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Comparative characteristics of the effectiveness of surgical treatment of various forms of atrial fibrillation

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Abstract

The article analyzes the results of reconstructive operations on valves and CABG with MAZE carried out over the past 7 years at the Regional Center for Cardiac Surgery in Odessa in patients with chronic, paroxysmal and persistent forms of AF.

The expediency of supplementing open heart surgery (CABG, reconstructive valve surgery) with MAZE surgery has been shown for all patients with paroxysmal, persistent and chronic forms of AF.

Evaluated the effectiveness of the appointment of antiarrhythmic and anticoagulant therapy in these groups of patients.

Keywords: valve surgery; CABG; MAZE; persistent AF; paroxysmal AF; chronic AF.

The Regional Center for Cardiac Surgery of the Odessa Regional Hospital is the leading medical institution in the South of Ukraine for the treatment of cardiac arrhythmias and conduction disorders. Due to its relevance, atrial fibrillation (AF) deserves special attention. The prevalence of AF reaches 2% in the general population and 6% in people over

60 years old. Atrial fibrillation significantly increases the relative risk of overall and cardiovascular mortality and is considered a potentially lethal arrhythmia with significantly impaired quality of life and with the risk of serious complications and death. Medical therapy in most cases is ineffective and is aimed at restoring sinus rhythm, heart rate control, prevention of thromboembolic complications, is useful as the treatment of the underlying causes and for correction of electrolyte and metabolic disorders.

In 1987, a research center in St. Louis (USA) under the leadership of James L. Cox contributed to the appearing of the "maze" operation in cardiac surgery practice, later named after D. Cox (Cox-Maze operation). Over time this operation has undergone several modifications [3] The idea of the Cox-Maze surgery is to interrupt any possible electrical impulse circuits in the atria, preventing the re-contraction of the atria from being triggered by the same electrical impulse. Thus, Cox-Maze surgery removes the ability of the atrium to flutter or fibrillate. In the last 20 years, several types of open heart surgery have been developed to radically correct AF: 1) surgical isolation of the left atrium (LA) 2) the corridor procedure proposed by G. Guiraudon et al. in 1985; 3) in 1987, the first reports appeared on the clinical use of the most effective surgery for radical correction of AF - operation "Maze", which in the hands of the author of the technique - J.Cox has undergone several modifications (Maze 1-3). J. Cox et al. identified five main conditions that are required for the radical elimination of AF and the restoration of sinus rhythm: 1) elimination of AF; 2) restoration of heart rate; 3) AV synchronization recovery 4) restoration of the transport function of the atria; 5) reduced risk of thromboembolism. Only Maze-3 surgery (Cox-Maze III) meets all these 5 criteria.

Despite its proven efficacy (up to 95-97% of patients do not have atrial fibrillation in the long-term period), classically performed the Maze III surgery (“cut and sew” technique) not widely used due to the complexity of implementation, the need for prolonged cardiac arrest and cardiopulmonary bypass, as well as a high risk of intraoperative and postoperative bleeding. Maze IV surgery (method of forming maze lines using radio frequency energy) is much easier to perform, but its efficiency is slightly lower (up to 70% with persistent and up to 90% with paroxysmal form of AF).

Purpose: comparative analysis of the effectiveness of the MAZE IV surgery in the treatment of various forms of atrial fibrillation at the Regional Center for Cardiac Surgery in Odessa.

The analysis is based on a five-year follow-up. The study included 31 patients, 13 men and 18 women. Average age was 62 ± 7,1 years. The presence of AF in patients was

determined by the ECG method or according to the results of Holter monitoring.

Table 1 - Patient characteristics

Type of surgery	Persistent AF	Permanent AF	Paroxysmal AF
CABG + MAZE	5	-	-
Valve surgery for chronic rheumatic heart disease (mitral, tricuspid) + MAZE	5	3	6
Operations on valves with coronary artery disease (mitral, tricuspid) + MAZE	6	3	3
Total	16	6	9

There were 16 patients with persistent AF (51,6%), 6 patients with the permanent form (19,6%), and 9 patients with the paroxysmal form (29,0%). Arrhythmia duration ranged from 5 months to 5 years.

In 14 patients (45.1%) the cause of valvular pathology was rheumatic heart disease. Preventive use of antiarrhythmic drugs in these patients was ineffective.

Table 2. - Left atrium (LA) dimensions in operated patients according to echocardiography in the preoperative period

Number of patients with LA size from 3.5 to 4.0 cm	Number of patients with LA sizes from 4.0 to 5.0 cm	Number of patients with LA size more than 5.0 cm
3	16	12

