

Supraventriküler Taşikardilerin Tedavisinde Radyofrekans Katater Ablasyon Tedavisi: Tek Merkez Deneyimi

Radiofrequency Catheter Ablation Therapy in The Treatment of Supraventricular Tachycardia: A Single Center Experience

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ÖZ

GİRİŞ ve AMAÇ: Radyofrekans katater ablasyon supraventriküler taşikardilerin tedavisinde etkin bir yöntemdir. Biz bu çalışmamızda yeni kurulan bir aritmi merkezinde supraventriküler taşikardi sebebiyle ablasyon uyguladığımız ilk 269 hastaların sonuçlarını değerlendirmek istedik.

YÖNTEM ve GEREÇLER: Çalışmamızda Ocak 2013 ile Ocak 2016 tarihleri arasında yeni bir aritmi merkezinde supraventriküler taşikardi sebebiyle radyofrekans katater ablasyonu uygulanan 269 hastanın verileri retrospektif olarak incelendi. Tüm hastaların demografik bilgileri, elektrofizyoloji bulguları, uygulanan tedavi işlemleri ve karşılaşılan komplikasyonlar ve 1 yıllık takip sonuçları kayıt edildi.

BULGULAR: Çalışmaya 269 hasta (109 erkek) dahil edildi. Ortalama yaş $47,74 \pm 14,87$ idi. 196 hastada atrioventriküler nodal reenteran taşikardi (AVNRT), 35 hastada atrioventriküler reenteran taşikardi (AVRT), 18 hastada atrial taşikardi (AT), 20 hastada atrial flutter(AFL) ablasyonu uygulandı. 3 vaka işlem sırasında başarısız olundu (1 AT, 1 AVNRT, 1 AVRT). 1 yıllık takipte 7 hastada nüks görüldü (2 AT, 2 AVNRT, 2 AVRT, 1 AFL).

TARTIŞMA ve SONUÇ: RFCA kabul edilebilir bir başarı oranı ve düşük komplikasyon oranı ile SVT tedavisinde güvenli ve etkili bir yaklaşımdır. Sonuçlarımız uluslararası literatürle uyumludur.

Anahtar Kelimeler: Supraventriküler taşikardi; radyofrekans katater ablasyon; Elektrofizyolojik çalışma

ABSTRACT

INTRODUCTION: Radiofrequency catheter ablation (RFCA) is an effective method in the treatment of supraventricular tachycardia (SVT). In this study, we evaluated the results of the first 269 patients treated with RFCA of SVT in a our new arrhythmia center.

METHODS: 269 patients underwent RFCA for SVT between January 2013 and January 2016 were retrospectively evaluated in the study. Demographic and clinical characteristics of patients, electrophysiological findings and techniques, treatment methods, complications and one year follow-up data were recorded.

RESULTS: 269 patients (109 male) were evaluated in the study. Mean age was $47,74 \pm 14,87$. 196;35;18;20 patients underwent RFCA procedure for AVNRT;AVRT;AT;AFL, respectively. 3 patients had unsuccessful procedure (1 AT, 1 AVNRT, 1 AVRT). In 7 patients recurrences occurred (2 AT, 2 AVNRT, 2 AVRT,1 AFL) within 12 months after the ablation procedure.

DISCUSSION and CONCLUSION: RFCA is a safe and effective approach for the treatment of SVT with an acceptable success rate and low complication rate. Our results are compatible with international literature.

Keywords: Radiofrequency catheter ablation; supraventricular tachycardia; electrophysiology study

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INTRODUCTION

Supraventricular tachycardias (SVT) are commonly encountered in the clinical practice. Radiofrequency catheter ablation (RFCA) is an established treatment strategy to drug therapy for many forms of SVT (1). Except the SVT's that are associated with Wolf-Parkinson-White syndrome most cases of SVT are not life-threatening (2). Long term drug use are not effective and can be particularly harmful for some patients due to severe adverse effects. In addition, It is also associated with diminished quality of life (3).

Currently, RFCA is considered to be the first line treatment for some type of arrhythmias and particularly in cases that are refractory to drug therapies (1-4). RFCA is associated with a high success rate (ranging from 85%-100%) with a low complication rate. The recurrence rate depends on the type of SVT which is found to be 1%-8% in different studies (4). Operator experience is an another issue which has a significant impact on the success rate. Better results are observed after the first 250 cases and there is a long learning curve (5).

