

a cataleptogenic dose of the drug). The most significant differences were found in the group of animals treated with haloperidol at a dose of 0.5 mg/kg. In control, the average retention time in the «lecturer position» was 59.0±1.0 s. In the group of rats treated with 0.5 mg/kg haloperidol, 45.6±4.2 s ($p<0.05$).

When determining the proportion of animals retaining the given position for at least 60 s, it was found that in the groups treated with antipsychotics, the number of such rats was significantly less than in control. In the group of rats injected with 0.5 mg/kg haloperidol, these animals were only 6.6 % (the control group – 33.3 %) ($p<0.01$). When tested after 120 minutes, they were half as much as in the control group (46.6 % and 90 %, respectively). A similar trend was observed with chronic use of risperidone. When testing 60 minutes after the introduction of a cataleptogenic dose of haloperidol, the number of rats that maintained a «lecturer's pose» of up to 60 s was 20 % in the group receiving risperidone at a dose of 0.1 mg/kg, and in the group receiving 0.5 mg/kg – 6.6 %. After 120 min, the severity of catalepsy in the groups receiving risperidone was also less compared to the control.

The intensity of the cataleptogenic effect of haloperidol after a 30-day administration of antipsychotics was also lower than in control animals. The average duration of retention of the «lecturer's pose» in the first and second groups 90 minutes after the injection of the cataleptogenic

dose of haloperidol was 37.2±4.4 s and 30.4±4.1 s, respectively (in the control group – 48.8±4.6 s, $p<0.05$). In the third and fourth groups (risperidone 0.1 and 0.5 mg/kg), this indicator was 40.8±5.0 s and 38.2±5.2 s.

When determining the number of animals that kept their pose for at least 60 s, it was found that after chronic 30-day administration of haloperidol, the proportion of such rats in the first group was tested after 60 minutes – 20 %, in the second – 6.6 %, in the third – 18.3 %, in the fourth – 16.6 %, in the control group – 33.3 %. When testing after 90 and 120 minutes, differences with the control group persisted. In the control group of animals, 120 minutes after the introduction of the cataleptogenic dose of haloperidol, the «lecturer's pose» remained 90 % for 60 s, in the first group – 73.3 %, in the second – 38.4 %, in the third – 73.3 %, in the fourth – 53.3 %. Moreover, in the group of animals receiving a high dose of haloperidol (0.5 mg/kg), a further weakening of the cataleptogenic effect was found.

Conclusions. Therefore, prolonged administration of low doses of haloperidol reduces the severity of haloperidol catalepsy. Risperidone, which has a slightly different mechanism of neurotropic action [3], also weakens catalepsy, although this effect was less pronounced than with the chronic use of haloperidol. Thus, the data obtained suggest that haloperidol catalepsy can be used to assess the formation of tolerance to neuroleptics.

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ULTRASOUND DIAGNOSTICS FOR FETAL AORTIC COARCTATION

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УЛЬТРАЗВУКОВАЯ ДИАГНОСТИКА КОАРКТАЦИИ АОРТЫ У ПЛОДА

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The ultrasound assessment of the isolated coarctation of the aortic arch in the fetus was analyzed. Unfortunately, the features of the fetal blood circulation do not allow relying on the ultrasound criteria characteristics of a newborn because of the equal pressure in the ventricles of the fetal heart. This study provides ultrasound criteria for defects, which allows suspected pathologies to be verified in the fetus.

Keywords: aortic coarctation, fetus, prenatal ultrasound diagnosis, B-mode

Анализируется ультразвуковая оценка изолированной коарктации дуги аорты у плода. К сожалению, особенности кровообращения плода не позволяют опираться на ультразвуковые критерии, характерные для новорожденного, ввиду равного давления в желудочках сердца плода. В исследовании приводятся ультразвуковые критерии порока, позволяющие заподозрить и верифицировать эту патологию у плода.

