

CHOICE OF SURGICAL TREATMENT METHOD IN WOMEN WITH ISCHEMIC HEART DISEASE

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Abstract. Ischemic heart disease (IHD) in women is characterized by specific features of pathophysiology, clinical course, and outcomes, which requires a differentiated approach to the selection of surgical treatment methods. The aim of the study was to develop a prognostic model for selecting a revascularization method (coronary artery stenting and aortocoronary bypass surgery) in women with IHD based on an analysis of comorbidities and clinical and instrumental data.

A retrospective study was conducted on 302 female patients with IHD. Analysis was performed of body mass index (BMI), coronary calcium score (CCIS), echocardiography, and spirometry data. It was found that overweight is associated with a higher likelihood of stenting (OR = 2.48; 95% CI 1.28–4.81), whereas obesity does not have a statistically significant effect. The most significant predictor of treatment choice is the CCS ($\chi^2 = 96.47$; $p < 0.001$): with a CCI score of 0, the probability of stenting increases nearly 9-fold (OR

= 8.80; 95% CI 4.42–17.51), whereas with a CCI score > 400, aortocoronary bypass surgery is predominantly performed.

The data obtained indicate the key role of coronary calcification and comorbid factors in the choice of revascularization strategy. The necessity of a multidisciplinary approach with mandatory assessment of CCI and the functional status of the respiratory system when planning surgical treatment of IHD in women is substantiated.

Keywords: *ischemic heart disease, comorbidity, coronary calcium score index, coronary artery stenting and coronary artery bypass grafting.*

Introduction. Over the past two decades, empirical data have convincingly demonstrated that the pathophysiological mechanisms, clinical manifestations, therapeutic response, and prognostic outcomes of coronary artery disease (CAD) in the female population exhibit fundamental differences [1–7, 10]. A number of retrospective analyses have established that female gender is an independent predictor of postoperative mortality [2,8,9].

A particular clinical challenge is optimizing the choice of surgical treatment for IHD in women with non-obstructive and multivessel coronary artery disease [5–7, 9]. It has traditionally been believed that coronary artery bypass grafting (CABG) in women is associated with an increased risk of infectious and hemorrhagic complications, as well as mortality [1,2]. In this regard, it seems appropriate to stratify patients based on comprehensive clinical and instrumental indicators, allowing for the personalization of revascularization strategies.

Objective. Based on a comprehensive analysis of comorbid conditions, to develop a prognostic model for selecting the method of surgical treatment (coronary artery stenting (CAS) and coronary artery bypass grafting) in women with ischemic heart disease.

Materials and methods. A retrospective study was conducted at the “Republican Specialized Scientific and Clinical Medical Center for Surgery named after Academician V. Vakhidov.” The analysis included 302 women diagnosed with coronary artery disease. The mean age of the patients was 64.3 ± 8.2 years (age range from 51 to 79 years). The distribution by intervention method was as follows: 198 patients (65.6%) underwent coronary artery stenting, and 104 (34.4%) underwent aortocoronary bypass surgery. All patients underwent echocardiography (ECHO), spirometry, multislice computed tomography coronary angiography, and invasive coronary angiography. Post-infarction cardiosclerosis was diagnosed in the presence of a documented history of myocardial infarction and typical electrocardiographic and echocardiographic changes. Anthropometric examination included measurement of height (cm) and body weight (kg), followed by calculation of the body mass index (BMI) using the formula: $BMI = \text{body weight (kg)} / (\text{height (m)})^2$. Obesity was classified according to BMI categories: overweight - $25.0-29.9 \text{ kg/m}^2$; class I obesity - $30.0-34.9$; class II obesity - $35.0-39.9$; class III obesity - $\geq 40 \text{ kg/m}^2$. During MSCT coronary angiography, the coronary calcium score was calculated using the Agatston method (1 – $130-199 \text{ HU}$, 2 – $200-299 \text{ HU}$, 3 – $300-399 \text{ HU}$, 4 – $\geq 400 \text{ HU}$).

Patients were classified into the following CCI categories: 0 (no calcification); 1–10 (minimal calcification); 11–100 (moderate); 101–400 (severe); >400 (severe calcification). Statistical analysis of the data was performed using odds ratios (OR) and 95% confidence intervals (CI), as well as the χ^2 test.

