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Original Article

Features of symptomatic supraventricular tachycardia in northeast China residents

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Abstract: Objective: To determine the features of supraventricular tachycardia (SVT) by examining cases from two main medical centers in the Heilongjiang province of northeastern China. Methods: A total of 1677 consecutive SVT patients diagnosed by electrocardiography at the Second and Fourth Affiliated Hospitals of Harbin Medical University between January 2009 and January 2012 were included in the study. Results: The SVT healing rate was 96%. Electrophysiology confirmed 550 patients with atrioventricular nodal re-entrant tachycardia (AVNRT, 33%) and 1076 patients with atrioventricular re-entrant tachycardia (AVRT, 64%). The patients underwent subsequent radiofrequency catheter ablation (RFCA). The RFCA success rate was 98.9% and 99.1% in the AVNRT and AVRT groups, respectively. AVRT patients were younger than AVNRT patients (41.6±15.7 years vs. 46.9±14.7 years). Women with AVNRT had a higher morbidity rate than men (61% vs. 39%), while men with AVRT had a higher morbidity rate than women (55% vs. 45%). Of AVRT and AVNRT patients, 98% and 97.3% were of Han nationality, respectively, which was not statistically significant compared with the local Han population. Conclusion: Nearly two-thirds of the residents in northeastern of China with SVT had AVRT. The morbidity rates for different types of SVT differed statistically with respect to age and gender. The majority of patients with SVT (96%) can be cured by RFCA.

Keywords: Supraventricular tachycardia, atrioventricular nodal re-entrant tachycardia, atrioventricular re-entrant tachycardia, electrophysiologic study, radiofrequency catheter ablation

Introduction

Catheter ablation is a viable treatment option for arrhythmias [1-6]. Radiofrequency catheter ablation (RFCA) is now well-established as the treatment of choice for patients with symptomatic supraventricular tachycardia (SVT). The choice of catheter ablation in the treatment of arrhythmias is based on a number of factors, including, age, co-morbidities, patient preference, contraindications to anticoagulation, and left atrial dimension/fibrosis, and the success following ablation depends on similar factors [7].

To study the current composition and characteristics of SVT in the residents of the Heilongjiang province in northern China, we reviewed the medical records of patients with arrhythmias referred for catheter ablation at the two main medical centers of Harbin Medical University.

Material and methods

The study was comprised of patients who were referred to these two institutions for electrophysiologic studies and RFCA of SVT between January 2009 and January 2011. The patients ranged in age from 3-85 years. All anti-arrhythmic medications were discontinued ≥ 5.5 h before the procedure. For electrophysiologic studies, a 6 Fr deflectable decapolar catheter with a 2-mm inter-electrode distance and 5-mm spacing between each electrode pair was inserted into the coronary sinus through the subclavian or axillary vein. The position of the proximal electrode pair at the ostium of the coronary sinus was confirmed using contrast. An 8 Fr sheath placed in the femoral vein or a 7

Table 1. Success rates of patients who underwent EPS and RFCA for different types of SVT

Arrhythmia	Total		Male		Female		Fail	Success	Success %
	N	%	N	%	N	%			
RF for AVRT	1076	64%	589	55%	487	45%	10	1066	99.1%
RF for AVNRT	550	33%	213	39%	337	61%	6	544	98.9%
EPS only	51	3%	33	65%	18	35%	51	0	0%
Total	1677	100%	835	50%	842	50%	67	1610	96 %

F: fail; S: success; S %: success rate.

Table 2. Age distribution of patients who received RFCA

Age	AVNRT		AVRT	
	n	%	n	%
0-9	1	0.2%	19	1.8%
10-19	34	6.3%	107	10%
20-29	48	8.8%	105	9.8%
30-39	61	11%	221	20.6%
40-49	129	23.5%	275	25.5%
50-59	182	33.1%	219	20.4%
60-69	72	13.1%	97	9.1%
70-79	21	3.8%	30	2.8%
80-89	1	0.2%	2	0.2%
Total	550		1076	
Mean	46.9±14.7		41.6±15.7	

Fr sheath placed in the femoral artery was used to introduce the ablation catheter. Two multipolar, deflectable-tipped, closely-spaced (2 mm) electrode catheters were positioned in the bundle of His area of the right ventricle through the femoral vein. Rapid right ventricular stimulation and right atrial extra-stimuli were used for induction and termination of arrhythmias, and repeated 2-4 times to ensure the reproducibility of the responses.

