ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 03 | March - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CLINICAL PROFILE OF PATIENTS PRESENTING WITH SUPRAVENTRICULAR TACHYCARDIA IN A TERTIARY CARE HOSPITAL WITH ELECTROPHYSIOLOGY LAB IN RAJASTHAN

Cardiology

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ABSTRACT

Supraventricular tachycardia(SVT) is a miscellaneous group of arrhythmias used to describe tachycardias that involve cardiac tissue at the position of His or above.1 The frequence of SVT is 2.25/ 1000 persons with a female ascendance of 2:1 across all age groups.2,3.SVT increases patient morbidity, particularly when symptoms are frequent or continuous, and in a small cohort of cases with atrial fibrillation(AF) and ventricular pre-excitation, it can be fatal . This study includes all the patients presenting with supraventricular tachycardia, or with sudden onset palpitations, to our hospital in the previous 3 years. The patients were initially evaluated and taken for electrophysiological study and various diagnosis of SVT were made and treated. This study compiles all the diagnosis made at our hospital, and summarises the distribution of all types of SVT, according to age, gender, or type of SVT.

KEYWORDS

Supraventricular tachycardia, AVNRT, AVRT, AT, Electrophysiological study and radio-frequency ablation.

INTRODUCTION

In the absence of left or right bundle branch block, SVTs are often referred to as narrow complex tachycardias with the most common SVTs being atrioventricular nodal re-entrant tachycardia (AVNRT), atrioventricular re-entrant tachycardia (AVRT) and atrial tachycardia (AT). Close inspection of the surface ECG to identify markers of the underlying mechanism can reveal the diagnosis in up to 80% of AVNRT or AVRT cases, although an ECG in sinus rhythm is often required for comparison (Fig 1).[4]

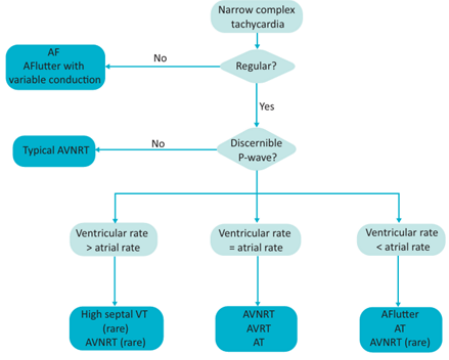

Fig 1. Diagnostic flow chart for electrocardiography in narrow complex tachycardia. AF = atrial fibrillation; AFlutter = atrial flutter; AT = atrial tachycardia; AVNRT = atrioventricular nodal re-entrant tachycardia, AVRT = atrioventricular re-entrant tachycardia, VT = ventricular tachycardia.

Atrioventricular Nodal Re-entrant Tachycardia

More than 60% of patients having invasive cardiac electrophysiological studies had AVNRT, the most prevalent SVT in the general population.[5]. It is made possible by the AV node's two functionally separate electrophysiological tracts—a slow channel and a fast pathway—with varying conduction velocities and refractory periods. To begin recurrent re-entry between the fast and slow pathways, an atrial (or less frequently a ventricular) premature beat is necessary. In the absence of bundle branch block, this will show up on the surface ECG as a narrow QRS tachycardia. The most prevalent type of AVNRT causes the atria and ventricles to activate nearly simultaneously, making it difficult to observe P-waves on the surface ECG during tachycardia. They can seem subtly when they are visible appearing as a pseudo S' deflection in the inferior leads or a false R' wave in lead V1.6. Prior research has reported that the presence of a pseudo S' deflection has a higher specificity and positive predictive value for AVNRT, even though a pseudo r' wave is more sensitive and, thus, more beneficial.4, 7 Identification of the P-wave can be aided by careful examination and comparison of the QRS complex in sinus rhythm with that during tachycardia.

Atrioventricular Re-entrant Tachycardia

The AV node is one of the circuit's essential limbs in AVRT, while the accessory pathway (AP), an embryological remnant that connects the atria and ventricle, makes up the other.[8]. These extra-nodal connections can conduct just from the atrium to the ventricle (also known as manifest ventricular pre-excitation or Wolff-Parkinson-White pattern ECG), from the ventricle to the atrium (also known as "concealed" and not visible on sinus rhythm ECG), or they can conduct in both directions. Since the AV node still limits the maximum rate of ventricular activation during AF, concealed APs are clinically safe.[8]. Both the AV node and the AP may conduct to the ventricle in sinus rhythm with evident ventricular pre-excitation. This means that the ventricle may be "pre-excited" by conduction via the AP before conduction via the AV node and His-Purkinje tissue. This results in the typical ECG findings of a widening of the QRS, slurred onset, and a short PR interval (<120 ms) . About 90% of AVRTs are orthodromic, meaning that the impulse passes through the AV node from the atrium to the ventricle and the AP from the ventricle to the atrium.[2] The QRS is frequently followed by and distinct from retrograde P-waves.[9]. Although it can also be observed in AVNRT, the presence of electrical alternans (alternating beat fluctuation in QRS amplitude/axis) during tachycardia is strongly predictive of AVRT.[7,10]

