

Clinical characteristics of the patients presented with supraventricular tachycardia in southeast Anatolian region of Turkey

Güneydoğu Anadolu Bölgesinde supraventriküler taşikardi ile başvuran hastaların klinik özellikleri

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ABSTRACT

Objective: In this study, we aimed to evaluate the characteristic of patients with supraventricular tachycardia for proper diagnosis and treatment in Southeast Anatolian region.

Methods: The study was has a retrospective cross-sectional design. One hundred eighty-seven consecutive patients who underwent catheter ablation of SVT between June 2012 and April 2014 at the Dicle University Heart Hospital were included in the study. In those patients, in whom the arrhythmia substrate was identified, ablation therapy was carried out using radiofrequency (RF) energy.

Results: Among SVTs 119 (63.6%) patients had atrioventricular nodal re-entry tachycardia (AVNRT), 20 (10.7%) patients had concealed atrioventricular re-entry tachycardia (AVRT), 40 (21.4%) patients had Wolf Parkinson White (WPW) syndrome, and 8 (4.3%) patients had atrial tachycardia. RF ablation was applied on 184 patients. Overall RF ablation success rate was 96.2%. Overall recurrence was 8 (4%) of 187 patients during the follow-up period 12 ± 6 (1-23) months. The recurrence was 4 (3.4%) of 119 patients in AVNRT, 2(5%) of 40 patients in WPW syndrome and 2 (10%) of 20 patients in concealed AVRT. There was no statistically significant difference between groups in terms of recurrence. Two patients having AVNRT ablation died due to acute coronary syndrome in clinical follow-up.

Conclusion: The acute and long-term success rates of SVT ablation were in accordance with literature. The other characteristics of SVT were similar with the current data.

Key words: Supraventricular tachycardia, radiofrequency energy, ablation

ÖZET

Amaç: Bu çalışmamızın amacı Güneydoğu Anadolu bölgesinde supraventriküler taşikardilerin (SVT) tanısı ve tedavisinin klinik özelliklerinin değerlendirilmesidir.

Yöntemler: Çalışma retrospektif olarak yapıldı. Haziran 2012 ve Nisan 2014 süresinde, Dicle Üniversitesi Kalp Hastanesinde ablasyon tedavisi amacıyla kateter ablasyon laboratuvarına alınan ardışık 187 hasta çalışmaya dahil edildi. Aritmi ayırıcı tanısı yapıldıktan sonra aritmi odağı radyofrekans (RF) yöntemi ile ablasyon yapıldı.

Bulgular: Supraventriküler taşikardili hastaların 119'u (%63,6) atriyoventriküler (AV) nodal reentran taşikardi (AVNRT), 20'si (%10,7) gizli AV reentran taşikardi (AVRT), 40'ı (%21,4) Wolf-Parkinson-White (WPW) sendromu ve 8'i (%4,3) atriyal taşikardi olarak saptandı. Yüz seksen dört hastaya RF ablasyon tedavisi uygulandı. Genel olarak RF ablasyon başarısı % 96,2 idi. Genel olarak 12 ± 6 (1-23 ay) aylık sürede 8 (%4) hastada nüks gelişti. Nüks gelişen hastaların 4 (%3,4)'ü AVNRT, 2 (%5)'si WPW sendromu ve 2 (%10)' si gizli AVRT olduğu saptandı. Gruplar arasında nüks açısından istatistiksel olarak fark yoktu. Takiplerde AVNRT ablasyonu yapılmış olan 2 hasta akut koroner sendrom nedeniyle öldüğü saptandı.

Sonuç: Supraventriküler taşikardili hastaların özellikleri literatür bilgileri ile benzerlik göstermektedir ve kliniğimizde SVT hastalarının tanısı ve tedavisi literatür ile uyumlu olarak başarılı bir şekilde yapılmaktadır.

Anahtar kelimeler: Supraventriküler taşikardi, radyofrekans enerjisi, ablasyon

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INTRODUCTION

The term supraventricular tachycardia (SVT) includes many tachycardias in which atrial or atrioventricular (AV) nodal tissue are essential for sustaining the arrhythmia. SVTs usually manifest themselves as recurrent palpitations, can seriously impair quality of life, and often prompt visits to primary care doctors and acute medical units [1]. So, proper diagnosis and treatment is essential in the management of the disease. In this study, we aimed to evaluate the characteristic of patients with SVT for proper diagnosis and treatment in Southeast Anatolian region.

