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Pathogenic aspects of dysarrhythmogenesis in patients with bronchial asthma

The analysis of published data on the key aspects of the pathogenesis of cardiac arrhythmias and blockades in patients with bronchial asthma suggests that vegetative regulation of heart rate decreases with increasing of BA severity.

Among the main aspects of the pathogenesis of cardiac arrhythmias and blockades in BA patients one can name the following: hypoxemia, reduction of the vascular bed, pulmonary hypertension and right heart overload, hypercatecholaminemia, and also blood gas content changing and acid-base balance.

Keywords: bronchial asthma, cardiac rhythm and conduction disorders.

Relevance of the topic: Currently, significant progress in the diagnosis, treatment and prevention of bronchial asthma (BA).

However, the high prevalence and frequency of cardio - vascular complications make BA actual problem of modern medicine. Analysis of modern literature and our own data indicate that in these patients there are almost all types of cardiac arrhythmias, as well as combinations thereof. It should be noted that the question of the possible pathogenetic factors underlying arrhythmias in patients with asthma, the literature highlights a little. In this connection it is interesting to summarize and synthesize the available data.

Purpose of study

Based on an analysis of published data, to examine key aspects of the pathogenesis of cardiac arrhythmias and blockades in patients with bronchial asthma.

Results and discussion

Because of the close anatomical and functional relationship of respiratory and cardio - vascular system, they can be viewed as a single cardiorespiratory system[4].

One of the main indicators of the functioning of the cardiorespiratory system is the cardiac rhythm. It is a reaction to various stimuli internal and external environment, due to the adaptive role of cardio - vascular and respiratory systems and is regulated by many mechanisms [1]. It is known

that in the regulation of bronchial obstruction plays an important role the autonomic nervous system, to assess the state which use analysis of heart rate variability (HRV).

The study Zulkarneeva AD et al. [2] revealed a correlation of HRV and the severity of airflow obstruction. With increasing bronchial obstruction FAR decreases, which can be viewed as the progression of disorders of autonomic regulation of cardiac rhythm in patients with asthma. The pathogenesis of this phenomenon- is the development of a partial autonomic blockade due to decrease in the density of beta-adrenergic receptors in asthma exacerbations [10].

The blockade of the autonomic regulation of heart rate in patients with asthma may be due to previous long-term treatment of beta2-agonists.

Duration of asthma and the presence of an overdose of sympathomimetics lead to the development of adrenergic imbalance, which is accompanied by a breach of segmental and suprasegmental activity of the autonomic nervous system that manifests a decrease in HRV and an unfavorable factor for the development of cardiac arrhythmias [7].

Among other factors contributing to the emergence of arrhythmias and conduction disturbances in patients with asthma, the literature points to hypoxemia, which causes an imbalance between oxygen transport and the needs of tissue in it[3]; change the rheological properties of blood type hyperviscosity syndrome, which leads to a violation of the pulmonary microcirculation and cardiac [5]; anatomical changes (bronchial obstruction, pulmonary emphysema), which lead to reduction of vascular bed, narrowing pre-capillaries that causes an increase in pulmonary vascular resistance and pulmonary hypertension[8]; with the growth of pulmonary hypertension increases the load on the myocardium of the right heart, which leads to restriction of coronary fraction of cardiac output, worsening of the conduction processes and the emergence of foci of active heterotopia; hyper catecholaminemia, the cause of which, apparently, is an increased release of endogenous catecholamines in response to stress associated with a bout of breathlessness [6].

Under the conditions of hypoxemia activates anaerobic glycolysis, prolonged presence of which leads to tissue acidosis and disturbance of cell permeability, which leads to disruption of enzyme systems, the accumulation of Na + and Ca2 + in the cytoplasm and loss of K + cardiomyocytes. These electrolyte changes are manifested myocardial electrical instability and lead to arrhythmias [9]. Correction of electrolyte disorders and blood gas (decrease and increase of pCO2 pO2) has a fairly clear antiarrhythmic effect [11]. According to other data found no statistically significant association between indicators blood gases, acid-base balance and rhythm disorders [6].

Conclusions:

1. The analysis of published data suggests that with increasing severity of asthma decreased vegetative regulation of cardiac rhythm.

2. The main aspects of the pathogenesis of cardiac arrhythmias and blockades in patients with bronchial asthma include: hypoxemia, reduction of the vascular bed, pulmonary hypertension and right heart overload, hyper catecholaminemia, and changing blood gas and acid-base balance.

These factors underlying dysarrhythmogenesis patients with asthma should be treated in practice in the selection of appropriate therapy.

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