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ECHOGRAPHY OF THE GALLBLADDER AND ALGORITHM FOR PREGNANCY MANAGEMENT IN PREGNANT WOMEN WITH BILIARY SLUDGE

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Abstract
Timely diagnosis and treatment of biliary sludge provides ample opportunities for primary and secondary prevention of cholelithiasis and reduces the number of surgical interventions. Our study examined 100 pregnant women with biliary sludge. The effect of the drug "Xophytol" artichoke extract (France / Rosa-Phytopharma) on the state of the gallbladder and fetoplacental blood flow was studied. The study was conducted in the multidisciplinary clinic of TMA during 2021-2024, the anamnesis of patients admitted for inpatient treatment was studied. Analysis of the obtained data showed a positive effect of the drug on the regression of biliary sludge and the state of fetoplacental blood flow.

Keywords: Pregnancy; bile sediment; artichoke extract - Xophytol .

Introduction

During pregnancy, the production of many hormones increases significantly, especially steroids metabolized in the liver. Beginning in the first week of pregnancy, the concentration of lipid fractions and cholesterol increases, which leads to an increase in the lithogenicity of bile. Studies of the composition of bile fluid at different stages of pregnancy have shown that along with an increase in cholesterol, there is a decrease in the concentration of bile acids. In particular, as a result of a change in the ratio of primary bile acids to secondary bile acids, conditions are created for the formation of gallstones. At the same time, during pregnancy, the gallbladder and intestines become tolerant to the activating effects of prostaglandins and to normal physiological effects that affect the contractility of smooth muscles. This is biologically justified, since the uterus has a common innervation, and any excessive increase in intestinal motility can provoke uterine contractility and lead to a threat of termination of pregnancy. Progesterone, having a relaxing effect

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on smooth muscle tissue, leads to a decrease in peristalsis of the smooth muscles of the gastrointestinal tract.

Ultrasound examination of the gallbladder revealed an early physicochemical stage of cholelithiasis, or so-called "biliary sludge," in 26.2% of women in labor, and gallstones in 5.2%. The term "sludge" is used to describe microscopic clusters of cholesterol crystals, mucin, calcium bilirubinate, and other pigments.

The problem of choosing a therapeutic intervention for placental dysfunction does not lose its relevance.

The relevance is due to the significant prevalence of this complication, the dependence of the drug on many components. Violation of the structural and functional properties of cell membranes, activation of lipid peroxidation, decreased antioxidant levels. impaired renal function, detoxification and synthetic function of the liver - these changes are of a multi-organ nature and lead to disruption of the fetoplacental system. This, in turn, served as the basis for the use of artichoke extract as an antioxidant, hepatoprotector and cholekinetic in a complex of therapeutic measures for the treatment of placental dysfunctionAn analysis of the existing literature revealed a lack of research on the application of this medication for managing fetoplacental dysfunction in pregnant women with biliary sludge. This gap in knowledge served as the foundation for our study's objectives.

Study Objective

To enhance diagnostic approaches and optimize treatment strategies for pregnant women with biliary sludge by evaluating echographic parameters and blood flow velocity in the vessels of the fetoplacental system.

Materials and Methods

The study involved a total of 130 pregnant women at various stages of gestation, categorized as follows:

Main group (n=100): Pregnant women diagnosed with biliary sludge through ultrasound examination, further subdivided based on gestational age:

15 women (15%) in the first trimester (up to 12 weeks)

38 women (38%) in the second trimester (13-27 weeks)

47 women (47%) in the third trimester (28-41 weeks)

Comparison group (n=30): Pregnant women without biliary sludge who were considered practically healthy.

All participants underwent ultrasound assessments of the liver and gallbladder, along with a general medical evaluation.

To assess the effectiveness of the treatment, the pregnant women diagnosed with biliary sludge were further divided into two subgroups:

Group X+ (n=60): Received the prescribed medication

Group X- (n=40): Did not receive the medication

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The treatment regimen included an initial dosage of two tablets, administered three times daily for seven days. This was followed by an outpatient phase, where patients continued with one tablet three times a day for an additional 20 days.

