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Six-month success of radiofrequency ablation in cardiac arrhythmias treatment – experience of our centre

Šestomesečni uspeh radiofrekventne ablacije u lečenju poremećaja srčanog ritma – iskustvo našeg centra

Ružica Jurčević Mudrić, Lazar Angelkov, Milosav Tomović, Dejan Kojić, Predrag Milojević

Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia

Abstract

Background/Aim. Numerous trials have shown a high success of radiofrequency ablation (RFA) in the treatment of the patients with cardiac arrhythmias. We aimed to examine the RFA initial success in treatment of different cardiac arrhythmias and the RFA success after 6 months of follow-up. Second aim was to evaluate influence of all clinical and echocardiography parameters on initial and 6-month success and failure of RFA. **Methods.** The present study included 320 consecutive patients with atrial and ventricular arrhythmias in which RFA was performed during 2014 in the Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia. We evaluated the initial RFA success and success of this procedure after 6-month follow-up. We also investigated the prognostic role of clinical and echocardiography parameters on initial and 6-month success and failure of RFA. **Results.** The RFA initial success for RFA of atrioventriculas (AV) node and AV nodal reentrant tachycardia (AVNRT) was 100%, RFA of pulmonary veins 99%, RFA of atrial flutter 92%, RFA of premature ventricular complexes (PVC) and the Wolf-Parkinson-White (WPW) syndrome 87%, RFA of ventricular tachycardia 85% and RFA of atrial tachycardia 78%. The success of RFA after 6 months of follow-up for RFA of the AV node was 100%, RFA of AVNRT 94%, RFA of atrial flutter 90%, RFA of WPW syndrome 86%, RFA of pulmonary veins 79% (paroxysmal atrial fibrillation 88% and persistent atrial fibrillation 63% with a significant difference $p < 0.05$), RFA of PVC 78%, RFA of ventricular tachycardia 77% and RFA of atrial tachycardia 67%. **Conclusion.** This study proved a very high RFA initial success in treatment of cardiac arrhythmias and a satisfactory RFA success after 6 months of follow-up. Only the prognostic value had the type of atrial fibrillation in the group with catheter ablated pulmonary veins: after 6-month follow-up, the patients with paroxysmal atrial fibrillation had a significantly better outcome than those with persistent form.

Key words:
arrhythmias, cardiac; catheter ablation; electrocardiography; recurrence; serbia.

Apstrakt

Uvod/Cilj. Veliki broj studija dokazao je visok uspeh radiofrekventne ablacije (RFA) u izlečenju bolesnika sa različitim srčanim aritmijama. Primarni cilj rada bio je da odredi neposredni uspeh RFA u lečenju različitih poremećaja srčanog ritma i uspeh RFA nakon šest meseci praćenja bolesnika. Sekundarni cilj je bio evaluacija uticaja svih kliničkih i ehokardiografskih parametara na neposredni i šestomesečni uspeh i neuspeh RFA. **Metode.** Istraživanje je obuhvatilo 320 uzastopnih bolesnika kod kojih je urađena RFA tokom 2014. godine na Institutu za kardiovaskularne bolesti "Dedinje", Beograd, Srbija. Procenjivan je neposredni uspeh RFA i uspeh RFA nakon šest meseci praćenja bolesnika. Određivan je uticaj kliničkih i ehokardiografskih parametara na neposredni, šestomesečni uspeh i neuspeh RFA. **Rezultati.** Neposredni uspeh iznosio je za RFA atrioventrikularnog (AV) čvora i RFA AV nodalne *reentrant* tahikardije (AVNRT) 100%, RFA plućnih vena 99%, RFA atrijalnog flatera 92%, RFA komorskih ekstrasistola i Wolf-Parkinson-White (WPW) sindroma 87%, RFA komorske tahikardije 85% i RFA atrijalne tahikardije 78%. Uspeh RFA nakon šest meseci praćenja ovih bolesnika bio je za RFA AV čvora 100%, RFA AVNRT 94%, RFA atrijalnog flatera 90%, RFA WPW sindroma 86%, RFA plućnih vena 79% (paroksizmalna atrijalna fibrilacija 88% i perzistentna atrijalna fibrilacija 63% sa značajnom razlikom, $p < 0.05$), RFA komorskih ekstrasistola 78%, RFA komorske tahikardije 77% i kod RFA atrijalne tahikardije 67%. **Zaključak.** Postignut je veoma visok neposredni uspeh RFA u izlečenju srčanih aritmija i zadovoljavajući uspeh RFA nakon šest meseci praćenja bolesnika. Prognostički značaj jedino je imao tip atri-