The QRS complex appears large and fully pre-excited in antidromic tachycardia, which is less common and occurs when the AP conducts antegradely and the node supplies the retrograde limb of the tachycardia when it re-enters the atrium from the ventricle via the His–Purkinje network. It might be challenging to distinguish between antidromic AVRT and ventricular tachycardia (VT) since the P-waves are frequently hidden in the ST segments. The former diagnosis is supported by the presence of pre-excitation during sinus rhythm recordings.

Atrial Tachycardia

The atrium is the source of atrial tachycardia (AT), which is unaware of the AV node's actions. The P-waves on the surface ECG have a steady tachycardia cycle length and appear monomorphic, although they differ morphologically from the sinus P-wave. Atrial flutter is by far the most prevalent AT observed in clinical practice, and there are two mechanisms: focal and re-entrant. The conduction characteristics of

the AV node determine the ventricular rate in all types of AT; atrial flutter is not frequently linked to 1:1 atrioventricular conduction. While atrial flutter is a constant atrial (P-wave) rate tachycardia with fluctuation in the ventricular (QRS) rate based on the behaviour of the AV node, focal AT (non-re-entrant) may exhibit rate variability due to acceleration and deceleration.[11].

METHODS

This study includes all the patients presenting with supraventricular tachycardia, or with sudden onset palpitations, to our hospital in the previous 3 years. The patients were initially evaluated and taken for electrophysiological study and various diagnoses of SVT were made and treated. This study compiles all the diagnoses made at our hospital, and summarises the distribution of all types of SVT, according to age, gender, or type of SVT.

Observations

Total number of patients included in our study were 532. We only included the patients with diagnosis of supraventricular tachycardia.

1. **Distribution According To Gender:-** 273 out of the total of 532 were males and 259 were females. Thus 51 % of our study population were males and 49 % were females. This shows that prevalence of SVT in our study population was almost equally distributed amongst males and females.
2. **Distribution According To Diagnosis:-** According to the above table, maximum number of patients were diagnosed as AVNRT, next was AVRT, which was followed by other types of SVT. 60 % of the total patients were diagnosed with AVNRT, 30 % were diagnosed with AVRT, and the rest 10 % comprised of AT, AF, AFL, and other tachycardias.
3. **Distribution Of Avnrt According To Gender:-** According to the above table, AVNRT was more commonly found in females than in males.
4. **Distribution Of Avrt According To Gender:-** According to the above table, AVRT was much more common in males than in females, contrasting from AVNRT.
5. **Distribution Of Avrt According To The Pathway :-** According to the above data, left sided pathways were more common than right sided pathways amongst the diagnosis of AVRT.
6. **Distribution Of Left Sided Pathways :-** According to the above table, most common pathway found in AVRT was left lateral pathway. Amongst other left sided pathways, posterior and anterior lateral were other common pathways.
7. **Distribution Of Right Sided Pathways :-** According to the above table, most common site of right sided pathway was posterior septal. Other common right sided pathways were, free wall and coronary sinus. We found 5 pathways located at the CS diverticulum.
8. **Distribution According To Manifest Pathway Or Concealed Pathway :-** Out of the total number of AVRT diagnosed, 101 had manifest accessory pathways, and 64 had concealed accessory pathways.

RESULTS AND CONCLUSIONS

1. Overall prevalence of SVT in males and females in equal, but occurrence of AVNRT is much higher in females than males, and AVRT is more in males than females.
2. 60 % of all the SVT were AVNRT in our study population, which matches accurately with world data.[5]
3. Amongst AVRT, most common were left sided pathways. Left lateral pathways were found to be the overall most common site of pathways amongst all AVRT.
4. Amongst right sided pathways, most common were posterior septal pathways.
5. All the above were successfully diagnosed by electro physiological studies, and were treated with radio-frequency ablation. The procedures were mostly uneventful, with only a few instances of transient AV blocks, which were later recoverd, and a few femoral site hemaotmas, which were successfully treated.
6. All of the SVT were successfully ablated with zero recurrences except atrial tachycardias, atrial flutter and atrial fibrillation, where a few recurrences were noted, and were treated by anti-arrhythmic and rate control drugs.
7. Most of the SVT can be successfully treated by radio-frequency ablation without any recurrence hence improving the quality of life of the patients and also rendering them treatment free for life-time.

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