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ARRHYTHMIC SYNDROME IN CHILDREN AND ADOLESCENTS WITH MINOR CARDIAC ANOMALIES

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Abstract

Diseases of the circulatory system occupy one of the leading places in the structure of cardiorheumatological pathology in children over the past decades. Studies devoted to the study of the prevalence of heart rhythm disorders in the child population allow not only to resolve controversial issues of norm and pathology, but also to establish age periods of risk of developing arrhythmia, concentrate efforts on the most significant pathological conditions and determine the direction of preventive programs. Analysis of the evolution of heart rhythm and conduction disorders over the past decade allows us to conclude not only about the increase in their frequency, but also about their rejuvenation, so in adolescents in the structure of functional diseases of the cardiovascular system, heart rhythm disorders make up 60.8%. Great importance in the pathophysiology of arrhythmias is currently attached to disorders of neurovegetative regulation of heart rhythm, electrolyte disturbances, and hereditary predisposition. However, the listed factors contribute to the formation of arrhythmias only in children with a special structure and electrophysiology of the cardiac conduction system. Many aspects associated with the mechanism of occurrence of individual clinical syndromes, in particular the occurrence of rhythm and conduction disturbances in children with MAC, their course and prognosis in specific patients, remain poorly studied, and the assumptions made on this account are controversial. Due to increased environmental loads and improved capabilities of modern diagnostics, the number of patients with connective tissue dysplasia syndrome (CTD) has increased sharply. The predominance of young people among them, and therefore of working age, conscription and childbearing age, gives this problem not only medical but also social significance. The issue of developmental anomalies of the cardiovascular system in hereditary connective tissue disorders (HCTD) attracts special attention of cardiologists, since such anomalies lead to the development of clinically significant pathological conditions and life-threatening, and sometimes fatal, complications.

INTRODUCTION

The problem of heart rhythm disturbances in minor cardiac anomalies (MAC) is studied. Evidence has emerged that congenital weakness of connective tissue is a factor complicating the course of coronary heart disease and myocardial infarction. However, to date there is no consensus on the contribution of cardiac dysplasia to the development of heart rhythm disturbances with the exclusion of other causes. There is no information on the incidence of hemodynamically significant heart rhythm disturbances and their relationship with the type and severity of cardiac

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dysplasia. Based on the above, it becomes clear that it is necessary to study the arrhythmic syndrome in children with cardiac dysplasia in order to identify the most significant etiologic factor in the development of this pathology and, as a consequence, timely determination of treatment tactics.

Purpose of the study to determine the significance of various variants of cardiac dysplasia in the development of cardiac rhythm and conduction disorders, to develop recommendations for the diagnosis and prognosis of arrhythmic complications in children and adolescents with minor cardiac anomalies

Objectives and methods of the research:

1. to study the structure of clinical and anatomical variants of minor cardiac anomalies in children and adolescents with arrhythmic syndrome;
2. to study the nature of various rhythm and conduction disorders in children and adolescents with minor cardiac anomalies depending on the variant and severity of cardiac dysplasia;
3. to identify the features of autonomic regulation of heart rhythm in children and adolescents with minor cardiac anomalies, to assess the role of autonomic dysfunction in the development of rhythm and conduction disorders in this category of patients.

Research results

1. Minor cardiac anomalies are one of the unfavorable factors predisposing to the development of arrhythmic complications in childhood and adolescence, including hemodynamically significant ones.
2. In the structure of minor cardiac anomalies in children and adolescents with arrhythmic syndrome, mitral valve prolapse (68.52%) and abnormal chords of the left ventricle (58.33%) prevailed, while isolated MVP and ALC of the left ventricle occurred in 17.59% and 34.26% of cases, respectively, in the remaining cases there were combined MAC (48.5%). Multiple MAC (3 or more) were observed in 11 children (10.2%).
3. In the structure of rhythm disturbances in children with minor cardiac anomalies, supraventricular extrasystole in pathological quantities and ventricular extrasystole were most often detected. In this case, a direct correlation was noted between the pathological amount of supraventricular extrasystole with isolated mitral valve prolapse and abnormal chords of the left ventricle, as well as with their combination and combined prolapse of the atrioventricular valves. A relationship was found between the gradation of ventricular extrasystole and the degree of mitral valve prolapse (in our study, the degree did not exceed 2), as well as with the presence of multiple minor anomalies in the heart (3 or more), i.e. with the degree of cardiac dysplasia, the presence of an open oval window and combined prolapse of the atrioventricular valves.
4. In children and adolescents with minor cardiac anomalies, grade 2 sinoatrial block is found in the structure of conduction disorders. was more often registered in patients with tricuspid valve prolapse and bicuspid aortic valve, a high correlation was found between stage 2 atrioventricular block and the presence of a bicuspid aortic valve and in combination with stage 2 mitral valve prolapse with abnormal chords of the left ventricle.

