

Urgent Catheter Ablation in Octogenarians with Serious Tachyarrhythmias

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Background: Urgent catheter ablation is often required for various tachyarrhythmias; however, its efficacy and safety in elderly patients have not been fully elucidated.

Methods: This study included consecutive octogenarians who underwent urgent radiofrequency catheter ablation (RFCA) for various serious tachyarrhythmias (urgent group, n=28) that were life-threatening, hemodynamically deleterious, or provoking ischemia, and consecutive octogenarians who underwent elective RFCA (control group, n=36). The rate of a successful RFCA, complications, later arrhythmia recurrences, and mortality were compared between the groups.

Results: There was no significant difference in the breakdown of the targeted arrhythmias between the groups, and common-type atrial flutter was most often targeted in both the urgent group (57%) and the elective group (56%). Compared with the control group patients, the patients of the urgent group were older (84 ± 3 vs. 82 ± 2 years $P=0.001$), with a higher frequency of baseline heart disease (68% vs. 17%, $P < 0.001$) and lower left ventricular ejection fraction ($45\% \pm 15\%$ vs. $68\% \pm 10\%$, $P < 0.001$). The rates of acute success (100% vs. 100%, $P=1.00$) and later arrhythmia recurrences (4% vs. 14%, $P=0.22$) were comparable between the groups. Two patients in the urgent group and 2 in the elective group had procedure-related nonlethal complications (7% vs. 6%, $P=1.00$): groin hematoma in 2, pressure ulcer in 1, and CO₂ narcosis in 1. There were no in-hospital deaths, and mortality during follow-up did not differ between the urgent and elective groups (6.0% vs. 3.9% per year, log-rank $P=0.38$).

Conclusion: Even in octogenarian patients, urgent catheter ablation for serious tachyarrhythmias can be safely performed with a high success rate and acceptable prognosis.

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Key words: octogenarian, arrhythmias, catheter ablation, heart failure, complication

Introduction

The life expectancy of the worldwide population is increasing¹. The aging process is associated with alterations in the myocardial structure, function, and electrophysiological properties, such as a prolongation of the action potential² and redistribution of electrical gap junctions^{3,4}. These alterations make the hearts of elderly persons more vulnerable to various arrhythmias. In addition, elderly persons often have structural heart disease, which makes cardiac arrhythmias even more likely. A resulting tachyarrhythmia can exacerbate certain conditions, such as coronary ischemia and a ventricular dysfunction.

Radiofrequency catheter ablation (RFCA) is an estab-

lished therapy for various arrhythmias and can be urgently performed for patients with serious arrhythmias⁵⁻⁹. The effectiveness of an urgent RFCA, however, in very elderly persons with drug-resistant tachyarrhythmias remains unclear. In very elderly patients with such serious arrhythmias, RFCA is often withheld because the risk of complications might outweigh the benefit, which would be obtained by eliminating the arrhythmias. To elucidate the efficacy of RFCA performed urgently in patients of this type, we retrospectively compared the acute and long-term clinical outcomes between octogenarians undergoing urgent RFCA for serious tachyarrhythmias and octogenarians undergoing elective RFCA for uncompli-

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cated arrhythmias.

Materials and Methods

Study Population

From January 2000 through June 2015, 2,842 patients underwent an RFCA at Nippon Medical School Teaching Hospital. Among these patients, 64 consecutive patients 80 or older (38 men and 26 women; mean age, 83 ± 2 years) were enrolled in the present study. The patients were divided into 2 groups. The urgent group ($n=28$) consisted of patients who underwent RFCA to improve serious conditions believed to be aggravated by the arrhythmias. These patients had drug-resistant tachyarrhythmias, which exacerbated the heart failure or cardiac ischemia, provoked a loss of consciousness, or were followed by cardiogenic shock or ventricular fibrillation (VF). The elective group ($n=36$) consisted of patients without an unstable cardiac condition who underwent an elective RFCA to have a tachycardia radically cured to improve their quality of life.

The groups were compared regarding the rates of acute ablation success, procedure-related complications, long-term arrhythmia recurrences, and mortality. Complications were defined as those that resulted in permanent injury, prolongation of the hospitalization, a requirement for any intervention for treatment, or death.

