Acta Scientific Cardiovascular System

Volume 1 Issue 4 August 2022

Research Article

Long-term Results of Surgical Treatment of Atrial Fibrillation in Patients with Coronary Heart Disease. One Center Experience

Zotov AS, Sakharov ER*, Osmanov IS, Shelest OO, Troitsky AV and Khabazov RI

Federal Scientific and Clinical Centre of Specialized Medical Care and Medical Technologies, Federal Biomedical Agency, Moscow, Russia

***Corresponding Author:** Sakharov ER, Federal Scientific and Clinical Centre of Specialized Medical Care and Medical Technologies, Federal Biomedical Agency, Moscow, Russia.

Received: July 20, 2022

Published: July 31, 2022

Abstract

Objective: Since 2015, our center has been actively promoting methods of surgical correction of atrial fibrillation, in particular, in patients with coronary heart disease. The study presents a comparative analysis of the late postoperative period in patients with coronary artery bypass grafting and atrial fibrillation.

Methods: The study included 189 patients with ischemic heart disease and atrial fibrillation for the period from 2015 to 2021. Patients were divided into 2 groups. The first group is represented by patients with ischemic heart disease and atrial fibrillation who underwent coronary bypass surgery and surgical treatment of atrial fibrillation (N = 68). The second group is represented by patients with ischemic heart disease and atrial fibrillation who underwent only myocardial revascularization (N = 121). Patients were comparable in age, gender, initial severity of the condition.

Results: Average follow-up for group 1 and group 2 was 28 and 52 months respectively. There was only 1 patient in group 1, who had dead from cardiovascular diseases in follow up. Freedom of atrial fibrillation was in 80,6% in group 1. In group 2 there were 7 patients who had dead from cardiovascular diseases and total freedom of atrial fibrillation was in 50,5% of patients. Combined endpoints (death, stroke/TIA, progression heart failure, myocardial infarction, bleeding, repeat ablations) were achieved in 22,2% in group 1 and 39,8% in group 2, respectively.

Conclusion: Surgical treatment of atrial fibrillation helps to reduce adverse events in the late postoperative period and contributes to the regression of heart failure.

Keywords: Atrial Fibrillation; Ischemic Heart Disease; Coronary Artery Bypass Grafting; Pulmonary Vein Ablation

Introduction

The 2017 STS Clinical Guidelines for the Surgical Treatment of AF include Class IB recommendations for surgical ablation during isolated and combined CABG. However, there is insufficient data of long-term survival, undesirable complications and progression of chronic heart failure. Several studies have examined the long-term effectiveness of concomitant surgical ablation with excellent indicators of freedom from recurrence of tachyarrhythmias [1-3]. To date, only a few randomized trials have been published. All of them have relatively small sample sizes, including different groups of patients, and contradictory data regarding medium- and long-term results [4,5]. It was found that preoperative AF is associated with a high risk of 30-day mortality and higher morbidity rates, including stroke, renal failure, prolonged ventilation, repeated operations and complications of deep sternal wounds. Patients with preoperative AF also have a higher long-term risk of death

from all causes and cumulative risk of stroke and systemic embolism compared to patients without AF [6,7]. A significant proportion of patients who underwent CABG were diagnosed with atrial fibrillation (AF) before surgery. Current multidisciplinary agreed guidelines support surgical ablation of atrial fibrillation during cardiac surgery, unless the addition of surgical ablation in the hands of the operating surgeon increases significant risk, even in asymptomatic patients [8]. Despite evidence supporting concomitant surgical ablation, in the latest published analysis of the STS database, only 28-33% of patients with preoperative diagnosed AF who underwent CABG received concomitant surgical ablation [8,14]. There are studies reporting the outcomes of the Cox-Maze III procedure in combination with CABG compared to isolated CABG, reports date back to the advent of radiofrequency ablation devices more than a decade ago [9-13].

Since 2015, our center has been actively promoting methods of surgical correction of atrial fibrillation. The main cohort is represented by patients with surgical treatment of atrial fibrillation and coronary bypass surgery. This study is presented by a comparative analysis of the immediate results and the long-term postoperative period in patients with and without surgical correction of atrial fibrillation after surgery in the volume of coronary bypass surgery. The study provides a comparative analysis of techniques for surgical correction of atrial fibrillation.

