Changes in hormonal and immune background in children with congenital heart disease

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Abstract: Congenital heart defects (CHD) are one of the most common anomalies in children. The frequency of CHD is up to 30% of all developmental defects. According to official statistics, more than 20 thousand cases of congenital heart defects of varying degrees of complexity are registered in children in the CIS countries every year, 75% of which require surgical correction of the defect. Children with CHD are susceptible to various diseases due to their hormonal and immune imbalance. As a rule, in the postoperative period, the main task of the cardiologist and pediatrician is aimed at adapting the child's cardiovascular system. However, the hormonal and immune systems of this category of patients are not assessed dynamically. In this regard, the issue of studying the hormonal and immune systems in children with congenital heart defects at an early age remains relevant and requires scientific research in this area.

Keywords: congenital heart defect, immune system, hormonal background, growth hormone, pathogenesis

According to the findings of the study by Muhammad Sohail Arshad at all (2021) conducted among 53 children with cyanotic congenital heart disease, all of them had adverse effects on nutrition and growth. The mean weight of patients with CVD was significantly lower as compared to the controls (21.19+6.24 kg vs. 26.48+8.1 kg, p-value=0.0003). Blood glucose levels were significantly lower among cases as compared to the controls (77.58+14.58 mg/dL vs. 87.25+11.82 mg/dL, p-value=0.0004). No significant difference was found between cases and controls in terms of various hormone levels studied (p-value>0.05), except for insulin-like growth factor-1 (IGF-1) levels (p-value<0.0001). Alteration of the pituitary-adrenal axis is suspected, while the pituitary-thyroid axis appears to function normally in patients with CHD. Serum levels of IGF-1 have been shown to be significantly decreased among patients with cyanotic congenital heart disease (CCHD).

Dinleyici E.C. at al (2017) conducted a prospective randomized study in 94 patients with CHD (36 girls and 58 boys aged 1 year to 192 months, 19 cyanotic CHD and 75 non-cyanotic CHD) and 54 children (26 girls and 28 boys) without CHD. In the

main group, 39.4% and 29.6% of the control group had malnutrition. The difference between cyanotic and acyanotic patients in terms of malnutrition was significant (57.9% and 34.6%, p <0.05). Serum IGF-1 levels were lower (41.8+/-3.9 μg/L, 106.9+/-17.9 μg/L, respectively, p<0.001) and GH levels were higher (6.43+/-0.9 ng/mL, 3.87+/-0.5, respectively, p<0.05) in the CHD group than in the controls. Serum IGF-1 levels were significantly lower in cyanotic CHD patients than in acyanotic patients (17.2+/-3.2 μg/L, 48.7.0+/-4.6 μg/L, respectively, p<0.001). Serum IGF-1 and GH levels were similar in well-nourished CHD patients and malnourished CHD patients (p>0.05). In the general study group, the most effective factor on the IGF-1 level in the blood serum was the presence of congenital heart disease (p < 0.001), in patients with congenital heart disease, the most effective factor on the IGF-1 level in the blood serum is the presence of cyanosis and malnutrition. In groups of patients with acyanotic, cyanotic and complete congenital heart disease, no correlations were found between the IGF-1 levels. But the growth hormone level in the serum negatively correlated with the diastolic diameter of the left ventricular interseptal space, diastolic mass of the left ventricle and end-diastolic volume of the left ventricle in patients with congenital heart disease.

In conclusion, we can say that the main changes in the hormonal status are observed in the pituitary-adrenal system, and this is reflected in growth retardation and physical development. The most important factor in the IGF-1 level in the serum is cyanosis. Decreased IGF1 levels and decreased left ventricular mass with elevated growth hormone levels are seen in patients with CHD, and these findings are seen in cases with cyanosis and malnutrition.

The course of CHD and early survival of patients with CHD are affected by the severity of concomitant congenital extracardiac pathology, which is found in 23-30% of patients with CHD; in the presence of such pathology, the mortality rate increases to 89%. Under certain unfavorable conditions of primary or secondary immunodeficiency, even very minor, hemodynamically compensated defects that do not require correction can serve as a background for the superposition of infection and the development of infective endocarditis and aggravate the course of associated rheumatological diseases. The modern concept of the formation of immunopathological conditions considers the neuroendocrine and immune systems as the basis of a single homeostatic regulation. The immune system is integrating, along with the central nervous and endocrine systems, and participates in maintaining the homeostasis of the child's body and establishing an optimal balance in its relationships with the environment. Immunological mechanisms participate in the pathogenesis of the main diseases of the perinatal period, and subsequently, determine the possibility of full rehabilitation of the sick child.

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