (2). In individuals trained on a new task, the REM period was noted to increase at night. If REM sleep deprivation occurred after the training on a new task, it was found that no stored information about the task emerged the next day. This was especially true if the second period of REM sleep was blocked; a deterioration of memory occurred (3).

The structure and the activity of sleep change with advancing age. More awakenings occur during the night; therefore, daytime sleepiness may increase. Because of the sleep-wake cycle, the sleep pattern is usually partitioned (4). In elderly individuals, NREM sleep phase I and II increase, whereas REM sleep decreases (5). Depending on the reduction of total sleeping time at night, periods of REM reduce and the transition latency to the first REM phase shortens (6).

In the elderly, inadequate and ineffective sleep may cause depression or anxiety, reducing the quality of life, or even may increase the rate of morbidity and mortality. Impaired sleep may also cause imbalances and limitations in movement that increase the risk of falling and admission to residential care facilities (7,8). Compared to the control group, patients with sleep disorders have been shown to have cognitive difficulties such as prolonged reaction time, memory dysfunction, and attention problems (9). The open-ended research question is that to what extent are the sleep quality and daytime sleepiness associated with the cognitive impairment? As far as we are aware, there has been no study about this issue reported from Turkey. Therefore, we attempted to investigate the relationship of sleep quality and daytime sleepiness with cognitive functions in the elderly population, aged ≥60 years.

MATERIALS AND METHODS

In this study, a simple random sampling method was used to select and enroll the participants, representing the elderly population of Sivas Province, for face-to-face interviews. To compensate for the socioeconomic status, different numbers of elderly people from various neighborhoods were included. The study was performed between January 2010 and January 2011 after obtaining the administrative permissions and approval by the local ethics committee. Individuals with speech disorders and severe vision or hearing deficits were excluded from the study.

In total, the study group comprised 500 people, aged ≥60 years. Informed and written consent was obtained from each participant or (for those who cannot write) the participant's closest relative before the study. The various assessment scales were administered and evaluated by the same clinician throughout the study.

Data Collection Tools

Socio-demographic Form

A form was used to obtain socio-demographic data of all the participants, including age, gender, marital status, education level, occupation, socioeconomic status, presence or absence of people living together, chronic diseases, and drug use. The economic status was assessed by their monthly income.

The Standardized Mini Mental Test (SMMT)

The SMMT was used to assess overall cognition. This test was developed for the first time by Folstein *et al*. (10). The validity and reliability of this scale for the diagnosis of mild dementia among the Turkish population has been shown by Güngen *et al*. (11). The SMMT scale consists of 11 sub-tests that measure orientation, registration memory, attention and calculation memory, and language and structure skills; the scores of which can add up to a maximum of 30 points. The SMMT was used in two different forms for educated (at least 5 years of education) or uneducated, according to the participants' educational background. A score of 25 points and below was considered as an indicator of cognitive dysfunction.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI was used to assess the quality of sleep. This scale was developed by Buysse *et al.* (12). The reliability and validity of this scale for the Turkish population was reported by Ağargün *et al.* (1). The PSQI evaluates the quality of sleep at night within the last month and has seven components: subjective sleep quality, sleep latency, sleep duration, habitual



sleep efficiency, sleep disturbances, use of sleeping medication, and daytime functions. Some components were measured using a single item, and some were obtained by grouping several items. Each item was evaluated on a scale of 0–3. The total score can be a value between 0 and 21. A total PSQI score above 5 indicates poor sleep quality.

Epworth Sleepiness Scale (ESS)

The ESS was developed in 1991 by M. W. Johns (13) and was shown to be a valid and secure test in a study on sleep disorder among the Turkish population (14). The ESS is a four-point Likert-type scale, each score ranging from 0 to 3, where high scores indicate sleepiness. With the ESS, a person can receive a total score between 0 and 24, and scores > 10 indicate daytime sleepiness.

Statistical Analysis

Descriptive data were given as mean ± standard deviation (SD). Differences between the categorical variables were analyzed using Pearson Chi-square test. Correlation between the scores of the tests (for non-normally distributed data) was investigated by using a Spearman's test. The influence of covariates of age, sex and education on cognitive test score is analyzed by multiple regression model. Association between dependent and independent variables was analyzed by using logistic regression. A p value <0.05 (two-sided) was considered as statistically significant. The statistical analyses were performed by SPSS version 14.0 (Statistical Packages for the Social Science) program.

RESULTS

The research cohort was made up of 500 individuals whose mean age was 68.85±6.8) years, with 258 (51.6%) females and 242 (48.4%) males. The mean age of female participants was 68.35±6.8 years and that of male participants was 69.38±6.8 (p=0.09). Among the total participants, 181 were not literate, 272 participants graduated from primary school, and 46 had higher education. Only four of the study participants were still working and the remaining was retired or unemployed.

Of the investigated cohort, 37.8% (n=189) were found to have cognitive dysfunction. The mean age (72.04±7.07 years) of participants with cognitive dysfunction was found to be significantly higher when compared to those without cognitive dysfunction (66.9±5.3 years) (p=0.001). In addition, age, female gender, low education and socioeconomic status, lack of social support, and living alone were observed to be significantly associated with poor cognitive performance (p<0.01). The demographic characteristics of the cohort are depicted in Table 1.

Examination of the PSQI global scores of the participants showed that 63.2% of the participants (n=316) were found to have an index score of ≥5, indicating poor sleep quality; whereas 36.8% of the participants (n=184) had an index score of <5, indicating good sleep quality. Of the participants with poor sleep quality, 53.8% (n=170) were found to have cognitive dysfunction and 46.2% (n=146) had normal cognitive functions, whereas in those with good quality of sleep, 89.7% (n=165) had normal cognitive functions. Accordingly, participants with impaired sleep quality performed significantly worse than the participants with good sleep quality with regard to cognitive functions (p=0.001) (Table 2). Multiple regression analysis by using hierarchical entry showed that PSQI explains the significant amount of variance in the cognitive outcome in the presence of age, sex and education as covariates (Table 3).

Regarding the ESS score, the study showed that 42.4% (n=212) of the participants had an ESS score >10, indicating daytime sleepiness, and 57.6% (n=288) had no daytime sleepiness. Analysis of these scores with regard to cognitive dysfunction showed that 63.7% of the participants (n=135) with daytime sleepiness were characterized to have cognitive dysfunction, and 36.3% of the participants (n=77) had no cognitive dysfunction. Approximately81.3% of the subjects (n=234) without daytime sleepiness were found to have normal cognitive functions (p=0.001) (Table 4). As shown in multiple regression analysis by using hierarchical entry, ESS predicted the significant amount of change in the dependent variable along with age and education (Table 5).

According to the logistic regression analysis, both the tests of sleep quality and daytime sleepiness were associated with cognitive performance, with PSQI showing the strongest association. In addition, individuals with a PSQI score ≥5 showed an increased risk for concomitant cognitive dysfunction about 4.17 (2.32 to 7.48) times higher than those with PSQI <5. In participants with an ESS ≥10, the logistic regression analysis predicted the risk of cognitive dysfunction to be 3.48 (2.18 to 5.54) times higher than in those with an ESS <10 (Table 6). Spearman's correlation analysis also showed a strong positive correlation between PSQI and ESS (r=0.51, p<0.0001).

Table 1— Demographic Data of the Participants According to the Distribution of Cognitive Functions.

Parameters	Low SMMT		Normal SMMT		Total	χ^2	p
	n	(%)	n	(%)	n		
Sex							
Female	113	(43.8)	145	(56.2)	258	8.15	0.004
Male	76	(31.4)	166	(68.6)	242		
Marital status							
Married	110	(33.0)	223	(67.0)	333	9.63	0.02
Single	79	(47.3)	88	(52.7)	167		
Education level							
Illiterate	99	(54.7)	82	(45.3)	181	43.2	0.001
Literate	41	(38.3)	66	(61.7)	107		
Primary	41	(24.8)	124	(75.2)	165		
High School	8	(19.5)	33	(80.5)	41		
University	0	(0)	6	(100)	6		
Occupation							
Employed	0	(0)	4	(100)	4	13.0	0.001
Unemployed	114	(45.1)	139	(54.9)	253		
Retired	75	(30.9)	168	(69.1)	243		
Socioeconomic level							
Low	88	(46.8)	100	(53.2)	188	10.5	0.005
Middle	72	(33.2)	145	(66.8)	217		
High	29	(30.5)	66	(69.5)	95		
Status of living							
None	18	(56.2)	14	(43.8)	32	10.8	0.01
With wife	78	(32.8)	160	(67.2)	238		
With children	60	(45.1)	73	(54.9)	133		
With wife and kids	33	(34.0)	64	(66)	97		
Total	189	(37.8)	311	(62.2)	500		

SMMT = Standardized mini mental test.

Discussion

Most of the elderly individuals in our study (63.2%) were found to be lacking good sleep quality. In addition, in individuals with impaired sleep quality, the risk of accompanying cognitive dysfunction was found to be greater than in those with normal sleep quality. The SMMT score of the elderly seemed to decrease as sleep quality deteriorated. When daytime sleepiness was analyzed, individuals with daytime sleepiness showed significantly greater cognitive dysfunction than those without. The majority of individuals without daytime sleepiness showed normal cognitive functions.

The prevalence of insomnia increases with age; most of the elderly have one or more complaints related to sleep, such as difficulty in falling asleep, daytime sleepiness, not feeling rested, or early waking (15). In a study of > 9,000 people above the age of 65 years, 28% of the participants reported difficulties in falling asleep and 42% had difficulties in both falling asleep and sustaining sleep at night (15). In our study, this percentage was higher (63.2%) showing that the majority of elderly have poor sleep quality. Cricco *et al.* (16) and Meguro *et al.* (17) also reported a similar relationship between sleep disorders and cognitive functions in the elderly. Cognitive functions are impaired in elderly individuals who complain of persistent insomnia and impaired sleep-wake cycle. In addition, poor sleep can be a prodromal marker of neurodegenerative disorders such as Parkinsonism (18) or can accelerate morbidity in the course of Alzheimer's disease (19).

In our study, the relationship between daytime sleepiness and cognitive function was also investigated. Excessive dayti-



Table 2— PSQI Distribution of Values According to the Cognitive Assessment.

Status	PSQI score 5 and <5	PSQI score >5	Total
Cognitive Functions Non-impaired n (%)	165 (89.7)	146 (46.2)	311 (62.2)
Cognitive Function Impaired n (%)	19 (10.3)	170 (53.8)	189 (37.8)
Total	184	316	500

PSQI= Pittsburgh Sleep Quality Index, p=0.001.

Table 3— Multiple Regression Analysis of PSQI With Age, Sex and Education as Covariates.

Variable	Model 1			Model 2		
	B	SE	Beta	B	SE	Beta
Age	-0.2	0.02	-0.38*	-0.18	0.02	-0.32*
Sex	0.4	0.35	0.05	-0.1	0.34	-0.2
Education	0.8	0.17	0.22*	0.8	0.16	0.22*
PSQI				-0.21	0.03	-0.28*
R2			0.24		0.31	

* P< 0.0001

me sleepiness contributes to high morbidity through life-threatening accidents, reduced labor productivity, and impaired psychosocial functioning. Elderly people have difficulty in staying awake during the day compared to young people; thus, daytime sleepiness complaints may be increased. Foley *et al.* (20) reported in their 3-year prospective study, which examined the relationship between sleep disorders and dementia in the elderly, that individuals who complain of excessive daytime sleepiness have an incidence of dementia two times greater than those without daytime sleepiness. Moreover, Ohayon and Vecchierini (21) found that elderly individuals

Table 4— ESS Distribution of Values Based On Cognitive Functions.

Status		ESS Score ≥10	ESS Score <10	Total
Cognitive Functions Non-Impaired	n (%)	77 (36.3)	234 (81.3)	311 (62.2)
Cognitive Functions Impaired	n (%)	135 (63.7)	54 (18.7)	189 (37.8)
Total		212	288	500

ESS=Epworth Sleepiness Scale, p=0.001.

Table 5— Multiple Regression Analysis of ESS With Age, Sex and Education as Covariates.

Variable	Model 1			Model 2		
	B	SE	Beta	B	SE	Beta
Age	-0.21	0.02	-0.38*	-0.16	0.02	-0.29*
Sex	0.4	0.35	0.53	0.4	0.33	0.05
Education	0.8	0.17	0.22*	0.74	0.16	0.2*
ESS				-0.24	0.03	-0.3*
R2		0.24			0.31	

*P<0.0001

Table 6— Coefficients of the Independent Variables and Odds Values According to Logistic Regression Analysis.

Variables	Beta	SE	p	EXP (Beta) ODDS	95% CI
PSQI (1)	1.42	0.29	0.001	4.17	2.32–7.48
ESS (1)	1.24	0.23	0.001	3.48	2.18–5.54
Stable	-1.40	0.30	0.001		

PSQI (1): Index score of ≥5, with impaired sleep quality group.
ESS (1): Scale score ≥10, day sleepiness group.

who slept<6 h a night and had a daytime sleepiness lasting more than an hour were cognitively impaired. Our results are in accordance with these previous reports. Daytime sleepiness is also associated with reduced social and cognitive stimulation, and the rate of cognitive dysfunction was found to be higher in elderly with decreased cognitive stimulus and social activities (22). Particularly, intellectual stimulation and social integration may be helpful for alleviating daytime sleepiness in the elderly (23).

People with sleep disorders may be at risk for potential cognitive dysfunction as well as late-onset depression, which can play a role in cognitive function. However, according to the study conducted by Cricco *et al.* (16), sleep quality disorder was found to be an independent risk factor for cognitive impairment in males.

In our study, a higher rate of cognitive dysfunction was also found to be associated with lack of social support and living alone, both in the elderly and in women. The low level of education and insufficient social integration due to isolation could explain why cognitive dysfunction was found to be more common in women.

Our goal was to investigate the association of sleep disorders with cognitive impairment. We assessed sleep disorders by using the PSQI and ESS subjectively and showed the association with cognitive dysfunction. The results are consistent with other studies based on the association of sleep complaints with cognition in the elderly.

The main shortcoming of our study is the lack of assessment of depression, which is a factor that can cause sleep disorders as well as cognitive impairment. In addition, the majority of study participants had a low level of education, which may raise doubts about the reliability of the data. For the latter reason, assessments were conducted by a single evaluator during the face-to-face interviews to obtain standardized data. Despite these weaknesses, the strength of the rating scales and the large number of study participants increase the reliability of the data obtained. To our knowledge, our study is the first in Turkey to show a relationship of sleep disorders with cognition among the elderly, by using a two-way evaluation. Our study proves that there is a significant association between these two conditions, without investigating a cause-and-effect relationship. In elderly individuals with daytime sleepiness, cognitive impairment should be kept in mind as an accompanying factor. Further studies are needed to validate the relationship between sleep quality and cognitive performance in elderly populations with more participants and including individuals with depression.

Conflict of Interest

The authors state that there is no conflict of interest.

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PAIN SENSITIVITY IN THE ELDERLY

ABSTRACT

Introduction: In previous studies of pain sensitivity in the elderly, reliance on experimental assessments of the pain threshold has led to inconsistent results; thus, the impact of ageing on pain sensitivity is still uncertain. In this study, we investigate the changes in experimental and clinical pain sensitivity in an elderly population.

Materials and Method: Pressure pain threshold measurements were obtained using a digital algometer for 80 elderly patients with chronic low back pain and 80 younger patients with low back pain (control group). A visual analog scale was used to assess the sensitivity of the thumbnail bed to painful stimuli (Thumb-VAS) and to low back pain (Low back pain-VAS). Correlation analyses were then used to explore the association between parameters of experimental and clinical pain sensitivity.

Results: Both groups had comparable gender distribution, body mass index, Beck Depression Inventory scores and pain duration (p>0.05 for all). There was no difference between the groups in experimental pain sensitivity parameters, including deltoid, 1st dorsal interosseous, tibial pressure pain threshold, thumb-VAS and low back pain-VAS (p > 0.05 for all). While experimental pain sensitivity parameters were highly correlated with each other (p=0.000 for all), they did not show a correlation with clinical pain sensitivity.

Conclusion: Healthy physiological ageing does not have a considerable impact on pain sensitivity as assessed by either experimental pain or clinical pain sensitivity.

Key Words: Ageing; Pain Perception; Pain Threshold.

ARAŞTIRMA

YAŞLILARDA AĞRI DUYARLILIĞI

ÖZ

Giriş: Deneysel ağrı eşiği ölçümlerine dayanan çalışmalarda elde edilen çelişkili sonuçlar nedeniyle yaşlanmanın ağrı duyarlılığı üzerine etkisi kesin olarak belirlenememiştir. Çalışmamızın amacı yaşlılarda deneysel ve klinik ağrı duyarlılıklarında oluşabilecek değişiklikleri araştırmaktır.

Gereç ve Yöntem: Kronik bel ağrılı 80 yaşlı hasta (71.3±5.4 yıl) ile 80 genç hastadan (28.8±4.4 yıl) oluşan kontrol grubunda dijital algometre ile basınç ağrı eşiği ölçümleri yapıldı. Visuel analog skala kullanılarak tırnak yatağının eşit düzeydeki ağrılı uyaranlara duyarlılığı (Başparmak-VAS) ve hastaların bel ağrısına olan duyarlılıkları (Bel ağrısı-VAS) değerlendirildi. Yüzaltmış hastanın tümü üzerinde yapılan korelasyon analizleri ile deneysel ve klinik ağrı duyarlılığı parametrelerinin ilişkisi incelendi.

Bulgular: Gruplar cinsiyet dağılımı, vücut kitle indeksi, Beck Depresyon Ölçeği skorları ve ağrı süresi açısından birbirine benzerdi (Bütün p'ler>0.05). Deneysel ağrı duyarlılığı göstergeleri olan deltoid, 1.dorsal interosseöz, tibia basınç ağrı eşiği ölçümleri ve başparmak-VAS'ın yanı sıra bel ağrısı-VAS değerlerinde de gruplar arasında fark bulunmadı (Bütün p'ler>0.05). Deneysel ağrı duyarlılığı parametreleri birbirleri ile ileri düzeyde ilişkili olmalarına rağmen (Bütün p'ler=0,000) klinik ağrı duyarlılığı (Bel ağrısı-VAS) ile ilişkili bulunmadılar.

Sonuç: Gerek deneysel gerekse klinik ağrı duyarlılıkları ile değerlendirildiğinde sağlıklı fizyolojik yaşlanmanın ağrı duyarlılığı üzerine belirgin etkisi görünmemektedir.

Anahtar Sözcükler: Ağrı Algılaması; Ağrı Eşiği; Yaşlanma.

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INTRODUCTION

Prolongation of life expectancy over the past few decades has produced a significant population of aged people, many of whom experience significant pain. According to the United Nations, the number of persons aged 60 or over is expected to increase globally from 841 million in 2013 to 2 billion in 2050 (1).

Ageing is associated with structural, functional and biochemical changes at every level of the nociceptive pathways, from the receptors to the cerebral cortex (2). Thus, there has been an interest in the impact of ageing on pain perception. The most common method used for assessment of pain perception in healthy elderly people is measurement of the pain threshold (PT). To date, data from these studies has been inconsistent; some studies suggest an increased PT with advancing age (3-5) while others show reduced (6-8) or unchanged PT (9-12).

It has been reported that while thermal stimulation generally leads to an increase in PT with age, pain pressure threshold (PPT) has had varied results in published studies and no overall changes in PT have been shown after electrical stimulation in the elderly (2). Studies have even shown that PT may vary in the same individual with the use of different stimulation methods (6,8). During PPT assessment, measurements over muscles has shown increased PT in the elderly (3,4), whereas measurements taken from points close to the bone gave decreased PT (6-8). An important consideration in these studies is the requirement for assessing the mental state of the elderly people, since pain rating relies on the patient's report (13,14). With so many factors affecting PT measurement and the wide range of results obtained, the question that comes to mind is, 'is PT alone sufficient to evaluate pain sensitivity in the elderly?'

Changes in pain sensitivity may be more accurately determined when clinical pain sensitivity is assessed in addition to experimental PT. Few data exist on the association of PT with clinical pain scores (PS) in elderly people (12). Similarly, available data on the association between the sensitivity to supra-threshold painful stimuli and age are also scarce (7). In this study, the following were our primary objectives: 1) to compare PPT levels in elderly and younger people by inducing experimental pressure pain, 2) to evaluate the sensitivity of elderly and younger people to equally intense supra-threshold painful stimuli and 3) to investigate how both groups rate their current low back pain (self-reported pain) in order to evaluate the impact of ageing on pain perception. A secondary objective of the study was to investigate the association of experimental and clinical pain sensitivities with each other.

MATERIALS AND METHOD

Subjects

The study was conducted in patients with chronic low back pain who were patients at the physical therapy and rehabilitation outpatient clinics of our hospital. Approval was obtained from the ethics committee before initiation of the study. Participating patients provided written informed consent prior to enrollment in the study. A total of 80 patients (40 females, 40 males) 65 years of age and older with chronic low back pain were included in the elderly patient group. The control group comprised a total of 80 patients (40 females, 40 males) from 18 to 35 years of age with chronic low back pain. An equal number of males and females were included in the groups due to the well-known effect of gender on PS (15).

Patients with low back pain for more than 6 months without a history of neurological deficit, severe vertebral deformity, or surgical intervention were qualified to enroll, while those with an inflammatory, infectious or malignant disease, central or peripheral nervous system disorders, diabetes mellitus or serious cardiac, pulmonary or psychiatric diseases were excluded. Patients who were treated with antidepressants, gabapentin or pregabalin for management of chronic pain and those who received opioid analgesics or underwent spinal injection were also excluded.

Assessment of Cognitive State

All pain severity scales used for assessment of pain perception which rely on self-reported pain have been shown to be affected by cognitive changes (14). Thus, the cognitive state of all patients was evaluated using the Turkish version of the Mini Mental State Examination (MMSE) before enrollment (16). Those patients who scored 25 points or higher were enrolled in the study (7).

Pressure Pain Threshold Measurement

Measurements were obtained using a digital pressure algometer (Storz Medical F-metre) version 5.0 with a 64 mm^2 circular probe. Three sites were used for measurements: the deltoid muscle, the first dorsal interosseous muscle (FDI) and the proximal 1/3 of the anterior side of tibia. Care was taken to avoid intake of an analgesic or any agent for pain relief in the 24 h to measurement. While taking measurements, pressure was increased in increments of 1 Newton per second. The level at which the patient first felt pain was recorded as PPT.

Three readings were obtained for each area and the average was used for assessment. PT results were expressed in kilopascal (kPa) units. Ten-minute intervals elapsed between measurements from different sites and 30-min intervals between measurements from the same site. All PT measurements were carried out by the same operator for both groups.

Assessment of Supra-threshold Pain Sensitivity

In order to examine the sensitivity of elderly and younger people to supra-threshold painful stimuli, the sensitivity of their thumbnail beds to pressure pain was assessed. For this purpose, 25 Newton/cm^2 pressure, a pressure level shown to produce pain in 20 volunteers before initiation of this study, was applied to the thumbnail bed of each patient. Following this painful stimulus, elderly and younger patients were asked to rate the severity of their pain on a 10-cm visual analog scale (Thumb-VAS). The left end of the 10-cm line was labelled as 'no pain' while the right end was considered 'worst imaginable pain'.

Assessment of Clinical Pain Sensitivity

Patients in both groups were asked to separately rate the intensity of their current low back pain at rest and during activity in order to examine their sensitivity to clinical pain. A 10-cm horizontal VAS was used for this purpose.

Assessment of Depression

Since depression can affect PT (17), patients in both groups were evaluated for symptoms of depression at the start of the study using the Beck Depression Inventory.

Statistical Analyses

Study findings were statistically analysed using Statistical Package for Social Sciences (SPSS) for Windows version 19.0. For analysis of the study data, descriptive statistical methods (mean, median, standard deviation, minimum-maximum) were used as well as the Mann–Whitney U test for between-group comparisons of non-normally distributed quantitative data. Inter-correlations between pain sensitivity parameters were explored using Spearman's correlation analysis. Results were interpreted at 95% confidence interval with significance level set at $p < 0.05$.

