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СТРУКТУРНО-ГЕОМЕТРИЧЕСКИЕ ИЗМЕНЕНИЯ В МИОКАРДЕ И ОСОБЕННОСТИ ДИАСТОЛИЧЕСКОЙ ДИСФУНКЦИИ ЛЕВОГО ЖЕЛУДОЧКА У БЕРЕМЕННЫХ С АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИЕЙ

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АННОТАЦИЯ

Цель исследования: разработать и внедрить комплекс мероприятий по прогнозированию, ранней диагностике и лечению гестоза на фоне артериальной гипертензии, что позволит улучшить исходы беременности и родов, состояние новорожденных и детей раннего возраста в этой группе женщины.

Материалы и методы исследования: Исследуемая группа: 15 беременных с артериальной гипертензией, 13 с преэклампсией, развившейся на фоне артериальной гипертензии (АГ), 17 женщин с физиологически протекающей беременностью. Методы исследования: клинико-статистический анализ, эхокардиография. Исследование диастолической функции проводили с помощью традиционной ЭхоКГ (доплерэхокардиографии) и тканевой ЭхоКГ. Исследование проводилось на базе СамМИ в I поликлинике СамМИ.

Выводы. Необходимо подчеркнуть самостоятельное значение оценки характера диастолической функции ЛЖ, нарушение которой будет являться ранним маркером неадекватной перестройки сердечно-сосудистой системы у беременных с определенными анамнестическими факторами риска гестоза и АГ. Регистрация исходных изменений диастолической функции возможна еще до морфофункциональной перестройки миокарда ЛЖ. У беременных с ТЭЛА на фоне АГ формированию концентрической геометрии и ДД ЛЖ предшествует непропорционально высокий ММЛЖ.

Ключевые слова: преэклампсия, объем миокарда левого желудочка, тканевая доплерэхокардиография.

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STRUCTURAL - GEOMETRICAL CHANGES OF THE MYOCARDIUM AND THE PARTICULARITIES OF THE LEFT VENTRICLE OF THE HEART IN A PREGNANT WOMEN WITH A DIFFERENT TYPES OF ARTERIAL HYPERTENSION

ANNOTATION

The purpose of the research: to develop and implement a set of measures for the prediction, early diagnosis, and treatment of preeclampsia on the base of hypertension, which will improve the outcomes of pregnancy and childbirth, the condition of newborns and infants in this group of women.

Materials and methods of research: Study group: 15 pregnant women with arterial hypertension, 13 with preeclampsia, developed on the base of arterial hypertension (AH), 17 women with physiologically occurring pregnancy. Research methods: clinical and statistical analysis, echocardiography. The study of diastolic function was carried out using traditional EchoCG (Doppler echocardiography) and tissue EchoCG. The study was carried out based on the SamMI functional diagnostics and AH in the I clinic SamMI.

Conclusions. It is necessary to emphasize the independent importance of assessing the nature of LV diastolic function, the violation of which will be an early marker of inadequate restructuring of the cardiovascular system in pregnant women with certain anamnestic risk factors for gestosis and AH. Registration of initial changes in diastolic function is possible even before morpho functional restructuring of the LV myocardium. In pregnant women with PE against the background of AH, the formation of concentric geometry and LV DD is preceded by a disproportionately high MMLV.

Keywords: preeclampsia, the myocardial mass of the left ventricle, tissue doppler echocardiography.

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TURLI XIL ARTERIAL GIPERTANZIYA BILAN HOMILADOR AYOLLARDA MIOKARDDAGI STRUKTUR-GEOMETRIK O'ZGARISHLAR VA YURAK DIASTOLIK DISFUNKTSIYASINING XUSUSIYATLARI

ANNOTATSIYA

Tadqiqot maqsadi: homiladorlik va tug'ish natijalarini, ushbu guruhdagi yangi tug'ilgan chaqaloqlar va chaqaloqlarning holatini yaxshilashga yordam beradigan gipertenziya asosida preeklampsyani prognozlash, erta tashxislash va davolash bo'yicha chora-tadbirlar kompleksini ishlab chiqish va amalga oshirish.

Materiallar va tadqiqot usullari: Tadqiqot guruhi: arterial gipertenziya bilan og'rigan 15 nafar homilador, 13 nafar arterial gipertenziya (AG) asosida rivojlangan preeklampsiya, 17 nafar fiziologik homiladorlik bilan kasallangan ayollar. Tadqiqot usullari: klinik va statistik tahlil, exokardiografiya. Diastolik funktsiyani o'rganish an'anaviy EXOKG (Doppler exokardiografiya) va to'qimalarning EXOKG yordamida amalga oshirildi. Tadqiqot SamMI I klinikasida o'tkazildi.

