

Frequency of Atrioventricular Nodal Reentrant Tachycardia and Atrioventricular Reciprocating Tachycardia in patients with Paroxysmal Supraventricular Tachycardia

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ABSTRACT

Objective: To evaluate the frequencies of atrioventricular nodal reentrant tachycardia (AVNRT) and atrioventricular reciprocating tachycardia (AVRT) on electrophysiological studies in patients presenting with paroxysmal supraventricular tachycardia (PSVT) on 12 lead surface ECG.

Patients and method: We performed a cross sectional study of 88 patients from June 28, 2011 to January 22, 2012 presenting in electrophysiology department with a diagnosis of PSVT on surface ECG. All patients underwent electrophysiological studies after necessary investigations and their type of arrhythmia were noted. Frequency of AVNRT and AVRT was confirmed after electrophysiological studies. Other less common types of PSVT and subtypes of AVRT and AVNRT on electrophysiology were also noted.

Results: A total of 88 patients with a diagnosis of PSVT on surface ECG were analyzed. Of these, 87 (98.9%) patients had palpitation while 1(1.1%) patient had syncope at the time of presentation. Overall, AVNRT was the predominant mechanism 47(53%), followed by AVRT 40(45%) and Atrial Tachycardia (AT) 1(1%). Among AVNRT, 46(97.9%) patients had slow/fast type of AVNRT while 1(2.1%) Patient had fast/slow type of AVNRT. While on the other hand all patients 40 (100%) had Orthodromic type of AVRT. There was a strong relationship between age and PSVT mechanism; the proportion of AVRT in both sexes decreases with age, whereas proportion of AVNRT increases as the age advances.

Conclusions: AVNRT is more frequent mechanism of tachycardia as compared to AVRT in patients with PSVT.

Keywords: Paroxysmal Supraventricular tachycardia (PSVT), Atrioventricular nodal reentrant tachycardia (AVNRT), Atrioventricular reciprocating tachycardia (AVRT)

INTRODUCTION

PSVT is a common arrhythmia seen in critical care settings of which AVNRT and AVRT are among the most common types^{1,2,3,4}. The AVNRT comprise approximately two thirds of cases of PSVT. AVNRT can present at any age; however its frequency increases with increase in age. It is a micro reentrant tachycardia that utilizes the AV node and, usually, perinodal atrial tissue. It requires dual conduction physiology in the AV node; a so-called fast pathway and a slow pathway^{5,6}.

AVRT is less common than AVNRT and the patients are usually younger. One main type of AVRT is Wolff-Parkinson-White (WPW) syndrome. AVRT uses two distinct pathways, the normal AV conduction system and an AV accessory pathway.

The most common variety occurs when the impulses travel down the AV node to the ventricle and up the accessory pathway. This is called orthodromic AV reentry tachycardia. The second type occurs when the accessory pathway is used in the anterograde direction to the ventricle and retrograde conduction occurs up the AV node. This is called antidromic AV reentry tachycardia^{4,7}. To differentiate between the two varieties of PSVT, electrophysiological studies are required^{1,8}.

In Pakistan in general, there are no local data available to find the frequencies of AVRT/AVNRT in patients with PSVT. It is a common practice to manage all patients with PSVT on surface ECG as AVNRT. However, since treatment options for AVRT/AVNRT are different, we can modify treatment accordingly if proper diagnosis is made.

This study will also help out in further research regarding differentiation of AVNRT and AVRT on modalities other than electrophysiological studies like ECG especially in emergency department.

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PATIENTS AND METHODS

Study population: From 28 June 2011 to 22 January 2012, a total number of 88 patients were included in this study presenting in electrophysiology department, Punjab Institute of Cardiology, Lahore with a diagnosis of PSVT on surface ECG. Patients with a subsequent diagnosis of sinus tachycardia, atrial flutter, atrial fibrillation, idiopathic ventricular tachycardia, coronary artery disease and anginal chest pain, preexisting ST-segment depression and bundle branch block were excluded from study.