Results

Age ranges for the two groups were as follows: 17–35 years for the younger patient group and 65–84 years for the elderly group. The mean age of each of the study groups is shown in Table 1. There was no difference between groups in body mass index (p=0.260) and the groups did not differ in the duration of low back pain (p=0.078). Depression has a known effect on PPT results, but depression scores were not significantly different between our study groups (Table 1).

Table 1— Study Group Characteristics.

	Elderly (n=80) Mean±SD	Young (n=80) Mean±SD	p
Age (years)	71.3±5.4	28.8±4.4	0.000
Sex (%female)	40 (50%)	40 (50%)	
BMI (kg/m^2)	26.9±4,2	26.1±4.1	NS
BDI	12.6±7.5	11.6±8.7	NS
Pain duration (months)	9.5±3.2	8.7±2.7	NS

BDI: Beck Depression Inventory, BMI: body mass index, NS: nonsignificant, SD: Standard deviation.

Figure 1 shows the median pressure PT values for both groups. Tibial PPT measurements were not significantly different between groups (p=0.516). A slight reduction observed in the measurements from the first dorsal interosseous muscle in the elderly was not statistically significant (p=0.521), and both groups were found to have the same median value for the deltoid muscle measurement (Figure 1).

VAS values for pain sensitivity of the thumbnail bed (Thumb-VAS) were not different between the groups (p=0.564). VAS scores for low back pain at rest (LBP VAS-R) and VAS scores for low back pain during activity (LBP VAS-

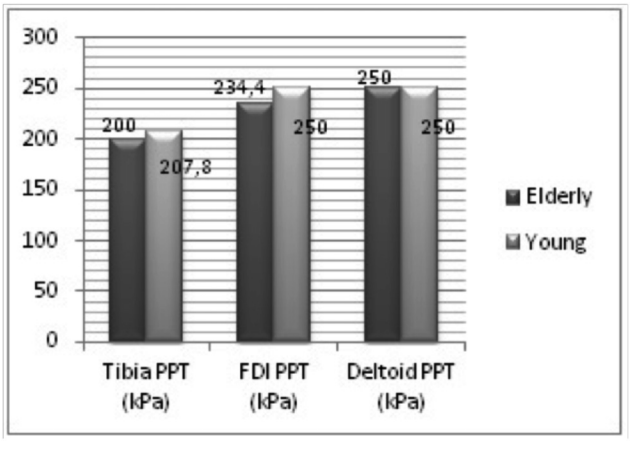


Figure 1— Median values of pressure pain threshold at three sites.



Table 2— Pain Sensitivity Parameters Compared Between Groups.

	Elderly Median (min-max)	Young Median (min-max)	p
Thumb VAS	7 (3-10)	8 (1-10)	0,564*
LBP VAS-R	5 (1-10)	4 (1-10)	0,155*
LBP VAS-A	7 (2-10)	6 (1-10)	0,338*

*Mann-Whitney U Test. LBP: low back pain, VAS: visual analog scale, VAS-A: visual analog scale activity, VAS-R: visual analog scale rest.

A) as measured by patient ratings were also not different between the groups (Table 2).

Results of correlation analysis for six parameters used for assessment of PS in both groups are shown in Table 3. Among these parameters, results of PT measurements obtained from the deltoid muscle, tibia and FDI showed a highly significant intercorrelation (p=0.000 for all). Thumb-VAS (another assessment performed after induction of experimental pain) showed a highly significantly correlation with PT values obtained at the other three sites (p=0.000). LBP VAS-A and LBP VAS-R scores, which reflect the sensitivity to clinical low back pain, showed a significant intercorrelation (p=0.000). However, there was no association between the clinical VAS scores and the four parameters used to indicate experimental pain sensitivity (Table 3).

Discussion

In this study, we examined the sensitivity of aged individuals to supra-threshold painful stimuli as well as to clinical pain and did not observe a substantial change in pain sensitivity with ageing for any of the parameters tested. PPT levels at each of the three measurement sites were comparable between the elderly and younger groups. Previously published studies have shown similar results; PPT measurements obtained by Edwards et al. from the trapezius and masseter muscles (9), by Donat et al. from the second and fifth digits (10) and by Gokoglu et al. from 18 fibromyalgic and 3 control points (11) have not shown a difference in PTs between elderly and younger patients.

Some studies have reported increased PPT levels with advancing age (3,4). Jensen et al.'s study is noteworthy because PPT was found to be increased only in female subjects (4). Visceral PPT was reported to be increased in the elderly using intra-oesophageal balloon distension test (18). In the literature, there are also studies reporting reduced PPT in elderly people (6-8). However, Lautenbacher et al. did not identify any age-related change in thermal PT in one of these studies (6), whereas Pickering et al. reported lower PPT only among male subjects and no age-related change in thermal PT (8).

The majority of studies that performed thermal PT measurements concluded that ageing was associated with increased PT (2,5). In most of these studies, heat was delivered using non-contact methods (2,19) and increased PT was attri-

Table 3— Correlation Analyses of Pain Sensitivity Parameters.

		DELTOID-PPT	FDI-PPT	TIBIA-PPT	THUMB-VAS	LBP VAS-R	LBP VAS-A
DELTOID-PPT	Cor. coeff.	1,000	**,482**	**,487**	-,333	-,041	-,034
	P value		**,000***	**,000***	**,000***	,621	,680
FDI-PPT	Cor. coeff.	**,482**	1,000	**,515**	**-,405**	-,031	-,016
	P value	**,000***		**,000***	**,000***	,712	,848
TIBIA-PPT	Cor. coeff.	**,487**	**,515**	1,000	**-,541**	-,105	-,148
	P value	**,000***	**,000***		**,000***	,207	,073
THUMB-VAS	Cor. coeff.	**-,333**	**-,405**	**-,541**	1,000	,049	,150
	P value	**,000***	**,000***	**,000***		,558	,070
LBP VAS-R	Cor. coeff.	-,041	-,031	-,105	,049	1,000	**-,311**
	P value	,621	,712	,207	,558		**,000***
LBP VAS-A	Cor. coeff.	-,034	-,016	-,148	,150	**-,311**	1,000
	P value	,680	,848	,073	,070	**,000***	

*p<0,001. Cor. coeff: correlation coefficient, FDI: first digital interosseöz, LBP: low back pain, PPT: pain pressure threshold, VAS: visual analog scale; VAS-A: visual analog scale activity; VAS-R: visual analog scale rest.

buted to age-related changes in the dermoepidermal region. However, according to Gibson, PT does not generally differ between elderly and younger people when contact methods are used (2).

In most of the studies that induced experimental pain by electrical stimulation, there was no marked change in PT with advancing age (2,12). In direct contrast, Tucker et al. reported increased PPT in people older than 75 years of age, particularly when they have age-related health problems (20).

According to Gibson, changes in PT with thermal and mechanical pain stimulation versus the lack of PT change with electrical stimuli observed in the elderly can be explained by the direct stimulation of the primary afferent fibres by the electric current. Nocioceptive receptors are activated when pain is induced with thermal and mechanical stimulation. It is known that the thermal detection threshold is increased with changes in the skin and subcutaneous tissue in the elderly (21). Also, Helme et al. demonstrated that elderly people have an increased threshold for thermal and electrically induced pain when the stimulus duration is kept short (22).

In one study, Mylius et al. examined the nociceptive flexion reflex (NFR) by delivering painful electrical stimuli to the sural nerve to assess pain sensitivity; they found that age did not have an effect on NFR threshold. When they evaluated responses to supra-threshold painful stimuli, there was no difference between elderly and younger patients (23). This finding is consistent with our data on the sensitivity to supra-threshold painful stimuli.

Pain perception may be diminished with ageing due to impairment of the myelinated A-delta fibres (24). Mylius et al. reported that NFR acts via A-delta fibres; their findings did not suggest a considerable loss of these fibres with advancing age. Before initiation of the study, patients with peripheral nervous system pathologies such as small fibre neuropathy were identified by electromyography and excluded from the study. Accordingly, it was reported that the normal range of afferent nerve fibre loss as part the physiological ageing process does not produce loss of nociception as shown by NFR (23).

Huang et al. reported that PTs show a high degree of variability for people over 70 years of age. While they concluded that thermal PT was reduced with ageing, no age-related change in PT was observed when patients younger than 70 years of age were studied. However, the study lacked assessment of the cognitive state of patients (5) and elderly people with cognitive impairment may not be able assess pain accurately (14).

During assessment of pain sensitivity, utilization of clinical pain not affected by confounding factors such as age-related changes in the stimulated region may deliver more robust findings. When we looked at the VAS ratings by both elderly and younger patients for the severity of their low back pain, we observed that both age groups perceived their current chronic pain at a comparable intensity. This finding is consistent with literature on the effect of age on perceived pain severity. In a study with 5239 subjects, Jarvik et al. reported that age was not associated with an increased perceived intensity of low back pain in people 65 years of age and older (25).

Lucantoni et al. reported that patients with silent ischemic cardiomyopathy had increased PT and suggested that this was related to individual PS irrespective of age (12). However, experimental pain sensitivity and clinical pain sensitivity were not correlated in our patients.

One of our study's limitations is the use of PPT alone for assessment of PT. PT could have been examined more extensively using other methods such as EPT. Another limitation is the non-representation of patients at a very advanced age due to our strict inclusion criteria.

In conclusion, although several factors including comorbid conditions, cognitive disorders and measurement errors associated with PT testing may lead to misconceptions regarding diminished pain perception in the elderly, for the time being, it is difficult to assume that elderly people experience reduced pain sensitivity than their younger counterparts. In future studies with a larger number of patients are needed to evaluate both experimental and clinical pain sensitivity taking into account such factors. Both our study and a major portion of the literature suggest that normal, physiological ageing does not produce a prominent change in pain sensitivity unless there is an undiagnosed neurological pathology or cognitive impairment, both of which could directly affect pain perception.

Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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RESEARCH

EFFECTS OF SLEEP QUALITY, INCOME LEVEL AND COMORBID CONDITIONS ON QUALITY OF LIFE IN A TURKISH ELDERLY POPULATION: A MULTICENTRE STUDY

ABSTRACT

Introduction: Our aim is to investigate the effects of sleep quality, income level and comorbid conditions on Quality of Life in a Turkish elderly population.

Materials and Method: This multicentric study was performed in seven districts. A total of 1030 patients older than 65 years of age who applied to the internal medicine and geriatrics outpatient clinics of study centres between January and December 2014 were included. All patients underwent the Pittsburgh Sleep Quality Index and Quality of Life Assessment (Short Form 36) tests viaface to face interview method. The demographic properties of patients were also recorded during this interview.

Results: The mean Quality of Life subscale scores, except for vitality, were significantly lower ($p<0.001$) in patients with poor sleep quality. When analysing the relationship between Quality of Life and multiple chronic diseases, it was observed that patients having multiple chronic diseases had significantly lowered scores in three subscales (physical functioning, mental health and bodily pain; $p=0.04$, $p=0.04$, $p=0.01$, respectively). There were significant differences between patients with high versus low income level with respect to the mean physical functioning, mental health and bodily pain subscales ($p=0.01$).

Conclusion: Our study demonstrated an adverse effect of low sleep quality, multiple chronic disorders and low income level on Quality of Life.

Key Words: Quality of Life; Sleep; Comorbidity; Aged.

ARAŞTIRMA

TÜRK GERİATRİK POPÜLASYONDA UYKU KALİTESİ, GELİR DURUMU VE KOMORBİDİTENİN YAŞAM KALİTESİNE ETKİSİ: ÇOK MERKEZLİ ÇALIŞMA

ÖZ

Giriş: Bu çalışmanın amacı Türk geriatrik popülasyonda uyku kalitesi, gelir durumu ve komorbiditeleri yaşam kalitesine etkisini araştırmaktır.

Gereç ve Yöntem: Çalışma İç Hastalıkları ve Geriatri polikliniklerine ayaktan başvuran, 65 yaş üstü 1030 hastayı içeren çok merkezli bir çalışmadır. Hastalarla yapılan yüzyüze görüşme yoluyla Pittsburgh Uyku Kalitesi ve Yaşam Kalitesi Kısa Form (Short Form–36) testleri yapıldı. Görüşmede ayrıca hastaların demografik özellikleri kaydedildi.

Bulgular: Uyku kalitesi düşük olan hastaların ortalama yaşam kalitesi subskala skorları (Zindelik skoru hariç) anlamlı olarak daha düşüktü ($p<0,001$). Çoklu kronik hastalığı olanların yaşam kalitesi 3 parametrede (Fiziksel fonksiyon, Mental sağlık, Ağrı) anlamlı olarak daha düşüktü (sırasıyla $p=0,04$; $p=0,04$; $p=0,01$). İlave olarak gelir durumu iyi olanlarda Fiziksel fonksiyon, Mental sağlık, Ağrı subskala skor ortalamaları anlamlı olarak daha yüksekti ($p=0,01$).

Sonuç: Çalışma düşük uyku kalitesi, çoklu kronik hastalık varlığı ve düşük gelir durumunun yaşam kalitesine olumsuz etkisini ortaya koymuştur.

Anahtar Sözcükler: Yaşam Kalitesi; Uyku; Komorbidite; Yaşlılık.

Introduction

Ageing is an inevitable process associated with a reduction in stress response, adaptation to environmental factors, reserve capacity of organs and homeostatic control. Due to the rapid progress made in the treatment of fatal complications associated with infectious diseases and atherosclerosis in the last few decades, life expectancy has greatly improved, which in turn has increased the proportion of the elderly population among the total population. The worldwide growth of the elderly population is also observed in the Turkish society. In 2013, the proportion of the elderly population to total Turkish population was 8% (1). It has been predicted that this figure will increase by 2- to 3-fold by next 30 years, in paral lel with a drop in fertility rates coupled with increased life expectancy as a result of early and effective diagnosis and treatment of chronic disorders (2).

Quality of life (QOL) broadly refers to feelings of happiness and satisfaction with one's life and requires harmony of individuals' expectations, values and concerns with those of the society in which one lives, including a good physical and mental health. Studies have shown a strong correlation between sleep quality and QOL, which suggests that sleep quality may be an important marker for QOL. In addition to being an inevitable process, ageing is a major cause of reduced QOL as a result of chronological, biological, social and psychological decline. Compared with other age groups, aged population has a greater prevalence of chronic disorders, which in turn leads to limitation of one's social activities with reduced QOL (3).

In this multicentre study, we aimed to investigate the effects of sleep quality, income level and chronic disorders on QOL in a Turkish elderly population who applied to the internal medicine and geriatrics outpatient clinics.

Materials and Method

Subjects

This study included 1030 patients older than 65 years of age who applied to the of the study centres in Istanbul, Ankara, Duzce, Corum, Mardin, Malatya and Diyarbakir provinces between January and December 2014. Patients were selected from a total of seven hospitals that were included study's cities. All patients underwent the Pittsburgh Sleep Quality Index (PSQI) ve Quality of life Assessment (Short Form 36) tests via a one-on-one interview method.

The demographic characteristics of the patients were also recorded during this interview, including age, sex, marital status persons with whom the patient lives income, educational status, number of co-morbidities (0–3 vs ≥4), and polypharmacy (currently using ≥5 drugs). In addition, the patients were also questioned about alcohol consumption and smoking habits. Patients living in nursing homes and with a Mini Mental State Examination (MMSE) score less than 17 were excluded. Informed consent was obtained from each patient. The local ethics committee of Dicle University approved the study.

Scales Used in the Study

The Pittsburgh Sleep Quality Index

The Pittsburgh Sleep Quality Index (PSQI), which can assess the patient's status for most of the days and nights in previous months, was used to measure sleep quality. There are seven component scores in this questionnaire consisting of 19 items, including subjective sleep quality, sleep onset latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications and daytime functioning, which altogether give a global score of 0 to 21. Higher global scores are indicative of worse sleep quality; as such a PSQI global score of ≥5 is suggestive of poor sleep quality. Its validity and reliability in the Turkish population were studied by Agargün et al. (Cronbach's alpha=0.80) (4).

Short Form 36 (SF-36)

This scale has been shown to be suitable for many societies and cultures in assessing the QOL. Kocyigit et al (5) conducted a study of validity and reliability of SF-36 in the Turkish version. It has eight subscales containing simple questions that assess physical functioning, social functioning, physical role limitation, emotional role limitation, bodily pain, mental health, vitality and general health.

Statistical Analysis

Statistical analyses were performed using SPSS for Windows 18.0 (SPSS Inc., Chicago, IL, USA). Data were tested for normal distribution using Kolmogorov–Smirnov test. Continuous variables were shown as mean ± standard deviation or median interquartile ranges as applicable. Continuous variables were compared using the Student's t-test and nominal variables using Chi-square test. Correlation analysis was performed by Pearson or Spearman test as applicable. A p value below 0.05 was considered as statistically significant.

Results

The mean age of the whole study population was 71.7±7.1 years and the women percent was greater than men

(54.9%). Among all the age groups in the whole study population, the early elderly age group was 67.3%.. The mean PSQI score of the whole study population was 3.6±2.2. A total of 604 (58.6%) patients had low income and 182 (17.6%) had chronic disorders. The overall characteristics of the whole study population are shown in Table 1.

Table 1— Clinical and Demographic Characteristics of the Patients.

Variables	N=1030
Sex, Female (n, %)	566(54.9%)
Age (years, mean±sd)	71.7±7.1
Age group (n, %)	
65-74	694(67.3%)
75-84	282(27.3%)
>84	54(5.4%)
Quality of life scores (Mean±SD)	
Physical functioning	66.3±14.7
Social functioning	67.1±14.2
Physical role	72.3±56.3
Emotional role	64.6±15.8
Mental health	64.1±16.2
Vitality	65.0±24.2
Bodily pain	65.3±15.1
General health	68.8±32.9
PSQI score (Mean±SD)	3.6±2.2
Number of medications (Mean±SD)	4.3±1.2
Education, low, (n, %)	887(%86.1)
Income status, low, (n, %)	604(%58.6)
Number of children (<4), low, (n, %)	798(%77.4)
Smoking, current, (n, %)	206(20%)
Alcohol use, current, (n, %)	63(6.1%)
Multiple chronic diseases (? 4),(n,%)	182(17.6%)
Polypharmacy present (n, %)	734(%71.2)
Marital status, (n, %)	
Married	724(70.2%)
Single	16(1.6%)
Widow	290(%28.1)
The person with whom the patient lives, (n, %)	
Spouse	726(%70.4)
Alone	82(%7.9)
Children	197(%19.1)
Relatives	25(%2.4)

SD: Standard Deviation, PSQI: Pittsburgh Sleep Quality Index.

Evaluation of the patients for sleep quality showed that the mean QOL subscales except for Vitality were significantly lower in the patients with poor sleep quality ($p < 0.001$). Analysis of the relationship between QOL and the presence of multiple chronic disorders showed that those having multiple chronic disorders had significantly lower scores in three subscales (physical functioning, mental health and bodily pain) ($p=0.04$, $p=0.04$ and $p=0.01$, respectively). Finally, analysis of income level in terms of QOL showed significant differences between patients with high vs low income with respect to mean physical functioning, mental health and bodily pain subscale scores ($p=0.01$ for all). The mean QOL scores and their statistical comparisons are shown in Table 2.

Pearson correlation test was performed between the QOL score and continuous variables such as age, sleep score, number of children, number of chronic disorders, and number of medications used. Besides the number of children, other continuous variables showed a significant correlation to QOL subscale scores. The results of the Pearson correlation analysis are shown in Table 3.

Discussion

This multicentre study demonstrated the unfavourable effects of low sleep quality, multiple chronic disorders and low income level on QOL. In addition, our study showed a low health-related QOL (HRQOL) in the elderly subjects with such socio-demographic characteristics as being female, being in the middle or old elderly period, smoking, being single or divorced, living alone, having less number of children, and absence of polypharmacy.

Research efforts towards the effects of health conditions on QOL have recently been hastened. Health and QOL are closely inter-related. This close association can be evaluated using HRQOL measures, which assess the individuals' physical, biological, psychological and social status (6,7).

Sleep disorders are reportedly present in more than 50% of the general population aged greater than 65 years. Ageing is associated with a reduction in the duration, quality and efficiency of sleep. A poor sleep quality causes excessive daytime sleepiness, health problems, depression and reduced QOL (8). Many previous studies have investigated the relationship between sleep disorders and HRQOL, although their results have been considerably inconsistent. The discrepancy between the results of the different studies was represented by two studies from Spain (8,9), one of which suggested that short sleep duration and reduced HRQOL were related to each ot-



Table 2— Quality of Life Subscale Scores According to Clinical and Demographic Characteristics of the Study Population.

	PF	SF	PR	ER	MH	Vit	BP	GH
Sex								
Male	64.1±15.5	**68.5±25.9[c]**	**77.5±28.4[b]**	64.7±10.6	74.5±26.4	**63.8±10.2[b]**	55.9±35.2	**68.2±14.3[b]**
Female	63.2±18.5	**64.2±35.5**	**68.0±15.8**	62.6±18.2	72.4±16.1	**66.3±14.0**	58.8±21.4	**63.2±42.3**
Age group								
65-74	**63.6±15.9[c]**	67.5±14.0	73.1±56.4	65.4±34.4	**74.5±33.1[c]**	**66.7±14.2[c]**	56.0±24.8	**65.5±21.1[a]**
75-84	**61.8±25.8**	66.8±35.5	71.7±41.8	53.0±25.6	**63.1±22.8**	**63.7±16.5**	54.1±15.5	**52.7±32.1**
>85	**58.0±20.5**	63.8±22.6	64.8±16.3	62.8±29.9	**60.1±15.5**	**60.8±26.2**	52.8±20.1	**41.5±20.1**
Income								
Good	**64.0±16.2[c]**	67.3±14.5	73.6±59.8	66.4±14.1	**64.2±17.5[c]**	54.8±24.7	44.9±25.6	**70.1±41.1[c]**
Poor	**60.1±14.9**	66.9±13.8	70.5±50.9	63.5±12.6	**60.1±15.8**	56.2±25.5	42.4±23.1	**63.9±14.7**
Education								
Low	54.1±13.2	58.5±24.3	75.5±19.7	54.6±15.5	64.6±26.4	73.4±12.8	50.5±25.5	58.8±20.1
High	52.5±28.1	60.1±34.6	78.0±12.5	62.6±10.4	62.3±20.2	76.6±10.8	52.0±30.6	56.5±40.3
Alcohol								
Yes	56.4±20.5	52.7±20.4	68.4±50.1	60.7±10.8	68.8±33.4	75.5±35.7	51.2±25.5	58.8±12.2
No	52.6±14.4	58.6±33.8	64.7±42.6	54.1±23.5	64.4±14.5	69.1±22.6	46.7±26.4	55.4±20.5
Smoking								
Yes	64.0±15.9	64.3±16.2	73.5±42.4	**59.1±23.1[c]**	65.4±18.5	56.5±35.4	**62.6±30.1[c]**	48.7±33.5
No	62,5±15.1	62.8±15.5	72.0±30.5	**55.6±35.5**	61.6±21.1	54.5±20.7	**56.8±28.4**	46.5±20.2
Marital Status								
Married	63.9±15.4	**68.0±14.2[c]**	**71.2±40.1[a]**	65.2±15.1	64.4±19.5	65.4±14.0	**69.0±32.5[c]**	68.1±14.4
Single	61.6±20.7	**64.1±16.2**	**58.7±25.5**	67.6±25.7	68.8±22.0	63.6±10.9	**66.3±14.5**	69.2±24.5
Widow	63.2±16.1	**60.8±14.3**	**65.6±40.1**	63.0±14.4	63.1±14.4	63.9±10.1	**65.4±18.5**	70.5±35.4
Whom lived								
Spouse	**64.0±15.5[c]**	**68.1±14.1[c]**	**70.3±40.0[b]**	**65.3±17.2[c]**	60.4±12.4	65.4±14.1	**66.2±24.9[c]**	**68.2±19.3[b]**
Alone	**60.3±16.1**	**62.8±12.7**	**61.5±19.4**	**57.1±16.9**	58.1±12.6	63.3±13.6	**60.1±15.2**	**54.1±22.2**
Children	**64.3±16.0**	**65.4±14.6**	**81.5±12.5**	**61.3±25.5**	61.8±14.2	63.9±15.7	**64.5±26.5**	**80.7±40.4**
Relative	**57.5±16.2**	**63.0±13.5**	**73.3±33.6**	**64.6±22.1**	58.1±22.5	64.7±15.8	**61.6±15.8**	**66.6±28.4**
Number of children								
0-3	**60.2±17.1[b]**	66.6±15.6	73.4±38.2	**61.6±27.5[b]**	**60.5±18.8[a]**	**63.2±16.3[c]**	**52.5±17.4[b]**	68.0±14.5
>3	**64.5±15.1**	67.3±13.8	72.0±52.4	**65.5±11.5**	**65.2±18.5**	**65.5±13.8**	**56.1±14.3**	69.0±36.6
PSQI								
Good	**68.6±12.4[a]**	**72.5±10.6[a]**	**73.9±11.1[a]**	**73.1±10.6[a]**	**70.0±12.5[a]**	74.7±37.6	70.9±10.1[a]	**70.4±11.2[a]**
Poor	**53.5±16.3**	**56.3±14.1**	**64.9±16.6**	**54.7±14.8**	**52.1±16.5**	66.7±24.5	53.6±16.3	**54.0±14.0**
Chronic Disease								
0-3	**66.2±14.6[c]**	67.2±14.1*	71.8±51.0*	67.0±15.0*	**66.9±15.3[c]**	66.1±24.5*	60.1±11.7*	**59.0±25.7[b]**
≥4	**51.8±15.1**	66.9±14.4	74.6±32.4	65.1±11.3	**51.4±11.4***	57.8±10.2	45.9±10.6	**57.7±24.6**
Polifarmasi								
Yes	53.6±11.5	66.9±24.1	72.3±54.5	64.4±32.3	**72.8±41.5[b]**	**55.5±12.7[b]**	62.4±25.4	**68.7±33.1[b]**
No	50.8±16.0	67.7±15.5	71.5±14.9	63.2±22.0	**61.5±15.8**	**43.2±11.4**	59.8±21.1	**55.4±25.8**

[a]; p<0.001, [b]; p<0.01, [c]; p<0.05, PF: Physical functioning, SF: Social functioning, PR: Physical role, ER: Emotional role, MH: Mental health, Vit: Vitality, BF: Bodily pain, GH: General health, PSQI: Pittsburgh Sleep Quality In.

