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CONTEMPORARY MODALITIES AND ADVANCED TECHNOLOGIAL APPROASHES IN THE COMPREHEVSIVE MANAGEMENT OF PERIODONTITS

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Abstract:

The article is devoted to the study of modern methods of treatment of inflammatory periodontal diseases. Inflammatory periodontal diseases are a modern problem in dentistry. Periodontitis is a complex nosological unit among periodontal diseases. The article describes the most frequently used and modern methods and means of treatment of periodontal diseases, as well as the use of LED technologies and ozone therapy for the treatment of inflammatory periodontal diseases. The article presents the modern aspects of conservative treatment of inflammatory periodontal diseases using ultrasound devices, including the apparatus "Vector", antibacterial and phytopreparations. They can be recommended for various forms of pathology or accompany other types of treatment (orthopedic and surgical). According to experts from the world health organization, people aged 35 to 50 years have a periodontal disease rate of 69-98%. Numerous and long-term studies of domestic and foreign authors have proved that the leading etiological factor in the development of periodontal tissue diseases are periodontal pathogenic bacteria. Most of the periodontal pathogenic bacteria are represented by anaerobes, which are highly adhesive, invasive and toxic. Effective treatment of patients with infectious and inflammatory periodontal diseases, as a rule, includes medicinal effects on periodontal pathogenic bacteria as the main etiological factor in the development of gingivitis and periodontitis by local and general use of antibiotics.

Keywords: LED technology, "Vector" periodontitis, antiseptics, antibiotics.

INTRODUCTION. In contemporary dental practice, periodontal diseases have emerged as some of the most widespread and clinically significant pathological conditions, characterized by their pervasive nature across all patient demographics. The alarming and rapid escalation in the prevalence of these disorders presents a multifaceted challenge to modern medicine. Such conditions are frequently associated with severe consequences, including the premature loss of multiple teeth, substantial impairment of masticatory efficiency, and the subsequent disruption of speech articulation. Beyond these localized clinical manifestations, periodontal diseases exert a profound systemic influence on the overall physiological state of the human body, leading to a demonstrable decline in the general quality of life for affected individuals. This broad spectrum of complications compels the medical community to recognize periodontology not merely as a localized sub-discipline, but as a critical and specialized branch of dental science. Consequently, this issue is no longer regarded strictly as a dental concern; it has evolved into a significant public health challenge with profound socio-economic implications.

Periodontitis is considered one of the most complex inflammatory diseases affecting the periodontal tissues and is classified as a distinct nosological entity. It is well-established that the management of periodontitis requires a comprehensive, multidisciplinary approach. This involves targeting primary etiological factors, addressing the complex pathogenetic mechanisms of the inflammatory process, and implementing effective symptomatic treatments. In patients suffering from this condition, the absence of early diagnostics and timely intervention can lead to the rapid destruction of periodontal structures and irreversible tooth loss within a relatively short period. While specific diagnostic markers exist, their clinical expression often varies significantly between individual patients, complicating the diagnostic process. When the disease is identified in its advanced stages, achieving successful therapeutic outcomes becomes an exceedingly difficult clinical task.

By definition, periodontitis (parodontitis) is an inflammatory condition of the supporting structures of

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the teeth, characterized by the progressive destruction of the alveolar bone and the periodontal ligament [1, 2]. These pathologies are classified based on several criteria: their distribution (localized or generalized); the clinical phase (acute, chronic, exacerbation, including abscess formation, or remission); and the degree of severity (mild, moderate, or severe). The primary clinical criteria for determining the severity of periodontitis include the depth of periodontal pockets, the extent of alveolar bone resorption, and the degree of pathological tooth mobility.

