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MEXANISMS OF NEUROVEGETATIVE REGULATION IN BRONCHOPULMONARY DISEASES IN CHILDREN.

Abdurakhmonov Jasur Nematovich
assistant Department of 3 Pediatrics and Medical Genetics Samarkand Medical University, Samarkand,Uzbekistan
E-mail: jasurdbek@gmail.com ORCID: -0000000279297569
Sharipova Oliya Askarovna
Doctor of Medical Sciences, Professor of the Department 3-Pediatrics and medical genetics Samarkand Medical University, Samarkand, Uzbekistan
E-mail: sharipova7323@bk.ru ORCID-0000-0001-6830-2134

Abstract

In the article, the authors disclosed the latest modern data on the analysis of the literature on the role of the autonomic nervous system in the course of bronchopulmonary diseases. The participation of the autonomic nervous system in the body's response to the impact of external and internal environmental factors is shown. The article analyzes the patterns of response of the autonomic nervous system in pneumonia, which should be paid attention not only to the treatment of the infectious factor, but also to systems that regulate the reactivity of the body. A detailed study of autonomic control in the pathogenesis of respiratory diseases allows us to make the correct diagnosis of these diseases and the correct choice of treatment tactics. It is emphasized that it plays an important role in providing and treating effective prevention and treatment of the disease in such children.

Keywords: broncho-pulmonary diseases, autonomic nervous system, autonomic regulation, sympathetic, parasympathetic nervous system.

Despite the achievements of modern medicine, respiratory diseases account for the majority of childhood diseases in all age groups and account for 80% of all respiratory diseases at an early age. Among children with respiratory diseases, out of–hospital acute pneumonia has a special place in the practice of pediatricians [29,30]

The last decade has seen a high prevalence of acute pneumonia in young children in all countries of the world, including Uzbekistan, at 35-40 per 1,000 children. In addition, acute pneumonia is the leading cause of death in children worldwide, with a high risk of developing various complications and a long recovery period. [40].

Consequently, such a prevalence of pneumonia in young children shows that it maintains a high rate of complications and mortality: In particular, according to the WHO, in 2017, 15% of children under 5 worldwide , i.e., pneumonia caused death in 808694 children [40]

We know that the presence of co-morbidities such as rickets, anemia, diathesis [9,29,30,34] is also important for the development of severe out-of-hospital acute pneumonia and high mortality [9,29,30,34].

In addition, one of the factors ineffectiveness of treatment in accordance with clinical recommendations is the inadequate "response" of the child's body [34], which is determined by the systems that regulate the body's reactivity.

Currently, according to WHO Classification 10, the term vegetative dysfunction is used in these reactions. The term anterior dystonia is used in various pathologies of muscle tone.

Vegetative dysfunctions are classified as psychosomatic diseases, which in the modern classification (KXT10) are called somatoform and are presented in a separate category: F45.3. Somatoform vegetative dysfunction [3,4,7,8,].

The autonomic nervous system, along with the central nervous system and the pituitary-adrenal cortex, are involved in providing neurohumoral control of the body.

We know that the vegetative part of the central nervous system is one of the main mechanisms determining the adaptive nature of the human body [28,].

Vegetative nerves perform functions such as airway muscle tone, secretory functions, blood circulation, vascular permeability, and secretion of inflammatory mediators [9,13].

Physiologists and clinicians have established a direct link between the functional state of the human body and the autonomic nervous system (ANS), which plays a special role in the stress management system [4,5,7,13]. The control and stability of vegetative balance, which is necessary to ensure adaptation to changing conditions with optimal voltage of control systems, has been proven to be critical [3].

According to a number of scientists [1,4,6,11,22,38,43], the operation of regulatory systems with obvious stress leads to a violation of the autonomic balance and a decrease in the adaptive-reserve capacity of the organism.

It is known that the autonomic nervous system plays an important role in ensuring the body's adaptation to external and internal adverse factors. [12,17]. According to many scientists [8,12,17,18], in a moderate state of ANS, a child's body adapts more easily to stress. In addition, if there is dysfunction of the ANS, vegetative dystonia, the formation of neuroses and any, including infectious diseases, may continue in a more severe form [14,22,23,34]. The symptoms of these diseases relate to the neurogenic component of symptom formation; Rapid regulation of cardiac contractile function is provided by two parts of the ANS - sympathetic and parasympathetic. The principle of gravity in the work of these sections of the ANS: all the effects that increase and accelerate one section, brake and weaken the other.

Presented in the first physiological concept of J. Langley (1925) and proved by the results of observations of changes in integral parameters in the modeling of endo- and exogenous effects - heart rate (HR), blood pressure (BP), heart rate. Mironova T.F., and co-authors (2005) have shown a prognostic role of individual indicators of heart rhythm variability in assessing the risk of sudden cardiac death in this category of patients.

