

Catheter ablation of atrial fibrillation in patients with hypertrophic cardiomyopathy: atrial fibrillation type determines the success rate

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Abstract

Background: Atrial fibrillation (AF) in patients with hypertrophic cardiomyopathy (HCM) is generally associated with deterioration of the clinical status, functional capacity, and quality of life. It is also an independent risk factor for stroke and death. Studies evaluating the effectiveness of AF ablation in this cohort are relatively scant, have included relatively few patients, and their results are somewhat conflicting. Thus, the aim of this study was to assess the safety and efficacy of catheter ablation of AF in patients with HCM.

Methods: Thirty patients (10 females; mean age 48.7 ± 11 years) with drug-refractory paroxysmal ($n = 14$), persistent ($n = 7$), or long-persistent (> 1 year; $n = 9$) AF were prospectively recruited into the study. Eleven patients were in New York Heart Association (NYHA) class I, 13 patients were in NYHA class II, and 6 patients were in NYHA class III. Mean atrial volume was 180 ± 47 mL, interventricular septum thickness was 20.5 ± 6.3 mm, and left atrial area was 29.8 ± 6.2 cm². Ablation protocol was adjusted to the clinical and electrophysiological status of the patients. Pulmonary vein isolation and bidirectional cavo-tricuspid isthmus block were performed in all patients. In addition, left atrial linear lesions were created and complex fragmented atrial potentials were ablated in patients with persistent and long-persistent AF, as well as during repeated procedures.

Results: At 12 months, stable sinus rhythm (SR) was present in 16 (53%) patients, significantly more frequently in patients with paroxysmal AF (71% in SR) compared to those with persistent (57.1% in SR) or long-persistent (22% in SR) AF. A significant reduction of AF burden was observed in 85.7% of patients with paroxysmal AF, 71.4% of patients with persistent AF, and 55.5% of patients with long-persistent AF. Single procedure success rate was 33% (10 patients), and repeat ablation procedures were performed in 13 patients. No periprocedural complications occurred. Thromboembolic events were noted in 2 patients with arrhythmia recurrence during the follow-up, including stroke in 1 patient and peripheral embolism in the other patient. In both these patients, heart failure worsening was observed during these events, and anticoagulation was inadequate in one of them. Five of 16 patients in whom stable SR was observed during the follow-up were off antiarrhythmic drug therapy at final evaluation. In the other 6 patients, antiarrhythmic drug therapy was continued due to ventricular arrhythmias. Successfully treated patients more often had paroxysmal AF (successful ablation: paroxysmal AF in 10 of 16 patients; unsuccessful ablation: paroxysmal AF in 4 of 14 patients; $p = 0.009$) and were younger (45 ± 11.5 years vs. 52.6 ± 9.2 years; $p = 0.046$). In addition, a trend toward a reduced need for cardioversion at the end of the procedure was also observed in these patients (3 patients in the successful ablation group vs. 8 patients in the unsuccessful ablation group; $p = 0.056$). In multivariate regression analysis, paroxysmal AF was the only independent predictor of a successful outcome.

Conclusions: Catheter ablation of AF in patients with HCM is an effective and safe therapeutic option, particularly in patients with paroxysmal AF. Effectiveness of ablation is significantly smaller in patients with persistent AF and even more so in those with long-persistent AF. Repeated procedures were often necessary. Continued antiarrhythmic drug therapy is often required due to a significant degree of atrial remodelling.

Key words: hypertrophic cardiomyopathy, atrial fibrillation, catheter ablation of atrial fibrillation

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INTRODUCTION

Atrial fibrillation (AF) is the most common arrhythmia in hypertrophic cardiomyopathy (HCM), and its occurrence is usually associated with development or worsening of heart failure symptoms, along with a significant increase in the risk of stroke and death [1, 2]. Use of antiarrhythmic drugs to maintain sinus rhythm (SR) is of limited value and may lead to adverse effects [3, 4]. Various approaches to transcatheter ablation of AF have proven successful in the treatment of this arrhythmia in patients with or without structural heart disease, including those with HCM [5–10]. However, data on ablation in patients with HCM and drug-refractory AF are scant and were collected in relatively small patient groups. In addition, these studies showed some significant differences in regard to both procedural aspects and outcomes of this treatment [11–16]. Thus, the aim of this study was to assess the safety and efficacy of radiofrequency catheter ablation of AF in patients with HCM.

