

UDC: 616-06

TYPES OF RADIOFREQUENCY ABLATION AND CLINICAL SYMPTOMS IN PATIENTS WITH ATRIAL FIBRILLATION AND FLUTTER

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The study involved 76 patients with atrial fibrillation and atrial flutter (AF/AFL) who were divided into groups depending on conducted surgery (radiofrequency ablation of pulmonary veins (RFA PV), cavo-tricuspid isthmus (CTI), a combined strategy (PV + CTI)). We evaluated the sex and age of patients, AF and AFL form, duration of AF/AFL, classification of AF / AFL by the different scales, stage and degree of hypertension (AT); types of coronary heart disease (CHD); diabetes mellitus type 2; acute cerebrovascular accident history; functional class and stage of chronic heart failure (FC CHF). The frequency distribution of basic cardiovascular diseases and their clinical signs are observed equally in patients with AF/AFL, regardless of the type of surgery carried out and they do not influence the choice of the latter. Male patients often held RFA CTI and women – RFA PV. Patients with persistent AF often require alternative treatments, especially catheter ablation of arrhythmic substrate.

KEY WORDS: clinical features, atrial fibrillation and flutter, surgery, catheter ablation, cavo-tricuspid isthmus, pulmonary veins

ТИПИ РАДІОЧАСТОТНОЇ АБЛЯЦІЇ І КЛІНІЧНІ ОЗНАКИ У ПАЦІЄНТІВ З ФІБРИЛЯЦІЄЮ ТА ТРІПОТІННЯМ ПЕРЕДСЕРДЬ

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Обстежено 76 пацієнтів з фібриляцією та тріпотінням передсердь (ФП/ТП) в групах в залежності від проведеного оперативного втручання (радіочастотна абляція легеневих вен (РЧА ЛВ), cavo-трикуспідального істмусу (КТІ), комбінована стратегія (ЛВ+КТІ)). Оцінювалися стать та вік пацієнтів, форма ФП та ТП, тривалість перебігу ФП/ТП, класифікація ФП/ТП за різними шкалами, стадії та ступені артеріальної гіпертензії (АГ); типи ішемічної хвороби серця (ІХС); наявність цукрового діабету 2 типу; гостре порушення мозкового кровообігу в анамнезі; функціональний клас та стадія хронічної серцевої недостатності (ФК ХСН). Частота поширення основних кардіоваскулярних захворювань та їх клінічних ознак спостерігаються однаково в групах пацієнтів з ФП/ТП незалежно від типу проведеного оперативного втручання і вони не впливають на вибір останнього. Пацієнтам чоловічої статі частіше проводиться РЧА КТІ, і жіночої – РЧА ЛВ. Пацієнти з персистою формою ФП частіше потребують альтернативних методів лікування, в першу чергу катетерної абляції субстрату аритмії.

КЛЮЧОВІ СЛОВА: клінічні ознаки, фібриляція та тріпотіння передсердь, оперативне втручання, катетерна абляція, cavo-трикуспідальний істмус, легеневі вени

ТИПЫ РАДИОЧАСТОТНОЙ АБЛЯЦИИ И КЛИНИЧЕСКИЕ ПРИЗНАКИ У ПАЦИЕНТОВ С ФИБРИЛЛЯЦИЕЙ И ТРЕПЕТАНИЕМ ПРЕДСЕРДИЙ

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Обследованы 76 пациентов с фибрилляцией и трепетанием предсердий (ФП/ТП) в группах в зависимости от проведённого оперативного вмешательства (радиочастотная абляция легочных вен (РЧА ЛВ), каво-трикуспидального истмуса (КТИ), комбинированная стратегия (ЛВ + КТИ)). Оценивались пол и возраст пациентов, форма ФП и ТП, длительность течения ФП/ТП, классификация ФП/ТП по различным шкалам; стадии и степени артериальной гипертензии (АГ); типы ишемической болезни сердца (ИБС); наличие сахарного диабета 2 типа; острое нарушение мозгового кровообращения в анамнезе; функциональный класс и стадии хронической сердечной недостаточности (ФК ХСН). Частота распространения основных кардиоваскулярных заболеваний и их клинических признаков наблюдаются одинаково в группах пациентов с ФП/ТП независимо от типа проведённого оперативного вмешательства, и они не влияют на выбор последнего. Пациентам мужского пола чаще проводится РЧА КТИ, женского – РЧА ЛВ. Пациентам с персистирующей формой ФП чаще требуются альтернативные методы лечения, в первую очередь, катетерная абляция субстрата аритмии.