It is known from sources that the smooth muscle automatism of the respiratory tract is provided by the cholinergic fibers of the parasympathetic nerve [9,12,15]. The main transmitter is acetylcholine, which is modulated by many substances produced from the ends of these nerve fibers (histamine, serotonin, substance P, prostaglandins). The neurotransmitter of sympathetic activity in the lungs is norepinephrine, which acts on β^2-adrenoceptors, which are located in the membrane layer of smooth muscle and cause their expansion [15,18,21]. The lungs have been shown to be a potent metabolic laboratory for a number of biologically active

substances, including catecholamines. It has been reported that pathological conditions in the lungs can significantly affect the metabolism of catecholamines in lung tissue [12,15,18].

It is known that the pathology of the respiratory system is characterized by an increase in metabolism [41,42]. The main enzyme involved in the metabolism of catecholamines is monoamine oxidase A, the activity of which decreases during the disease, which leads to an increase in the amount of norepinephrine in the lungs.

In atopic diseases, vegetative changes can be considered as superficial, secondary, somatic [16]. It is known that the activation of immunocompetent cells and the next stage of the pathophysiological process in allergy are under the control of neurovegetative regulation [2,39,43]. In particular, the state of the central chain of regulation of autonomic tone plays an important role in the development of bronchial asthma (BA) in children [2,35]

Pathological vegetative reactions (hypersympathetic type of vegetative reactivity) and dysfunction of the superficial segment of the ANS in the form of psychovegetative syndrome as a result of autonomic disorders in hypoxic cases of obstructive-respiratory genesis Shves D.A. (2006).

N.N. According to Kiryukhina et al (2006), all patients with BA have some degree of autonomic dysfunction. Symptoms of autonomic dysfunction often include red dermographism(skin writing) , hyperhidrosis, "wet pillow" symptoms, and heavy heartbeat accompanied by profuse sweating.

In stressful situations, such as an attack of BA disease, vegetative shifts occur, resulting in poor control of not only behavioral responses and impaired ability to work, but also the clinical course and consequences of the disease [2,35].

Tojiboev T.T. (2004) reported that cardiac rhythm variability in patients with bronchial asthma was characterized by decreased segmental, sympathetic, and parasympathetic control activity. This is due to the severity and phase of the disease, the neuropsychological or hormone-dependent pathogenetic mechanism, and co-morbidities. The relationship between sympathetic and parasympathetic management is synergistic. There is also evidence that there is a link between the severity of BA disease and the initial vegetative tone. [35] Accordingly, in early eu- and vagotonia, abnormal changes in heart rhythm occur, which is characterized by an increase in heart rate, which indicates a decrease in adaptive capacity.

From the point of view of modern medicine, pneumonia is a multifactorial pathogenesis, and the nervous system, especially the autonomic nervous system, is involved in shaping the response to the infectious process in the lung tissue [9,14,20,34].

It is known that in pneumonia, the dysfunction of the autonomic nervous system is secondary and is based on somatic origin [28].

Decreased adaptive capacity of the body under the influence of nonspecific damaging factors leads to damage to lung tissue [33].

A number of researchers have noted the involvement of the nervous system in the process of inflammation in the lungs [28,36]. There is no doubt that the inflammatory process affects the nervous system, as well as the involvement of the nervous system in the pathogenesis of inflammation. According to a number of experts, the

involvement of the autonomic nervous system as a secondary mechanism in the course of pneumonia is observed. [28,33]

Second, the violation of the autonomic supply, by its nature, leads to changes in the cardiorespiratory system, changes in bronchial and vascular tone, vascular wall permeability, microcirculatory disorders, increased bronchial obstruction, which affects the course and outcome of pneumonia .

Including Fisher A. M., (2005) Gavrilovs O.V. [9] analyzed the patterns of autonomic nervous system effects in pneumonia and the relationship between the severity of pneumonia, its duration, and the risk of developing complications and individual indicators of vegetative status.

Tatochenko V.K. [30] and several researchers have noted that failure to correct the pathological process in a timely manner can lead to the development of complications and prolong the course of the disease and the recovery process.

Molchanov N.S. (1965) suggest that impaired ANS function causes trophic changes in lung tissue and also leads to reactions in the small circulatory system.

Nyankovskiy S.L. and co-authors [28,29] showed that intoxication, asthenic syndrome, and autonomic disorders persisted for a long time in children with acute pneumonia outside the hospital.

Conclusion: The results thus obtained suggest that the study of autonomic dysfunction in young children with pneumonia is important. This is because autonomic dysfunction can lead to disease progression, severity, and complications. This requires the consideration of autonomic disorders in the complex treatment of pneumonia.

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