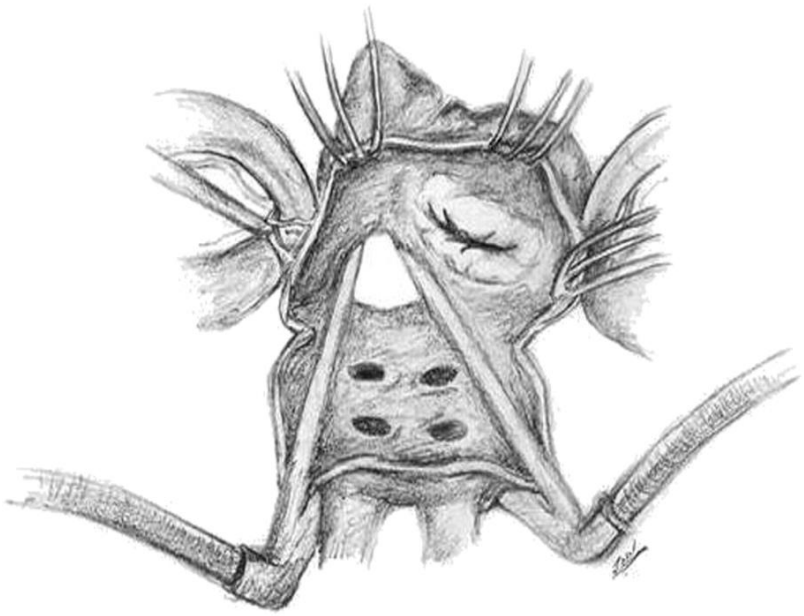
Table 3 - The value of the ejection fraction (EF) in operated patients according to echocardiography in the preoperative period

Number of patients with preserved EF	Number of patients with EF 40-50%	Number of patients with EF less than 40%
16	9	6

The use of the heart-lung machine duration increased by 20-25 minutes due to MAZE procedure.

The first stage of the operation, regardless of the total volume of surgical treatment, began with a standard connection of the heart-lung machine (cannulation of the aorta;

depending on the need for interventions on the right heart or only in the left chambers of the heart - bicaval cannulation or cannulation of the right atrium with a double-lumen venous cannula). Two types of cardioplegia were used depending on the expected time of cardiopulmonary bypass – cold blood cardioplegia or Custodiol in the aortic root and selectively in the orifices of the coronary arteries in the case of operations supplemented by intervention on the aortic valve. Hypothermia - 33-34 C. The first line of the created maze is left atriotomy in the area of the right pulmonary veins, the second line - left atrial appendage resection. Transmural damage to the conduction system was achieved using bipolar radiofrequency ablation in the oblique and transverse sinuses, respectively, above and below the collector of the orifice of the pulmonary veins. All these lines were connected to each other, creating a so-called box.



In the peculiarities of postoperative management, all patients underwent the temporary cardiac pacing (TCP), moreover 25 (80.6%) patients underwent atrial stimulation with a heart rate of 90 per minute, and 6 patients (19.4%) had ventricular stimulation for 5-7 days. 1 patient developed a complete AV block, which required a permanent pacemaker. In 2 (6.5%) patients with chronic AF who underwent CABG with MAZE, atypical atrial flutter was recorded during hospital stay after surgery. All this cases required cardioversion after performing transesophageal echocardiography. Subsequently, patients continued to receive amiodarone and warfarin.

On the first day after the surgery, amiodarone was administered at a dose of 900-1200 mg, followed by a decrease in the dosage. Patients with chronic AF continued to receive a

prophylactic dose of 200 mg after discharge, and patients with persistent form were discharged from the hospital without antiarrhythmic therapy. Heparin was prescribed to all patients 12 hours after surgery at a dose of 15-20 thousand units per day or Enoxaparin sodium 0.5 mg/kg 2 times a day. From the 2nd day of the postoperative period, warfarin was prescribed at a dose of 5 mg until the target INR level was reached within 2-3. Patients with valvular disease continued to receive warfarin for life, and patients with coronary heart disease - at least 3 months together with antiplatelet agents (aspirin). Patients in the intensive care unit underwent continuous monitoring of ECG, blood pressure, Sat O2 and laboratory tests (CBC, blood gases, coagulation tests, the biochemical profile). The average bed-day in the intensive care unit was 2-3 days.

30 (96.8%) patients were discharged with sinus rhythm. In three cases development of atrial flutter was noted on the third day. On day 7, patients were discharged after restoration of sinus rhythm by electrical cardioversion. Follow-up was carried out 3, 6 and 12 months after discharge. After 12 months, all patients with persistent and paroxysmal AF retained sinus rhythm. In patients with a permanent form of atrial fibrillation the resumption of arrhythmia was recorded in five cases out of six. Patients were also observed at a later date. Differences were noted from the second year of observation. In the group of patients with persistent AF, recurrence of arrhythmia was recorded in two patients. In the group of patients with a paroxysmal form, sinus rhythm persisted.

Mortality in the hospital period was 1 person (3.2%). A deceased patient developed a perioperative myocardial infarction associated with non-coronary damage to the heart muscle, which led to acute heart failure. Death occurred on the 3rd day of the postoperative period.

Conclusions:

1. It is advisable to supplement open heart surgery (CABG, reconstructive valve surgery) with MAZE for all patients with paroxysmal and persistent AF.

2. The efficiency of the surgery in patients with paroxysmal atrial fibrillation is significantly higher.

3. The feasibility of MAZE surgery in patients with persistent AF is questionable.

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