ORIGINAL ARTICLE

# SUCCESS FREQUENCY OF RADIOFREQUENCY CATHETER ABLATION IN PATIENTS WITH NARROW-COMPLEX TACHYCARDIA

**Muhammad Rehan Khan[1], Muhammad Marwat[2], Zahid Aslam Awan[3], Syed Azhar Sherazi[4]**

[1]Department of Cardiology and [2]Ophthalmology, Gomal Medical College and [3]Department of Cardiology, Post Graduate Medical Institute, Peshawar and [4]Cardiology Unit, D.H.Q Teaching Hospital, D.I.Khan, Pakistan

## ABSTRACT

**Background:** Narrow-complex tachycardia is a common arrhythmia. The objective of this study was to determine the success frequency of radiofrequency ablation in patients with narrow complex tachycardia.

M**aterial & Methods:** This cross sectional study conducted in Department of Cardiology, Lady Reading Hospital Peshawar, from January 2008 to January 2009. All patients with narrow complex tachycardia were included. Radiofrequency catheter ablation procedure was carried. The procedure was considered successful when post ablation tachycardia could not be induced within two minutes of isoprenaline 2$\mu$g/ minute with infusion pump. The demographic variables were gender, age in years, age grouping and the research variables were type of narrow complex tachycardia, success and complications of procedure. The data was analyzed for fequeccy (number) and relative frequency (%).

**Results:** Out of 50 patients 24 (48%) were male and 26 (52%) wer female. The mean age of patients was 39.72 $\pm$13.31(13-70) years. Ten (20%) patients were in age group of upto 25 years, 31 (62%) were in age group of 26-50 years and nine (18%) were in age group of more than 50 years. The frequency of successful procedure was 49 (98%) all over. Out of 50 patients with narrow complex tachycardia, 28 (56%) patients were of atrioventricular nodal reentry type, 17 (34%) patients were of atrioventricular reentrant tachycardia type, 4 (8%) patients were of atrial tachycardia and only one (2%) patient was of atrial fibrillation type.

**Conclusion:** Radiofrequency catheter ablation in narrow complex tachycardia is a reasonable therapeutic approach.

**KEY WORDS:** Radiofrequency catheter ablation, Narrow complex tachycardia, Electrophysiological study, Electrocardiography.

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## INTRODUCTION

Debilitating cardiac arrhythmias affect millions of people worldwide, creating the need for diagnostic, mapping and ablative technologies which aid treatment. Narrow-complex tachycardia is a common dysarrhythmia presenting to emergency unit.[1] The patient may present in hemodynamically collapse state or when persistent for months may lead to tachycardia induced cardiomyopathy.[1]

In narrow complex tachycardia the heart rate is more than 100/ minute and QRS complex is less than 120 ms (three small squares on ECG).[2]

**Corresponding author:**
Muhammad Rehan Khan, Assistant Professor
Department of Cardiology
Gomal Medical College, D.I.Khan, Pakistan
e-mail: fine_dr4u@yahoo.com

The common types of narrow complex tachycardia are atrioventricular nodal tachycardia, atrioventricular reentrant tachycardia and atrial tachycardia. 80% of narrow complex tachycardia can be differentiated by standard 12 lead ECG.[3,4] Narrow complex tachycardia can be terminated by valsalva maneuvers or facial immersion methods in infants. Adenosine and calcium channel blockers are the intravenous drugs of choice for termination of paroxysmal supraventricular tachycardia.[5,6] Medical treatment of SVT with antiarrhythmic drugs has limited efficacy. Catheter ablation has emerged as a curative treatment with high success rate.[7,8] Catheter ablation provides a safe and highly effective treatment for symptomatic patients with supraventricular tachycardia.[9]

Catheter ablation should also be considered in difficult cases of atrial flutter, intra- atrial reentry

and automatic atrial tachycardia.[10] Catheter ablation has emerged as a curative treatment with high success rate. Catheter ablation provides a safe and highly effective treatment for symptomatic patients with supraventricular tachycardia.

The objective of this study was to determine the success frequency of radiofrequency ablation procedure in patients with narrow complex tachycardia.

## MATERIAL AND METHODS

It was a cross sectional study conducted in Department of Cardiology, Lady Reading Hospital Peshawar, from January 2008 to January 2009. A sample of 50 patients were selected by convenience sampling. All patients with narrow complex tachycardia were included. All patients with broad complex tachycardia were excluded. Informed consent was taken by explaining risk and benefit ratio of the study. The patients were selected from outdoor and casualty departments. The patients were diagnosed on basis of history, clinical examination and ECG changes. They diagnostic features of narrow complex tachycardia on ECG were heart rate more than 100/ minute and QRS complex less than 120 ms (three small squares on ECG). They were given intravenous A-V nodal blocking drugs such adenosine, beta blockers, calcium channel blockers, and digoxin. Their ECG was repeated to observe if the sinus rhythm is restored. If not restored, the procedure was repeated. After restoration of sinus rhythm, they were sent home with the the same A-V nodal blocking drugs orally. They were booked for radiofrequency catheter ablation and were advised to discontinue these drugs six days prior to the procedure. Radiofrequency catheter ablation procedure was carried in Electrophysiology Laboratory using EP-Workmate (Electrophyiological) System (St. Jude Medical Inc., St. Paul, Minn., USA). The procedure was considered successful when post ablation tachycardia could not be induced within two minutes of intravenous isoprenaline 2$\mu$g/ minute with infusion pump. ECG events during EP study were recorded in the system and a soft copy handed over to the patients.

