SPECIFICITIES OF PREOPERATIVE EVALUATION OF OLDER PATIENTS WITH CANCER

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Abstract. According to the literature data, one of the factors determining the perioperative prognosis of a patient is the amount of functional reserves of the body. Older patients often have several chronic diseases, which, together with age-related changes, affects the functional state of the body and its reserve capabilities. The purpose of our study was to assess the sensitivity of the methods most common in preoperative assessment for patients over 60 years of age with cancer. We conducted a retrospective assessment of the medical history data of patients undergoing inpatient treatment at the Thoracic Surgery Department of the Pavlov First Medical University, St. Petersburg, Russia. All patients had verified primary lung or esophageal cancer and had no distant metastases, each patient underwent elective surgical treatment in the scope of radical surgery. The study included 100 patients (64 men and 36 women) aged 60 to 74 years (average age 67.02+0.56). 45% had stage III cancer, others had I and II stages. Preoperatively all patients were examined according to a standard algorithm, and they also underwent cardiopulmonary exercise testing. 42% of patients had perioperative complications. According to the results of the basic preoperative laboratory and instrumental examination, ASA, RCRI and P-POSSUM risk scores, there were no significant differences between the groups of

patients with and without complications. We have identified some differences according to the results of cardiopulmonary exercise testing. The respiratory rate, the value of the ventilation equivalent in oxygen at the anaerobic threshold and at the peak of the exercise were higher in the group of patients without complications. Aerobic capacity on the anaerobic threshold was higher in the group of patients with complications. The results of our study show that a basic clinical and laboratory examination may not be sufficient for the preoperative assessment of elderly patients with cancer. Cardiopulmonary exercise testing can be used to assess the functional abilities of the body of this group of patients.
Keywords: cancer, risk stratification, functional reserves, cardiopulmonary exercise testing

Cancer is one of the leading causes of disability and mortality in the world, along with diseases of the cardiovascular and respiratory systems. According to the WHO data, the incidence of cancer increases annually, the highest morbidity rate is observed in the age group of 60-75 years [1]. Cancers of lung and gastrointestinal tract is among the most common oncological diseases. Surgical treatment of cancer of these localizations is associated with great traumatism, and, as a result, a higher incidence of complications and mortality rate in comparison with other oncological diseases. The risks of perioperative complications during radical operations for cancer diseases increase with age and are closely related to the prevalence of the oncological process, radiotherapy and chemotherapy performed before surgery, concomitant somatic pathology. Elderly patients have a number of factors that negatively affect the perioperative prognosis, including comorbidity, age-associated processes, geriatric syndromes and related functional disability [2,3,4]. Age and comorbidity-associated changes in the physiological functioning of the body worsen functional reserves, which affect the characteristics of the body's response to operational stress. So that, the risk of complications for elder patients increases in comparison with younger age groups.

Currently, there are many methods of operational risk stratification that are recommended for use by international communities. These include various risk assessment scales based on anamnesis data, laboratory and instrumental studies, as well as methods for assessing functional status by determining exercise tolerance. It should be noted that at the moment there is no single algorithm for preoperative evaluation of older patients with cancer, which determines the relevance of further research and the search for the most effective methods of preoperative evaluation of geriatric patients.

The purpose of our study was to assess the sensitivity of the methods most common in preoperative assessment for patients over 60 years of age with cancer.

Materials and methods. We conducted a retrospective assessment of the medical history data of patients undergoing inpatient treatment at the Thoracic Surgery Department of the Pavlov First Medical University, St. Petersburg, Russia. All patients had verified primary lung or esophageal cancer and had no distant metastases. During hospitalization, each patient underwent elective surgical treatment in the scope of radical surgery. We evaluated the peculiarities of the course of the operation, the presence of complications and the features of postoperative period. Statistical processing of the material was carried out using specialized research application packages (Excel 2020).

The study included 100 patients (64 men and 36 women) aged 60 to 74 years (average age 67.02+0.56 years). 45% had stage III cancer, others had I and II stages. Preoperatively all patients were examined according to a standard algorithm, including evaluation of clinical, biochemical (ALT, AST, bilirubin, amylase, creatinine, urea, glucose, potassium, sodium) blood tests, ECG, echocardiography, computer tomography, endoscopy, spirometry. They also underwent cardiopulmonary exercise testing on a Cortex device using a bicycle ergometer. In the course of the study, gas analysis, ECG recording in 12 leads, saturation, metabolism assessment, and blood pressure measurement were continuously carried out. The standard protocol of continuously increasing (ramp) load was used [5]. The study began with the registration of indicators at rest, followed by the stage of pedal rotation from 55 to 65 per minute without any load. Both stages lasted 3 minutes. The next stage included a continuously increasing load with a constant increase of 10 watts per minute, while the patient had to keep the pedal speed at the selected level, regardless of their resistance, the duration of the stage was from 8 to 12 minutes. The criteria for the transition to the next stage – recovery – were the achievement of a submaximal heart rate (85% of the maximum heart rate) or the appearance of clinical symptoms (shortness of breath, dizziness, chest pain, ECG changes). The recovery period lasted 3 minutes, during which the load on the pedals was stopped, the patient continued pedaling without any load while maintaining the same rotation rate. The total duration of the study did not exceed 30 minutes.

