Review of Initial Outcome of Radiofrequency Cardiac Catheter Ablations of Accessory Pathways Carried Out at Madras Medical Mission, India

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ABSTRACT

Context: Accessory pathways (APs) are one of the common supraventricular arrhythmias encountered regularly at the Cardiac Catheterization Laboratory of Madras Medical Mission, India. **Aims:** The purpose of this study was to evaluate the initial outcome following radiofrequency catheter ablations of accessory pathways. **Settings and Design:** This retrospective study was carried out in the Cardiac Electrophysiology Department, of the Institute of Cardiovascular Diseases, Madras Medical Mission, India. **Methods and Materials:** Records of consecutive cases of accessory pathways following cardiac electrophysiologic studies and radiofrequency ablation carried out between January 2013 and March 2014 were reviewed. Seventy-seven cases were chosen for analysis. **Statistical Analysis Used:** The data were analyzed using SPSS statistical software version 15. **Results:** The 77 patients comprised 49 males and 28 females There was a very high success rate (96.1%). Early complications were observed in only 2 (2.6%) patients, comprising cardiac tamponade, and pericardial effusion without tamponade. There was no mortality from the procedure. 10.4% were cares of recurrence following previous RFA. **Conclusions:** RFA of APs was associated with a high success rate and very low incidence of complication.

Key words: Initial outcome; Madras Medical Mission; radiofrequency ablation of accessory pathways

Introduction

There are three important mechanisms of supraventricular tachycardias (SVTs): Accessory pathway (AP) mediated atrioventricular reentry tachycardia (AVRT), atrioventricular nodal reentry tachycardia (AVNRT), and ectopic atrial tachycardia. AVRT are the second most common type of SVT and are the most common cause of SVT in children comprising 73–85%.[1] The proportion of SVT caused by AVRT declines progressively with age, from 60% during the first decade of life to 9% after the age of 70.[2]

Access this article online	
Quick Response Code:	Website: www.wajradiology.org
	DOI: 10.4103/1115-3474.164863

Intracardiac catheter ablation techniques for treatment of cardiac arrhythmias in humans was first reported in 1982 by Gallagher *et al*.[3] Initially direct energy was used, and later on radiofrequency energy was introduced.[4] It has since then become a standard modality of treatment, being accepted as a Class I indication in cases of symptomatic SVT and the modality of choice for patients with various drug refractory arrhythmias.[5]

How to cite this article: Uwanuruochi K, Saravanan S, Ganasekar A, Solomon B, Murugesan R, Krishnamoorthy J, *et al*. Review of initial outcome of radiofrequency cardiac catheter ablations of accessory pathways carried out at Madras Medical Mission, India. West Afr J Radiol 2016;23:28-31.

Acute ablation success varying from 92% to 98.8% in patients with APs has been reported.[6-9] Conventionally, ablation is usually carried out by application of radiofrequency energy. The recurrence rate has ranged from 5.4% to 7.8%, being reported to be lowest free-wall APs and highest for anteroseptal APs.[6,10] Studies are ongoing to improve accuracy, reduce procedure and fluoroscopy time, and reduce recurrence.

There have been few reports on patients with APs from sub-Saharan Africa.[11,12]

It is however believed that the prevalence is underreported. Many APs are concealed, and may be included under the broad umbrella of supraventricular arrhythmias in electrocardiographic (ECG) studies.[13] Many are concealed, and would only be diagnosed with invasive electrophysiologic studies. Some may present as sudden cardiac death, as facilities for early diagnosis and consequent intervention is scarce in sub-Saharan Africa. At autopsy, they are also usually missed due to lack of structural evidence to confirm the cause of death.[14]

However, it is well documented that cardiovascular diseases are on the increase in developing nations.[15,16] This implies that more patients will develop cardiac arrhythmias, and with the availability of electrophysiologic studies, more are going to be diagnosed. There is a need for physicians to keep abreast of this potential benefit, as well as associated risks of the procedure.

In this report, we present the initial outcome following radiofrequency catheter ablations of APs in patients treated at the Cardiac Electrophysiology Department of Madras Medical Mission, India.

Methods

We retrospectively studied records of consecutive ablations carried out between January 2013 and March 2014 at the Cardiac Electrophysiology Department, of the Institute of Cardiovascular diseases, Madras Medical Mission, India. In our study, we described the demographic characteristics of the patients treated by radiofrequency ablation (RFA), the indication for the procedure, the prevalence of associated cardiovascular morbidity in the patients. We also observed the percentage of cases having repeat RFAs and documented the frequency of the various early complications of radiofrequency. Finally, we described the success rate of the procedure.

Access was obtained through the right femoral vein and right femoral artery. Catheters used were Quadripolar 6F for high right atrium, His and right ventricular apex, Decapolar 6F for coronary sinus and EPT BLAZER II 7F STD CURVE and J and J CORDIS WEBSTER MEDIUM CURVE 7F for the ablator.

