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A case of simultaneous surgery for aortic and mitral insufficiency, and gastric adenocarcinoma

Today, the introduction and use of simultaneous surgeries is a significant challenge, despite the fact that quite a large number of patients with combined pathology requires such treatment. This article describes a clinical case of successfully performed one-stage surgical intervention in a patient with aortic and mitral insufficiency and adenocarcinoma of the pylorus. The preoperative examination, scope of surgical intervention, accesses, early postoperative period, and pathologic examination data are described. Our experience with simultaneous surgeries shows that there is a need for standardization of such surgical interventions by creating guidelines and protocols with their further integration into general practice.

Key words: simultaneous surgery, aortic insufficiency, mitral insufficiency, aortic valve replacement, mitral valve plastic, gastric adenocarcinoma, subtotal gastric resection.

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Oncology and cardiovascular disease are the leading causes of death in men and women around the world. The coexistence of malignant neoplasm and cardiovascular disease is often seen in clinical practice. This can be explained by the fact that both of these pathological conditions have the same risk factors, the most significant of which are smoking and hypodynamia. Moreover, nowadays investigators believe that some cardiological drugs are potentially carcinogenic [1, 3, 10].

It is often difficult to choose surgery tactics in patients with concomitant pathology [5, 7]. It is not clear which therapeutic option is a most beneficial for the patient. Currently, two variants are available. The first one is bilateral treatment, the first phase of which is a cardiac surgery with artificial circula-

tion, while second phase of treatment is performed in 4–6 weeks [8]. The second variant is a one-stage two-phase surgical tactics – simultaneous surgery [14]. There is disagreement among experts about the terms and sequence of these stages [8, 12].

Simultaneous surgeries are surgical interventions on two or more organs for the treatment of diseases which are not interrelated. That term was introduced by M. Reifferscheid in 1971 [11]. In 1978 M.L. Dalton and co-authors [3] reported for the first time on successful simultaneous aortocoronary bypass surgery and resection of lung adenocarcinoma.

We present a clinical case of simultaneous replacement of the aortic valve with a mechanical prosthesis, mitral valve repair by Alfieri, and subtotal gastrectomy by Billroth-II for adenocarcinoma.

Case report

Patient F, 67 years old, hospitalized with the diagnosis: Ischemic heart disease, angina pectoris, III functional class. Aortic insufficiency III degree, mitral insufficiency II degree, permanent atrial fibrillation. Essential hypertension stage III (transient ischemic attack in 2011), stage IIA heart failure with decreased ejection fraction of the left ventricle (LV). Low referent adenocarcinoma of the pyloric antrum. T2NOM0. Clinical group IIA.

Echocardiography showed the following aortic dimensions: aortic annulus 2,8 cm, aortic root 4,4 cm, ascending aorta 4,6 cm, aortic arch 3,8 cm, aortic valve calcification, severe aortic regurgitation, eccentric along interventricular septum, prolapse of the left coronary cusp. Moderate mitral regurgitation, mitral annulus diameter 5,3 cm; mild tricuspid regurgitation, diameter of the fibrous annulus 4,7 cm; mild regurgitation on the pulmonary valve. Left ventricular diastolic volume 413 ml, left ventricular ejection fraction 43 %. Diffuse hypokinesia of LV walls. Coronary angiography revealed narrowing of right coronary artery lumen in the middle third 75 % and sub-occlusion (95 %) in the distal part.

At gastroduodenoscopy tumor was noted in the antral part, pre-pyloric area, 5,0 cm × 8,0 cm in size. Margins reduced, with rarefaction in the center under the fibrin and hematin, lumen deformed; pylorus moderately deformed. Pathomorphological diagnosis – low-differentiated adenocarcinoma.



Fig. 1. Computed tomography of abdominal cavity organs of patient F, 67 years old (tumor in the antral part of the stomach (circled in red))

During computer tomography with contrast in the antrum on the posterior spine tumor of irregular shape with elevated margins was found, thickness up to 1–1.4 cm, up to 3 cm in diameter, lymph nodes not affected. This corresponds to T1-T2NOMO (Fig. 1).

Due to the presence of low-differentiated adenocarcinoma of the stomach, aortic and mitral valve pathology, it was decided to perform a simultaneous operation. Angioplasty was performed in the distal third of the right coronary artery (Fig. 2).

Surgery protocol: middle sternotomy, pericardium dissection and connection of artificial circulation by the scheme «superior aorta – right atrium» (Fig. 3).