Xulosa. CHQ diastolik funktsiyasining tabiatini baholashning mustaqil ahamiyatini ta'kidlash kerak, uning buzilishi gestoz va AG uchun ma'lum anamnestik xavf omillari bo'lgan homilador ayollarda yurak-qon tomir tizimining yetarli darajada qayta tuzilishining erta belgisi bo'ladi. Diastolik funktsiyadagi dastlabki o'zgarishlarni ro'yxatga olish CHQ miokardning morfofunksional qayta tuzilishidan oldin ham mumkin. AG fonida PE bo'lgan homilador ayollarda konsentrik geometriya va CHQ DD shakllanishidan oldin nomutanosib ravishda yuqori MMCHQ mavjud.

Kalit so'zlar: preeklampsiya, chap qorincha miokard massasi, to'qimalarning doppler exokardiografiyasi.

Relevance: Despite numerous studies, gestational toxicosis (gestosis) continuous to remain a "perplexing disease of an assumption".

Contrary to close attention to this "manageable" in the whole World cause of the death among pregnant women, and educated conventional treatments, described in the acceptable medical literature. The variability of the described reasons leading to the development of preeclampsia and the methods of the treatment, and the prophylaxis of that condition accordingly is also widely published.

Due to the mentioned above reasons, the analysis of the mechanisms of the development of preeclampsia and the assessments of the risk factors of this insidious condition is an actual problem of modern obstetrics worldwide.

The nature of the cardinal restructuring in eclampsia and arterial hypertension of the pregnancy remains controversial. Some research is suggesting documenting the possibility of prognosis of gestational complications of the undesirable prenatal outcomes by using analysis of a variant of the geometry of the LV.

The difficulties of the assessment of the true hemodynamic disorders at the times of the complications of gestational pregnancies are explained by the dubitability of the delineation aspects of differentiation compensatory changes. The physiologic dynamic of the myocardial changes accompanied by pregnancy of arterial hypertension our combination in gestosis, manifesting on the base of gestational increase in arterial pressure.

The data on LV diastolic function in pregnant women with different genesis of arterial hypertension are ambiguous. The counterargument becomes the statement that tissue myocardial doppler echocardiography which can be a useful noninvasive method of monitoring maternal cardiac function in gestosis to detect early structural and functional changes in the myocardium [7].

The absence of prognostically significant diagnostic tests indicates insufficient use of the capabilities of modern medicine. Whereas with the help of hemodynamic markers of the severity of preeclampsia, and early predictors of its development would be possible timely diagnosis of forms with an unexpressed clinical picture, mild forms, and, consequently, prevention of severe forms of gestosis.

Thus, among the many problems associated with preeclampsia, and eclampsia, the problems of diagnosis, prognosis, assessment of severity and pathogenetically main treatment occupy one of the most important places and are of great importance for both obstetricians, gynecologists and cardiologists.

The purpose of the research: to develop and implement a set of measures for the prediction, early diagnosis, and treatment of preeclampsia on the base of hypertension, which will improve the outcomes of pregnancy and childbirth, the condition of newborns and infants in this group of women.

Materials and methods of research: Study group: 15 pregnant women with arterial hypertension, 13 with preeclampsia, developed on the base of arterial hypertension (AH), 17 women with physiologically occurring pregnancy. Research methods: clinical and statistical analysis, echocardiography. The study of diastolic function was carried out using traditional EchoCG (Doppler echocardiography) and tissue EchoCG. The study was carried out on the basis of the SamMI functional diagnostics and AH in the I clinic SamMI.

Comprehensive assessment of the state of the cardiovascular system of patients - SMAD (daily monitoring of blood pressure), EchoCG, dopplerometry of uteroplacental and fetal blood flow three times: in terms of 16-18 weeks, 22-24 weeks, and 36 weeks of pregnancy.

Study results: Echocardiographic examination was performed on a ACCUVIX XQ with anatomical M-mode, using the M3S sensor, characterized by the presence of a broadband 2nd tissue harmonic. EchoCG parameters were determined according to a standard procedure with the measurement of the main hemodynamic parameters.