The demographic variables were gender, age in years, age grouping and the research variables were type of narrow complex tachycardia, success of catheter ablation and complications of the procedure. The age grouping was as: upto 25 years, 26-50 years and more than 50 years. The data was analyzed for fequeccy (number) and relative frequency (%).

## RESULTS

This study comprised total 50 patients with 24 (48%) male and 26 (52%) female. The mean age of patients was 39.72 $\pm$13.31(13-70) years. Ten (20%) patients were in age group of upto 25 years, 31 (62%) were in age group of 26-50 years and nine (18%) were in age group of more than 50 years.

Out of 50 patients with narrow complex tachycardia, 28 (56%) patients were of atrioventricular nodal reentry type (AVNRT), 17 (34%) patients were of atrioventricular reentrant tachycardia type (AVRT), 4 (8%) patients were of atrial tachycardia and only one (2%) patient was of atrial fibrillation type. (Table 1)

**Table 1: Frequency of Types of Narrow complex tachycardia in 50 patients.**

| Narrow complex tachycardia, | Frequency | Percentage |
|---|---|---|
| Atrioventricular nodal reentry type (AVNRT) | 28 | 56% |
| Atrioventricular reentrant tachycardia type (AVRT). | 17 | 34% |
| Atrial tachycard | 4 | 8% |
| Atrial fibrillation type | 1 | 2% |
| Atrial flutter | 0 | %0 |
| Sinus tacycardia | 0 | %0 |

The frequency of successful procedure was 49 (98%) all over. The frequency of successful procedure was 23 (96%) in males and 26 (100%) in females.

Only one (2%) patient (female) developed complication in the form of ventricular fibrillation. She was cardioverted on the table in .

## DISCUSSION

In our study the mean age of patients was 39.72 $\pm$13 years with a range of 13 to 70 years. Ten (20%) patients were in age group of upto 25 years, 31 (62%) were in age group of 26-50 years and nine (18%) were in age group of more than 50 years. In a study conducted by Calkin et al[12] patients were from 8 months to 90 years of age (mean age 37$\pm$18 years). It was a multicentre study and 1050 patients include in this. Our study was a small volume consisted of 50 patients only, because it was conducted by a single (operator) in this centre. Infants and children of less than 10 years of age were not included in our study due to unavailability of ablation catheter of their size and also because there was no recognized pediatrics cardiology unut, so such patients were not referred to electrophysiologist.

Radiofrequency (RF) catheter ablation became first-line therapy for supraventricular tachycardia in patients with Wolff-Parkinson-White syndrome[1] and atrioventricular (AV) nodal reentrant tachycardia (AVNRT) in the early 1990s. In our study 50 patients were ablated with narrow complex tachycardia, being referred from different areas of Pakistan. Our Electrophysiology Laboratory was the only such centre for electrophysiological studying in the country.

In our study 16 out of 17 patients of atrioventricular reentrant tachycardia were successfully ablated. One patient went into ventricular fibrillation that may due to the presence of accessory pathway. That was immediately successfully cardioveretd in the electrophysiological laboratory. Our results were consistent with findings from a study by Lo YS et al[13] where nine patients with narrow complex tachycardia underwent radiofrequency ablation. Five patients were known to have Wolff Parkinson White syndrome. Success rate was similar to our study and no complication was demonstrated, but in this study duration of procedure was less than or equal to 3 hours (180 minutes) because of technical difficulties in localizing accessory pathway. In some cases accessory pathway location was unusual. In our study procedure duration was 60 to 90 minutes which was half of that study because it was performed by a single operator who has skill and experience.

In our study 49/50 patients were successfully ablated so success frequency was 98%. We also see such similarities in other studies as well. Catheter ablation performed at the University of Oklahoma Health Sciences Centre in patients with accessory pathways, the success frequency was 98.8%.[14] In a study by Calkin et al a total of 1136 ablation procedures were performed with success frequency of 95%.[13] Complication rate was very low in our study, it was only 2%. Only one (2%) patient (female) developed complication in the form of ventricular fibrillation. She was cardioverted on the table.

In a study by Nakagawa H, Jackman WM**, the over all success frequency for ablation procedures was 96.1% (379 of 389). Results of succes**s frequency for different types of arrhythmia in their study were as: AVNRT 98% (130/132), AVRT 91% (97/106), typical atrial flutter 99% (129/130) and for atrial tachycardia 86% (18/21).[15] Results of success frequency for different types of arrhythmia in our study included AVNRT 100% (28/28), AVRT 100% (17/17), and for atrial tachycardia 75% (3/4).

In a study by Showkatholi et al,[16] complication rate was very low (0.8%). Three patients had complete heart block, two of whom required permanent pacemaker. A further patient with AVNRT had transient complete heart block that lasted for less than 24 hours. In this study success frequency of first procedure (de novo) was compared with those who had previous attempts of ablation in this institute or other institute. Those patients who underwent redo procedures had lower chance of success when compared with first procedure while our study was limited to results of first procedure because it was a single center study and ablation were done by single operator.

## CONCLUSION

Radiofrequency catheter ablation in narrow complex tachycardia appears to be a reasonable therapeutic approach regarding feasibility and effectiveness without increasing the risk of complication.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.