Epidemiologically, periodontitis is most frequently diagnosed in patients between the ages of 30 and 40. The clinical progression is often characterized by a history of gingival bleeding over several years, followed by episodes of acute pain, increased tooth mobility, and functional impairment of the dentition. Localized periodontitis is typically triggered by specific local factors, such as mechanical irritation from overhanging filling materials, poorly fitted orthopedic or orthodontic structures, or the chemical effects of toxic substances (e.g., arsenic paste, formaldehyde). Physical trauma and post-traumatic bone osteolysis also play a significant role in localized tissue destruction.

The prognosis for localized periodontitis is generally favorable, provided that the irritating factor is identified and removed, followed by an adequate course of therapy. Conversely, chronic periodontitis results from a combination of local and systemic factors. This process usually originates as gingivitis and subsequently spreads from the gingival margin into the deeper supporting tissues [3, 4].

In the initial stages of treatment, the high-quality instrumental removal of dental deposits, combined with meticulous root surface scaling and planning, is of paramount importance. Currently, periodontology utilizes a diverse array of advanced techniques and specialized instrumentation designed to effectively eliminate dental plaque and calculus to facilitate tissue regeneration [5].

Depending on the underlying mechanism of ultrasonic (US) wave generation, modern scaling devices are primarily categorized into magnetostrictive and piezoelectric systems. The operational dynamics of the magnetostrictive scaler (MS) are distinguished by the ellipsoidal trajectory of the working tip. This specific motion pattern is designed to minimize traumatic impact on the hard dental tissues, ensuring a more conservative approach during debridement. However, a characteristic feature of magnetostrictive technology is the rapid and significant heat generation within the nozzle, which consequently necessitates a constant flow of water for cooling and irrigation. Despite this thermal aspect, the technology allows for exceptionally delicate maneuvers that preserve the integrity of restorative structures and exert a gentle influence when in contact with soft periodontal tissues. Consequently, this modality facilitates a professional hygiene procedure that is virtually painless and provides a high level of comfort for the patient. Thus, in contemporary clinical practice, magnetostrictive ultrasonic technology is recognized as one of the least invasive methods for the effective removal of dental deposits.

One of the most critical factors in the progression of periodontal inflammation is the persistence of pathogenic microflora within the oral cavity. Achieving a stable normalization of the oral microbiome remains the primary objective of various pharmacological interventions. In the management of generalized chronic periodontitis, antibacterial agents are fundamentally categorized into two major groups [6, 7]:

1. **Antiseptics:** These are substances characterized by a broad, non-selective spectrum of activity. They function by inhibiting the proliferation of pathogenic microflora, primarily through the coagulation of microbial cellular proteins upon contact.
2. **Antibiotics:** These agents, which may be of natural or semi-synthetic origin, exert a direct and targeted antimicrobial effect on the specific pathogenic microorganisms responsible for triggering periodontal inflammation.

In recent years, the "Vector" system (Durr Dental, Germany) has been successfully integrated into the protocols for the prevention and treatment of periodontal diseases. This advanced apparatus is specifically engineered to eliminate subgingival biofilms, dental plaque, calculus, and bacterial endotoxins, thereby effectively neutralizing the primary triggers of periodontal breakdown. The "Vector" system is designed for the highly efficient debridement of periodontal pockets and the simultaneous polishing of root surfaces.

The core operational principle of this technology involves the synergistic use of ultrasonic energy and a specialized medicinal suspension containing hydroxyapatite crystals. Through the medium of a hydrodynamic jacket, the ultrasonic waves penetrate deep into the periodontal pocket, performing intensive and meticulous cleaning. This technological approach allows for a gentle yet highly effective polishing of the tooth surface. The clinical outcomes of such manipulations include the significant reduction of pain and gingival bleeding, alongside a measurable decrease in the depth of pathological pockets [8].

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Furthermore, a significant number of researchers emphasize that ozone therapy serves as a highly effective treatment modality for various diseases rooted in inflammatory syndromes of bacterial etiology. In this context, the integration of the "Vector" system with the use of distilled ozonated water represents a clinical advancement of substantial scientific and practical importance.