In this study, we aimed to report our first results of 269 patients that underwent SVT ablation procedure in a new arrhythmia clinic in a tertiary hospital in Turkey.

METHODS

The present study was a retrospective observational study. Patients that underwent RFCA procedure between January 2013 and January 2016 in a tertiary hospital in Turkey were enrolled in the study. The data was extracted from hospital records. Patients that underwent electrophysiological study (EPS) but in whom ablation was not attempted were excluded. During procedures, evaluation of electrophysiological findings and treatment methods were left to the discretion of the attending cardiologists.

Informed consent forms were obtained from all patients before the procedure. Final diagnosis was defined as the tachycardia induced at EPS that are thought to be responsible for clinical arrhythmias. The demographic and clinical characteristics of patients, type of arrhythmias, EPS indications,

treatment procedures and complications were recorded.

Electrophysiology and Ablation Procedure

All antiarrhythmic agents were stopped one week before the procedure. One 6F and two 7F sheaths were introduced through the femoral vein. A conventional four catheter EPS was performed with catheters located in right atrium, right ventricle, bundle of His and coronary sinus. Patients in whom left sided accessory pathways were considered, retrograde trans-aortic approach from the femoral artery was performed.

Bipolar electrograms were filtered at 30-500 Hz, amplified at gains of 20-80 mm/mV, and displayed and acquired on a physiological recorder (EP Tracer System, Netherlands). Tachycardia was induced using standard pacing protocols. Intravenous 5000 units of unfractionated heparin was administered to all patients. Differential diagnosis was made by using differential pacing maneuvers.

In case of AVNRT (Atrioventricular Nodal Reentry Tachycardia) diagnosis, RFCA was applied over the slow pathway using the combined anatomic approach and electrogram guided approach via the ablation catheter (RF Mariner MC-7Fr). RF energy was delivered at energy of 30-50 W and temperature of 45-60°C up to 60 seconds. In patients with small Koch's triangle, cryo-ablation was performed for the slow pathway ablation to avoid damaging the native conduction tissue.

For AVRT, the location of the accessory pathway was determined by mapping the shortest Atrioventricular (AV) interval during sinus rhythm in manifest accessory pathway and the shortest Ventriculoatrial (VA) interval during ventricular pacing or tachycardia. RFCA was performed at sites of shortest AV or VA interval. The success of ablation was defined as loss of pre-excitation or no-inducible tachycardia by pacing.

The ablation procedures of AFL and AT were performed by the guidance of electroanatomic mapping system (Ensite, St Jude Medical). Successful RFCA procedure was defined as index arrhythmias no longer being inducible at the end of the procedure and no evidence of accessory pathway being present. EPS was repeated 30

minutes after the last ablation to ensure that clinical tachycardia was no longer inducible.

Follow-up

All patients were followed up in outpatient clinic after 4 weeks from the procedure and at 6-12 months. All patients had 12-lead ECG and Holter recordings routinely during follow-up, and also an additional ECG was acquired if the patients experienced recurrence of symptoms.

Statistical Analysis

Statistical Software Package of SPSS version 17.0 was used for analysis. All the values were expressed as mean±standard deviation. Categorical data was reported as proportions and continuous data as percentages. $p < 0.05$ was considered statistically significant.

RESULTS

Two hundred and sixty nine patients (40.5% male) who underwent RFCA of supraventricular tachycardia were evaluated retrospectively in this study. Mean age was $47,74 \pm 14,87$. The type of supraventricular tachycardia of patients was depicted in Table 1.

Nine patients were treated with cryo-ablation (6 AVNRT, 3 AVRT). The procedure was unsuccessful in 3 patients (1 atrial tachycardia, 1 AVNRT, 1 AVRT). During the follow up of 1 year 7 patients had recurrence (2 atrial tachycardia, 2 AVNRT, 2 AVRT, 1 Atrial flutter).

