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SPIS TREŚCI

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Ultrasonographic peculiarities of fetoplacental complex in pregnancy complicated by intrauterine infection

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ABSTRACT

Introduction: the relevance of intrauterine infections is determined by significant peri- and postnatal loss as well as health impairment, which often results in disability and reduced quality of life. Ultrasonography is employed in order to provide a reliable assessment of the functional state of the fetoplacental system secondary to intrauterine fetal infection in the course of pregnancy. Ultrasound imaging is essential in diagnosis of various preclinical complications of pregnancy and detection of abnormalities in the developing fetus.

The aim of the study was to perform ultrasonographic assessment of fetoplacental complex in pregnancy complicated by intrauterine infection.

Materials and methods: the study involved 304 pregnant women who underwent ultrasonographic and bacteriological somatogenic examination. The women were divided into the following groups depending on the presence and nature of the diagnosed infection: Group 1 - 50 patients with normal pregnancy, who were not found to have signs of infection (control group), Group 2 - 50 pregnant women with viral infections (CMV and herpes simplex virus); Group 3 - 50 pregnant women with bacterial infections (chlamydia, ureaplasma, mycoplasma), Group 4 - 154 patients with mixed viral and bacterial infections. Clinical groups with intrauterine infections (IUI) were considered main ones.

Results: increased echogenicity of the endothelium of internal and provisional organs was considered to be the main ultrasonographic sign of intrauterine fetal infections as these changes were equally observed in pregnant women of the main group. Main symptoms of viral infections included ventriculomegaly, hypoplasia of the chest, echogenic fibrous inclusions in the papillary muscles and valve flaps, hepatomegaly, placental hypoplasia, oligohydramnios. Dolichocephalic skull, choroid plexus cysts, gastromegaly, placental calcifications, polyhydramnios were more common in bacterial infections. Pregnant women with mixed viral and bacterial infections were found to have those and other signs of infection in equal measure.

Conclusion: ultrasonographic somatogenic examination is of great diagnostic importance in preclinical diagnosis of intrauterine infection. Timely detection of changes in fetus and provisional organs provides a differentiated approach to administration of pathogenetically targeted treatment of this group of patients.

Key words: pregnancy, intrauterine infection, ultrasonographic somatogenic examination, fetoplacental complex.

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INTRODUCTION

An increase in the incidence of intrauterine infections in both obstetric and perinatal practice has been observed recently. Intrauterine infections remain a major challenge not only for obstetricians, perinatologists and pediatricians, but for health care in general, as they are one of the main causes of perinatal morbidity and mortality [1]. Intrauterine infections largely determine the level of infant mortality, accounting for 11-45% of perinatal loss [2]. The significance of intrauterine infections is firstly stipulated by a considerable level of peri- and postnatal mortality, and secondly, by disorders which often result in disability and reduced quality of life.

Intrauterine infection is the cause of the entire range of antenatal abnormalities, particularly infectious diseases of the fetus, intrauterine growth delay, malformations, stillbirth, miscarriage, development of fetoplacental insufficiency [3]. Recently scientists have placed greater focus on the study of intrauterine infection as an etiological factor in the development of fetoplacental insufficiency [4].

Intrauterine infection is accompanied by an impairment of placental membranes and deposition of immune complexes in tissues, triggering disintegration of the functional system "mother-placenta-fetus", disruption of redox processes and development of placental insufficiency [5]. Placental dysfunction in exposure to microbial toxins and their metabolites triggers the development of fetal hypotrophy, reducing its resistance to infectious agents [6,7].

Ultrasonographic examination is performed for a reliable assessment of the functional state of fetoplacental system against the background of intrauterine fetal infection in the course of pregnancy. Despite the absence of definitive ultrasonographic criteria of intrauterine infection, ventriculomegaly, hyperechogenic endothelium of the intestine, increased echogenicity of placenta, expansion of intervillous space, oligohydramnios, polyhydramnios and congenital malformations are considered the most informative indices. Ultrasound imaging gives a possibility to provide preclinical diagnosis of various complications of pregnancy and fetal abnormalities as well as to identify echographic markers of intrauterine infection, signs and severity of placental insufficiency, necessary for early treatment and determination of therapeutic approach in each case.

THE AIM OF THE STUDY

To perform ultrasound assessment of fetoplacental complex in pregnancy complicated by intrauterine infection.

MATERIALS AND METHODS

The study implied examination of 304 pregnant women using bacteriological and ultrasonographic somatogenic methods. Infectious pathogens were identified by bacteriological and virological studies, as well as polymerase chain reaction. As a result of examinations, patients were divided into 4 groups depending on the presence and nature of the infection. Group 1 included 50 patients with normal pregnancy who were not found to have signs of infection. This group was the control one. Group 2 comprised 50 pregnant patients with viral infections (CMV and herpes simplex virus); Group 3 involved 50 pregnant women with bacterial infections (chlamydia, ureaplasma, mycoplasma) and Group 4 amounted for 154 patients with mixed viral and bacterial infection. The groups of patients with intrauterine infection (IUI) were considered main ones. Ultrasonographic somatogenic study was conducted using MINDRAY DC-8 ultrasound scanner.

Statistical data were processed using general-purpose software system Statistica for Windows version 6.1 (Russified version).