RFCA was not attempted in patients in whom SVT was not induced in the electrophysiologic study. Patients who were diagnosed with atrioventricular nodal re-entrant tachycardia (AVNRT) or atrioventricular re-entrant tachycardia (AVRT) by an electrophysiologic study underwent RFCA. Catheter ablation (30-50 W, 55-60°C, 120-180 sec) was performed using a 4-mm electrode-tipped, non-irrigated ablation catheter connected to radio frequency equipment (Stockert EP Shuttle; Biosense Webster,.

AVRT of left-sided origin was ablated in some patients using a trans-septal technique. Following catheter ablation, the same stimulation protocol that was used to induce arrhythmias before ablation was performed once again to ensure that tachycardia was not inducible. Successful catheter ablation was defined as the inability to re-induce tachycardia. Following discharge from the hospital, patients were followed-up periodically in the outpatient clinic. Long-term clinical efficacy was assessed based on an electrocardiogram at rest, 24-h monitoring, and clinical symptoms.

Continuous data are expressed as the mean ± SD. Comparisons of parametric data were performed using Student's *t*-test, and comparisons of non-parametric data were performed using a chi-square test with Yates correction or the Fisher's exact test.

Results

Of the 1677 patients enrolled in the study, 51 (3%) failed to develop SVT during the electrophysiologic examination. Of patients in whom SVT was induced and localized, 550 had AVNRT (33%) and 1076 had AVRT (64%) and underwent RFCA. Sixteen patients failed SVT ablation, with a success rate of 99.1% and 98.9% in the AVRT and AVNRT groups, respectively. The total success rate for SVT was 96%, with complications in 0.5% of patients, including pneumothoraces (5 patients), cardiac tamponade (3 patients), and femoral artery hematomas (2 patients; **Table 1**).

There were more female than male patients with AVNRT (61% vs. 39%), while there were more male than female patients with AVRT (55% vs. 45%; **Table 1**). AVNRT patients were younger than AVRT patients (46.9±14.7 years vs. 41.6±15.7 years; **Table 2**; **Figures 1**-**3**). Of AVRT and AVNRT patients, 98% and 97.3% were of Han nationality, respectively, which was not statistically different compared with the local Han population (**Table 3**).

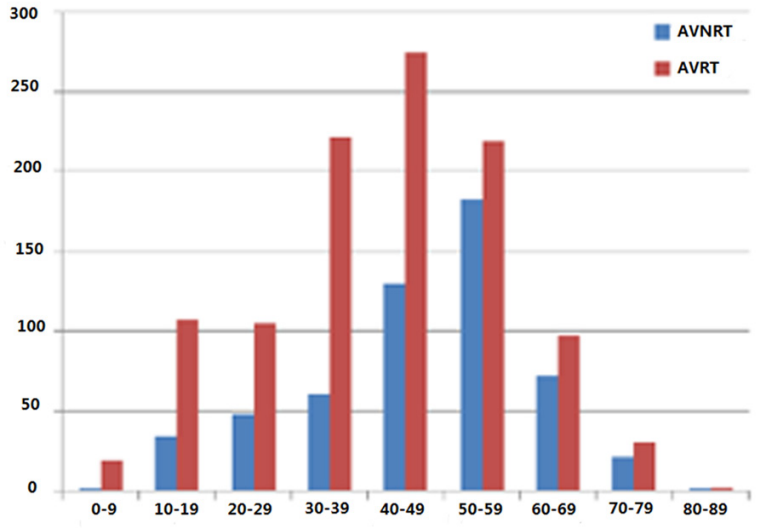

Figure 1. Age distribution of patients who underwent RFCA.

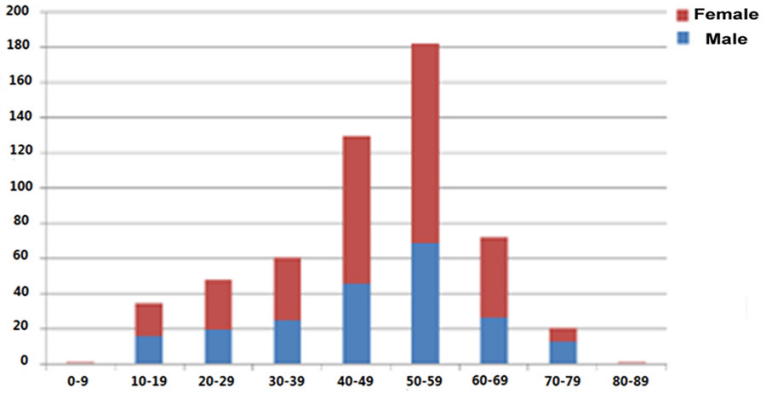

Figure 2. Age and gender distribution of patients with AVNRT.