Correspondence to: Ružica Jurčević Mudrić, Institute for Cardiovascular Diseases Dedinje, Heroja Milana Tepića 1, 11000 Belgrade, Serbia. E-mail: ruzicajurcevic@hotmail.com

jalne fibrilacije u grupi bolesnika kojima je urađena RFA plućnih vena: nakon šest meseci praćenja bolesnici sa paroksizmalnom atrijalnom fibrilacijom imali su značajno bolji uspeh RFA nego oni sa perzistentnom formom.

Ključne reči:
aritmija; ablacija preko katetera; elektrokardiografija; ehokardiografija; recidiv; srbija.

Introduction

Importance of radiofrequency ablation (RFA) in the treatment of atrial and ventricular arrhythmias is high and the success of procedure increases every day due to the new methods and techniques [1]. RFA is the most successful therapy for typical atrial flutter (AF), atrioventricular (AV) nodal reentrant tachycardia (AVNRT), the Wolf-Parkinson-White (WPW) syndrome and idiopathic ventricular tachycardia (VT), effective in over 95% of the patients [2]. These patients do not need the antiarrhythmic drugs after successful RFA.

The success rate of RFA is lower in the management of premature ventricular complexes (PVC) and VT in structural heart diseases, 75%–85% after the follow-up of the patients [3]. RFA of pulmonary veins (PV) is the newest field in therapy of atrial fibrillation (AFib) with the greatest results in the paroxysmal form of this disease and about 80% of success after 5 years of following up the patients [4].

The aim of this study was to examine the initial success of RFA in treatment of atrial and ventricular arrhythmias and to evaluate the RFA success after 6 months of the patients' follow-up. We also aimed to investigate the influence of all clinical and echocardiography parameters on the initial and 6-month success of RFA and the initial and 6-month failure of RFA.

Methods

The present study included 320 consecutive patients with different cardiac arrhythmias in which RFA was performed during 2014 at the Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia. We divided patients into the following 8 groups: RFA of AF, RFA of atrial tachycardia (AT), RFA of PV, RFA of AV node, RFA of AVNRT, RFA of PVC, RFA of VT and RFA of WPW syndrome. We examined the following in each group: initial success of RFA and success after 6 months of the patients' follow-up; prognostic role of all clinical and echocardiography parameters on the initial and 6-month RFA success; prognostic influence of clinical and echocardiography parameters on initial and 6-month failure of RFA.

We evaluated the clinical symptoms and signs, electrocardiogram (ECG), 24 h ambulatory monitoring, echocardiography and performed the electrophysiological exam and RFA in all patients. Transoesophageal echocardiography (TEE) was done in all patients in the groups for RFA of AF, AT and PV with paroxysmal and persistent arrhythmias; we examined the presence of thrombus in left auricula and left atrium, anatomy of left, right, superior and inferior PV because of a significant inter- and intra-patient variability in the number, size and bifurcation of the PVs. The patients with thrombus were excluded from the study because of a risk of cerebral insult. Multislice computed tomography (MSCT) of PV was performed in all patients in the group for RFA of atrial fibrillation and together with the images from TEE which provided better visualization of PVs.

An expert with a manipulation skill, introduced catheter for ablation in pathoanatomic substrate which caused arrhythmia and delivering the RF energy made a limited lesion, a few millimeters wide and deep in the endocard. The RF energy was applied at a target temperature of 50°C with a power limit to 30–35 W for 30–60 s.

