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The Prevalence of Atrial Fibrillation and Related Factors Including Anthropometric, Hemodynamic and Echocardiographic Parameters in Patients with Hemodialysis

Hemodiyaliz Hastalarında Atriyal Fibrilasyon Prevalansı ve Bununla İlişkili Antropometrik, Hemodinamik ve Ekokardiyografik Parametreler

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ABSTRACT

Introduction: *Atrial fibrillation is the most common type of arrhythmia. The prevalence of atrial fibrillation is increased in hemodialysis patients. The aim of the present study was to investigate the prevalence of atrial fibrillation and related factors including anthropometric, hemodynamic and echocardiographic parameters in hemodialysis patients.*

Patients and Methods: *We recruited 154 [72 (46.8%) woman, 82 (53.2%) man] hemodialysis patients in this study. Atrial fibrillation was determined electrocardiographically (the P waves was absent and RR intervals were irregular) and the patients were divided into two groups depending on the presence or absence of atrial fibrillation. Transthoracic echocardiography was performed in all patients.*

Results: *There were 7 (4.5%) patients with atrial fibrillation. Although we found that the age, left ventricle end-diastolic diameter, left ventricle end-systolic diameter and left atrial diameter were increased in hemodialysis patients with atrial fibrillation, ejection fraction increased in hemodialysis patients with no atrial fibrillation. Left atrial diameter and left ventricle end-systolic diameter were shown to be independent predictors of atrial fibrillation in hemodialysis patients ($p< 0.05$).*

Conclusion: *Left atrial diameter and end-systolic left ventricle diameter were independent predictors of atrial fibrillation in hemodialysis patients.*

Key Words: *Atrial fibrillation, left atrium, left ventricle, electrocardiography, echocardiography.*

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ÖZET

Giriş: *Atriyal fibrilasyon en sık görülen aritmi tipidir. Atriyal fibrilasyon insidansı hemodiyaliz hastalarında artmıştır. Bu çalışmanın amacı hemodiyaliz hastalarında atriyal fibrilasyon prevalansını ve bununla ilişkili antropometrik, hemodinamik ve ekokardiyografik parametreleri araştırmaktır.*

Hastalar ve Yöntem: *Toplam 154 [72 (%46.8) kadın, 82 (%53.2) erkek] hemodiyaliz hastası çalışmaya dahil edildi. Elektrokardiyografide P dalgalarının olmaması ve düzensiz RR intervali varlığında atriyal fibrilasyon tanısı konuldu ve hastalar atriyal fibrilasyon olup olmamasına göre iki gruba ayrıldı. Tüm hastalara transtorasik ekokardiyografi yapıldı.*

Bulgular: *Hastaların 7 (%4.5)'sinde atriyal fibrilasyon mevcuttu. Atriyal fibrilasyon olan grupta yaş, sol ventrikül diyastol sonu çapı, sol ventrikül sistol sonu çapı ve sol atriyum genişliği daha fazla iken; atriyal fibrilasyon olmayan grupta ejeksiyon fraksiyon daha yüksekti. Hemodiyaliz hastalarında sol atriyum çapı ve sol ventrikül sistol sonu çapı atriyal fibrilasyonu belirlemede bağımsız prediktörler olarak saptandı (p< 0.05).*

Sonuç: *Hemodiyaliz hastalarında sol atriyum çapı ve sol ventrikül sistol sonu çapı atriyal fibrilasyonu belirlemede bağımsız prediktörlerdir.*

Anahtar Kelimeler: *Atriyal fibrilasyon, sol atriyum, sol ventrikül, elektrokardiyografi, ekokardiyografi.*

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INTRODUCTION

Atrial fibrillation is the most common type of arrhythmia. The prevalence of this disease in the world is approximately 1.5%-2% of the general population, with the average age of patients with this condition steadily rising[1]. Also, the prevalence of atrial fibrillation is increased in patients with hemodialysis patients[2]. Ansari et al. showed that serious atrial arrhythmias are common in a hemodialysis population[3]. Risk factors for symptomatic atrial arrhythmias in hemodialysis patients may include hyperparathyroidism and echocardiographic findings of chamber enlargement, valvular lesions, or ventricular dysfunction[3]. Atrial fibrillation is associated with a five-fold risk of stroke and a three-fold incidence of congestive heart failure, higher mortality and very common hospitalization[1]. The aim of this present study was to investigate the prevalence of atrial fibrillation and related factors including anthropometric, hemodynamic and echocardiographic parameters in hemodialysis patients.

