

<http://dx.doi.org/10.35630/2199-885X/2022/12/2.21>

ESTIMATION OF THE POSSIBILITY FOR LEFT VENTRICULAR REMODELLING AFTER RESTORATION OF THE SINUS RHYTHM IN PATIENTS WITH PERSISTENT FORM OF ATRIAL FIBRILLATION

Received 25 January 2022;
Received in revised form 17 February 2022;
Accepted 21 February 2022

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ABSTRACT — Atrial fibrillation is one of the most urgent rhythm disturbances leading to permanent disability of the population. Therefore, the aim of this study was to investigate the possibility of left ventricular remodelling after restoration of sinus rhythm. The results of treatment in 821 patients were analyzed, each of them was assigned to one of 4 groups depending on the tactics of surgical intervention: group 1 — electrical cardioversion was performed, group 2 — pacemaker implantation (DDD) and pharmacological cardioversion; 3rd group — electrical cardioversion and pacemaker implantation; and the 4th group — RFA was performed. After the treatment, a decrease in EDV was revealed by 18.7% in the 1st group, 13.7% in the 2nd group, 19.65% in the 3rd group and 11.3% in the 4th group. An increase in the SD was observed: by 14% in the 1st group, 5.6% in the 2nd group, 10.9% in the 3rd group and by 3.65% in the 4th group, as well as an increase in EF by 48% in the 1st group, 17.5% in group 2, 29.76% in group 3 and 4.5% in group 4. Thus, left ventricular remodelling is feasible after restoration of sinus rhythm after persistent atrial fibrillation.

KEYWORDS — atrial fibrillation (AF), LV remodelling, restoration of sinus rhythm, antiarrhythmic drugs.

INTRODUCTION

Atrial fibrillation (AF) is one of the most common rhythm disorders with a number of complications including stroke, left ventricular dysfunction, heart failure, impaired cognitive function and vascular dementia, which also significantly increases admission rates and affects quality of life [1, 2, 3]. An important issue in the treatment of long-term progressive AF is the maintenance of the restored rhythm. A factor contributing to the subsequent recurrence of AF is an increase in the size of the left chambers of the heart as a result of development of atrial dilatation and mitral re-

gurgitation (MR). It was established that 1/3 of patients with AF have valvular pathology that is detected only by echocardiography. Concomitant valvular pathology causes deterioration of the AF, leads to volume and pressure overload with the development of tachycardiomyopathy. The wave-like contraction of the atria leads to their dilation, and subsequent dilation of the LV cavity and mitral annulus with the development of MR. This dilation of the heart chambers also reduces the likelihood of subsequent restoration of sinus rhythm and leads to a sharp deterioration in the patient's general condition [4, 5, 6].

Purpose:

To analyse the outcomes and assess the possibility of left ventricular remodelling after restoration of sinus rhythm after treatment with antiarrhythmic drugs in combination with various invasive treatment methods.

MATERIAL AND METHODS

A retrospective analysis of the outcomes in 821 patients with AF at the DCTMC and Gusak IERS over the period since 2014 to 2020. Mean patient age was 69 ± 0.54 years (range: 31 to 93). Men — 528 (64.3%), women — 168 (35.7%). In all patients, AF duration exceeded 4 months, and drug therapy was ineffective for sinus rhythm maintenance. In 312 (38%) patients, persistent bradycardia (up to the episodes of light-headedness) occurred after attempts to maintain sinus rhythm. The patients were divided into several groups depending on the applied treatment methods: 1st — 418 (50%) patients who underwent electrical cardioversion; 2nd — 287 (35%) patients who underwent pacemaker implantation (DDD) and chemical cardioversion; 3rd — 62 (7.5%) patients who underwent electrical cardioversion and subsequent pacemaker implantation; 4th — 54 (6.5%) patients who underwent radiofrequency ablation: pulmonary veins isolation using Carto3 and/or Biotok system. Subsequently antiarrhythmic therapy was prescribed to all patients in the form of amiodarone tablets at a maintenance dose of 200 mg/day. Baseline data of the patients are presented in Table 1.