This trial determined the RFA initial success, the RFA success after 6 months of the follow-up and the influence of all clinical and invasive parameters on the procedural success and failure. We defined the initial success as termination and inability to induce arrhythmia after catheter ablation. The success of RFA of AF means the achievement bidirectional block in cavotricuspidal isthmus. The endpoint for RFA of PV was establishment of bidirectional block between left atrium and PV. The failure of RFA means that after the procedure we can induce identical tachycardia like before RFA.

After 6 months from the ablation procedure, a recurrence of arrhythmias was evaluated based on the present symptoms, clinical signs, ECG, 24 h ambulatory monitoring. The patients who had symptoms without documentation of arrhythmia recidivism were examined by 7-day ambulatory monitoring. Recurrence was defined as episodes of arrhythmias lasting for more than 30 s after a 30-day blanking period. None of the patient with the successful RFA received antiarrhythmic drugs after the ablation procedure – except the group with RFA of PV (6 weeks antiarrhytmic therapy and 3 months anticoagulation). It means that the 6-month success for RFA of PV was evaluated in drug-free patients. A repetition of RFA was recommended for the patients with recurrence of their arrhythmias and for initially failed RFA.

The continuous variables are expressed as means ± standard deviation (SD). The initial successes of RFA and that after 6 months of follow-up were shown in percentage. Comparison between the groups was performed using the Student`s *t*-test (unpaired) and the proportions were compared by using χ^2 analysis with an aim to evaluate the influence of all clinical and echocardiography parameters on the initial and 6-month success and failure of RFA. The values of $p < 0.05$ were considered significant.

Results

During 2014, at the Institute for Cardiovascular Diseases "Dedinje", RFA was performed in 320 patients with the initial success in 93% and failure in 7%, respectively, and was effective in 296 patients and unsuccessful in 24 cases (Table 1). The RFA success rate after 6 months of follow-up

was 83% (267 cases) because 29 patients had recurrence of arrhythmia (10%). A total number of patients who appeared to have the ineffective RFA after 6 months of follow-up was 53 (17%) and they were indicated to repeat the intervention.

RFA of AF was done in 38 patients (36 with typical AF and 2 with atypical AF) which baseline characteristics prior to the initial procedure are shown in Table 2. The RFA initial success rate in AF was 92%, 35 patients had the successful RFA and in 8% (3 cases) was ineffectual. After 6 months of follow-up, only 1 patient had a recurrence of AF and we calculated the success of RFA of AF in 34 (90%) cases and failure in 4 (10%) patients who were indicated for the repeat procedure. RFA of typical AF in 36 patients had the initial success in 97% (effectual in 35 patients), and after 6 months of follow-up, it was successful in 94% (recidivism in 1 patient). Both cases with atypical AF had unsuccessful RFA initially. Six patients with ablated AF and accompanied paroxysmal AFib were indicated for RFA of PV. The clinical and echocardiography parameters did not have influence on the initial and 6-month success and failure of RFA in the group with AF.

The initial success rate of RFA in 9 patients with AT was 78%. RFA was effective in 7 cases and in 22% (2 cases) was unsuccessful. After 6 months of follow-up 1 patient had recidivism of AT, and RFA of AT had good results in 67% (6 patients) and failure in 33% (3 patients).

RFA of PV was performed in 76 patients (65 males and 11 females mean age of 55 ± 8 years) with the AFib diagnosis and-systolic diameter (Table 2). The average duration of the symptoms was 5 ± 4 years and 8 (11%) patients had syncope. Echocardiography found the mean, values for ejection fraction (EF) 55 ± 8% (range 20%–65%), endodiastoli diameter (EDD) 54 ± 4 mm, and-systolic diameter (ESD) 36 ± 5 mm and diameter of left atrium (LA) 42 ± 5 mm (between 30–53 mm). According to the duration, AFib was divided into two types: paroxysmal AFib in 49 (65%) patients and persistent AFib in 27 (35%) cases.