Methods

Characteristics of patients

The study was presented by 189 patients with coronary heart disease and atrial fibrillation for the period from 2015 to 2021. All patients underwent myocardial revascularization. Patients are represented by two groups. The first group is represented by patients who underwent coronary bypass surgery for coronary artery disease and surgical treatment of atrial fibrillation (N = 68). Among the patients of the first group, the diagnosis of persistent AF was established in 38,2% (N = 26), long-standing persistent AF in 19,1% (N = 13). The second group is represented by patients with atrial fibrillation and coronary artery disease who underwent isolated coronary bypass surgery (N = 121). Among the patients of the second group, the diagnosis of persistent AF was established in 9,1% (N = 11), long-standing persistent AF in 18,2% (N = 22). The average follow-up period for the first group was 28 months, for the second 52 months. The clinical characteristics of the patients are presented in table 1.

	Group 1 N = 68	**Group 2 N = 121**	P
Male, n (%)	58 (85,3)	93 (76,9)	>0,05
Age	66 [59-69]	65 [60-71]	>0,05
Duration of AF, months, median [LQ-UQ]	24 [12-60]	24 [12-60]	>0,05
AF paroxysmal, n (%)	29 (42,6)	88 (72,7)	0,001
Persistent AF, n (%)	26 (38,2)	11 (9,1)	0,001
AF is long-term persistent, n (%)	13 (19,1)	22 (18,2)	>0,05
NYHA 1, n (%)	5 (7,3)	7 (5,8)	>0,05
NYHA 2, n (%)	53 (77,9)	88 (72,7)	>0,05
NYHA 3, n (%)	10 (14,7)	26 (21,5)	>0,05
CHADS2 score, median [LQ-UQ]	3 [3-4]	4 [3-5]	>0,05
HAS bled, median [LQ-UQ]	2 [1-3]	2 [2-3]	>0,05
Indexed LA volume, median [LQ-UQ]	37,5 [29,8-44,5]	37,9 [30,8-47,0]	>0,05
Indexed EDV LV, median [LQ-UQ]	52,5 [46,8-63,8]	59,0 [50,1-69,0]	0,033
Indexed ESV LV, median [LQ-UQ]	22,9 [19,5-28,9]	26 [21,0-37,0]	0,007
EF LV (%), median [LQ-UQ]	56 [52-60]	52 [47-58]	0,001
PA pressure, median [LQ-UQ]	31 [29-37]	30 [28-37]	>0,05

Table 1: Clinical characteristics of patients.

Note: Quantitative data are presented as Me (LQ-UQ), where Me is the median, as well as the percentage of the population (%), LQ-lower quantile, UQ-upper quantile.

Abbreviations: AF - Atrial Fibrillation, EF - Left Ventricular Ejection Fraction, LA - Left Atrium, EDV - End Diastolic Volume, ESV - End Systolic Volume, LV - Left Ventricle, PA - Pulmonary Artery.

Operation

All patients underwent myocardial revascularization. Surgical ablation of atrial fibrillation was performed in the first group before myocardial revascularization. Patients of the second group underwent ablation according of a modified mini-maze lesion or a «box» lesion scheme.

Results

The results of the early postoperative period are presented in table 2. In the early postoperative period, there was one case of TIA in group 1 and group 2. The average bypass time in the first group is higher than in the second, which is explained by ablation. The development of AF in the early postoperative period in group 2 was in 25,8% of cases, while in group 1 the development of AF was only 1,5% of cases.

	Group 1 N = 68	**Group 2 N = 121**	P
Time of Bypass, min	115 [87-130]	103 [84-127]	>0,05
Time of compression aorta, min	59 [49-73]	63 [52-79]	>0,05
LIMA, n (%)	64 (94,1)	116 (95,9)	>0,05
Additional interventions, n (%)	5 (7,4)	12 (9,9)	>0,05
Defibrillation intra-operative, n (%)	7 (10,3)	11 (9,1)	>0,05
Hospital stay, days, median [LQ-UQ]	8 [7-10]	11 [8-14]	<0,05
Complications			
Resternotomy due to bleeding, n (%)	1 (1,5)	3 (2,5)	>0,05
Pacemaker, n (%)	4 (5,9)	0 (0,0)	<0,05
Respiratory failure	1 (1,5)	1 (0,8)	>0,05
Acute cardiovascular failure	6 (8,8)	6 (4,9)	>0,05
TIA	1 (1,5)	1 (0,8)	>0,05
Mortality	0 (0,0)	1 (0,8)	>0,05
Rhythm at discharge			
Sinus, n (%)	62 (91,2)	88 (73,3)	0,002
Atrial fibrillation, n (%)	1 (1,5)	31 (25,8)	0,001

Table 2. Clinical characteristics of patients in the early postoperative period.