According to the standard method, clinical blood analysis, biochemical analysis of blood and urine were examined. The biochemical analysis of blood and urine which was taken at the time of 14-16 weeks and 28-30 weeks

LV hypertrophy (LVH) in the patient was established if the thickness of the posterior wall of the LV (LVH) reached 12 mm or more, and the value of the left ventricular myocardial mass index (LVMI) was equal to or exceeded 110 g/m². The values of IMMLV in the range of 89-109 g/m² for women were considered as the borderline mass of the myocardium (concentric left ventricular remodeling).

To determine the proportionality of MMLV to group, SAP, gender, preload, the formula proposed by G. Simone et al. was used (2002):

due MMLV = 55.37 + 6.64 × height (m 2.7) + 0.64 × IL – 18.07 × floor,

where impact load (IL) = EchoSAP × IV × 0.0144,
sex ratio: male. = 1 and women = 2.

MMLV was calculated in two-dimensional mode by the "area-length" method.

To study the relationship between the studied parameters and the disproportionately high mass of the left ventricular myocardium, the concept of the coefficient of disproportionality (CD) of an increase in MMLV was introduced. CD was calculated as the ratio of actual MMLV to due MMLV: CD (%) = actual MMLV/due MMLV × 100.

According to the recommendations of the above mentioned authors, the following groups of patients were identified:

- CD > 128%, i.e., with disproportionately high MMLV.
- CD < 128%, i.e., with proportional MMLV.

To determine the types of geometry of the left ventricle, the relative thickness of the LV myocardium was calculated using the formula:

$$RTW = TIW + TPWL / ADS.$$

To analyze the LV diastolic function, the traditional method of studying the transmittal flow (TMF) in pulse-wave. Doppler mode was used, as well as the analysis of the movement of the fibrous ring of the mitral valve by tissue doppler imaging. The peak velocities of myocardial movement in systole (Sm wave, m/sec), in the phase of early (Em wave, m/sec) and late filling (Am wave, m/sec), as well as the Em/Am ratio in the apical four-chamber and parasternal positions were evaluated.

Statistical processing of the obtained results was carried out using the statistical software package Statistica v.6.0. and the Microsoft Office Excel 2010 program.

To assess the reliability of the results obtained, the Student's criterion was used to compare the average research data, the differences between the obtained data were considered reliable at $p < 0.05$.

Dyscussion: The analysis of the echocardiographic parameters of the studied pregnant women showed that in the second trimester, the average value of the end-diastolic LV volume was significantly lower - 38 (108-119) ml of patients with PE on the background of hypertension.

With the progression of pregnancy, not only a further decrease in the volume of LV filling in the diastole was revealed, but also a decrease in the preload volume and ejection fraction. Such "findings" contradict the conclusions [8] about the preservation of myocardial contractility even with LV overload on the background of PE.

In the analysis of linear echocardiographic indicators, a significant decrease in LV EDV in PE against the background of hypertension progressed with the growth of pregnancy, amounting to 33 (42-48) in the III trimester, whereas in uncomplicated pregnancy, both ESV and EDV increased by an average of 17 and 16%, respectively.

The thickness of the interventricular septum and the posterior wall of the left ventricle in pregnant women with hypertension increased significantly less than in combined gestosis. The values of linear (TPVLV, TIS, ESS) and volumetric echocardiographic parameters of the left ventricle in the systole (ESV) testified to the least significant metamorphoses of the morpho functional characteristics of the LV myocardium of healthy pregnant women.

Morpho functional features of the myocardium in various types of AH turned out to be strictly vectorized, demonstrating the transition of the adaptive mechanism into an aggravating factor against the background of increasing requirements for the heart in PE against the background of AH. The mass of the left ventricular myocardium (MMLV) was examined.

Using the term "disproportionality coefficient" (DC), it was found that disproportionately high MMLV was the prerogative of pregnant women with PE on the background of hypertension, which corresponds to the changes described by B. Vasapollo, G.P. Novelli, H. Valensise [9]. The DC of patients with combined gestosis was significantly higher: 140% - in the second and 163% in the third trimester.

Moreover, in the third trimester, the average DC value of patients with PE on the background of hypertension in 1.5 times higher than that in women with hypertension and 2 times higher in healthy pregnant women.

According to modern ideas, in response to any "aggression" against the myocardium, the cardiac muscle responds structurally and functionally-changes, changes in the pumping function of the heart, systolic and diastolic components, which can be designated as remodeling [2].