Ключевые слова: коарктация аорты, плод, пренатальная ультразвуковая диагностика, В-режим

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CHD – coronary heart disease
NERICP – New England Regional Infant Cardiac Program

US – ultrasound investigation
VSD – Ventricular Septal Defect

Coarctation of the aorta occurs on average in 6–8 % of patients with coronary heart disease (CHD) and diagnosis of CHD becomes critical in the neonatal period. Great importance is thus attached to its prenatal diagnosis. According to J. Kailin, the pathology has a fairly low accuracy of fetal verification [1]. The New England Regional Infant Cardiac Program (NERICP) included this defect in the four most frequently requiring catheterization and surgical treatment during the first year of life [2]. The severity of symptoms in the neonatal period is determined by the location of the narrowing, the degree of obstruction and the size of the fetal communications. The frequency of occurrence by gender is 1.27–1.74 in favor of the male [2]. The effect of genetic aspects on the development of this anomaly has been accurately established in patients with Turner syndrome (45X), in whom aortic coarctation can often be detected during echocardiography. Aortic arch obstruction is relatively common in newborns and even more common in stillborns. The frequency of occurrence of the combination of aortic coarctation with a bicuspid aortic valve is around 80 %. Abnormalities of the mitral valve occur with this defect much less often, mainly with Shone's syndrome. VSD can be perimembranous, muscular or with a deviation of the conical septum under the aorta. According to some authors, the latter is more often associated with a break in the aortic arch (93 %) compared with coarctation (47 %). The fetus is a patient, but not a newborn, therefore, approaches to ultrasound diagnostics in the fetus and newborn are different [1, 3].

Material and Methods. During the study covering the period 2014–2018, 72 fetuses were examined in the period from 17 to 38 weeks of gestation with a direct diagnosis of isolated aortic coarctation. Pregnant women were pre-examined in the prenatal diagnostic rooms of the city and / or region and only 37 (51.4 %) of the fetuses were diagnosed with coarctation of the aorta. Patients were examined on expert-class ultrasound machines from GE Logic E9 (USA) and Philips EPIQ 5 (Holland) using a C5-1 convex sensor. Coarctation of the aorta in these patients was combined with complex CHD, including atrioventricular canal and various variants of a single ventricle. Given the parallel model of blood circulation, and, accordingly, the absence of hemodynamically significant markers of this pathology in the fetus, the aorta was evaluated in B-mode in two orthogonal planes using color Doppler. Visual and quantitative criteria were the basis for the statement of the anomaly. Based on the experience gained from examining the hearts of the fetuses of more than a thousand pregnant women at different gestational periods from 2014–2018, the most reliable diagnostic criterion for potential coarctation of the aorta was a visual assessment of the ascending section, the arch, the aortic isthmus in B-mode and Color Doppler, mainly in the slice position through three vessels («V» or

«U» connections). For a more accurate diagnosis, it was necessary to measure the descending aorta, including at the level of the diaphragm, with its relationship with the ascending division. The descending aorta is normally more than 50 % of the size of the ascending aorta.

All newborns with a suspected or established diagnosis were examined in the immediate period after birth. Among the fetuses with suspected aortic coarctation, the diagnosis was confirmed in 65 (90.3 %) newborns.

Results and Discussion. In the group of fetuses, we studied with a potential diagnosis, the aortic isthmus after 30 weeks of gestation was 1.9 ± 0.6 mm ($p < 0.005$). Kailin, J. A. et al. consider the size of the aortic isthmus to be more than 3 mm after 30 weeks of gestation. According to our data, in 90.3 % of cases, the carotid-subclavian index, which is normally more than 1.5, was 1.3 ± 0.2 ($p < 0.005$). All fetuses experienced systolic-diastolic flow – a blood flow pattern in the isthmus and/or aortic arch when using Color Doppler. In three fetuses, the ratio of the inflow to the LV and the RV was less than 1. The ratio of the diameter of the isthmus to the diameter of the ascending aorta was observed to be less than 0.53 in 59 (81.9 %) of the fetuses with potential coarctation of the aorta, and the ratio of the diameter of the descending aorta to the diameter of the ascending aorta was observed to be less than 0.6 in 55 (76.4 %) of the fetuses. According to Satou G. et al., these ratios should be higher than 0.6 in newborns. As there is no data in the literature regarding these ratios in fetuses, when examining fetuses, we relied on the parameters characteristic of newborns.