Table 3— Pearson Analysis of the Continuous Variables in the Study Population.

	PF	SF	PR	ER	MH	Vit	BP	GH
Age	r= - 0.039	r= - 0.059	*	**	r= - 0.044	**	r= - 0.050	**
			r= - 0.078	r= - 0.086		r= - 0.084		r= - 0.098
PSQI scala score	***	***	***	***	***	***	***	***
	r= - 0.0395	r= - 0.045	r= - 0.0453	r= - 0.0423	r= - 0.0431	r= - 0.0466	r= - 0.0419	r= - 0.0496
Number of children					*			
	r= 0.049	r= 0.003	r= 0.015	r= 0.052	r= 0.065	r= 0.031	r= 0.043	r= 0.019
Number of chronic			*	***	***	***	***	
disease	r= - 0.177	r= 0.057	r= 0.062	r= - 0.222	r= - 0.232	r= - 0.0126	r= - 0.195	r= 0.026
Number of drugs used	***	**	***	***	*		**	**
	r= 0.103	r= 0.084	r= 0.125	r= 0.124	r= 0.079	r= 0.033	r= 0.089	r= 0.095

PF:Physical functioning, SF: Social functioning, PR: Physical role, ER: Emotional role, MH: Mental health, Vit: Vitality, BF: Bodily pain, GH: General health, PSQI: Pittsburgh Sleep Quality Index, *;p<0.05, **;p<0.01, ***;p<0.001

her while the other rejected such an association. Furthermore, Duran et al (10) and Lo and Lee (11) found a strong correlation between sleep quality and QOL in studies with 975 and 301 subjects, respectively. Such conflicting results also suggest that further research is necessary to clarify the relationship between sleep duration and QOL. In our study, the QOL scores except for the Vitality subscale were significantly lower in the patients with low sleep quality. Furthermore, there was a significant correlation between PSQI score and all subscale scores of the QOL score.

Patients with low HRQOL also suffer from chronic disorders. Kriesgman et al (12) reported that the number of disorders an individual suffers was closely related to physical functional decline. On the other hand, a multinational study conducted in eight countries found that chronic conditions affect QOL to a similar degree and in a similar pattern, despite some variations between the study countries (13). Wei et al (14) demonstrated a strong correlation between chronic disorders and QOL in a study comprising 3714 subjects. We detected a partial correlation between the presence of multiple chronic disorders and QOL, with physical functioning, mental health and general health subscale scores being significantly lower in patients with multiple chronic disorders. Similarly, there existed a significant correlation between the number of chronic disorders and certain subscales of QOL.

The impact of socio-demographic characteristics and clinical conditions on HRQOL has also been extensively investigated. HRQOL may be associated with low income and educational level as well as poor health status (15). Lubetkin et al (16) showed that a lower income predicted a low HRQOL in more than 13,000 Americans. The English Longitudinal Study of Aging indicated that lower income and educational levels and poor health status, among others, reduce HRQOL (15). The mean scores of the physical functioning, mental health and general health parameters were significantly lower in the subjects with low income compared with the high income group.

Kempen et al (17) reported that physical and social function and mental health components of QOL were related to educational level in the elderly people. We found no significant difference with respect to educational level and QOL scores. HRQOL seems to decline more rapidly as one ages, as evidenced by some reports of significantly worse HRQOL in older than younger subjects. There are also reports of gender effect on HRQOL (18,19).

In our country a study by Turgul et al (20) using the SF-36 scale reported that in individuals >65 years of age, the mean QOL scores of males were higher than those of females. Altuğ et al (21) found no significant difference between both genders with respect to QOL scores in an elderly population. HRQOL was partly affected by gender and age in our study. This might be due to various reasons. First, women are more prone to have depression, chronic disorders and to be involved in care provision.

Quality of Life of the elderly has been documented to be altered by social–psychological factors. Marventeno et al (22) reported that the most important positive factor for QOL was living with one's family, neighbours and relatives. We also found a significant correlation between QOL and the number of the persons an old person lived together and the number of



children he/she had. QOL scores were higher in the elderly subjects living with spouse, children or relatives compared with those living alone; those with a number of children greater than three also had higher QOL scores. The above findings that are in disagreement with previous reports may have stemmed from the difference of the socio-demographic properties of the Turkish society. That is, family bonds are stronger in Turkish society. Hence, in contrast to the elderly people living in western societies, the elderly population of the Turkish society usually live together with their relatives. QOL is also affected by marital status and a subject's ethnic origin. Living with one's own spouse may lead to increased activity during daily life and a sense of well-being and confidence. Hence, as compared with ones who are divorced, widowed or never married, the elderly people who are married or live with someone else had a higher QOL (23). We also demonstrated higher QOL scores in married persons compared with those who were either single or divorced.

In conclusion, our study demonstrated the unfavourable effects of sleep quality, presence of multiple disorders and low income level on QOL. Furthermore, many socio-demographic characteristics (such as having advanced age, being female, smoking, living alone, having less number of children, and absence of polypharmacy) were correlated to a lower QOL. Social support programmes aiming at the modifiable ones of these factors can contribute to efforts to increase QOL in the elderly.

Limitations

Our study has some limitations. Firstly, the descriptive nature of the study does not allow us to determine causality. Second, our patients represented a geriatric population presenting to geriatry clinics and may not necessarily represent the whole population. Thirdly, the results of the study may have been affected by false reporting or under-reporting, as some study data were based on personal statements.

Conflict of Interest

The authors declare that they have no conflicts of interest concerning this article.

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RESEARCH

EFFECT OF LARYNGEAL MASK CUFF PRESSURE ON POSTOPERATIVE PHARYNGOLARYNGEAL MORBIDITY IN GERIATRIC PATIENTS

ABSTRACT

Introduction: In many of the world's developed regions, the geriatric population forms a rapidly increasing portion of the total population. Therefore the vast majority of daily operating schedule constitutes the elderly patients. Pharyngolaryngeal complications are indicators of quality geriatric patient care. This study compared postoperative pharyngolaryngeal morbidity in geriatric patients managed with manometers to limit the laryngeal mask intracuff pressure (60 cmH_2O) with geriatric patients under routine care.

Materials and Method: Over 65 years of age with indications for elective surgery requiring laryngeal mask insertion were included in this prospective randomized and double-blind study. The Laryngeal Mask Unique intracuff pressure was measured with a manometer and recorded. In the pressure limiting group, LMU intracuff pressure was adjusted equal to 60 cmH_2O (44 mmHg). No intervention was performed in the routine care group. Ventilation parameters evaluated in the peroperative period, and throat pain, dysphonia and dysphagia were evaluated in the 1st and 24th hour postoperative.

Results: In the study, the throat pain ($p< 0.001$), dysphonia ($p< 0.001$) and dysphagia ($p=0.007$) in the Group Pressure Limiting at postoperative 1st hour group were statistically significantly lower than in the in the Group Rutine Care. In the 24th hour postoperative throat pain ($p< 0.001$), dysphonia ($p=0.022$) and dysphagia ($p=0.042$) were statistically significantly lower in the Group Pressure Limiting.

Conclusion: According to the results of this study, the conclusion was reached that limiting the cuff inner pressure reduced postoperative pharyngolaryngeal complications in geriatric patients using Laryngeal Mask Unique.

Key Words: Aged; Laryngeal Mask; Postoperative Complications.

ARAŞTIRMA

GERİATRİK HASTALARDA LARİNGEAL MASKE KAF BASINCININ POSTOPERATİF FARİNGOLARİNGEAL KOMPLİKASYONLAR ÜZERİNE ETKİSİ

ÖZ

Giriş: Dünyanın birçok gelişmiş bölgesinde toplam nüfusun en hızlı artan bölümünü geriatrik popülasyon oluşturmaktadır. Bu nedenle günlük operasyon çalışma programının büyük çoğunluğu yaşlı hastalar oluşturmaktadır. Geriatrik hastalarda faringolaringeal komplikasyonlar hasta bakım kalitesinin belirleyicisidir. Bu çalışmada, rutin bakım uygulanan geriatrik hastalar ile manometre ile laringeal maske kaf içi basınç sınırlaması (60 cmH_20) yapılan geriyatrik hastalarda postoperatif faringolaringeal morbidite karşılaştırıldı.

Gereç ve Yöntem: Çalışma, 65 yaş üstü 90 hasta ile prospektif, randomize ve çift kör, laringeal maske yerleştirilme endikasyonu olan elektif cerrahilerde yapılmıştır. Tüm hastalarda, Laringeal Maske Unique kaf içi basınç değerleri bir monometre ile ölçülerek kaydedildi. Kaf içi Basınç Sınırlama Grubu'nda kaf içi basınçları 60 cmH_2O (44 mmHg) olacak şekilde ayarlanırken, Rutin Uygulama Grubu'nda sadece ölçülen basınç değeri kaydedildi. Peroperatif dönemdeki ventilasyon parametreleri ve postoperatif 1. ve 24.saatte boğaz ağrısı, yutkunma güçlüğü ve ses kısıklığı değerlendirildi.

Bulgular: Bu çalışmada, basınç sınırlı grupta postoperatif 1.saatte boğaz ağrısı ($p<0.001$), yutkunma güçlüğü ($p=0.007$) ve ses kısıklığı ($p<0.001$) rutin uygulama grubuna göre karşılaştırıldığında istatistiksel olarak anlamlı olarak düşük bulundu. Basınç sınırlı grupta 24. saatte boğaz ağrısı ($p<0.001$), yutkunma güçlüğü ($p=0.042$) ve ses kısıklığı ($p=0.022$) rutin uygulama grubuna göre karşılaştırıldığında istatistiksel olarak anlamlı olarak düşük bulundu.

Sonuç: Bizim çalışmamızın bulgularına göre geriatrik hastalarda Laringeal Maske Unique uygulamalarında kaf içi basınç sınırlaması yapılmasının postoperatif faringolaringeal komplikasyonların azalmasına neden olduğu sonucuna varılmıştır.

Anahtar Sözcükler: Yaşlılık; Laringeal Maske; Komplikasyon; Postoperatif.

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INTRODUCTION

The geriatric patient population represents a wide group. Therefore, it is important to evaluate each aspect of anaesthesia management in this geriatric population (1).

The laryngeal mask airway (LMA) is widely used for airway management during anaesthesia. A recent survey reported that the use of a supraglottic airway device (SGAD) as a primary airway management device for general anaesthesia is as high as 56.2% (1). These devices have advantages over endotracheal intubation, such as fewer skills required for insertion and the ability to be used in difficult airway situations.

Currently, major complications are rarely observed with the use of LMAs. Pharyngolaryngeal morbidity linked to laryngeal mask use is related to correct choice of mask size, technique of placement, correct position of the LMA on the larynx, cuff volume and cuff pressure (2). The ideal cuff of a SGAD should provide good airway seal during positive pressure ventilation and protect against pulmonary aspiration without causing trauma to the surrounding structures. During laryngeal mask use, the high pressure of the laryngeal mask cuff with pressure on the pharyngeal mucosa and reduction in pharyngeal perfusion may cause the development of postoperative complications such as sore throat, dysphonia and nerve damage (3). However, the incidence of minor complications such as sore throat, dysphonia and dysphagia causing patient dissatisfaction after operations is very high, and studies have shown that this rate varies from 20 to 50% (4-7). It has been stated that keeping laryngeal mask cuff pressure below 45 mmHg (60 cmH_2O) can prevent pharyngolaryngeal morbidity related to laryngeal masks, and it has been shown that using a manometer after LMA placement to limit pressure within the cuff can reduce this morbidity by nearly 70% (2,5).

There are few studies commenting on pharyngolaryngeal morbidity, especially in group elderly (8).

We hypothesize that the routine use of manometry to measure and limit the intracuff pressure less than 60 cmH_20 may reduce the incidence of postoperative pharyngolaryngeal morbidity. The objective of this randomized controlled trial was to compare the incidence of postoperative pharyngolaryngeal morbidity in the geriatric age group managed with manometers to limit intracuff pressure with geriatric patients under routine care of Laryngeal Mask Unique® (LMU) insertion without the use of manometry.

MATERIALS AND METHOD

This study was registered in ClinicalTrials.gov (Identifier: NCT02189954) on July 7, 2014 by Sule Ozbilgin after IRB approval (Dokuz Eylul University Ethics Committee for Clinical Researchers, protocol number: 269-GOA, approval number: 2011/23-02, Izmir, Turkey), and written informed consent was obtained. Ninety patients above the age of 65 in the American Society of Anesthesiologists (ASA) physiological classification group I-III, undergoing elective surgery and with indication for LMA placement participated in this prospective, randomized and double-blind study.

Patients with recent history of upper respiratory tract infection, obese patients with body-mass index above 35 $kg.m^2$, symptomatic hiatus hernia, contraindications for LMA use such as severe gastroesophageal reflux, or those with dementia and who could not cooperate were excluded from the study.

Every patient was preoperatively evaluated, and ASA and Mallampati classifications were recorded. Patients taken to the operating room received standard monitoring [electrocardiography (ECG), pulse oxymetry, non-invasive blood pressure, capnogram)] and bispectral index (BIS) monitoring [BIS-Vista ™ (Aspect Medical Systems; Newton; MA, USA)] before anaesthesia induction.

After patients were preoxygenised with 6 $L.min^{-1}$ oxygen through a face mask for 3 minutes, anaesthesia induction was provided by 0.02 $mg.kg^{-1}$ midazolam (Dormicum® ampoule, Roche Company Limited, Istanbul), 1-2 $\mu g.kg^{-1}$ fentanyl (Fentanyl® 0.05 $mg.ml^{-1}$ampoule Jansen Pharmaceutica N. V., Belgium) and 1-2 $mg.kg^{-1}$ propofol (Propofol %1 Fresenius® Fresenius Kabi, Sweden). During ventilation, Guedel-type airway was not used unless there was ventilation difficulty with the face mask. Before insertion, the LMU used in daily routine was lubricated with a water-based gel, and the cuff was completely deflated. After induction, when BIS values were between 40 and 60 and sufficient chin relaxation was obtained, LMU was inserted by an anaesthetist with more than five years of experience. A size 3 LMU was used in weighing less than 50 kg; and a size 4 LMU was used 50-90 kg. and a size 5 LMU was used more than 90 kg. in patients. The placement method was according to the manufacturer's instructions. All patients were ventilated by a breathing circuit with heat and moisture filter.

After the laryngeal mask was inserted, the cases were manually ventilated so that peak inspiratory pressure was less than 20 cmH_2O, and the cuff of both groups was inflated with a 20 ml injector until the leak sound ceased. Regular end-tidal CO_2 curves and chest movement showed successful insertion and ventilation. During attempts, depending on the patients' reactions and with the requirement of keeping BIS



values between 40 and 60, additional doses of 0.5 mg.kg^{-1} propofol were administered.

After LMU was fixed and anaesthetic depth was sufficient (BIS between 40 and 60), the cuff pressure of the LMU was measured with a manometer (cuff pressure manometer, Rüsch, Germany). Groups were divided into 2 groups using a random number table. In the group with cuff pressure limitation (Group PL, n=45), cuff pressure was held at 60 cmH_2O (44 mmHg) (5), while in the routine care group (Group RC, n=45) pressure was only measured and recorded.

Anaesthesia was maintained with 50% air in O_2 and 1.5-2.5% sevoflurane and additional 0.5 mg.kg^{-1} propofol doses to keep BIS between 40 and 60. All patients were ventilated with positive pressure ventilation with a tidal volume of 7-8 ml.kg^{-1}, inspirium: expirium ratio 1:2 and end-tidal CO_2 ($ETCO_2$) held between 30 and 35 mmHg. Oropharyngeal leak pressure (OLP) measurement was recorded as the pressure value when a leak sound was heard from the mouth after the expirium valve was closed and fresh gas flow was reduced to 3 L.min^{-1}. OLP was measured immediately after the laryngeal mask was inserted, every 5 minutes in the first half hour and every 15 minutes afterwards. At the same intervals, tidal volume, mean airway pressure, end tidal carbon dioxide levels and SpO_2 values were also recorded. If the operation lasted more than 1 hour, a second manometric measurement was taken; pressure was adjusted to 60 cmH_2O in the pressure limited group and only recorded in the other group.

After the operation, the LMU were removed when the patients were awake and could open their mouths on command; unless necessary, oropharingeal suction was not applied. In the study protocol, the placement ease of the LMU, number of attempts, duration of surgery, airway use, laryngospasm incidence, total fentanyl dose, presence of blood on the LMU after removal and application of pharyngeal suction was recorded. After anaesthesia, the patients were monitored in the recovery unit, and analgesia was provided by 5-10 mg intravenous meperidine titration and nonsteroidal anti-inflammatory drugs (NSAID). A researcher blind to the groups recorded sore throat, dysphonia and dysphagia in the 1st and 24th hour, classifying as none, slight, moderate and severe (4). Cases developing rare complications of recurrent laryngeal nerve, hypoglossal nerve and lingual nerve paralysis were recorded. The cases were transported to the ward when Aldrete scoring criteria were appropriate. Cases discharged early from the ward had 24th hour evaluation completed by telephone communication.

Statistical Analysis

In statistical analysis for 96.6% power, the groups comprised 45 people. Data, percentage, average, standard deviation and median have been shown with their minimum and maximum values. Chi Square Test was used for categorical variables; for constant variables, at test was used when suitable for normal distribution, and when unsuitable for normal distribution, a Mann Whitney U was used for analysis. $P < 0.05$ was considered significant. All statistics were performed using SPSS (Statistical Package For Social Sciences, Chicago, IL, USA) version 15.0.

RESULTS

A total of 90 patients were included in the study. Demographic and operative properties of both groups were similar (Table 1). All the LMA devices were inserted on either first or second attempt. No ventilation failure occurred within the 2 groups.

The success of the first attempt insertion in the pressure limited group was 88.9%, while in the routine care group this rate was 86.7% (p=0.748). Immediately after insertion, the LMU cuff inner pressure was 92.7±20.5 in the PL group (mean±sd), while this was 82.2±22.2 cmH_2O in the RC group (p=0.222). There was no statistically significant difference between the groups in terms of number of attempts. None of the patients developed serious complications such as laryngospasm, pulmonary aspiration or nerve damage.

There was no significant difference found between OLP values of the PL group and the RC group (p=0.514). The average in the pressure-limited group was 22.02±6.44 cmH_20, while the average in the RC group was 22.93±6.75 cmH_2O.

The throat pain, dysphagia and dysphonia complications in the groups at the postoperative 1st and 24th hour are shown in Table 3. The throat pain (p< 0.001), dysphonia (p<0.001) and dysphagia (p=0.007) in the PL group in the postoperative 1st hour were statistically significantly lower. In the PL group at the 24th hour, there was a statistical difference found in throat pain (p< 0.001), dysphonia (p=0.022) and dysphagia (p=0.042).

When comparements for throat pain, dysphagia and dysphonia at the 1st and 24th postoperative hours in each individual group were performed (p=0.046). For dysphonia (p=0.100) and dysphagia, there was no significant change between the 1st and 24th hour in the PL group. In the RC group, the throat pain (p=0.033), dysphonia (p=0.014) and dysphagia (p=0.008) were significantly reduced at the 24th

Table 1— Demographic Characteristics and Operative Data for Patients.

Groups	Pressure Limiting (n=45)	Routine Care (n=45)	p
Baseline Characteristics			
Age (year) (mean±SD)	72.8±6.2	71.9±5.4	0.428
ASA (1/2/3)	10/31/4	8/35/2	
Mallampati (I/II/III)	26/18/1	29/14/2	
Gender (males/females)	22/23	23/22	0.833
Weight (kg) (mean±SD)	75,2±11.9	69.6±11.9	0.038
Operative Characteristics			
Anesthesia Duration (min) (mean±SD)	55.6±33.1	57±31.6	0.808
Ease of LMU insertion (Easy/fair/difficult)	39/6/-	32/12/1	
Attempts for LMU insertion (1/2)	40/5	39/6	0.748
Types of Surgery			
- Eye	3	6	
- Urology	32	30	
- Gynecologic	2	5	
- General surgery	7	3	
- Plastic and reconstructive	1	1	
Fentanyl Intraoperatively (µg) (mean±SD)	97.1±48.6	98.5±51.9	0.426
Meperidine Postoperatively (mg) (mean±SD)	18.3±4.9	19.5±6.3	0.497
Postoperative NSAID (yes/no)	1/44	3/42	0.616

ASA= American Society of Anesthesiologists; LMU= Laryngeal Mask Unique; NSAID= Nonsteroideal antiiflamatuar drugs.

Table 2— Details of Airway Management.

Groups	Pressure Limiting (n = 45)	Routine Care (n = 45)	p
LMU size (3/4/5)	2/36/7	5/39/1	0.442
The first measured cuff pressure (cmH_2O) (mean±SD)	92.75±20.53	87.20±22.27	0.222
Amount of air deflated (in ml) (mean±SD)	3.41±2.54	-	
Oropharyngeal leak pressure (cmH_2O) (mean±SD)	22.02±6.44	22.93±6.75	0.514
Guedel-type airway use (%)	-	2.2	1.000
Pharyngeal suctioning (%)	-	-	
LM blood-stain (no blood/trace amounts/marked)	42/3/-	40/5/-	0.714

hour compared to the 1st hour (Table 3). When the LMU was removed, the percentage with trace amounts of blood was 6.7% in the PL group, while this rate was 11.1% in the RC group. Significant amounts of blood on the LMU after removal were not observed in any group.

When the intraoperative ventilation parameters were compared, there was no statistically significant difference between the groups in terms of average airway pressure (p=0.875), peak airway pressure (p=0.698), tidal volume, peripheral oxygen saturation and end-tidal carbon dioxide values (p=0.669).

The intraoperative fentanyl usage was the same between the two groups (Table 1). The postoperative meperidine consumption (mean±sd) in the PL group was 18.39±4.91 and 19.53±6.39 in the RC group, with no statistically significant difference found.