The progressive increase in LV myocardial mass determined not only a significantly large value of the disproportionality coefficient (DC), but also the formation of concentric hypertrophy and concentric remodeling in preeclampsia, which developed against the background of arterial hypertension.

The prerequisites for such a structural modification were an increase in TPVLV and TIS in combination with reduced diastolic values EDS and EDV the most significant in the cohort with PE, developed against the background of hypertension. The changes in the structure of the LV myocardium revealed by us correspond to the results of the study [8], which indicated that pathological changes caused by any decrease in the functional activity of myocardial cells occur both at the level of individual cells and the interstitial space of the myocardium, and the entire LV chamber as a whole.

The analysis of LV geometry types revealed the predominance of the variant of eccentric hypertrophy in healthy pregnant women – more than one in two in the second trimester (54.3%) and almost two thirds III (71,7%)

According to several authors [5; 6], during pregnancy, as well as during physical exertion, there is a volume overload-induced, reversible physiological left ventricular hypertrophy, a short-term decrease in systolic function and a significant change in diastolic function.

Patients with hypertension had significantly higher frequency of normal LV geometry (72.2%), even though the option of concentric remodeling was twice as rare (18.5 and 37.1%), and concentric hypertrophy was four times less common (9.2 and 32.2%, respectively) than with PE against the background of AG.

In the third trimester, with combined gestosis, the frequency of concentric hypertrophy and remodeling increased - 45,2 and 40,3%, respectively; with hypertension, the variant of concentric remodeling became dominant in 2.5 times compared with concentric LV hypertrophy (37 vs 14.8%).

The process of LV hyperplasia (HLV) in patients with PE on the background of hypertension was more pronounced, since the nature of the increase in MMLV exceeded the limits of compensatory: 142% in the II and 152% in the III trimester, demonstrating the inadequacy of cardiovascular restructuring in this variant of gestational complication. We believe it is reasonable for this cohort to conclude that an increase in the number and mass of functioning myocardial structures is able to compensate for the increasing demands on the heart only at a certain stage, however, if the mass of the myocardium begins to exceed the ability of other systems to ensure its operation, the adaptive mechanism becomes complicating factor.

When examined by TMDEhoCG, initial disorders of LV diastolic function (DF), manifested by a violation of its relaxation, were diagnosed in every third (35.5%) patient with PE on the background of AH and almost every fifth with AH (18.5%).

The high frequency of LV diastolic dysfunction in combined gestosis corresponds to the data that the increase in transmittal pressure during early passive filling reflects changes in a more hypertrophied ventricle, which loses the ability to relax as quickly as normal [3].

The analysis of LV diastolic function revealed a high informative value of tissue doppler before the traditional Doppler-Echo-KG study: with standard echocardiography and combined gestosis, these were determined one and a half times less often (20.9%), with hypertension – two times less often (9.2%) than with tissue doppler. In the third trimester, the frequency of detection of diastolic dysfunction (DD) doubled: the relaxation type was determined in more than half of pregnant women with PE on the background of hypertension, which was twice as high as the frequency of its detection using standard EchoCG (59.7% and 32.2%, respectively).

The possibility of earlier detection of initial changes in maternal cardiac function in women with hypertension even before morpho functional restructuring of the LV myocardium is noteworthy, which is confirmed in the data of M.N. Alekhine [1].

Therefore, it is necessary to emphasize the independent importance of assessing the nature of LV diastolic function, the violation of which will be an early marker of inadequate restructuring of the cardiovascular system in pregnant women with particular anamnes risk factors of gestosis and hypertensive disorders as such was taking place in pregnant women with arterial hypertension.

In patients with pure gestosis, impaired DF was also detected significantly more often with tissue doppler - twice as compared with traditional doppler (46.2 and 22.2%), confirming its higher informativeness. The data obtained by us regarding the parameters of LV diastolic function in the group of healthy pregnant women on average testified to its preservation, however, in 4.6% of women there was a slight increase in the duration of peak E, which indicates the possibility of changes in diastolic measurements due to the transformation of the myocardial structure itself, expressed in LV remodeling and its eccentric hypertrophy.

Conclusions. It is necessary to emphasize the independent importance of assessing the nature of LV diastolic function, the violation of which will be an early marker of inadequate restructuring

of the cardiovascular system in pregnant women with certain anamnestic risk factors for gestosis and AH. Registration of initial changes in diastolic function is possible even before morpho functional

restructuring of the LV myocardium. In pregnant women with PE against the background of AH, the formation of concentric geometry and LV DD is preceded by a disproportionately high MMLV.

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