КЛЮЧЕВЫЕ СЛОВА: клинические признаки, фибрилляция и трепетание предсердий, оперативное вмешательство, катетерная абляция, каво-трикуспидальный истмус, легочные вены

INTRODUCTION

Despite progress in the management of patients with atrial fibrillation (AF), this arrhythmia remains one of the major causes of stroke, heart failure, sudden death, and cardiovascular morbidity in the world [1–2].

With the introduction of catheter interventions methods the opportunity to radically eliminate the arrhythmia substrate revealed itself, which is particularly important for young patients.

In general, catheter ablation is effective in restoring and maintaining sinus rhythm in patients with symptomatic paroxysmal, persistent and probably long persistent AF (AFL) as second-line therapy after failure or intolerance to antiarrhythmic therapy. In paroxysmal AF as catheter ablation was considered first-line therapy, randomized study showed only a slight improvement results rhythm control compared with antiarrhythmic therapy [3].

Patients with documented right-atrial isthmus-dependent flutter, undergoing ablation due to AF, the right atrial isthmus ablation is recommended [1].

The above requires a careful approach to assess the main clinical characteristics of patients requiring surgical treatment for arrhythmia, which is not enough studied at the moment.

OBJECTIVE

To establish clinical features of patients with AF and AFL depending on the type of conducted radiofrequency ablation.

MATERIALS AND METHODS

76 patients aged 59 ± 8 (p (M \pm sd)) (44 male and 32 female) were examined, from them

– 21 patients with radiofrequency ablation of pulmonary veins (RFA PV), 30 - cavo-tricuspid isthmus (CTI), 25 – a combined strategy (PV + CTI), which were distributed to the appropriate group.

We evaluated the sex and age of patients, AF and AFL forms (paroxysmal, persistent, permanent); duration of AF/AFL (> or < 1 year); classification of AF / AFL by scales: EHRA (I–IV), CHA2-DS2-VASc (0–5), HAS-BLED (1–3); stage (I–III) and degree (1–3) of arterial hypertension (AH); types of ischemic heart disease (IHD) (angina of effort and functional classes (FC), X-syndrome, variant angina (VA), silent myocardial ischemia (SMI), atherosclerotic heart disease (ASHD), past myocardial infarction (PMI)); diabetes mellitus (DM) type 2; acute cerebrovascular accident history (CVA) ; FC and stages of chronic heart failure (CHF) according NYHA classification, stages of CHF according Strazhesko M.D. and V. H. Vasilenko in the Association of Cardiologists of Ukraine recommendations (2012) [4–5].

The data obtained after the formation of the database processed in Microsoft Excel. For statistical evaluation of the results were used parametric criteria's (mean – M, standard deviation – sd), non-parametric criteria's (absolute (n, number), relative (percentage (p, %) and the average error rate (sP)). The level of statistical significance of differences between groups was assessed using non-parametric Friedman ANOVA and Kendall coefficient of Concordance test and additionally performed a Wilcoxon Matched Pairs Test for parameters that showed a statistical difference between the groups to identify differences between couples. Friedman nonparametric test

was considered statistically significant at $p < 0.05$, Wilcoxon test was considered statistically significant when $W < 0.05$.

Calculations were performed using the software package STATISTICA 10.

RESULTS AND DISCUSSION

Table 1 present's data on the distribution of patients by age and sex in different groups conducted surgery with the evaluation of statistical significance.

Table 1

Distribution of patients by age and sex in different groups conducted surgery with the evaluation of statistical significance

Indicator		RFA PV	RFA CTI	RFA PV+CTI
Total (n, % ± sP)		21, 28 ± 5	30, 39 ± 6	25, 33 ± 5
Males		7, 33 ± 5	23, 77 ± 5	14, 56 ± 6
Females		14, 67 ± 5	7, 23 ± 5	11, 44 ± 6
Gender (n, % ± sP)	The level of statistical significance of differences between groups	Friedman test result	p = 0,0023	
		Value of coefficient of Concordance	W = 0,2888	
		Wilcoxon test result	p = 0,0033	No significant difference
Age (M ± sd, years)		53 ± 9	64 ± 7	59 ± 6
	The level of statistical significance of differences between groups	Friedman test result	No significant difference p = 0,2231	
		Value of coefficient of Concordance	W = 0,075	

Notes: M – mean; n – number; sd – standard deviation; sP – the average error rate.

