Quality of Life after Ablation vs Medication Therapy in Patients With Supraventricular Tachycardia

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Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI2021/v33i31B3169

ABSTRACT

Objective: Supraventricular tachycardia (SVT) is the most common presentation of patients at cardiac emergency department. This study aims to determine the quality of life in patients with supraventricular tachycardia after they treated with medicines vs. ablation therapy.

Methods: This prospective clinical comparative study was held at the National Institute of Cardiovascular Diseases (NICVD). Patients 18 years or older of either gender presenting with the two most common variants of SVT i.e. Atrioventricular nodal reentry tachycardia (AVNRT) and Atrioventricular reentry tachycardia (AVRT) were eligible to be included into the study. Once stabilized at the emergency department (ED) the patients were given the option to undergo electrophysiology study and radiofrequency ablation (EPS and RFA) (group A) or opt for medications only (group B). Quality of life (sense of personal well being, impact on social life, fear of mortality or anxiety about the disease, recurrence of episodes of arrhythmia, and visits to ED) was assessed through a questionnaire filled after six months of receiving treatment.

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Results: A total of 120 patients were included into our study. Group A and group B were evenly divided with 60 patients each. The overall mean age of the participants and duration of cardiac illness were 44.67±18.91 and 5.42±3.13 years, respectively. Patients who received EPS and RFA (group A) had superior and statistically significant scores (better QoL) for sense of personal well being, impact on social life, fear of mortality or anxiety levels, recurrence of arrhythmia, and visits to the ED as compared to those who received medications alone, p<0.05.

Conclusion: EPS and RFA vastly improved the quality of life in patients with SVT post treatment. Medications alone are associated with a high number of post treatment sequels and adverse events; therefore they are best avoided in patients with SVT.

Keywords: SVT treatment; QoL outcome; Pakistan.

1. INTRODUCTION

Supraventricular tachycardias (SVTs) or tachyarrhythmias are a sundry group of disorders that affect both an adult as well as a pediatric population [1,2]. By definition SVTs occur due to accessory conduction pathways in the heart above the bundle of His, however there are unique pathophysiological processes associated with each subtype of SVTs. Most of these occur suddenly without prior symptoms or signs and just as abruptly spontaneously resolve, for this reason the term paroxysmal SVTs is also often used [2]. The mortality for these tachycardias alone is not significant but they do contribute greatly in impairing quality of life by causing loss of working hours, reduced productivity, more frequent emergency department (ED) visits, hospital admissions, and increased health care costs [2,3].

Due to reasons discussed above SVT is one of the best studied clinical entities in all of medicine, especially its two most common variants in adults’ i.e. Atrioventricular nodal reentry tachycardia (AVNRT) and Atrioventricular reentry tachycardia (AVRT) have been researched upon more than others [4], leading to some emerging insights and novels methods of diagnosis, treatment and even prevention [5,6].

This has led to substantial improvements in the management of SVTs [6]. Electrophysiological study (EPS) and radiofrequency ablation (RFA) have emerged as the treatment of choice for AVNRT and AVRT [7]. Local and international data has shown that EPS and RFA are safe and effective in diagnosis and treatment of SVTs with excellent long term outcomes [8,9].

However, both EPS and RFA are invasive procedures and inevitably raise concerns about their procedure related adverse events, morbidity and mortality. This choice is further complicated by availability of oral medications that in the short term provide effective rate control [10] without the need for in hospital admission [11], but with oral medications the underlying pathology or accessory pathway remains intact and as such is prone to recurrences [12]. There are a multitude of reasons as to why a patient would choose one treatment over the other (and are beyond the scope of this study) but in the end the choice is the patient’s to make either by themselves or in consultation with their relatives and must be respected by the physicians. In this study we attempted to objectively access all important issues that in our opinion most affect the quality of life in patients treated for SVT over time by giving, but as of writing this is the first study to objectively interpret the quality of life in such patients from our institute.

2. PATIENTS AND METHODS

This was a qualitative prospective study held at the NICVD, Karachi. It was held from January 2019 to June 2019. Patients having age ≥18 years of both gender and presenting for the first time in to the emergency department (ED) of the NIVCD were included into the study. Only patients diagnosed with either one of the two major variants of SVT i.e. AVNRT and AVRT were eligible for induction into the study. Patients with known ischemic heart disease and poor LV function were excluded from the study due to their limitations in prescribing calcium channels blockers. SVT, AVNRT and AVRT were defined in light of the latest guidelines issued by the ESC [13]. Both AVNRT and AVRT occur due to accessory pathways and as such are not ‘supraventricular’ but most societies and guidelines include them in the SVT classification [13].

