

Original Research Article

Clinical profile of patients diagnosed with supraventricular tachycardia: a descriptive study at a tertiary care hospital

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ABSTRACT

Background: Supraventricular tachycardia is a clinical syndrome characterized by a rapid tachycardia with an abrupt onset and termination. The objective of our study was to determine and assess the clinical profile, electrocardiographic and echocardiographic of patients diagnosed with supraventricular tachycardia.

Methods: This cross-sectional study was conducted in the department of general medicine, Dr DY Patil medical college and hospital, Navi Mumbai from April 2020 till October 2021, in which we included patients diagnosed with any type of supra-ventricular tachycardia and excluded hemodynamically unstable patients.

Results: In the present study, of the 45 cases, atrial fibrillation was the most common mechanism of SVT, diagnosed in 47% of the patients. Next most common was AVNRT (22%) and AVRT (18%). In addition, atrial tachycardia was diagnosed in 9% of the patients and atrial flutter was diagnosed in 4%. Mean age of the patients was 34.5 years, ranging from 13 to 68 years and 56% were males. It was observed that palpitation was the most common symptoms (91%). On ECG, no abnormalities were detected in 64%, while left ventricular hypertrophy (18%) and prolonged corrected QT (18%) were the most common abnormalities. On echocardiography, no abnormality was detected in 78% of the patients. Furthermore, 49% of the patients achieved normal sinus rhythm with a single dose of adenosine infusion and 33% of the patients required another dose of adenosine infusion.

Conclusions: Palpitation is common presentation symptom. Most of patients had good response to medication treatment especially adenosine therapy, additional treatment was required in few patients.

Keywords: Atrial fibrillation, Supraventricular tachycardia, Treatment, Echocardiography

INTRODUCTION

Supraventricular tachycardia (SVT) is a clinical phenomenon defined by a fast heartbeat that begins and ends abruptly. These arrhythmias are common in otherwise healthy persons with no structural cardiac problems. Palpitations and dyspnea are common symptoms, as is tachycardia-induced cardiomyopathy. The three most prevalent causes of SVT are atrioventricular nodal re-entrant tachycardia (AVNRT) (50-60%), atrioventricular re-entrant tachycardia (AVRT) in individuals with Wolff-Parkinson-White syndrome (25-30%), and atrial tachycardia (10%).¹ Supraventricular

tachycardia start based on a crucial atrial-His (AH) interval favours AVNRT, while atrial tachycardia and AVRT cannot be totally ruled out. The spontaneous end of supraventricular tachycardia with atrial depolarization, as well as termination with ventriculoatrial (VA) block during ventricular pacing, argues against atrial tachycardia as the explanation.² A septal VA interval of less than 70 ms excludes orthodromic AVRT as the cause of supraventricular tachycardia.³ The majority of individuals with paroxysmal SVT respond well to therapy. However, a limited minority of WPW patients are at danger of abrupt death. The prognosis of individuals with SVT caused by a structural defect in the

heart varies on the degree of the abnormality, although the prognosis of healthy persons with no structural problems is favourable. There have been a few studies of clinical features of SVT in Indian individuals. As a result, the goal of our research was to identify the clinical profile, electrocardiographic, and echocardiographic of individuals with supra-ventricular tachycardia.

METHODS

Study design and sampling

We conducted an observational cross-sectional study, in the department of general medicine, Dr DY Patil medical college and hospital, Navi Mumbai from April 2020 till October 2021. We included patients aged 12 years or more, who were diagnosed with any type of supraventricular tachycardia. Hemodynamically unstable patients were excluded from the study. The sample size was calculated using following formulae: $N = (Z_{\alpha/2})^2 * (PQ) / E^2$, where N=sample size, $Z_{\alpha/2}$ =Z value at 10% error (1.96), P=taken as 68% (Pandee et al reported that the most common presenting complaint was palpitation, observed in 68% of the patients with SVT), $Q=1-P$ and E=allowable error (taken as 15%).⁴ Thus, the minimum sample size calculated was 37.15. During the study duration, we included 45 consecutive patients fulfilling the study criteria.

Data collection and data analysis

A pre-designed semi-structured research proforma was used to gather data. The patients' demographic information was acquired from their medical records. All patients had information on their clinical presentation, prior medical history, comorbid diseases, medication history, personal history, general physical and systemic examination results, and laboratory tests (CBC, lipid profile, LFT, thyroid function for high risk). All patients had a 12-lead electrocardiogram as well as a transthoracic echocardiography. The statistical study comprised patient profile based on several demographic, laboratory, and clinical characteristics. Means and standard deviations were used to provide descriptive analysis of quantitative parameters. Ordinal data was represented as an absolute number and a percentage. All analyses were carried out using the Epi Info programme (CDC, Atlanta).