PATIENTS and METHODS

Patient Population

We recruited 154 [72 (46.8%) woman, 82 (53.2%) man] hemodialysis patients in this study. The mean duration of hemodialysis was 37.2 ± 3.9 months. A detailed history was taken and each participant underwent a systemic physical examination before attending to the study. Patients with moderate and/or severe valvular heart disease were excluded. All subjects were not smoking or had using alcohol. All subjects gave their consent for inclusion in the study. The investigation conforms to the principles outlined in the Declaration of Helsinki.

Body Mass Index Measurements

Body mass index (kg/m²) were calculated dividing body weight in kilograms by square of body height in meters.

Blood Pressure Measurement

The arterial blood pressure of the subjects was measured by the same clinician. The subjects were in supine position and had rested at least 20 minutes before the measurement. The blood pressure was measured, using a mercury sphygmomanometer with a cuff appropriate to the arm circumference (Korotkoff phase I for systolic blood pressure and V for diastolic blood pressure). Blood pressure measurements were performed twice for each subject and their mean was used for statistical analysis.

Pulse pressure = Systolic blood pressure - Diastolic blood pressure,

Mean blood pressure = [Systolic blood pressure + 2 x Diastolic blood pressure] / 3

Surface Electrocardiography

Atrial fibrillation was demonstrated in all 12 leads of the surface electrocardiography which were simultaneously recorded. In atrial fibrillation the P waves, which represent depolarization of the atria, was absent and RR interval was irregular. All recordings were performed in the same quiet room during spontaneous breathing, following 20 minute of adjustment in the supine position.

Transthoracic Echocardiography

A Vivid 3 cardiovascular ultrasound system [3S sector probe (1.5-3.6 MHz), GE] was used for transthoracic echocardiographic evaluation[4]. Echocardiography was performed with the subject in the lateral decubitus position for measurements of parameters such as left ventricle end-diastolic and end-systolic diameters, left atrial diameter, and pulmonary velocity.

Statistical Analysis

Statistics were obtained using the ready to use programme of SPSS version 8.0. All the values were expressed as mean ± standard deviation. The obtained results were assessed by independent samples t-test. Relations between variables were calculated using linear regression analysis. $p< 0.05$ was considered significant.

RESULTS

The prevalence of atrial fibrillation was 7 (4.5%) patients. Although we found that the age, left ventricle end-diastolic diameter, left ventricle end-systolic diameter and left atrial diameter (Figure 1) were increased in hemodialysis patients with atrial fibrillation, ejection fraction is increased in hemodialysis patients with no atrial fibrillation (Table 1). Left atrial diameter and left ventricle end-systolic diameter were shown to be independent predictors of atrial fibrillation in hemodialysis patients (R^2= 0.41, F= 1.621; p= 0.03, p= 0.04, respectively).

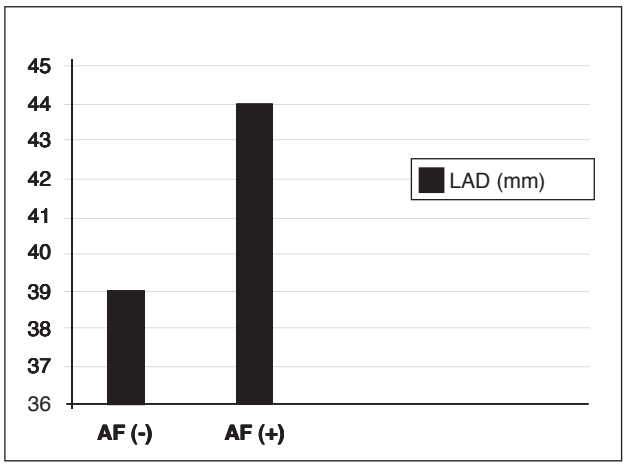

Figure 1. Left atrial diameter (LAD) in hemodialysis patients with presence or absence of atrial fibrillation (AF).