Discussion

Our study showed that when the cuff pressure of the LMU inserted in patients above 65 years of age was regulated to 60 cmH_2O, there was a reduction in postoperative pharyngolaryngeal morbidity.

Hyperinsufflation of the LMA cuff may cause damage due to high pressure on the structures of the larynx and pharynx. High LMA cuff inner pressure may cause a reduction in the



Table 3— Pharyngolaryngeal Discomfort Evaluation.

Groups	Pressure Limiting (n = 45) Median (min-max)	IQR	Routine Care (n = 45) Median (min-max)	IQR	p*
Sore throat					
at 1 h	1(1-2)	0.00	1 (1-4)	0.00	<0.001
at 24 h	1 (1-1)		1 (1-3)		<0.001
p value**	0.46		0.033		
Dysphonia					
at 1 h	1 (1-1)	0.00	1 (1-3)	0.00	< 0.001
at 24 h	1 (1-1)		1 (1-3)		0.022
p value**	1.00		0,014		
Dysphagia					
at 1 h	1 (1-2)	0.00	1 (1-3)	0.00	0.007
at 24 h	1 (1-1)		1 (1-2)		0.042
p value**	0.157		0.008		

*p: Mann Whitney U test.
**p: Wilcoxon-signed rank test.
IQR: Interquartile range.

perfusion pressure of capillaries in the pharynx mucosa. Though it may be rare in surrounding tissues, nerve damage may form as a result of trauma related to pressure (9,10). Additionally, the high cuff inner pressure in LMA cuff hyperinsufflation may cause an increase in postoperative pharyngolaryngeal morbidity, especially throat pain (11,12). As recommended by the manufacturing company, the LM cuff pressure should not exceed 60 cmH_2O.

Seet et al.(5) recently demonstrated that intracuff pressure exceeds normal limits when used for anaesthesia. They reported that when the LM cuff insufflation is routinely made, high rates of incidence of composite pharyngolaryngeal adverse events at 45.6% are seen, but when it is checked with a manometer, the incidence falls to 13.4%. Additionally, this study found that the incidence of throat pain in the 24th hour was lower in the pressure limiting group compared to the routine care group (13.6 vs. 3.1%, p=0.008). As a result of their study, they recommended the routine use of pressure manometers when the LM is first placed.

While 4 similar studies in the adult population showed that reducing LM cuff inner pressure and volume reduced postoperative pharyngolaryngeal complications (4,13,14) other studies have not showed any relationship between the two (2,15,16). Brimacombe et al. (4) showed in a randomized controlled trial that inflation of the LMA cuff with a smaller volume of air (15-20 ml) was associated with a decreased incidence of the primary outcome of sore throat at 18–24 h postoperatively (20 vs. 42%, p< 0.04) compared with a larger volume of air (30–40 ml). Burgard et al (13), were to investigate the effect of cuff pressure reduction on postoperative sore throat in LMA anaesthesia. They were reported postoperative sore throat can be reduced when cuff pressure is continuously monitored and kept on low-pressure values. However, they have used nitrous oxide and oxygen for maintained anaesthesia in both study. The studies which report no relation between LMA cuff pressures and postoperative pharingolaryngeal complications have nitrous oxide usage (17,18) and lower sample size (17) study group. This makes conflict effect upon results. Several confounding variables may have affected pharyngolaryngeal adverse events. We didn't use nitrous oxide in our study, we excluded two important effect; nitrous oxide usage and experienced practitioner. Several confounding variables may have affected pharyngolaryngeal adverse events. Yurtlu et al. (2) have showed that experience of the anesthesia team practitioners does not have an influence on accurate determination of LMA cuff pressure and related pharyngolaryngeal adverse event incidences.

Schloss (12) evaluated the incidence of LMA hyperinflation and determined that 53% of subjects had an LMA intracuff pressure equal to or exceeding 60 cmH_2O. They concluded that a significant percentage of patients have an intracuff pressure greater than the generally recommended upper limit of 60 cmH_20 (used nitrous oxide). In a prospective study by Haldar and Immanuel, they found that the cuff pressure of the

inserted LMA was above 44 cmH_2O in 76% of patients (19). A more worrying situation is that of these, 48% had cuff inner pressure measurements recorded above 88 mmHg. This high LMA cuff pressure was recorded as 132 mmHg at the start of anaesthesia and as 153 mmHg at the end of the case by Lenoir (20), and the previous results were confirmed (used nitrous oxide). Seet reported an average LMA cuff pressure of 107 mmHg. Thus, the majority of LMA cuff pressures significantly exceed the manufacturer's guidelines in anaesthetic practice (used nitrous oxide). Starting from this point, a variety of studies were completed on the use of an injector to provide the most appropriate volume to reach but not exceed target cuff pressure for LMA (21).

Over time, nitrous oxide can diffuse into the LMA cuff and increase the cuff inner pressure (16). Inhalation agents do not diffuse through LMU, a new type of SGAD. In addition, we consider that our use of air and oxygen in our study removed this factor and allowed us to more clearly evaluate the relationship between pharyngolaryngeal morbidity and LMU cuff pressure.

Brimacombe et al (18) measured the OLP values after inflating cuffs with 10, 20, 30 and 40 ml volumes and found they were 19±5, 25±4, 27±4 and 25±4 cmH_2O, respectively. The researchers showed that when the cuff volumes rose above 30 ml, the OLP values reduced. When Brimacombe et al (22) held the LMU cuff pressure at 60 cmH_2O and 180 cmH_2O, the OLP values were 18.0±5.8 cmH_20 and 15.6±4.6 cmH_20, respectively. The researchers concluded the lower OLP values at 180 cmH_2O pressure may be related to better placement of the LM at low cuff inner pressures (60 cmH_2O). Similarly, in a study by Keller et al (23), LM cuff inflation with increasing volumes increased the OLP values; however, when the volumes rose above 20 ml, they showed that the OLP values reduced. The researchers determined that inflating the LM cuff above 25 ml did not increase OLP values and improved fibreoptical imaging. In our study, while the OLP values in the pressure limited group were 22.02±6.44 cmH_2O, they were 22.93±6.75 cmH_2O in the routine care group. As a result, there was no significant difference between the groups in terms of LMA insertion and the markers of efficiency, ventilation parameters such as airway pressure and volume. The monitoring of anaesthesia depth by BIS may have been effective at preventing observation of any differences between the groups.

When different ventilation modes (spontaneous ventilation, pressure support and pressure control ventilation) were evaluated in a randomized, controlled study of the effect of manometer monitoring on pharyngolaryngeal side effects, when the LMA cuff pressure is prevented from exceeding 60 cmH_2O the pharyngolaryngeal discomfort reduced independently of ventilation mode (24).

In our study, in the postoperative 1st hour ($p<0.001$) and 24th hour ($p<0.001$), the incidence of throat pain in the PL group was found to be lower than in the RC group. Even though the population was geriatric, our findings comply with the findings of researchers such as Seet (5), Burgaard (13) and Karthick (25) in adult patients. We standardized the insertion procedures for the LMU in both groups. Though there was no statistical difference in both the cuff volume and cuff inner pressure values of the LMU in both groups, when the groups were evaluated from the point of view of postoperative pharyngolaryngeal morbidity, there was a statistically significant difference. While the pressure was not very different between the groups, the reduced volume in the PL group may have provided an advantage. In spite of the reduced volume, the leak did not repeat, and as a result, evaluating the inflation a short time after the cuff is inflated for the first time is the correct step in all LMA applications. We observed that the incidence of throat pain, dysphonia and dysphagia in the PL group in the postoperative 1st and 24th hour was lower. However we discovered statistically significant differences between sore throat, dysphagia and dysphonia in the first hour and 24 hours later. We may comment the reduction of pharingeolaryngeal complications after a while therefore the reduction of high cuff pressure effects in acute period.

In our study, sufficient depth of anaesthesia was monitored with BIS, and a standard postoperative analgesia protocol was followed. There was no significant difference in doses of peroperative fentanyl and postoperative meperidine.

In our study, the success on first insertion attempt was 88.9% in the PL group group and 86.7% in the RC group ($p=0.748$). In studies with LMU, the success rate on first attempt is reported as 88-100% (4,22). Our study complies with these.

A different aspect of our study population is that it was geriatric. While the average ages in other studies were 39±14 years for Brimacombe (4), 46±16 for Seet (5), and 49.1±13.0 for Karthik (25), our average age was 72.3±5.8 years. Along with accompanying diseases, the geriatric population carries a high risk of perioperative morbidity and mortality. Seventy-five percent of surgical cases in their seventh decade have one or more accompanying health problems. Hypertension, renal diseases, atherosclerosis, myocardial infarction and chronic obstructive pulmonary disease (COPD) are the most frequ-



ently observed accompanying diseases in geriatric cases. The number of accompanying diseases is a more important marker of prognosis in geriatric cases than age. The increase in accompanying diseases, especially COPD, increases the risk of apnoea and airway obstruction in the recovery period (1).

The mask ventilation can not be effective or enough in over 65 year old patients because of being edentulous, loose of tissue elasticity and muscle tone (25). The mask doesn't fit in cheeks and lead to air leakage in edentulous patients. The percentage of edentulous is 60% in over 65 year old patients (26) and this percentage is more then other age groups. Racine et al (27) observed difficult mask ventilation incidance 16% in the study betweeen edentulous patients. Therefore, LMA usage for anesthesiology practice in geriatric patients is more valuable. The procedures about this application and properties belongs to postoperative pharingolaryngeal care should be known well and appropriate strategies sould be thought.

Additionally, the frequency of repeated surgical procedures is higher in this patient group. As a result, LMA use without muscle relaxants to prevent exposure to postoperative residual effects has become the cornerstone of airway devices in the geriatric patient group. Furthermore, the provision of better hemodynamic conditions for laryngoscopy and endotracheal intubation continue to strengthen its popularity. Aspiration pneumonia is a potentially life-threatening complication. Arozulah et al (28) found the 30-day mortality incidence was 20% in patients with pneumonia. One of the reasons for a tendency to aspiration pneumonia is progressive reduction in pharyngeal and supraglottic sensitivity with increased age, and as a result this may contribute to dysphagia and development of aspiration in elderly patients (29).

It has been observed that LMA cuff pressure exceeds the manufacturer's recommendations in the majority of anaesthetic applications (6,21). Even in geriatric patients where all surgical procedures do not require neuromuscular blockers, routine aneroid manometer use to maintain LM pressure at the desired level may reduce the rate of laryngopharyngeal morbidity after the operation (6).

Limitations of our study include the lack of imaging with a fibreoptic bronchoscope after LMU placement and not evaluating the position in the hypopharynx of the supraglottic airway device in the geriatric age group.

In conclusion, the results of this study of the insertion of LMA in the geriatric age group and regulation of cuff pressure show that keeping cuff pressure below 60 cmH_2O reduces postoperative pharyngolaryngeal complications. However, further studies are required to research the effect of factors such as the use of pharmacological agents and appropriate choice of airway device size and experience on the postoperative pharyngolaryngeal complications especially in the geriatric age group.

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RESEARCH

RELIABILITY AND VALIDITY OF FOUR STEP SQUARE TEST IN OLDER ADULTS

ABSTRACT

Introduction: The aim of this Cross-sectional descriptive study was to determine the reliability and validity of Four Step Square Test for use to evaluate balance ability in older adults.

Materials and Method: Participants were 44 men and 36 women (n=80; Mean age of the participants were 72.69±5.09 years. Participants performed the Four Step Square Test, the Time Up & Go test, the Functional Reach test, the One Leg Standing test and completed the Berg Balance Scale.

Results: The Four Step Square Test has good Cronbach's Alpha (0.96) with the other balance measures. The Four Step Square Test has good correlations with the Time Up & Go test ($p<0.001$) and in the same way there were a good correlations between the Four Step Square Test and Berg Balance Scale ($p<0.001$).

Conclusion: Four Step Square Test is a reliable and valid tool for measuring the dynamic balance ability in older adults.

Key Words: Postural Balance; Aged; Reproducibility of Results.

ARAŞTIRMA

YAŞLILARDA DÖRT ADIM KARE TESTİNİN GEÇERLİLİK VE GÜVENİLİRLİK ÇALIŞMASI

ÖZ

Giriş: Bu çalışma dengeyi değerlendirmek için kullanılan Dört Adım Kare Testi (Four Step Square Test)'nin yaşlılarda geçerlilik ve güvenilirlik çalışmasını yapmak amacıyla planlanmıştır.

Gereç ve Yöntem: Araştırmaya 65-85 yaş aralığında 80 yaşlı birey alınmıştır. Olguların 44'ü erkek, 36'sı kadındır. Katılımcıların ortalamaları 72,69±5,09 yıldır. Bu araştırmada olguların denge yetenekleri Berg Denge Skalası, Süreli Kalk Yürü Testi, Fonksiyonel Uzanma Testi, Tek Ayak Üzerinde Durma Testi ve Dört Adım Kare Testi ile değerlendirilmiştir.

Bulgular: Dört Adım Kare Testinin geçerliliği için; daha önce geçerlilik ve güvenilirliği saptanmış testler ile Dört Adım Kare Testi skorları karşılaştırılmıştır. Cronbach Alpha ölçümü sonucu ise 0,96 bulunmuştur. Dört Adım Kare Testi ile Süreli Kalk Yürü Testi arasında güçlü bir ilişki ($p<0,001$) ve aynı şekilde Dört Adım Kare Testi ile Berg Denge Skalası arasında da güçlü bir ilişki ($p<0,001$) bulunmuştur.

Sonuç: Dört Adım Kare Testi yaşlılar için geçerli ve güvenilir bir testtir.

Anahtar Sözcükler: Postural Denge; Yaşlı; Geçerlilik ve Güvenilirlik.

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INTRODUCTION

The ageing process has chronological, biological, social and psychological dimensions. The physiological and physical changes that occur among the elderly limit or prevent some activities in individuals (1). The prevalence of some acute and chronic diseases is related to the ageing process. Ageing is related to a high incidence of functional and physical deficiency regardless of whether it is related to a particular disease (2). Falls resulting in injuries increased by 46%–60%, depending upon the amount that physical activity level decreases of 19%–26% on elderly (3). The most important causes of falling among older adults are a decrease in mobility and in ability to maintain balance. Most falls that result in injuries occur during movement. The balance is the ability of keeping the centre of body gravity within the support level and ability of maintaining this situation (1,2,4).

Clinical, laboratory and functional approaches are used to evaluate balance in the elderly (1,4,5). Clinical balance measurements include static balance tests, such as timed heel-toe stance and single leg stance (4,5,6). Laboratory balance tests assess dynamic postural reflexes using various tools and force platforms. In addition, balance evaluations in the laboratory environment frequently combine static and dynamic balance tests (4,5).

This study was planned with the aim of improving the objective evaluation method of the Four Step Square Test (FSST) used by the medical team that evaluates balance of older patients in the clinical setting. This study includes evaluating both its validity and reliability. The result of this study may help clinicians to use balance assessment to improve the quality of health of the elderly.

MATERIALS AND METHOD

Our study was conducted between May and August of 2013 on the elderly residents, aged 65–85 in nursing homes. Before starting the study, informed consent was obtained from the volunteer participants. Using inclusion and exclusion criteria described below, a total of 80 cases were found suitable for participating in the study.

Inclusion Criteria of the Study

- Healthy individuals aged 65–85
- Absence of a neurological or orthopaedic problem that may prevent the tests
- Absence of a vision or hearing impairment that may prevent the tests
- No history of surgery of a lower extremity or the lumbar spinal region
- Able to independently perform activities of daily living

Exclusion Criteria of the Study

- Individuals with a result of 7 or less on the Hodkinson's Abbreviated Mental Test
- Presence of a cognitive, vision or hearing impairment,
- Individuals with a lower extremity impairment that could affect balance.

This study was certified by the Pamukkale University Medical Ethics Committee (B.30.2.PAU.0.20.05.09/90).

Outcome Measurement

Demographic features, dominant extremity, educational background, additional diseases, use of adaptive mobility equipment and vision and hearing disorders of all participants were recorded.

Static and dynamic balance tests were used to evaluate balance level of the participants. The Single Leg Stance Test (SLST) and Functional Reach Test (FRT) were used as static balance tests. The Four Step Square Test (FSST), Timed Up and Go Test (TUGT) and Berg Balance Scale (BBS) were used as dynamic balance tests.

Before obtaining measurements, we informed the participants regarding the tests and the positions they would be asked to perform in them. The physical therapist (PT), who recorded each test in the study, demonstrated the correct way to perform each position. Then, before each test, the participants were allowed to make one timed trial to accustom them to the measurement method and decrease the potential negative effect of unfamiliarity with the test on their scores. Because multiple tests were recorded per session, 5-min rest breaks were provided to the participants to reduce the potential effect of fatigue on the results.

Static Balance Tests

The Single Leg Stance Test (SLST); one leg is raised without touching the standing leg. At the beginning, the eyes remain open. The patient is instructed to close his/her eyes, and he/she should sustain his/her balance for 30 second. If the raised leg touches the supporting leg, if the raised leg touches the ground, if the patient hops on the standing leg, or if he/she touches something for balance, the presence of a balance disorder is suspected.



Inability to balance on one leg for 30 s during SLST is an indicator of decreased balance function. However, the clinical expectation for the ability to balance on one leg decreases based on the patient's age. Healthy individuals who are 60–69-year-old should be able to stand on one leg with eyes open for at least 5 s (7).

Functional Reach Test (FRT); developed by Duncan et al., FRT is a reliable and validated test used in clinical measurement of balance. While standing barefoot in a relaxed position, the patient is instructed to raise his/her right arm to 90° and then to reach forward with the right arm to the farthest position that he/she can without taking a step and losing his/her balance. During FRT, the physical therapist observes whether the patient keeps both feet on the ground and does not step forward. If either of these behaviors occurs, the patient repeats the test. Functional Reach Test is repeated three times, and the best measurement is recorded (8). Decreased reach ability indicates that the patient's has an increased future fall risk; a value of 15 cm or lower indicates a markedly increased fall risk, whereas a value of 15–25 cm indicates a mild fall risk (9,10).

Dynamic Balance Tests

The Four Step Square Test (FSST); test clinically assesses the ability to change directions while stepping. At the beginning of the test, the patient stands on the upper left square (Square 1) and faces in the direction of Square 2. First, the stepping sequence is clockwise: Square 1, followed by Squares 2, 4 and 3. Then, the stepping sequence is counterclockwise: Square 3, followed by Squares 4, 2, and 1. The patient is instructed to step through the sequence as quickly a possible without touching the canes and contacting both feet with the ground in each square (10). The physical therapist demonstrates the test and the patient is allowed to practice the pattern to learn the sequence. The test is repeated if the patient cannot complete the sequence successfully or if he/she either loses his/her balance or touches the cane. Two scores are obtained, and the better of these two scores is recorded. The timed effort begins when the first foot touches the ground in Square 2 and then ends when the patient's second foot contacts the ground in Square 1 (10,11,12).

Timed Up and Go Test (TUGT); the test evaluates functional mobility, balance and performance in adults aged 65 years and older. Wearing his/her regular shoes and customary walking aids, the patient begins the test seated in a standard armchair with his/her back against the chair, arms rested on the chair's arms and both feet flat on the floor. The patient is instructed to rise and walk to a line on the floor 3 m away, turn around at the line, walk back to the chair and sit down in the chair. The test ends when the patient's buttocks touch the seat. The test is repeated twice; the fastest time is recorded.

A time of <10 s is classified as mobile, <20 s as generally independent and >30 s as limited mobility (10,13,14).

Berg Balance Scale (BBS); test is a 14-item scale designed to measure balance of the elderly in a clinical setting. It can be used to detect the fall risk. Each item is scored between 0 and 4 points in accordance with the ability of the patient to meet specific time and distance requirements of the test. The lowest level of function indicates '0' indicates the lowest level of function and '4' indicates the highest level of function. The patient's score the score indicates the ability in terms of completing the duty independently. The total score ranges from 0 to 56. For this study, scores ranging from 41 to 56 indicate that the patient's balance is good; scores ranging from 21 to 40 indicate that the patient's balance is acceptable (may need some assistance), and scores from 0 to 20 indicate that the patient's balance is poor (cannot ambulate) (12,13).

Statistical Evaluation

All data were computed and calculated using Statistical Package for the Social Sciences (SPSS) for Windows statistical program (20.0 versions) $p<0.05$ was accepted statistically significant. Descriptive results were given as min-max., mean± standard deviation (mean±sd) and percentage (%). The Reliability Analyze was used to look Cronbach alpha value a selected sample (n=20) with one week interval (test-retest). Pearson correlation analysis was used to show the relation between FSST and other four balance tests (15).

RESULTS

A total of 80 were participants included in the study with average age of 72.69±5.09 participated to the study; 55% (n=44) were male and 45% (n=36) were female. Average height, body weight and body mass index (BMI) were 165.35±6.29 cm, 71.05±8.72 kg and 25.90±2.02 kg/m^2, respectively. The right lower extremity of 78.8% (n=63) was dominant, whereas the left lower extremity of 21.2% (n=17) was dominant.

Test-Retest Reliability

Test-Retest analysis was done to look Cronbach alpha (internal consistency) it was found to be 0.96 ($p<0.001$).

Table 1— Static and Dynamic Balance Test Results.

Balance Tests	Min. – Max.	mean±sd
Static Tests		
Single Leg Stance Test (sec)	2.90 -37.60	16.37±10.54
Functional Reach Test (cm)	3.30 – 26.20	9.38±4.02
Dynamic Tests		
Four Step Square Test (sec)	6.20 – 26.50	15.24±5.06
Timed Up and Go Test (sec)	6.60 - 35	15.18±5.61
Berg Balance Scale score (max=56)	38 - 56	50.08±4.19

Table 2— Relation of Four Step Square Test with Balance Tests.

Balance Tests	Four Step Square Test	
	r	p
Static Tests		
Single Leg Stance Test	-0.348	< 0.01*
Functional Reach Test	-0.232	< 0.05*
Dynamic Tests		
Timed Up and Go Test	0.595	< 0.001*
Berg Balance Score	-0.641	< 0.001*

*Pearson Correlation Analysis.

When static balance test results were examined, the average values of SLST and FRT were 16.37±10.54 s and 9.38±4.02 cm, respectively. According to FRT results, the majority of participants showed a high fall risk. When dynamic balance test results examined, the average values of FSST, TUGT and BBS were 15.24±5.06 s, 15.18±5.61 s and 50.08±4.19, respectively. Berg Balance Scale results showed no significant balance impairment in our study group. Static and dynamic test results are shown in Table 1.

Simultaneous Validity

When the relationship between FSST and the other balance tests was examined, a negative statistically significant (r=-0.348; p <0.01) relationship with SLST among static balance tests was observed. Similarly, a negative statistically significant (r=-0.232; p=p<0.05) relationship was observed between FSST and FRT.

When the relationship between FSST and other dynamic balance tests was examined, a positive statistically significant (r=0.595; p<0.001) relationship was observed with TUGT among static balance tests. A negative (r=-0.641; p<0.001) relationship was observed between FSST and BBS. The relationship of FSST with static and dynamic balance tests is shown in Table 2.

Discussion

In our study, according to the test-retest reliability results of FSST, it was determined that FSST was homogenous and has strong internal reliability. When simultaneous validity results were examined, it was determined that FSST is a valid test method for assessing balance among the elderly.

Dite et al. (3) studied 81 geriatric patients (average age, 70 years) to rate validity and reliability of FSST in Australia. Their participants were divided into three groups. The first group consisted of patients who had fallen two or more times in the previous 6 months, the second group consisted of patients who had fallen less than once in the previous 6 months and the third group consisted of patients who had never fallen in the previous 6 months. They used TUGT, FRT and FLST tests as well as FSST to assess balance and observed a negative relationship (r=-0.83) between FSST and TUGT scores as well as a negative relationship (r=-0.47) with FRT and a positive relationship (r=0.88) with TUGT (p<0.001). The optimum score of the FSST to differentiate between the individuals with decreased balance and an increased risk of falling from healthy individuals was at 15 s. The results of our study showed scores similar to those of Dite et al.; this indicates that FSST can be used effectively to rate balance and fall risk in both of these communities.