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Exacerbation of bronchopulmonary pathology in old age, especially with concomitant ischemic heart disease (IHD), is accompanied by a high frequency and variety of arrhythmic events. At the same time, there is no convincing direct evidence of the leading role of IHD in the occurrence of arrhythmias in patients with chronic obstructive pulmonary disease. There is a possibility of latent course of IHD in this pathology.

A relationship has been revealed between nocturnal attacks of bronchial asthma, transient arrhythmias and pulmonary hypertension. Sleep and associated cardiorespiratory dysfunction are caused by arterial hypoxemia, hypercapnia and acidosis, the manifestations of which are aggravated in a horizontal position. Against the background of bronchial obstruction, pulmonary hypertension and impaired respiratory regulation, prerequisites are created for the appearance of apnea and other pathological forms of breathing during sleep, accompanied by biomechanical disorders. Numerous studies conducted in this area have proven that external respiration is a very sensitive indicator of the general condition of the body and the processes occurring in the upper respiratory tract and lungs.

Functional methods for studying external respiration are very diverse, but only some of them allow long-term observations in natural conditions for the subject. For example, the rheopneumography technique has this capability.

Dynamic rheopneumography opens up new opportunities for studying volume-time relationships in the structure of the respiratory cycle, as well as identifying hidden cardiorespiratory system failure. Additional information can be obtained by including respiratory tests in the dynamic observation protocol. Due to insufficient study, they are rarely used in practice.

A relatively small number of works have been published in Russian literature, the purpose of which was a synchronous study of circadian features of the functioning of the respiratory, cardiovascular, autonomic and central nervous systems in conditions of habitual human life.

In 2023, the first portable cardiac recorders appeared on the domestic market, supplemented by the function of dynamic rheopneumography with synchronous recording of motor activity and body position of the subject. At the same time, approaches to assessing the nature of the rheographic ventilation curve remain unresolved, the data available in the literature are scattered and heterogeneous. While in foreign analogues, the number of automatically analyzed indicators is already more than 40. Thus, modern multifunctional systems for dynamic monitoring of physiological indicators in the conditions of habitual life open up new opportunities for studying cardiorespiratory interactions, which require further study.

Conclusions:

1. In children with minor cardiac anomalies complicated by arrhythmic syndrome, in most cases a mixed type of initial vegetative status was noted, sympathicotonic orientation of coronary heart disease was significantly more often detected in children with arrhythmias without MAC. Analysis of heart rate variability showed a general tendency for sympathetic influences on the heart rhythm to predominate in children with arrhythmias in both groups.

2. Increased tone of one or another link of the autonomic nervous system was reflected in the nature of the arrhythmic syndrome mainly in the form of nomotopic rhythm disturbances, conduction disturbances and heterotopic arrhythmias in non-pathological quantities. In children

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with MAC, a relationship was found between the sympathicotonic direction of the IVS and the presence of ventricular extrasystole and paroxysmal tachycardia.

3. The criteria for identifying risk groups for hemodynamically significant arrhythmic complications in children with minor cardiac anomalies are: the presence of multiple (3 or more) MAC, the presence of combinations of mitral valve prolapse with mitral regurgitation and abnormal chords of the left ventricle, an increase in the degree of mitral valve prolapse, the presence of an open oval window in combination with other MAC, a sympathicotonic type of the initial vegetative status.

PRACTICAL RECOMMENDATIONS

1. Children with arrhythmic syndrome who have phenotypic signs of connective tissue dysplasia require Doppler echocardiography to exclude minor cardiac anomalies.
2. Children with mitral valve prolapse with mitral regurgitation in combination with abnormal chords of the left ventricle, as well as children with an open oval window in combination with other MACs and children with multiple (3 or more) minor cardiac anomalies should be classified as a high-risk group for the development of hemodynamically significant arrhythmic complications.
3. A comprehensive examination of children with arrhythmias against the background of MAC should include an assessment of the initial vegetative status and continuous daily ECG monitoring in order to clarify the degree of arrhythmic syndrome and analyze heart rate variability.
4. All children with arrhythmic syndrome against the background of minor anomalies in the development of the heart should be under the supervision of a cardiologist for the purpose of early diagnosis and prevention of hemodynamic disorders.

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