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Case Report

## Diagnosis of Cardiovascular Complications in Oncosurgery. Clinical case

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### Abstract

*Oncocardiology has emerged as a discipline in response to the rapidly growing number of patients with a combination of cancer and cardiovascular disease. The important role of cardiovascular disease in increasing the risk of surgical interventions is now undisputed. It is reported that cardiac complications occur in at least 30% of surgical patients with pre-existing circulatory pathology.*

*Reducing cardiac complications in oncosurgery is one of the most pressing problems of modern medicine. It is achieved by careful assessment of perioperative status of cardiovascular system, functional assessment of organs and systems, comparison of risks of complications development with preventive measures, careful selection of patients, use of minimally invasive surgical technologies, minimisation of stress impact of surgical intervention on the organism.*

*The purpose of this manuscript: to describe a clinical case of early diagnosis of an acute cardiovascular complication in a cancer patient.*

*An important role in the planning of combined treatment of oncological patients belongs to the determination of functional reserves and risks of cardiovascular complications, as well as their prevention. The prognosis for life is determined not only by oncological disease, but also by the presence of cardiovascular pathology, its stage and degree of compensation.*

*Keywords: oncosurgery, cardiovascular complications, functional diagnostic methods.*

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## Introduction

The problem of systematisation of methods of diagnostics and prevention of cardiovascular complications in high-risk patients into a unified scheme that will qualitatively improve the provision of care to surgical oncology patients, reduce the number of early postoperative complications and optimise interdisciplinary interactions of specialists within the framework of teamwork is important and urgent. Despite innovative approaches and new possibilities of conservative therapy, surgical methods of treatment are indispensable in the tactics of oncological diseases treatment. At present, reducing mortality from cardiovascular complications after extra-cardiac surgical interventions is one of the priority tasks of modern healthcare. In contrast, Electrocardiography (ECG) and Echocardiography (ECHO) is a routine method of diagnosing cardiac lesions before non-cardiac surgical interventions because it is a non-invasive, inexpensive and universal examination method widely used in routine practice [1]. ECG and ECHO allows the determination of clinically relevant parameters for

perioperative cardiovascular risk stratification. Advanced modern echocardiographic technologies can provide additional information and thus improve the prognostic value of the method. Despite the widespread use of the method in surgical oncology patients in our country, Echocardiography in patients with low preoperative risk is not considered in foreign recommendations and is considered inappropriate. The global statistics of cardiac complications in extracardiac surgeries reaches from 7 to 11% [2,4]. In the territory of the European Union at least 167 thousand cases of cardiac complications during non-cardiac surgical interventions are registered annually, 19 thousand of which are life-threatening [3,5]. The problem of perioperative cardiovascular complications in oncology patients has become even more important in recent years, as life expectancy and age of persons undergoing surgical interventions are increasing.

**The purpose of this message:** to describe a clinical case of early diagnosis of an acute cardiovascular complication in a cancer patient.

## Case description

Patient T, 63 years old, was admitted to the National scientific oncology center, Astana, Kazakhstan for planned surgical treatment with the diagnosis of macroglossia. From the medical history it is known that she is registered with a cardiologist for cardiac ischemia, three-vessel coronary lesion of arterial hypertension, underwent myocardial infarction in 2013, surgical treatment with aorto-coronary bypass surgery in 2013, also with a neurologist for ischemic cerebral stroke in 2019. The patient was hospitalized for surgical treatment for macroglossia, tongue resection was performed without complications. On the second day after surgery, the patient complained of burning-pressing pain in the heart area with irradiation to the left sublobe. The patient was investigated, ECG, ECHO, coronary angiography and laboratory tests were performed.

ECG (Figure 1) showed elevation (ST-T segment elevation) in aVR-V1 lead. ST-T segment depression up to 5.0 mm, in leads. I-II-aVL-aVF from V3 to V6.