Revealed significant differences between groups in the ratio of male/female ($p < 0.05$), where the group CTI dominated by men, in the group PV – women; group PV + CTI ratio had no significant difference.

Table 2 presents data of main characteristics of the clinical course and the underlying rating scale AF/AFL with the assessment of the level of statistical significance.

The persistent form of the AF surpassed the RFA PV group ($p < 0.05$), between CTI and PV + CTI groups statistically difference was not revealed. The significant difference was detected between all groups by the types: paroxysmal form predominated in PV + CTI group, persistent – in CTI group.

Figure shown the distribution of data for group's duration of AF/AFL with assessment of statistical significance.

Table 2

Main characteristics of the clinical course and the underlying rating scale AF/AFL

Main characteristics of heart rhythm disturbances		RFA PV	RFA CTI	RFA PV+CTI	
AF (n, % ± sP)	Total	21, 100	14, 47 ± 6	25, 100	
	Paroxysmal	3, 14 ± 4	1, 7 ± 3	16, 64 ± 6	
	Persistent	18, 86 ± 4	11, 79 ± 5	9, 36 ± 6	
	Permanent	0	2, 14 ± 4	0	
	The level of statistical significance of differences between groups	Friedman test result	p = 0,0083		
		Value of coefficient of Concordance	W = 0,2279		
Wilcoxon test result		p = 0,0082	No significant difference	p = 0,0071	

Continuation of the table

AFL (n, % ± sP)	Total		4, 19 ± 5	30, 100	25, 100	
	Paroxysmal		0	3, 10 ± 3	14, 56 ± 6	
	Persistent		4, 100	25, 83 ± 4	11, 44 ± 6	
	Long-persistent		0	2, 7 ± 3	0	
The level of statistical significance of differences between groups	Friedman test result		p = 0,00001			
	Value of coefficient of Concordance		W = 0,5493			
	Wilcoxon test result		p = 0,0002	p = 0,0071	p = 0,0014	
Classificati on of AF/AFL and scales (n, % ± sP)	EHRA	I	0	0	0	
		II	1, 5 ± 2	1, 3 ± 2	2, 8 ± 3	
		III	19, 90 ± 3	27, 90 ± 3	23, 92 ± 3	
		IV	1, 5 ± 2	2, 7 ± 3	0	
	The level of statistical significance of differences between groups	Friedman test result		No significant difference p = 0,246		
		Value of coefficient of Concordance		W = 0,666		
	CHA2-DS2-VASc	0	4, 19 ± 5	3, 10 ± 3	4, 16 ± 4	
		1	6, 29 ± 5	9, 30 ± 5	9, 36 ± 6	
		2	7, 33 ± 5	8, 27 ± 5	8, 32 ± 5	
		3	2, 10 ± 3	6, 20 ± 5	3, 12 ± 4	
		4	1, 5 ± 2	3, 10 ± 3	1, 4 ± 2	
		5	1, 5 ± 2	1, 3 ± 2	0	
	The level of statistical significance of differences between groups	Friedman test result		No significant difference p = 0,793		
		Value of coefficient of Concordance		W = 0,011		
HAS-BLED	1	8, 38 ± 6	7, 23 ± 5	8, 32 ± 5		
	2	10, 48 ± 6	18, 60 ± 6	13, 52 ± 6		
	3	3, 14 ± 4	5, 17 ± 4	4, 16 ± 4		
The level of statistical significance of differences between groups	Friedman test result		No significant difference p = 0,3817			
	Value of coefficient of Concordance		W = 0,458			

Notes: n – number; sd – standard deviation; sP – the average error rate.