Atrioventricular reentry tachycardia was diagnosed on the basis of retrograde atrial activation through the AP (eccentric atrial activation) during tachycardia; and preexcitation of the atria by His-refractory ventricular depolarization. Other maneuvers including ventricular-atrial (V-A)-linking, V-A dissociation during ventricular overdrive pacing (VOP), post-VOP response, spontaneous termination with atrial (A) or ventricular (V) depolarization, presence of atrial-His (A-H) jump, and right ventricular pacing (observing for entrainment, termination, and atrial activation sequence) were occasionally employed in differential diagnosis. The AP was localized by a combination of analysis of the delta wave vector from the surface ECG and catheter mapping for earliest retrograde atrial activation during tachycardia or ventricular pacing. In 21 patients (27.3%) three-dimensional (3D) electroanatomical mapping system (St. Jude EnSite Velocity) was employed. In four cases, there was no fluoroscopy used for the procedure, the entire procedure was done under 3D electroanatomical mapping system guidance. In 9 cases (11.7%), tachycardia was not inducible, but RFAs was still was considered in view of recurrent palpitations, documented tachycardia, and basal preexcitation.

Radiofrequency ablation

For left sided pathways (64.3%), retrograde transaortic approach was initially employed. When RFA was unsuccessful, the transseptal approach was adopted (40.3%). Right-sided pathways comprised 35.7% of cases. At a site where signals were satisfactory, few radiofrequency energies were delivered (50C, 50W, 120–150 s). In 4 patients, (5.2%) radiofrequency energy by conventional catheter was inadequate, and cool path irrigation tip catheter was used. Post-RFA, V-A conduction was tested for using adenosine and tachycardia inducibility was tested using isuprel.

The data was analyzed using SPSS statistical software version 15 (SPSS, Inc. Chicago Illinois).

Results

The mean procedure time was 120.64 ± 57.27 min while the mean fluoroscopy time was 20.13 ± 17.37 min. 77 cases of consecutive RFAs were reviewed. They consisted of 49 males and 28 females. They had a mean age of 35.69 years (±14.62).

The frequency of associated cardiovascular diseases in the patients studied are diabetes mellitus 7 (9.1%), hypertension 3 (3.9%), coronary heart disease 3 (3.9%), atrial septal defect 2 (2.6%), hypothyroidism 1 (1.3%), ebstein anomaly 2 (2.6%), and transposition of great arteries 1 (1.3%).

The distribution of indications for RFA in the patients were recurrent, drug refractory palpitations 52 (67.5%), recurrent palpitations 14 (18.2%), recurrence following previous RFA 8 (10.4%). The indications, preexcited atrial fibrillation with fast ventricular rate, incessant tachycardia documented

Table 1: Distribution of accessory pathways

Location of accessory pathway	Frequency	Percentage
Right posteroseptal	15	19.5
Right midseptal	3	3.9
Right free wall	11	14.3
Left posteroseptal	6	7.8
Left anterolateral	11	14.3
Left anteroseptal	1	1.3
Left free wall	32	41.6
Para-Hisian	1	1.3
Persistent junctional reentrant tachycardia	1	1.3
Nodo-fascicular reentrant tachycardia	1	1.3
Multiple pathways	3	3.9
Total	77	100.0

tachycardia with recurrent palpitations were each in one case (1.3%).

The diagnoses were orthodromic tachycardia in the vast majority (97%). There were a case each (1.5%) of persistent junctional reentrant tachycardia and nodofascicular reentrant tachycardia. There were four cases of wide complex tachycardia, but there were due to associated RBBB in orthodromic tachycardia.

The distribution of pathways was as described in Table 1.

There were three cases of multiple pathways, one had typical AVNRT and with AVRT, right posteroseptal and right free wall, and left free wall with right posteroseptal.

The AP was concealed in 28 patients (36.4%), while preexcitation was documented in 49 (63.6%).

A total of 74 (96.1%) patients had successful ablations. In one with left anteroseptal AP few radiofrequency energies delivered did not result in loss of preexcitation and it was decided not to attempt further energy delivery in view of the pathway being nearer to the A-V node. Redo RFA using 3D electroanatomical mapping system + permanent pacemaker implantation was planned in the event symptoms recurred. In another patient with right posteroseptal AP and inferior vena cava interruption with azygos continuation, the right internal jugular vein tried for ablation, but the loss of antegrade preexcitation was only transient following RFA. A third developed pericardial effusion with no evidence of tamponade and ablation was deferred. Serial echo to monitor the progress of pericardial effusion to consider RFA after 1-week of stabilization was ordered.

Early complications were observed in only 2 (2.6%) patients. One had cardiac tamponade while the other had pericardial effusion without tamponade.

There was no mortality associated with the procedure.

Discussion

This study describes the results of catheter ablation therapy of AP carried out in the Electrophysiology Department of Madras Medical Mission between January 2013 and March 2014. AVRT was more common in the males (63.6%), similar to other publications.[4]

There was a very high success rate (96.1%), very low complication rates (2.6%) and no mortality in this study. These rates are comparable to that obtained in other reputable centers worldwide.[17,18] This recommends the procedure whenever patients meet the indication.

There is a need for appropriate referrals of patients that will benefit from the procedure and increased interest among cardiologists for training in cardiac electrophysiology.

Conclusion

This study shows that RFA of APs was associated with a high success rate and very low incidence of complication.

Limitations

The nationality of patients was not included in the data collected. The retrospective nature that made it difficult to fill up missing data and the small sample size of the study are other limitations.

Appreciation

The Medical Director of Federal Medical Centre Umuahia, Dr. Abali Chuku and the Staff of the Electrophysiology Clinical Research Office of Madras Medical Mission.

Source of funding

Nil.

Conflicts of interest

There are no conflicts of interest.

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