SVT was defined as a heart rate of >100 beats/min due to pathology from the bundle of His or above with characteristic changes on the
electrocardiogram (ECG) or Holter monitoring. AVNRT was defined by the presence suggestive symptoms (sudden rapid palpitations, dizziness, dyspnea, chest pain or fullness, fatigue, and rarely presyncope or syncope) for a minimum of 2 months and typical findings on ECG such as narrow complex tachycardia (QRS duration <120 ms), discernable P wave and a heart rate of 120-240 beats/min with or without bundle branch block. Similarly, AVRT was defined by the presence of suggestive symptoms for a minimum of 2 months and typical findings on the ECG such as narrow complex tachycardia, a heart rate of 120-300 beats/min, discernable P wave, along with variable findings of delta wave associated with the Wolf-Pakinson-White (WPW) syndrome, QRS alternans, T wave inversion or ST segment depression. The diagnosis of these patients was purely made by the electrophysiologists in light of recent guidelines.

All patients were initially treated and stabilized at the ED. The protocols and different modalities used to treat the patients at the ED will not be a part of this study. Once stable, the patients were given the option to either opt for electrophysiological study (EPS) and radio frequency ablation (RFA) (group A) or medical treatment only (group B). The risks and benefits of both choices were explained thoroughly by the on call consultant/registrar.

Patients choosing EPS after stabilization went under local anesthesia, which was performed in the fasting state. Standard 6Fr bipolar and quadric polar catheters were inserted percutaneously via the right and left femoral vein and positioned in the high right atrium, His bundle region, coronary sinus and the right ventricular apex. The diagnostic EP study was performed by using a standard protocol. As soon as the clinical tachycardia was induced, detailed mapping and ablation maneuvers were performed as per the standard protocol, using either a conventional or an irrigated-tip catheter. Depending on the underlying mechanism of SVT, successful RFA was defined as non-inducibility of AVNRT and loss of delta wave or pathway mediated retrograde ventriculoatrial conduction block for AVRT. Patients opting for medical management were given tablet Verapamil (calcium antagonist or slow channel inhibitor) 240 mg per oral once daily (OD) or tablet Bisoprolol (competitive selective B1 adrenergic blocker) 2.5 to 5 mg per oral once daily (OD). Both groups were followed every 4 weeks. In patients with poorly controlled symptoms in group B the doses of either drug were titrated up to the maximum tolerated dose. Compliance of medications was confirmed by a primary attendant who was present at all follow ups.

The two groups were eventually followed up at six months post discharge at which point the patients in the presence of an attendant were requested to fill in a questionnaire (Fig. 1) assessing the quality of life post treatment. Any concerns or reservations regarding the questionnaire were addressed by a senior cardiologist at that time. The questionnaire was designed to assess quality of life (QoL) post treatment in patients with SVT by objectively grading or scoring the five most pertinent parameters that influence QoL in such subjects (in the author’s opinion). These included sense or perception of personal well being after SVT and its treatment, interference or negative impact on social life, further episodes of arrhythmia, number of revisits to the ED (for arrhythmia or other cardiac events), and fear of mortality. Sense of personal being, impact on social life and anxiety or fear of mortality were scored from 1-10 (with 1 being the lowest and 10 being the highest). Only documented visits to the ED (at NICVD or elsewhere) and episodes of arrhythmia were recorded in our study. All parameters were individually evaluated; there was no overall cumulative score.

On a scale of 1-10 (with one being the lowest and 10 being the highest):

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>How well/comfortable have you been with your health or being in the last six months?</td>
<td>1-10</td>
</tr>
<tr>
<td>Has the treatment negatively affected your social life?</td>
<td>1-10</td>
</tr>
<tr>
<td>Do you have anxiety or fear for your life due to this particular disease despite treatment?</td>
<td>1-10</td>
</tr>
<tr>
<td>How many times did you visit the emergency department in last six months due to tachyarrhythmia(s)?</td>
<td>1-10</td>
</tr>
<tr>
<td>How many further documented episodes of arrhythmia did you experience in the last six months?</td>
<td>1-10</td>
</tr>
</tbody>
</table>

Fig. 1. Questionnaire
2.2 Questionnaire on Assessment of Quality of Life Post Treatment in Patients with Supraventricular Tachycardia

Statistical Package for Social Sciences (SPSS) version 21.0 (SPSS Inc., Chicago, IL, USA) was used to analyze the data. Means and standard deviations were calculated for the variables like age, duration of cardiac disease, personal well being, negative impact on social life, anxiety or fear of mortality, number of visits to the ED, and further episodes of arrhythmia. Frequencies and percentages were calculated for the variables of gender, comorbidities, and the subtype of SVT i.e. AVNRT and AVRT. A p value of <0.05 was taken as significant.

