

Surgical treatment of atrial fibrillation. Operations MAZE at the Regional Center of Cardiac Surgery in Odesa

P.V. Kistruha, V.V. Hrubnik, Horiachiy A.V., O.A. Hitalchuk, L.O. Sobitniak,
O.V. Blikhar

Regional Center of Cardiac Surgery, Odesa, Ukraine

Annotation

The article analyzes the results of reconstructive valves operations and CABG with MAZE performed in the Regional Center for Cardiac Surgery in Odesa over the past 6 years in patients with chronic, paroxysmal and persistent forms of AF. The expediency of complementing open heart surgery (CABG, reconstructive valve surgery) with MAZE surgery was shown to all patients with paroxysmal, persistent and chronic forms of AF. The effectiveness of the appointment of antiarrhythmic and anticoagulant therapy in these groups of patients was evaluated.

Key words: valve operations, CABG, MAZE, persistent AF, paroxysmal AF, chronic AF.

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Atrial fibrillation (AF) is one of the most common heart rhythm disturbances worldwide. The prevalence rate of atrial fibrillation reaches 2% in the general population and 6% in people over 60. Atrial fibrillation significantly increases the relative risk of mortality and is considered as a potentially lethal arrhythmia. AF also leads to significant impaired the quality of life with the risk of serious complications and death. In most cases the medical therapy is ineffective and is aimed at restoring sinus rhythm, controlling heart rate and preventing thromboembolic complications. Certainly treatment of AF must be on the background of treatment of the main diseases, correction of electrolyte and metabolic imbalance.

In 1987, experimental research in St. Louis (USA) under the leadership of James L. Cox led to the emergence of the "maze" operation in cardiac surgery practice, later named after D. Cox (Cox-Maze operation). Over time, it has undergone several modifications [3]. The idea behind Cox-Maze surgery is to interrupt any possible electrical impulse circuits in the atria, preventing the re-contraction of the atria by the same electrical impulse. In this way, 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 application of the most effective operation for radical correction of AF - the "MAZE" operation, which in the hands of the author of the method - J. Cox underwent several modifications (MAZE 1-3). J. Cox et al. identified five main conditions that are required for radical elimination of AF and restoration of sinus rhythm: 1) elimination of AF; 2) restoration of heart rate; 3) restoration of AV synchronization and 4) transport function of the atria; 5) reducing the risk of thromboembolism. Only Operation Maze-3 (Cox-Maze III) meets all these 5 criteria.

Despite the proven efficacy (up to 95-97% of patients do not have atrial fibrillation in the long-term period), the Maze III operation (cut and sew technique) in the classical version has not found widespread use due to the complexity of its implementation, the need for prolonged cardiac arrest and artificial circulation, as well as a high risk of intraoperative and postoperative bleeding. Operation Maze IV (a technique for the formation of labyrinth lines using radio frequency energy) is much easier to perform, but its efficiency is somewhat lower (up to 70% with a persistent and up to 90% with a paroxysmal form of AF).

Goal: to analyze the effectiveness of MAZE IV surgery performed at the Regional Center for Cardiac Surgery in Odesa.

I. Methods And Materials

There were 10 men and 17 women in the main group. The average age is 59 ± 2.1 years. The presence of AF in patients was determined by ECG or by Holter monitoring

Table 1. Patients characteristics

Type of surgery	Persistent AF	Permanent AF	Paroxysmal AF
CABG + MAZE	5	-	-
Valve replacement due to CRHD (mitral/ tricuspid valves) + MAZE	5	1	4
Valve replacement (mitral/ tricuspid valves) + CABG + MAZE	6	3	3
Total	16	4	7

* CRHD– chronic rheumatic heart disease

* CABG - coronary artery bypass grafting

There were 16 patients (59.3%) with a persistent AF, 4 patients (14.8%) with a permanent AF and 7 patients (25.9%) with a paroxysmal form AF. The duration of arrhythmia ranged from 5 months to 5 years.

In 10 patients (37%), the cause of valvular pathology was rheumatic heart disease. Prophylactic administration of antiarrhythmic drugs in these patients was ineffective.

