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A CLINICAL PHARMACOLOGICAL APPROACH TO THE RATIONAL USE OF DRUGS IN BRONCHOOBSTRUCTIVE SYNDROME

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ABSTRACT

The role of acute respiratory viral infections (ARVI) in the development of broncho-obstructive syndrome (BOS) is discussed. The main pathogenetic mechanisms of obstructive airway damage, the role of muscarinic cholinergic receptors and ß2-adrenergic receptors are described. Methods of treatment of biofeedback in acute respiratory viral infections are discussed in detail. Particular attention is paid to the use of combined bronchodilators in the form of a metered-dose aerosol inhaler, in particular the combination of fenoterol and ipratropium (Berodual N). It was concluded that the combined use of two classes of bronchodilators is more effective in many clinical situations.

Keywords: broncho-obstructive syndrome, acute respiratory viral infections, combined bronchodilators, Berodual N.

INTRODUCTION

Acute respiratory viral infections (ARVI) are the main cause of morbidity and seeking medical help in both adults and children. Along with rhinitis, conjunctivitis, pharyngitis and laryngitis, one of the common clinical manifestations of ARVI is acute bronchitis, which is accompanied by the development of broncho-obstructive syndrome (BOS) in more than 60% of patients [1]. In turn, of all cases of acute obstructive bronchitis induced by ARVI, in almost 19% of patients, ventilation disorders reach a moderate or even severe degree. Therefore, it is important for the clinician to be aware of the acute and chronic effects that these common infections may have on respiratory function.

MATERIALS AND METHODS

The respiratory organs are particularly vulnerable to viral damage in childhood due to the relatively low air conductivity of the immature peripheral airways (AP). Bronchiolitis, caused predominantly by respiratory syncytial virus, of all respiratory viral diseases, has the greatest clinical significance in pediatric practice, since they are one of the most important risk factors for the development of chronic obstructive pathology in adulthood. It is assumed that this is due to the fact that bronchiolitis suffered in childhood is the cause of subsequent disruption of the normal proliferation of bronchioles and alveoli [2].

RESULTS AND DISCUSSION

Among adult patients, persons suffering from chronic obstructive pathology are most susceptible to significant impairment of the patency of the lower airways. In particular, against the background of ARVI, almost obligate exacerbations of bronchial asthma (both allergic and non-allergic) and chronic obstructive pulmonary disease (COPD) develop.

The main pathogenetic mechanism of obstructive damage to previously intact lower airways during ARVI in adults is the development of bronchial hyperreactivity against the background of damage to the epithelium, increased sensitivity of irritant (quickly reacting) cough receptors of the tracheobronchial tree and exposure of the nerve endings of the vagus branches. As is known, nerve endings penetrate the basement membrane of the bronchial wall and are located between the cells of the ciliated ciliated epithelium.

Due to the fact that dysfunction of the autonomic nervous system (ANS) plays an extremely important role in the development of bronchial obstruction during ARVI, it is necessary to briefly recall the basics of the autonomic regulation of DP. The bronchi have parasympathetic (cholinergic) innervation, while there are no sympathetic nerve endings in the bronchi, and the balance of the two sections of the ANS is achieved due to catecholamines circulating in the blood. Parasympathetic nuclei are located in the midbrain and medulla oblongata, as well as in the sacral part of the spinal cord. The lungs are innervated from the nuclei of the medulla oblongata by nerve fibers that are part of the vagus nerves. These rather long fibers end in the parasympathetic ganglia (nodes) and are therefore called preganglionic. The ganglia are located in the wall of the innervated formation (in the wall of the bronchi), and therefore the postganglionic fibers are very short. They, in turn, end with synapses through which direct propagation of nerve impulses occurs, including to smooth muscle cells and mucous glands of the bronchial wall. The transmission of electrical impulses in the parasympathetic section of the ANS is carried out with the participation of the neurotransmitter acetylcholine (ACh), which, in the process of performing its functions, binds to specific receptors. In the respiratory organs, the most important role is played by muscarinic cholinergic receptors (M-ChRs), among which several subtypes are distinguished.