3. RESULTS

Final analysis was performed on 120 patients. The overall mean age and SD of the participants was 44.67±18.91 years. The mean heart rate in patients with AVRT and AVNRT at the time of emergency department presentation was 174.40±31.21 and 183.71±27.63 beats per minute, respectively. Overall, female predominance was observed but group analysis has shown male predominance in group A (60%, n = 36). Mean duration of cardiac illness was 5.42±3.13 years; patients opting for medical treatment only were slightly older. General characteristics of the patients included into the study are shown in Table 1.

The overall success rate of AVRT and AVNRT in group A (EPS and RFA) was significantly better (89% and 93%, respectively) as compared to the success rate of AVRT and AVNRT in group B (medicine only) was 69% and 73%, respectively, p<0.001. Patients in group A had clinically and statically significantly better scores (quality of life) for all parameters included in the questionnaire. Patients in group B exhibited more frequent visits to the emergency department (for the cardiac illness) and recurrent episodes of arrhythmia. Scores of all the parameters alluded to in the questionnaire with respect to both groups and their statistical significance are summarized in Table 2.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Overall N = 120</th>
<th>Group A N = 60</th>
<th>Group B N = 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>44.67±18.91</td>
<td>41.22±6.70</td>
<td>51.27±18.53</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>12 (10.0%)</td>
<td>7 (11.66%)</td>
<td>5 (8.33%)</td>
</tr>
<tr>
<td>&lt;Graduation</td>
<td>70 (58.33%)</td>
<td>31 (51.66%)</td>
<td>39 (65.0%)</td>
</tr>
<tr>
<td>≥Graduation</td>
<td>38 (31.66%)</td>
<td>22 (36.66%)</td>
<td>16 (26.66%)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>88 (73.33%)</td>
<td>38 (63.33%)</td>
<td>50 (83.33%)</td>
</tr>
<tr>
<td>Single</td>
<td>29 (24.16)</td>
<td>20 (33.33%)</td>
<td>9 (15.0%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>3 (2.5%)</td>
<td>2 (3.33%)</td>
<td>1 (1.66)</td>
</tr>
<tr>
<td>Smokers</td>
<td>31 (25.83)</td>
<td>21 (35.0%)</td>
<td>10 (16.66%)</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>28 (23.33%)</td>
<td>12 (20.0%)</td>
<td>16 (26.66%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>28 (23.33%)</td>
<td>8 (13.33%)</td>
<td>20 (33.33%)</td>
</tr>
<tr>
<td>AVNRT*</td>
<td>86 (71.66%)</td>
<td>47 (78.33%)</td>
<td>39 (65.0%)</td>
</tr>
<tr>
<td>AVRT**</td>
<td>34 (28.33%)</td>
<td>13 (21.66%)</td>
<td>21 (35.0%)</td>
</tr>
<tr>
<td>Duration of cardiac illness (years)</td>
<td>5.42±3.13</td>
<td>3.74±2.41</td>
<td>8.23±4.92</td>
</tr>
<tr>
<td>Physical Activity/day – minutes</td>
<td>22.21±20.93</td>
<td>20.13±9.41</td>
<td>17.01±0.19</td>
</tr>
</tbody>
</table>

*Atrioventricular nodal reentry tachycardia
**Atrioventricular reentry tachycardia
Table 2. Post treatment quality of life assessment in both groups

<table>
<thead>
<tr>
<th>QoI Score Parameters</th>
<th>Group A N = 60</th>
<th>Group B N = 60</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal well being</td>
<td>9.26±3.09</td>
<td>6.08±4.57</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Negative impact on social life</td>
<td>1.0±0.78</td>
<td>8.41±5.69</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Fear of mortality</td>
<td>1.29±2.42</td>
<td>7.02±4.91</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Arrhythmia Frequency</td>
<td>1.33±0.95</td>
<td>6.48±3.53</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Revisits to the ED</td>
<td>0.61±0.80</td>
<td>3.55±3.33</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

4. DISCUSSION

There are a variety of reasons as to why a patient would choose one therapy over another. These could be social, religious, traditional, economic, personal, opinion of loved ones, previous experience, level of education or any other. It was not the narrative of this study to identify such factors and what impact they have on decision making of the patients with respect to supraventricular tachycardia. However, our study did identify two trends. One, patients with relatively shorter duration of cardiac disease were more likely to opt for EPS and RFA compared to those with longer history of SVTs. Two, having a shorter history of SVTs inevitably made the patients comparatively younger and perhaps more willing to go under an invasive procedure. There are no studies linking younger age and shorter duration of disease with the decision to go for EPS and RFA (to the best of our knowledge), but authors previously describing the efficacy and safety of these procedures for arrhythmias have reported mean ages of 30-46 years [14,15], this is quite similar to the mean age of patients who chose EPS and RFA i.e. group A in our study; these results are barring reports on the pediatric group of patients, in whom the mean age at presentation and intervention are understandably very low [16,17]. Be that as it may correlation between age and duration of disease to preferred treatment modality for SVTs has not been established yet.