METHODS

The study was has a retrospective cross-sectional design. One hundred eighty-seven consecutive patients who underwent catheter ablation of SVT between June 2012 and April 2014 at the Dicle University Heart Hospital were included in the study. All participants gave an informed consent and the study was approved by local ethics committee. Patient information regarding indication, procedural details and possible complications of the ablation procedure was provided during an outpatient visit at our institution or at the referring institution prior to the planned procedure. All patients were taken to the electrophysiology laboratory in the non-sedated state and underwent an initial diagnostic study using three diagnostic catheters. In those patients, in whom the arrhythmia substrate was identified, ablation therapy was carried out using radiofrequency (RF) energy. Five thousand IU of heparin were administered intravenously in all patients following the ablation procedure. Procedural success was defined as non-inducibility of the tachycardia after ablation, including atropine challenge in patients in whom a tachycardia had been induced after cholinergic inhibition before the ablation. All patients in the outpatient group spent a minimum of twelve hours following the ablation in a post procedure recovery room prior to their discharge. In all patients a pre-discharge electrocardiography (ECG) was recorded to confirm sinus rhythm, to exclude procedure-related bundle branch block or AV block as well as persisting block in case of an accessory pathway with antegrade conduction. Echocardiography was routinely performed after ablation pro-

cedure for detection of pericardial effusion. Patients who underwent ablation were given acetylsalicylic acid 100 mg / day for a month after the ablation.

All patients underwent clinical follow-up four to twelve weeks after the ablation procedure at our outpatient clinic. This follow-up visit included a 12-lead ECG in all patients and holter in patients with persisting symptoms. We tried to reach all of patients through the phone calling for knowing last status in April 2014.

Statistical Analysis

Continuous variables are presented as mean \pm standard deviation. Categorical variables are expressed as number and percentage and compared using a Chi-square (χ^2) or Fisher's exact test as appropriate. Procedural outcomes, complications, were assessed according to one patient group treatment. Continuous variables between groups were compared using an unpaired Student's t-test or the Mann-Whitney U test for not normally distributed variables. Variance analysis was performed with Kruskal-Wallis test. Statistical analyses were performed using SPSS 15.0 (SPSS Inc, Chicago, Illinois). A p value less than 0.05 was considered significant. The study was conducted in accordance with the regulations of the institutional ethics committee.

RESULTS

The study population consisted of 187 SVT patients. The basic clinical characteristics of the study population are shown in Table 1. More than 93% of the patients had symptoms persisting for more than a year and more than 85% of those were suffering at least 2 episodes per month. Overall, 82% of the patients were on at least 1 antiarrhythmic agent which were beta blockers and calcium channel blockers commonly, five patients were on propafenone. The basic electrophysiological characteristics of the study group are shown in Table 2.

Among SVTs 119 (63.6%) patients had AV nodal re-entry tachycardia (AVNRT), 20 (10.7%) patients had concealed AV re-entry tachycardia (AVRT), 40 (21.4%) patients had Wolf Parkinson White (WPW) syndrome, and 8 (4.3%) patients had atrial tachycardia (AT). RF ablation was applied on 184 patients. RF ablation was not applied to 2 patients with AT and 1 patient with intermittent WPW

syndrome. We combined the WPW syndrome and concealed AVRT as AVRT. AVNRT, AVRT and AT were compared. The comparison for the three groups are shown in Table 3. We found that AVRT was younger than the AVNRT and AT (34 ± 14 , 47 ± 16 , 54 ± 12 , $p < 0.001$, respectively). We found that RF duration of AVNRT was lower than the AVRT and AT (116 ± 74 ms, 182 ± 95 ms, 268 ± 94 ms, $p < 0.001$ respectively). We found that fluoroscopy duration of AVNRT was lower than the AVRT and AT (25 ± 8 ms, 35 ± 10 ms and 39 ± 12 ms, $p < 0.001$, respectively). The acute ablation success rate of AVNRT was higher than AVRT and AT (99.1%, 90%, and 88%, $p = 0.008$, respectively). The recurrence rate was not different among groups, statistically.

