FEATURES OF PREGRAVID MANAGEMENT AND PREVENTION OF COMPLICATIONS IN WOMEN WITH CARDIOVASCULAR PATHOLOGY (LITERATURE SURVEY)

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ABSTRACT — The article describes the modern principles of management and examination of pregnant women with various forms of cardiovascular system pathology. Normal pregnancy is always associated with significant hemodynamic overload, water retention, increased circulating blood volume and, as a consequence, cardiac output. In the face of altered hemodynamic associated with the presence of any cardiovascular pathology, danger to the mother's health (especially at the time of birth) and child (during the entire period of gestation).

KEYWORDS — pregnancy, cardiovascular disease, pregravid management, extragenital pathology, thrombotic complications, anticoagulant therapy.

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Cardiovascular disease remain a major cause of pregnancy and labor complications, intrauterine growth restriction and are associated with a high level of maternal and perinatal mortality [3, 5]. Advances in the early diagnosis of heart disease, as well as the latest achievements in the field of cardiovascular surgery, have significantly expanded the reproductive potential of this group of patients. As a consequence, the majority of patients with cardiovascular pathology express a desire for their own pregnancy [5, 8].

In general, pregnant women with heart disease are very difficult group of patients, regardless of the type of pathology. Typically, such women by the time of pregnancy planning also have associated somatic chronic diseases (gastro-intestinal pathology, respiratory disease), which on the one hand, have a further negative impact on the course of pregnancy, and the other, make necessary pregravid preparation. Morover, hemodynamical changes during pregnancy (increased cardiac output, decrease blood pressure, increased heart rate), in women with heart disease adversely affect the processes of placentation and utero-placental blood flow formation. This leads to chronic tissue hypoxia and, consequently, to the development of pregnancy complications. Women with heart disease have a higher risk of operative delivery due to the cardiovascular indications. Newborns of mothers with heart disease often have lower Apgar score, lower growth and weight characteristics, which could affect their future physical and mental development [8, 9].

Cardiovascular disease in pregnant women represent a rather heterogeneous group of disorders that are associated with increasing maternal age and the high rate of cardiovascular risk factors, including diabetes mellitus, hypertension and obesity. Moreover, improved results of surgical treatment of congenital heart defects led to an increased number of patients with heart defects that can acheive succesfull pregnancy. [11]

The most common cardiovascular diseases in pregnant women include hypertension (6–8% of cases) [10], congenital heart disease, mainly characterized by a blood shunts [3, 5], and acquired heart defects [7]. Neonatal complications occur in 20–28% of patients with heart disease, with neonatal mortality ranging from 1 to 4%. The risks of maternal and neonatal complications are closely correlated with each other [2, 13]

CURRENT STATE OF PREGRAVIDARY ASSESSMENT OF PREGNANCY COMPLICATIONS RISKS IN WOMEN WITH CARDIOVASCULAR DISEASE

The risk associated with pregnancy depends on the nature of heart disease and the clinical condition of the patient. There are several approaches to assessing the risk of cardiovascular complications in pregnant women. For example, it is possible to assess the risk associated with a particular disease. In general, the risk of complications depends on the complexity of the disease [2]. Severe scales have been developed, including the best known and most commonly used CARPREG index. It has been validated in several studies, and can be used to assess the risk of complications in the mother, although the risk assessment may be overestimated [14, 15].

CARPREG risk index: each predictor is assigned 1 point. The risk of cardiovascular complications in pregnant women: 0 points — 5%, 1 point — 27%,> 1 points — 75%

CARPREG Index takes into account:

1. History of cardiovascular events: heart failure, transient ischemic attack, stroke or arrhythmia before pregnancy.
2. The initial NYHA functional class > II or cyanosis
3. Obstruction of blood flow in the left chambers of the heart (mitral orifice area of 30 mm Hg)
4. Left ventricular systolic dysfunction (ejection fraction <40%)

There is also a modified classification of the World Health Organization [14, 15]. This classification integrates all known cardiovascular risk factors, including underlying heart disease and related disorders. It includes contraindications to pregnancy, which are not taken into CARPREG index (Table 1).