DISCUSSION

Although we found that the age, left ventricle end-diastolic diameter, left ventricle end-systolic diameter and left atrial diameter were increased in hemodialysis patients with atrial fibrillation, ejection fraction is increased in hemodialysis patients with no atrial fibrillation. We found that the prevalence of atrial fibrillation was 4.5% in this study. Left atrial diameter and left ventricle end-systolic diameter were shown to be independent predictors of atrial fibrillation in hemodialysis patients.

Atrial fibrillation is the most common cardiac arrhythmia and increases the risk of stroke. The prevalence of atrial fibrillation is greater in patients with chronic renal insufficiency than normal renal function[2]. Several risk factors including advanced age, increasing age is an important risk factors for the development of atrial fibrillation in general population and hemodialysis patients, left atrial dilatation, low ejection fraction, increased left ventricle diameters, duration of hemodialysis and concomitant coronary artery disease and/or hypertension have been reported for atrial fibrillation in patients with hemodialysis[1,5-7]. Some risk factors were found to be significantly different between the two groups in our study, but only left atrial diameter and left ventricle end-systolic diameter were an independent pre-

Table 1. Anthropometric, hemodynamic, and echocardiographic values in groups

	AF (-)	AF (+)	p
Age (years)	53.8 ± 14.4	69.5 ± 11.5	**0.005**
Body mass index (kg/m²)	25.36 ± 6.41	25.57 ± 4.85	0.93
Systolic blood pressure (mmHg)	128.97 ± 21.77	130.00 ± 14.14	0.90
Diastolic blood pressure (mmHg)	75.98 ± 10.02	78.57 ± 3.77	0.49
Mean blood pressure (mmHg)	93.66 ± 13.15	95.67 ± 6.00	0.69
Pulse pressure (mmHg)	53.22 ± 15.32	51.42 ± 13.45	0.76
Heart rate (beats/min)	79.12 ± 11.98	82.85 ± 8.07	0.41
LV end-distolic diameter (mm)	49.78 ± 3.65	54.71 ± 5.46	**0.001**
LV end-systolic diameter (mm)	31.04 ± 5.67	36.85 ± 3.71	**0.008**
Ejection fraction (%EF)	59.72 ± 6.39	49.28 ± 8.47	**< 0.001**
Left atrial diameter (mm)	39.10 ± 3.15	44.14 ± 5.49	**< 0.001**
Pulmonary velocity (m/sn)	0.97 ± 0.16	0.94 ± 0.13	0.25

AF: Atrial fibrillation, LV: Left ventricle.

dictor of atrial fibrillation in regression analysis. This may result from the relatively small population size.

The relationship between left atrial diameter, increased left ventricle diameters and atrial fibrillation has been well-established, as in our study. Atrial dilatation can be a cause of atrial fibrillation[7]. The underlying mechanisms for atrial fibrillation are not yet fully understood. Atrial fibrillation is frequently caused by microreentry circuits of electrical impulses especially in the left atrial wall (multiple-wavelets theory)[8]. The incidence of wavelets are determined by both the mass and the electrical vulnerability of the atrial myocardium. The left atrial size has been adopted to predict the risk of mortality, stroke and the development of atrial fibrillation[9,10]. In addition with left atrial diameter, left ventricular dimensions especially left ventricle end-diastolic dimension correlates well with left atrial diameter in adult patients with atrial fibrillation[6]. Also, patients with dilated left ventricle and lower ejection fraction seem to be at high risk for left ventricle thrombus formation[11].

In conclusion, left atrial diameter and end-systolic left ventricle diameter were independent predictors of atrial fibrillation in hemodialysis patients.

CONFLICT of INTEREST

None declared.

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