Table 2. The sizes of the left atrium (LA) in the operated patients according to echocardiography in the preoperative period

Amount of patients with the LA sizes from 3.5 to 4.0 cm	Amount of patients with the LA sizes from 4,0to 5,0cm	Amount of patients with the LA sizes more then 5,0cm
2	15	10

Table 3. The Ejection Fraction (EF) in the operated patients according to echocardiography in the preoperative period

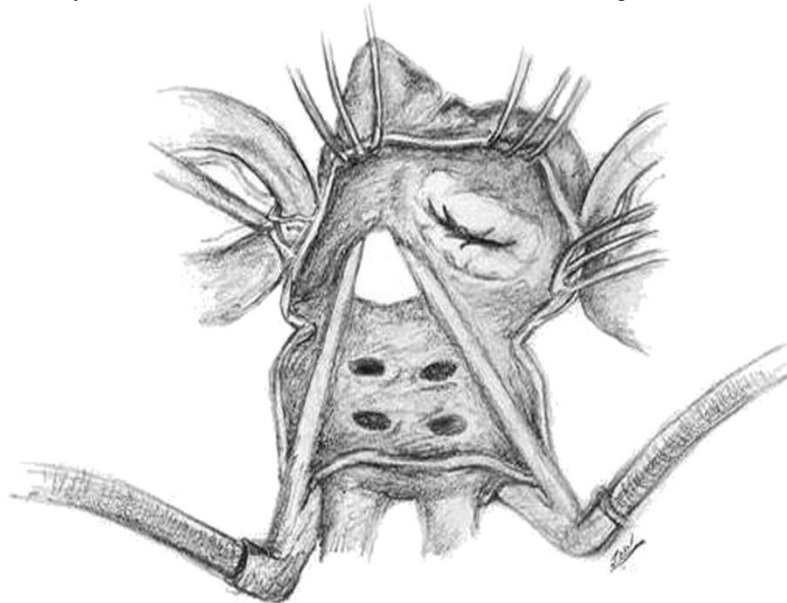
Amount of patients with normal EF	Amount of patients with EF 40-50%	Amount of patients with Φ EF less than 40%
14	8	5

The duration of use of cardiopulmonary bypass in connection with MAZE increased by 20-25 minutes

The first stage of the surgery began with the implementation of the standard connection of the cardiopulmonary bypass regardless of the expected intervention (aortic cannulation; depending on the situation -bicaval cannulation or cannulation of the right atrium with the double-lumen venous cannula)

Two types of cardioplegia were used depending on the estimated time of cardiopulmonary bypass - cold blood cardioplegia or Custodiol injection in the aortic root and selectively in the coronary arteries in case of additional aortic valve intervention. Was reached hypothermia - 33-34 C.

The left atriotomy was in the region of right pulmonary veins and it was the first line of the created labyrinth. The second line was the left atrial appendage resection. Using bipolar radiofrequency ablation in the oblique and transverse sinuses was achieved transmural damage to the conducting system above and below the collector of the pulmonary veins. All these lines were interconnected creating a so-called box.



A temporary pacemaker was implanted for the all of patients. 22 (81.5%) patients had underwent atrial stimulation with a heart rate of 90 per minute and 5 patients (18.5%) had ventricular stimulation for 5-7 days. One patient developed a complete AV block, which required a permanent pacemaker implantation. Atypical atrial flutter was recorded in 2 (7.4%) patients with chronic AF and underwent CABG with MAZE in postoperative period. And atypical atrial flutter also was recorded in 2 (7.4%) patients with chronic AF and underwent valve replacement with MAZE in postoperative period. In all cases we made a cardioversion after performing a transesophageal echo. Subsequently, patients continued to receive amiodarone and warfarin.

On the first postoperative day amiodarone was administered in a dose of 900-1200 mg, followed by a reduction in dosage. Patients with a chronic form of AF after discharge continued to receive a prophylactic dose of 200 mg, and patients with a persistent form were discharged from the hospital without antiarrhythmic therapy. Heparin was prescribed to all patients in 12 hours after surgery at a dose of 15000-20000 units per day or enoxaparin 0.5 mg / kg 2 times a day. From the 2nd day of the postoperative period, warfarin was prescribed in a dose of 5 mg, until the target INR level was reached within 2-3. Patients with valvular pathology continued to receive warfarin lifelong, and patients with coronary heart disease receive antiplatelet agents (aspirin) for at least 3 months along. Patients in the intensive care unit underwent continuous monitoring of ECG, blood pressure, Oxygen saturation and laboratory tests (complete blood count, blood gases, coagulation tests, blood biochemistry). The average period of stay in the intensive care unit was 2-3 days
25 patients (92.6%) were discharged with sinus rhythm. The observation was carried out in 3, 6 and 12 months after the discharge. After 12 months all patients with persistent and paroxysmal forms of AF remained sinus rhythm.

Mortality in the hospital period was (3.7%) -1 person. The deceased patient developed 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.

II. Conclusions

1. Open heart surgery (CABG, reconstructive valve surgery) is advisable to supplement the operation MAZE in all patients with paroxysmal and persistent forms of AF
2. Patients under observation in the dynamics noted the stability of the state, preserved sinus rhythm without recurrence of AF
3. The feasibility of MAZE surgery in patients with persistent AF is needed in the further discussion.

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