In women who belong to Class I according to the WHO classification, the risk of cardiovascular complications is very low, so during pregnancy observation of the cardiologist may be limited to 1–2 visits. In patients with class II disease the risk of cardiovascular complications from low to medium, so it is advisable to contact a cardiologist in each trimester. If a woman belongs to Class III, then there is a high risk of complications. In such cases, she should be encouraged to frequent (every 1–2 months) consultation of cardiologist and obstetrician during pregnancy. In women belonging to Class IV, pregnancy is not recommended. If such a patient becomes pregnant and refuses to terminate the pregnancy, she should be inspected every month.

Table 1. *Modified classification of the risk of cardiovascular complications in pregnant women, proposed by WHO*

Risk class	Risk of complications
I	The risk of the mother's death is not increased; the risk of complications is not increased or increased only slightly
II	The slight increase in the risk of maternal death or moderate increase in the risk of complications
III	A significant increase in the risk of maternal mortality and the likelihood of serious complications. It is recommended to consult a specialist. Intensive surveillance of cardiologist and obstetrician during pregnancy, labor and and in the postpartum period is needed
IV	High risk of maternal mortality and severe complications. Pregnancy is contraindicated. In the case of pregnancy, it is recommended to interrupt it. If a woman decides to continue the pregnancy, intensive monitoring is needed

Overall, cardiovascular disease significantly reduces the reproductive potential of women of childbearing age. Adequate correction allows to compensate the pathological process and to choose the individual stragegy of pregnancy managment. Timely and complex correction of cardiovascular disease at the pregravid stage may allow to significantly improve reproductive potential.

For the early detection of cardiovascular diseases in the pregravid period obstetrician-gynecologists should always perform the initial screening in women of reproductive age to determine risk group according to the established criteria followed by further examination (ECG, echocardiography, Holter monitoring, special laboratory tests).

Overall consultation includes three main stages: pregravid, gestational and postpartum. At the pregravid stage assessment of the functional state of cardiorespiratory system is performed and further diagnostic steps and specialists consultations are planned to determine risks. After that overall conclusion about planned pregnancy should be done.

Already in the primary visit at the stage of pregnancy planning obstetrician-gynecologist should ask woman's history, conduct a thorough medical examination, assess a presence of signs of cardiovascular dis-

ease, including congenital heart defects, rheumatic fever, infective endocarditis. Particular attention should be payed to the previous heart surgeries, postoperative period, it is necesserly to examine medical records.

In women of reproductive age from the group of risk before the planned pregnancy complex examination of the cardiovascular system should by performed including ECG, X-rays, echocardiography, if necessary Holter monitoring, transesophageal echocardiography, stress tests , veloergometry and coronarography. Laboratory studies may include blood cultures (in endocarditis) and markers of the rheumatic process activity. Woman should be reffered to cardiologist and other specialists as needed, including genetic.

In the second visit doctor examines the results of functional and laboratory studies, conclusions of experts, patient's medical records and make a decision about the degree of risk. As mentioned above pregnancy planning in women with heart defects is possible only in I and II risk classes.

PREVENTION OF THROMBOEMBOLIC COMPLICATIONS DURING PREGNANCY IN WOMEN WITH HEART DISEASE

According to A. James et al. (2006), who analyzed more than 12 millions of delivery during the period from 2000 to 2002 in the US, one of the leading factors for cardiovascular complications in pregnancy is advanced age [2]. Other risk factors are not different from those of non-pregnant women and include smoking, hyperlipidemia, diabetes mellitus and cardiac pathology in the family history [7]. In addition, factors that increase the risk of cardiovascular complications in women include oral contraceptives, especially in combination with smoking, and the use of assisted reproductive technologies in the late reproductive age [16].

Most patients with cardiovascular disorders are at high risk for thromboembolic complications. Given the fact that the pregnant woman lives in a state of hypercoagulability, anticoagulation therapy in pregnant women with heart disease is extremely important and challenging.

