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Assessment of Admission Hemoglobin Levels and Gender Differences in Transvenous Radiofrequency Ablation Therapy for the Treatment of the Slow Pathway of Atrioventricular Nodal Reentrant Tachycardia

Atriyoventriküler Nodal Reentran Taşikardide Yavaş Yolun Transvenöz Radyofrekans ile Ablasyonunda Başvuru Hemoglobin Seviyeleri ve Cinsiyet Farklılığının Değerlendirilmesi

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ABSTRACT

Introduction: *Atrioventricular nodal reentrant tachycardia is the most common regular supraventricular arrhythmia in humans. This study investigated the admission hemoglobin levels and gender differences in transvenous radiofrequency ablation therapy for the treatment of the slow pathway of atrioventricular nodal reentrant tachycardia.*

Patients and Methods: *Nineteen consecutive patients with symptomatic drug-resistant typical slow-fast atrioventricular nodal reentrant tachycardia underwent an invasive electrophysiology study and performed radiofrequency ablation of slow conduction pathway within atrioventricular node. Blood samples were taken between 08.30 and 09.30 a.m. from the antecubital vein for complete blood count.*

Results: *Nineteen consecutive patients with slow-fast atrioventricular nodal reentrant tachycardia (12 female, 7 male) were ablated. Mean admission hemoglobin and hematocrit (%) levels were significantly increased in male patients as compared with female patients (15.38 ± 1.21 mg/dL, 12.72 ± 1.36 mg/dL, $p < 0.001$; 45.41 ± 3.26, 37.90 ± 2.88, $p < 0.001$ respectively). There was not gender differences in the radiation exposure time, fluoroscopy time, complication rate (0%) and acute success rate (100%).*

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Conclusion: *There was not gender differences in the radiation exposure time, fluoroscopy time, complication rate and acute success rate at the transvenous radiofrequency ablation therapy for the treatment of atrioventricular nodal reentrant tachycardia. Mean admission hemoglobin and hematocrit levels were significantly decreased in female patients as compared with male patients.*

Key Words: *Tachycardia, atrioventricular nodal reentry; ablation techniques; sex differences; hemoglobinometry.*

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ÖZET

Giriş: *Atriyoventriküler nodal reentran taşikardi insanda en sık gözlenen düzenli supraventriküler aritmidir. Bu çalışmada, atriyoventriküler nodal reentran taşikardide yavaş yolun transvenöz radyofrekans ile ablasyonunda başvuru hemoglobin seviyeleri ve cinsiyet farklılığı araştırılmıştır.*

Hastalar ve Yöntem: *Semptomatik, ilaca dirençli tipik (yavaş-hızlı) atriyoventriküler nodal reentran taşikardisi olan 19 ardışık hasta, invaziv elektrofizyoloji çalışması ve atriyoventriküler yavaş iletim yolunun radyofrekans ablasyonu için çalışmaya alındı. Sabah saat 08.30-09.30 aralarında tam kan sayımı için antekübital venden kan örneği alındı.*

Bulgular: *Yavaş-hızlı atriyoventriküler nodal reentran taşikardisi olan (12 kadın, 7 erkek) 19 ardışık hasta ablate edildi. Ortalama başvuru hemoglobin ve hematokrit (%) değerleri erkeklerde kadınlara göre daha yüksekti (sırası ile, 15.38 ± 1.21 mg/dL, 12.72 ± 1.36 mg/dL, p < 0.001; 45.41 ± 3.26, 37.90 ± 2.88, p < 0.001). Radyasyon maruziyet zamanı, floroskopi zamanı, komplikasyon oranı (%0) ve akut başarı oranı (%100) açısından cinsiyet farklılığı yoktu.*

Sonuç: *Atriyoventriküler nodal reentran taşikardinin transvenöz radyofrekans ablasyonu ile tedavisinde radyasyon maruziyet zamanı, floroskopi zamanı, komplikasyon oranı ve akut başarı oranı açısından cinsiyet farklılığı saptanmamıştır. Başvuru ortalama hemoglobin ve hematokrit değerleri kadınlarda erkeklere göre daha düşüktür.*

Anahtar Kelimeler: *Taşikardi, atriyoventriküler düğüm yeniden girişi; ablasyon teknikleri; cinsiyet farklılığı; hemoglobin seviyeleri.*

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INTRODUCTION

Atrioventricular nodal reentrant tachycardia (AVNRT) is the most common regular supraventricular arrhythmia in humans[1]. In the slow-fast form of AVNRT (typical AVNRT), the onset of atrial activation appears before, at the onset, or just after the QRS complex, thus maintaining an atrial-His/His-atrial ratio > 1[2]. Although typically, the earliest retrograde atrial activation is recorded at the His bundle electrogram, careful mapping studies have demonstrated that posterior or even left septal fast pathways may occur in some patients with typical AVNRT[2-4]. This tachycardia can be cured with the slow pathway ablation[5]. Although the ablation of slow-pathway approach is effective, it may be associated with a 1% risk of atrioventricular block[5]. The detailed electrophysiological characteristics of the gender differences associated AVNRT have not been clarified. This study investigated the admission hemoglobin levels and gender differences in transvenous radiofrequency ablation therapy for the treatment of the slow pathway of AVNRT.

PATIENTS and METHODS

Patients

Nineteen consecutive patients with symptomatic drug-resistant typical slow-fast AVNRT underwent an invasive electrophysiology study (EPS) and performed radiofrequency ablation (RFA) of slow conduction pathway within atrioventricular node. All ablation procedures were performed by the same cardiologist and all patients provided written, informed consent. The investigation conforms with the principles outlined in the Declaration of Helsinki. Blood samples were taken between 08.30 and 09.30 a.m. from the antecubital vein for complete blood count. Blood cell were counted on the HMX (Beckman Coulter, USA) analyzer. Left ventricular ejection fraction was measured by echocardiography (A Vivid 3 cardiovascular ultrasound system [3S sector probe (1.5-3.6 MHz), GE]).