Electrophysiologic Study and Catheter Ablation

In the elective group, all antiarrhythmic drugs (AADs) except for amiodarone were discontinued for at least 5 half-lives before the RFCA; in the urgent group, the administration of AADs, which could not suppress the arrhythmias completely, were continued in 7 patients (25%) to decrease the frequency of arrhythmic attacks or the heart rate during the tachyarrhythmia. The ablation procedure has been guided by electroanatomical mapping (Ensite NavX, St. Jude Medical, Minneapolis, MN, USA, and CARTO, Biosense Webster, Diamond Bar, CA, USA) since July 2004. In patients with atrioventricular nodal reentrant tachycardia (AVNRT) or atrioventricular reciprocating tachycardia (AVRT), the radiofrequency current was delivered at the slow pathway and accessory pathway. In the atrial fibrillation (AF) ablation, pulmonary vein isolation was performed by encircling the bilateral pulmonary veins. The decision to create additional linear lesions was made by each individual physician. In the patients with the common-type atrial flutter (AFL), linear lesions were created between the tricuspid valve and inferior vena cava. In patients with monomorphic ventricular tachycardias (VTs), the critical isthmus of the arrhythmia

was defined by the electroanatomic activation mapping or by entrainment pacing^{10,11}. Ablation was then performed to transect the identified isthmus. In patients with premature ventricular contractions (PVCs) preceding VF, radiofrequency energy applications were carried out at the earliest activation site or the site where a similar paced QRS morphology as the spontaneous PVC was recorded or at both sites⁹.

Statistical Analysis

The data are expressed as the mean \pm standard deviation for continuous variables and as absolute frequencies and percentages for categorical variables. For continuous variables and categorical variables, differences between groups were compared with Student's *t*-test and Fisher's exact test, respectively. The time to the recurrence of arrhythmia or to a patient's death after the RFCA were expressed with the use of Kaplan-Meier curves and assessed with the log-rank test. The follow-up data were censored if the patient died or was lost to follow-up without an arrhythmia recurrence. All tests were 2-sided and a $P < 0.05$ was considered to indicate statistical significance. All statistical analyses were performed with SPSS for Windows 11.0J software (SPSS Inc., Chicago, IL, USA).

Results

Characteristics of the Study Subjects

Compared with the patients in the elective group, those in the urgent group were significantly older (84 ± 3 vs. 82 ± 2 , $P=0.001$) and had a higher frequency of baseline heart disease (68% vs. 17%, $P < 0.001$), a lower left ventricular ejection fraction ($45\% \pm 15\%$ vs. $68\% \pm 10\%$, $P < 0.001$), and a higher value of the serum brain natriuretic peptide (301 ± 213 vs. 140 ± 134 pg/mL, $P=0.002$) (Table 1). At the time of the ablation procedure, 3 patients (11%) in the urgent group were mechanically ventilated and 1 patient received a continuous catecholamine infusion because of severe heart failure. The interval from the initial recording of the targeted arrhythmia to the ablation procedure was 13.5 ± 8.5 days in the urgent group and 401 ± 789 days in the elective group ($P < 0.001$). Among the patients of the urgent group, the time between the onset of the arrhythmia and the performance of ablation was within 24 hours in 2 patients and within 7 days in 8 patients. Before the ablation, class I AADs were less often used and beta-blockers were more often used in the urgent group than in the elective group (Table 1).

