

Comprehensive Treatment of Odontogenic Ostites of the Jaw Bones with Increased Effectiveness

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Abstract: Odontogenic osteomyelitis of the jaw bones represents one of the most complex and socially significant problems of modern maxillofacial surgery and dentistry. According to various authors, odontogenic infection accounts for 70-85% of all inflammatory diseases of the maxillofacial region, while osteomyelitis lesions account for 15-20% of the total number of odontogenic inflammatory processes.

Keywords: Odontogenic osteitis, jaw osteomyelitis, prevention, treatment, antibacterial therapy, surgical treatment, microbiological diagnostics.

Introduction. The relevance of the problem is due not only to the high prevalence of this pathology but also to significant difficulties in diagnosis and treatment, especially in chronic forms of the disease. Current trends are characterized by an increase in the number of atypical forms of osteomyelitis progression, an increase in the resistance of pathogenic microflora to antibacterial therapy, as well as an increase in the development of complications, including sepsis and mediastinitis. Traditional approaches to the treatment of odontogenic osteitis are based on a combination of surgical intervention (removal of the causative tooth, opening and drainage of purulent foci, sequestrectomy) and conservative therapy (antibiotic therapy, detoxification and anti-inflammatory therapy). However, the effectiveness of standard treatment is not always sufficient, which is manifested in the high frequency of relapses (15-25%), the development of chronic forms of the disease (30-40% of cases), and the formation of persistent functional and aesthetic disorders. The modern understanding of the etiopathogenesis of odontogenic osteitis of the jaw bones has undergone significant changes in recent decades. While previously these diseases were viewed primarily through the lens of classical infectious-inflammatory processes, now they are recognized as pathological conditions of a complex multifactorial nature, encompassing microbiological, immunological, genetic, and anatomical-physiological components. The main factors reducing the effectiveness of traditional treatment are: incomplete elimination of the infectious agent from bone tissue, insufficient vascularization of the affected area, disorders of local and systemic immunity, the formation of biofilm of resistant microflora, as well as inadequate assessment of the prevalence of the pathological process at the preoperative stage. In recent years, significant attention has been paid to the development of new approaches to treating osteomyelitis, including the use of modern antiseptic drugs of prolonged action, osteoinductive materials, physiotherapeutic methods, as well as personalized antibacterial therapy regimens based on the determination of microflora sensitivity and pharmacokinetic features of drugs. A promising area is the development of comprehensive treatment protocols that integrate modern surgical techniques with innovative conservative treatment methods, including the use of osteoplastic materials, local antibiotic therapy, immunomodulatory therapy, and methods for stimulating reparative processes in bone tissue. An important aspect of improving treatment effectiveness is the optimization of diagnostic approaches using modern imaging methods (LCT, MRI, radionuclide studies), laboratory markers of inflammation and infection, as well as molecular genetic methods for identifying pathogens and determining their resistance to antibacterial drugs. Odontogenic osteitis of the jaw bones is a

serious problem in dentistry and maxillofacial surgery, as it can lead to significant functional and aesthetic disorders. According to various studies, odontogenic osteitis accounts for a significant portion of all acute inflammatory diseases of the maxillofacial region, which emphasizes the importance of their timely diagnosis and effective treatment. Despite achievements in the development of dentistry and surgery, the problem of odontogenic spines remains relevant, which is associated with frequent cases of neglect and the development of complications such as abscesses and osteomyelitis[5]. Especially concerning are the cases of dental structure-related osteitis, which not only creates obstacles to the normal functioning of the maxillofacial system but also significantly deteriorates the quality of life of patients due to pain syndrome and aesthetic disturbances. In recent years, there has been an increase in the number of cases of odontogenic osteitis associated with the deterioration of the dental health of the population and various risk factors, such as immune disorders, vitamin deficiency, and non-compliance with hygiene standards[6]. Modern diagnostic methods, including the integration of molecular genetic technologies and advanced radiological imaging methods, are opening new horizons for improving the effectiveness of detecting and treating odontogenic osteitis. However, to this day, insufficient attention is paid to the strategy of prevention and first aid in outpatient practice, which can lead to the progression of diseases and the development of severe complications[7]. This work presents a comprehensive analysis of modern methods for the prevention and treatment of odontogenic osteitis of the jaw bones, emphasizing the need to integrate a multidisciplinary approach, including dentists, maxillofacial surgeons, and therapists[8]. The study systematizes current data on the pathogenesis of odontogenic osteitis, its clinical manifestations, and treatment methods. Modern diagnostic approaches, including the combination of clinical and laboratory methods, are considered. An algorithm for managing patients at different stages of treatment is also proposed, which includes both preventive measures and the principles of surgical intervention in complications. Based on the analysis conducted, practical recommendations were formulated for improving the effectiveness of prevention and treatment of odontogenic osteitis, as well as promising areas for further research in this area. From a dental perspective, the health of patients with odontogenic osteitis is subject to numerous negative factors, as the infectious process can significantly disrupt mineral metabolism and the condition of oral tissues. Therefore, it is important to consider that these conditions can exacerbate and worsen the course of the underlying disease.