METHODS

Thirty patients were prospectively recruited into the study from September 2008 to June 2011. The diagnosis of HCM was based on the echocardiographic finding of asymmetric left ventricular hypertrophy in the absence of other factors that might result in a similar degree of hypertrophy [17]. AF was refractory to drugs in all study participants. The exclusion criteria included anteroposterior left atrial (LA) dimension > 6 cm, age > 70 years, left ventricular outflow gradient > 50 mm Hg, LA thrombus, and conditions precluding anticoagulant therapy.

Paroxysmal AF was found in 14 (47%) patients, persistent AF that did not resolve spontaneously within 7 days or required cardioversion for termination was present in 7 (23%) patients, and long-persistent AF, defined as continued presence of AF for at least 12 months before ablation, was found in 9 (30%) patients.

Before ablation, all patients were treated with oral anti-coagulants to maintain the international normalised ratio (INR) of ≥ 2 . Chronic antiarrhythmic therapy was continued in the perioperative period and for at least 3 months after ablation. In patients who required antiarrhythmic drugs due to ventricular arrhythmia, this therapy was not discontinued after ablation. Before ablation, all patients underwent 24- to 48-hour ambulatory Holter monitoring and standard echocardiographic examination, and 8 patients also underwent 2-week continuous electrocardiographic (ECG) monitoring using the PocketECG system. In addition, all patients underwent pre-procedural computed tomography of LA to evaluate its size and anatomy, exclude the presence of LA thrombus and evaluate the size of pulmonary vein ostia. Baseline N-terminal brain natriuretic propeptide (NT-proBNP) was determined in all patients. The study was approved by a local ethics committee, and all patients gave informed consent for participation in the study. The study was conducted in accordance with the Helsinki Declaration.

Electrophysiological testing and ablation

Right femoral venous access was used to introduce catheters into the heart. Surface ECG and intracardiac electrograms were recorded using EP MedSystems (West Berlin, New Jersey, USA) or Bard (Bard, Inc. Lowell, MA, USA) electrophysiological systems. For ablation, CARTO (Biosense Webster, Inc., Diamond Bar, CA, USA) or EnSite NavX (St. Jude Medical, St. Paul, Mn, USA) electroanatomic mapping systems were also used. A deflectable quadripolar diagnostic catheter was used in all patients, initially placed in the coronary sinus. Following transeptal puncture, an ablation catheter and a circumferential mapping catheter (Lasso, Biosense Webster, Diamond Bar, CA, USA) used for mapping and confirming pulmonary vein electrical isolation were introduced to LA. Heparin was administered intravenously during ablation, initially in a dose of 100 U/kg and then 1000–1500 U every hour. In all patients, ablation was performed using an irrigated tip catheter (Navistar, Thermocool, Biosense Webster, Diamond Bar, CA, USA or Thermocool, Biosense Webster, Diamond Bar, CA, USA). Maximum energy output during ablation was 35 W during pulmonary vein isolation and 42 W during creation of linear lesions and ablation of complex fragmented atrial electrograms (CFAE). Ablation protocol was adjusted to the clinical setting and left to discretion of the operator. The basic approach was to perform electrical isolation of pulmonary venous ostia. During ablation of atrial tachycardias and atrial flutters, radiofrequency (RF) ablation sites were identified based on activation and entrainment mapping [18, 19]. In patients in whom it was elected to create linear lesions at the LA roof, mitral isthmus, or right atrial cavo-tricuspid isthmus, the aim of ablation was to achieve a bidirectional conduction block in these areas [20]. CFAE ablation was performed until local potentials were reduced by at least 50% or for up to 40 s. CFAE were defined as fragmented (≥ 3 deflections from the isoelectric line), low-amplitude (< 0.25 mV) potentials of a long duration (≥ 100 ms or continuous electrical activity) and/or a very short cycle (< 140 ms) recorded during AF. Ablation sites were chosen based on visual inspection and measurements as displayed on the screen of the electrophysiological system [20]. Linear lesions and CFAE ablation were performed in patients with persistent and long-persistent AF, as well as during repeated ablation procedures.

