

Effect on Human Kidney Morphology in the Embryonic Period of Disorders of the Formation of the Cardiovascular System

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World statistics indicate a high level of spread of congenital malformations of the urinary and cardiovascular systems, reaching 15% among the child population. The widespread introduction of ultrasound screening of pregnant women has led to the active identification of urological and cardiovascular features of the formation in fetuses and newborns. Currently, the best non-invasive and highly accurate method for studying hemodynamics and determining renal blood flow is dopplerometry. The possibilities of using this research method during pregnancy allow us to assess the renal hemodynamics of the fetus [1-3].

Assessment of renal hemodynamics in combination with morphometric parameters of the kidneys is normal in case of disturbances in the formation of the cardiovascular system.

The material for the study was ultrasonography data of 10 fetuses of pregnant women (III trimester of pregnancy) without pathology of the cardiovascular and urinary systems, as well as ultrasonography data of 7 fetuses with impaired formation of the cardiovascular system in the III trimester of pregnancy. Ultrasonography was performed at the Grodno Regional Clinical Perinatal Center. The study of the fetal kidneys was carried out according to a standard method with an assessment of their anatomical state, the nature of blood supply using the B-mode. Studies were performed on a Samsung Medison ultrasound machine. The linear dimensions of the kidney were measured. During Dopplerometry, such characteristics of Doppler curves as the pulsation index and the resistance index in the main trunk of the renal artery were determined. Statistical data processing was performed using the application software package Statistics 8.0.

Ultrasound examination of the fetal kidneys was rounded and determined in the form of paired bean-shaped formations of medium echogenicity, located on both sides of the spine. When evaluating the parameters of fetuses in the third trimester of pregnancy without pathology, the following parameters of the length of the kidney were obtained: on the right, 39.3 ± 3.62 mm, on the left, 40.3 ± 4.73 mm. When assessing the length of the kidney in fetuses with impaired formation of the cardiovascular system, the following parameters were obtained: on the right ($n = 7$) 32.7 ± 4.82 mm, on the left ($n = 7$) 33 ± 5.92 mm. which differed statistically significantly ($p \leq 0.01$), both in the right and left kidneys, in comparison with healthy ones. The width indices of the fetuses in the third trimester of pregnancy without pathology were 20.2 ± 1.98 mm on the right and 20.8 ± 3.08 mm on the left, while the width indices were 17 on the right for fruits with impaired cardiovascular system 17.42 ± 2.76 mm, left 17.28 ± 2.5 mm. which differed statistically significantly ($p \leq 0.05$), both in the right and left kidneys, in comparison with healthy ones.

Assessing the renal blood flow indices of the main renal artery in fetuses in the third trimester of pregnancy without pathology, the following dopplerometric data were obtained: in the kidneys located on the right side, the pulsation index was 2.05 ± 0.57 , and the resistance index was 0.87 ± 0.05 . On the left side, the pulsation index was 1.93 ± 0.43 , and the resistance index was 0.88 ± 0.07 . Assessing the renal blood flow indices of the main renal artery in fetuses with impaired formation of the cardiovascular system, the following dopplerometric data were obtained: in the kidneys located on the right side, the pulsation index was 1.92 ± 0.33 , and the resistance index was $0.88 \pm$

0.05. On the left side, the pulsation index was 1.96 ± 0.38 , and the resistance index was 0.88 ± 0.05 . There were no statistically significant differences between the parameters of the right and left kidneys in fruits without pathology with fruits with impaired formation of the cardiovascular system ($p \geq 0.05$).

Violations of the formation of the cardiovascular system in the prenatal period, affect the formation of the organs of the urinary system, in particular the kidneys. Thus, a significant decrease in the size of the kidneys is noted, along with the preservation of the parameters of renal blood flow, indicating the formation of adaptive mechanisms on the part of the kidneys, which can serve as the basis for the development of markers for identifying violations of the formation of organs and systems of the fetus.

Bibliography

1. Chugunova OL. "Risk factors and diagnosis of diseases of the urinary system in newborns". *Ros West Perinatol and Pediatric* 1 (2010): 12-20.
2. Demidov VN. "Multicystosis and polycystosis of a horseshoe-shaped kidney, established by ultrasound at the beginning of the second trimester of pregnancy". *Prenatal Diagnosis* 1.4 (2002): 294-298.
3. Trefilov AA. "The prevalence of kidney malformations according to the results of mass ultrasound screening". *Pediatric Pharmacology* 2 (2006): 44-46.

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