The initial success rate for RFA of PV in 76 patients with AFib was 99%, which means that RFA was effective in 75 patients and in 1% (1 patient) was unsuccessful. After 6 months of follow-up, RFA of PV was efficient in 79% (60 patients) and unsuccessful in 21% (16 patients) who were indicated for the repeat procedure. It means that 20% (15) of the initially successfully ablated patients had the recurrence of AFib. A significant difference and prognostic influence was proved for the type of AFib ($p < 0.05$), the patients with paroxysmal AFib had better outcome after 6 months of follow-up with RFA success in 88% (of 49 cases ablated, 43 cured) than those with persistent AFib and the RFA success in 63% (of 27 cases ablated, 17 cured).

Table 1

Radiofrequency ablation (RFA) the initial success and RFA success after 6 months of the follow-up of 320 patients with cardiac arrhythmias

Arrhythmia type (number of patients)	Initial success, number (%) of patients	6 months follow-up success number (%) of patients
Atrial flutter (38)	35 (92)	34 (90)
Atrial tachycardia (9)	7 (78)	6 (67)
Atrial fibrillation (76)	75 (99)	60 (79)
RFA of AV node (11)	11 (100)	11 (100)
AVNRT (50)	50 (100)	47 (94)
PVC (45)	39 (87)	35 (78)
VT (47)	40 (85)	36 (77)
WPW syndrome (44)	39 (87)	38 (86)
Total (320)	296 (93)	267 83)

AVNRT – atrioventricular nodal reentrant tachycardia; PVC – premature ventricular complexes; VT – ventricular tachycardia; WPW – Wolf-Parkinson-White.

Table 2

Baseline characteristics of patients (n = 320) with cardiac arrhythias prior to the radiofrequency ablation (RFA)

Arrhythmia type (number of patients)	Age (years)	Gender (M/F)	Symptoms duration (years)	Syncopa n (%)	Ejection fraction (%)	LA diameter (mm)	Hypertension n (%)	Structural heart disease n (%)
AF (38)	58 ± 11	29/9	3 ± 2	3 (8)	52 ± 11	41 ± 5	5 (13)	27 (71)
AT (9)	41 ± 19	5/4	6 ± 4	2 (22)	52 ± 13	37 ± 6	0 (0)	1 (11)
Afib (76)	55 ± 8	65/11	5 ± 4	8 (11)	55 ± 8	42 ± 5	33 (43)	14 (18)
AV node (11)	68 ± 6	8/3	4 ± 3	3 (27)	28 ± 14	49 ± 5	1 (9)	8 (73)
AVNRT (50)	48 ± 11	22/28	12 ± 11	9 (18)	59 ± 4	36 ± 5	7 (14)	3 (6)
PVC (45)	46 ± 15	17/28	6 ± 5	8 (18)	55 ± 8	38 ± 6	5 (11)	14 (31)
VT (47)	54 ± 16	37/10	3 ± 2	18 (38)	35 ± 17	42 ± 6	1 (2)	45 (96)
WPW syndrome (44)	32 ± 15	29/15	9 ± 9	5 (11)	57 ± 6	35 ± 4	6 (14)	1 (2)

AF – Atrial flutter; AT – atrial tachycardia; Afib – atrial fibrillation; AVNRT – atrioventricular nodal reentrant tachycardia; PVC – premature ventricular complexes; AVnode – atrioneutricular node; VT – ventricular tachycardia; WPW – Wolf-Parkinson-White; M/F – male/female; LA – left atrium.

Complications for RFA of PV were reported in 6 patients: 1 patient had pericardial effusion and 4 patients had hematoma on the place of punction (Table 3). These complications were cured conservatively, except in one case of jugular vein hematoma when vascular surgery had to be done. In one patient an ablation catheter clenched in chordaes of myocardium and a cardiac surgery solved the problem.