Overall RF ablation success rate was 96.2%. Overall recurrence was 8 (4%) of 187 patients during the follow-up period 12 ± 6 (1-23) months. The recurrence was 4 (3.4%) of 119 patients in AVNRT, 2 (5%) of 40 patients in WPW syndrome and 2 (10%) of 20 patients in concealed AVRT. There was no statistically significant difference between groups in terms of recurrence (Table 4). Transient ischemic attack was developed in one patient who had left side AVRT. She was improved two minutes later. Two patients having AVNRT ablation died due to acute coronary syndrome in clinical follow-up. In one patient gunshot caused acute coronary syndrome four month later ablation and the other patient developed acute coronary syndrome one month later ablation.

Table 1. Basic clinical characteristics of the study group (n=187)

Age, year	42.9±16.2
Female (%)	63
Smoking (%)	8.6
Hypertension (%)	12.8
Diabetes mellitus (%)	7
Coronary artery disease (%)	9.1
Duration of symptoms (year, median)	4.5
An electrocardiography showing tachycardia (%)	85
Symptom frequency (number of episodes/month, median)	2
Ejection fraction (%)	61±6

Table 2. Basic electrophysiological characteristics of the study group (n=187)

AVNRT (%)	63.6
Concealed AVRT (%)	10.7
WPW syndrome (%)	21.4
Atrial Tachycardia (%)	4.3
Basal PR interval (ms)	145±36
Basal AH interval (ms)	69±29
Basal HV interval (ms)	35±11
Tachycardia cycle length (ms)	307±44
RF duration (ms)	143±91
Number of RF (median)	4
Fluoroscopy duration (min)	29±10
PR duration after ablation (ms)	145±36
Ablation success (%)	96.2

Abbreviation: AVNRT; atrioventricular nodal re-entry tachycardia, AVRT; atrioventricular re-entry tachycardia, RF; radiofrequency, WPW; Wolf Parkinson White

Table 3. The comparison for the three groups

	AVNRT (n=119)	AVRT (n=60)	Atrial tachycardia (n=8)	p
Age (year)	47±16	34±14	54±12	<0.001 ^a
Female (%)	60	65	62	0.89
Tachycardia cycle length (ms)	312±40	298±51	296±44	<0.001 ^b
RF duration (ms)	116±74	182±95	268±94	<0.001 ^c
Fluoroscopy duration (min)	25±8	35±10	39±12	<0.001 ^d
Ablation success (%)	99.1	90	88	0.008 ^e
Recurrence (%)	3.3	6.6	0	0.55

p^a (Age; AVNRT-AVRT; $p < 0.001$, AVNRT-AT; $p = 0.14$, AVRT-AT; $p = 0.001$); **p^b** (RF duration; AVNRT-AVRT; $p < 0.001$, AVNRT-AT; $p < 0.0001$, AVRT-AT; $p = 0.026$); **p^c** (Fluoroscopy duration; AVNRT-AVRT; $p < 0.001$, AVNRT-AT; $p < 0.001$, AVRT-AT; $p = 0.43$); **p^d** (TCL; AVNRT-AVRT; $p = 0.001$, AVNRT-AT; $p = 0.07$, AVRT-AT; $p = 0.63$)

Abbreviation: AVNRT; atrioventricular nodal re-entry tachycardia, AVRT; atrioventricular re-entry tachycardia, RF; radiofrequency, WPW; Wolf Parkinson White

Table 4. The comparison of groups with and without recurrence

	Recurrence (-) (n=179)	Recurrence (+) (n=8)	p
Age (year)	43±16	39±16	0.42
Female (%)	63	50	0.47
Basal PR interval (ms)	145±35	135±45	0.48
Basal AH interval (ms)	68.4±9.4	72±14	0.41
Basal HV interval (ms)	36±11	33±12	0.39
Tachycardia cycle length (ms)	308±45	283±11	0.057
RF duration (ms)	144±92	126±64	0.81
Fluoroscopy duration (min)	29±10	27±4	0.75
PR duration after ablation (ms)	167±17	174±14	0.22

RF: Radiofrequency

DISCUSSION

We found that overall RF ablation success rate was 96.2% and overall recurrence rate was 4% (n=8) during a mean follow-up period 12 months in patients with SVT. Only one patient complicated with TIA whom left side AVRT ablation was performed.