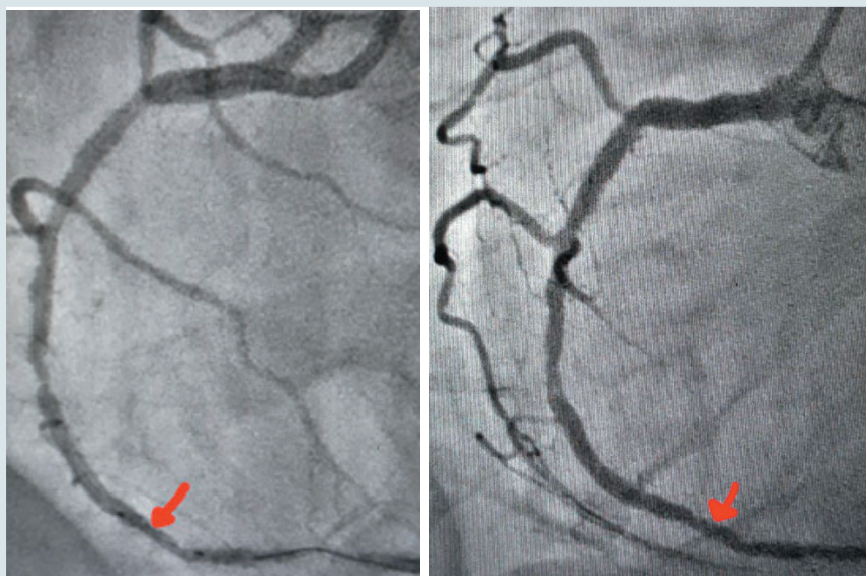


Fig. 2. Balloon angioplasty of the right coronary artery in the distal third (red arrow – place of occlusion in the right coronary artery, left – before angioplasty, right – after)

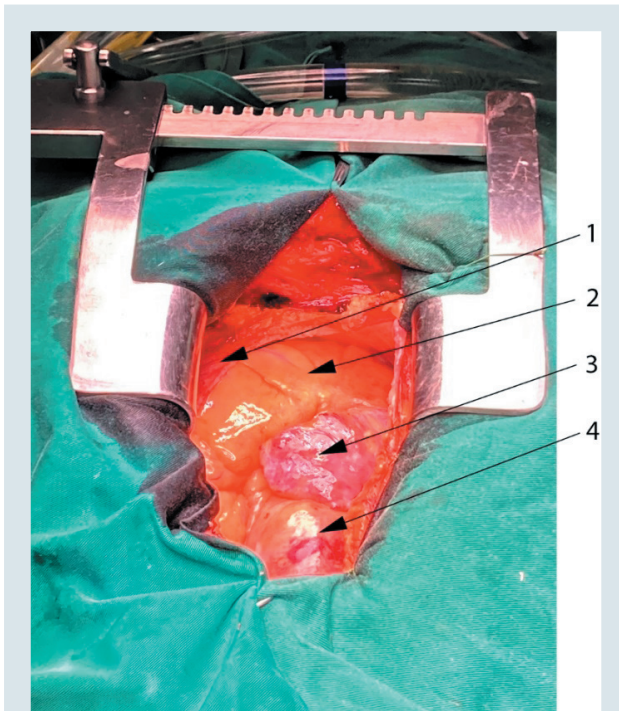


Fig. 3. Sternotomy access, open pericardium (1 – opened pericardium, 2 – right ventricle, 3 – right atrium, 4 – ascending aorta)

The main stage of surgical intervention was performed under conditions of moderate hypothermia (27–32 °C), standard heparinization (300 U/kg). Aortic constriction, transverse aortotomy, myocardial protection – antegrade selective pharmacological cardioplegia (Kustodiol solution 20 ml/kg) in the coronary artery orifices. At revision of the aortic root: the valve is tricuspid, prolapse of the left coronary cusp, calcinates in the base of the cusps and coxae. The aortic valve cusps were dissected. Transaortic access was used to perform Alfieri mitral valve repair and Saint Jude Medical #27 mechanical aortic valve prosthesis implanted according to the standard technique, aortic hermitization. The total duration of artificial blood flow was 52 minutes, the duration of the aortic clamping was 31 minutes. After gradual warming up to 37.5 °C, the artificial blood circulation machine was stopped and disconnected, heparin was inactivated and the sternotomy access was closed layer by layer, which made it possible to start the second stage of the operation – subtotal gastric resection according to Bilioth-2.