Targeted Arrhythmias

The targeted arrhythmias did not differ significantly

Table 1 Baseline characteristics of the patient groups

	Urgent group (n=28)	Elective group (n=36)	P value
Age, years	84±3	82±2	0.001
Female sex, n	12 (43%)	14 (39%)	0.80
Body mass index, kg/m ²	23.1±4.4	22.3±3.5	0.48
Prior diagnosed heart disease			
Ischemic heart disease, n	11 (39%)	2 (6%)	0.001
Post-coronary artery bypass graft state, n	6 (21%)	1 (3%)	0.04
Cardiomyopathies, n	4 (14%)	3 (8%)	0.69
Valvular heart disease, n	6 (21%)	1 (8%)	0.04
Congestive heart failure, n	19 (68%)	3 (8%)	0.69
None, n	9 (32%)	30 (83%)	<0.001
Echocardiographic findings			
Left atrial diameter, mm	41±7	36±8	0.01
Left ventricular ejection fraction, %	45±15	68±10	<0.001
Left ventricular hypertrophy, n	7 (25%)	8 (22%)	1.00
Comorbidities			
Hypertension, n	20 (71%)	21 (58%)	0.31
Diabetes melitus, n	9 (32%)	7 (19%)	0.26
Chronic obstructive pulmonary disease, n	4 (14%)	2 (6%)	0.39
Serum brain natriuretic peptide, pg/mL	301±213	140±134	0.002
Drugs before the ablation			
Class I antiarrhythmic drug	2 (7%)	11 (31%)	0.03
Class III antiarrhythmic drug	12 (43%)	7 (19%)	0.06
Beta-blocker	14 (50%)	11 (31%)	0.03
Calcium channel blockers, n	13 (46%)	15 (42%)	0.80
Digoxin, n	3 (11%)	4 (11%)	1.00

Table 2 Targeted arrhythmias of catheter ablation

	Urgent group (28 patients, 32 arrhythmias)	Elective group (36 patients, 45 arrhythmias)	P value
Common-type atrial flutter, n	16 (57%)	20 (56%)	1.00
Atrial tachycardia*, n	4 (14%)	4 (11%)	0.72
Atrial fibrillation, n	2 (7%)	10 (28%)	0.053
Atrioventricular nodal reentrant tachycardia, n	4 (14%)	9 (25%)	0.77
Atrioventricular reciprocating tachycardia , n	2 (7%)	1 (3%)	0.58
Ventricular tachycardia, n	3 (11%)	1 (3%)	0.31
Premature ventricular contraction preceding ventricular fibrillation, n	1 (4%)	0	0.44

*Including uncommon-type atrial flutter

between the groups (Table 2). Common-type AFL was most often targeted in both the urgent group (57%) and the elective group (56%, $P=1.00$). The AF ablation tended to be performed more often in the elective group (28% vs. 7%, $P=0.053$). In the urgent group, 24 patients (86%) had supraventricular tachyarrhythmias, and the reason for the urgent procedure was exacerbated heart failure in 16 patients, loss of consciousness in 4 patients, worsened pre-existing cardiac ischemia that could not be treated by medical therapy or percutaneous coronary intervention

in 2 patients, and cardiogenic shock in 2 patients. Four patients in the urgent group underwent RFCA for frequent ventricular tachyarrhythmias (sustained VT in 3 patients and PVCs triggering VF in 1 patient), which were life threatening in 3 patients and exacerbated the pre-existing heart failure in the remaining patient. The baseline heart diseases in these patients were a prior myocardial infarction in 3 patients and hypertensive heart disease in 1 patient. The maximum incidence of sustained VT/VF attacks within 24 hours was 16 ± 22 ,

Table 3 Acute and chronic outcomes after catheter ablation

	Urgent group (n=28)	Elective group (n=36)	P value
Acute success of catheter ablation, * n (%)	28 (100)	36 (100)	1.00
Procedure time, minutes	126±65	170±87	0.02
Fluoroscopy time, minutes	36±27	41±25	0.29
Procedure-related complications, n (%)	2 (7)	2 (6)	1.00
Discharged alive after ablation, n (%)	28 (100)	36 (100)	1.00
Arrhythmia recurrence			
After the first procedure, n (%)	1 (4)	5 (14)	0.22
After the last procedure, n (%)	1 (4)	2 (6)	1.00
Follow-up period, years	3.6±2.4	2.9±2.4	0.25
Death during follow-up, n (%)	6 (21)	4 (11)	0.31
Mortality, percent per year	6.0	3.9	0.38†

*Pulmonary vein isolation in patients with atrial fibrillation and elimination of all clinical tachyarrhythmias in the others

† Log-rank P

and the mean daily frequency from the day of the initial VT/VF occurrence to the RFCA was 3.8 ± 3.7 . Direct current deliveries were performed before the ablation procedure in all patients with ventricular tachyarrhythmias and 5 of the 24 patients (21%) with supraventricular tachyarrhythmias with immediate recurrences in all patients.