Whitney et al. observed average FSST scores among their 32 participants (average age, 67.3 years) of 13.6 s. They divided participants into three groups based on the number of falls each participant reported per day. The group of participants who had no falls received FSST scores from 9 to 11 s; the individuals who fell once a day received scores from12 to 18 s, and the participants who reported falling two or more times per day received scores from 14 to 21 s. The average FSST score in our study was 15.24 s. Comparing our scores with those of Whitney et al., we observed that our FSST scores were reliable to identify our participants as individuals with a significant risk of falling (16).

Blennerhassett, et al. used FSST method to asses pre-treatment and post-treatment balance on 37 ambulatory hemiparetic individuals (14 right hemiparetic, 16 left hemiparetic and seven bilateral hemiparetic), with an average age of 53 years. Average FSST score of the pre-treatment individuals was 20.8±15.0 s; Average FSST score of the post-treatment individuals was 17.9±11.6 s. According to these results, FSST is



a sensitive and reliable test not only for healthy elderly individuals but also for evaluating balance changes receiving hemiparetic rehabilitation services (17).

Ceceli et al. measured SLST scores of their elderly participants to be 12.4±10.73 s. In our study, the average SLST score was 16.37±10.54 s, which negatively correlated (r=-0.348) with FSST (p<0.01) (18,19). In contrast, Ceceli et al. stopped recording when their participants successfully reached the time of 30 s. Therefore, two groups of SLST scores differed.

Finally, several tests have clinical uses to evaluate balance in the elderly. We observed there are very few easily understandable clinical methods that are simple and fast to administer. We believe that FSST, whose validity and reliability we evaluated in this study, is important for because it is easy to administer, requires only a short time to administer, is easy to understand and produces valid and objective results. We believe that studies on the application of FSST to patient populations with different types of impairments as well as with other age groups can help to determine valid cut-off scores that may indicate risks of falling.

Conflict of Interest

All authors of this study declare no conflict of interest.

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Review Article

VASCULAR AGING

Abstract

The incidences of heart and vascular diseases increase with age and it is known to be the leading cause of mortality and morbidity in developed countries. Although aging is a chronological process, it is known that some environmental factors, chronic diseases and lifestyle may form and speed up the process of aging, especially of the cardiovascular system. Due to the changes that occur at structural and molecular levels in the vascular system of the elderly, the function of the cardiovascular system becomes impaired. Vascular aging is a normal physiological process, which develops gradually along with the age. The most known pathophysiological vascular changes are the ones beginning at the intimal level such as atherosclerosis. However, the other vascular pathologies leading to the thickness in media and adventitia and remodeling are also seen in aging even if atherosclerosis is not present. These changes include an increase in collagen fibers and covalent bonds, local inflammation, fibrosis, mucous matter storage, a marked decrease in the elastin composition and the classifications of elastic laminas. Aging related differences develop independently of the atherosclerosis. They create a cumulative effect by activating the atherosclerosis with contributions of other factors such as hypertension, dyslipidemia, diabetes mellitus, renal failure, dietary, genetic and smoking along with aging. When the format and the mechanism of occurrence of these changes in the growing elderly population are carefully managed today, we can take a considerable step towards protecting the community from cardiovascular events and diseases.

Key Words: Aging; Atherosclerosis; Blood Vessels.

Derleme

DAMAR YAŞLANMASI

Öz

Kalp ve damar hastalıkları insidansının yaşlanmayla birlikte artış gösterdiği ve gelişmiş ülkelerdeki mortalite ve mobiditenin önde gelen nedenlerinin başında yer aldığı bilinmektedir. Yaşlanma kronolojik bir süreç olmakla beraber bazı çevresel faktörler, kronik hastalıklar ve yaşam şeklinin yaşlanmanın özellikler kardiyovasküler sistem üzerindeki etkilerinin meydana geliş şekli ve sürecini hızlandırabildiği bilinmektedir. Yaşlılıkta damar sisteminde meydana gelen yapısal ve moleküler düzeydeki değişiklikler nedeniyle kardiyovasküler sistem fonksiyonlarında bozulmalar meydana gelmektedir. Damar yaşlanması yaşla beraber yavaş yavaş gelişen normal fizyolojik bir süreçtir. Patofizyolojik vasküler değişikliklerin en bilinenleri ateroskleroz gibi intimal düzeyde başlayan değişikliklerdir. Bununla birlikte media ve adventisyada kalınlaşma ve remodelinge yol açan diğer vasküler patolojiler ateroskleroz yokluğunda dahi yaşlılıkla beraber ortaya çıkmaktadır. Bu değişiklikler kollajen lifleri ve kovalen bağlarında artış, lokal inflamasyon, fibrozis, mukoid madde depolanması, elastin içeriğinde belirgin azalma, elastik lamina kalsifikasyonları şeklindedir. Yaşlanmayla ilişkili bu değişiklikler aterosklerozdan bağımsız olarak gelişen bir süreçtir, çoğu zaman yaşlanmayla beraber, hipertansiyon, dislipidemi, diyabet, böbrek yetmezliği, diyet, genetik ve sigara kullanımı gibi diğer faktörlerin de katkılarıyla aterosklerozu da aktive ederek kümülatif bir etki oluşturmaktadır. Bu değişikliklerin oluş şekli ve mekanizması dikkatli incelendiğinde günümüzde artan yaşlı nüfusta meydana gelebilecek kardiyovasküler olaylardan korunmakta önemli bir adım atılabilecektir.

Anahtar Sözcükler: Yaşlanma; Aterosklerozis; Kan Damarları.

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In developed countries, cardiovascular diseases play a major role as mortality and morbidity causes. Although cardiovascular disease and stroke incidences are under control by effective treatment methods for some risk factors such as hypertension and hypercholesterolemia. They have been known to increase with the age (1).

Aging occurs at molecular, cellular, tissue levels and in the systems of the organism. It advances with time independently of the causes such as any accident or disease and it includes all irreversible structural and functional changes (Table 1). Though aging is a chronological process, personal and environmental factors are mostly effective for this process to occur earlier or later. Therefore, the physiological changes occurring with age are also observed to different degrees in individuals (2).

While United Nations accepts aging population as the age of sixty and over, the World Health Organization accepts this at the age of sixty-five and over. The latter definition is mainly adopted in national and international aging studies(3). Many factors such as the changes in lifestyle by age, retirement, beginning of sedentary life and the diversity in the nutritional habits may be confused with the natural alterations of aging. In addition, the changes occurring in other organ systems also closely affect the changes in cardiovascular system as a result of aging. Therefore, while a variety in cardiovascular system is described, the genetic factors and life conditions should be considered.

The incidence of cardiovascular disease increases along with age, and the majority of mortality caused by cardiovascular system diseases has been observed in population over the age of sixty-five. Vascular aging is a normal physiological process, which develops gradually along with the age. The researchers throughout the world have recently started to figure out the intricate physiopathology of this occurrence. The most known pathophysiological vascular changes are the ones beginning at the intimal level such as atherosclerosis. However, the other vascular pathologies leading to the thickness in media and adventitia and remodeling are also seen in aging even if atherosclerosis is not present (1,3).

Table 1— Age-Associated Changes in Human Arterial Structure and Function.

Subendothelial collagen fibers and covalent bonds	↑
Local inflamation	↑
Arterial wall fibrosis	↑
Elastin composition	↓
Elastin fragmentations	↑
Proteoglycans	↑
Matrix metalloproteinase activity	↑
Intimal migration and proliferation of vascular smooth muscle cells	↑
Arterial distensibility	↓
Pulse wave velocity	↑
Total peripheral resistance	↑
Endothelial permiability	↑
Endothelial nitric oxide release	↓
Inflamatory markers and mediators	↑
β Adrenergic mediated vasodilatation	↓

The Structure of Normal Arteries

1. Elastic Arteries; Aorta and its large branches are in this group. Their diameters are more than 7 mm but their walls are thin with regard to their diameters. The most developed layer in arteries is tunica media. Flexible laminas contract at systole and decrease the pressure alterations. At diastole, flexible contraction regulates the arterial pressure. Away from the heart, the flow rate of arterial pressure and the pressure changes decrease (4). Endothelium is a single-fold flat epithelium. Endothelia cells are 10-15mm in width and 20-25 mm in length. Cells are connected to each other with tight junctions and gap junctions and make up the barrier. They have rich pinocytotic vesicles. There are electron-dens bodies surrounded by membrane, known as Weibel-Palade bodies (von-Willebrand factor) which are 0,1 mm in diameter and 3 mm in length in endothelium cells. They also have structures that include Factor VIII (4,5).

The fibers helping the rhythmic contractions and relaxations are arranged longitudinally. Smooth muscle cells are present in this layer. They both contract and synthesize the extracellular inter-substance and fibrils. The amount of fiber increases while coming closer to tunica media. The flexible fibers intensify at the border of media, and constitute elastic internal membrane. But as it resembles media, it is difficult to differentiate it (5).

There are 40-70 flexible laminas that increase with age in tunica media. Gaps among the laminas are called as windows.

There are smooth muscles, reticular fibers, vasa vasorum and chondroitin sulfate among the flexible membranes. Elastic arteries do not have a real elastic external membrane. Tunica adventitia is slim and about half of the media thickness in size. It consists of fibro elastic connective tissue including flexible collagen fibers, vasa vasorum and nerves (4).

Muscular Arteries: It is the most common arterial type delivering the blood to the organs. Their diameters are 2,5-7 mm. Depending on the contraction of smooth muscle in media, the blood flow is regulated by local, hormonal and neural stimuli. From the flexible arteries to the muscular arteries, elastic material decreases, and smooth muscles increase. They have very clear elastic internal and external membranes (4,6).

Tunica Intima: It is thinner than elastic arterial intima and while a small number of smooth muscle cells exist in the subendothelial layer, internal elastical membrane is very clear. Rarely, two internal elastical membranes may co-exist (bifid internal elastic lamina). As in the elastic arteries, endothelium has prolongations passing to internal elastic membranes. These prolongations are attached to the smooth muscles located in media that is close to intima by means of gap junctions (7).

Tunica Media: It is mainly made up of smooth muscle cells. Smooth muscle cells here are smaller than in the internal organ walls. Several smooth muscle bands facing intima have longitudinal course. There are 40 layers of concentric smooth muscles in greater muscular arteries while there are only 3-4 layers of the smooth muscles in the small muscular arteries. As the vascular structures branch out, the number of layers decreases. Every smooth muscle cell is surrounded by external lamina, which is similar to basal lamina. Matrix of the tunica media reveals PAS positive reaction. There are elastic, reticular fibers, small amounts of collagen fibers and chondroitin sulfate among the smooth muscles in proteoglycan-structured matrix. Smooth muscles have a function in the production of matrix and fibers. Vasa vasorum exist among the muscle cells. They have a clear external elastic membrane that is made up of several thin elastic layers, but it is thinner than the internal elastic membrane. There are several windows existing among the layer (8).

Tunica Adventitia: Collagen tissue fibers, fibroblasts, lipid cells, vasa vasorum, lymphatic vessels, and nerve ends without myelin exist in this layer. The neurotransmitters released from the nerve ends depolarize some smooth muscle cells at the top by passing through the windows of the external elastic membrane and reaching media. The stimulus is transferred to other smooth muscle cells by gap junctions. Vasomotor nerves also exist. Intersubstance material is mostly made up of dermatan sulfate and heparan sulfate. Collagen and elastic fibers have a longitudinal course enough to facilitate the shrinking of the arteries when injured (9).

Arterioles: They are terminal arterial vessels regulating the blood flow to the capillaries. The width of their walls is similar to the diameter of their lumens. They are supported by sub-endothelial collagen tissue including endothelium, type III collagen and several elastic fibers. While thin and windowed internal elastic membrane exists in the small arterioles, 2-3 layers of smooth muscle exist in large arterioles. They have no external elastic membrane. Adventitia layer is the thin fibro elastic collagen tissue containing a few fibroblasts (10).

The arteries supplying blood to the capillary bed are called as metarteriols. Their smooth muscle layers have intervals. Smooth muscle cells are located separately from each other. Smooth muscle cells occur sphincter (precapillary sphincter) regulating the blood flow to the capillaries. It balances the pressure difference between arterial and venous systems.

Structural Changes in the Vascular System in Aging

The vascular network normally sends the blood from the left ventricle to the tissue capillaries and in order to provide a continuous blood flow through the vascular system, it has a buffering property for the continuous injections of the ventricle, especially in aorta. This feature called "windkelsel effect" is related to the high flexibility in aorta and other large arteries (11). Combined with aging, elongation and tortoises occur in especially large arteries. Enlargement in lumen and wall thickness, including especially intima and media layers, are observed. Age associated morphological changes in the vascular wall are listed in table (Table 2). These changes result in an increase in vascular sclerosis, systolic blood pressure, pulse pressure and a decrease in diastolic pressure (12-15).

While the effect of aging in muscular arteries is at a lower level, the changes in elastic arteries are fairly clear. These changes include an increase in collagen fibers and covalent bonds, local inflammation, fibrosis, mucous matter storage, a marked decrease in the elastin composition and the classifications of elastic laminas (16,17). Aging related differences develop independently of the atherosclerosis. They create a cumulative effect by activating the atherosclerosis with contributions of other factors such as hypertension, dyslipidemia, diabetes mellitus, renal failure, dietary, genetic and smoking along with aging. Sclerosis in the vascular wall is related to the relative amount of elastin and collagen materials. Much more elastin exists at the proximal parts of the arterial system than the distal parts, therefore enlargement and sclerosis are evident in especially aorta and its branches (18). Depending on age, collagen accumulation and elastin degradation as well



Table 2— Age Associated Changes in Intima Media and Matrix.

Intima
Increased thickness (smooth muscle cells and matrix)
Increased Matrix metalloproteinase
Increased expression of adhesion molecules
Increased nitrite and nitrate levels
Decreased endothelial nitric oxide synthase activity
Increased Angiotensin converting enzyme activity
Media
Increased thickness
Increase in size but decrease in number of smooth muscle cells
Matrix
Increased collagen content
Increased collagen cross-linking (nonenzymatic glycation)
Increased fibronectin
Decreased elastin: calcification and fragmentation
Increased glycosaminoglycans

as intramural accumulation of proteins such as integrin, fibronectin and desmin in the vascular wall play an important role in the increase of sclerosis in vascular wall (17,18). As a result of the disappearance of the buffering effect of the vascular network, the increase in atherosclerosis may have a destructive effect especially on the microcirculation in brain, kidney and heart. Endothelium cells play an important role in regulating many arterial features such as vascular tonus, permeability, angiogenesis and the response to inflammation. In addition to sclerosis, enlargement and thickness in the vascular wall, the changes are also observed in endothelium layer of the vascular lumen along with aging. Irregularity and elongation are seen in the endothelial cells due to the high rate of laminar blood flow. Consequently, endothelium function and its regenerative capacity diminish along with age. Endothelial cells are exposed to risk factors such as hypertension, smoking and hyperlipidemia, lose their protective effects against the adhesion of thrombocyte, monocytes and neutrophils (19). By producing various autocoids apart from substance transportation, endothelium layer plays an important role in regulating many features such as vascular tonus, angiogenesis and response to inflammation (20). Nitric oxide (NO) is the most well-known endothelium derived auotocoid. It has a protective action as a vasodilator, as an inhibitor of leukocyte adhesion, thrombocyte aggregation, and smooth muscle cells proliferation. It is known that the decrease in production and bioavailability of NO is observed by age. As a result of the decreased NO production and its effect, vasodilatation mechanism related to the endothelium diminishes. In females, the decrease in the NO dependent vasodilatation mechanism occurs about ten years later than males, whereas it progresses very rapidly in males. Additionally, the decrease in the release of hyperpolarizing factor via endothelium, which is another effective substance, and the increase in the release of vasoconstrictor products such as endotheline-1 and thromboxane A2 are observed (21).

In addition to impaired endothelial function and chronic vascular inflammation, arterial stiffness increase. As the large conduit arteries stiffen, aortic pulse wave velocity and pulse pressure also increase. Increased aortic pulse wave velocity results in early return of the reflected pressure wave, which produces significant systolic pressure augmentation and a decrease in diastolic pressure. Decreased diastolic pressure results in decreased coronary artery blood flow. The sequelae of increases in systolic hypertension result in left ventricular remodelling, diastolic dysfunction, and accelerated development of atherosclerotic lesions, all of which create a potential risk factor for increased cardiovascular mortality in the elderly patients (18).

Functional Changes in the Vascular System in Aging

As a consequence of structural effects occurring in the vascular network along with aging, the changes in blood and pulse pressures are mainly observed. The main indicators of blood pressure are blood volume, atherosclerosis and peripheral vascular resistance. Depending on sclerosis developing in the arterial wall, diastolic blood pressure decreases and systolic blood pressure increases. In a study by Franklin et al., it was demonstrated that systolic and diastolic blood pressures increased together up to 5th decade, and that the diastolic blood pressure diminished in the later period (15). Thus, isolated systolic hypertension after the 6th decade is observed most commonly.

A large amount of systolic blood stays in aorta due to its elasticity and provides the continuity of blood flow during diastole. As a result of the disappearance of the elasticity of aorta along with aging, the pressure on aorta increases significantly especially during systole. Increases in pulse pressure as well as an increase of difference among systolic and diastolic pressures are also seen. Therefore, the pulse pressure is used as the effective indicator of atherosclerosis in especially elastic vessels (15).

Hemostatic and Clinic Findings

Though age is one of the most important factors of cardiovascular mortality, atherosclerosis also causes an important increase both in cardiovascular mortality and morbidity risk occurring with age and in cardiovascular mortality and morbidity risk independent from age. Owing to the post-atherosclerosis and structural changes occurring in especially elastic arteries, systolic hypertension develops with aging. Depending on hypertension, failure findings in the left ventricle will develop within time. The impairment in left ventricle diastolic functions seen most commonly in the old population leads to the main cause of heart failure findings. Additionally, the prolonged systolic ejection time is also the second factor causing the increase in wall thickness as well as the arterial pressure. As a consequence of all these factors, vascular damage increases and then the clinical picture such as the increase in workload of the heart, left ventricular hypertrophy, cerebrovascular events and deterioration in renal functions occur. The vascular changes that occur as a result of aging are also observed noticeably in coronary arteries. For this reason in older ages, the risk of coronary artery disease also increase (22).

Discussion

With aging, structural changes such as fragmentation in elastic fibers, slimming and deterioration in arterial wall, as well as the disappearing in elastin fibers and elastic lamina are observed (23). Since the amount of elastic fibers in proximal ascending aorta is higher than the amount of collagen fibers, the changes occurring with aging become very prominent in this part.

Taking into account all of the data, it is seen that the structural changes in the large arteries and aging play an important role in cardiovascular mortality. It is primarily known that the changes occurring in the large vessels alter the left ventricle diastolic functions and cause diastolic heart failure. More than 50% of heart failure cases observed in the older population occur with this mechanism (24). Additionally, enhanced pulse wave velocity and prolonged ejection time lead to the increase in systolic blood pressure and pulse pressure. Therefore, it may lead to end organ damages such as renal damage or cerebrovascular event with the left ventricular hypertrophy and enhanced cardiac work load (16). The dysfunction occurring in endothelial cells is mostly observed in coronary arteries and they lead to coronary dysfunction (22). Another important matter is that the regression occurring in baroreceptor control of the cardiac rate increases the susceptibility to arrhythmia in the older population. In a study by Rodeheffer et al., it was shown that the regular exercise inhibited the regression in baroreceptor control of cardiac rate in the older population (25).

Currently, reducing pulse pressure is the most effective strategy to prevent arterial stiffness and decrease wave reflections in elderly patients with systolic hypertension. In addition, the roles of newer therapies targeting at breaking collagen cross-links or preventing their formation should be investigated (18).

Consequently, further studies on the effects of aging on structural, functional, and molecular levels in cardiovascular system should be prioritized. Through these studies, environmental cardiovascular occurrences can be minimized and therefore an important component of healthy aging would be provided.

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REVIEW ARTICLE

COMMUNICATION DISORDERS IN ELDERLY PEOPLE

ABSTRACT

Communication may be verbal and nonverbal. Communication changes are commonly reported in older people. In the typical process of aging, communication skills change due to health issues such as depression and cognitive problems. In this review manuscript, communication problems in elderly people are presented. There are health problems found in individuals of older age groups that may affect communication. Examples of these are as follows: cerebral palsy, multiple sclerosis, hearing and visual loss, aphasia, and neurodegenerative diseases. To improve communication with older adults, some measures should be followed, such as "Speak at a normal conversational pace. Avoid speaking very quickly or very slowly" and "Repeat and elaborate on important points." Communication disorders are experienced in older adults. Etiologic factors may be related to general health problems such as neurological problems, hearing and visual loss, and social problems (such as retirement or social isolation). In older adults with communication disorders, everyone throughout society, and especially health care specialists, should be aware of the problem and should use the simple measures to improve communication problems. In this paper, the issue of communication problems in elderly people will be evaluated.

Key Words: Communication; Aged; Nervous System Diseases.

DERLEME

YAŞLILARDA İLETİŞİM BOZUKLUKLARI

ÖZ

İletişim, sözel ve sözel olmayan şekillerde olabilir. Yaşlı insanlarda, iletişim değişiklikleri bildirilmiştir. Tipik yaşlanma ile, fiziksel sağlık, depresyon ve bilişsel problemler nedeniyle iletişim becerileri değişiklik göstermektedir. Bu derleme yazıda, yaşlı kişilerdeki iletişim sorunları sunulmuştur. Yaşlı grubunda, birçok sağlık problemleri vardır ve bunlar iletişimi etkilemiştir: Serebral palsi, multipl skleroz, işitme ve görme kaybı, afazi ve nörodejeneratif hastalıklar gibi. Yaşlılarda iletişimi arttırmak için, basit stratejiler izlenebilir: "Normal konuşma hızı ile konuşun. Çok hızlı veya çok yavaş konuşmaktan kaçının" ve "Önemli noktaların vurgulayın ve tekrar edin." İletişim bozuklukları, yaşlılarda görülmektedir. Etiyolojik faktörler genel sağlık problemleri ile ilgili olabilmektedir, ki bunlar nörolojik problemler, işitme ve görme kaybı, sosyal sorunlardır (emeklilik ve sosyal yalnızlık). İletişim bozuklukları olan yaşlılarda, toplumun ve sağlık çalışanlarının bu sorunun farkında olmaları; ve basit önlemlerle iletişim sorunlarını iyileştirmeye çalışmaları gereklidir. Bu yazıda, yaşlı kişilerdeki iletişim problemleri konusu ele alınacaktır.

Anahtar Sözcükler: İletişim; Yaşlılar; Sinir Sistemi Hastalıkları.

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INTRODUCTION

Communication is important for patients and families. For the needs of elderly patients and health-care providers, the most vital topic is communication (1). In this review manuscript, communication problems in elderly people will be evaluated in a detailed literature review.

COMMUNICATION WITH THE ELDERLY

In the communication process, information is transferred through words, body language, and voice (2). In the aging process, communication maybe affected. Elderly people usually suffer from sensory loss, and they usually have memory problems, and they are affected by social problems such as retirement. Separation from family members also affects the communication process (3). Problems due to aging and age-related problems are important. All of these affect communication, often reducing it (3,4).

Elderly patients feel anxiety and frustration. Moreover, age-related chronic diseases impact the health conditions of these patients. Medical costs for treatments increase, and interpersonal relationships can be affected negatively (5).

Common types of communication are verbal and nonverbal. When people converse with each other, it is verbal communication. During this type of communication, questions may be asked. In face-to-face communication, and for understanding the topic of conversation well, active listening becomes very important. If communication occurs by telephone, listening skills may become even more important (6).

If the communication is nonverbal, facial expressions, eye contact, and body language (behaviors and motion) will be more important. In elderly people, nonverbal communication will be effective, but interaction must be done well (7).

There may be communication problems related to health problems among elderly people. It is reported that hearing problems (42%) and writing problems (26%) are prevalent in elderly people (8). In the process of aging, health problems, such as chronic diseases, depression, and cognitive problems, may cause decreases in communication. Hearing loss develops and the power of speech decreases (9). Fluency of speaking and speaking volume are also affected. There may be a tremor in the speaking voice due to age (10).