After upper midline laparotomy and revision of the abdominal cavity organs a cancerous tumor was revealed, which was localized in the pre-pyloric zone of the antral region along the small curvature with transition to the posterior wall. There were no distant metastases. After gastric and omental mobilization, subtotal resection was performed. The duodenum was crossed 2.5 cm below the

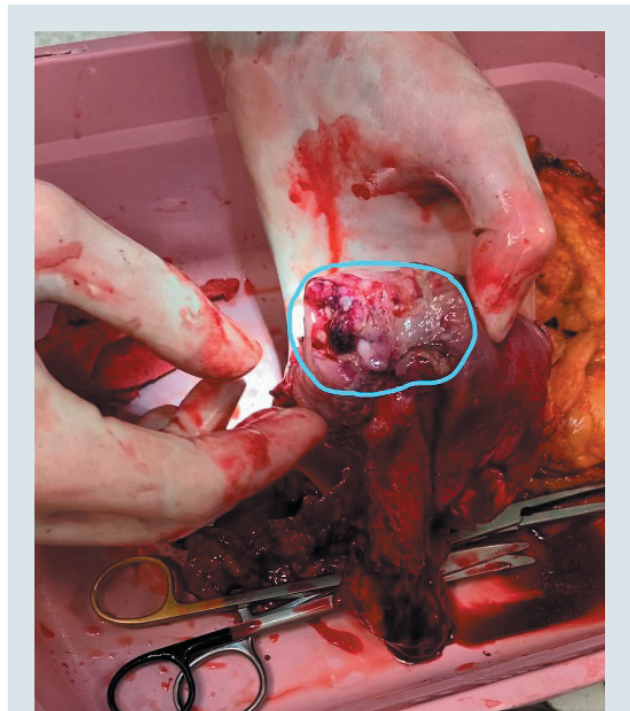


Fig. 4. The stomach macroreparation: adenocarcinoma with ruptured edges (circled in blue)

pylorus using an autosuture 60 mm linear stapler, the duodenum was additionally peritonized with a purse-string suture, after which the small curvature of the stomach was formed using a Proximat 75 mm linear stapler. Gastrojejunal anastomosis by Hofmeister – Finisterer was applied. A probe beyond the gastrojejunoanastomosis level was passed into the abducens loop of the empty intestine for enteral feeding and another nasogastric probe for unloading stomach. Drains were installed and laparotomy access was sutured in layers. Gross examination showed a 5.0×5.0 cm tumor with a rupture in center and truncated margins (*Fig. 4*).

The patient was extubated after 6 hours. In reanimation, Meronem was used as antibiotic therapy in a dose of 1 g for 10 days and Amikacin for 7 days. Dobutamine at a dose of 2.4 mcg/kg/min for 7 days and Milrinone at a dose of 0.6 mcg/kg/min for 1 day were used as inotropic therapy. Proton pump inhibitor pantoprazol was used intravenously 80 mg two times per day for 21 days. On the third day, the sternum and intrapericardial drains were removed. On the fifth day, abdominal drainage and gastric tube were removed. While staying in the ICU on the fifth day after surgery, bradycardia episodes appeared, temporal external pacing was performed. On the seventh day the parenteral feeding tube was removed. The patient was transferred from the intensive care after 10 days. On the 15th day the heart rhythm recovered. Epicardial electrodes of

the external pacemaker were removed on the 21st day after the surgery. On the 26th day the patient was discharged for rehabilitation under the supervision of a cardiologist and oncologist at the place of residence.

Pathologically, we found highly significant adenocarcinoma in the marginal zone of the gastric ulcer, undifferentiated cancer in the bottom area of the gastric ulcer with sprouting into the submucosal base, as well as in the third preparation noted sprouting into the muscular lining of the stomach (pT2NOMOG4R0, stage IB).

Discussion

The choice of surgical tactics in patients with combined cardiovascular and oncologic pathology is very complicated. There is possibility of simultaneous and two-stage surgery. Simultaneous surgery has advantages of one-stage intervention, treatment of both diseases without loss of time for the treatment of oncological disease, reduced time in intensive care and in the hospital. Among disadvantages, there are increased amount of intraoperative treatment, longer time of stay under anesthesia, the possibility of abdominal and gastrointestinal bleeding in the postoperative period against the background of heparinization.