Another innovative approach in the management of periodontitis is "PRP therapy" (Platelet-Rich Plasma). This procedure involves the autologous injection of platelet-rich plasma derived from the patient's own blood into the periodontal tissues. The process entails venous blood collection followed by specialized centrifugation to isolate the liquid plasma fraction. The resulting concentrate is then administered along the mucogingival junction of the upper and lower jaws, typically in a course of 3–5 sessions with specific intervals to stimulate tissue regeneration [9].

In modern dentistry, there is an increasing shift toward minimally invasive techniques that yield profound therapeutic benefits. Phytotherapy (herbal medicine) is one such method, offering numerous advantages over traditional chemical pharmacological interventions, particularly regarding its biocompatibility and reduced systemic toxicity.

While ozone therapy has been utilized across various medical fields for decades, its systematic application in dentistry gained momentum in the mid-1990s. Ozone exhibits potent broad-spectrum antimicrobial properties, effectively neutralizing bacteria, viruses, fungi, and other pathogenic microflora. Remarkably, the antiseptic potency of pure ozone is estimated to be 300 times greater than that of chlorine. However, unlike many synthetic antiseptics, ozone does not exert cytotoxic or irritant effects on multicellular organisms due to their robust antioxidant defense systems. Therapeutic doses of ozone actually stimulate these antioxidant mechanisms and reduce the intensity of lipid peroxidation (LPO) [10].

Extensive research indicates that ozone therapy significantly enhances peripheral circulation and microcirculation through its vasodilatory effects. Additionally, some studies have noted its potential in increasing caries resistance. In cases of periodontal inflammatory disease, the efficacy of ozone therapy is directly correlated with the severity and stage of the inflammatory process; notably, the more advanced the periodontitis, the more pronounced the therapeutic impact. Patients treated with ozone therapy show remarkable improvements in periodontal indices. For instance, a significant reduction in gingival bleeding is often observed within just 1–2 days following the initial application of ozonated oil—a result that proves sustainable over the long term. Due to its high efficacy, natural origin, and absence of adverse side effects, medical ozone holds great promise for the future of dentistry.

Similarly, laser technology is revolutionizing the field by providing dentists with a vast array of minimally invasive and virtually painless procedures. Lasers ensure sterile conditions, meeting the highest clinical standards for patient safety [11, 12]. The advantages of lasers are well-documented: they offer bloodless surgical sites due to their precise hemostatic effect on blood vessels, which significantly accelerates the post-operative healing phase. The reduced need for local anesthesia and the absence of undesirable side effects creates a far more comfortable experience for both the clinician and the patient [13]. Furthermore, the evolution of LED (Light Emitting Diode) technology—utilizing non-thermal, monochromatic, high-intensity light sources—is finding increasing application in contemporary dental protocols [14, 15].

CONCLUSION

The periodontium is a multifaceted and vital component of the human body that demands rigorous scientific study and a sophisticated clinical approach. The onset of clinical recovery and the duration of remission are highly individualized, depending on a constellation of factors: age, the presence of systemic somatic pathologies, the severity of the disease, localized aggravating factors, and the specific gingival biotype of the patient.

Modern research underscores that periodontal disease remains one of the most pressing challenges in contemporary dentistry. According to World Health Organization (WHO) experts, the prevalence of periodontal disorders among individuals aged 35 to 50 ranges from an alarming 69% to 98%. Numerous long-term studies by domestic and international authors confirm that the primary etiological drivers of periodontal tissue destruction are periodontopathic bacteria. The majority of these pathogens are anaerobic organisms characterized by high adhesion, invasiveness, and significant toxicity.

REFERENCES

1. Abduvakilov Zh.U., Rizaev Zh.A. [Features of the course of inflammatory periodontal diseases in metabolic syndrome]. *Visnyk problem biolohiyi i medytsyny*. 2018;1(2):353-355. (In Russ.)
2. Barer G.M. *Therapeutic Dentistry: textbook in 3 parts*. Moscow: GEOTAR-Media; 2008. Part 2: Periodontal Diseases. (In Russ.)