Complications

Significant ablation-related complications included death, stroke, transient ischaemic attack, peripheral embolism, cardiac tamponade or perforation, valvular damage, arteriovenous fistula requiring surgical intervention, and a large vascular access site haematoma resulting in a drop of haemoglobin level by 2 g/dL.

Long-term follow-up

After the ablation procedure, patients were followed-up for arrhythmia recurrence at 4 weeks and then every 3–6 months. During each visit, a 12-lead ECG was performed, along

with Holter monitoring at least once every 3–6 months, including at least one 48-hour monitoring during follow-up. Standard 12-lead ECG and/or Holter monitoring was performed each time a patient reported recurrence of an abnormal heartbeat (palpitation). In 8 patients who underwent 2-week continuous ECG monitoring using the PocketECG system, this study was repeated after the ablation procedure.

Ablation failure was defined as a recurrence of AF, atrial flutter or atrial tachycardia recorded in ECG or ICD memory or an episode of palpitation lasting more than 3 min and of similar characteristics as that before ablation, occurring after the initial 3 months after ablation. In contrast, arrhythmia recurrences within 3 months after the ablation procedure were thought to be related to healing after ablation and were not considered to represent ablation failure. Significant reduction of AF burden was defined as at least 5-fold reduction of the frequency and length of AF episodes, or conversion from long-persistent AF to paroxysmal AF.

Statistical analysis

Continuous variables were presented as mean values \pm standard deviation (SD), and the groups without or with ablation failure were compared using the Student *t* test or Mann-Whitney U test, depending on the variable distribution. Qualitative variables were expressed as proportions and percentages, and the groups were compared using the exact Fisher test. Survival free from arrhythmia was estimated using the Kaplan-Meier method. In univariate analyses, groups without or with ablation failure were compared for all significant clinical and echocardiographic variables, including parameters that were significantly related to AF ablation success in previous studies. Multivariate logistic regression was used to identify significant predictors of successful ablation and included those variables for which the univariate between-group comparison yielded a *p* value of ≤ 0.1 . $P < 0.05$ was considered statistically significant. Statistical analyses were performed using the Statistica 5.0 software (StatSoft, Inc., Tulsa, OK, USA).

RESULTS

Patient characteristics

The study population included 20 (67%) men and 10 (33%) women aged 48.7 ± 11 years. Mean duration of AF was $6 \pm \pm 4.2$ years. In patients with paroxysmal AF, the incidence of arrhythmia episodes was 2.4 ± 2.9 per week. Duration of arrhythmia in patients with long-persistent AF was 20 ± 7 months. At least one electrical cardioversion was previously performed in 19 patients. Mean number of antiarrhythmic drug used unsuccessfully before ablation was 1.8 ± 1.2 . Amiodarone was used previously or at the time of recruitment in 21 patients. Eleven (37%) patients were in New York Heart Association (NYHA) functional class I, 13 (43%) patients were in NYHA class II, and 6 (20%) patients were in NYHA class III. Left ventricular outflow obstruction with pressure gradient > 30 mm Hg was found in 6 (20%) patients, and systolic

anterior motion of the mitral valve in 5 (16.7%) patients. Septal alcohol ablation was previously performed in 2 (7%) patients. Implantable cardioverter-defibrillator (ICD) was used in primary prevention of sudden cardiac death in 12 patients, and in secondary prevention in 4 patients. In 4 patients, inappropriate ICD interventions occurred before ablation due to AF with rapid ventricular rate, and 7 patients had a 2-chamber (DDD) pacemaker implanted. Coronary artery disease was present in 3 patients, and type 2 diabetes in 2 patients. A thromboembolic complication occurred previously in 3 (10%) patients, including stroke in 2 patients, and mesenteric artery embolism in 1 patient. In another 2 patients, computed tomography performed routinely before ablation showed the presence of a thrombus, later confirmed by transoesophageal echocardiography, despite therapeutic anticoagulation with INR > 2 . In these 2 patients, ablation was performed after 6 weeks of enoxaparin treatment (1 mg/kg bid) when subsequent transoesophageal echocardiography confirmed the absence of a thrombus.

