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КОМПЛЕКСНЫЙ ПОДХОД К ТЕРАПИИ ВОСПАЛИТЕЛЬНЫХ ПРОЦЕССОВ В ЧЕЛЮСТНО-ЛИЦЕВОЙ ОБЛАСТИ

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✓ ***Резюме***

Воспалительные процессы в челюстно-лицевой области представляют собой одну из наиболее сложных и многогранных проблем современной стоматологии и челюстно-лицевой хирургии. Анатомо-топографические особенности данной области, включающей структуры различного эмбрионального происхождения, богатую васкуляризацию и иннервацию, множественные межтканевые пространства и тесную взаимосвязь с жизненно важными органами, обусловливают специфику течения воспалительных заболеваний и требуют особых подходов к их диагностике и лечению.

Ключевые слова: Одонтогенные оститы, остеомиелит челюстей, профилактика, лечение, антибактериальная терапия, хирургическое лечение, микробиологическая диагностика

ЮЗ-ЖАҒ СОҲАСИДАГИ ЯЛЛИҒЛАНИШ ЖАРАЁНЛАРИНИ ДАВОЛАШГА КОМПЛЕКС ЁНДАШУВ

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✓ ***Резюме***

Юз-жағ соҳасидаги яллиғланиш жараёнлари замонавий стоматология ва юз-жағ жарроҳлигининг энг мураккаб ва кўп қиррали муаммоларидан биридир. Ушбу соҳанинг анатомик ва топографик хусусиятлари, турли хил эмбрионал тузилмалар, бой васкуляризация ва иннервация, кўплаб тўқималараро бўшлиқлар ва ҳаётий муҳим органлар билан чамбарчас боғлиқлиги яллиғланиш касалликларининг ўзига хос кечишини белгилайди ва уларни ташхислаш ва даволашда алоҳида ёндашувларни талаб қилади.

Калит сўзлар: Одонтоген остит, жағ остеомиелитлари, профилактика, даволаш, антибактериал терапия, жарроҳлик даволаш, микробиологик диагностика

COMPREHENSIVE APPROACH TO THE TREATMENT OF INFLAMMATORY PROCESSES IN THE MAXILLOFACIAL REGION

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✓ ***Resume***

Inflammatory processes in the maxillofacial region represent one of the most complex and multifaceted problems of modern dentistry and maxillofacial surgery. The anatomical and topographical features of this area, which includes structures of various embryonic origins, rich vascularization and innervation, numerous interstitial spaces, and close interaction with vital organs, determine the specific course of inflammatory diseases and require special approaches to their diagnosis and treatment.

Key words: Odontogenic ostitis, osteomyelitis of the jaws, prevention, treatment, antibacterial therapy, surgical treatment, microbiological diagnostics

Relevance

The modern understanding of the etiopathogenesis of odontogenic osteitis of the jaw bones has undergone significant changes in recent decades. If previously these diseases were considered primarily through the prism of classical infectious and inflammatory processes, now they are recognized as pathological conditions of a complex multifactorial nature, including microbiological, immunological, genetic, and anatomical-physiological components [1].

Odontogenic osteitis in adults and children represents a heterogeneous group of inflammatory diseases of the jaw bone tissue characterized by progressive damage to the cortical and spongy bones, which can significantly affect the quality of life of patients, the function of the chewing apparatus, and social functioning. According to epidemiological studies, the frequency of odontogenic osteomyelitis varies within 0.8-2.1 per 100,000 population, with jaw osteomyelitis accounting for up to 90% of all facial skeletal osteomyelitis cases. Despite the apparent "benignity" of the course in some cases, the severity of symptoms, the frequent development of complications in the form of pathological fractures, the formation of fistula pathways, and the development of sepsis create a significant clinical and social burden[2].

Over the past two decades, the understanding of the etiopathogenesis of odontogenic osteitis has significantly deepened and shifted from predominantly mechanical explanations to a multifactorial model that integrates the microbiological component, features of local and systemic immune response, genetic predisposition to the development of inflammatory diseases, as well as anatomical and physiological features of blood supply and innervation of the jaw bones. The results of molecular-biological and immunohistochemical studies confirm the role of pro- and anti-inflammatory cytokine imbalance, disorders in the complement system, and congenital immunity in the pathogenesis of bone destruction. Simultaneously, interest in studying the role of biofilm-forming microorganisms, including resistant strains of staphylococci, streptococci, and anaerobic flora, has increased, necessitating a review of approaches to antibacterial therapy. The concept of persistent inflammation, supported by microbial films and disruption of bone tissue repair processes, explains the chronicity of the process and resistance to standard therapy in some patients[3].

The clinical heterogeneity of odontogenic osteitis (variability of onset age, localization of the process, dynamics of symptoms, and spectrum of complications) makes the tasks of early risk stratification and prognosis, as well as the development of personalized treatment strategies, relevant. In this regard, the role of integrating clinical, laboratory, microbiological, and visualization biomarkers is increasing for

more accurate patient phenotyping, predicting disease progression, selecting optimal therapy, and monitoring treatment effectiveness [4].

The purpose of this review is to systematize modern data on the clinical, microbiological, and pathogenetic characteristics of odontogenic osteitis of the jaw bones, to discuss their prognostic significance and practical impact on the choice and optimization of therapy in the paradigm of personalized medicine.