Dementia is seen in elderly patients. Dementia is another issue that decreases communication. In patients with dementia, both receptive and expressive language skills are affected. When language is affected, problem-solving skills are affected; this is because the patients cannot communicate properly. Memory loss and decreases in visuospatial abilities also increase communication problems among the elderly (11). The social situation of the elderly people may be affected by these communication problems (12). Neurological problems, such as Parkinson's disease, hearing loss, dysarthria, and disability are associated with communication problems in older adults (13).

HEALTH PROBLEMS AFFECTING COMMUNICATION

Human beings perceive the world through these different criteria: the visual system, auditory system and kinesthetic (connected to sensations). In reality, the three representational systems work together, in a synergic manner, although every human being "will specialize" in one; this preference will greatly influence the way of thinking, speech patterns and behavior (14).

As a person ages, some problems may develop that cause communication problems. Their social lives change. On retirement from work, daily activities decrease (15). Cognitive problems affect communication. There are also chronic diseases such as cardiac disease, sleep problems, hearing loss, and osteoarthritis (16) that affect communication.

Older adults should also be considered capable of handling their own healthcare where the idea that old age or frailty may inhibit ones' decisional capacity. It is essential to provide appropriate and accessible information for each individual case in order to confirm patient comprehension, especially in the presence of possible coexisting disabilities (i.e., cognitive impairment, presbyacusia, visual disturbances, etc.). Cognitive impairment may limit the ability to actively participate in the process. In this context, physicians deal with three different situations on a daily basis: 1) patients with good cognitive functioning; 2) patients with various degrees of cognitive impairment; 3) patients with a legal guardian (14).

Problems with the senses are common in elderly people. Hearing loss is seen in 50%. Dysphonia is detected in 18%. Moreover, voice changes are reported in elderly people. Sometimes, phoniatric examination and support may be needed. Hearing problems cause difficulty in listening and speech perception. Additional cognitive problems increase the difficulty in understanding. Infectious ear diseases also decrease communication because ear infections cause a decrease in the perception of speech (17,18). Sahin, et al (19) reported that the elderly patients of 60 years of age or more with moderate sensorineural hearing loss could catch up their normal hearing

peers in their communication skills within six months only if they prescribed and used proper hearing aids. Physicians should use a slow and clear language, avoid interruptions, use simple grammar with pauses underlining key phrases (20).

Cerebral palsy causes disabilities in elderly people. This disease affects communication skills. Patients become socially isolated, and as a result, social communication problems develop. Motility of the patients decreases, and the degree of activity also decreases. Towards the end of one's life, the general level of function decreases, as does participation in social activities. Patients cannot communicate well compared to healthy people (15,21-23).

A stroke in the left hemisphere of the brain may cause aphasia, which is a language problem. In Wernicke aphasia, patients speak fluently, but may use incorrect words, sometimes even producing nonwords called neologisms. There may also be impairment in speech repetition. Comprehension decreases. These patients cannot recollect correct words when asked. All of these language problems cause communication problems and decreased communication (15,24,25).

Neurodegenerative diseases affect emotions, sexual life, and self-awareness of elderly patients. These patients may begin to show antisocial behaviors. These antisocial results can also be seen in Alzheimer's disease, dementia, and aphasia (26).

Multiple sclerosis (MS) is another disease affecting communication skills among elderly people. The patients with MS show cognitive problems, fatigue to different degrees, and limitations in mobility. These problems affect the communication of patients. These patients need extra support from their families and from health-care providers (15,27,28).

Visual problems and vision loss are detected in elderly people. As people age, vision problems have begun to be detected more commonly. Cataract and vision loss are also prevalent among elderly people (29). These diseases negatively affect vision, as a result, reducing communication skills.

Improving Communication Among Elderly People

To improve communication among elderly people, significant effort will be necessary because of the existence of hearing problems, vision loss, cognitive problems, and neurological diseases. In telephone calls, proper understanding may be impaired because of problems with hearing and the use of language (30).

In Cochrane Database, Wetzels, et al (31) reported that stimulating the involvement of older patients in their primary care may enhance their health. They reviewed studies of interventions to improve older people's involvement in their care. There has been little research in this area involving older people. Only three trials were identified. In these trials, the effects of written or face-to-face preparation for consultations with doctors were evaluated. Interventions of a pre-visit booklet and a pre-visit session (either combined or pre-visit session alone) led to more questioning behaviour by older people and more self-reported active behaviour. Overall, there is sparse evidence about the effects of interventions for improving older patients' involvement in their primary care (31). Attending to provider-patient and provider-provider communication, and to patient social support and self-care needs, could improve integration and care outcomes (32).

In Cochrane Database, Grimley Evans, et al (33) reported DHEA supplementation as a means of retarding ageing and age-associated cognitive impairment but there is very little evidence from controlled trials. In two trials DHEA was associated with a deleterious effect on visual memory after a psychosocial stressor and quality of life measures, but there is inconsistent systematic evidence of adverse effects from DHEA.

In Cochrane Database, Kauppi, et al (34) reported that people with severe mental health problems often have difficulties with 'treatment compliance and following their treatment programme. They can have difficulty remembering to take medication or appointment times. Unpleasant side effects of medication can also lead to people stopping medication, and a lack of insight into their illness can mean they do not see the need to follow treatments. Non-compliance with treatment can lead to poor health outcomes and even relapses and hospitalisation. There are several methods healthcare professionals use to help people with serious mental illness improve compliance; once such method is prompting. The purpose of prompting is to help patients to follow the treatment instructions and keep the treatment appointment times by using reminders via telephone calls, personal visits or posted referral letter (34).

To improve communication, a quiet room is necessary. In this condition, it is possible to make eye contact. Where there is aphasia, reading materials may be useful. Conversations should last longer. By means of these measures, communication can be increased (35).

The measures below may help to increase communication among elderly people (15,36-38):

- Reduce the grammatical complexity of spoken language.
- Avoid using "baby talk" or addressing the patient with endearing or cute names, such as "Sweetie" or "Honey."



- Don't speak very loudly, or with an exaggerated or high-pitched intonation.
- Speak at a normal conversational pace. Avoid speaking very quickly or very slowly.
- Repeat and elaborate on important points.
- Provide written information to supplement what you are telling the patient orally; consider materials using pictures.
- The environment should be quiet.
- Conversation and communication should be made face-to-face.
- If the patient uses hearing aids and eyeglasses, ensure they are being employed when you are communicating with the patient.
- Do not hurry during conversation with elderly people because their hearing, understanding, and cognitive abilities are reduced.

SAGE ADVICE for Elderly People (39)

- **S is for Simplify**. Do not use medical terminology. Use simple words.
- **A is for Assume** Don't assume that elderly people are deaf or blind. Communicate with them in a kindly fashion.
- **G is for Give information**. Older people should be given information. If necessary, written information should be given.
- **E is for Ease into it.** Avoid sharing too much too quickly. Give time to understand and work slowly.
- **A is for Acknowledge.** Instead, of overlooking and passing by their concerns, listen to them.
- **D is for Discovery.** Ask questions to see if they truly understand.
- **V is for Value.** Don't use unfriendly terms; respect them.
- **I is for Individualize.** Acknowledge cultural beliefs and changes.
- **C is for Communicate**. Don't tell them what to do. Focus on what is most important.
- **E is for Empathize:** Try to see the situation from the elderly person's perspective.

In conclusion, Communication disorders are often experienced by older adults. Etiologic factors may be related to general health problems such as neurological problems and sensory loss (hearing and vision) or social problems (being retired or socially isolated). In older adults with communication disorders, everyone in society, especially health-care specialists, should be aware of the problem and use the simple measures recommended to reduce communication problems.

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Case Report

A CASE OF PYODERMA VEGETANS ASSOCIATED WITH CROHN'S DISEASE SHOWING GOOD RESPONSE TO PREDNISOLONE

Abstract

Pyoderma vegetans, also known as pyodermatitis vegetans, is a rare inflammatory dermatosis characterized by vesiculopustular lesions and vegetating plaques most commonly affecting the scalp, trunk, flexural areas and extremities. The etiopathogenesis of pyoderma vegetans has not been clearly elucidated yet; however, it has been proposed that pyoderma vegetans is associated with a number of underlying conditions, including ulcerative colitis, cutaneous T-cell lymphoma, primary immunodeficiency, alcoholism and human immunodeficiency virus infection. Although pyoderma vegetans may also be seen in healthy individuals, considerable association between immunosuppression and pyoderma vegetans is evident. Moreover, the occurrence of pyoderma vegetans and its oromucosal analogue, pyostomatitis vegetans, has been reported to be as high as 75% in patients with inflammatory bowel disease; hence, pyoderma vegetans has been considered to be an indicator of inflammatory bowel disease. On the other hand, the association of pyoderma vegetans with Crohn's disease has been rarely documented, and most of the reported cases are associated with ulcerative colitis. Here, we present a case of pyoderma vegetans associated with Crohn's disease that showed remarkable response to corticosteroid therapy.

Key Words: Pyoderma; Crohn Disease; Inflammatory Bowel Disease; Corticosteroids.

Olgu Sunumu

PREDNİZOLON TEDAVİSİNE İYİ YANIT VEREN CROHN HASTALIĞI İLE ASSOSİYE BİR PİYODERMA VEJETANS OLGUSU

Öz

Piyodermatitis vejetans olarak da adlandırılan piyoderma vejetans, genellikle saçlı deri, gövde, fleksural bölgeler ve ekstremitelerde yerleşen vezikülopüstüler lezyonlar ve vejetatif plaklarla karakterize nadir rastlanan inflamatuar bir dermatozdur. Piyoderma vejetans, etiyolojisi henüz tüm yönleriyle aydınlatılamamış sebebi bilinmeyen bir hastalıktır. Bununla birlikte, piyoderma vejetansın ülseratif kolit, kutanöz T hücreli lenfomalar, primer immün yetmezlikler, alkolizm ve insan immünyetmezlik virüsü gibi altta yatan çok sayıda durum ile bağlantılı olduğu ileri sürülmektedir. Piyoderma vejetans her ne kadar sağlıklı kişilerde de görülebilse de, piyoderma vejetans ile immün süpresyon arasındaki ilişki aşikardır. Dahası, piyoderma vejetans ve oromukozal analoğu piyostomatitis vejetansın, inflamatuar barsak hastalığı olan bireylerde %75'e varan oranlarda görüldüğü bildirilmiştir ki, piyoderma vejetansın inflamatuar barsak hastalığının bir göstergesi olduğu düşünülmektedir. Ancak, Crohn hastalığı ile assosiye olan piyoderma vejetans olgusu nadiren raporlanmıştır ve inflamatuar barsak hastalığı ile ilişkili olan piyoderma vejetans hastalarının çoğu ülseratif kolit tanısına sahiptir. Biz de burada, kortikosteroid tedavisine oldukça iyi yanıt veren Crohn hastalığı ile assosiye olan bir piyoderma vejetans olgusunu sunmak istiyoruz.

Anahtar Sözcükler: Piyoderma; Crohn Hastalığı; İnflamatuar Barsak Hastalığı; Kortikosteroidler.

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Introduction

Pyoderma vegetans (PV), or pyodermatitis vegetans, is a rare, chronic, inflammatory dermatosis characterized by vesiculopustular lesions and vegetating plaques most commonly affecting the scalp, flexural areas and extremities (1-3). When oral vegetative pustular oral lesions are present, it is called pyodermatitis-pyostomatitis vegetans that has been reported to be associated with inflammatory bowel disease (IBD) in 75% of cases (4). Here, we report a case of PV associated with Crohn's disease (CD) that showed good response to systemic prednisolone treatment.

Case Report

A 67-year-old male patient came to our outpatient clinic with a two-month history of non-healing wounds on his trunk and extremities. He had a medical history of asthma and CD, for which he was receiving inhaled glucocorticoids, long-acting bronchodilators and 40 mg/week of adalimumab. We were able to gather limited information regarding to his gastroenterological disease, in that the patient had been followed up for CD in another hospital. We learned that before the diagnosis of CD was made, he had been suffering from intractable abdominal pain, watery diarrhea and weight loss. He had been examined in a local hospital, where colonoscopy was performed, which revealed erythematous, friable colonic mucosa with skip areas. With the presumed diagnosis of CD, he was referred to a tertiary referral hospital which do not provide access to his medical records. However, we found out that one and a half years ago systemic corticosteroids and azathioprine were initiated for the diagnosis of CD although the treatment was changed with adalimumab one year ago. When he was admitted in our outpatient clinic, he was found to be anaemic with normal vital signs. On physical examination, the abdomen was soft and slightly tender on the right lower quadrant. Dermatological examination revealed multiple, vegetative, erythematous plaques with indurated borders studded with oozing pustules, particularly located on the pelvic, bilateral coxal and bilateral upper femoral areas. The peripheries of the plaques were serpiginous and the remaining central areas were hyperpigmented with velvety texture (Figure 1). Examination also revealed hyperpigmented, velvety plaques on the dorsum of the right hand, left popliteal area and several smaller erythematous plaques with central hyperpigmentation on the trunk. Laboratory tests demonstrated anaemia with a haemoglobin (Hb) level of 8.4 g/dL (normal range, 14–18 g/dL), serum iron level of 14 µg/dL (normal, 60–180 g/dL), transferrin saturation of 4% (normal, 20%–50%), serum ferritin level of 12.7 ng/mL (normal, 23.9–336.2 ng/mL), hypoalbuminemia with a serum albumin level of 2.5 g/dL (normal, 3.5–5.2 g/dL) and hypoproteinemia with serum a total protein level of 5.9 g/dL (normal, 6.5–8.5 g/dL). Moreover, the erythrocyte sedimentation rate (ESR) increased to 34 mm/h (normal, 0–20 mm/h), C-reactive protein level elevated to 62 mg/L (0,2–5 mg/L) and the faecal occult blood test was positive. Wound culture from one of the lesions was positive for *Staphylococcus aureus* and *Streptococcus* species. His-



Figure 1— Multiple erythematous, vegetating plaques of varying size with oozing pustules at the advancing serpiginous border and central velvety hyperpigmented areas on the pelvic, bilateral coxal and upper femoral regions.

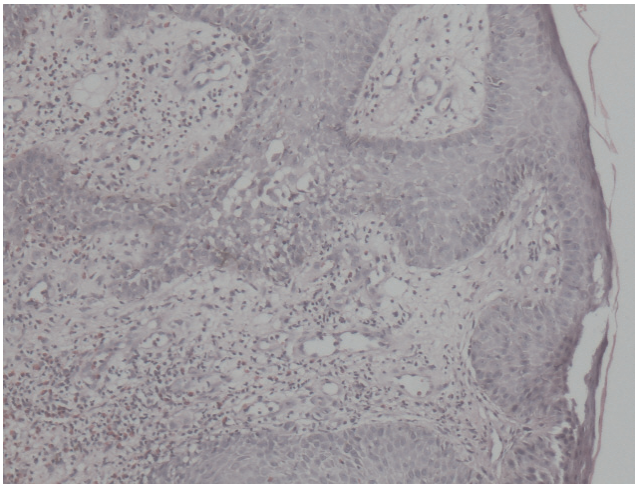


Figure 2— Focal suprabasal acantholysis is seen in epidermis that shows prominent pseudoepitheliomatous hyperplasia. There are many eosinophils in the dermis (HEx 100).

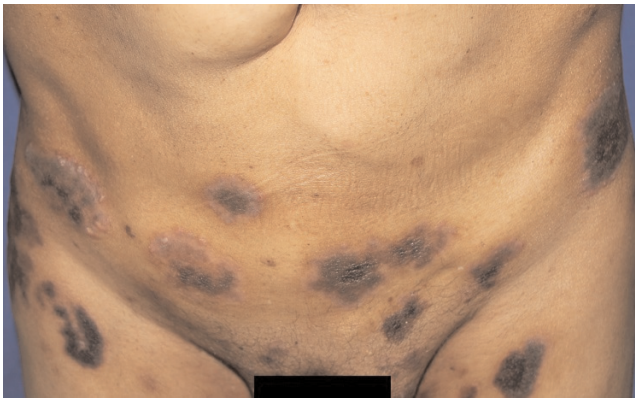


Figure 3— Resolution of the lesions after the theraphy (15th day of the treatment).



Figure 4— 45th day of the treatment.

topathological examination of the cutaneous lesions demonstrated pseudoepitheliomatous hyperplasia with dermal inflammatory infiltrate mainly comprising neutrophils, eosinophils and focal suprabasal acantholysis (Figure 2). Direct immunofluorescence studies were negative. The patient was assessed by the gastroenterologist however the consultant doctor did not planned any medical intervention due to the fact that the follow up of the patient had been carried out in another hospital. Based on clinical and histopathological findings, we diagnosed PV associated with CD. In addition to adalimumab, we administered oral prednisolone at 50 mg/day, topical corticosteroid and wet dressing with boric acid. On the 15th day visit, there was marked clinical improvement in both dermatological (Figure 3) and gastroenterological symptoms. As the patient showed clinical recovery (Figure 4), oral prednisolone was gradually tapered and discontinued within 3 months.

Discussion

Pyoderma vegetans is a rare chronic inflammatory dermatosis of uncertain aetiology characterized by vegetative oozing lesions and is generally observed in middle-aged men (1,3). However, PV has a high incidence rate in immunosuppressed states like immunoglobulin A deficiency (5), human immunodeficiency virus infection (6), diffuse T-cell lymphoma (7), chronic myeloid leukaemia (8), alcoholism and chronic malnutrition (2,3). On the other hand, although antibiotics usually offer limited improvement in PV symptoms, as *S. aureus* and other bacteria are generally isolated from PV lesions, bacterial colonization has been postulated as an aetiological factor for the induction of PV (1,2). Moreover, there have been reports regarding the considerable association between PV and halogen exposure, tattoos and foreign body reaction (2,3). Indeed, the most favoured hypothesis is that bacterial colonization or epidermal invasion plays a critical pathogenic role in the development of PV, which is believed to be an adverse tissue reaction, in patients with defective immunity who are locally or systemically immunocompromised (1,2).

To date, the highest prevalence of PV was found in patients with IBD, particularly ulcerative colitis (UC) (3,9-13). There is a general assumption that PV represents a specific marker for IBD (11) and a presumptive diagnosis of PV should prompt a complete gastrointestinal evaluation and necessitate the follow-up of the patient on a routine basis (2,3,13). Usually, the disease activity of PV runs a parallel course with that of IBD; PV progresses with intestinal disease, exacerbates with IBD and ameliorates with colectomy or remission of IBD (2,13). Systemic corticosteroids, dapsone, azathioprine, cyclosporine, isotretinoin, methotrexate and infliximab are treatment options for PV that generally cure both cutaneous and intestinal disease, as observed in our case (2,3,13-15). It is noteworthy that although the association of PV with CD has been rarely documented (4,16,17) and most of the reported cases are associated with UC (3,9-13), our case represents a particular example of PV associated with CD with characteristic clinical and histopathological findings, clinical course and response to treatment.

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Case Report

ATYPICAL SACRAL AND ILIAC BONE INSUFFICIENCY FRACTURES IN A PATIENT RECEIVING LONG-TERM BISPHOSPHONATE THERAPY

Abstract

Insufficiency fractures are a type of stress fracture occurring in bones with low resistance. The most common cause of insufficiency fractures is postmenopausal osteoporosis. Corticosteroid use, radiotherapy, rheumatoid arthritis, Paget disease, osteomalacia, long-term use of bisphosphonates, hyperparathyroidism, diabetes mellitus, primary biliary cirrhosis, renal osteodystrophy are among the other risk factors. These fractures are generally overlooked because the symptomatology is similar to the clinical signs of osteodegenerative diseases, which are common in the elderly, particularly without a history of trauma.

A 73-year-old female patient was admitted to our outpatient clinic with a increase in low back pain intensity and difficulty in walking 3 months ago without a history of any trauma. She had a waddling gait with painful movements of both hips. Lumbar range of motion was normal but painful. On laboratory examination 25(OH) vitamin D3 level was low. Pelvic magnetic resonance imaging showed widespread bone marrow edema at both sacral wings and left iliac bone and signal recordings corresponding to insufficiency fractures in this region.

Herein we present a case of an osteoporosis patient with sacral and iliac bone fractures that were treated conservatively.

Key Words: Fractures, Stress; Ilium; Sacrum; Osteoporosis; Aged; Diphosphonates.

Olgu Sunumu

UZUN SÜRELİ BİFOSFONAT TEDAVİSİ ALAN BİR HASTADA GÖRÜLEN ATİPİK SAKRAL VE İLİAK KEMİK YETERSİZLİK KIRIKLARI

Öz

Yetersizlik kırıkları direnci azalmış kemikte görülebilen bir tip stres kırığıdır. En sık sebep postmenopozal osteoporozdur. Kortikosteroid kullanımı, radyoterapi, romatoid artrit, Paget hastalığı, osteomalazi, uzun süreli bifosfonat kullanımı, hiperparatiroidi, diabetes mellitus, primer bilier siroz ve renal osteodistrofi diğer risk faktörleri arasındadır. Yaşlı popülasyonda sık görülen osteodejeneratif hastalıkların klinik bulgularına benzer semptomatoloji görülmesi nedeniyle, özellikle de bir travma öyküsü yoksa sıklıkla gözden kaçırılır.

Yetmişüç yaşında kadın hasta 3 ay önce travma olmadan oluşan bel ağrısında artış ve yürümede zorluk şikayeti ile polikliniğimize başvurdu. Her iki kalça hareketleri ağrılı ve ördekvari yürüyüşü vardı. Bel hareketleri açık ancak ağrılı idi. Laboratuvarında 25(OH) vitamin D3 düzeyi düşüktü. Pelvik manyetik rezonans görüntülemede bu bölgede yetersizlik kırığını işaret eden her iki sakral kanat ve iliak kemikte yaygın kemik iliği ödemi ile uyumlu bulgular görüldü.

Bu olgu sunumunda sakral ve iliak kemik kırığı tespit edilen, konservatif yöntemlerle tedavi edilen bir osteoporoz hastası sunulmuştur.

Anahtar Sözcükler: Yetersizlik Kırığı; İlium; Sakrum; Osteoporoz; Yaşlı.

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Introduction

Insufficiency fractures are a type of stress fracture that occurs with normal or physiological stress on bones that are weakened by decreased elastic resistance (1). Osteoporosis is the most important risk factor, and the pelvis is the most common location for these fractures. The sacrum and pubic rami are typically affected (2,3). This type of fracture is less common in iliac bones, and only a small number of case reports on iliac bone fractures have been reported in the English literature (3,4).

Insufficiency fractures are generally overlooked because of non-specific clinical symptomatology. Complaints such as pain in the hip and groin and walking problems are suggestive of degenerative diseases in the elderly; therefore, diagnosis of insufficiency fractures causing these symptoms may be delayed (5). Delays in the diagnosis and treatment process may increase disability. The most important components of therapy are a conservative approach and physical therapy (5,6).

Herein we present a case of patient who had sacral-iliac bone insufficiency fractures that were treated successfully with physical therapy and vitamin D replacement.

Case Report

A 73-year-old female patient was admitted to our outpatient clinic with a 2-year history of hip and low back pain and difficulty in walking. She had been referred to various clinics for this complaints and had received medical treatments for a diagnosis of lumbar discopathy. She had progressive increase in low back pain intensity and difficulty in walking 3 months ago. She stated that the pain was worse when walking or standing for a long time and that it radiated to both knees and decreased with rest or use of analgesics. She did not report a history of trauma. After that she had received electrotherapy in another center; however, her symptoms returned only 2 weeks after she completed the program. Her medical history revealed hypertension and osteoporosis. She was taking calcium and vitamin D for osteoporosis. She had been treated with bisphosphonates for 10 years and had last received a zoledronic acid infusion 1 year ago.

Her vital signs were stable, and the results of systemic examination were normal. Her pain severity was 8/10 on the visual analog scale (VAS). She had a waddling gait with painful movements of both hips. Lumbar and hip range of motion was normal but painful. The sacroiliac compression test was bilaterally positive. The results of a neurological examination were normal.