Particular attention was paid to the main risk factors, such as age, parity (first or repeated pregnancy), premorbid background (gastrointestinal diseases). Pregnant women in the study groups received basic therapy for pregnancy complications (registration for pregnancy, threat of miscarriage, placental dysfunction, etc.), and in parallel, treatment of extragenital pathology (anemia, urinary tract infection, etc.) was carried out. Ultrasound examinations were conducted on pregnant women across all three trimesters to evaluate the condition of the gallbladder. These diagnostic procedures were performed using Mindray DC-30 and SONOSCAPE S-22 ultrasound systems equipped with a transabdominal convex probe operating at a frequency of 3.5 MHz. In addition to assessing the gallbladder, the ultrasound evaluations also considered the state of the internal reproductive organs and the presence of any pathological changes.

To determine gestational age, ultrasound imaging was performed at different pregnancy stages. Before the embryo became visible, gestational age was estimated based on the mean internal diameter of the gestational sac, calculated as the average of three perpendicular measurements. Once the embryo and fetal heartbeat were detected, crown-rump length (CRL) served as the primary indicator. The obtained measurements were then compared with standardized obstetric reference tables to establish the gestational age corresponding to the dimensions of the gestational sac and embryo.

In the second and third trimesters, ultrasound evaluations involved measuring key fetal parameters, including biparietal diameter (BP), abdominal circumference (AC), and femur length (FL), to assess their correlation with gestational age. Additionally, placental characteristics such as thickness, location, structure, and maturity were examined, alongside an assessment of amniotic fluid volume. For fetometric assessment, the data were determined taking into account the gestational age and were compiled on the basis of tables proposed by L.S. Persianinova, V.N. Demidova (1982) and A.N. Strizhakova, M.V. Medvedeva. To determine the location of the placenta, determine the thickness and degree of maturity and the gestational age, according to the classification proposed by P. Grannum and V.N. Petrova et al. (1993), the degree of maturity of the placenta was measured: 0 degree - up to 30 weeks, 1 degree - 30-32 weeks, II degree - 34-36 weeks, III degree - 37-38 weeks of pregnancy.

Doppler sonography was utilized to evaluate the condition of uteroplacental-fetal circulation. The assessment focused on analyzing blood flow velocity curves in key vascular structures, including the right and left uterine arteries, umbilical arteries, and the middle cerebral artery of the fetal brain.

To ensure a more accurate evaluation of uteroplacental-fetal hemodynamics, the study employed the three-tier classification system developed by M.I. Ageeva:

Grade IA: Increased resistance in the uterine arteries, indicating impaired uteroplacental circulation while fetal-placental circulation remains unaffected.

Grade IB: Normal uteroplacental circulation but compromised fetal-placental circulation, characterized by increased resistance in the umbilical artery.

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Grade II: Compensated or subcompensated fetal hemodynamics, presenting with elevated resistance in both the uterine and umbilical arteries.

Grade III: Decompensated hemodynamic disturbances, marked by severe fetal circulatory dysfunction, including the absence of diastolic blood flow in the umbilical artery or the presence of reversed blood flow.

Research results and Discussion

TABLE-1. ULTRASONIC EXAMINATION RESULTS OF THE GALLBLADDER, ABS., (%)

Echographic data	Q G (n =30)		AG (n = 10 0)		χ^2	P
	abs.	%	abs.	%		
Deformation of the gallbladder	1	3.3	11	11 .0	1.6	>0.05
Structural abnormality of the gallbladder wall	-	-	23	23 .0	-	-
Gallbladder volume						
40-59 ml	14	46.7	69	69 .0	4.99	<0.05
60 ml and more	4	13.3	31	31 .0	3.7	<0.05
Less than 40 ml	12	40	-	-	-	-
Contents of the gallbladder						
Same	30	100	-	-	-	-
Another	-	-	100	100	-	-

In pregnant women with biliary sludge and in women of the control group, the thickness of the gallbladder walls did not exceed 3 mm, however, in 23 (23%) cases, changes in its exostructure were detected. In pregnant women with biliary sludge, diffuse changes in the gallbladder wall were detected, as well as premural structures measuring 2-4 mm in the gallbladder that did not produce an acoustic shadow.