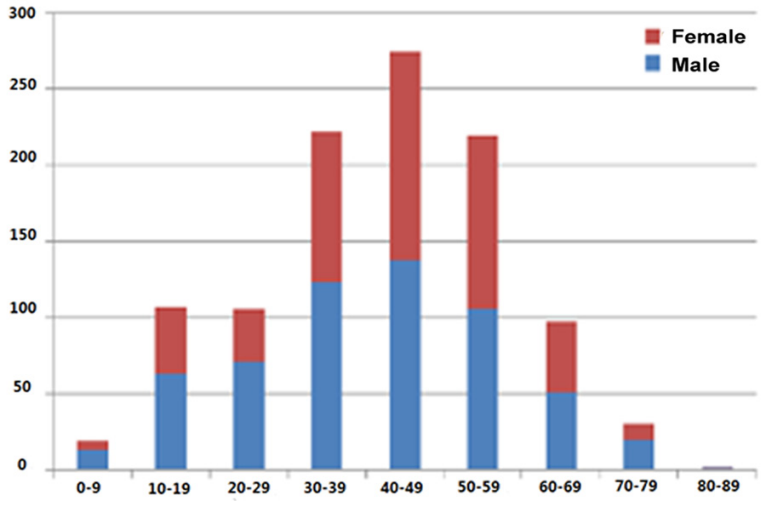

Figure 3. Age and gender distribution of patients with AVRT.

Discussion

Catheter ablation therapy should be offered to all patients with symptomatic SVT as a long-term management option barring standard contraindications [12]. Given the high success rates and favorable safety profiles of diagnostic electrophysiologic studies followed by an attempt at catheter ablation, many patients choose this option early in the course of their treatment. Catheter ablation as a treatment for SVT was first used in the mid-1980s, in which 2-10 sequential direct current shocks of 300-400 J were delivered to the heart to disrupt the myocardial tissue [8, 9, 12, 13]. In general, guidelines recommend ablation for patients with recurrent SVT despite treatment or poorly-tolerated SVT, although recommendations vary based on the category of SVT and known success rates.

Fortunately, given the usual manifestation of arrhythmias in early-to-middle adulthood, most patients have few comorbidities, including structural heart disease. Ablative therapy is by far more successful in controlling symptoms and improving quality of life than current pharmacologic therapy. This is the largest study describing different types of RFCA among residents of northeast China.

Heilongjiang province lies in the northern part of China, where the Han people make up 96.4% of the population. Of AVRT and AVNRT patients, 98% and 97.3% were of Han nationality, respectively, which was not statistically differ-

Table 3. Nationality of the patients who received RFCA

	Total	Han people		Other people		u	*P*
		n	%	n	%		
AVRT	1076	1054	98%	22	2%	1.95	>0.05
AVNRT	550	535	97.3%	15	2.7%	1.08	>0.05
Local people			96.4%		3.6%		

ent compared with the local Han population. Thus, the Han people in northeast China do not have a significant preponderance for SVT compared to the general Han population. As demonstrated in earlier studies, AVNRT had 2:1 female preponderance in the current study. Women had a higher preponderance for arrhythmias of the AVNRT type. Jackman et al. [10, 14, 15] reported that women are affected by AVNRT twice as frequently as men. In our study, the percentage of males with AVNRT was 39%, while the percentage of females was 61%, which was similar to earlier studies. Males appear to be more easily affected by AVRT than women (55% vs. 45% P=0.005).

In this retrospective study from two main medical centers of Harbin Medical University in the Heilongjiang province in northern China, an arrhythmic attack could not be induced in 3% of SVT patients with notable symptoms and electrocardiographic confirmation. Thus, the target area of catheter ablation could not be located. This remains the main obstacle for physicians in improving the success rate of RFCA in patients with SVT. The current study revealed that RFCA is highly successful in most symptomatic SVT patients with a very low incidence of serious complications; however, one of the shortcomings of the current study was that patient follow-up was only 24 h and the long-term outcome of RFCA for SVT should be explored in future studies. The 2003 consensus guidelines for SVT management strongly endorsed RFCA over anti-arrhythmic medications for the long-term management of arrhythmias [11]. In general, RFCA is recommended as a class I intervention for nearly all categories of patients with SVT; the only exceptions are patients who do not desire ablation after discussing the risks and benefits of the procedure, and patients with asymptomatic pre-excitation on electrocardiography. Therefore, we conclude that RFCA, as a long-term therapy for SVT, is safe and effective in residents of China.

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Disclosure of conflict of interest

None.

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