The diagnostic value of the aVR lead in patients with acute coronary syndrome is often underestimated, but special attention should be paid to it. ST elevation in aVR and aVL may indicate occlusion of the left main coronary artery; ST elevation in aVR and V1 is also specific for this pathology, as in our clinical case. The aVR leads contain important prognostic information in patients with first acute myocardial infarction without ST-segment elevation and left coronary artery stenosis. ST-segment elevation in aVR can also be present in myocardial infarction with ST-segment elevation and usually predicts a more unfavorable outcome, which is probably related to more severe coronary artery disease. ST-segment elevation in aVR on the background of acute coronary syndrome allows identification of patients with severe coronary heart disease. However, left main coronary artery disease remains independently associated with ST-segment elevation in aVR.

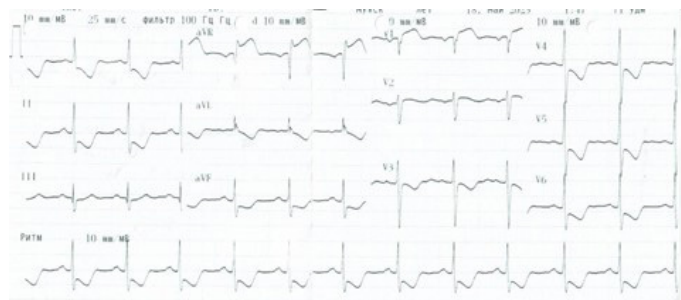


Figure 1 -Electroencephalography of a patient with macroglossia

Echocardiography results: Condition after aorto-coronary bypass surgery, suffered myocardial infarction. The aorta is thickened, slight dilatation of the ascending aorta. Dilation of the left atrium. Diffuse hypokinesis, akinesis of basal septal segments. Left ventricular systolic function is reduced EF (ejection fraction) =40%. Left and right ventricular diastolic dysfunction. Pericardium without features.

The patient was examined by a cardiologist, taking into account her complaints, aggravated history of the disease and risk factors, laboratory and instrumental

examination data, diagnostic CAG to determine the state of the coronary channel + shuntography was shown to the patient according to vital criteria.

Coronary arteriography was performed: multivessel coronary lesion. Mammary-coronary bypass on the anterior-interventricular branch is functioning, the other shunts are not visualized (the number is not known).

## Discussion

The patient had a high risk of acute myocardial ischemia after surgical treatment against the background of concomitant cardiovascular pathology. The leading triggers of perioperative ischemia and myocardial damage are surgical trauma and anesthesia. Surgical intervention as an acute stress realizes itself by increasing the level of catecholamines and cortisol [9]. The content of catecholamines and cortisol directly depends on the degree of surgical trauma, anesthesia and its withdrawal, intubation and extubation, pain syndrome, anemia, fasting and hypothermia. Increased levels of stress hormones lead to increased BP, HR, coronary artery dysfunction, relative deficiency of insulin and free fatty acids [7]. These changes increase myocardial oxygen demand, contributing to myocardial ischemia and/or myocardial injury [9]. The patient received conservative therapy in intensive care. The patient's condition improved in the dynamics, she was discharged with recommendations to follow up with a cardiologist and oncologist.

## Conclusions

Perioperative myocardial injury and myocardial infarction are formidable cardiac complications in noncardiac surgical interventions, contributing to increased postoperative mortality. Timely diagnostics of cardiovascular complications with the help of functional methods reduces the risk of unfavourable outcomes in oncology patients. Control and monitoring of the main risk factors for complications responsible for the development of ischaemia is of paramount importance for oncologists and cardiologists. Most patients with perioperative myocardial infarction have no symptoms of ischaemia, which indicates the advisability of monitoring ECG and troponin levels in

Any surgical intervention is accompanied by tissue damage, blood loss, increased myocardial oxygen demand, imbalance of factors of coagulation and fibrinolytic blood systems. Against the background of blood loss and infusion therapy, volumic changes, hematologic and electrolyte disorders develop [8]. The degree of severity of these processes depends on the volume, type and duration of surgery, type of anesthesia, amount of blood loss and infusion therapy [9]. As a result, conditions are created for ischemia of organs and tissues, and primarily myocardium. This problem is of particular relevance in surgical treatment of cancer patients and persons with concomitant CVD (cardiovascular disease) [10]. In this regard, knowledge of the leading triggers and risk factors for the development of perioperative myocardial ischemia is of great practical importance to optimize the selection and preparation of patients for surgery [6], to use rational pharmacotherapy [10] and to improve the results of surgical treatment [11].

the postoperative period, especially in high-risk patients (patients older than 65 years or older than 45 years with a history of coronary heart disease, atherosclerosis of peripheral arteries, stroke).