Ablation Procedures and Complications

In all the octogenarians included in the present study, the RFCA sessions were completed without an interruption due to worsening of heart failure, respiratory failure, or other complications. All clinically documented and targeted arrhythmias were successfully ablated and became noninducible with programmed electrical stimulation with or without an isoproterenol infusion at the end of the RFCA session (Table 3). Among the 3 patients of the urgent group and 1 patient of the elective group in whom VTs were targeted (Table 2), nonclinical VTs were still induced in 1 patient in each group. Among the 4 patients of the urgent group and 4 patients of the elective group with ATs, the mean number of inducible ATs during the session was 2.3 ± 1.3 and 2.0 ± 1.4 , respectively, and all ATs were successfully terminated with radiofrequency current deliveries and were not induced at the end of the session in either group. In the 12 patients with AF, all septal and lateral pulmonary veins were successfully isolated. Additional roof line ablation was added in 1 patient of the urgent group who had persistent AF, and mitral isthmus linear ablation and left atrial roof line ablations were performed in 2 patients of the elective group who had persistent AF. The mean procedure time was

significantly shorter in the urgent group ($P=0.02$) (Table 3) but did not differ if the 12 patients with AF (2 in the urgent group and 10 in the elective group) were excluded from the analysis (122 ± 64 and 144 ± 78 minutes, respectively, $P=0.29$).

After the RFCA, 2 patients of the urgent group and 2 patients of the elective group had procedure-related non-fatal complications (7% vs. 6%, $P=1.00$): pressure ulcer and groin hematoma in the urgent group and CO₂ narcosis and groin hematoma in the elective group. Those complications developed in 4 women and no men (100% vs. 0%, $P=0.02$).

Postprocedural In-hospital Clinical Courses in the Patients of the Urgent Group

In the 28 octogenarians who underwent an urgent RFCA, the targeted arrhythmias did not recur by the time of hospital discharge, which was 14 ± 14 days after the ablation session. All class I AADs and calcium channel blockers were withdrawn after the session. Among the 12 patients who had received class III AADs, the drugs were discontinued in 7 patients but were continued in 2 patients with VT, 2 patients with AT, and 1 patient with AF. Among the 28 patients of the urgent group, follow-up echocardiography was performed in 24 patients (86%) 12 ± 10 days after the ablation session and revealed that left ventricular ejection fraction had significantly increased ($49\% \pm 18\%$) compared with that before the RFCA ($59\% \pm 14\%$, $P=0.04$). In the 17 patients who had decompensated heart failure before the RFCA, a rapid amelioration of symptoms was observed in all patients when both the pulmonary congestion and pleural

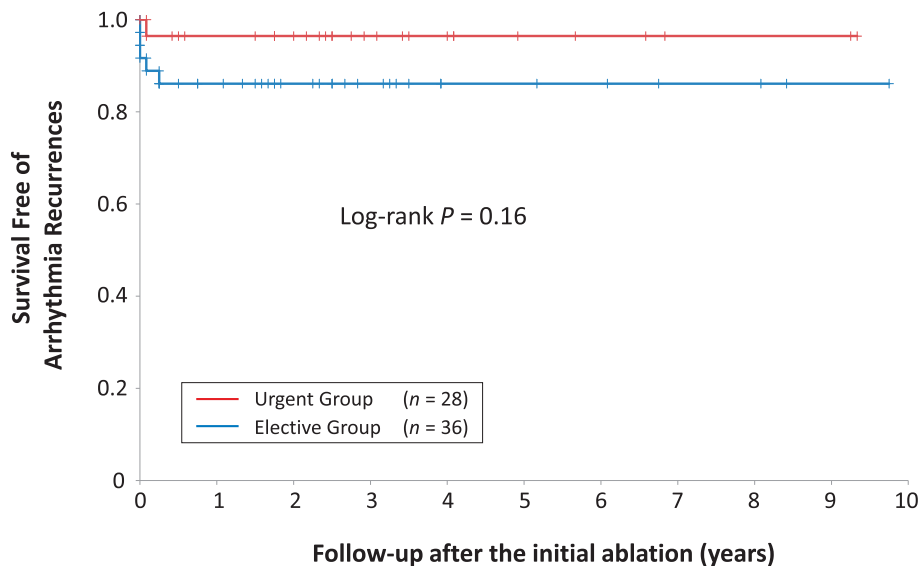


Fig. 1 Kaplan-Meier survival free curves of arrhythmia recurrences. The arrhythmia recurrence rate after the first ablation procedure did not differ between the urgent ablation group and the elective ablation group.

effusions had disappeared within 8.0 ± 4.5 days after the procedure. An implantable cardioverter defibrillator (ICD) was placed in the 4 patients with ventricular tachyarrhythmias. In 4 who had complained of a loss of consciousness and 2 patients who had exhibited cardiogenic shock, no fainting or syncopal episodes emerged after the RFCA session.