EPS and RFA therapy for SVT have demonstrated superior outcomes for treatment of SVTs compared to medication alone for better part of last three decades leading inexorably to improved quality of life; multiple analysis have already recorded the excellent social, emotional, personal and physical scores with markedly reduced levels of anxiety in patients undergoing EPS and RFA for SVTs irrespective of age, gender or type of tachycardia [18-20]. Our results are akin to such previous reports. Patients who opted for RFA and EPS had clinically and statistically better scores for personal well being, impact on social life and anxiety or fear of mortality.

The superb scores for personal well being, impact on social life and anxiety post treatment for SVT with EPS and RFA can directly be correlated to the number of recurrent episodes of arrhythmia or lack thereof and number of visits to the ED due to said arrhythmia. EPS and RFA work by mapping and ablation or obliteration of the pathological pathway or focus causing accessory rhythm leading to arrhythmias [21], despite the technical difficulties and high level of expertise required for the procedure, success rates of 85-95% have been reported [22,23].There are little to no adverse events associated with this procedure despite its invasiveness in adults and children alike [24,25].

In theory once the accessory pathway or excitatory focus has been “removed” further episodes of arrhythmias should not occur. In practice however that is not the case. Recurrence rates for tachycardia are variable and seem time dependant; Hindricks G et al. and Iturralde Torres P et al. both reported a recurrence rate of approximately 10% over long term follow up (>1 year), but notably both recorded a mortality rate of approximately 10% over long term follow up (>1 year), but notably both recorded a mortality rate of approximately 10% over long term follow up (>1 year), but notably both recorded a mortality rate of approximately 10% over long term follow up (>1 year), but notably both recorded a mortality rate of approximately 10% over long term follow up (>1 year). Approximate recurrence rates for SVTs have ranged from 5-15% and mortality from 0-5% [26,27]. Our study only followed up the patients for six months and perhaps this was the reason that most patients from group A did not suffer from even a single recurrent episode of SVT, this corresponded with the exceptionally low rates of ED visits. Concordantly all parameters determining the quality of life post treatment unusually enhanced.

Hopefully, in the future ablation along with other non invasive techniques and gene therapy will provide new corridors for diagnosis, treatment and effective management of all types of tachycardias including SVTs and atrial fibrillation [28]. However, for the moment it seems traditional medications such as beta blockers,
adenosine, digitalis etc. have had their day and for the most part will be used where other modalities of treatment with respect to SVT are not available [28].

The efficacy of verapamil and adenosine in emergency treatment of SVT, converting out of hospital SVT to normal rhythm and rate have been thoroughly described in previous publications [29]. Both medications however were associated with poor outcomes, high rate of intra treatment complications and recurrence of arrhythmia [29]. Similar data for beta blockers have also been described previously, although they were found to be slightly less efficacious than verapamil or adenosine [30]. The biggest short coming with pharmacotherapy is the persistence of the accessory pathway or excitatory focus which remains prone to recurrence. For the time being pharmacological agents are considered to be alternate therapy only to be used in specific circumstances [30].

However, in the authors opinion ablation versus medications for the treatment of SVT is a foregone conclusion. The number of recurrent episodes of arrhythmia and the ED visits recorded in our study were too high. The negative impact this had on the personal well being, social life and anxiety level of the patients was overwhelming. On average patients in group B were experiencing a recurrent episode of arrhythmia every month post treatment leading to ED visits and/or hospital admission once every 6-8 weeks. This drastically reduced their chances to be social, not to mention the psychological toll multiple evaluations at the ED must have taken on them and their anxiety levels. It’s also unlikely that any patient being subjected to monthly ED visits and such a high number of recurrences of arrhythmia would be able to carry out day to day activities without interruption; this would naturally lead to a low level of sense of personal well being.

With such stark differences in overall quality of life between patients going under EPS and RFA versus those opting for medications only, the choice of treatment for SVT becomes academic. Patients must be counseled about the advantages of EPS and RFA all the while reassuring them about the safety of the procedure, addressing their just concerns in a respectful manner. Pharmacotherapy alone may appear to be a more attractive option for some patients, but elucidating the long term adverse events of pharmacotherapy especially the negative impact it has on one’s personal physical well being and social life will further make the case in favor of EPS and RFA.

5. CONCLUSION

EPS and RFA are the modern day treatment of choice for SVTs. They are associated with clinically and statistically significant improvement in the patients personal well being, social life, reduced anxiety levels, exceptionally low recurrence rates and visitations to the ED. Pharmacotherapy alone should be avoided.

CONSENT

Written consent was taken in all cases and patient confidentiality was always ensured.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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PMCID: PMC5673321.

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