Table 3

Significant complications of radiofrequency ablation (RFA) in 12 patients out of 320 (3.75%)

Complications	Frequency, number (%)
Inguinal hematoma	5 (1.56)
Jugular Vein hematoma	1 (0.31)
Pericardial effusion	1 (0.31)
Cardiac tamponade	2 (0.63)
Complete AV block	2 (0.63)
Catheter clenched in myocardium chordaes	1 (0.31)
Total	12 (3.75)

AV – atrioventricular.

The initial success rate for RFA of AV node in 11 patients with permanent tachyarrhythmia absolute was 100% which means that in all patients RFA was effective. After 6 months of follow-up, there was no relapse of arrhythmia and the success rate for RFA of AV node remained 100%.

RFA of AVNRT was efficient in all 50 patients with the initial success of 100%. After 6 months of follow-up RFA of AVNRT had a success in 94% (47 patients) and the recurrence of tachycardia in 6% (3 patients) which were indicated for the repeat intervention. The electrophysiology study prior to RFA diagnosed a typical slow-fast AVNRT in all 50 patients.

RFA of PVC was performed in 45 patients (17 males and 28 females) with the mean age 46 ± 15 years (range 18–77 years). Average duration of the symptoms was 6 ± 5 years (range 1–20 years) and syncope had 8 (18%) patients. On admission to hospital, the changes were found in 27 (60%) cases using the standard ECG: PVC in 26 (58%) patients and rhythm of pacemaker in 1 (2%) case. Echocardiography found average EF 55% ± 8% (range 25–60%), EDD 54 ± 5 mm, ESD 34 ± 6 mm and the LA dimension 38 ± 6 mm (range 28–53 mm).

The RFA initial success in 45 patients with PVC was 87%, i.e. in 39 cases RFA was effective and it was unsuccessful in 6 cases 13%). After 6 months of follow-up, RFA had good results in 78% (35 patients) and failure in 22% (10 patients) because arrhythmias recurrence occurred in 4 cases. The localization of ablated PVC was determined in right ventricle in 61% (27 patients) and in left ventricle in 39% (18 patients). The right ventricular outflow tract was presented in 55% (24 cases) and left ventricle outflow tract in 26% (12 cases). In our results, there were no any good or bad predictor for the initial or 6-months prognosis in this group of patients found.

RFA of VT was done in 47 patients (37 men and 10 women) with the mean age of 54 ± 16 years (range 17–80 years). The average duration of symptoms was 3 ± 2 years (between 1–8 years) and 18 (38%) patients experienced syncope. Fifteen (33%) patients had implantable cardioverter defibrillators. On admission to hospital, the abnormal electrocardiogram was found in 10 (20%) patients: PVC in 3 (6%) patients, VT in 3 patients, AFib in 1 (2%) patient, left bundle branch block in 2 (4%) patients and rhythm of pacemaker in 1 patient. Echocardiography found the mean values for EF 35% ± 17% (range 10–60%), EDD 61 ± 8 mm, ESD 45 ± 10 mm and the LA diameter 42 ± 6mm (range 30–60 mm). Five patients had a significant mitral valve regurgitation (3+) and indication for a surgery of mitral valve.

The initial success rate for RFA of VT in 47 patients was 85%, which means that RFA was efficient in 40 patients and failure happened in 7 (15%) cases. After 6 months of follow-up, 4 (8%) patients had the recurrence of VT, and a success rate was 77% (36 patients) and failure of ablation of VT, after the follow-up was 23% (11 patients). The location of ablated VT was described in right ventricle in 27% (13 patients), left ventricle in 49% (22 patients), epicardial in 18% (9 patients) and fascicular VT in 6% (3 patients). In right ventricle, the VT form outflow tract was presented in 23% (11 cases) and from tricuspid annulus in 4% (2 cases). In left ventricle, VT form outflow tract was found in 4% (2 cases), mitral annulus in 4% and the most common free wall was noted in 34% (16 patients). One patient had VT origin from post infarct psudoaneurysm in the posteroseptal part of left ventricle and in one case VT was from the papillary muscle. The approach to RFA depended of the VT site of origin: retroaortal in 32% (14 cases), through femoral vein in 27% (13 patients), transseptalis access in 23% (11 patients) and epicardial approach in 18% (9 patients). After RFA of VT, an implantable cardioverter defibrillator was indicated in 10 patients because the control electrophysiological study induced fast VT or ventricular fibrillation. We did not prove an influence of VT localization, the clinical and echocardiography parameters on the initial and 6-monthsuccess or failure of RFA.