Arrhythmia Recurrences and Mortality after the Hospital Discharge

By July 2015, 2 patients were lost to follow-up. The follow-up rate was 97%. During the follow-up period of 3.2 ± 2.4 years, arrhythmias recurred in 1 patient of the urgent group (4%) who was an 84-year-old woman undergoing an RFCA for rapid ATs and in 5 patients of the elective group (14%) who underwent ablation for AF (Fig. 1), but the rate of arrhythmia recurrence did not differ between the groups ($P=0.22$) (Table 3). In the patients of the urgent group in whom AT recurred, repeat ablation procedures failed to maintain sinus rhythm; therefore, and ablation of the atrioventricular node and pacemaker implantation were performed, after which there was no acute decompensation of the heart failure. Among 5 patients of the elective group in whom AF recurred, 4 underwent a repeat ablation procedure, which caused the AF to cease in 3 patients. The survival rates free of arrhythmia recurrence after the last procedure also did not differ between the groups. The estimated arrhythmia recurrence-free survival rates at 3 years after the repeated procedures were 96% in the urgent group

and 93% in elective group (log-rank, $P=0.68$). Among the 4 patients with a successful VT/PVC ablation followed by an ICD implantation, no appropriate or inappropriate device therapy was delivered during the follow-up period.

Six patients in the urgent group died 4.7 ± 2.5 months after hospital discharge: the deaths were due to heart failure in 2 patients and to intracranial bleeding, liver cirrhosis, gastrointestinal perforation, and an estimated natural death in 1 patient each. In the elective group, 4 patients died 7.1 ± 1.2 months after hospital discharge: the deaths were due to heart failure, pneumonia, sepsis, and an estimated natural death in 1 patient each. There were no sudden cardiac deaths. The mortality rate did not differ between the urgent group (6.0% per year) and the elective group (3.9% per year, log-rank $P=0.38$) (Table 3). The estimated survival rate at 3 years after the initial RFCA procedure was 95% in the urgent group and 100% in the elective group (Fig. 2).

Discussion

Catheter Ablation in Very Elderly Persons

RFCA has become a first-line therapy for various tachyarrhythmias with satisfactorily high success rates. The present study has also demonstrated that RFCA is an effective therapy, even when performed urgently in octogenarians with serious tachyarrhythmias. Previous studies of elective RFCA in patients 80 years or older have also revealed a good efficacy¹²⁻¹⁵. In a study¹² demonstrating