Table 1. Type of Supraventricular Tachycardias of all patients

Type of Supraventricular Tachycardia	Number (patients)
Typical slow-fast atrioventricular nodal reentrant tachycardia	180
Atypical fast-slow atrioventricular nodal reentrant tachycardia	16
Atrioventricular reentrant tachycardia	35
Right lateral WPW AP	4
Right anteroseptal AP	2
Right posteroseptal AP	5
Left lateral AP	20
Left posteroseptal AP	2
Midseptal or parahisian AP	2
Atrial tachycardia	18
Right Atrial	15
Left atrial	3
Atrial flutter	20

One hundred and ninety six patients underwent atrioventricular nodal reentrant tachycardia

(AVNRT) ablation. Six of these patients were treated with cryo-ablation. The procedure was unsuccessful in 1 case. On the follow up 2 of these patients had recurrence. Two patients with AVNRT had re-intervention with cryo-ablation.

Thirty five patients underwent patients underwent atrioventricular reentrant tachycardia (AVRT) ablation. The details of the accessory pathways were depicted in table 1. The procedure was unsuccessful in 1 case (left postero-septal). Three of these patients were treated with cryo-ablation 2 patients had recurrence on the follow up (right antero-septal, 1 postero-septal). One of these patients with AVRT was treated successfully with RFCA.

Eighteen patients underwent atrial tachycardia ablation (15 right atrial), 20 patients underwent atrial flutter ablation. Two patients with atrial tachycardia (1 left atrial, 1 right atrial) and 1 patient with atrial flutter had recurrence on the follow up. The origin of the atrial tachycardias were tricuspid annulus in 4 cases, crista terminalis in 9 cases, right upper pulmonary vein in 1 case, left interatrial septum in 2 cases, coronary sinus ostium in 1 case, right atrial appendix in 1 case.

For the evaluation of complications; 9 patients had hematoma at the femoral vein puncture side, 2 patients had deep venous thrombosis. None of patients had perforation, arterial laceration, femoral vein injury, arteriovenous fistula formation and AV block during intervention. Mean fluoroscopy time was $16,89 \pm 4,28$ minutes.

DISCUSSION

Overall the clinical outcome and clinical experience of RFCA in the treatment of SVT patients is encouraging in our center. The success rate and long term results are compatible with the current literature. Because of the remarkable safety and efficacy of catheter ablation, it is now considered as first line therapy for most types of supraventricular arrhythmias (1-4).

AVNRT can be treated with RFCA of the slow pathway. We have used combined anatomic and electroanatomic approach for the treatment of the AVNRT. RFCA is associated with the development of AV block in 1% of cases (6). None of our patients developed AV block during the

procedure and follow up. We have used cryoablation during the procedure in 8 cases.

Cryoablation has the advantage of testing the ablation site for the occurrence of AV block before producing permanent lesions (7). Two patients had recurrence during follow up and ablation was performed again successfully in these patients. Electroanatomic mapping by Ensite system was used in 38 patients for the treatment of atrial tachycardia and flutter. None of these patients experienced complications and 3 patients had recurrence at follow up.

For the accessory pathway ablations, only in one case we failed to ablate successfully and the patients had recurrence at follow up. After the first procedure the resolution of inflammation and edema with the injury of RFCA can be associated with the recurrence in 5% of patients (8, 9). The patients who had recurrence were treated successfully during the second intervention.

Recurrence after ablation of an accessory pathway, manifested by return of delta waves or supraventricular tachycardia was reported in 5 to 12 percent of the patients. Exact delineation of the pathway location and anatomic knowledge of the operator are very important in these cases (10,11). Approximately one half of the recurrences after AP ablation occur after the first 12 hours after the procedure and repeat intervention usually is associated with permanent cure in these patients (12).

Current literature supports the notions that RFCA procedures have a learning curve and results of RFCA improve with the operator's experience (8). In a conducted study unsuccessful cases decreased from 24% in the first 50 cases to 4% after the first 250 cases in AP ablation (9). Despite the learning curves, our results were promising and compatible with experienced centers. Our complication rates were compatible with the literature. None of our patients had serious complication such as cardiac perforation, tamponade and mortality.

In conclusion, our current results indicate that the RFCA is a safe and effective approach for the treatment of SVT with an acceptable success rate

and low complication rate. Our results are compatible with international literature.

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