Analysis of maternal intracardiac hemodynamics and fetoplacental blood flow in women with myocarditis

Abstract: In purpose of to estimate of the central hemodynamics and feto-placentary complex condition at pregnant with myocarditis 128 pregnant with myocarditis aged about 17–40 years were studied. Received results are shown, that at 68.5 % women with myocarditis the strike fraction (SF) was increased (> 70 %). At women with high SF (SF >70 %) in 64 % cases there are revealed failure of blood groove in uterine arteries, in 18 % cases — failure in placental blood groove and in 12 % cases failure of maternal-placentary blood groove.

Keywords: myocarditis, pregnant, hemodynamics, systolic myocardial dysfunction.

Introduction
Diseases of the cardiovascular system in pregnant women predominate among extragenital pathology [1; 2; 4]. They account for more than 60 % of all internal organs diseases. They are one of the leading causes of maternal and perinatal mortality, cause serious complications and lead to women invalidization [1; 2; 6; 7]. Percentage of cardiac diseases in the maternal mortality structure is from 5 to 32 %, and in the perinatal mortality structure is 4.3 to 25 % [3; 6; 7]. Statistical data of results of the maternal mortality in the United States analysis showed that gestational cardiomyopathy takes a leading position in the cardiovascular pathology structure [3; 5], and more than half of the cases occur in myocarditis.

American literature indicates that cardiomyopathy leads to the risk of maternal mortality development in 15–60 % of cases [1; 3; 6]. The analysis of maternal mortality for the last 5 years in the Republic of Uzbekistan confirmed the data of the leading scientists of the world that requires paying close attention in pregnant women.

Experts from around the world share a common opinion that the true percentage of myocarditis is not determined due to a number of reasons:
- Misconception in myocarditis diagnostics;
- Absence of pathognomonic complaints and typical objective data;
- Features of the latent period, and also that fact that histological and instrumental methods of examination, which can verify inflammatory lesion of the myocardium, are unavailable for broad audience of practicing physicians [6; 7]. Moreover, difficulties in the myocarditis diagnostics in pregnant women are associated with physiological changes in the cardiovascular system, which occur during gestation.

Aforesaid indicates the relevance of myocarditis in pregnant women.

Assessment of central maternal hemodynamics in case of myocarditis and state of placentofetal blood flow in this disease could disclose new aspects of the pathogenesis of obstetric and perinatal complications in women with this pathology.

Aim
Assessment of central maternal hemodynamics and state of placentofetal blood flow in pregnant women with postinfluenzal myocarditis.

Materials and methods
We studied 128 pregnant women with myocarditis which have turned to the consultative polyclinics of the Republican specialized scientific-practical medical center of obstetrics and gynecology (RSSPMCOG Tashkent, Uzbekistan). The age of pregnant women ranged from 17 to 40 years.

The inclusion criterion was the presence of the postinfluenzal myocarditis in pregnant women. Exclusion criteria were presence of rheumatic myocarditis, organic diseases of the heart and blood vessels and symptomatic hypertensions.

The study was carried out in 2 stages: 1st stage consisted of the hemodynamic changes features on the background of myocarditis in different age periods analysis; 2nd stage of our research consisted in a comparative study of the influence of the degree of contractile function of the left ventricle violation on the placentofetal blood flow. In this connection we choose the ejection fraction evaluated with the help of echocardiography as the main parameter, which would characterize the contractile function of the myocardium. Therefore, at this stage, the patients were divided taking into account values of ejection fraction. The values of ejection fraction from 55 to 70 % have been considered as normal parameters.
During collective examination with cardiologists, together with clinical and anamnestic data analysis, electrocardiography (ECG) and echocardiography, conducted in the Department of functional diagnostics of the Republican cardiological center in Tashkent, have been carried out. To assess the state of the placentofetal complex and fetal the doppler study (ALOKA, Japan) has been carried out the by the Department of functional diagnostics of RSSPMCOG. Qualitative blood flow parameters that characterize the peripheral vascular resistance (PVR): peak systolic to end diastolic ratio (PSED), resistance index (RI), and pulsation index (PI) have been used.