Note: Quantitative data are presented as Me (LQ-UQ), where Me is the median, as well as the percentage of the population (%), LQ-lower quantile, UQ-upper quantile.

Abbreviations: LIMA - Left Internal Thoracic Artery.

Observation of patients in the long-term postoperative period

The follow-up period for the first and second groups was 28 and 52 months, respectively. In the first group, where the ablation therapy was performed, freedom from AF without antiarrhythmic therapy was 80,6%. In the second group, freedom from AF without antiarrhythmic therapy was 50,5%. The combined endpoint (death, stroke/TIA, progression heart failure, myocardial infarction, bleeding, repeat ablations, pacemaker implantations) was achieved in the first group in 22,2%. In the second group, the combined endpoint was reached in 39,8%. The data of the long-term postoperative period are presented in table 3.

	Group 1 N = 62	**Group 2 N = 91**	**P**
Freedom from AF without additional antiarrhythmic therapy, n (%)	50 (80,6)	46 (50,5)	0,001
Combined Endpoints, n (%)	14 (22,2)	39 (39,8)	0,001

Table 3: Clinical characteristics of patients of the long-term postoperative period.

Mortality from cardiovascular causes was 1 person for group 1 and 7 people for group 2 (Figure 1).

Figure 1: Survival rate (p > 0.05).

Discussion

Preoperative AF is associated with an increased risk of all causes (including perioperative) of morbidity and mortality in patients with coronary heart disease. The possibility of concomitant surgical ablation of AF during coronary artery bypass surgery should be considered. In the latest STS (Society of Thoracic Surgeons) guidelines for the treatment of atrial fibrillation, surgical ablation is recommended during concomitant isolated CABG as an indication for Class I (evidence level B, non-randomized) [14]. The authors of the recommendations were critical of the fact that many surgeons preferred less invasive approaches, such as epicardial ablation, sometimes without full consideration of the pathophysiology of AF. According to the results of STS studies, only 33% of patients with coronary bypass surgery and preoperative AF receive concomitant surgical ablation, and, as a rule, ablation consists in isolation of the ostium of the pulmonary veins [14]. In our study, modified mini-maze lesion or «box» lesion sets were performed in patients from group 1 during myocardial revascularization. Freedom from AF in the first group was 80,6%. In the second group, freedom from AF without antiarrhythmic therapy was 50,5%. The combined endpoint (death, stroke/TIA, progression heart failure, myocardial infarction, bleeding, repeat ablations, pacemaker implantations) was achieved in the first group in 22,2%. In the second group, the combined endpoint was reached in 39,8%. Our study showed that the ablation techniques does not increase perioperative risks. In the long-term period, in terms of freedom from atrial fibrillation and achieving a combined endpoint, ablation therapy in the first group had significantly better indicators. In the group where ablation wasn't performed, there is a more pronounced progression of chronic heart failure, transient ischemic attack and other adverse events. The limitations of the study are due to the short follow-up period and the limited number of patients. Overall survival in the study groups did not differ (Figure 1), although the first group shows a positive trend. But in the group where ablation was performed, the indicators of freedom from all adverse events were significantly higher than in the group where ablation was not performed (Figure 2) (p = 0,004, Log-Rank test).

Figure 2: Achievement of the combined endpoint against the background of AF recurrence (p < 0,004).

Conclusions

Our study showed that surgical ablation doesn't increase perioperative risks, reduce adverse events (at follow-up), allows to increase freedom from atrial fibrillation in the long-term period. In our daily practice, we prefer a mini maze procedure or «box» lesion sets for patient with ischemic heart disease and atrial fibrillation.

Funding Source

The study was funded by Federal Scientific and Clinical Centre of Specialized Medical Care and Medical Technologies, Federal Biomedical Agency.