Intervention: All patients of SVT, meeting the inclusion criteria underwent an electrophysiology study after necessary investigations and frequency of AVNRT and AVRT or other less common types of PSVT was noted. In case of AVNRT, further subtypes were noted whether it was typical (slow/fast) or atypical avnrt. However, if it was found to be AVRT, then it was further investigated to find orthodromic or atidromic type of AVRT.

Statistical analysis: Collected information was transferred to SPSS version 16.0 computer software programme and analyzed accordingly. Quantitative variable are presented as mean and standard deviation. Qualitative variable i.e., AVRT/AVNRT are presented as frequencies and percentages.

RESULTS

Mean age of the patients was 34.43+11.76 years. Out of 88 patients, 46(52.3%) were male and 42(47.7%) were female. All patients underwent electrophysiological studies and their type of arrhythmia was noted. Of these, 87(98.9%) patients presented with palpitation while only 1(1.1%) patient had syncope at the time of presentation. Overall, AVNRT was the predominant mechanism 47(53%), followed by AVRT 40(45%) and AT 1(1%). Among AVNRT, 46(97.9%) patients had slow/fast type of AVNRT while 1 (2.1%) Patient had fast/slow type of AVNRT. While on the other hand all patients 40(100%) had Orthodromic type of AVRT. There was a strong relationship between age and PSVT mechanism; the proportion of AVRT in both sexes decreased with age, whereas AVNRT increased.

The majority of patients with AVRT were male (24/45 [53.3%]), whereas the majority of patients with AVNRT were female (26/42 [61.9%]). The distribution of PSVT mechanism was influenced by gender. In females, 61.9% had AVNRT and 38.1% had AVRT; On the other hand in males, 46.7% had AVNRT and 53.3% had AVRT.

Table: Demographics, presenting complaints and types of PSVT

Variables	Frequency
Gender	
Male	46(52.3%)
Female	42(47.7%)
Complaint	
Palpitation	87(98.9%)
Syncope	1(1.1%)
Age	
>40 AVNRT	18(75%)
>40 AVRT	6(25%)
<40 AVRT	29(46%)
<40 AVNRT	34(54%)
PSVT	
AVNRT – Slow fast	46(97.9%)
AVNRT – Fast slow	1(2.1%)
AVNRT – Orthodromic	40(100%)
AVNRT – Antidromic	0
Atrial TC	1(1.1%)

DISCUSSION

PSVT may have a variety of electrophysiologic mechanisms, including atrial tachycardia, atrioventricular (AV) nodal reentry, and tachycardia involving an accessory AV connection. Atrial tachycardia may be reentrant or may be caused by abnormal automaticity or triggered activity. AV nodal reentry, in which the reentrant circuit is confined to the AV node or the region around the AV node, is the most common type of PSVT in adults. Orthodromic supraventricular tachycardia is the most frequently found tachycardia in patients with accessory AV connections. During orthodromic supraventricular tachycardia, antegrade conduction occurs via the AV node, and retrograde conduction occurs via an accessory AV connection. Other types of PSVT, including junctional tachycardia, are less common^{9,10,11}.

In this interventional study comparing frequency of AVNRT and AVRT in patients with PSVT, there were more male patients as compared to female patients. The main presenting complaint of patients was palpitation. The predominant mechanism was AVNRT followed by AVRT and AT. Almost all patients with AVNRT had slow/fast or typical AVNRT and all AVRT patients had Orthodromic type of AVRT. AVRT was predominant mechanism in males while AVNRT was predominant mechanism in females. In accordance with previous studies it was found that AVNRT is the most frequently found mechanism of arrhythmia in patients with PSVT followed by AVRT and AT respectively. The results of

our study are comparable with the study conducted by Erdinler I et al for differentiation of narrow QRS complex tachycardia types using 12 lead ECG¹². In this study 120 patients with narrow QRS complex tachycardia on surface ECG underwent EP studies. It was found that 70(58%) patients were having AVNRT while 40(34%) and 10(8%) were having AVRT and AT respectively as a mechanism of their tachycardia.