Immediate ablation outcomes

During ablation, spontaneous or induced AF was noted in 28 (94%) patients. In addition, typical atrial flutter was observed before or during ablation in 10 patients. Pulmonary vein isolation and bidirectional cavo-tricuspid isthmus block were performed in all patients. Linear lesions were created at the LA roof and mitral isthmus in 17 and 11 patients, respectively, and CFAE ablation was performed in 19 patients. During repeated procedures, ablation of at least 1 morphology (range 1–5, median 2) of atrial tachycardia or atypical atrial flutter was performed in 10 patients.

In 17 of 28 patients with AF occurring during the ablation procedure, ablation resulted in termination of AF, including in 3 patients in whom intravenous propafenone administration was necessary for this purpose. In 8 patients, no arrhythmia could be induced after ablation despite several bursts of rapid atrial pacing at an increasing rate up to the cycle length of 200 ms or equal to atrial refractory period. Electrical cardioversion was required to restore SR after ablation in 11 patients.

Mean total procedure duration in the study group was 177 ± 51 min, fluoroscopy time was 24 ± 8.8 min, and RF current application time was 56 ± 27 min. Overall, 47 ablation procedures were performed, including 1, 2 or 3 procedures in 17, 9, and 4 patients, respectively. No major complications were noted during or immediately after the ablation procedure.

Long-term follow-up

Overall, the mean follow-up time from the initial ablation procedure was 1.9 ± 1.2 years. At 1 year since the last ablation procedure, survival free of arrhythmia was noted in 16 (53%) patients, and a significant reduction of AF burden was obtained in 23 (76%) patients. Outcomes in patients with paroxysmal AF were significantly better as compared to patients with persistent

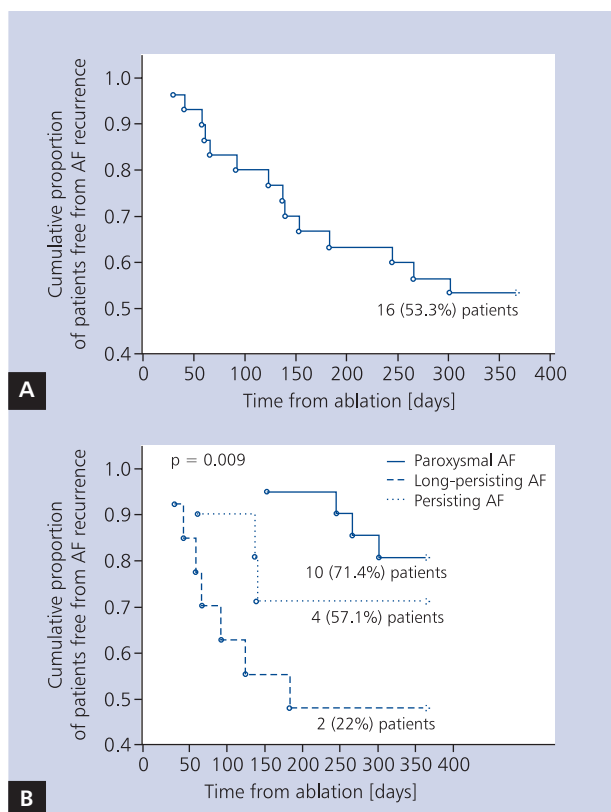


Figure 1. Kaplan-Meier survival curves showing cumulative proportion of patients free from atrial fibrillation (AF) recurrence after ablation during a 12-month follow-up; **A.** All patients; **B.** Patients with paroxysmal AF, persistent AF, and long-persistent AF separately

and long-persistent AF. Therapy was fully successful in 71% of patients with paroxysmal AF, 57.1% of patients with persistent AF, and 22% of patients with long-persistent AF (Fig. 1). A significant reduction of AF burden was obtained in 85.7% of patients with paroxysmal AF, 71.4% of patients with persistent AF, and 55.5% of patients with long-persistent AF (Fig. 2). After the first ablation procedure, no arrhythmia recurrences were noted in 10 (33%) patients, and the remaining patients had recurrent arrhythmia. At this stage, due to patient preference or a specific clinical profile, rate control strategy was chosen in 7 patients, and repeated ablation was performed in 13 patients (Fig. 3).

