



# Mammarokoronarny Shunting on the Working Heart by the “Midcab» Method and Gene Status: The First Experience in Uzbekistan

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## Abstract

**Background and Objectives:** Surgical methods are often applied in treatment of patients with coronary heart disease. The modern direction in development of coronary surgery today became the transition to mini-accesses and to an arterial revascularization. For lifetime of the coronary shunting (CS) enough experience was accumulated of its performance in the conditions of artificial blood circulation.

**Material and Methods:** Minimally Invasive Direct Coronary Artery Bypass MIDCAB. The patient arrived with the diagnosis: Coronary heart disease, stenocardia. EH-III stage, risk 4 very high. A concrement in the right kidney, heart failure IIA stage. Functional class- III NYHA. Genotyping of the SNP was performed by polymerase chain reaction Real-Time PCR. (essential hypertension panel (9 genes); Coronary heart disease panel (8 genes)).

**Result:** The operation by a technique of “MIDCAB” was executed in our center in September 2017, for the first time in Uzbekistan. The patient had a high genetic risk of predisposition to hypertension and thrombophilia. Surgery was carried out in conditions - high chest epidural anesthesia in combination with an endo- tracheal anesthesia. Artificial ventilation of lungs was carried out through an intubation tube in the two-pulmonary mode of ventilation. The patient was stacked on a back with a body tilt 15-30°. Access to heart was made through a left-side front side thoracotomy in the fifth midrib. Length of a skin section was 12 cm.

**Conclusion:** Owing to small experience, a section was made long - 12 cm. Surgery time, also was long. Now performance of MIDCAB is carried out in 135 min. Blood losses are also reduced. Gradual understanding of advantages MIDCAB operation by most of surgeons, led to a revascularization alternative through a sternotomy. Thus, using MIDCAB technology is the effective strategy of treatment patients with coronary heart disease. It allows to reduce injury of surgery, to improve the postoperative period, to reduce quantity of complications. However, there are still many surgeons who skeptical about this operation, because of fears about the early and remote postoperative results. The clinical picture coincided with the genetic status of the patient. It is worth noting that the disease has variable expressivity and penetration, with the presence of additional genetic and environmental factors being important in many cases.

**Keywords:** Minimally Invasive Direct Coronary Artery Bypass MIDCAB; Coronary Shunting CS; Multiplex PCR Technology

**Abbreviations:** BP: Blood Pressure; GLS: Global Longitudinal Strain; EH: Essential Hypertension; ECG: Electrocardiogram; LIMA: Left Internal Mammary Artery; LAD: Left Anterior Descending; PCR: Polymerase Chain Reaction; SNP: Single-Nucleotide Polymorphisms; Echo: Echocardiography; FC: Functional Class; EAH: Electric Axis of The Heart

## Introduction

Surgical methods are often applied in treatment of patients with coronary heart disease. The modern direction in development of coronary surgery today became the transition to mini-accesses and to an arterial revascularization. For lifetime of the coronary shunting

(CS) enough experience was accumulated of its performance in the conditions of artificial blood circulation [1-4]. High interest of surgeons to mini-accesses are defined by the following:

- a. High level of lethality at patients with coronary heart disease.

- b. A possibility in development of purulent inflammatory complications in breast.
- c. Negative impact of artificial blood circulation on an organism.
- d. The prolonged seam and low cosmetic effect [5-7].

As result it led to development of less traumatic accesses to heart when performing coronary shunting. So F.J. Benetti was offered left-side mini-tarakotomy for shunting of a front interventricular artery with use by LIMA, this equipment received the name MIDCAB (a mini-invasive direct revascularization of coronary arteries) [8-10]. Thus, today coronary shunting, by a technique of "MIDCAB" means performance it from mini-access, on the working heart, without connection of artificial blood circulation, access to heart at the same time is provided through a left-side torakotomiya in the 5th midrib [11-13]. The key role in preparing of the patient for the operation "MIDCAB" is occupied by visualization of heart and assessment of warm haemo dynamics. Today it is a method of assessment deformation and twisting a myocardium on two-dimensional tracking of spots of a gray scale by the ultrasonic image [14-16]. Meanings of circular deformation more-than 11.0% with sensitivity of 78.3% and specificity of 73.1% were a signal of early pathological remodeling of LIMA at a sharp myocardial infarction. In turn values of longitudinal deformation of LIMA allow predicting development of an acute heart failure during the hospital period [17,18].

## Material and Methods

The patient arrived with the diagnosis: Coronary heart disease, stenocardia. EH-III stage, risk 4 very high. A concrement in the right kidney, heart failure IIA stage. Functional class- III NYHA. Genotyping of the SNP was performed by polymerase chain reaction

Real-Time PCR. (Essential hypertension panel/9 genes; Coronary heart disease panel/8 genes). Essential hypertension panel- ADD1, AGT704, AGT521, AGTR1, AGTR2, CYP11B2, GNB, NOS3:786, NOS3:894. Coronary heart disease panel - F2, F5, F7, F13A1, FGB, ITGA2, ITGB3, PAI-1.