42% of patients had perioperative complications, 9% of all patients died because of complications. The types of complications included hemodynamically significant cardiac arrhythmias; the development of severe respiratory failure with transfer to an artificial lung ventilation due to the exacerbation of existing chronic lung diseases (COPD, bronchial asthma, chronic bronchitis); hypotension and bradycardia requiring inotropic support; delirium; perioperative myocardial infarction; pneumonia. The most frequent complication was paroxysm of atrial fibrillation (68%), 32% of them had more than one paroxysm.

The group of patients with complications had no statistically significant differences in weight, height, and body mass index in comparison with another group. There was no correlation between age, body mass index, the presence of verified coronary artery disease, arterial hypertension, chronic lung diseases, diabetes mellitus, chemotherapeutic treatment, the volume of surgery and the frequency of complications.

The main characteristics of patients are presented in Table 1.

Table 1. The main characteristics of patients.

	Patients without complications (n=58)	Patients with complications (n=42)
Mean age, years	66,9±0,5	67,1±0,6
Mean BMI, kg/m^2	25,8±0,7	26,1±0,9
coronary artery disease	15	15
hypertension	52	39
diabetes mellitus	7	6
chemotherapeutic treatment before surgery	48	32
chronic pulmonary diseases	35	28
smoking	40	30

Note: p>0,05

The risk of cardiac complications was assessed by the RCRI index [6], the surgical and anesthetic risk was assessed by ASA, the risk of developing any complications was calculated by P-POSSUM [7]. The data were comparable in both groups. According to the results of the basic laboratory and instrumental examination, there were also no significant differences between the groups.

We have identified some differences according to the results of cardiopulmonary exercise testing. The respiratory rate, the value of the ventilation equivalent in oxygen at the anaerobic threshold and at the peak of the exercise were higher in the group of patients without complications. Aerobic capacity on the anaerobic threshold was higher in the group of patients with complications, at the peak of the exercise the results were comparable. The results are presented in table 2.

Table 2. The results of cardiopulmonary exercise testing.

	Group without complications	Group having complications
Respiratory rate (AT)	25,8±0,7*	23,1±0,7*

Respiratory rate (peak)	28,0±0,8*	24,5±0,7*
V'E/V'O2 (AT)	33,1±0,8	31,0±0,7
V'E/V'O2 (peak)	35,2±1,1*	33,1±0,9*
V'O2/WR (AT), ml/min/kg	15,0±0,5*	18,1±2,0*
V'O2/WR (peak), ml/min/kg	28,4±2,1	29,9±2,9

Note: AT – anaerobic threshold, peak - peak of the exercise, V'E/V'O2 - ventilation equivalent in oxygen, V'O2/WR - aerobic capacity.

*p<0,05

The ranges of ventilation equivalent on carbon dioxide, oxygen uptake on anaerobic threshold and the peak of the exercise were comparable in both groups of patients and showed most of them (88%) as high-risk patients according to the standard algorithm of preoperative assessment [8].

Discussion. According to the literature data, one of the factors that have the most significant impact on the perioperative prognosis is the level of the physiological reserve of the body and the possibility of its use under the influence of a stress factor [9,10]. Mobilization of compensatory-adaptive reactions during surgery is a non-specific adaptive response to surgically induced stress. These changes correlate with changes under the influence of any other stress factor, including exercise [11]. This allows the use of cardiopulmonary exercise testing in the preoperative examination of patients. In the course of our study, we obtained higher ventilation and respiratory rates during exercise, which may indicate higher physiological reserves and better implementation of them. The dynamics of oxygen use per unit of power in a group of patients with complications can become an important sign of faster activation of functional reserves and, as a result, faster depletion of them, which determines the violation of the process of long-term adaptation. In our study, we found that in addition to the indicators of cardiopulmonary exercise testing used in the traditional protocol of preoperative assessment, it may be important to identify some other indicators that provide more information about the state of the body of geriatric patients with cancer.

Conclusion. The results of our study show that a basic clinical and laboratory examination may not be sufficient for the preoperative assessment of elderly patients with cancer. Cardiopulmonary exercise testing can be used to assess the functional abilities of the body of this group of patients. Further studies with a large number of patients are necessary to clarify the results obtained.

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