Complications

Thromboembolic events occurred in 2 patients with arrhythmia recurrence after ablation. In 1 of these patients, during pneumonia at 4 months after ablation, when anticoagulant therapy was inadequate (INR 1.6), femoral artery embolism occurred and was treated surgically. In the other patient with advanced heart failure (NYHA class III), an embolic event within a foot artery occurred at 2 months after ablation, when INR was slightly subtherapeutic (1.9), and was successfully

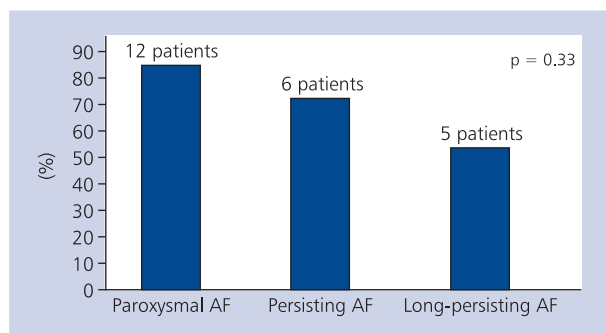


Figure 2. Proportion of patients with hypertrophic cardiomyopathy showing significant clinical improvement following ablation of atrial fibrillation (AF) depending on the type of AF

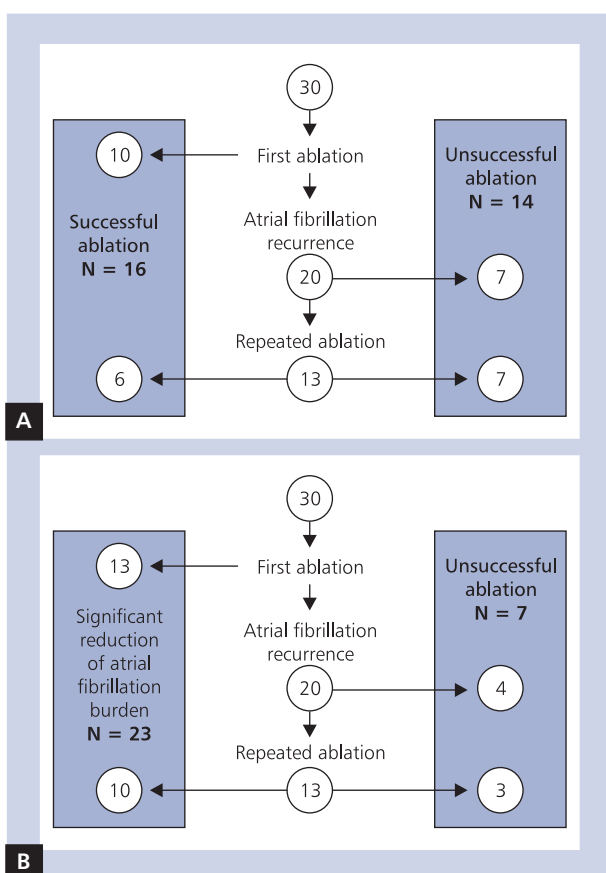


Figure 3. Flowchart showing ablation outcomes in the study group, including the number of ablation procedures; **A.** Complete ablation success vs. no improvement; **B.** Partial clinical improvement vs. no improvement

treated with intravenous alteplase administration. Subsequently in the same patient, when INR was within therapeutic range (2.2) during the second week after another ablation procedure, numbness of the upper arm was noted, and brain computed tomography showed a 7-mm ischaemic lesion. These symptoms resolved after another week.

Antiarrhythmic drug therapy after ablation

Among 16 patients with no arrhythmia recurrence at 1 year, antiarrhythmic drug therapy was discontinued in 5 patients. Of the remaining patients, 7 were treated with amiodarone, 3 with sotalol, and 1 with dronedarone. In these patients, the decision to continue antiarrhythmic drug therapy was affected by concomitant presence of ventricular arrhythmia (6 patients) or patient preference (2 patients).