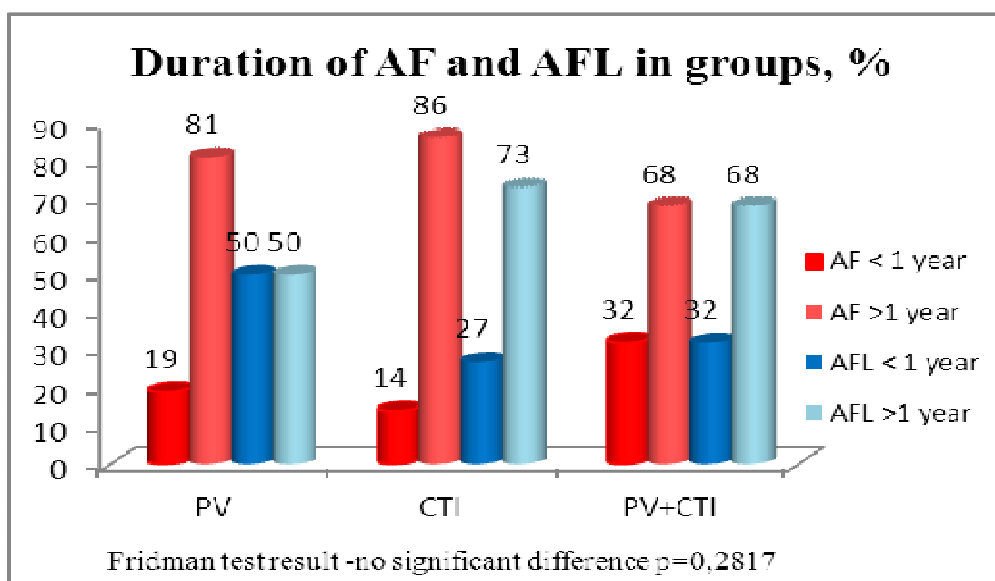


Fig. Distribution of data for group's duration of AF/AFL

The significant difference between the groups in duration of AF/AFL groups is absent, so the duration of the course of a particular type of arrhythmia did not influence the selection of the type of surgery.

These basic clinical indicators of patients who were carried various types of intervention are presented in Table 3.

Table 3

Basic clinical indicators of patients who were carried various types of intervention

Clinical features		RFA PV	RFA CTI	RFA PV+CTI			
Total number of patients, part from the total number (n, % ± sP)		21, 27 ± 9	30, 39 ± 6	25, 33 ± 5			
Diseases	Total	Total	12, 57 ± 6	20, 67 ± 5	16, 64 ± 6		
		Stage	I	0	0	0	
			II	9, 75 ± 5	15, 75 ± 5	14, 88 ± 4	
			III	3, 25 ± 5	5, 25 ± 5	2, 12 ± 4	
		Degree	1	0	3, 15 ± 4	0	
			2	6, 50 ± 6	6, 30 ± 5	9, 56 ± 6	
			3	6, 50 ± 6	11, 55 ± 6	7, 44 ± 6	
		The level of statistical significance of differences between groups	Friedman test result	No significant difference p = 0,5044			
			Value of coefficient of Concordance	W = 0,0325			
		IHD (n, %± sP)	Total	Total	10, 48 ± 6	21, 70 ± 5	14, 56 ± 6
	Angina of effort			2, 20 ± 5	10, 48 ± 6	3, 22 ± 5	
	FC of angina			I	0	0	0
				II	2, 67 ± 5	3, 30 ± 5	2, 67 ± 5
				III	1, 33 ± 5	7, 70 ± 5	1, 33 ± 5
				IV	0	0	0
X-syndrome	1, 10 ± 3			0	0		
VA	0			0	0		
SMI	0			0	0		
ASHD	7, 70 ± 5			8, 38 ± 6	10, 71 ± 5		
PMI	0	3, 14 ± 4	1, 7 ± 3				
The level of statistical significance of differences between groups	Friedman test result	No significant difference p=0,6294					
	Value of coefficient of Concordance	W = 0,022					
DM (n, % ± sP)	Total	Total	1	6	3		
		Type	2	1, 100	6, 100	3, 100	
Acute CVA (n, % ± sP)	Total	3, 14 ± 4	3, 10 ± 3	3, 10 ± 3			
CHF (n, % ± sP)	Total	Total	16, 76 ± 5	26, 87 ± 4	15, 60 ± 6		
		FC	I	7, 43 ± 6	7, 27 ± 5	6, 40 ± 6	
			II	6, 38 ± 6	11, 42 ± 6	7, 47 ± 6	
			III	3, 19 ± 4	8, 31 ± 5	2, 13 ± 4	
			IV	0	0	0	
		Stages	I	8, 50 ± 6	8, 31 ± 5	8, 53 ± 6	
			IIA	8, 50 ± 6	14, 54 ± 6	7, 47 ± 6	
			IIB	0	4, 15 ± 4	0	
		The level of statistical significance of differences between groups	Friedman test result	No significant difference p = 0,3492			
				Value of coefficient of Concordance	W = 0,1597		

Notes: n – number; sP – the average error rate.