Results and discussion

At the moment of turning into the hospital more than half of pregnant women (53 %) were in the second trimester, every 4th pregnant women (25 %) was in the first gestation trimester. Amount of primigravidas and primiparas was 34 and 38.2 %, respectively. The study has been conducted in two stages.

We were interested in the features of intracardiac and central maternal hemodynamics changes on the background of myocarditis in different age aspects. In our study, more than half of pregnant women (87) were 20–29 years, there were 23 women (20 %) from 30 to 34 years, and only 13 women (10 %) were from 35 to 40 years. Only 4 % (5 women) from the general population were women under 20 years. Henderson et al. (USA, 2011) has identified age-related risk group of gestational cardiomyopathy development in case of myocarditis presence. The author specified that greatest risk of the cardiomyopathy development have women over 35 years. The authors have also identified that the most favorable age for pregnancy is 20 to 24 years. A cohort of pregnant women over 35 years with myocarditis in our study was 64 % of the total number of women.

72 % of women have some complaints, in 28 % of cases myocarditis has been diagnosed for the first time during cardiologist consultation. The most common complaints of pregnant women were shortness of breath (61 %), palpitation (55 %), in rare cases — fatigue (6 %), weakness (5 %) and dizziness (5 %). 27 % of pregnant women have single complaints, the rest of women have combination of several complaints.

Sinus tachycardia (heart rate (HR) more than 90 beats per minute) according to the ECG has been noted in 65 % of cases, heart rhythm disorders by ventricular arrhythmia type has been registered in 19 % of women, heart rhythm disorders by supraventricular arrhythmia type has been registered in 5 % of cases. The repolarisation abnormality in standard (III) and reinforced (AVF) leads has been observed in 16 % of cases, in precordial leads in 19 % of cases, partial bundle branch block has been observed in 13 % of pregnant women with myocarditis.

During assessment of the intracardiac hemodynamics the following data have been obtained: the most common symptom of intracardiac hemodynamics disorders was mitral regurgitation, which in most cases was detected in 62 and 54 % of pregnant women in the age 20–29 and 35–40 years, respectively.

Tricuspid regurgitation was typical for women from the age groups of 15–19 and 35–40 years, marked at every 5th and 6th pregnant, respectively.

The analysis of the data that have been obtained in the study of the central and intracardiac maternal hemodynamics in patients with myocarditis confirmed our hypothesis about the influence of pregnancy on cardiac function of pregnant women with myocarditis. Herewith we noted violations of the systolic-diastolic heart function on the background complicated by postinfluenzal myocarditis. The contractile function violation has been judged on the background of fraction ejection (FE) parameter. Echocardiography data have shown an increased FE together with increased myocardial index in 68 % of pregnant women.

Comparative assessment of the left ventricular (LF) contractile function showed that the greatest number of women with increased fractional ejection of the left ventricle was at the age of 15–19 and 35–40 years (80 and 77 %, respectively) (figure). We have notice that the older the woman the higher the risk of FE increasing. These our data correspond with the results of foreign authors [4].

There were 40 patients with normal FE values (with decreased systolic LF function), while there were 87 patients with FE greater than 70 % (with increased myocardium systolic function). The purpose of the second stage was to answer the question do the violations of the myocardium contractile function affect the state of the fetoplacental system, and if the answer is "yes", then how changes are expressed in the system mother-placenta-fetus on the background of FE changes.

Interesting data have been obtained during comparative investigation of the results of the utero-fetoplacental blood flow and state of the maternal systolic LF function doppler study (table 1).

So, 64 % of women with increased FE (FE > 70 %) have impaired blood flow in uterine arteries, 18 % of women have placental blood flow violation, and 12 % of them have uteroplacental blood flow violation. The antenatal hypoxia developed in 88 % of cases.