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3. Khetagurov S.K. [Functional state of the dentofacial system in individuals with primary arterial hypertension]. *Cand. Med. Sci. Diss.* Moscow; 2014. (In Russ.)
4. Guseynov T.S., Akhmedova E.A., Gasanova M.A., Khalilov M.A. [Medico-prophylactic features of periodontitis in patients with thyroid diseases]. *Journal of New Medical Technologies (Electronic Edition)*. 2019;(2). (In Russ.)
5. Musaev U.Yu., Rizaev Zh.A. [Clinico-biochemical evaluation of antioxidant efficacy in the therapy of patients with generalized periodontitis against the background of iron deficiency anemia]. *The Institute of Stomatology*. 2009;(3):42. (In Russ.)
6. Yashshen I.V., et al. [Molecular genetic method for diagnosing periodontitis]. *International Scientific and Practical Conference "World Science"*. 2017;5(6):48-51. (In Ukrainian/Russ.)
7. Dvorak V. [Use of ozone in dentistry]. *Novoe v stomatologii [New in Dentistry]*. 2010;(5):82-86. (In Russ.)
8. Bezrukova I.V., Grudyanov A.I. [The use of medical ozone in dentistry]. *Stomatologiya*. 2011;(2):61-63. (In Russ.)
9. Rizaev Zh.A., Rakhimova D.A., Zhumaev S.Yu. [Features of periodontal tissue lesions in patients with chronic obstructive pulmonary disease]. *Health, Demography, Ecology of Finno-Ugric Peoples*. 2020;(3):63-65. (In Russ.)
10. Rizaev Zh.A., et al. [Personalized therapy of generalized periodontitis based on an integrated assessment of clinical and laboratory parameters]. *Problems of Biology and Medicine*. 2021;(3):120. (In Russ.)
11. Sarkisov A.K., et al. [Inflammatory biomarkers in chronic generalized periodontitis against the background of bronchiectasis]. *Journal of New Medical Technologies*. 2020;(1):10-14. DOI: 10.24411/1609-2163-2020-16547.
12. Feshchenko I.F., Sysoev N.P., Bezrukov S.G. [Efficacy of non-pharmacological treatment methods for inflammatory periodontal diseases developed against the background of artificial dental restorations]. *Journal of New Medical Technologies*. 2018;(4):83-89. (In Russ.)
13. Yanushevich O.O., Dmitrieva L.A., Grudyanov A.I. *Periodontitis XXI Century. Guide for Physicians*. Moscow; 2014. (In Russ.)
14. Wolf H.F., Rateitschak E.M., Rateitschak K. *Periodontology*. Translated from German; edited by Prof. Barer. Moscow: MEDpress-inform; 2008.
15. Amirkhanyan A.N., Moskvin S.V. [Laser therapy in dentistry]. *Meditsinskiy Biznes [Medical Business]*. 2010;2(189):32-45. (In Russ.)
16. Khaybullina R.R., Gilmutdinova L.T., Gerasimova L.P. [Evaluation of the effectiveness of photodynamic therapy in patients with chronic generalized periodontitis]. *Health and Education in the XXI Century*. 2016;18(2):247-250. (In Russ.)
17. Orekhova L.Yu., Loboda E.S., Oboeva M.L. [Evaluating the effectiveness of complex treatment for chronic generalized periodontitis using the laser photodynamic system "PACT 200"]. *Russian Stomatology*. 2016;9(1):101. (In Russ.)
18. [Application of the "LED-active 03" activator with modulated red light in therapeutic dentistry]. Available from: http://www.medtorg-plus.ru/articles/70/. (Accessed: March 2026).
19. Kobzeva G.B., Gontarev S.N. [Modern LED technologies in the treatment of periodontal diseases]. *Scientific Bulletins of Belgorod State University. Series: Medicine. Pharmacy*. 2019;(3):336-340. (In Russ.)