The term SVT is generally used to refer to AVNRT, AVRT, and AT. People of all ages, either sex, and any ethnicity can develop SVT. Variability in prevalence exists among the different SVT mechanisms. Based on a study of 1754 patients undergoing catheter ablation of 1856 SVTs (excluding atrial fibrillation, atrial flutter, and inappropriate sinus tachycardia) between 1991 and 2003, Porter et al found AVNRT as the predominant SVT mechanism (56%), followed by AVRT (27%), and AT (17%) [2]. Similar to this data we found AVNRT (64%) as the most common type of SVT. A higher proportion of AVNRT cases occur in women, and AVRT is more likely to affect men [3]. In our study, both AVNRT and AVRT were common in woman. That was probably due to the impassivity of men, as men traditionally do not care their health problems in this region.

Common symptoms include palpitations, chest pain, anxiety, lightheadedness, pounding in the neck, shortness of breath, and uncommonly syncope [4]. Sudden onset and offset of palpitations is typical for a re-entrant arrhythmia, while for sinus tachycardia onset and offset is usually gradual. Patients with AVNRT or AVRT may be able to termi-

nate palpitations with vagal maneuvers such as the Valsalva maneuver, breath holding, or coughing. In a patient with tachycardia, prominent jugular venous A waves caused by atrial contraction against the closed tricuspid valve may be seen [5]. In our study, the most common symptom was palpitation. This was rarely accompanied by others symptoms such as chest pain, shortness of breath, anxiety, lightheadedness and syncope.

In general, improvement of quality of life is the major therapeutic goal for SVTs, and treatment strategies are selected according to symptoms and patient preference. Patients troubled by recurrent symptomatic episodes are offered treatment; options include drug therapy or catheter ablation. Patients can learn Valsalva maneuvers and some find this helpful in controlling their symptoms. There is no large scale randomized studies comparing these treatments. However, data from prospective non-randomized studies suggest that catheter ablation results in a greater reduction in symptoms and higher quality of life scores compared with medical treatment [6-8]. In our study, catheter ablation results in a greater reduction in symptoms of patients.

Patients with pre-excitation (delta wave on ECG) warrant special consideration. Such patients are at risk of sudden cardiac death from ventricular fibrillation induced by rapidly conducted atrial fibrillation. The findings from a recent meta-analysis suggest that in patients who do not have palpitations, this risk seems to be relatively low (1.25 per 1000 person years, 95% confidence interval 0.57 to

2.19 per 1000 person years) [9]. Symptoms of palpitations appear to be associated with an increased risk of ventricular fibrillation [10]. In general drug treatment is reserved for minimizing symptoms while awaiting catheter ablation or for long term management of patients who decline catheter ablation or in whom the procedure carries an unacceptably high risk. Drug treatment may be effective in reducing the frequency of symptoms but complete suppression is uncommon [11]. In our study, acute success rate was similar with literature.

In AVNRT, the slow pathway is targeted with the aim of modifying conduction so that re-entrant tachycardia can no longer be sustained. Both acute and long term success rates for this procedure are high. In a large observational study acute success was achieved in 98% of cases [12]. A meta-analysis of 10 observational studies comprising 1204 patients reported a 4.3% recurrence rate [13]. Serious complications are uncommon, the most serious being AV block requiring pacemaker therapy (affecting 1% of patients in early series) [12,14,15]. In our study, the acute and long success rate were similar with literature. AVRT is also amenable to catheter ablation. Observational studies and registries have observed acute success rates of more than 95% and recurrence rates less than 5% [14,16]. In our study, the acute and long success rate were similar with literature. Atrioventricular block is a risk in cases where the accessory pathway is close to the AV node and His bundle; however, use of cryothermal energy may reduce this risk [17]. Other complications are reported to occur in less than 2-3% of patients including vascular injury, bleeding, venous thrombosis, pulmonary embolism, myocardial perforation, systemic embolism (in the case of a left sided accessory pathway), and rarely, death (0-0.2%) [14].

Focal AT can also be successfully treated with catheter ablation, although randomized control trials are lacking, and evidence is limited to small observational studies. Acute success rates of 85% with recurrence rates of 8% have been reported [18-20]. In our study, acute success rate was 88% and no recurrence was observed in clinical follow-up.

In conclusion, acute and long term success rates of SVT ablation were in accordance with literature. The other characteristics of SVT were similar to the current data.