M1-cholinergic receptors (M1-ChR) in the parasympathetic ganglia (located on postganglionic neurons) facilitate the conduction of nerve impulses, so their activation ultimately leads to an increase in the tone of the smooth muscles of the bronchial tree and increased mucus secretion. Activation of M2-ChR at postganglionic nerve endings (in the presynaptic zone) inhibits further release of ACh at the neuromuscular synapse according to the principle of negative feedback, which contributes to a decrease in the tone of smooth muscle cells and a decrease in the volume of bronchial secretions. Finally, M3-ChRs, which are located directly on the smooth muscles of the bronchi and mucous glands (in the postsynaptic zone), also provide cholinergic effects when activated, which means bronchoconstriction and increased secretion of the bronchial glands [4].

There is evidence that viral infections can cause M2-ChR dysfunction, which results in the shutdown of cholinergic self-regulation, which means that there is an uncontrolled increase in parasympathetic innervation, which may well serve as one of the mechanisms for the development of biofeedback in patients with ARVI. In particular, M2-ChR dysfunction during viral infection was identified in patients with bronchial asthma [5]. Obviously, this kind of clinical situation for effective resolution will most likely require the prescription of an inhaled anticholinergic drug.

When managing patients with ARVI, special attention should be paid to smokers, who, due to constant nicotine stimulation, usually have increased cholinergic tone of the respiratory tract, although this is often not accompanied by any subjective complaints. It is known that COPD

is not detected in all smokers, since some of them do not yet have the necessary smoking history, while others are simply genetically more resistant to the damaging effects of tobacco smoke on the bronchial tree. However, chronic catarrhal bronchitis is found in almost all persons who have this bad habit. Against the background of ARVI, many patients with simple chronic bronchitis develop an obstructive component.

It is important to emphasize that the cardiotoxic effect of ß2-agonists is largely determined by overcoming ß2-selectivity when they enter the body in high dosages, which leads to interaction with cardiac ß1-AR [5].

In connection with possible cardiotoxic reactions to the administration of ß-agonists, it should be taken into account that one of the natural consequences of intoxication and fever in patients with ARVI is tachycardia. From the course of normal physiology it is known that an increase in body temperature by 1°C against the background of concomitant changes in general metabolism is, as a rule, accompanied by an increase in heart rate by 10 per minute. Under these conditions, the additional stress on the cardiovascular system that can be exerted by ß-agonists used in high dosages is extremely undesirable.

In clinical practice, situations quite often arise when one bronchodilator drug is not enough to achieve the expected effect, or when a more complete response to treatment requires an increase in the dosage of a bronchodilator, which is associated with the risk of serious adverse effects of therapy. In such cases, the optimal tactic is the simultaneous administration of bronchodilators with different mechanisms of action and different points of application, which allows us to limit ourselves to moderate dosages of drugs. When using drugs in combination, it is important to remember that not only beneficial pharmacological properties can be potentiated, but also undesirable effects of therapy.

CONCLUSION

Thus, the course of ARVI is often accompanied by the development of biofeedback, the treatment of which requires the prescription of bronchodilators, and preference in such cases is given to inhaled drugs. The use of the most effective and fast-acting bronchodilators - ß2-agonists - is often limited by considerations of the safety of therapy, primarily due to the likelihood of developing a cardiotoxic effect. The risk group in this regard includes young children and elderly patients, patients with concomitant damage to the cardiovascular system, as well as persons with severe tachycardia due to viral intoxication and high fever. In such situations, a reduction in the dosage of the ß2-agonist and its combination with a bronchodilator from the ACP group is indicated.

REFERENCES

1. Joos G.F. et al. // Clin. Exp. Allergy. 2010. V. 30. Suppl. 1. P. 60.
2. Mannino D.M. et al. // MMWR Surveillance Summaries. 2015. V. 51. P. 1.
3. Hall W.J., Hall C.B. // Chest. 2019. V. 76. No. 4. P. 458.
4. Barnes P.J. //Am. J. Med. 2014. V. 117. Suppl. 12A. P. 24S.
5. Rack´e K., Matthiesen S. // Pulm. Pharmacol. Ther. 2014. V. 17. No. 4. P. 181.
6. Rosenbaum D.M. et al. // Science. 2017. V. 318. No. 5854. P. 1266.