Most researchers indicate that treatment with UFH and LMWH is safe for fetus [4]. These drugs do not cross the placenta, and do not possess the ability to cause teratogenic effects, but theis use is associated with increased risk of bleeding [1, 4], osteoporosis, heparin-induced thrombocytopenia [14, 15]. In general, LMWH has the following potential advantages over UFH during pregnancy:

1) causes less heparin-induced thrombocytopenia;

2) has a longer plasma half-life and a more predictable dose response than UFH;

3) has a higher availability of applications without the need for laboratory monitoring and the possibility of using a single day dose;

4) a lower risk of heparin-induced osteoporosis;

5) appears to have a lower risk of bleeding complications.

Current clinical guidelines are almost entirely based on non-randomized studies.

With regard to oral anticoagulants, warfarin use should be limited to patients with artificial heart valves. If the warfarin dose does not exceed 5 mg per day, the risk of embryopathy is very low. Pregnant should be transferred to heparin at the 36th week, with close monitoring, preferably using anti- Xa factor at the level of > 0.55 IU/mL. If anti-factor Xa test is not available, aPTT level should be maintained at or above the value that exceeds 2 times the normal interval to provide increased efficiency of heparin in the III trimester.

DELIVERY IN PATIENTS WITH CARDIOVASCULAR DISEASE

Spontaneous onset of labor is preffered over induced labor in most women with heart disease and with normal heart function. The time of delivery is selected individually, taking into account the state of the cardiovascular system, cervical ripeness, fetal lung maturity and fetal viability. Strong recommendations are missing due to the lack of prospective data and information on the role of the individual characteristics of the patient, so the tactics should be chosen individually.

In women with mild heart disease tactics of labor management is the same as in healthy pregnant women. Vaginal delivery is preffered. Mechanical methods of labor induction, such as use of Foley catheter have advantages over drugs, particularly in patients with cyanosis, in which the decrease in peripheral vascular resistance and / or arterial pressure may have serious consequences. [6]

An individualized strategy of labor management should be elaborated, including labor dates (spontaneous or induced), labor induction method, plan of analgesia/regional anesthesia and the necessary level of monitoring. If there is a high risk of complications, the delivery is advantageously carried out in a specialized center under the supervision of multidisciplinary team. Vaginal birth is associated with less blood loss and reduced risk of infection venous thrombosis and thromboembolism compared with caesarean section [13]. Overall, cesarean section is justified in the presence of obstetric indications. The absolute contrain-

dications to vaginal birth are not strongly defined, as they largely depend on the mother's condition to the beginning of labor.

After the onset of labor it is necessary to monitor systemic blood pressure and heart rate, as the epidural anesthesia may cause hypotension. If necessary, a pulse oximetry and continuous ECG monitoring should be used. Cardiac catheterization for hemodynamic parameters monitoring is rarely needed, since it is accompanied by an increased risk of arrhythmias, bleeding and thromboembolic complications after catheter removal [13].

During labor, the preferred position of the woman is lying on her left side to reduce the influence of uterine contractions on hemodynamics [6]. Uterine contractions should lead to prolapse of the fetal head without straining to avoid the undesirable effects of Valsalva maneuver. To facilitate delivery, forceps or vacuum extraction can be used. It is necessary to carry out continuous monitoring of fetal heart rate.

Labor management in women with pathology of the cardiovascular system, receiving anticoagulants: by the 36th week of pregnancy, oral anticoagulants should be replaced by LMWH or UFH. Women receiving LMWH, should be transferred to intravenous unfractionated heparin for at least 36 hours prior to induction of labor or a caesarean section. UFH should be canceled for 4–6 hours before scheduled delivery. UFH treatment is resumed after 4–6 hours after delivery in the absence of hemorrhagic complications.

Labor is accompanied by marked changes in hemodynamics and blood volume, especially in the first 12–24 hours, which may cause a decompensation of heart failure in women with organic heart diseases. Therefore hemodynamic monitoring should continue for at least 24 hours after birth [14, 15].

Thus, at present, the problem of cardiovascular disease in pregnant women which leads to a potentially dangerous conditions for both the mother and the child is becoming increasingly important. Such tendency is associated with an increased prevalence of cardiovascular risk factors among women. The impact of these risk factors is enhanced by physiological changes in the cardiovascular system, characteristic for pregnancy.

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