There were 4 complications of VT catheter ablation: 2 inguinal hematomas were managed conservatively, 1 cardiac tamponade was cured with pericardiocentesis and 1 complete AV block was treated with implantation of pacemaker (Table 3).

Initial success for RFA of WPW syndrome in 44 patients was 87%; in 39 patients the results were good and in 13% (5 patients) they were ineffective. After 6 months of follow-up, recurrence happened in 1 (1%) case, and the RFA success rate was 86% (efficient in 38 cases) and failure in 14% (6 patients). According to the localization, the accessory pathways (AP) were classified: right ventricular free wall in 5 (13%) cases, left ventricular free wall in 19 (43%) cases, septal position in 19 (43%) cases and epicardial location in 1 (1%) case. We did not find any prognostic role of parameters on the initial and 6-months success or failure of RFA. We described two complications of catheter ablation of AP: in one case the complete AV block was managed with implantation of pacemaker, and in another case, the cardiac tamponade was treated with pericardiocentesis (Table 3).

Significant complications of RFA were reported in 12 (3.75%) patients. There were not procedure related deaths.

Discussion

The present study includes the largest number of patients with cardiac arrhythmias that were analyzed at the Institute for Cardiovascular Diseases "Dedinje", Belgrade, Serbia. Our results proved to be of a high importance and capability of RFA in the treatment of atrial and ventricular arrhythmias, and can be compared with results recorded in the eminent electrophysiology laboratories [1, 4]. This trial showed an excellent initial success of RFA in 93% of 320 patients and failure in 7% of cases which were indicated for the repeat procedure. After 6 months of follow-up, 10% had the recurrence of arrhythmias and the RFA success was satisfactory in 83%.

This study found the initial success of 97%, and after 6 months of follow-up, good results were achieved in 94% of patients. Atypical AF was found only in 2 cases and we did not analyze them. In relevant literature, a success of catheter ablation of typical AF is over 95%, and smaller for atypical AF [5].

The group with ablated AT had the small number of patients, so we cannot compare our results with other studis where the success rate was 93% for right atrium AT and smaller for left atrium AT [6].

The present study showed the eminent initial success of 99% in the patients with ablated PV. We proved the RFA success after 6 months of follow-up in 79% and significantly better outcome ($p < 0.05$) in the patients with paroxysmal AFib (success rate of 88%) than those with persistent AFib (success rate 63%). Sohns et al. [7] found the initial success for catheter ablation of PV in 92%, and after 2 years of follow-up it was 81% for paroxysmal AFib and 76% for the persistent form. A large number of studies identified the predictors of a poor outcome following RFA of PV: non-paroxysmal AFib and particulary longstanding persistent AFib; increased atrial size; sleep apnea and obesity; elderly patients; decreased left ventricular function; left atrial fibrosis as detected by cardiac magnetic resonance imaging (MRI) [8]. We proved only one predictor (paroxysmal AFib) of a good 6-month prognosis in our patients with ablated PV. The limitations of our study were small number of cases and only 6 months follow-up after RFA of PV comparing to other trials with a larger number of patients and longer follow-up [4, 7, 8].