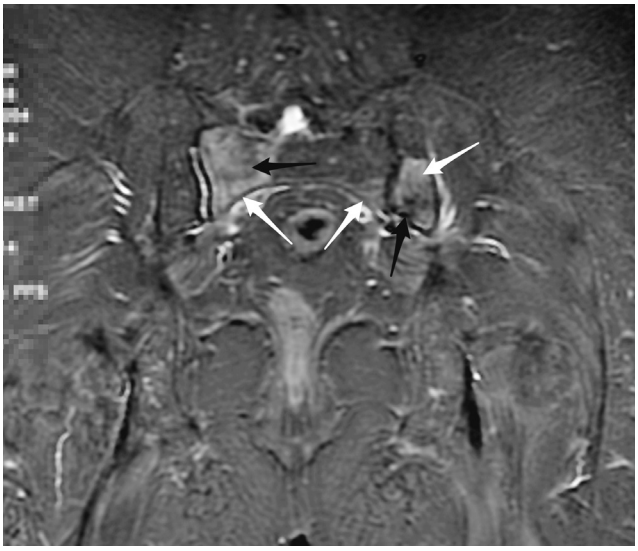


Figure 1— In the Short TI Inversion Recovery (STIR) sequence at the coronal plane, areas of edema are observed in both iliac bones, although more prominently on the right and hyperintense (white long arrows) at the left sacral wing. Hypointense (black short arrows) signal recordings were present, indicating insufficiency fractures within the area of edema.

On laboratory examination, serum calcium was 9,3 mg/dl (8.4-10.2), phosphate 3.1 mg/dl (2.3-4.7), alkaline phosphatase 177 U/l (40-150), PTH of 71 pg/ml (19.8-74.9) and 25(OH) D3 level 10.4 pg/L. Remaining including complete blood count, eritythrocyte sedimentation rate, CRP, renal function tests, protein electrophoresis, tumor markers, hepatic function tests, serum protein and albumin were in normal ranges. A subsequent DEXA scan revealed osteopenia.

Lumbar magnetic resonance imaging (MRI) performed before her referral to our clinic revealed bulging in the L1–2 and L3–4 discs, hypertrophy of the facet joints at the L4–5 vertebrae, and disc degeneration. Roentgenograms of the pelvis and both hip joints revealed degenerative changes. Subsequent pelvic MRI showed widespread bone marrow edema at both sacral wings and left iliac bone and signal recordings corresponding to insufficiency fractures in this region (Figures 1, 2). Because she did not have any diseases such as hypogonadism, hyperthyroidism, hyperparathyroidism, a tumoral disease such as multiple myeloma, or a metabolic disease such as diabetes mellitus and was not using any drugs that may lead to bone mass loss by affecting bone metabolism, the condition of the patient was considered to be the result of atypical sacral and iliac bone insufficiency fractures due to osteomalacia and long-term bisphosphonate therapy.

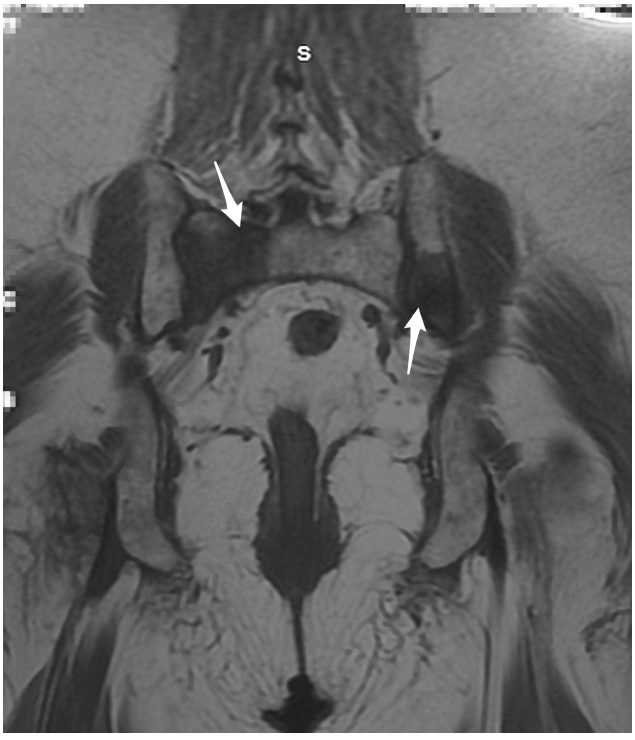


Figure 2— An area of edema in the right iliac bone and a hypointense edema area at the left sacral wing were observed on T1-weighted sequences at the coronal plane. Hypointense (white arrows) signal recordings are present, indicating insufficiency fractures within the area of edema.

A nonsteroidal anti-inflammatory drug (Naproxen 750mg/day, 7days), hotpack (20min/day), and electrotherapy (transcutaneous electrical nerve stimulation, 20 min/day) was started for pain relief. Joint range of motion exercises, progressive resistance exercises, and balance-coordination exercises were planned as physiotherapy program. Therapeutic doses of vitamin D (50000 IU/week, 8 weeks) was started and dietary calcium intake was increased with close follow-up of serum calcium levels. At the end of 3 weeks, her VAS score had decreased from 8 to 1, and her walking distance had increased. She was discharged with a home exercise program.

At the follow-up examination 3 months after discharge, her VAS score was 2, her vitamin D level was normal, and there were no recently developed symptoms. The patient was safely ambulatory for long distances without any support.

Discussion

Stress fractures are classified as fatigue and insufficiency fractures. Fatigue fractures are due to abnormal stress on normal bone, whereas insufficiency fractures are due to normal stress on weakened bone (1). Pelvic insufficiency fractures occur rarely as a diagnostic entity in cases of back and hip pain; however, they are one of the most significant conditions in terms of morbidity and mortality (5,6). These pelvic and hip fractures are still frequently overlooked in the elderly. It was reported that the incidence had increased 5.3-fold by 2002, and the mortality rate approached that of hip fractures (7). Moreover, the incidence is considered to be underestimated because of uncertain clinical signs and difficulty in diagnosis (5).

The vertebrae, tibia, femur, fibula, calcaneus, ramus pubis, sacral wing, and ilium are the areas where insufficiency fractures are observed. The pelvis is the most frequently affected region, whereas ilium fractures are relatively less common (3,4). Soubner et al. (3) reported only one case of ilium fracture out of 91 bone fractures in a series of 60 patients with insufficiency fractures. Fractures generally occur in elderly postmenopausal osteoporosis patients. Corticosteroid use, radiotherapy, rheumatoid arthritis, Paget disease, osteomalacia, hyperparathyroidism, diabetes mellitus, primary biliary cirrhosis, and renal osteodystrophy are among the other risk factors (8). Long-term use of bisphosphonates is among the recently described risk factors (1,9). In our case, the patient had a known history of osteoporosis for 10 years and osteomalacia.

Symptoms of the disease may be confused with complaints of degenerative conditions. Early diagnosis is difficult in the absence of a history of major trauma. Persistent, sometimes sudden back pain, sacral-pelvic pain, and groin pain are the frequently observed symptoms (5). Back pain may radiate to the gluteal region, hips, and lower extremities. Thus, it may be confused with osteoarthritis, trochanteric bursitis, spinal stenosis, and lumbar disc herniations (6,10).Generally, patients complain of difficulty in walking because of the increasing severity of pain. Neurological symptoms are generally absent. Gotis-Graham et al. (11) reported pain at the sacrum and hips as the most common symptom and a 5%–6% incidence of radiculopathy. In our case, the patient had experienced back pain and pain in both hips for years. Our patient's diagnosis was also delayed and she was prescribed several medications with the misdiagnosis of lumbar disc herniation previously.

The most preferred diagnostic methods are conventional radiography, MRI, computed tomography (CT), and bone scintigraphy (12). Conventional radiography is used primarily. However, vascular calcifications, gas shadows, and fecal material may pose difficulty in interpreting the images, and the fractures can be detected in only 40% of cases (13). Bone scintigraphy is the most sensitive diagnostic method (96%). Abnormal uptake may be detected 72 h after the onset of symptoms (14). MRI is preferred as a sensitive modality for detecting changes at spinal structures and bone marrow. Decreasing signal intensity on T1-weighted sequences and increasing signal intensity on T2 images indicate edema at the fracture line. Fat-suppressed and contrast-enhanced sequences may aid in the differential diagnosis by discriminating the pathologic structure (10,15). CT may show the fracture line; however, exposure to radiation and limited diagnostic information in evaluation of transverse fractures limit its usage (15). Conventional radiography of our patient revealed no pathological finding except for degenerative changes. MRI revealed widespread bone marrow edema at both the sacral wings and left iliac bone and signal recordings probably due to insufficiency fractures within this area.

Treatment of insufficiency fractures is generally conservative. Analgesics, bed rest, and reduced load are the first choices (5,6). Pain is controlled by analgesics and physical therapy methods. Osteoporosis and osteomalacia should not be overlooked (6,8). The patients should be mobilized as soon as possible to avoid the negative effects of immobilization. Early rehabilitation and loading exercises should be applied as much as can be tolerated by the patient (8,12). Assisted mobilization devices may be used if needed. Babayev et al. (6) stated that pelvic insufficiency fractures are rarely life threatening but may lead to functional disability and emphasized the importance of rehabilitation. In our patient, a nonsteroidal anti-inflammatory drug, electrotherapy, and hotpack treatment were used for pain control and range of motion exercises, progressive resistance exercises, and balance-coordination exercises were planned as physiotherapy program. 50000 IU 25 (OH) Vitamin D weekly was prescribed along with increased dietary calcium intake with close monitoring of serum calcium levels and in 8 weeks. The patient was able to do her routine daily activities at the follow-up examination 3 months after discharge.

Sacroplasty or surgical therapy is recommended when conservative treatment fails or when neurological loss and/or pelvic instability occurs (12). Our patient was successfully treated with conservative measures and thus did not require surgery.

In conclusion, we should always bear in mind the possibility of insufficiency fractures in differential diagnosis of elderly patients presenting with bone and muscle pain. Osteoporosis and osteomalacia should not be overlooked. Nonspecific symptomatology may delay the diagnosis, and diagnosis also may be easily overlooked by plain radiography, which will in turn increase the disability, because early diagnosis and proper rehabilitation may help in reducing functional disability.

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Case Report

AN UNEXPECTED CASE OF ATYPICAL FEMUR FRACTURE MISDIAGNOSED AS RADICULOPATHY AND HIP OSTEOARTHRITIS: A PATIENT TREATED WITH BISPHOSPHONATE

Abstract

Bisphosphonates are the most commonly used drugs in the treatment of osteoporosis. Several randomized controlled studies have proved their effectiveness in the treatment of postmenopausal osteoporosis and today BPs are considered a first-line therapy for osteoporosis. Bisphosphonates inhibit osteoclastic activity, decrease bone turnover and increase bone mineral density. Although there is strong evidence that bisphosphonates prevent osteoporotic fractures, in recent years, there have been several reports that show the increasing risk of atypical femoral fractures that is related to prolonged usage (5 years or longer) of bisphosphonates. This may be related to prolonged suppression of bone turnover. By suppressing the bone turnover they impair the ability of bone to repair the microdamages and leads the accumulation of microcracs. In this case, we report 67-year-old female who presented with atypical femoral fracture.

Key Words: Alendronate; Bisphosphonates; Femoral Fractures.

Olgu Sunumu

BİSFOSFONAT TEDAVİSİ ALAN BİR HASTADA RADİKÜLOPATİ VE KALÇA OSTEOARTRİTİNİ TAKLİT EDEN ATİPİK FEMUR KIRIĞI: OLGU SUNUMU

Öz

Bisfosfonatlar osteoporoz tedavisinde en yaygın kullanılan ilaçlardır. Postmenopozal osteoporozun tedavisinde etkili oldukları birçok randomize kontrollü çalışma tarafından kanıtlanmıştır ve günümüzde osteoporoz tedavisinde birinci seçenek ilaç olarak kullanılmaktadırlar. Bisfosfonatlar, osteoklastik aktiviteyi inhibe ederek kemik döngüsünü azaltır ve kemik mineral dansitesini arttırırlar. Bisfosfonatların osteoporotik kırıkları önlediğine dair güçlü kanıtlar olmasına rağmen geçtiğimiz yıllarda uzun süreli kullanım (5 yıl veya daha fazla süre) sonrasında atipik femoral fraktür riskini artırdıkları çeşitli çalışmalarla rapor edilmiştir. Bunun sebebi kemik döngüsünü baskılayarak kemiğin mikro hasarları tamir etme becerisini bozması ve mikro-çatlakların birikmesine yol açması olabilir. Bu yazıda atipik femur kırığına sahip 67 yaşındaki bir kadın hasta sunulmaktadır.

Anahtar Sözcükler: Alendronat; Bisfosfonat; Femur Kırığı.

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Introduction

Bisphosphonates (BPs) are highly effective medications for the prevention and treatment of osteoporosis. However, they are associated with sporadic cases of atypical femoral fractures. Atypical femur fractures were first reported in 2007 and are now recognized as a unique clinical entity (1). They are described as fractures that are located in the subtrochanteric region and femoral shaft, transverse or short oblique orientation, resulting spontaneously or after minimal trauma (2). Atypical femoral fractures are rarely seen among the stress fractures but they gained much interest recently because of their strong relationship with BPs. In this article, we present a 67-year-old female with a 6-year history of continuous alendronate therapy, who was diagnosed with nondisplaced fracture of the left femur.

Case

A 67-year-old female patient was admitted to our clinic with severe low-back, left thigh and hip pain. The pain had started about 1 year previously. He had applied to several health centers due to pain. He had received physical therapy and analgesic medications with a diagnosis of lumbar discopathy and hip osteoarthritis but there had been no improvement. The patient has osteoporosis for about 10 years and has been receiving alendronate therapy continuously for the past six years because of postmenopausal osteoporosis. She did not use any other drug for osteoporosis. She had undergone right femur fracture occurring spontaneously about three years ago. There was no history of trauma, fall, alcohol intake and smoking.

Clinical examination revealed an antalgic gait due to the left leg pain. There was pain over the shaft of left femur during palpation. The motion of the left hip joint was painful in all directions. Lumbar motions were restricted and she had lumbar paravertebral muscle spasm. There were no neurological deficits of the lower extremities. Lumbar magnetic resonance imaging showed disc herniation at L2-L5 and L5-S1 and radiographs showed hip mild degeneration. The serum calcium, phosphate, parathyroid and thyroid hormones and 25-hydroxy vitamin D levels were in normal range. Femur and lumbar spine were evaluated by dual-energy X-ray absorptiometry. T-scores were in the osteopenic range, and showed T-score of -1.0 at lumbar spine (L1-L4) and -1.5 at femur. Magnetic resonance imaging (MRI) of the left lower extremity revealed findings consistent with the previous fracture line on the right femur (Figure 1a) and the suspected di-

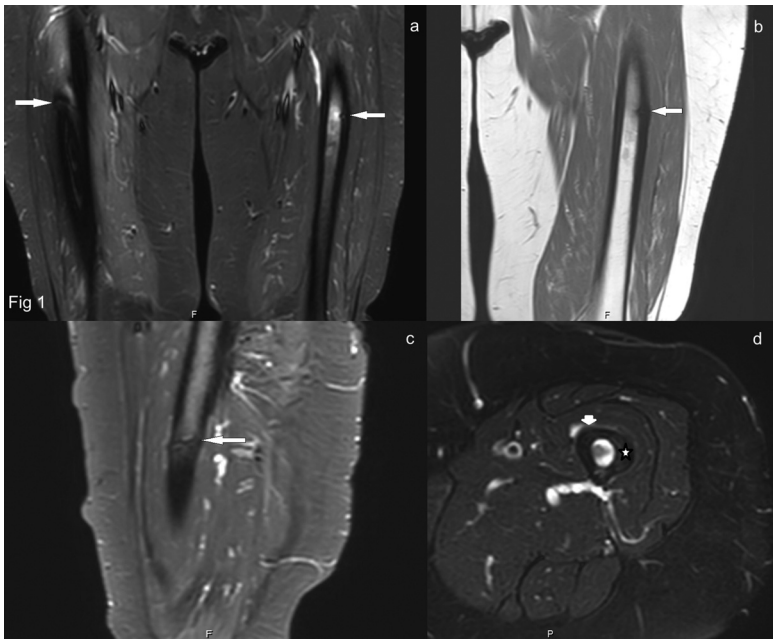


Figure 1— a. Coronal T2 SPAIR image shows transverse, incomplete fracture lines (arrows) in the proximal femur diaphysis bilaterally. The fracture line on the right femur is hardly seen depending on the metallic artifact at the site of the previous surgery, **b.** coronal T1 TSE and **c.** sagittal T2 SPAIR demonstrate an appearance of cortical breaking slightly due to incomplete fracture line with focal cortical thickening in the lateral cortex of left side, **d.** axial T2 SPAIR shows bone bruise (star) with hyperintensity in adjacent soft tissue planes due to edema (arrow head).

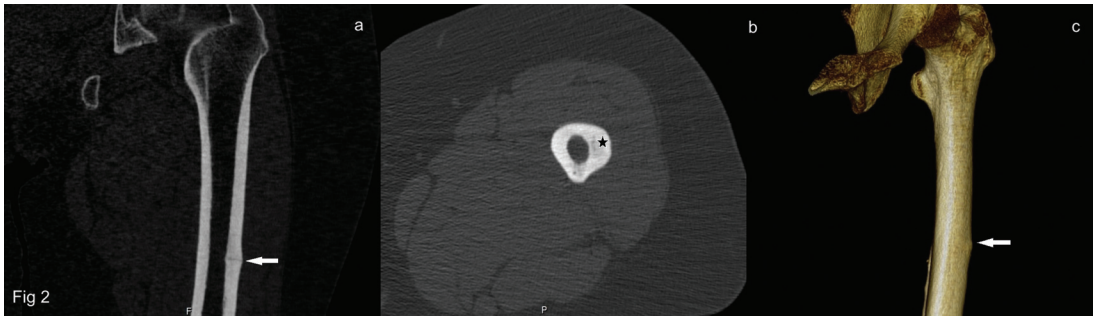


Figure 2— In a, non-displaced and incomplete fracture line (arrow) is detected in coronal non- enhanced and reformatted CT image, **b.** axial non enhanced CT image shows discrete radiolucency (star) on the fracture site, **c.** The cortical thickening (arrow) on the lateral cortex can be easily seen in VRT - CT (Volume Rendering Technique- Computerized Tomography) image.

aphyseal femoral shaft fracture (Figure 1b-c-d). Computerized Tomography scan (CT scan) demonstrated non-displaced transverse fracture in the middle third of the diaphysis (Figure 2a-b-c). The alendronate therapy was discontinued and orthopedic surgical approach was planned.

In conclusion, BPs are considered a first-line therapy for osteoporosis today. They inhibit osteoclast-mediated bone resorption and decrease fracture risk by suppressing excessive bone remodeling. In long term, reduction of remodeling is also related with increased micro damage accumulation and may result to an a dynamic brittle bone (2-4). The guidelines advise prescribing BPs not for longer than 5 years. Long-term BP usage may over suppress bone turnover and severe suppression of bone turnover and micro damage accumulation may lead to increase the risk of atypical fracture (5). In recent years, there have been increasing number of clinical trials, cases and case series that show the increasing risk of atypical femoral fractures that is related to prolonged usage of BPs (4). But there is no rationale for their discontinuation. The occurrence of atypical femoral fracture is very rare as compared to the number of fractures prevented by BPs.

In this report, we aimed to emphasize the atypical femoral fractures associated with long-term usage of BPs. We advise that; In geriatric patients who have received long-term treatment of BPs, fractures should be remind and clinicians not just satisfied with radiographs, further radiological investigations should be carried out in the presence of persistent thigh and hip pain.

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Case Report

A LATE DIAGNOSED CERVICAL MYELOPATHY CASE

Abstract

Cervical spondylotic myelopathy is the most important cause of myelopathy in the elderly. It is defined as spinal cord dysfunction secondary to the compression of the cord caused by degenerative disease of the cervical spine. Cervical spondylotic myelopathy is a slowly progressing disease, and disability caused by cervical spondylotic myelopathy can be life threatening. Despite its severity, it may remain undiagnosed for a long time. We report the case of an 80-year-old female with cervical spondylotic myelopathy leading to paraparesis. She progressively had difficulty in walking, which worsened in the last year. She had knee pain for several years, with a known diagnosis of bilateral gonarthrosis. She had been walking with the aid of a cane when her symptoms worsened and became unable to walk independently in the past months. Her walking disability was attributed to advanced bilateral gonarthrosis. Upon physical examination, she had bilateral knee contractures, extensor plantar responses, and tonus was slightly increased in the legs. Muscle strength was also decreased in the right upper and bilateral lower extremities. Magnetic resonance imaging of the cervical spine revealed spondylotic myelopathy from C3 to C6. Cervical decompression and a stabilization operation were performed. She responded well to the rehabilitation programme. Cervical spondylotic myelopathy should always be considered for elderly patients with walking disabilities, and physicians should be aware that this disease develops insidiously and coexisting diseases leading to disability may mask the symptoms and delay the diagnosis.

Key Words: Cervical Vertebrae/physiopathology; Spinal Cord Diseases; Spondylosis/therapy.

Olgu Sunumu

GEÇ TANI ALMIŞ BİR SERVİKAL MYELOPATİ OLGUSU

Öz

Servikal spondilotik myelopati; servikal omurganın dejeneratif patolojilerine bağlı olarak spinal kordun kompresyonuna sekonder gelişen spinal kord disfonksiyonudur. Servikal spondilotik myelopati yavaş ilerleyen bir hastalıktır. Neden olduğu disabilite hastaların hayatını ciddi derecede etkilemesine rağmen uzun zaman tanı almadan kalabilmektedir. Bu makalede servikal spondilotik myelopati sonucu paraparezi gelişen 80 yaşındaki bir olgu sunulmuştur. Polikliniğimize yürüme güçlüğü ile başvuran hastanın öyküsünde son yıllarda kötüleşen ilerleyici bir yürüme güçlüğü mevcuttu. Olgunun uzun yıllardır olan diz ağrısı şikayeti ve bilinen bilateral gonartroz tanısı vardı. Şikayetlerinin artışından önce tek kanedyenle yürüyebilen hastanın son birkaç aydır bağımsız yürüyemediği, artan yürüme güçlüğünün ileri evre gonartroza bağlandığı öğrenildi. Hastanın fizik muayenesinde bilateral diz kontraktürü mevcuttu. Kas kuvveti sağ üst ekstremitede ve bilateral alt ekstremitelerde azalmış bulundu. Plantar yanıt bilateral ekstansör ve alt ekstremite kas tonusu hafifçe artmıştı. Servikal manyetik rezonans görüntülemede C3 seviyesinden C6 seviyesine uzanan spondilotik myelopati saptandı. Servikal kompresyon ve stabilizasyon operasyonu yapılan hasta rehabilitasyon programından fayda gördü. Servikal spondilotik myelopati yürüme güçlüğü bulunan yaşlı hastalarda ayırıcı tanıda mutlaka düşünülmelidir. Servikal spondilotik myelopati yavaş ilerleyen ve progresif seyir gösteren bir hastalıktır ve dizabiliteye neden olan diğer kronik hastalıklar semptomları maskeleyerek tanıyı geciktirebilir bu konuda dikkatli olunmalıdır.

Anahtar Sözcükler: Servical Vertebra/Patofizyoloji; Spinal Kord Hastalıkları; Spondilozis/tedavi.

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Introduction

Cervical spondylotic myelopathy (CSM) is defined as spinal cord dysfunction secondary to chronic progressive compression of the cervical spinal cord caused by degenerative disc disease, spondylosis or other degenerative pathology of the cervical spine (1). CSM causes progressive disability and severely impairs the quality of life. It is the most common cause of acquired spinal cord dysfunction in adults over 55 years (2). The incidence of CSM was reported to be 26.6% in a study of 585 patients with tetraparesis and paraparesis (3). CSM is a slowly progressive disease, and disability caused by CSM can be seriously devastating. Despite its severe consequences, it might remain undiagnosed for a long time. We report the case of an 80-year-old patient with CSM in whom symptoms were masked by coexisting severe bilateral gonarthrosis, which caused a delay in the diagnosis of CSM.