RESULTS

In the present study, of the 45 cases, atrial fibrillation was the most common mechanism of SVT, diagnosed in 47% of the patients (Table1). Mean age of the patients was 34.5 years, ranging from 13 to 68 years and 56% were males. In addition, the most common age group involved was 41 to 60 years (42%). Palpitations were the most common symptoms (91%). Next most common symptom was dizziness, experienced by 76% of the patients (Table 2). Among comorbidities, hypertension was the most common (33%). Findings of various laboratory

investigations are described in table 3. Mean TLC was 7200 ± 823 per cumm and mean ESR was 16.8 ± 3.4 mm per hour. In addition, mean CRP levels were 0.45 ± 0.17 mg/dl, mean CK-MB was 1.34 ± 0.55 ng/ml, mean troponin I was 0.028 ± 0.001 ng/ml and mean NT-proBNP level was 720.8 ± 90.4 pg/ml.

Table 1: Demographic variables of the patients included in the study.

Demography	N	%
Age groups (years)		
12 to 20	2	4
21 to 40	15	33
41 to 60	19	42
More than 60	9	20
Gender		
Male	25	56
Female	20	44

Table 2: Frequency distribution of patients according to their baseline characteristics.

Variables	N	%
Mechanism of SVT		
Atrial fibrillation	21	47
AVNRT	10	22
AVRT/WPW	8	18
Atrial tachycarida	4	9
Atrial flutter	2	4
Symptoms		
Palpitations	41	91
Dizziness	34	76
Dyspnea	20	44
Syncope	17	38
Fatigue	15	33
Chest pain	12	27
Nausea	6	13
Comorbidity		
Hypertension	15	33
Diabetes mellitus	9	20
Coronary artery disease	5	11
Valvular heart disease	4	9
Congestive heart failure	6	13
Congenital heart disease	3	7
Chronic kidney disease	1	2

Chest X-ray was found to show cardiomegaly in 38% and consolidation in 7% of the patients. On ECG, no abnormalities were detected in 64%. Abnormalities were divided as conduction delay, axis deviation, chamber enlargement and repolarization abnormality. Left axis deviation was present in 16%, LVH was diagnosed in 18% and prolonged corrected QT was found to be present in 18%. On echocardiography, no abnormality was detected in 78% of the patients. Among the rest, aortic root dilation (9%) was the most common abnormality.

Furthermore, we observed that 49% of the patients achieved normal sinus rhythm with a single dose of adenosine infusion (0.1 mg/kg).

Table 3: Frequency distribution of patients according to their investigations.

Laboratory investigations	Mean	SD
TLC (per cumm)	7200	823
ESR (mm/hour)	16.8	3.4
CRP (mg/l)	0.45	0.17
CK-MB (ng/ml)	1.34	0.55
Troponin I(ng/ml)	0.028	0.001
NT-proBNP (pg/ml)	720.8	90.4
Other investigations	N	%
Chest X-ray findings		
Normal	28	62
Cardiomegaly	17	38
Consolidation	3	7
ECG abnormalities		
Conduction delay		
Intraventricular conduction delay	3	7
Junctional bradycardia	2	4
Premature ventricular contractions	5	11
Axis deviation		
Left axis deviation	7	16
Chamber enlargement		
Atrial enlargement	3	7
LVH	8	18
RVH	4	9
Repolarization abnormality		
Prolonged corrected QT	8	18
ST wave abnormality	4	9
Echocardiography abnormalities		
Aortic root dilation	4	9
Coronary fistula to pulmonary artery	3	7
MVP	2	4
Pulmonary valve anomaly	2	4
ASD	1	2
No abnormality	33	73

It was found that 33% of the patients required another dose of adenosine infusion (0.2 to 0.3 mg/kg). The remaining patients did not respond to adenosine infusions and were thus given amiodarone (5 mg/kg) or verapamil (0.15 mg/kg) infusion to conversion to normal sinus rhythm (Figure 1).

DISCUSSION

Although the actual prevalence of SVT in children is unclear, it has been found to range from 1 in 25,000 to 1 in 250 children.⁵ According to reports, 25% of children with PSVT display wolf-parkinson-white (WPW) syndrome on their resting ECG. According to some authors, SVTs in children or adolescents with normal

heart structure are classified into three or four major categories: atrioventricular reentrant or reciprocating tachycardia (AVRT) due to an accessory pathway, atrioventricular nodal reentrant tachycardia (AVNRT), and ectopic atrial tachycardia, including permanent form of junctional reciprocating tachycardia (PJRT).

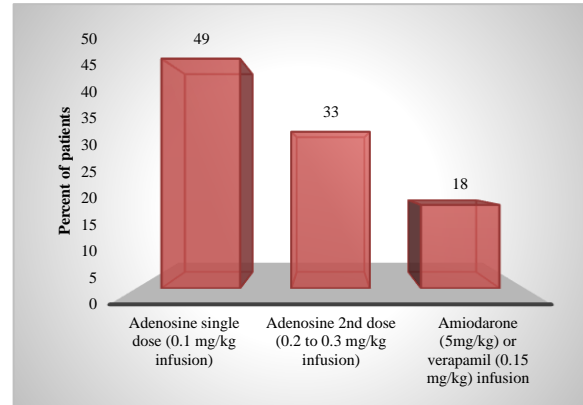


Figure 1: Distribution of patients according to the treatment given.