Predictors of successful ablation

Univariate analysis showed that successfully treated patients more often had paroxysmal AF. These patients were younger than those in whom ablation was unsuccessful. In the latter group, a trend toward an increased need for cardioversion to restore SR at the end of the ablation procedure was noted. Other parameters, including echocardiographic and clinical variables, did not differ between successful and unsuccessful ablation groups (Table 1). Multivariate logistic regression showed that the only significant predictor of ablation success was the type of AF (χ^2 10.3; $p = 0.016$ for the overall model; $p = 0.037$ for the variable "AF type"; Table 2).

DISCUSSION

Our study was conducted prospectively in a single-center population of patients with HCM and concomitant drug-refractory AF who were treated with ablation, which is currently the second largest among those reported [15]. Our findings indicate that ablation in these clinically challenging patients is safe, and its effectiveness depends largely on the type of AF. Success rate of AF ablation in patients with HCM reported in the literature ranged from 45% to as much as 92%

[10–16]. Previous studies clearly indicate that ablation outcomes in this patient group are worse compared to patients with idiopathic or secondary AF, and the recurrence rate after initial ablation is high, necessitating repeated ablation in 39–72% of patients. In our study population, survival free from AF was 52%, and a significant reduction in AF burden was obtained in another 23% of patients. In practice, this translates to sporadic and/or very short-lasting episodes, in contrast to persistent AF or paroxysmal AF with frequent episodes that was present before ablation. Discontinuation of antiarrhythmic drug therapy was possible in 5 patients, and in another 6 patients this therapy was continued due to concomitant ventricular arrhythmia. A need to continue antiarrhythmic drug therapy due to concomitant ventricular arrhythmia was also highlighted by other authors as a factor that might obscure evaluation of actual effectiveness of AF ablation in patients with HCM [14, 16].

Structural atrial remodelling in patients with HCM and AF is particularly advanced, which is manifested, e.g., by significant atrial enlargement. In our study population, mean LA volume as evaluated by computed tomography was 180 mL. In contrast, mean LA volume in a group of 82 patients treated in our centre, who underwent ablation due to idiopathic or secondary AF, was 118 ± 30 mL (unpublished data). The degree of underlying cardiac disease in our study population is also evidence by the proportion of patients with ICD or pacemaker, the proportion of patients with a history of thromboembolic complication, and baseline NT-proBNP level. In this clinical perspective, ablation outcomes reported herein seem quite good, as it would be rather unrealistic to expect a success rate at the level of about 90%.

Table 1. Comparison of clinical and echocardiographic variables between successful and unsuccessful ablation groups

	Successful ablation	Unsuccessful ablation	P
Paroxysmal/persistent atrial fibrillation	10/6	4/10	0.009
Age [years]	45.2 ± 11.5	52.6 ± 9.2	0.046
Cardioversion after ablation	3	8	0.056
Gender (male/female)	10/6	10/4	0.77
Duration of atrial fibrillation [years]	6 ± 5.6	5.7 ± 3.8	0.86
New York Heart Association class	1.9 ± 0.9	1.8 ± 0.6	0.75
LA volume in computed tomography [mL]	171.5 ± 59.8	189 ± 25.7	0.37
Maximum IVS thickness [mm]	19.8 ± 5.9	21.3 ± 7.0	0.51
LV posterior wall thickness [mm]	13.1 ± 2.3	13.9 ± 2.6	0.37
LV systolic dimension [mm]	49.7 ± 6.4	47.9 ± 4.1	0.37
LV diastolic dimension [mm]	30 ± 6.1	29.3 ± 5.6	0.74
LV ejection fraction [%]	60.8 ± 5.6	63.3 ± 10.8	0.49
LA dimension, parasternal view [mm]	51.5 ± 5.0	51.6 ± 4.9	0.96
LA area [cm ²]	28.9 ± 7.1	30.8 ± 5.1	0.41
Right ventricular systolic pressure [mm Hg]	37 ± 12	38 ± 11	0.68
NT pro-BNP level [pg/mL]	1430 ± 1148	1668.9 ± 1157	0.6

IVS — interventricular septum; LA — left atrium; LV — left ventricle; NT-proBNP — N-terminal brain natriuretic propeptide