Urgent Ablation in Octogenarians

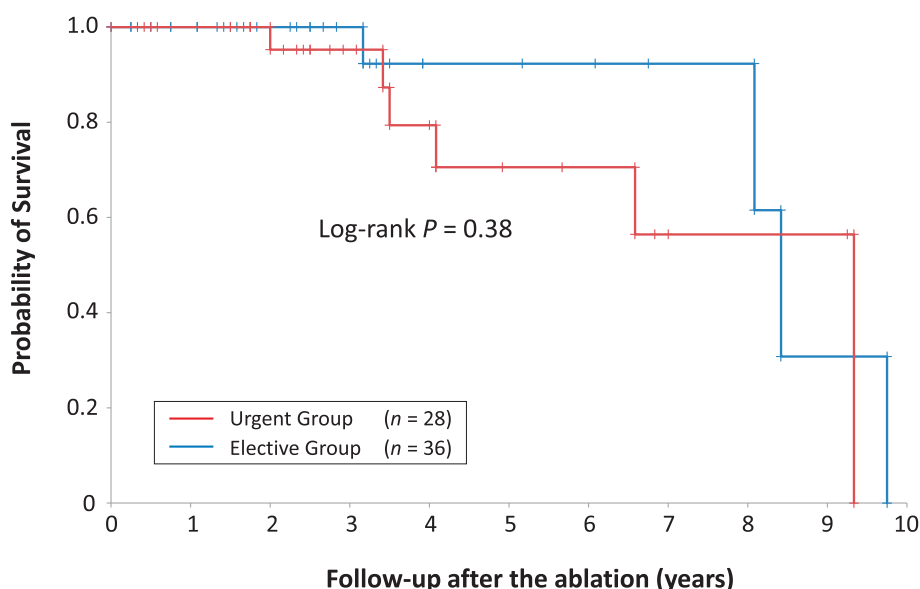


Fig. 2 The estimated survival rates after hospital discharge. The estimated 3-year survival rate did not differ between the urgent ablation group (95%) and the elective ablation group (100%).

the results of ablation procedures in 37 patients 80 years or older from 1996 through 1998, the acute success rate was 97%, which was comparable to the rate in younger patients. Another study¹³ of RFCA in 131 consecutive geriatric patients ranging in age from 80 to 92 years old for a success rate exceeding 97% for all targeted arrhythmias. In these studies^{12,13}, most of the targeted arrhythmias were AVNRT, common-type AFL, and a His bundle ablation. Recently, the results of AF ablation (isolation of all pulmonary veins with or without additional lesions), which requires a more complicated process to be completed, have been reported. In observational studies^{14,15} comparing the procedural results between patients 80 years or older and younger patients, the arrhythmia-free rates without AADs in the late follow-up period were 69% and 71%, respectively, in 1 study¹⁴ and 78% and 75%, respectively, in the other study¹⁵. Regarding VT ablation in patients 80 years or older, the results in 14 patients (mean age, 84 years) with ischemic or nonischemic cardiomyopathy has recently been published¹⁶. Noninducibility of any monomorphic VT at the end of the procedure was attained in 80% of the patients, and during a mean follow-up of 12.2 months the VT recurrence rate was 30.7% and the mortality rate was 53.8%.

In the present study, including the patients with an urgent catheter ablation, the arrhythmia recurred after the initial RFCA in 5 of 12 patients with AF (42%), 1 of 8 patients with AT (13%), and none of the other patients. Al-

though common-type AFL, which usually requires an uncomplicated procedure and achieves a high success rate, was the most frequently targeted arrhythmia in the present study, we considered the sinus rhythm maintenance rates to be acceptable. The results of the RFCA in the present study and in previous studies indicate that catheter ablation is as effective in very elderly patients as in younger patients.

Complications Related to Catheter Ablation

Although considered effective, RFCA is often withheld in very elderly patients because of the possibility of severe complications. In the present study, procedure-related complications developed in 2 of 28 patients of the urgent group (7%) and 2 of 36 patients of the elective group (6%). The rates of complications related to contemporary ablation procedures in the patients 80 years or older were reported to be up to 4% for the RFCA of various arrhythmias¹³, up to 9% for that of AF^{14,15,17}, and up to 14% for that of VT¹⁶. Studies^{13,14,17} have shown that vascular complications, including groin hematomas, were the leading cause of complications, and serious complications, i.e., death or cerebral infarctions, were rare. These complications are consistent with those seen in the present study. A pressure ulcer, seen in 1 patient of the urgent group, is rare after an RFCA procedure but can develop in very elderly patients. We use a high-specification foam mattress for every ablation session, but the patient's position of bed rest after the procedure

should be changed as frequently as possible. All complications observed in the present study occurred in female patients. A higher rate of complications in women than in men has also been reported after the ablation of AF¹⁷ and AFL¹⁸. The increased complication rate might be related to women's smaller bodies, but there is no clear explanation. Further clinical studies of this issue are warranted.