Table 1. – Results of the utero-fetoplacental blood flow doppler study

<table>
<thead>
<tr>
<th></th>
<th>FPI Ia</th>
<th>FPI Ib</th>
<th>FPI II</th>
</tr>
</thead>
<tbody>
<tr>
<td>FE&gt;70</td>
<td>55</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>(n = 87)</td>
<td>(64 %)</td>
<td>(12 %)</td>
<td>(8 %)</td>
</tr>
<tr>
<td>FE 55–70</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>(n = 40)</td>
<td>(14 %)</td>
<td>(5 %)</td>
<td>(5 %)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FEGRS</th>
<th>Antenatal hypoxia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>76</td>
<td>(88 %)</td>
</tr>
</tbody>
</table>

61
However, the fetoplacental complex hemodynamics violations also have been noted in pregnant women with myocarditis on the background of normal FE values. Violation of blood flow in uterine arteries (FPI Iа) has been noted in 14% of women, and violations of placental blood flow (FPI Ib) — in 10% of cases. Violation of uteroplacental blood flow (FPI II) has been noted in 5% of cases. In 67% of cases the pregnancy proceeded on the background of antenatal hypoxia.

The obtained data once again confirm that the maternal hemodynamics violation, caused by myocarditis, plays a major role in the placental insufficiency development. However, the results obtained after 2nd stage of the study carrying out show that pregnant women with myocarditis can develop fetoplacental blood flow violation even on the background of normal ejection fraction value. This information once again emphasizes that there are unknown causes and pathogenetic mechanisms of violations in the system mother-placenta-fetus in case of myocarditis, which further study let scientists more deeply understand the pathogenesis of obstetric complications on the background of this circulatory system disease in pregnant women.

Conclusions

Thus, the myocarditis that develops during pregnancy is a condition that threatens the mother and fetus life, and requires further study for pregnancy and childbirth management tactic development.

Central maternal hemodynamics in case of myocarditis development can be characterized by impaired LV contractile function, which underlies number of obstetric and perinatal complications development.

Consequently, the maternal hemodynamics dysfunction adversely affecting the fetoplacental complex, result in uterine arteries blood flow disorders development, which in turn leads to the placental vessels resistance index increasing.

However, role of immunological-inflammatory and autoimmune processes in the development of some obstetric and perinatal complications that require further study cannot be excluded.

References:

Dmitrenko Diana Victorovna,
Shnayder Nataliya Alekseevna,
Govorina Yuliya Borisovna,
Myravyova Anastasiya Vladimirovna,
Krasnoyarsk State Medical University named after Prof. V.F. Vyno-Yaseneysky,
the Department of Medical Genetics and Clinical Neurophysiology
E-mail: mart2802@yandex.ru

The effect of CYP2C9 gene polymorphism at the level of Valproic acid in serum in women of reproductive age with epilepsy

The study was sponsored by the Regional State Autonomous Institution “Krasnoyarsk regional fund to support scientific and technical activities” (a grant for the implementation of the initiative project “Investigation of mechanisms of genetically deterministic adverse drug effects while taking antiepileptic drugs” (Additional Agreement № 15/15 from 19.06.2015) under the Competition of scientific and technical of the Youth Creativity).

Abstract: The purpose of research — the study of the influence of single nucleotide polymorphisms (SNPs) of gene CYP2C9 on the concentration of valproic acid (VPA) in the blood. Higher levels of VPA was observed in patients with genotype CYP2C9*2/*3 (100 mg/k/ml) and genotype CYP2C9*1/*2 (86 mg/k/ml), compared with the genotype CYP2C9*1/*3 (72.5 mg/k/ml) and genotype CYP2C9*1/*1 (66 mg/k/ml).

Keywords: Epilepsy, Pharmacogenetics, Valproic acid, Therapeutic drug monitoring, CYP2C9.

Introduction. Epilepsy is a chronic brain disease characterized by recurrent seizures that result from excessive electrical activity of neurons in the brain, accompanied by a variety of clinical and paraclinical manifestations, and requires long-term, and in some cases — receiving life antiepileptic drugs (AEDs). The purpose of AED-therapy, on the one hand, preventing