Table 2. Multivariate logistic regression results

Model: logistic regression. Dependent variable: success vs. failure.				
Loss: maximum likelihood, mean squared error, scaled to 1.				
Final loss: 16.944; χ^2 (3) = 10.35; p = 0.016				
	B0 constant	Age	PAF	Cardioversion
Evaluation	-2.22	0.06	-2.02	0.03
Standard error	3.35	0.05	0.92	0.07
t (28)	-0.66	1.33	-2.19	0.05
P	0.51	0.19	0.04	0.69
-95% CL	-9.08	-0.03	-3.91	-0.14
+95% CL	4.63	0.16	-0.13	0.15
Wald χ^2	0.44	1.77	4.81	0.02
P	0.51	0.18	0.03	0.69
Odds ratio	0.11	1.06	0.13	1.01
-95% CL	0.0001	0.97	0.02	0.86
+95% CL	102.4	1.18	0.88	1.17

CL — confidence limit; PAF — paroxysmal atrial fibrillation

In general, reported predictors of successful ablation included paroxysmal AF, young age (< 50 years), LA volume below 130 mL, low NYHA class, and linear ablation lesions [14–16]. Our findings indicate that the main predictor of ablation outcome in the evaluated group of patients has been the type of AF. Failure of other variables, including age and LA size, to independently predict the success of ablation, may have resulted from a relatively small size of the study sample, which is a clear limitation of our study. Complete elimination of AF episodes was possible in as many as 71% of patients with paroxysmal AF and in only 22% of patients with long-persistent AF. Similar results were reported by Callans et al. [13]. Of note, LA volume was below 130 mL in only 13% of our patients (n = 4), compared to 34% in the study by Di Donna et al. [16]. This difference might explain divergent findings of these 2 studies.

It is not clear how extensive lesions should be created during the ablation procedure in this patient group. The highest success rate of 92% (with concomitant use of antiarrhythmic drug therapy) was reported by the group of Natale who only performed pulmonary vein isolation at the antrum level, along with isolation of the vena cava superior. However, they mostly treated patients with paroxysmal AF, which might explain these good results [12]. Bunch et al. [15], who reported a success rate of 75% in a group of 33 patients, performed only pulmonary vein isolation in 24% of them, and combined pulmonary vein isolation with linear lesions in the remaining 76% of patients. Gaita et al. [14] reported overall long-term success rate of 64% in a group of 26 patients, half of them with paroxysmal AF and a success rate of 77%, and the other half with persistent AF and a success rate of 50%. Ablation protocol included pulmonary vein isolation and linear lesions at the LA roof and mitral isthmus.

Di Donna et al. [16] used the same ablation protocol in a 2-center study including 61 patients and reported a success rate of 67%. Our findings confirm that ablation is safe. Following unsuccessful procedures, thromboembolic events occurred in 2 (6.7%) patients but were likely related to subtherapeutic INR values. Of note, a similar rate of thromboembolic events was observed in this population before ablation, and another 2 patients were found to have asymptomatic LA thrombi. These observations highlight the need for adequate anticoagulation in patients with HCM and concomitant AF.

CONCLUSIONS

Catheter ablation of AF in patients with HCM is an effective therapy, particularly in patients with paroxysmal AF. Effectiveness of ablation is significantly smaller in patients with persistent, and even more so in those with long-persistent AF. Arrhythmia recurrences after initial ablation are frequent and patient may require repeated procedures. Despite ablation, antiarrhythmic drug therapy has to be continued in many patients.

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Conflict of interest: none declared

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Przezkórna ablacja migotania przedsionków prądem o wysokiej częstotliwości u pacjentów z kardiomiopatią przerostową: typ migotania a skuteczność zabiegu

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Streszczenie

Wstęp: Migotanie przedsionków (AF) u pacjentów z kardiomiopatią przerostową (HCM) powoduje pogorszenie wydolności fizycznej chorych, przyczynia się do obniżenia jakości ich życia oraz wiąże się z istotnym ryzykiem wystąpienia udaru mózgu i zgonu. Dane dotyczące ablacji przezkórnej AF w tej populacji są nieliczne, obejmują relatywnie małe grupy pacjentów, a uzyskane wyniki przedstawiane w publikacjach są rozbieżne.