Adherence to modern recommendations for the management of patients with myocardial infarction improves clinical outcomes.

**Ethical aspects.** The patient provided informed consent for the publication of his medical information.

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## Онкохирургиядағы жүрек-қан тамыр жүйесі асқынуларының диагностикасы. Клиникалық жағдай

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### Түйіндеме

Онкокардиология онкологиялық және жүрек-қан тамыр жүйесінің аурулары қосарласа жүретін науқастардың тез өсіп келе жатқан санына жауап пән ретінде пайда болды. Жүрек асқынулары қанайналымы жүйесінің патологиясы бар хирургиялық науқастардың кем дегенде 30%-ында кездеседі. Онкохирургиядағы жүрек асқынуларының төмендеуі заманауи медицинаның ең өзекті мәселелердің бірі болып табылады. Бұған жүрек-қан тамыр жүйесінің периоперативті күйін мұқият бағалау, органдар мен жүйелердің жағдайын функционалды бағалау, асқынулардың даму қаупін алдын-алу шараларымен салыстыру, науқастарды мұқият таңдау, аз инвазивті хирургиялық технологияларды қолдану, хирургиялық араласудың ағзаға стресстік әсерін азайту арқылы қол жеткізіледі.

Бұл қолжазбаның мақсаты: онкологиялық науқаста дамыған жүрек-қан тамыр жүйесінің жедел асқынуын ерте диагностикалау бойынша клиникалық жағдайды сипаттау.

Онкологиялық науқастың кешенді емдеуді жоспарлаудағы маңызды рөл функционалдық резервтерді және жүрек-қан тамыр жүйесі бойынша асқынуларының даму қаупін анықтауға, сондай-ақ, олардың алдын алуға жатады. Өмір сүру болжамы тек онкологиялық аурумен ғана емес, сонымен қатар, науқаста белгілі бір жүрек-қан тамыр жүйесінің патологиясының болуымен, оның сатысымен және компенсациялану деңгейімен анықталады.

Түйінді сөздер: онкохирургия, жүрек-қан тамырлары асқынулары, функционалды диагностика әдістері.

## Диагностика сердечно-сосудистых осложнений в онкохирургии. Клинический случай

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### Резюме

Онкокардиология возникла как дисциплина в ответ на быстрорастущее число пациентов с сочетанием онкологических и сердечно-сосудистых заболеваний. Кардиальные осложнения возникают не менее чем у 30% хирургических больных с преобладающей патологией системы кровообращения. Снижение кардиальных осложнений в онкохирургии является одной из наиболее актуальных проблем современной медицины. Это достигается путем тщательной оценки периоперационного статуса сердечно-сосудистой системы, функциональной оценки органов и систем, сопоставления рисков развития осложнений с мерами профилактики, тщательного отбора пациентов, использования малоинвазивных хирургических технологий, минимизации стрессового воздействия оперативного вмешательства на организм.

Цель данной рукописи: описать клинический случай ранней диагностики острого сердечно-сосудистого осложнения у онкологического больного.

Важная роль при планировании комбинированного лечения онкологического пациента принадлежит определению функциональных резервов и рисков развития сердечно-сосудистых осложнений, а также их профилактике. Прогноз для жизни определяется не только онкологическим заболеванием, но и наличием у больного той или иной сердечно-сосудистой патологии, ее стадией и степенью компенсации.

Ключевые слова: онкохирургия, сердечно-сосудистые осложнения, методы функциональной диагностики.