The review is aimed at forming a holistic model linking biological mechanisms with clinical solutions, which can contribute to improving short-term and long-term outcomes in patients with odontogenic osteitis. The microbiological aspect of odontogenic ostitis attracts special attention from researchers. Modern studies demonstrate the polymicrobial nature of the infectious process with the predominance of anaerobic microorganisms (60-80% of cases), which indicates a significant contribution of the conditionally pathogenic flora to the development of the disease. However, the complexity of the microbial architecture of odontogenic foci, including both aerobic and obligate-anaerobic mechanisms, makes the identification of specific microbial markers and their clinical application a complex task [5].

The immunological component of the pathogenesis of osteitis gained recognition after isolating a subgroup of patients with disorders in the congenital and adaptive immune systems. This concept suggests that in genetically predisposed individuals, microbial invasion can trigger an excessive inflammatory response directed against bone structures, leading to the development of osteonecrosis and sequestration[6].

The relevance of studying the clinical, immunological, and microbiological aspects of odontogenic osteitis is due to the need to develop personalized approaches to diagnosis, prognosis, and treatment. Understanding the molecular mechanisms of osteitis development opens up opportunities for targeted therapeutic strategies and improvement of long-term outcomes in patients with odontogenic osteitis. The microbiological basis of odontogenic osteitis is confirmed by studies showing the isolation of pathogenic flora from lesions in 85-95% of cases. The most common pathogens are α-hemolytic streptococci, peptostreptococci, bacteroids, превotele, and fusobacteria. Particular attention is paid to methicillin-resistant staphylococci (MRSA) and β-lactamase producers, the frequency of which increases [7].

Modern microbiological studies have identified several key pathogens associated with odontogenic osteitis. Particular attention is paid to genes encoding virulence factors (adhesions, invasions, toxins), the "quorum sensing" system, and the formation of biofilm. Polymorphisms in genes controlling these processes can affect the severity of the infectious process and resistance to therapy. Large-scale metagenome studies have revealed new microbial associations, including the role of Porphyromonas gingivalis, Tannerella forsythia, and Treponema denticola. These findings expand the understanding of molecular pathways involved in odontogenic ostitis and indicate the role of microbial interaction processes, biofilm formation, and immune response modulation. The concept of immunopathogenesis, proposed by modern researchers, suggests an autoimmune mechanism for the development of osteitis in some patients. According to this hypothesis, microbial antigens can imitate bone matrix proteins, leading to the production of cross-reacting antibodies and the development of inflammation in bone tissue [8].

Immunological studies in patients with odontogenic osteitis reveal elevated levels of antibodies to microbial antigens, as well as autoantibodies to bone tissue components (antibodies to type I collagen, osteocalcin, bone morphogenetic protein). Increased concentrations of pro-inflammatory cytokines (IL-1β, TNF-α, IL-6) in blood serum and tissue fluid maintain the role of neural inflammation in the pathogenesis of osteodestructive processes. Recent studies have expanded the understanding of immunopathogenesis by including a wider range of congenital and adaptive immunity disorders, which include various genetic and acquired risk factors for an excess inflammatory response [1].

Odontogenic osteitis exhibits significant clinical heterogeneity, complicating the prognosis of the disease. Identifying clinical subtypes based on the age of onset of the disease, the characteristics of the inflammatory process, concomitant diseases, and family history can contribute to a more accurate prognosis. Acute onset of the disease (with pronounced intoxication), predominance of osteolytic changes, absence of concomitant immunodeficiency conditions, and a negative history of systemic diseases are associated with a more favorable prognosis. On the contrary, subacute onset, pronounced sclerotic changes in the bones, concomitant diabetes mellitus, and immunodeficiency conditions predict a persistent course [2].

Understanding the microbiological and immunological mechanisms of odontogenic osteitis allows for the development of personalized therapeutic strategies. Pharmacogenetic studies demonstrate the influence of CYP450 gene polymorphisms, drug transporters, and receptors on the effectiveness and tolerance of antibacterial drugs traditionally used to treat ostitis. In patients with immunocompromised forms of osteitis, immunomodulatory approaches, including the use of biological drugs, pro-inflammatory cytokine inhibitors, and immunosuppressants, can be effective. However, these methods require careful patient selection and safety monitoring [3].

Conclusions

Modern data confirm the complex etiopathogenesis of odontogenic osteitis of the jaw bones, including microbiological factors, immunological disorders, and genetic predispositions, which requires a comprehensive multidisciplinary approach to diagnosis and treatment. Odontogenic osteitis is characterized by significant microbiological heterogeneity involving multiple pathogens that affect the processes of film formation, antibiotic resistance, and immune response modulation. Identifying specific microbial markers has prognostic significance for choosing the appropriate therapy. A significant portion of patients with odontogenic osteitis exhibit signs of immune response disorders, including increased levels of pro-inflammatory cytokines and autoantibodies, which supports the concept of immunocompromised inflammation and justifies the use of immunomodulatory approaches in selected patients. The integration of clinical data (age of onset, course characteristics, concomitant diseases) with microbiological markers and immunological indicators can improve disease progression prognosis and optimize therapeutic strategies. The pharmacogenetic findings open up prospects for individualized antibacterial therapy of odontogenic osteitis, potentially increasing treatment effectiveness and reducing the frequency of adverse effects. Further research is needed to validate microbiological and immunological biomarkers, develop standardized diagnostic and treatment protocols for various subtypes of ostitis, and evaluate the long-term effectiveness of personalized therapeutic approaches.

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