Urgent Catheter Ablation

Catheter ablation can be performed urgently in patients who have severe tachyarrhythmias and has been recognized as an effective therapy and as a last resort for some patients in extremely poor condition. The efficacy of RFCA has been reported in patients with electrical storms in the setting of an acute myocardial infarction^{5,6}, chronic ischemic heart disease^{7,8}, cardiomyopathies^{7,8}, and acute heart failure decompensation⁹. Furthermore, RFCA eliminates monomorphic VTs and polymorphic VT/VF attacks by eliminating the initial PVC, which triggers these arrhythmias and often emerges in the damaged but surviving Purkinje network^{6,9}. In the present study 1 patient of the urgent group also exhibited VF storms triggered by monomorphic PVCs, which were successfully ablated without any recurrence of VF at the site exhibiting a Purkinje potential. In another 3 patients of the urgent group with frequent monomorphic VT attacks, RFCA successfully suppressed the arrhythmia recurrences. In 1 of these patients, nonclinical VT remained inducible, which was reported to be a predictor of a later arrhythmia recurrence⁷. The high acute and chronic success rates of the VT ablation in the subjects of the present study may be due to none of these patients having any nonischemic dilated cardiomyopathy, which is an independent predictor of the recurrence of VT and mortality after RFCA⁷.

In the present study, 86% of the patients of the urgent group underwent RFCA for supraventricular tachyarrhythmias. These arrhythmias sometimes exacerbate heart failure; cause tachycardia-induced cardiomyopathy (as was also presumed in the present subjects from the improved left ventricular ejection fraction after the RFCA); and provoke cardiogenic shock, especially in elderly patients or in patients with baseline heart disease; and recovery to sinus rhythm ameliorates, such an unstable hemodynamic function¹⁹⁻²¹. Furthermore, these serious supraventricular tachyarrhythmias are also associated with an increased mortality rate²⁰⁻²². Our study showed that the acute success of RFCA was obtained in all patients of the urgent group, and in the 17 patients who

had heart failure, a rapid amelioration was observed. Furthermore, preprocedural administration of class I AADs and calcium channel blockers, which worsen heart failure, were stopped after the RFCA in all patients. This may also have contributed to the non-significant difference in the prognosis after the RFCA between the urgent and elective groups.

In the patients of the urgent group, common-type AFL was the most frequently targeted arrhythmia, as was shown in a report of 131 RFCA procedures in octogenarians¹³. The AFL is often seen in elderly patient with structural heart diseases²³, and is as hemodynamically and prognostically harmful as AF²⁴. At the same time, this arrhythmia can be eliminated by catheter ablation with a relatively simple procedure requiring 1 linear lesion between the tricuspid annulus and the inferior vena cava. As the heart rate is more difficult to control in patients with AFL than in patients with AF, we suggest that RFCA not be delayed in elderly patients with common-type AFL and an inappropriate control of heart rate.

Study Limitations

This study had several limitations. First, because this was a single-center retrospective study, the efficacy and safety of the urgent RFCA in octogenarians with severe arrhythmias were not conclusive. Although a randomized comparison among cases of severe arrhythmia attacks is difficult, these results should be confirmed in a prospective multicenter study. A second limitation was that we chose octogenarians who had elective ablation as the control group and compared the outcomes between patients undergoing an urgent ablation and those undergoing an elective ablation. It also would have been clinically meaningful to compare outcomes between elderly patients who had drug-resistant serious arrhythmias with and without RFCA. Such a comparison, however, would be difficult in our institute because we usually perform urgent RFCA in such patients. A third limitation of this study was that the optimal timing of the urgent RFCA was not indicated. The RFCA was performed 13.5 ± 8.5 days after the onset of the severe arrhythmias rather than early. At present, confirmation of the resistance or intolerance to drug therapy precedes the urgent RFCA, especially in patients with supraventricular tachyarrhythmias. The safety and effectiveness shown in the present study suggest that an urgent RFCA can be the first-line therapy or can at least be performed much earlier for severe, hemodynamically deleterious tachyarrhythmias.

Conclusions

We compared the clinical outcomes of 28 octogenarians undergoing an urgent RFCA for severe, drug-resistant tachyarrhythmias to those of 36 octogenarians undergoing an elective RFCA. No differences between the groups were observed in the acute ablation success rate, complication rate, arrhythmia recurrence rate, or mortality rate after hospital discharge. In the 17 patients of the urgent group with an acute decompensation of cardiac failure, the pulmonary congestion and pleural effusions disappeared rapidly after the elimination of the tachycardia. These data suggest that an urgent catheter ablation is an appropriate therapeutic option for severe tachyarrhythmias, even in elderly patients.

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Conflict of Interest: None declared.

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