Based on the results presented in tables, age, class EHRA, scale CHA2-DS2-VASc and HAS-BLED, duration of course of arrhythmia, the stage and degree of AH, types of IHD, DM, acute CVA, stage and FC CHF in groups RFA PV, CTI and PV+ CTI statistical differences were absent and therefore did not influence on the choice of the type of surgical intervention, that was not reflected in the literature.

We have identified as J. Romero et al. [6], the prevalence in the structure of sex men in the group RFA CTI due to higher prevalence of AFL among male gender. The presence in some patients with AFL concomitant AF, by the same data [6] should be regarded as a separate disease.

The predominance of women in the group RFA PV are explained by the data [7] about more symptomatic AF course in females, when medical intervention ineffective and ablation of arrhythmia substrate comes to the fore in the treatment strategy.

According to the data [8], persistent form of AF is associated with a poor control of the rhythm using drug therapy; therefore, these patients often require alternative therapies, especially RFA of arrhythmia substrate.

REFERENCES

1. 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS The Task Force for the management of atrial fibrillation of the European Society of Cardiology (ESC) [Electronic source] // *European Heart Journal*. – 2016. – Link: <http://eurheartj.oxfordjournals.org/content/ehj/early/2016/09/08/eurheartj.ehw210.full.pdf>
2. Rybalchenko I. Y. Prognostic significance criteria in assessment of the effectiveness of permanent atrial fibrillation control in different classes of QRS complex duration / I. Y. Rybalchenko, I. V. Soldatenko, L. O. Martimyanova. // *The Journal of V. N. Karazin Kharkiv National University, series Medicine*. – 2011. – No. 22. – p. 54–58.
3. Radiofrequency ablation as initial therapy in paroxysmal atrial fibrillation / [Cosedis J, Johannessen A, Raatikainen P. et al.]. // *The New England journal of medicine*. – 2012. – No. 367. – p. 1587–1595.
4. Cardiovascular disease. Classification standards for diagnosis and treatment of cardiac patients / Edited by prof. V. N. Kovalenko, prof. M. I. Lutay. – Sci. M. Sirenko – K.: PP VMB, 2007. – P. 128.
5. The QTc interval duration class and clinical features of patients with pacemakers in the acute postoperative period / M. S. Brynza, D. E. Volkov, D. A. Lopin, M. I. Yabluchansky. // *The Journal of V. N. Karazin Kharkiv National University, series Medicine*. – 2013. – No. 25. – P. 29–36.
6. Atrial fibrillation inducibility during cavotricuspid isthmus-dependent atrial flutter ablation as a predictor of clinical atrial fibrillation [Electronic source] / [Romero J., Diaz J.C., Di Biase, L. et al.] // *Journal of Interventional Cardiac Electrophysiology*. – 2017. – Link: <http://link.springer.com/article/10.1007%2Fs10840-016-0211-9/>
7. Gender-related differences in presentation, treatment and long-term outcome in patients with first-diagnosed atrial fibrillation and structurally normal heart: the Belgrade atrial fibrillation study / [T. S. Potpara, I. M. Marinkovic, M. M. Polovina et al.]. // *International journal of cardiology*. – 2012. – No. 161. – P. 39–44.
8. Mittal S. Differentiating Paroxysmal From Persistent Atrial Fibrillation / Suneet Mittal. // *Journal of the American College of Cardiology*. – 2014. – Vol. 63, Is. 25 – P. 2849–2851.

CONCLUSIONS

1. The frequency distribution of main cardiovascular diseases and their clinical characteristics (stage and degree of AH, types of IHD, DM, acute CVA, stage and FC CHF) observed equally in patients with AF/AFL regardless of the type conducted by surgical intervention and therefore they do not affect its choice.

2. Male patients often carried RFA CTI and women – RFA PV, due to the greater prevalence of AFL among the first and more severe clinical course of AF among second.

3. Patients with persistent form of AF more often require addition of medical therapy by alternative methods, especially catheter ablation of arrhythmia's substrate.

PROSPECTS FOR FURTHER RESEARCHES

It seems to be appropriate to study further clinical course of AF and AFL depending on the type of surgical intervention and characteristics of drug therapy.