A recent study conducted by Braunschweig F et al in 2011 also demonstrated more no of AVNRT as compared to AVRT and AT¹³. This study was conducted on 318 patients (age 45±17 years, 58% female) with PSVT and AV nodal reentrant tachycardia (AVNRT), AV reciprocating tachycardia through a concealed accessory pathway (AVRT), and Atrial tachycardia (AT) were found in 213(67%), 95(30%), and 10(3%) cases, respectively. Frequency of AVNRT was higher than our study in this study and it was mainly due to predominance of AVNRT in female patients.

The rationale of the present study is to find the frequencies of AVRT/AVNRT in patients with PSVT as there is no local data available so far. This study will help out in further research regarding differentiation of AVNRT and AVRT on modalities other than electrophysiological studies like ECG especially in emergency department.

CONCLUSION

Atrioventricular nodal reentrant tachycardia (AVNRT) is more frequently found mechanism of arrhythmia than Atrioventricular reciprocating tachycardia (AVRT) in patients with paroxysmal supraventricular tachycardia (PSVT).

REFERENCES

1. Zipes DP. Specific Arrhythmias . Diagnosis and Treatment. In: Braunwald E, Braunwald's heart disease: a textbook of cardiovascular medicine. 8th ed. Philadelphia: 2008; 878-89
2. Ayra A, Kottkamp H, Piorkowski C, Schirdewahn P, Tanner H, Kobza R, et al. Differentiating atrioventricular nodal reentrant tachycardia from tachycardia via concealed accessory pathway. *Am J Cardiol* 2005;95:875-8.
3. Lee PC, Huang B, Tai CT, Hseih MH, Chen YJ, Chiang CE. The electrophysiological characteristics in patients with ventricular stimulation inducible fast-slow form AVNRT. *Pacing Clin Electrophysiology* 2006; 29 :1105-11.
4. Betts T. Supraventricular arrhythmias: Investigation and Treatment. In: Hawkins V. *Medicine International Cardiovascular disorders Rheumatology* .ed06(3). Kidlington, Oxford: Medicine publishing company; 2006:259-267.
5. Drago F, Grutter G, Silvetti MS. Atrioventricular reentrant tachycardia in children. *Paediatr Cardiol* 2006; 27:454-9.
6. Letsas KP, Weber R, Siklody CH, Mihas CC, Stockinger J, Blum T, et al. Electrocardiographic differentiation of common type atrioventricular nodal reentrant tachycardia from atrioventricular reciprocating tachycardia via a concealed accessory pathway. *Acta Cardiol* 2010; 65:171-6.
7. Klein GJ, Sharma AD, Yee R, Guiraudon GM. Classification of supraventricular tachycardias. *Am J Cardiol*. Aug 31 1987;60(6):27D-31D.
8. Katritsis D, Becker A, Ellenbogen K, Giazitzoglou E, Korovesis S, Karabinos I, Camm AJ. Slow-pathway ablation in atrioventricular nodal re-entrant tachycardia modifies the electrophysiologic characteristics of the right inferior atrial input to the human atrioventricular node. *Heart Rhythm* 2005; 2:Suppl. S117-S118.
9. Kadish A, Passman R. Mechanism and management of paroxysmal supraventricular tachycardia. *Cardiol Rev* 1999; 7(5):254-64.
10. Kastritsis DG, Camm AJ .Classification and differential diagnosis of AVNRT. *Europace* 2006; 8(1):29-36.
11. Lee PC, Huang B, Tai CT, Hseih MH, Chen YJ, Chiang CE. The electrophysiological characteristics in patients with ventricular stimulation inducible fast-slow form AVNRT. *Pacing Clin Electrophysiology* 2006; 29(10): 1105-11.
12. Erdinler I, Okmen E, Oguz E et al. Differentiation of narrow complex tachycardia types using 12 lead electrocardiogram. *Ann Non-Invasive Electrocardiol* 2002; 7(2):120-6.
13. Maglana MP, Kam RM, Teo WS. The differential diagnosis of supraventricular tachycardia using clinical and electrocardiographic features. *Ann Acad Med Singapore*. 2000 Sep;29(5):653-7.