## Result

The operation by a technique of "MIDCAB" was executed in our center in September, 2017, for the first time in Uzbekistan.

**A. Complaints:** on the short wind, pains behind a breast amplifying at physical activity.

**B. Anamnesis:** the long time suffers from CHD and EH. In 2015 had a heart attack. In 2017 the koronarografiya on which it is revealed LAD occlusion in a proximal third is revealed.

**C. Objectively:** Average serious condition. Active position. Clear consciousness. Clean integuments. A bone and muscular system without deformation. Lymph nodes are not increased. Heart tones are muffled. BP-110/70 mm Hg. The liver is not increased. There are no hypostases.

**D. ECG:** heart rate - 66 beats/min, the Sinus rhythm. EAH is rejected to the left. PQ-12 ms; QRS-10 ms; QT - 0.38 ms. Signs of a hypertrophy of the left ventricle.

**E. EchoKG:** Structure changing of a cavity in the left auricle. By means of EchoKG the assessment analysis of deformation myocardium is carried out. The results of indicators systolic function of all segments of the left ventricle are shown in the picture. Global longitudinal strain GLS-of 10.6% (Figure 1).

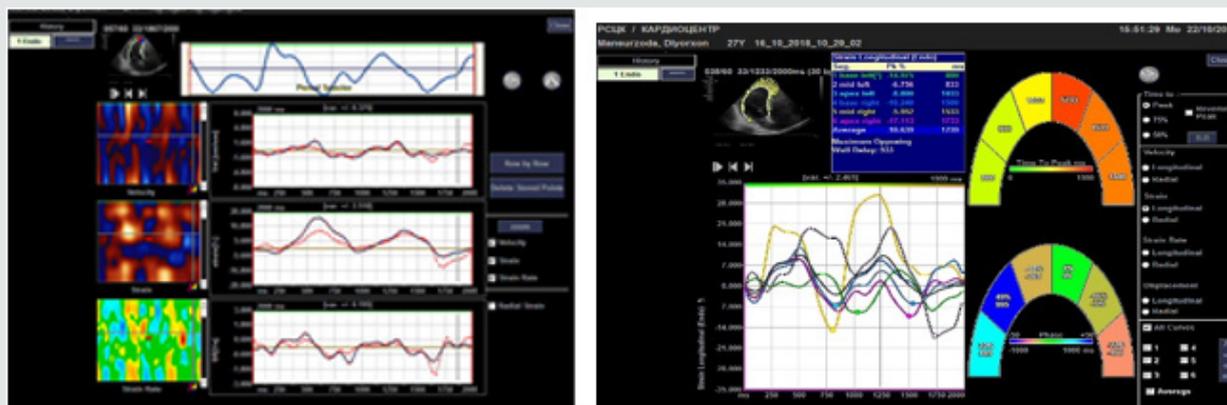


Figure 1: Global longitudinal strain.

- F. was equal.
- G. Ultrasonography of Carotids:** Stenosis of a distal segment.
- H. Ultrasonography of Abdominal Organs:** Chronic cholecystitis. Stone in the right kidney.
- I. Ultrasonography of a Thyroid Gland:** hyperplasia of a thyroid gland.

**J. Coronary Angiography:** A trunk of the left coronary artery - roughness of contours in sr/3. The front descending artery - occlusion in the ave./3 bending around (Figures 2 & 3). This patient had operation on august 30, 2017: Coronary shunting on the working heart by MIDCAB technique without artificial blood circulation (off-pump).

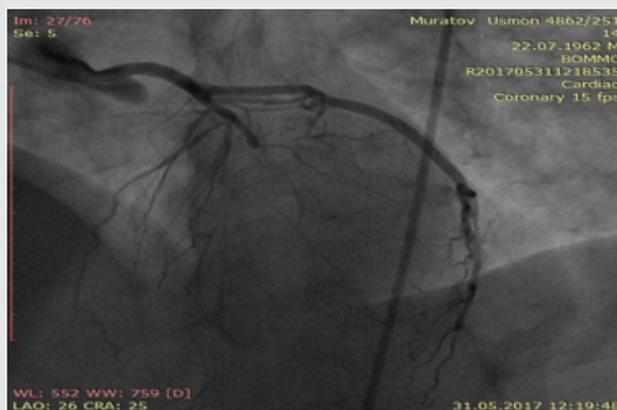


Figure 2: Koronaroangiography Occlusion in a proximal third of LAD.