(Figure 1: Ultrasound image of bile sediment)

Against the background of treatment with artichoke extract, echography of the gallbladder revealed positive dynamics of gallbladder function, in the form of a reliable increase of 22.1% compared to the control group. In our opinion, the positive effect on the dynamics of biliary sludge in pregnant women may be due to the restorative effect of the regulatory components of the drug on the dynamic function of the gallbladder. The therapy led to the restoration of wall homogeneity in 17 (73.9%) gallbladders.

TABLE-2. DYNAMICS OF BILIARY SAJ MANIFESTATIONS DURING TREATMENT IN PREGNANT WOMEN ACCORDING TO ULTRASONIC STUDY DATA, ABS., (%)

		"X+" (n=60)		"X-" (n=40)		χ^2	P
		abs.	%	abs.	%		
BS	++	49	81.6	18	45	14.6	<0.01
	+ -	11	18.3	9	22.5	0.26	>0.05
	--	-	-	13	32.5	-	-

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Note: "++" - disappearance of sludge; "+" - partial regression or absence of sludge; "-" - deterioration of biliary sludge echography.

Thus, the use of artichoke extract in pregnant women with biliary congestion leads to the elimination of symptoms of biliary and intestinal dyspepsia in pregnant women with biliary congestion, elimination of biliary congestion, improvement of the motor-evacuation function of the gallbladder, and reduces the risk of gallstone formation.

All pregnant women who took part in the examination underwent ultrasound examination of the fetus and placenta. In 79 out of 100 pregnant women in the main group, fetometric indices corresponded to the pregnancy norm. In ultrasound examination, fetal growth retardation was diagnosed 2 times more often - in 6 (6%) in Group 1 and in 1 (3.3%) in the comparative group. Intrauterine fetal growth retardation revealed by ultrasound examination is a probable criterion for impaired metabolic function of the placenta and placental dysfunction. We were interested in studying the degree of maturity of the placenta. When studying the degree of maturity of the placenta, premature maturation of the placenta was detected in 15 (15%) in the main group and in 2 (6.7%) in the control group.

TABLE-3. SONOGRAPHIC ASSESSMENT OF THE STATE OF THE MOTHER-PLACENTA-FETUUS SYSTEM IN PREGNANT WOMEN WITH BILE SLUDGE, ABS., %

Indications for ultrasound examination	KG (n=30)		AG (n=100)		χ^2	P
	abs.	%	abs.	%		
Premature aging of the placenta	2	6.7	15	15.0	1.41	>0.05
Abnormal placentation	1	3.3	6	6.0	0.32	>0.05
Fetal growth retardation	1	3.3	6	6.0	0.32	>0.05
Polyhydramnios	-	-	12	12.0	-	-
Low water content	-	-	3	3.0	-	-
Violation of fetoplacental circulation	2	6.7	15	15.0	1.41	>0.05

One of the symptoms of fetoplacental insufficiency is a change in the amount of amniotic fluid. Polyhydramnios was detected in 12 (12%) pregnant women in the main group, and oligohydramnios in 3. This type of pathology was not encountered in the comparison group. Changes in the thickness of the placenta in pregnant women were detected in 15 (15%) in the main group, in 2 (6.7%) in the comparison group. This was mainly manifested in the form of thinning of the placenta. Low placentation occurred 2 times more often in the first group 6 (6%), in the comparison group this figure was 1 (3.3%). In pregnant women with biliary sludge, blood flow disorders in the uterus, umbilical system and fetal vessels were detected by Doppler ultrasound 2 times more often 15 (15%) and 2 (6.7%) in the comparison group. Violations of degree IA were detected in 10 (75%), and degree IB - in 5 (25%).