Electrophysiologic Study and Ablation Procedure

Electrophysiology study and RFA were performed according to the previously described procedure[6]. All antiarrhythmic agents had been discontinued for more than

three days. No patient had received amiodarone. Conventional quadripolar (Jos 6F) and multi-polar (Marinr CS-7Fr) (for coronary sinus and His) catheter were introduced into the right atrium across the tricuspid valve to record a right-sided His bundle electrogram, the coronary sinus, and right ventricle. Bipolar electrograms were filtered at 30-500 Hz, amplified at gains of 20-80 mm/mV, and displayed and acquired on a physiological recorder (Cardiotek EP Tracer System, Holland), together with surface electrocardiograms. Two stimulation protocols were performed: 1) programmed stimulation of the coronary sinus with eight basic stimuli train and subsequent single, and afterwards double extrastimuli with gradually (20-ms step) shortened coupling interval, and 2) incremental pacing protocol. Typical slow-fast AVNRT was diagnosed according to standard criteria[2]. AV nodal conduction jumps were diagnosed using the criteria of an increase of at least 50 ms in the AH interval for a 10 ms decrease in the atrial coupling interval. Demonstration of a conduction jump indicated persistent conduction over the slow pathway. The ablation catheter (RF Marinr MC-7Fr) is withdrawn inferiorly from the His bundle region along the atrial edge of the tricuspide annulus. Positioning of the catheter at the slow pathway region can be performed in either the left anterior oblique or right anterior oblique view. Radiofrequency energy was delivered at an energy of 30-50 W and temperature up to 50-60°C, for 60 second. Basal and atropin-induced stimulation protocols were repeated after ablation RF in order to stimulate AVNRT and to confirm elimination of tachyarrhythmia. Following successful ablation, patients were discharged from hospital within 24 hours on acetilcalicilic acid and no antiarrhythmic drugs.

Statistical Analysis

Statistics were obtained using the Statistical Software Package of SPSS version 8.0. All the values were expressed as mean ± standard deviation. Mann-Whitney test was used to examine the variables. $p < 0.05$ was considered significant.

RESULTS

Nineteen consecutive patients with slow-fast AVNRT (12 female, 7 male) were ablated. Mean admission hemoglobin and hematocrit (%) levels were significantly increased in male patients as compared with female patients (15.38 ± 1.21 mg/dL, 12.72 ± 1.36 mg/dL, $p< 0.001$; 45.41 ± 3.26, 37.90 ± 2.88, $p< 0.001$ respectively) (Table I). All patients had normal left ventricular function (ejection fraction > 50%), without evidence of underlying structural heart disease. In all patients, AVNRT was induced during EPS. RFA successfully eliminated tachyarrhythmia in 19 (100%) patients. No patient presented with atrioventricular block of any degree. There was not gender differences in the radiation exposure time, fluoroscopy time, complication rate (0%) and acute success rate (100%) (Table I).

DISCUSSION

Current study showed no gender differences in the radiation exposure time, fluoroscopy time, complication rate and acute success rate like as previous studies[7,8]. Dagres et al. showed that fluoroscopy time, radiofrequency applications, and procedure duration were similar in male and female patients undergoing accessory pathway ablation as well as in male and female patients undergoing AVNRT ablation[8]. The gender differences of atrioventricular nodal properties may be associated with the gender difference in the autonomic tone. Liu et al. demonstrated that the average heart rate of female was faster than male[9]. Gender differences in the heart rate variability, is a marker of autonomic tone and that heart rate turbulence may be a marker of baroreceptor sensitivity, and baroreceptor sensitivity have been also reported[10]. The gonadal hormones and low hemoglobin levels may induce arrhythmias especially

Table 1. Comparing the age, procedural parameters and hematologic findings between female and male

	Female (n= 12) (Median, Min/Max)	Male (n= 7) (Median, Min/Max)	
Age (years)	46.0 ± 14.4	50.8 ± 13.5	0.59
Radiation exposure time (min)	15.83 ± 5.71	15.07 ± 6.09	0.96
Fluoroscopy time (sec)	98.75 ± 76.45	73.71 ± 82.93	0.06
Hemoglobin (g/dL)	12.72 ± 1.36	15.38 ± 1.21	**< 0.001**
Hematocrit (%)	37.90 ± 2.88	45.41 ± 3.26	**< 0.001**
Leukocytes (/uL)	6693.30 ± 1.60	7398.60 ± 1.59	0.29
Platelets (/uL)	258416.70 ± 34.69	230714.30 ± 39.27	0.26

female patients, as in our study. Rosano et al. showed that a greater number of episodes of supraventricular tachycardias began at the time of lower plasma levels of 17β estradiol and higher levels of progesterone[11]. The acute administration of 17β estradiol in menopausal women affected the right atrial electrical conduction, increased the intraatrial conduction time, and intranodal conduction time[12]. Also, catecholamine concentrations during the luteal phase may facilitate the occurrence of supraventricular tachycardias[13].

Low hemoglobin levels has been shown to be an important factor in increasing cardiac output to maintain adequate oxygen supply to the tissues[14]. When hemoglobin concentration decreases, body may increase cardiac output to maintain the normal metabolic demands of tissues, which increases cardiac work, and result in tachycardiaand may trigger AVNRT via atrial ectopic beats[15].

In conclusion, there was not gender differences in the radiation exposure time, fluoroscopy time, complication rate and acute success rate at the transvenous radiofrequency ablation therapy for the treatment of AVNRT.

CONFLICT of INTEREST

None declared.

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