Study results and discussion. The comorbidity profile of the women with CHD examined was characterized by a high prevalence of hypertension, which was detected in 290 patients (96.0%). Post-infarction cardiosclerosis was recorded in 154 women (51.0%). Type 2 diabetes mellitus was noted in 111 cases (36.7%), which corresponds to population data on the high prevalence of

diabetes among women with CHD. The prevalence of obesity differed significantly: 84 patients (27.8%) had grade I obesity, 42 (14.0%) had grade II obesity, and 7 (2.3%) had grade III obesity. Thus, a total of 133 women (44.1%) suffered from obesity of varying degrees of severity. Gastrointestinal tract pathology was identified in 87 patients (28.8%).

An analysis of the distribution of female patients by BMI category based on the surgical procedure performed showed that the normal weight group (BMI 18.5–24.9 kg/m²) included 96 women (31.7% of the entire cohort), of whom 60 underwent stenting and 36 underwent coronary artery bypass grafting. In the overweight group (73 patients, 24.2%), the ratio was 52 to 21 in favor of stenting. A statistically significant odds ratio was identified only for the overweight category: OR = 2.48 (95% CI 1.28–4.81). This means that in women who are overweight, the probability of undergoing endovascular coronary stenting is 2.48 times higher compared to patients with normal weight or obesity grades I–III (combined). For the remaining BMI categories, the confidence intervals crossed the unit, indicating no statistically significant association between obesity and the choice of revascularization method.

When assessing the distribution of CCI between the stenting and aortocoronary bypass groups, a χ^2 value of 96.47 (degrees of freedom = 4) was obtained, with $p < 0.001$, indicating an extremely strong statistically significant association between the degree of coronary calcification and the choice of revascularization strategy. In 112 patients (37.1%), a CCI of zero was recorded (complete absence of calcium deposits). The odds ratio was 8.80 (95% CI 4.42–17.51). Thus, in the absence of calcification, the probability of stenting is nearly 9 times higher compared to CABG. A CCI in the range of 1–10 (minimal calcification) was identified in 41 patients (13.6%). The confidence interval crosses the unit (0.93–4.45, $p = 0.08$), which is not statistically significant. For a CCI of 11–100 (moderate calcification), identified in 78 patients (25.8%), the differences were not statistically significant. A CCI in the range of 101–400

(severe calcification) was recorded in 39 patients (12.9%) ($p < 0.001$). The likelihood of undergoing stenting was reduced by more than threefold. The most indicative range was a CCI of over 400 (severe calcification), which was detected in 32 patients (10.6%) ($p < 0.001$). This represents an extremely low likelihood of undergoing stenting. Indeed, of the 32 women with severe calcification, only 2 underwent stenting; the remaining 30 were referred for coronary artery bypass grafting. Consequently, a CCI > 400 is a virtually absolute predictor of the choice of CABG. An echocardiographic examination performed according to a standard protocol revealed that some patients exhibited a slight decrease in left ventricular systolic function, which was associated with post-infarction myocardial remodeling. In addition, spirometry revealed subclinical obstructive respiratory dysfunction in a significant proportion of patients (including those without clinically manifest pulmonary pathology), which may influence the choice of anesthetic regimen and postoperative respiratory support during CABG.

Conclusion: The results suggest that being overweight, unlike obesity, is not associated with an increased risk of surgical complications; consequently, such patients are more often offered a less invasive procedure—stenting. In cases of grade II–III obesity, the technical difficulties of endovascular procedures and the risk of postoperative complications during CABG may be comparable, which negates differences in treatment strategy. The coronary calcium score is the strongest anatomical predictor of the choice of revascularization method ($\chi^2 = 96.47$; $p < 0.001$). The absence of coronary calcification (CCI = 0) is associated with a statistically significant preference for coronary artery stenting. Severe coronary calcification (CCI > 400) almost invariably determines the choice of coronary artery bypass grafting. In women with ischemic heart disease and multivessel coronary artery disease, along with a high coronary calcium index, there is a slight reduction in left ventricular systolic function, post-infarction myocardial remodeling, and subclinical

obstructive respiratory dysfunction, which must be taken into account during preoperative planning. The data obtained justify the need for a multidisciplinary approach to planning surgical treatment of CHD in women, with mandatory preoperative assessment of the coronary calcium index and indicators of respiratory function, especially in the category of patients who are overweight or obese.

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