Cel: Celem pracy była ocena skuteczności i bezpieczeństwa przezkórnej ablacji AF prądem o wysokiej częstotliwości u pacjentów z HCM.

Metody: Do badania włączono prospektywnie 30 pacjentów (10 kobiet), w wieku $48,7 \pm 11$ roku, z opornym na farmakoterapię AF napadowym (14 osób), przetrwałym (7 osób) i długotrwale-przetrwałym (> 1 rok; 9 osób). W klasie I, II i III wg NYHA było odpowiednio 11, 13 i 6 pacjentów. Średnia objętość lewego przedsionka wynosiła 180 ± 47 ml, maksymalna grubość przegrody międzykomorowej $20,5 \pm 6,3$ mm, a powierzchnia lewego przedsionka $29,8 \pm 6,2$ cm². Rozległość ablacji była dostosowana do sytuacji klinicznej. Podstawę zabiegu stanowiła izolacja żył płucnych i dwukierunkowy blok przewodzenia w cieśni trójdzielno-żylniej. U pacjentów z AF przetrwałym i długotrwale-przetrwałym oraz u osób z nawrotem AF wykonywano linie ablacyjne w lewym przedsionku i ablację rozfragmentowanych potencjałów.

Wyniki: W 12-miesięcznej obserwacji po zabiegu stabilny rytm zatokowy utrzymywał się u 16 (53%) pacjentów. Stosowane leczenie okazało się w pełni skuteczne u 71% osób z AF napadowym i odpowiednio u 57,1% i 22% pacjentów z AF przetrwałym i długotrwale-przetrwałym. Istotną redukcję ładunku AF uzyskano u 85,7% chorych z AF napadowym, 71,4% pacjentów z AF przetrwałym i 55,5% z AF długotrwale-przetrwałym. Po pierwszym zabiegu nie zaobserwowano nawrotów arytmii u 10 (33%) pacjentów, a u kolejnych 13 wykonywano powtórne zabiegi. W trakcie zabiegów nie wystąpiły istotne powikłania. U 2 chorych z nawrotem arytmii po ablacji wystąpiły powikłania zakrzepowo-zatorowe pod postacią udaru mózgu i zatorowości obwodowej. Powikłania te wystąpiły w trakcie nasilenia niewydolności serca przy współistniejącym nieadekwatnym leczeniu przeciwzakrzepowym u jednego z nich. W obserwacji odległej terapię antyarytmiczną przerwano u 5 osób. U kolejnych 6 pacjentów leczenie to utrzymano ze względu na współistniejącą arytmie komorową. U osób, u których skutecznie wyeliminowano AF, częściej przed ablacją występowało ono w postaci napadowej (ablacja skuteczna: AF napadowe u 10 z 16; ablacja nieskuteczna: AF napadowe u 4 z 14; $p = 0,009$), pacjenci ci byli młodsi ($45 \pm 11,5$ vs. $52,6 \pm 9,2$ roku; $p = 0,046$), obserwowano także trend w kierunku rzadziej wykonywanej kardiowersji elektrycznej na koniec zabiegu (ablacja skuteczna: 3 vs. nieskuteczna: 8; $p = 0,056$). Na podstawie analizy wieloczynnikowej regresji logistycznej wykazano, że jedynym niezależnym predyktorem skutecznej ablacji było występowanie AF w formie napadowej.

Wnioski: Ablacja AF jest skuteczną i bezpieczną metodą leczenia u pacjentów z HCM, zwłaszcza gdy arytmia ma charakter napadowy. U pacjentów z AF przetrwałym, a szczególnie długotrwale-przetrwałym jej skuteczność jest istotnie mniejsza. Nawroty arytmii po pierwszym zabiegu są częste, co wymaga kolejnych sesji ablacji. Uwzględniając rozległy substrat w obrębie przedsionków, u wielu pacjentów mimo ablacji konieczne jest utrzymanie leczenia antyarytmicznego.

Słowa kluczowe: kardiomiopatia przerostowa, migotanie przedsionków, ablacja przezkórna migotania przedsionków

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