RESULTS AND DISCUSSION

Ultrasonographic somatogenic findings in pregnant women of both control and main groups corresponded to the data of fetal nomograms elaborated by E.A.Yakovenko (1994) [8]. Control group patients were not found to have any changes in the internal and provisional organs.

Table I. Changes in the internal and provisional organs in women of the main group (absolute number (%±Δ), where Δ - error %)

Ultrasonographic findings	Main clinical group		
	1 (n=50)	2 (n=50)	3 (n=154)
Fetal head and brain structures			
Dolichocephalic skull	26 (52±7.1)	38 (76±6)	14 (9±2.3)
Ventriculomegaly	35 (70±6.5)	14 (28±6.3)	16 (10±2.5)
Increased echogenicity of the ventricular system	42 (84±5.2)	39 (78±5.9)	45 (29±3.7)
Choroid plexus cysts -unilateral -bilateral	 11 (22±5.9) 5 (10±4.2)	 22 (44±7.0) 16 (32±6.6)	 18 (12±2.6) 12 (8±2.2)
Chest			
Hypoplasia of the chest	41 (82±5.4)	22 (44±7.0)	36 (23±3.4)
Hypoplasia of the lungs	36 (72±6.3)	18 (36±6.8)	30 (19±3.2)
Cardiomegaly	7 (14±4.9)	10 (20±5.7)	14 (9±2.3)
Increased echogenicity of the lungs	38 (76±6.0)	36 (72±6.3)	46 (30±3.7)
Echogenic fibrous inclusions in papillary muscles and valve leaflets	27 (54±7.0)	15 (30±6.5)	38 (25±3.5)
Abdomen			
Hypoplasia of the abdomen	11 (22±5.9)	10 (20±5.7)	-
Hepatomegaly	31 (62±6.9)	20 (40±6.9)	46 (30±3.7)
Perivascular infiltration of the liver	24 (48±7.1)	19 (38±6.9)	31 (20±3.2)
Nephromegaly	14 (28±6.3)	17 (34±6.7)	23 (15±2.9)
Pyelectasis -unilateral -bilateral	 5 (10±4.2) 19 (38±6.9)	 7 (14±4.9) 16 (32±6.6)	 24 (16±2.9) 32 (21±3.3)
Increased echogenicity of the pelvicalyceal system and renal parenchyma	32 (64±6.8)	30 (60±6.9)	73 (47±4.0)
Gastromegaly	19 (38±6.9)	33 (66±6.7)	45 (29±3.7)
Increased echogenicity of gastric contours	36 (72±6.3)	44 (88±4.6)	62 (40±4.0)
Increased echogenicity of the intestine	42 (84±5.2)	40 (80±5.7)	73 (47±4.0)
Provisional organs			
Increased echogenicity of placenta	29 (58±7.0)	37 (74±6.2)	41 (27±3.6)
Hypoplasia of placenta	23 (46±7.0)	-	46 (30±3.7)
Hyperplasia of placenta	-	10 (20±5.7)	40 (26±3.5)
Expansion of intervillous space	16 (32±6.6)	21 (42±7.0)	52 (34±3.8)
Calcifications of placenta	26 (52±7.1)	24 (48±7.1)	69 (45±4.0)
Enlargement of sinuses of the basal veins	17 (34±6.7)	14 (28±6.3)	28 (18±3.1)

Main group patients had changes in the internal and provisional organs and changes in the amount of amniotic fluid (Table I).

In the assessment of ultrasound data on the amount of amniotic fluid, oligohydramnios was diagnosed in cases when numerical values of the amniotic index were below the 5th percentile. The depth of the largest amniotic fluid pocket in this case was less than 2 cm. Polyhydramnios was characterized by an increase in numerical values of the amniotic fluid index by more than 97.5 percentile, and the depth of the largest amniotic fluid pocket by more than 8 cm. Thus, the patients under investigation were most frequently found to have oligohydramnios - in 42% of cases in Group 2 with viral urogenital infections and up to 28% in Group 3 (mixed infections). Alternatively, polyhydramnios was observed in 40% and 26% in the group with bacterial infections (Group 3) and mixed type (Group 4), respectively.

Increased echogenicity of the endothelium in provisional and internal organs was considered to be the main ultrasonographic sign of intrauterine fetal infection as it was equally common in pregnant women of the main group. Such ultrasound signs as increased echogenicity of the endothelium in internal and provisional organs, ventriculomegaly, choroid plexus cysts, hepatomegaly, gastromegaly, nephromegaly, pyelectasis were observed in the same patient.

The main symptoms of viral infections included ventriculomegaly, hypoplasia of the chest, echogenic fibrous inclusions in the papillary muscles and valve leaflets, hepatomegaly, hypoplasia of placenta, oligohydramnios. Dolichocephalic skull, choroid plexus cysts, gastromegaly, calcifications in placenta, polyhydramnios were more common in bacterial infections. Pregnant women with mixed viral and bacterial infections were equally found to have these and other signs of infection.

CONCLUSION

Ultrasonographic somatogenic study has a high diagnostic value in preclinical diagnosis of intrauterine fetal infections. Timely detection of changes in the fetus and provisional organs gives a possibility to provide differentiated approach to administration of pathogenetically targeted treatment of these patients.

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