Advantages of the two-stage surgery are reduced amounts of intervention during each operation, which enables quick recovery of the patient and reduces the risk of bleeding. At the same time, cardiac surgery performed at the first stage, may restrict or delay treatment of oncologic disease, two hospitalizations and twice anesthesia are needed, recovery time increases, the preoperative tension, anxiety, and postoperative pain sensations of the patient increase, and the financial costs also grow. All of these factors form the basis for doubts about choosing the most appropriate surgical treatment for the patient.

In examining the available literature, we note that, despite a 43-year history, large number of descriptions of interventions and statistical data, the number of cases of combined cardiac valve pathology and Bilroth-II ventricular resection was rather small, if compared with other simultaneous surgeries [12, 13].

There is no conflict of interest.

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Mainly, the publications referred to a single valve prosthesis or bypass surgery, after which the next stage was performed: lung resection, rectal resection, cholecystectomy, hysterectomy, gastric resection [4, 9, 12, 13, 16].

Taking into consideration the information from open sources, one can certify that the total rate of simultaneous operations with oncologic process of the stomach and cardiovascular pathology is from 0.4 % to 1.2 % [9, 12, 15]. The hospital mortality in such combined diseases is from 6.6 % to 7.2 % [6, 8, 12].

The number of operations performed with artificial circulation ranges from 21.4 % to 53.3 % [4, 12]. There is a difference of opinions regarding the risk of tumor recurrence due to the use of a blood circulation. In some cases the authors focus on this issue and try to proceed with caution [12], while others have good results, with 100 % 5-year survival rate, stating that there is no danger in the use of a blood circulation [4]. We tend to think that we should proceed cautiously and, if possible, perform an off-pump surgical intervention.

In our case, due to combined cardiac valve pathology and unstable hemodynamics, subtotal gastric resection as a first stage was contraindicated. At the same time, due to the presence of oncological process, a separate two-stage intervention, where the first step would be cardiac surgery, would postpone the second abdominal stage indefinitely, which could manifest itself by the formation of metastases and significantly change the volume of the second stage surgery and may worsen quality of life of the patient. It was for this reason that a general decision was made to conduct a simultaneous operation, which ended successfully.

Conclusions

Taking into account the data of the conducted review of world literature we believe that this case demonstrates the possibility of using simultaneous surgery. It is necessary to create and introduce protocols of combined interventions into cardiac surgery and oncology practice, as there is a demand for such surgeries, despite little experience in their performance and a small number of cases described.

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Клінічний випадок проведення симультанної операції з приводу аортальної і мітральної недостатності та аденокарциноми шлунка

На сьогодні неоднозначним є впровадження та використання симультанних операцій, незважаючи на те, що досить значна кількість пацієнтів з поєднаною патологією потребує саме такої хірургічної тактики. У статті описано клінічний випадок успішно проведеного одномоментного хірургічного втручання в пацієнта з аортальною і мітральною недостатністю та аденокарциномою пілоричного відділу шлунка. Описані передопераційні дослідження, обсяг оперативного втручання, доступи, ранній післяопераційний період та отримані дані патогістологічного дослідження. Наш досвід з проведення симультанних операцій свідчить, що є певна необхідність у стандартизації подібних оперативних втручань шляхом створення рекомендацій та протоколів з подальшою їх інтеграцією в загальну практику.

Ключові слова: симультанна операція, аортальна недостатність, мітральна недостатність, протезування аортального клапана, пластика мітрального клапана, аденокарцинома шлунка, субтотальна резекція шлунка.

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Клинический случай проведения симультанной операции по поводу аортальной и митральной недостаточности, а также аденокарциномы желудка

На сегодняшний день введение и использование симультанных операций является неоднозначным, несмотря на то что, достаточно большое количество пациентов с комбинированной патологией требует именно такой хирургической тактики. В статье описан клинический случай успешно выполненного одномоментного хирургического вмешательства у пациента с аортальной и митральной недостаточностью, а также аденокарциномой пилорического отдела желудка. Описаны предоперационные исследования, объемы оперативного вмешательства, доступы, ранний послеоперационный период и полученные данные патогистологического исследования. Наш опыт проведения симультанных операций показывает, что существует необходимость в стандартизации подобных оперативных вмешательств путем создания рекомендаций, протоколов и в дальнейшем их введении в общую практику.

Ключевые слова: симультанная операция, аортальная недостаточность, митральная недостаточность, протезирование аортального клапана, пластика митрального клапана, аденокарцинома желудка, субтотальная резекция желудка.