REFERENCES

1. Walfridsson U, Strömberg A, Janzon M, Walfridsson H. Wolff-Parkinson-White syndrome and atrioventricular nodal re-entry tachycardia in a Swedish population: consequences on health-related quality of life. *Pacing Clin Electrophysiol* 2009;32:1299-1306.
2. Porter MJ, Morton JB, Denman R, et al. Influence of age and gender on the mechanism of supraventricular tachycardia. *Heart Rhythm* 2004;1:393-396.
3. Tada H, Oral H, Greenstein R, et al. Analysis of age of onset of accessory pathway-mediated tachycardia in men and women. *Am J Cardiol* 2002;89:470-471.
4. Delacretaz E. Supraventricular tachycardia. *N Engl J Med* 2006;354:1039-1051.
5. Gursoy S, Steurer G, Brugada J, et al. The hemodynamic mechanism of pounding in the neck in atrioventricular nodal reentrant tachycardia. *N Engl J Med* 1992;327:772-774.
6. Bathina MN, Mickelsen S, Brooks C, et al. Radiofrequency catheter ablation versus medical therapy for initial treatment of supraventricular tachycardia and its impact on quality of life and healthcare costs. *Am J Cardiol* 1998;82:589-593.
7. Goldberg AS, Bathina MN, Mickelsen S, et al. Long-term outcomes on quality-of-life and health care costs in patients with supraventricular tachycardia (radiofrequency catheter ablation versus medical therapy). *Am J Cardiol* 2002;89:1120-1123.
8. Tanboğa IH, Kurt M, Işık T, et al. Catheter ablation treatment of atrioventricular nodal re-entrant tachycardia. *Dicle Med J* 2012;39:166-173.
9. Obeyesekere MN, Leong-Sit P, Massel D, et al. Risk of arrhythmia and sudden death in patients with asymptomatic preexcitation: a meta-analysis. *Circulation* 2012;125:2308-2315.
10. Klein GJ, Bashore TM, Sellers TD, et al. Ventricular-fibrillation in the Wolff-Parkinson-White Syndrome. *N Engl J Med* 1979;301:1080-1085.
11. Winniford MD, Fulton KL, Hillis LD. Long-term therapy of paroxysmal supraventricular tachycardia: a randomized, double-blind comparison of digoxin, propranolol and verapamil. *Am J Cardiol* 1984;54:1138-1139.
12. Feldman A, Voskoboinik A, Kumar S, et al. Predictors of acute and long-term success of slow pathway ablation for atrioventricular nodal reentrant tachycardia: a single center series of 1,419 consecutive patients. *Pacing Clin Electrophysiol* 2011;34:927-933.
13. Stern JD, Rolnitzky L, Goldberg JD, et al. Meta-analysis to assess the appropriate endpoint for slow pathway ablation of atrioventricular nodal reentrant tachycardia. *Pacing Clin Electrophysiol* 2011;34:269-277.
14. Scheinman MM, Huang S. The 1998 NASPE prospective catheter ablation registry. *Pacing Clin Electrophysiol* 2000;23:1020-1028.
15. Ganz LI, Friedman PL. Supraventricular tachycardia. *N Engl J Med* 1995;332:162-173.
16. Calkins H, Yong P, Miller JM, et al. Catheter ablation of accessory pathways, atrioventricular nodal reentrant tachycardia.

- cardia, and the atrioventricular junction: final results of a prospective, multicenter clinical trial. The Atakr Multicenter Investigators Group. *Circulation* 1999;99:262-270.
17. Friedman PL, Dubuc M, Green MS, et al. Catheter cryoablation of supraventricular tachycardia: results of the multicenter prospective "frosty" trial. *Heart Rhythm* 2004;1:129-138.
 18. Kay GN, Epstein AE, Dailey SM, Plumb VJ. Role of radiofrequency ablation in the management of supraventricular arrhythmias: experience in 760 consecutive patients. *J Cardiovasc Electrophysiol* 1993;4:371-389.
 19. Biviano AB, Bain W, Whang W, et al. Focal left atrial tachycardias not associated with prior catheter ablation for atrial fibrillation: clinical and electrophysiological characteristics. *Pacing Clin Electrophysiol* 2012;35:17-27.
 20. Lesh MD, van Hare GF, Epstein LM, et al. Radiofrequency catheter ablation of atrial arrhythmias. Results and mechanisms. *Circulation* 1994;89:1074-1089.