A multidisciplinary approach, combining the actions of dentists and surgeons, represents the most promising way to optimize treatment. Comprehensive assessment of the dental status, regular preventive measures, and oral sanitation should be the basis for combating odontogenic osteitis.

This work is aimed at systematizing modern scientific data on the prevention and treatment of odontogenic osteitis of the jaw bones, as well as developing an algorithm for an interdisciplinary approach to patient management. The presented analysis has not only theoretical significance for deepening understanding of the clinical and pathogenetic mechanisms of odontogenic osteitis but also practical value, offering specific recommendations for optimizing preventive and therapeutic measures [1]. Odontogenic osteitis in adults and children represents a heterogeneous group of inflammatory diseases of the jaw bone tissue characterized by progressive lesions of 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 seemingly "benign" 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].

In the period from 2023 to 2025, a study was conducted at the Department of Oral Surgery and Maxillofacial Surgery of the Tashkent State Dental Institute, aimed at studying and improving the prevention and treatment of odontogenic osteitis of the jaw bones.

The study involved 80 patients of both sexes. The patients were divided into two groups. The first group included 42 individuals without odontogenic osteitis, including 20 men and 22 women. The average age of this group was 34 years. This group served as a control group for assessing clinical and serological parameters.

The second group included 38 patients with odontogenic osteitis of the jaw bones, including 18 men and 20 women. The average age of participants in this group was 35 years. Among the subjects under study were patients with various forms of odontogenic osteitis, including osteitis caused by complications after dental treatment, as well as other cases associated with the ineffectiveness of the ongoing therapy.

Each patient underwent comprehensive examination, including clinical trials, maxillofacial radiography, and laboratory tests. Based on the data obtained, an assessment of their dental health status and the effectiveness of the treatment methods used was conducted. Treatment and prevention recommendations based on evidence-based medicine principles were developed individually for all patients.

Particular attention was paid to risk factors contributing to the development of odontogenic osteitis, such as the presence of chronic diseases, immunodeficiency, poor oral hygiene, as well as individual characteristics of the body. The study is aimed at improving the effectiveness of diagnostics and measures for the treatment and prevention of odontogenic osteitis in order to improve the quality of life of patients and reduce the risk of disease recurrence.

Research results. Odontogenic osteitis of the jaw bones is a serious medical problem characterized by inflammatory processes caused by infections originating from teeth and perioral tissues. The clinical picture of these diseases is diverse and can vary significantly depending on the severity of the infection, its location, and the patient's individual characteristics. However, the absence of pathognomonic symptoms often leads to difficulties in diagnosing odontogenic osteitis.

When assessing the clinical picture of odontogenic osteitis, several key aspects should be considered:

1. Patients' primary appeal to dentists: Many patients do not realize the seriousness of the disease and turn to dentists in late stages, which makes early diagnosis and treatment difficult.
2. Potential epidemiological hazard: Infectious processes can be transmitted through saliva, posing a risk to others.
3. Comprehensive approach to treatment: The necessity of using antibacterial therapy and surgical measures under specialist supervision.

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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