Assessment of the degree of preservation of coronary reserves in pregnant women with mitral stenosis

Matlubov Mansur Muratovich[1]
Muminov Abdukhalim Abduvakilovich [2]
Yusupov Jasur Tolibovich [3]

EMAIL :

[1] Samarkand state medical institute, Dsc, head of chair of anesthesiology and reanimatology
[2] assistant of chair anesthesiology and reanimatology
[3] assistant of chair anesthesiology and reanimatology

ABSTRACT: *76 pregnant women with MS with gestation periods from 12 to 37 weeks were examined in detail in order to objectively assess the degree of CR preservation. In all women during prenatal preparation, the parameters of central hemodynamics were studied, functional tests were performed, and the degree of narrowing of the atrioventricular opening was recorded.*

The diagnostic and prognostic significance of all the studied parameters is analyzed. The obtained data were processed using a non-uniform sequence of the procedure for recognizing pathological processes and ranking them according to the constructive logic model. From the processed features, the most informative ones were selected, followed by their evaluation in points. Summing up the scores allows you to determine the degree of safety of the CR, in relation to each specific clinical situation.

KEYWORDS: *pregnancy, mitral stenosis, coronary reserves.*

INTRODUCTION

Relevance. The anaesthetic manual for surgical interventions in patients with concomitant diseases of the cardiovascular system is one of the more difficult and far from fully solved problems of modern anaesthesiology.

This problem is particularly acute in pregnant women, in whom the risk of an unfavorable outcome is particularly high and depends on the optimal tactics of an obstetrician-gynecologist, cardiologist, anesthesiologist- resuscitator, as well as on the severity and nature of cardiovascular pathology.

Naturally, such a contingent of patients requires an individual approach to the anesthesiological manual, the main requirement for which is to ensure the safety of delivery, as well as hemodynamic stability during the entire period of labor and the nearest postoperative period. Prenatal assessment of the degree of preservation of coronary reserves is of great importance for the successful implementation of these requirements.

Currently, there are several effective invasive and non-invasive methods of evaluation of APSS. These include transesophageal Doppler echocardiography, gas chromatography, X-ray densitometry, radioisotope scintigraphy, etc. [3,8].However, these techniques are complex and expensive, and therefore cannot be used for everyday diagnostic practice. At the same time, the generally accepted criteria that characterize the functional state of the cardiovascular system, when considered separately, are not always sufficiently informative.

Purpose of the study: to develop a multivariate scale for prenatal assessment of the degree of preservation of coronary reserves in pregnant women with atrioventricular stenosis

Materials and methods: It is based on the existing multivariate scales of the degree of preservation of coronary reserves for patients with heart failure [1, 4, 5], which were calculated using a simplified version of the algebraic model of constructive logic [6, 7]. 76 pregnant women aged 17-32 years with gestation periods from 12 to 37 weeks were examined. All patients had stenosis of the atrioventricular orifice of varying severity or combined mitral defect with prevalence of stenosis.

In all women during prenatal preparation, respiratory rate (RR) and heart rate (HR), blood pressure (BP), saturation (SpO2)(standard monitoring of the main support systems) were studied. Central hemodynamics was studied by echocardiography. We calculated the ejection fraction (EF), the parameters of the shock (MI) and cardiac index (CI), the shock (UOS) and minute volume of the heart (MVH), the reserve coefficient (RC), total peripheral vascular resistance (TPVR), and the left ventricular power index (LVPI).The following functional tests were performed: a breath-holding test, a 6-minute step test, and a nitroglycerin test based on changes in LVPI.

The diagnostic and prognostic significance of the following factors was studied: BH, HR, BP, SpO2; parameters of central hemodynamics – PVH, MI, MVH, CI, TPVR, LVPI, CR, and FV; results of functional tests; the severity of MS and heart failure.

The obtained data were processed using a non-uniform sequence of the procedure for recognizing pathological processes [2]. The informative features were selected and ranked using the Kullback informative measure, according to the constructive logic model [6].

Results. Of the above-mentioned signs, the most informative in terms of assessing the safety of coronary reserves were: a breath-holding test, a test with nitroglycerin, a 6-minute step test,EF, CI, and the severity of mitral stenosis. The information obtained and its assessment in predictive points are presented in Table 1.

Table 1

Multivariate criteria for the preservation of coronary reserves for pregnant women with MS.

The most informative signs	Predictive score
Degree of narrowing of the atrioventricular orifice	
Ist - insignificant (>2,9 sm2)	0,5
IInd - moderately expressed (2,9-2,0 sm2)	1
IIIrd - expressed (1,9-1,1 sm2)	3
IVth - critical (<1 sm2)	5
Cardiac index, l/m2/min	
2,8-2,5	1
2,4-2,0	2
<2,0	5
Ejection fraction	
60,0-55,0	1
54,0-50,0	2
<50,0	5
Breath-holding test, sec	
30,0-20,0	1
19,0-10,0	2
<10,0	3
Execution is not possible	5
Test with nitroglycerin (according to the changes LVMI)	
LVMI increased	1
LVMI stay without dinamic	2
LVMI decreased	5
6-minute step test, in meters	
301-400	1
300-250	2
249-150	4
Execution is not possible due to the severity of the overall condition	5
Maximum number of points – 30. Coronary reserves are preserved – 6-9 score; reduced – 10-17 score; sharply reduced – 18-24 score; lack – 25-30 score.	

Diagnostic coefficients – scores-were calculated for the selected features. When using the method, the scores were summed up until the following thresholds were reached: low (6-9 points), which indicates the preservation of coronary reserves; medium (10-17 points), indicating a decrease in coronary reserves; high (18-24 points), indicating a sharp decrease in coronary reserves; and critical (25-30 points), indicating the absence of reserves.

Conclusion. Thus, the information obtained allows us to individually determine the degree of preservation of coronary reserves for patients with MS, therefore, to determine the operational and anesthetic tactics, the need and direction of prenatal drug preparation in each specific clinical situation.

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