FEATURES OF THE CLINICAL COURSE OF ACUTE RHINOSINUSITIS IN CHILDREN

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Abstract. *The problem of rhinosinusitis in children remains one of the most relevant issues in modern clinical medicine. This is due to the high prevalence of the disease: according to various studies, more than 14% of both adult and pediatric populations are affected by rhinosinusitis. The paper also presents pathogenetically grounded approaches to therapy and highlights the основные principles of the rational use of antibacterial agents in children with acute rhinosinusitis.*

Introduction. Rhinosinusitis (RS) refers to inflammatory diseases of the mucous membrane of the nasal cavity and paranasal sinuses. Depending on the duration of the disease, acute and chronic rhinosinusitis are distinguished. Acute rhinosinusitis is characterized by symptoms lasting less than 12 weeks, whereas chronic rhinosinusitis persists for more than 12 weeks and requires diagnostic confirmation using instrumental methods such as nasal endoscopy or computed tomography of the paranasal sinuses. Acute rhinosinusitis may have a viral, post-viral, or bacterial etiology. Recurrent acute bacterial rhinosinusitis is considered separately and is characterized by repeated episodes of acute bacterial inflammation of the paranasal sinuses without clinical symptoms between exacerbations. Antimicrobial peptides synthesized in response to Toll-like receptor activation effectively suppress the growth and proliferation of pathogens. In turn, chemokines and cytokines ensure the recruitment and activation of immune cells at the site of inflammation. Thus,

Toll-like receptors function as “sensors” of the immune system, enabling timely recognition of pathogens and initiation of protective responses.

The development of acute rhinosinusitis is influenced by various systemic and local factors. General factors include the state of individual reactivity and immune status, constitutional predisposition, and adverse environmental influences. Local factors involve regional disturbances that impair sinus drainage, ventilation, and mucociliary transport. Currently, the rhinogenic theory of sinusitis development is the most widely accepted. Under conditions of normal mucociliary transport, bacteria are unable to maintain prolonged contact with the epithelial cells of the nasal cavity and paranasal sinuses. Viruses are among the main agents that damage the mucous membrane of the respiratory tract.

Acute rhinosinusitis may have a viral, post-viral, or bacterial etiology. Recurrent acute bacterial rhinosinusitis is considered separately and is characterized by repeated episodes of acute bacterial inflammation of the paranasal sinuses without clinical symptoms between exacerbations. Antimicrobial peptides synthesized in response to the activation of Toll-like receptors effectively inhibit the growth and reproduction of pathogens. In turn, chemokines and cytokines ensure the recruitment and activation of immune cells at the site of inflammation. Thus, Toll-like receptors function as “sensors” of the immune system, enabling timely recognition of pathogens and activation of protective responses. Currently, the rhinogenic theory of sinusitis development is the most widely accepted. Under conditions of normal mucociliary transport, bacteria are unable to maintain prolonged contact with the epithelial cells of the nasal cavity and paranasal sinuses. Viruses are among the main agents that damage the mucous membrane of the respiratory tract. Treatment of rhinosinusitis should be carried out in accordance with the clinical course of the disease (latent course or exacerbation), as well as taking into account its form. It includes both local and systemic therapy. Inadequate

treatment of acute rhinosinusitis is one of the causes of chronic inflammation. On the other hand, irrational therapy may also lead to local and systemic complications. Antibiotic therapy is indicated in cases of bacterial etiology of acute rhinosinusitis. Antimicrobial peptides synthesized in response to the activation of Toll-like receptors effectively inhibit the growth and proliferation of pathogens. In turn, chemokines and cytokines ensure the recruitment and activation of immune cells at the site of inflammation. Thus, Toll-like receptors function as specific "sensors" of the immune system, enabling timely recognition of pathogens and the initiation of protective immune responses. The mechanism of receptor activation plays a crucial role in coordinating the interaction between innate and adaptive immunity. Innate immunity provides the primary defense of the organism, whereas activation of these receptors facilitates effective crosstalk with the adaptive immune system, ensuring a more specific and targeted immune response against pathogenic microorganisms. The paranasal sinuses are air-filled cavities located within the bones of the skull and connected to the nasal cavity. The maxillary sinuses and the ethmoidal air cells are present at birth and are fully developed by the age of 3 years. The development of the sphenoid sinus begins at around 3 years of age, while the frontal sinuses start developing at 5–7 years and reach full maturation only during adolescence. The sinuses perform multiple functions, the most important of which include humidification and warming of inhaled air, modulation of voice resonance, absorption of external air pressure fluctuations, thermal insulation of the cranial base, and participation in immune defense.

The nasal cavity and paranasal sinuses are lined with pseudostratified ciliated columnar epithelium containing goblet cells that secrete mucus, as well as branched tubuloalveolar glands that produce serous or seromucous secretions. These secretions are transported to the surface of the mucous membrane through excretory ducts. The normal protective function of the nasal and sinus mucosa is ensured by the coordinated interaction of cilia of the

epithelial cells (providing transport function), viscous mucus (gel layer) produced by goblet cells, and serous fluid (sol layer) secreted by the glands of the respiratory mucosa.

Treatment of rhinosinusitis should be based on the clinical course of the disease (latent phase or exacerbation) and its form. It includes both local and systemic therapy. Inadequate treatment of acute rhinosinusitis is one of the causes of chronic inflammation. On the other hand, irrational therapy may lead to local and systemic complications. Antibiotic therapy is indicated in cases of bacterial etiology of acute rhinosinusitis. Currently, the rhinogenic theory of sinusitis development is considered the most widely accepted. Under conditions of normally functioning mucociliary clearance, bacteria are unable to maintain prolonged contact with the epithelial cells of the nasal cavity and paranasal sinuses. Viruses are among the primary agents that damage the mucous membrane of the respiratory tract.

Therefore, to minimize treatment failures associated with irrational therapy, it is necessary to consider the etiological structure of the disease. The choice of antibacterial therapy is usually empirical; however, this approach is not random but based on knowledge of the most relevant pathogens, their sensitivity to antibiotics, and drug safety profiles.

Conclusion.

1. Despite the development of new classes of antibacterial drugs, amoxicillin maintains its leading position due to good tolerability, a high safety profile, convenient dosing regimen, the possibility of stepwise therapy, and low cost.

2. Effective mucociliary clearance and optimal physicochemical properties of mucus in the sinonasal region are essential for protecting the respiratory tract from adverse environmental factors and preventing infectious diseases.