Competing Interests

The authors declare that they have no competing interests.

Bibliography

1. Gammie JS., *et al*. "Atrial fibrillation correction surgery: lessons from the Society of Thoracic Surgeons National Cardiac Database". *Annals of Thoracic Surgery* 85 (2008): 909-914.

2. Doukas G., *et al*. "Left atrial radiofrequency ablation during mitral valve surgery for continuous atrial fibrillation: a randomized controlled trial". *JAMA* 294 (2005): 2323-2329.

3. Rankin JS., *et al*. "One-year mortality and costs associated with surgical ablation for atrial fibrillation concomitant to coronary artery bypass grafting". *European Journal of Cardio-Thoracic Surgery* 52 (2017): 471-477.

4. Pokushalov E., *et al*. "Benefit of ablation of first diagnosed paroxysmal atrial fibrillation during coronary artery bypass grafting: a pilot study". *European Journal of Cardio-Thoracic Surgery* 41 (2012): 556-560.

5. Al-Atassi T., *et al*. "Mapping and ablation of autonomic ganglia in prevention of postoperative atrial fibrillation in coronary surgery: MAAPPAFS atrial fibrillation randomized controlled pilot study". *Canadian Journal of Cardiology* 30 (2014): 1202-1207.

6. Malaisrie SC., *et al*. "Burden of preoperative atrial fibrillation in patients undergoing coronary artery bypass grafting". *The Journal of Thoracic and Cardiovascular Surgery* 155 (2018): 2358-2367.e2351.

7. Saxena A., *et al*. "Systematic review and meta-analysis on the impact of preoperative atrial fibrillation on short- and long-term outcomes after aortic valve replacement". *Journal of Cardiovascular Surgery* (Torino) 58 (2017): 943-950.

8. Calkins H., *et al*. 2012 HRS/EHRA/ECAS expert consensus statement on catheter and surgical ablation of atrial fibrillation: recommendations for patient selection, procedural techniques, patient management and follow-up, definitions, endpoints, and research trial design". A report of the Heart Rhythm Society (HRS) Task Force on Catheter and Surgical Ablation of Atrial Fibrillation. Developed in partnership with the European Heart Rhythm Association (EHRA), a registered branch of the European Society of Cardiology (ESC) and the European Cardiac Arrhythmia Society (ECAS); and in collaboration with the American College of Cardiology (ACC), American Heart Association (AHA), the Asia Pacific Heart Rhythm Society (APHRS), and the Society of Thoracic Surgeons (STS). Endorsed by the governing bodies of the American College of Cardiology Foundation, the American Heart Association, the European Cardiac Arrhythmia Society, the European Heart Rhythm Association, the Society of Thoracic Surgeons, the Asia Pacific Heart Rhythm Society, and the Heart Rhythm Society. Heart Rhythm. 9 (2012): 632-96. e21.

9. Damiano RJ Jr., *et al*. "The long-term outcome of patients with coronary disease and atrial fibrillation undergoing the Cox maze procedure". *The Journal of Thoracic and Cardiovascular Surgery* 126 (2003): 2016-2021.

10. Ad N., *et al*. "Association of operative risk with the outcome of concomitant Cox Maze procedure: a comparison of results across risk groups". *The Journal of Thoracic and Cardiovascular Surgery* 148 (2014): 3027-3033.

11. Ad N., *et al*. "Do we increase the operative risk by adding the Cox Maze III procedure to aortic valve replacement and coronary artery bypass surgery?". *The Journal of Thoracic and Cardiovascular Surgery* 143 (2012): 936-944.

12. Pokushalov E., *et al*. "Benefit of ablation of first diagnosed paroxysmal atrial fibrillation during coronary artery bypass grafting: a pilot study". *European Journal of Cardio-Thoracic Surgery* 41 (2012): 556-560.

13. Cherniavsky A., *et al*. "Assessment of results of surgical treatment for persistent atrial fibrillation during coronary artery bypass grafting using implantable loop recorders". *Interactive CardioVascular and Thoracic Surgery* 18 (2014): 727-731.

14. Badhwar V., *et al*. "The Society of Thoracic Surgeons 2017 Clinical Practice Guidelines for the Surgical Treatment of Atrial Fibrillation". *Annals of Thoracic Surgery* 103.1 (2017): 329-341.