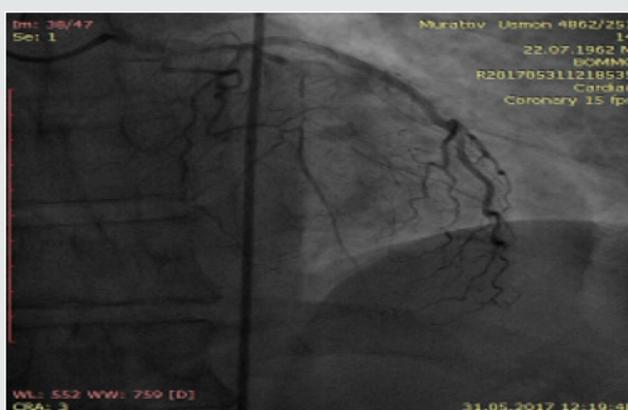


Figure 3: Koronaroangiography Filling of a distal third of LAD through collateral.

**K. Gene Tests:** We have studied genotype of 17 genes of cardiovascular continuum. The patient had a high genetic risk of predisposition to hypertension and thrombophilia. Genetic tests showed a tendency to parameters like: Risk Endothelial dysfunction, risk of water-salt exchange disturbance and arterial stiffness increases. We took into account the fact that the food-induced gene expression variability significantly affects the increase in blood pressure. We selected clinical signs for creation

of the prognostic table by means of the method of the consecutive diagnostic procedure based on a technique of the sequential analysis offered by A. Wald. For each informative sign gradation of this or that indicator was selected to equal the diagnostic value of each of indicators. Thus, by means of point system the personal diet for a period of 10 days is prescribed. This triangulation has allowed to stratify and prioritize patient information as to determine the dynamics of the EH clinical development.

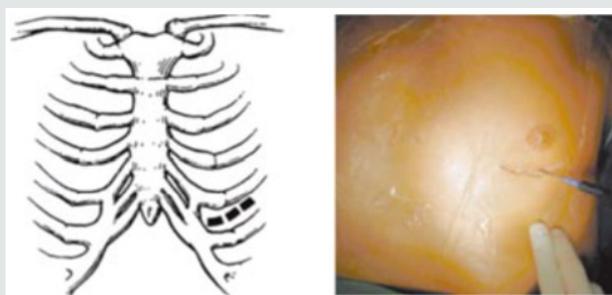


Figure 4: Access to the 5<sup>th</sup> midrib.

**L. Surgery:** Surgery was carried out in conditions - high chest epidural anesthesia in combination with an endo-tracheal anesthesia. Artificial ventilation of lungs was carried out through an intubation tube in the two-pulmonary mode of ventilation. The patient was stacked on a back with a body tilt 15-30°. Access to

heart was made through a left-side front side thoracotomy in the fifth midrib. Length of a skin section was 12 cm. (Figure 4). Further allocated LIMA. Later made a perikardiotomiya. When forming an anastomosis of LIMA - LAD installed the intracoronary shunt. Formed anastomosis by PROLENE thread 8-0. After formation,

anastomosis carefully checked for tightness, possibility and excluded possible excesses. Drainage of a cavity pericardium and the left pleural cavity carried out through a puncture in 6-7 midrib at the left. Duration of operation was 200 min. In the early postoperative period, pneumonia or heavy respiratory insufficiency was not observed. A postoperative current smooth, was in intensive care unit within 1 day. After leaving hospital the condition of the patient improved. Complaints to pains in heart, short wind, feeling of shortage of air, weakness decreased. Seams are removed on the 7<sup>th</sup> day. In the late postoperative period standard therapy with dynamic out-patient observation is recommended to the patient (Figure 5).



**Figure 5:** A type of a postoperative seam for the 7<sup>th</sup> day a/o.

## Discussion

Showing to small experience, a section was made long -12 cm. Surgery time, also was long. Now performance of MIDCAB is carried out in 135 min. Blood losses are also reduced. Gradual understanding of advantages MIDCAB operation by most of surgeons, led to a revascularization alternative through a sternotomy. Thus, using MIDCAB technology is the effective strategy of treatment patients with coronary heart disease. It allows to reduce injury of surgery, to improve the postoperative period, to reduce quantity of complications. However, there are still many surgeons who skeptical about this operation, because of fears about the early and remote postoperative results. The clinical picture coincided with the genetic status of the patient. We assume that with a long time the salt damaged the patient's surgical site. We used multiplex PCR technology for two SNP panels. It can identify the causal mutation, which confirm the diagnosis of the disease. However not all mutations in different genes show a similar behavior-they are usually associated with a specific set of symptoms and with a different prognosis. This helps performing the appropriate risk stratification for the disease and foreseeing possible complications.

A correct diagnosis of the disease allows for appropriate risk stratification. In addition, the identification of certain types of mutations in some genes provides prognostic information

in carriers. The test has predictive value for the disease when a pathogenic mutation is found. It is very important for genetic counseling and useful for familial monitoring. It allows identifying the carriers at risk of developing the disease, who must follow appropriate clinical monitoring. It is worth noting that the disease has variable expressivity and penetration, with the presence of additional genetic and environmental factors being important in many cases.

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