Numerous trials reported the recurrence of AFib after RFA of PV in 20%–40% of patients, while recidivism of AFib was 20% in our patients after 6 months of follow-up [4, 6]. Early relapse of AFib and/or AT is frequent during first 3 months after the catheter ablation of PV and can spontaneously vanish, so experts made consensus that repeat RFA was not recommended during this time [4]. They also concluded that, in some patients who had highly symptomatic atrial arrhythmias resistant to the treatment with antiarrhythmic drugs, it was recommended to ablate PV within 3 months after first intervention. Most of the studies confirmed that the patients who had recurrence and underwent repeat RFA had the most frequently origin of AFib from already ablated PV and rarely from a new focus in non-ablated PV and another location in atrium [4, 7, 8].

The treatment of drug resistant permanent absolute tachyarrhythmia in our patients with RFA of AV node had the excellent initial success in 100% without the recurrence after 6 months of follow-up. Numerous trials showed the success rate of 99%–100% for RFA of AV node [2].

The present study reported a great initial success of 100% for RFA of AVNRT, and after 6 months of following up period, the success was 94%. Stern et al. [9] revealed the initial success in 98% of cases for RFA of AVNRT, and after 3 months of follow-up, recurrence was 2%. All our patients had the typical slow-fast form of AVNRT, while in literature this form was described in 90% of cases [6].

RFA of PVC in our patients had the initial success of 87% and after 6 months of follow-up success is 78%. Numerous studies revealed the initial success for RFA of PVC to be 80%–90% [10, 11].

RFA of VT had good initial results in 85% of our patients, and after 6 months of follow-up, the success was 77%. Famous electrophysiology laboratories had 17% of epicardial mapping while our results for RFA of epicardial VT were distinguished by 18% [12]. Pederson et al. [1] revealed the biggest success of RFA for idiopathic VT from right and left ventricular outflow tracts (over 90%), while from other sites of origin the results of VT catheter ablation were modest (71%–79%) [1, 3]. Our results do not prove any good or bad predictor of initial or 6-month success or failure in the groups with RFA of PVC and VT. Numerous trials identified the predictors of a poor prognosis for RFA of PVC and RFA of VT: structural heart disease, decreased left ventricular EF, older patients and presence of the RFA major complications [1].

This study found the modest initial success of RFA of WPW syndrome in 87% of cases, and after 6 months of follow-up, the success in 86% of cases. In literature, the initial good results for RFA of AP was 99%, and after 3 months of follow-up, recidivism was 2% [13]. We did not find a prognostic role of AP location, the clinical and echocardiography parameters in the group of patients with RFA of AP. In the largest trial conducted on 1,050 patients, Calkins et al. [14] reported that the success rate for catheter ablation of left free wall APs was slightly higher than for RFA of right-sided APs (95% *vs* 90%, $p = 0.03$). After an initially successful procedure in 93% of patients, the recurrence of AP conduction was found in approximately 5% of cases. The recurrence-free interval after ablation was also the best with left-sided pathways.

Limitations of the present study were 8 groups of different arrhythmias with the small number of patients and a short 6-month follow-up. These facts influenced our finding of only one prognostic parameter – the type of atrial fibrillation in the group of patients with ablated PV. The data from present trial will be included in a future study with a bigger number of cases and longer follow-up.

This study showed significant RFA complications in 12 of 320 (3.75%) patients, which is acceptable and can compare with result (3%–4.2%) from the other eminent electrophysiology laboratories [2]. There were no deaths during RFA in our patients which are excellent results.

According to our results and the data from literature, we conclude that RFA is a safe procedure that is evolving with a

great success in treatment of cardiac arrhythmias. Catheter ablation is a therapy of choice for the management of typical AF, AVNRT, WPW syndrome and idiopathic VT.

Conclusion

The present study proved a very high RFA initial success in treatment of atrial and ventricular arrhythmias and the satisfactory RFA success after 6 months of follow-up. Only the prognostic value had a type of atrial fibrillation in the group with catheter ablated pulmonary veins: after 6 months of the follow-up, the patients with paroxysmal atrial fibrillation had a significantly better outcome than those with the persistent form.

This trial showed a great success of RFA, high in therapy of cardiac arrhythmias, which can be compared with the results in famous electrophysiology laboratories.

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