Several authors believe that in addition to direct visualization of the defect, the fetus lacks other criteria [1, 4]. In Satou G. et al., the criterion for coarctation after 30 weeks of gestation is the size of the transverse aorta of less than 3 mm [1, 3]. A small carotid-subclavian index deserves practical interest in the diagnosis of malformations. Also, for 97.7 % of newborns, the sensitivity of the carotid-subclavian artery index was less than 1.5, with a specificity of 92.3 %. An imbalance of the ventricles with a prevalent right ventricle is an indirect sign of malformation, as it also occurs in other pathological conditions. An imbalance of the ventricles, with a prevalent right ventricle due to left hypoplasia rather than dilatation, requires a careful assessment of the latter. In fact, the entire left heart with obstructive lesions of the arc has a tendency to hypoplasia, with the left ventricle, the fibrous ring of the aortic valve and the ascending aorta being of smaller size [4]. In newborns, when deciding whether the left ventricle can provide systemic blood flow, it is customary to rely on the Rhodes criteria. There are no such criteria for the fetus. But in both newborns and fetuses, the formation of the apex of the heart and the presence of antegrade blood flow through the aortic valve are essential. Left ventricle

hypoplasia caused by a decrease in the transverse size of the ventricle is of secondary importance.

Narrowing of the aorta in which the ratio of the diameter of the isthmus to the diameter of the ascending aorta is less than 0.53 and the ratio of the diameter of the descending aorta to the diameter of the ascending aorta is less than 0.6 [5] would alarm US doctors.

In our opinion, the causes of overdiagnosis of a potential defect were: firstly, wariness regarding the «criticality» during the neonatal period and borderline values of the above indices. Secondly, when assessing in the third trimester, an error rate in favor of the defect prevailed in fetuses of the size of an open oval window at the lower border of the gestational norm. Therefore,

the increased blood flow through the Batalov duct led to a relative prevalence of its size over the aortic isthmus. Thirdly, visualization of the aortic arch showed different features at different gestational periods [4].

Conclusions. The work presented shows the importance of and nuances in the prenatal diagnosis of coarctation of the aorta, requiring not only theoretical knowledge but also practical skills. The difficulty of prenatal diagnosis is in the lack of patterns similar to newborns, and the final diagnosis depends largely on the experience of a specialist. Nevertheless, the above ultrasound criteria and indices make it possible to verify aortic coarctation in the fetus with a high degree of probability.

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THE INFLUENCE OF PLANT EXTRACTS ON THE VISCOSITY OF BLOOD AND THE OXIDATIVE STATUS OF ANIMALS WITH EXPERIMENTAL LIVER CANCER

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ВЛИЯНИЕ РАСТИТЕЛЬНЫХ ЭКСТРАКТОВ НА ВЯЗКОСТЬ КРОВИ И ОКСИДАТИВНЫЙ СТАТУС ЖИВОТНЫХ С ЭКСПЕРИМЕНТАЛЬНЫМ РАКОМ ПЕЧЕНИ

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The use of extracts of *Chamaenerion angustifolium* and *Aristolochia clematitis* improved the rheological properties of blood at high shear rates and decreased the content of intermediate lipoperoxidation products in experimental PC-1 liver cancer in white rats. Extracts of *Filipendula ulmaria* and *Petasites spurius* showed no effect on either endpoint.

Keywords: bioflavonoids, lipoperoxidation, blood viscosity, carcinogenesis