Case

An 80-year-old female with walking difficulty was referred from the neurosurgery clinic. Her medical history revealed that she had progressive difficulty in walking, which worsened in last years. She had knee pain for several years that was diagnosed as bilateral gonarthrosis and was walking with a cane. She did not want to have an operation and had been treated conservatively. Over time progressive worsening was thought to be caused by gonarthrosis and knee contractures. Once she had visited a neurologist for the stiffness in her legs. Cranial magnetic resonance imaging (MRI) revealed small vessel disease, and spinal stenosis and multiple intervertebral bulging discs were detected in the lumbar MRI. She was given symptomatic drugs. She became unable to walk independently in the last year. Six weeks ago, she was referred to a neurosurgeon for the pain in her arm, and MRI of the cervical spine revealed spondylotic myelopathy from C3 to C5 (Figure 1). Cervical decompression and a stabilization operation were performed and she was referred for rehabilitation. Upon physical examination, she had bilateral knee contractures (20 degrees extension limitation and 80 degrees flexion). Muscle strength was decreased in the right upper and bilateral lower extremities (manual muscle testing 4-/5). Deep tendon reflexes were found to be increased in the legs and normative in the arms. Plantar responses were extensor and tonus was slightly increased in the legs. After a 4-week inpatient rehabilitation programme, she was able to walk with the aid of a walker, and she is still following up with a home-based rehabilitation programme.

Discussion

The pathophysiology of CSM is thought to be multifactorial, with static factors causing stenosis and dynamic factors

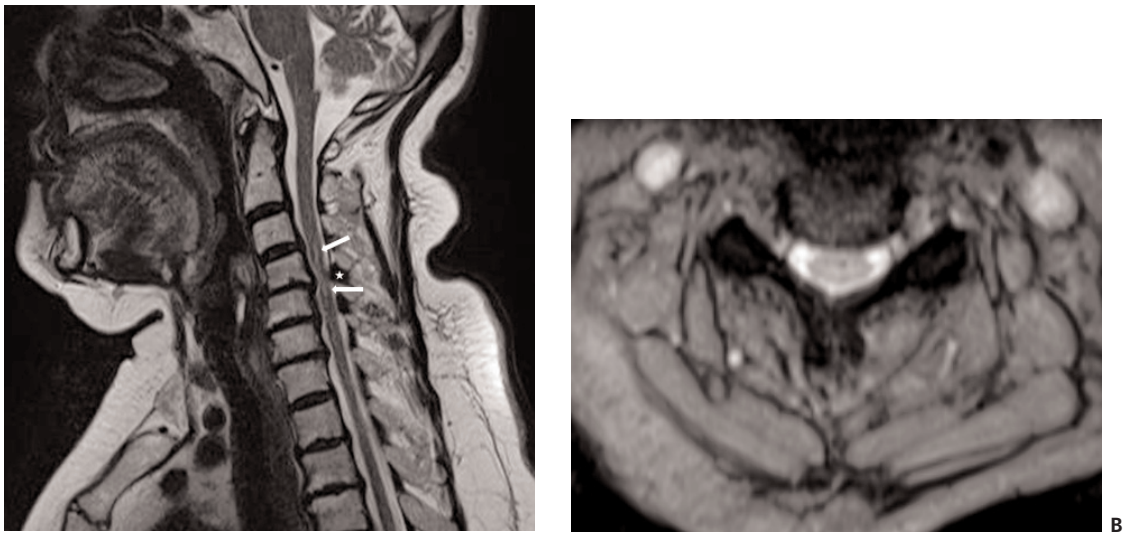


Figure 1— Cervical spondylotic myelopathy. T2-weighted **A.** sagittal and **B.** axial magnetic resonance images showing cervical spondylotic changes including spinal cord compression by disc osteophyte complexes and hypertrophic flaval ligaments (asterisk) accompanied by intramedullary high signal intensity reflecting moderate stage spondylotic myelopathy at C4-C5 (arrows).



resulting in repetitive injury to the spinal cord. The clinical findings related to the compression of the cervical spinal cord leads to a wide range of symptoms. CSM usually begins insidiously; therefore, patients often do not know the time of onset of symptoms and they may be unaware of subtle changes in balance or hand dexterity. Preliminary diagnosis of CSM could be considered with clues obtained from a detailed history and physical examination. The initial symptoms are loss of muscular strength and dysesthesia in the upper extremities, decline in fine hand skills, difficulty in writing, balance impairment and gait difficulty (4). Therefore, medical history often elicits difficulty in activities such as buttoning buttons, using keys, or changes in hand writing. Gait and balance disorders are more specific to cervical myelopathy; therefore, questioning patients in terms of these symptoms is important. Sadasivan conducted a retrospective study of 22 patients with cervical spondylotic myelopathy who were admitted to the hospital for surgical treatment of their neurological condition (5). The earliest consistent symptom in their patients was gait abnormality. Recent use of assistive devices, such as a cane or walker, may reflect progression of myelopathy. The patient in our case also had progressive walking difficulty, but her walking disability was attributed to advanced bilateral gonarthrosis, and this misinterpretation led to the progression of myelopathy causing paraparesis. Similarly, Sadasivan mentioned a considerable delay in the diagnosis of CSM and reported an average 6.3 year delay in their retrospective study. Sphincter dysfunction is also often a symptom seen later, and severe cases of CSM may present with symptoms of incontinence (4). Other common complaints are shoulder and arm pain, neck pain and stiffness and paresthesia and weakness in the upper extremities (6). Patients may have concomitant radicular signs and symptoms, which our patient also suffered; therefore, referred to a neurosurgeon. Radicular symptoms were reported in 25% of cases with the Spurling test (7).

Physical examination findings usually reveal lower motor neuron symptoms at the lesion level and upper motor neuron symptoms below the level of the lesion. Upper extremity symptoms may be unilateral but lower extremity symptoms are mostly bilateral. Sensory deficits, usually related to dorsal column function (reduced joint position and vibratory sense) and loss of pain sensation, can be elicited in the lower extremities and may contribute to the gait impairment. Physical examination should include a balance assessment with clinical tests such as heel-to-toe tandem walking and the Romberg test where disturbance shows posterior column involvement.

Imaging modalities including plain radiographs, computed tomography (CT) and MRI are all important in the diagnosis and each may provide helpful information in patients with CSM. Initial evaluation includes anteroposterior and lateral radiographs of the cervical spine where narrowing of disc space, osteophytes, facet arthrosis and ossification of the posterior longitudinal ligament may be visualized together with the evaluation of cervical lordosis. CT improves the depiction of bone spurs on the spinal canal and sometimes shows cord compression by disc osteophyte complexes. However, because of superior soft tissue resolution and multiplanar capability, MRI has replaced CT and became the mainstay in noninvasive evaluation of patients with painful myelopathy. MRI provides valuable information about disc herniation, morphology and internal signal of the spinal cord. Many authors have considered that intramedullary high signal intensity in MRI might represent a variety of histologic changes, including edema, ischemia, demyelination, gliosis, microcavities and cavities (4,5,8). In our patient, MRI showed apparent cervical spondylotic changes including loss of cervical lordosis and disc osteophyte complexes between C3-C5. The cervical spinal canal was narrowed and the spinal cord was compressed by disc osteophyte complexes anteriorly and hypertrophic flaval ligaments posteriorly which were apparent at the C4-C5 level. T2-weighted images also showed the intramedullary high signal of the spinal cord at the C4-C5 level reflecting moderate stage spondylotic myelopathy (Fig. 1). There was no pathologic finding on the T1-weighted images.

Differential diagnosis is important in CSM. Amyotrophic lateral sclerosis is one of the most frequently involved diseases to rule out (8). Neoplasia, multiple sclerosis, spinal cord infarction, syringomyelia and vitamin B12 deficiency should also be considered in the differential diagnosis (8). Parasagittal cerebral lesions, multiple strokes and brainstem strokes can mimic CSM, although onset tends to be acute (9).

The natural history of CSM has not been clearly defined. The debate about the course of CSM and the efficacy of conservative treatment is still ongoing. A longer duration of symptoms has been reported to present a poor prognosis (5,10). In a recent investigation Oshima (11) suggested that 62% of patients with mild CSM will not deteriorate or undergo surgery 10 years after diagnosis and that malalignment and instability are adverse prognostic factors. Matz, PG (10) in a systematic review of the literature regarding the natural history of CSM suggested a mixed course with many patients having quiescent disease for long periods of time and others experiencing a stepwise decline. Given the lack of definitive data regarding the natural history of CSM it is crucial to inform patients prior to conservative treatment about the potential for progression and possibility of spinal cord injury.

Conservatively treated patients should be advised to avoid hyperextension injury or even minor trauma, which may lead to progression of CSM. Physical therapy agents, exercise programmes and cervical collars may be used in the conservative treatment but there is limited evidence for them (8) and prolonged collar immobilization may result in muscle deconditioning.

The duration of the patient's complaints should also be considered while planning conservative treatment; chances to benefit from conservative treatment decrease as the duration of symptoms increases. Surgery should be considered in patients with refractory symptoms despite conservative measures, progressive symptoms, bowel or bladder dysfunction, or overt weakness. The number of surgical procedures in elderly patients has been increasing as the population ages. Kanchiku et al. investigated 43 cases with an average age of 79 years that underwent surgical treatment for CSM. They reported favourable postoperative outcomes and stated that when the surgical methods were compared selective laminoplasty is less invasive and well-suited for the elderly compared to conventional C3-C7 laminoplasty and anterior decompression and fusion (12).

In conclusion, CSM is the most common cause of spinal cord dysfunction in the elderly and underdiagnosis is frequent due to the vagueness of symptoms. Gait disturbance, which is one of the most common symptoms of CSM, might be mistakenly attributed to a coexisting disease such gonarthrosis or coxarthrosis or simply to ageing. Therefore, clinicians should be cautious and gait disturbance should be investigated with high suspicion of CSM.

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Case Report

INTRA-ABDOMINAL PERFORATION DUE TO CARDIOPULMONARY RESUSCITATION FOLLOWING NON-INVASIVE MECHANICAL VENTILATION IN AN ELDERLY PATIENT

Abstract

Medical treatment with non-invasive mechanical ventilation is the gold standard for elderly patients with acute exacerbation of chronic obstructive pulmonary disease who may develop respiratory failure. However, for geriatric patients needing high-pressure support, non-invasive mechanical ventilation may lead to gastric distension associated with the passage of air into the esophagus and stomach. There are very few cases in literature of gastric perforation developing secondary to gastric distension. In these patients, cardiopulmonary resuscitation increases potential risks by engendering an increase in intra-thoracic and intra-abdominal pressure. After intubation, gastric air decompression with a nasogastric catheter will protect patients from complications such as gastric distension, aspiration and gastric perforation.

In this case report, we present an 84-year-old patient with severe exacerbation of chronic obstructive pulmonary disease, who was treated with non-invasive mechanical ventilation at intermittent high pressures for 6 hours in the emergency department but suffered a cardiac arrest because of respiratory failure. Cardiopulmonary resuscitation was then applied, resulting in the development of pneumomediastinum, pneumoperitoneum and bilateral rectus abdominis rupture associated with gastric perforation.

Due to increased tissue fragility in this age group, complications which may develop from non-invasive mechanical ventilation, which has been applied to avoid the undesired effects of intubation in elderly patients, are of greater importance and should not be ignored.

Key Words: Noninvasive Ventilation; Cardiopulmonary Resuscitation; Perforation; Pulmonary Disease, Chronic Obstructive; Mediastinal Emphysema; Pneumoperitoneum.

Olgu Sunumu

YAŞLI HASTADA NONİNVAZİV MEKANİK VENTİLASYON SONRASINDA UYGULANAN KARDİYOPULMONER RESUSİTASYONA BAĞLI İNTRAABDOMİNAL PERFORASYON

Öz

Akut "kronik obstruktif havayolu hastalığı" alevlenmesine bağlı solunum yetmezliği gelişen yaşlı hastalarda medikal tedavi ile birlikte uygulanan noninvaziv mekanik ventilasyon altın standart olarak belirtilmiştir. Bununla birlikte yüksek basınç gereksinimi olan yaşlı hastalarda noninvaziv mekanik ventilasyon, özefagus ve mideye hava geçişine bağlı olarak gastrik distansiyona neden olabilir. Literatürde çok nadir olarak gastrik distansiyona sekonder gelişen mide ve özefagus perforasyonu bildirilmiştir. Bu yaş grubunda kardiyopulmoner resustasyon uygulaması intratorasik ve intraabdominal basınç artışına yol açarak olası riskleri daha da arttırmaktadır. Entübasyon sonrası nazogastrik sonda yardımı ile gastrik hava dekompresyonu yapılması, hastaları gastrik distansiyon, aspirasyon ve gastrik rüptür gibi komplikasyonlardan koruyabilir.

Biz olgu sunumumuzda ileri derecede kronik obstruktif havayolu hastalığı olan, acil serviste 6 saat aralıklı yüksek basınçlarda noninvaziv mekanik ventilasyon yapılan ancak solunum yetersizliği sebebiyle arrest olup kardiyopulmoner resustasyon uygulanan ve gastrik rüptüre bağlı pnömomediastinyum, pnömoperitonyum, ve bilaretal rektus rüptürü gelişen 84 yaşındaki hastayı sunmayı amaçladık.

Yaşlı hastalarda entubasyonun istenmeyen etkilerinden sakınmak amacıyla uygulanan noninvaziv mekanik ventilasyona bağlı gelişebilen komplikasyonlar, doku frajilitesinin arttığı bu yaş grubunda önem kazanmaktadır ve göz ardı edilmemelidir.

Anahtar Sözcükler: Non-invaziv Mekanik Ventilasyon; Kardiyopulmoner Resustasyon; Perforasyon; Kronik Obstruktif Akciğer Hastalığı; Pnömomediasten; Pnömoperiton.

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Introduction

Geriatric patients with advanced stage chronic obstructive pulmonary disease (COPD) may develop respiratory failure associated with acute exacerbation. For patients presenting at hospital at that age and stage, medical treatment with non-invasive mechanical ventilation (NIMV) is the gold standard. This procedure reduces the need for endotracheal intubation and the length of hospital stay, thereby increasing life expectancy (1,2). For patients needing high-pressure support where there is patient-ventilator incompatibility, air swallowing or ventilations applied at pressures exceeding the esophageal sphincter closing pressure, NIMV may lead to gastric distension associated with the passage of air into the esophagus and stomach (3,4).

In geriatric patients, due to the loss of muscle and connective tissue, there is decreased tissue elasticity, leaving them more vulnerable to traumatic injuries. However, there are very few cases in literature of stomach and esophagus perforation that have developed secondary to gastric distension (5).

Cardiopulmonary resuscitation is the set of methods used to restart the circulatory and respiratory systems. Complications, which may develop during CPR, can usually be treated after successful resuscitation. Even though gastric distension resulting from a very strong and/or fast artificial respiration procedure is frequently seen, very few cases have been reported of massive gastric distension, which will cause gastric perforation and pneumoperitoneum (6,7).

In this study, we present the case of a geriatric patient with severe exacerbation of COPD, who was treated with NIMV at intermittent high pressures for 6 hours in the emergency department (ED) but suffered a cardiac arrest because of respiratory failure. CPR was then applied, resulting in the development of pneumomediastinum, pneumoperitoneum and bilateral rectus abdominis rupture associated with gastric perforation.

Case

An 84-year-old female patient previously diagnosed with COPD and congestive heart failure (CHF) used BIPAP at home and presented at the ED with complaints of respiratory problems. In the room-air test, SpO_2 was 45%; arterial blood gas (ABG) values were pH=7.27, pO_2=55 mmHg and pCO_2=86 mmHg; GCS was 15 and the patient was treated with nebulized bronchodilators (combivent-flixotide) and intravenous steroids by the emergency physicians. With NIMV planned, the patient was monitored for 2 hours attached to a BIPAP device (EPAP=6, IPAP=12). As the hypoxemia, hypercarbia and respiratory acidosis levels had not improved, in the subsequent ABG sample (pH=7.24, pO_2=50 mmHg, pCO_2=99 mmHg, SpO_2=77%), NIMV was continued with a mechanical ventilator (Maquet Servo-I) in continuous positive airway pressure (CPAP) mode (positive end-expiratory pressure (PEEP)=5 cmH_2O, pressure support (PS)=15 cmH_2O). Throughout 4 hours of CPAP application, the general condition did not improve, consciousness gradually lessened (GCS=9), and as there was widespread infiltration on the chest X-ray (Figure 1) and hypoxemia, hypercarbia and respiratory acidosis continued in the ABG (pH=7.19, pO_2=58 mmHg, pCO_2=100 mmHg, SpO_2=88%), it was decided to intubate the patient.

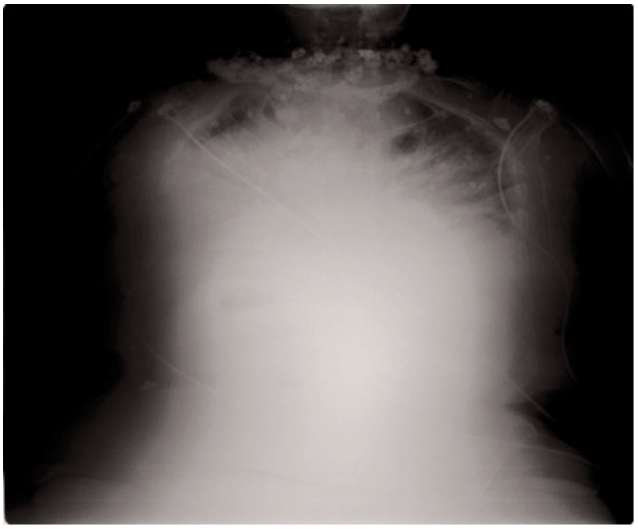


Figure 1— Chest X-Ray before intubation.

To apply intubation, 30 mg rocuronium and 60 mg propofol were administered intravenously. Then 1 mg atropine was administered to the patient, who had bradyarrhythmia. The patient did not respond to atropine and experienced difficulties with bag–valve–mask (BVM) ventilation. As the patient then had a cardiac arrest, crush intubation was applied, and CPR was started immediately. The patient could only be intubated at the second attempt, and at the 5th minute of CPR, normal sinus rhythm was restored. As the development of subcutaneous emphysema and abdominal distension was noticed, tracheal rupture was suspected, resulting from the crush intubation. After ruling out pneumothorax on the bedside ultrasonography (USG), an emergency chest X-ray (Figu-

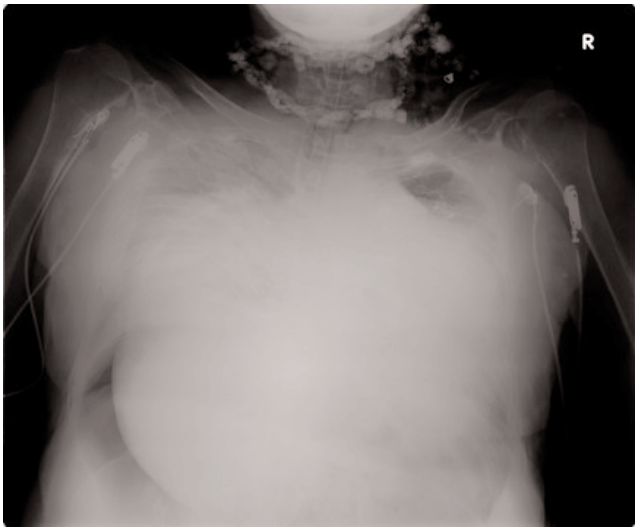


Figure 2— Chest X-Ray after intubation.

re 2) and thoracho-abdominal CT were taken. On the CT images, "an appearance of widespread air in the abdomen (3-4 lts.) and mediastinum" was determined (Figure 3). With a preliminary diagnosis of pneumomediastinum and pneumoperitoneum secondary to tracheobronchial rupture, the patient was admitted for surgery classified as ASA IV E.



Figure 3— CT Scan after intubation.



Figure 4— Chest X-Ray in the ICU.

In the OR, a thoracic surgery specialist performed a diagnostic bronchoscopy, the results of which were normal, and a general surgery specialist performed an upper gastrointestinal system endoscopy. Perforation was determined in the lesser curvature of the stomach and was repaired primarily. During the exploration, a right Morgagni hernia including the transverse colon and omentum was seen and repaired. Both rectus muscles were seen to be ruptured totally from the midportion of the muscle. Throughout the operation, hemodynamics were stable, and the patient was admitted to the intensive care unit (ICU) postoperatively.

The patient was attached to a mechanical ventilator in the ICU and, in the 2nd hour of monitoring, regained consciousness (GCS=E3M6VE). At 48 hours postoperatively, as hemodynamics were stable and ABG levels were pH=7.47, pO_2=81.7 mmHg, pCO_2=55 mmHg, and SpO_2=97%, and spontaneous respiratory effort was sufficient, the patient was extubated (Figures 4 and 5) and spontaneous ventilation was monitored for 2 days with intermittent NIMV support. Gastric decompression with a nasogastric tube was applied with the patient seated upright in bed at 45° during NIMV.

At the end of 2 days, due to continuing hypercarbia and deterioration in her general condition, the patient was re-intubated. Following mechanical ventilation in CPAP mode, extubation was attempted twice during medical treatment, but the respiratory parameters were not sufficient, and re-intubation was required within 30 minutes.



Figure 5— Patient after extubation.

On day 14, a percutaneous tracheotomy was performed, after which the general condition improved and a home-type mechanical ventilator was provided for the mobilized patient, who was then discharged uneventfully.

Discussion

This case report concerns the most feared complication of NIMV which can be seen in emergency patients, as a result of the delayed decision for intubation in a patient who was clearly unsuccessful on NIMV. It had been shown that insisting on a long period of NIMV increases mortality in emergency departments, and non-invasive ventilation must not be regarded as an alternative to intubation.

NIMV is often applied to geriatric patients with advanced-stage COPD in EDs when medical treatment is insufficient for hypercarbic respiratory failure, thus protecting patients from complications associated with intubation (1). The advantages of NIMV are intact airway defense mechanisms, increased patient comfort, physiological air warming and humidification, less need for sedation and easier weaning (9). Intubation should be considered for patients who cannot tolerate NIMV (10).

BIPAP machines are usually preferred at the first stage for NIMV in chronic patients, as they are economical, portable, easy to use and have good leakage compensation, but their use in the ED is limited (11).

In EDs and ICUs, NIMV can be applied with more advanced mechanical ventilators with bedside titration. However, PS and CPAP modes are often preferred, and to overcome auto-PEEP in COPD patients, PEEP application is recommended (1,2).

The application of PEEP results in improved oxygenation as well as reduced risk of lung injury related to the ventilator. However, in the application of PSV-PEEP for NIMV, keeping a high pressure to reach the targeted tidal volume and incompatibility of the patient to the ventilator can cause air swallowing and gastric distension (3,4).

Aspiration may occur due to air swallowing or ventilation at pressures exceeding the upper esophageal sphincter pressure. It can be prevented through proper patient selection, gastric decompression with a nasogastric tube, reduction of respiratory support pressures and intermittent application of NIMV (12).

Complications that may occur during the administration of CPR are generally treatable after successful resuscitation. Postmortem studies have shown thoracic complications in 40% of cases, abdominal-visceral complications in 30% and pulmonary complications in 13%. Life-threatening heart and major vessel injuries or intestinal rupture are extremely rare (0.1 to 5%) (13,14).

As conclusion, in elderly patients requiring high-pressure NIMV, where ventilator-patient compatibility cannot be achieved, complications which may develop associated with gastric distension can be prevented by close monitoring in respect of gastric distension and when necessary, providing decompression with NG tube.

When life-saving protocols such as NIMV or CPR are applied to geriatric patients, it should not be forgotten that in the same way as for evaluation of neonatal patients, complications which may develop, might be related to age just as much as the frequency of the procedure, duration and pressure applied.



Due to increased tissue fragility in this age group, complications which may develop from non-invasive mechanical ventilation, which has been applied to avoid the undesired effects of intubation in elderly patients, are of greater importance and should not be ignored.

Informed Consent

Informed consent was obtained from the patient's next of kin.

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