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Analysis of Doppler results showed that 15 pregnant women had signs of fetoplacental dysfunction. Hemodynamic disorders within the mother-placenta-fetus system, which are critical in the development of placental dysfunction, are characterized by increased peripheral vascular resistance across all components of this circulatory network.An increase in the SDO and IR indicators was noted compared to physiological indicators.

A comprehensive study of hemodynamics in pregnant women with biliary sludge allows for timely diagnosis of possible development of fetal growth retardation and objective assessment of the effectiveness of therapy.

Table-4. Results of antenatal Doppler ultrasound in the system of uterine arteries, umbilical artery, middle cerebral arteries of the fetus after complex therapy in pregnant women with biliary sludge

	28-32 weeks		33-37 weeks	
	RI before treatment	RI after treatment	RI before treatment	RI after treatment
a.uterine	0.62+0.034	0.49+0.026 **	0.60+0.019	0.47+0.19 ***
a.umblicalis	0.78+0.017	0.58+0.006 ***	0.81+0.009	0.68+0.006 *** ^^^
a.media of the brain	0.78+0.006	0.75+0.006 ***	0.71+0.004	0.77+0.005 *** ^

Note: *- significant difference compared to pre-treatment values (**-P<0.01; ***-P<0.001)

^- 1 group compared with the indicators after treatment, the difference is significant (^-P<0.05; ^^^-P<0.001)

Significant decreases in SDO and IR were observed in the uterine arteries, fetal umbilical artery, and increases in the fetal middle cerebral artery throughout pregnancy.

Table-5. Results of antenatal Doppler ultrasound after complex therapy.

	28-32 weeks		33-37 weeks	
	SDO before treatment	LMS after treatment	SDO before treatment	LMS after treatment
a.uterine	2.3+0.006	1.64+0.012 ***	2.6+0.004	1.70+0.015 *** ^^
a.umblicalis	3.2+0.006	2.37+0.009 ***	3.8+0.004	3.0+0.037 *** ^^^
a.media of the brain	3.6+0.006	4.25+0.012 ***	3.5+0.004	4.42+0.011 *** ^^^

Note: *- significant difference compared to pre-treatment values (**-P<0.01; ***-P<0.001)

^- 1 group compared with the indicators after treatment, the difference is significant (^-P<0.05; ^^^-P<0.001)

In the observed patients, improvement of results was noted in the uterine arteries up to 28-32 weeks - IR 0.49+0.026**, CDO 1.64+0.012***, in the umbilical artery of the fetus - IR 0.58+0.006***, CDO 2.37+0.009***, respectively, and in the middle cerebral artery of the fetus - IR 0.75+0.006***, CDO 4.25+0.012***, respectively. At 33-37 weeks of pregnancy, an average decrease in the SDO values to 2.6+0.004, RI to 0.60+0.019 was observed in the uterine arteries, RI to 0.68+0.006***^^^^, SDO to 3.0+0.037***^^^^, in the middle cerebral artery of the fetus, SDO increased to 4.42+0.011***^^^^, RI to 0.77+0.005***^. Thus, according to the results of antenatal Doppler imaging, the effect of artichoke extract treatment in patients with biliary sludge

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and those who used this drug for treatment is positive and effective. Based on the data obtained, we can conclude that it has a positive effect on the state of blood flow in the mother-placenta-fetus system.

algorithm based on the research results.

Conclusions

The use of artichoke extract in pregnant women with biliary congestion leads to the removal of biliary congestion (complete by 81.6% and partial by 18.3%), improves the motor-evacuation function of the gallbladder.

When performing ultrasound Dopplerography, placental dysfunction was twice as common in the group with biliary sludge compared with the control group.

In pregnant women with placental dysfunction, the use of artichoke extract also had a positive effect on maternal-placental-fetal hemodynamics.

Artichoke extract use during pregnancy in women with bile sludge reduces risk formation of gallstones.

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