Table 1. Patients' baseline data.

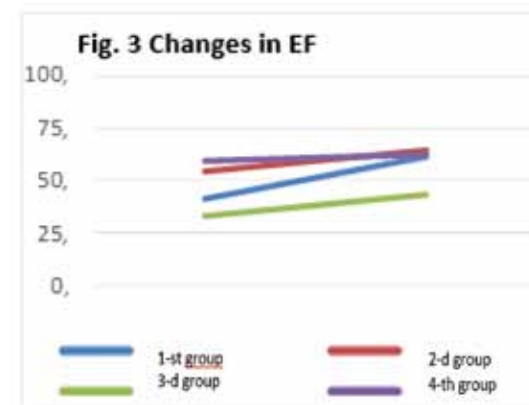
Parameter	Group 1	Group 2	Group 3	Group 4
EDV, ml	150±14	138±18	173±21	141±12
SV, ml	64±9	71±12	55±17	82±7
EF, %	41.3±4.8	54.8±3.2	33.6±2.1	59.4±1.8
Left atrium dimensions, cm	4.3*4.1*4.4	4.3*4.1*4.4	5.2*4.9*6.4	4.2*4.1*4.0
Right atrium dimensions, cm	4.2*4.1*4.9	4.2*4.1*4.9	6.2*4.9*5.8	4.1*3.9*3.9
Vena contracta, mm	4.3	3.7	5.1	2.4

RESULTS

In all patients, sinus rhythm was restored (in the 2nd and 3rd groups, the pacemaker DDD rhythm was maintained). Within 12 months AF recurrence occurred in 197 (24%) patients. There were 149 patients from the 1st group (18.15%), 25 (3.05%) from the second group, 4 (0.49%) from the 3rd group and 19 (2.31%) from the 4th group. These patients underwent repeated electrical cardioversion, the sinus rhythm was restored. Intensive antiarrhythmic treatment was prescribed with Amiodarone (solution for injections) 600 mg, IV drip, followed by a transition to a tablet form at a reduced dose of 200 mg/day. Echocardiographic data after 12 months are presented in Table 2. In the 1st, 2nd, 3rd and 4th groups, statistically significant differences ($p < 0.05$) in the echocardiographic indicators of the dimensions of the heart chambers were noted. In particular, in the 1st group, EDV reduced by 18.7%, SV increased by 14%, EF increased by 48%, vena contracta reduced by 40.5%. In groups 2, 3 and 4 the corresponding changes were 13.7%, 5.6%, 17.5%, 40.5%; 19.65%, 10.9%, 29.76%, 31.4%, and 11.3%, 3.65%, 4.5%, 25%, respectively. 4 patients died within 12 months: one due to the acute myocardial infarction, 2 due to oncological diseases, 1 due to the ischemic stroke (Table 2).

Table 2. Follow-up data after 12 months

Parameter	Group 1	Group 2	Group 3	Group 4
EDV, ml	122±9	119±7	139±11	125±10
SV, ml	73±4	75±11	61±57	85±9
EF, %	61.2±2.7	64.4±1.9	43.6±2.4	62.1±2.4
Left atrium dimensions, cm	4.1*4.4*5.3	3.9*3.8*4.1	4.2*4.1*4.4	4.0*4.0*3.9
Right atrium dimensions, cm	4.2*3.8*4.0	3.8*4.0*4.2	4.2*4.0*4.1	4.1*4.0*3.9
Vena contracta, mm	1.4	2.2	3.5	1.8



CONCLUSION

Analysis of the outcomes of combined treatment of AF using drug therapy and surgical methods showed that after sinus rhythm restoration, the best

results were observed in groups 2 and 3, however, in the short term, even in group 1. There were beneficial changes in echocardiography data, provided that the patients complied with all treatment recommendations. Thus, after more than 12-months follow-up in these groups of patients, left ventricular remodelling develops, which is manifested by a significant reduction in the mitral regurgitation grade, a reduction in EDV and an increase in EF.

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