Several previous studies have shown greater incidence of PSVT in female patients, contradicting our results. A study of over 1700 consecutive individuals without a history of AF/AFL who were referred for PSVT ablation discovered that around 62% were female, with the majority having AVNRT.⁶ While Rehorn et al's research was unable to determine the cause of PSVT, their results were consistent with female patients being more likely to develop PSVT, accounting for 61–65 percent of instances.⁷ The most frequent symptom we discovered was palpitation (91%). Whatever the aetiology of PSVT, symptoms range from a simple sense of palpitation to syncope or chest discomfort, with no symptoms occurring in some cases. The frequency of sudden cardiac mortality in WPW syndrome throughout children has been estimated to be as high as 0.5, according to the literature. PSVT symptoms are caused by hemodynamic alterations that occur during tachycardia.⁸ Increased heart rate during PSVT episodes compromises diastolic filling of both ventricles, resulting in reduced cardiac output. PSVT in neonates and infants manifests as acute congestive heart failure, with diaphoresis, vomiting, and pulmonary and intestinal congestion. These symptoms appear quickly and develop, leading to a misdiagnosis of a common acute disease in that age range. Although palpitation is the most common symptom in school-aged children and adolescents, syncope with SVT is uncommon. PSVT sufferers may experience shortness of breath, chest tightness or discomfort, and a sense of being lightheaded or dizzy.

The mean troponin I level in our research was 0.028 0.001 ng/ml, while the mean NT-proBNP level was 720.8 90.4 pg/ml. While the specific mechanism of troponin-I elevation in PSVT is unknown, the increased myocardial oxygen demand and reduced myocardial oxygen supply

caused by shorter diastolic filling during a paroxysmal episode are thought to be the outcome of temporary myocardial ischemia.⁹ Although the mechanisms governing myocardial synthesis or release of NT-proBNP in PSVT are unknown, sufficient loading of ventricular and/or atrial stretch during PSVT may boost NT-proBNP release. According to Magioncalda et al conversion to sinus rhythm in PSVT was accomplished in a small number of patients with NT-proBNP levels more than 4500 pg/ml, but the majority of those with levels less than 1500 pg/ml were normalised, even with anti-arrhythmic medications alone.¹⁰ They hypothesised that a medium-low level of NT-proBNP showed an immediate reaction to the distension of atrial tissue produced by PSVT, but greatly raised levels were likely generated by ventricular dysfunction as well, and so indicated a lower possibility of restoring sinus rhythm.

In 64% of the cases, we identified no abnormalities on the ECG. In the investigation of L'Italien et al, aberrant electrocardiography findings were found in 30 individuals (13.4%).¹¹ In their investigation, 86.6 percent of the participants had normal ECGs. The most prevalent abnormality was a prolonged corrected QT interval (20%), followed by LVH (16.6%). Left axis deviation (13.3%) and ST and/or T wave irregularity were also prevalent. Furthermore, no abnormalities were seen on echocardiography in 78% of the patients. Premkumar et al discovered that 41.67% of echocardiography findings were normal, whereas 55% of the reports indicated abnormalities.⁵ There was one instance each of aortic root dilation, coronary fistula to pulmonary artery, mitral valve prolapse, and pulmonary valve abnormality in the research by L'Italien et al.¹¹ With a single dose of adenosine infusion (0.1 mg/kg), 49 percent of the patients in our research attained normal sinus rhythm. It was shown that 33% of the patients needed an additional dosage of adenosine infusion (0.2 to 0.3 mg/kg). In Pandee et al research, 16 percent of patients got non-pharmacologic therapy as a first treatment, with each patient receiving ice-bag insertion, Valsalva manoeuvre, carotid massage, and combined carotid massage and ice-bag placement.⁴ Only one patient was effectively converted to sinus rhythm by carotid massage alone, but the other three patients were not converted and so required adenosine. 22 people needed medical care (88%). Adenosine was administered to ten of the twenty-two individuals (45%). Other medications were used to treat the remaining 12 individuals (55%). The effective rate of conversion to sinus rhythm among those treated with adenosine was 4 (40%), 4 (40%), and 2 (20%), respectively, within the first, second, and third doses of adenosine. This research has some drawbacks. Because this research was conducted at a single hospital, the findings may not be generalizable to the general community. Second, the timing of echocardiogram was based on numerous scenarios, and echocardiography, comprising multiple measures, was inconsistent; hence, assessing heart function in our patients was not statistically relevant.

CONCLUSION

According to the findings of this research, 42 percent of SVT patients were aged 41 to 60 years, 56 percent were men, the most frequent mechanism was atrial fibrillation, and palpitations were the most common presenting symptom. Many individuals may appear with non-specific symptoms, necessitating a high index of suspicion in order to detect SVT. Future research should be performed to evaluate long-term clinical outcomes in these individuals.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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