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METHODS OF OPTIMIZATION OF TREATMENT OF PERIODONTAL DISEASES USING NEW TECHNOLOGIES

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ABOUT ARTICLE

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Abstract: Currently, the treatment of periodontal disease is a pressing issue due to its high frequency [1]. Patients with the first signs of periodontal disease (gingival inflammation, pain, and bleeding) remain poorly motivated and receive inadequate attention. Gingival inflammation begins in the gingival sulcus, where the quantitative and qualitative composition of the gingival fluid is altered.

INTRODUCTION

Polymorphonuclear leukocytes increase in the gingival sulcus, lysosomes are released from the cells under the influence of endotoxin, and degranulation occurs. Lysosome-derived enzymes (proteases, hydrolases, and lysozymes) interact with surrounding structures, causing and enhancing changes. Cellular mediators include histamine, serotonin, prostoglandins, lymphokines, and slow-reacting substances, the release of which is mediated by polymorphonuclear leukocytes, mast cells, and basophils. The biologically active components cause a rapid increase in vascular permeability, microcirculation is impaired, blood flow is slowed, thrombosis is increased, and vasculitis, hypocoagulation, hyperfibrinolysis, and secondary hypoxia develop. These changes cause depolymerization of the intercellular material of the gingival sulcus epithelium, creating vacuoles, fissures, and favorable conditions for deep penetration of toxins as well as bacteria into the underlying tissue. Microcirculatory disturbances increase vascular and tissue permeability. Disruption of defense mechanisms is accompanied by inhibition of regenerative processes, formation of pathological granulation tissue, and spread of inflammation to deeper tissues such as alveolar bone [1]. The complexity and multistep nature of the pathologic processes in periodontal disease creates the need for

the use of drugs with diverse mechanisms of action, including anti-inflammatory drugs, analgesics, enzymes, drugs that stimulate microcirculation, drugs that improve immune defense, and many others that affect the etiologic links in the pathologic process. Although the pharmacotherapeutic armamentarium is vast, it should be noted that all drugs have side effects and toxicities associated with overdose, bioaccumulation, allergies and idiosyncrasies, and biological abnormalities. Many patients with periodontal disease have a constitutional condition and are treated by a medical doctor without considering an appointment with a dentist. More often than not, one pathology is replaced by another as a result of pharmacotherapy. In this regard, the development of treatments other than drug therapy and free from these drawbacks remains important. This group includes physiotherapeutic methods widely used in periodontology to influence the individual etiologic links of the process as well as symptomatic treatment during the diagnostic, complex treatment, preventive, and rehabilitative phases [4]. Physical factors can stimulate the body's immunological response, reduce the phenomena of systemic and local sensitization, and alter neuro-humoral processes in the body and pathological focus. They enhance the local selective effect of medicinal substances and restore microcirculation [4]. Timely and appropriate selection of physical factors in combined therapy can stop the initial symptoms of the condition, reduce its severity, reduce the severity of clinical manifestations and potential complications, or promote gradual changes in the condition, allowing other therapies to be implemented in the most favorable conditions [1, 3]. One promising direction is the development of different options for the therapeutic use of pulsed current. Currents can be easily controlled and, in a fairly wide range of properties, are an effective stimulus for structures concentrated in the reflexogenic zone or in the area of the acupuncture points [4]. Dynamic electrical stimulation (DENS) is a further development of transcutaneous electrical stimulation and acupuncture. The method uses short bipolar current pulses of various frequencies to produce a therapeutic effect on reflexogenic zones or acupuncture points, the shape of which varies according to the total electrical resistance (impedance) value of the tissue. DENS is performed with a portable transcutaneous electrical stimulation device, which is a sub-electrode zone with The DiaDENS device offers a wide range of frequencies from 10 Hz to 200 Hz for the treatment of various diseases. For the treatment of periodontal disease, the range is 60 to 77 Hz, 15 minutes. The design of the device allows for quick movement during treatment, selectively affects the functional state of internal organs, the regulatory mechanisms of physiological responses, and hyperalgesia, improves blood circulation, has an anti-inflammatory effect, activates the formation of biologically active substances and metabolic processes in the tissues, and normalizes muscle and vascular tone . Dynamic electrical stimulation helps increase overall well-being, improve mood, and enhance performance. Many studies have shown that the therapeutic effects of dynamic electrical stimulation are based on

multi-level reflexes and neurochemical responses that trigger a cascade of body regulatory and adaptive mechanisms [5]. Treatment in the complex treatment of periodontal disease can be used at any stage of treatment, stopping the pain syndrome, enhancing positive effects, reducing the possibility of complications, accelerating changes in the stages of the pathological process, and allowing the implementation of other treatments under the most favorable conditions, thereby increasing the patient's motivate and strengthen the patient's confidence in the positive outcome. A prerequisite for treatment selection is compliance with indications and contraindications. If necessary, the attending physician can prescribe the treatment in coordination with the reflexologist. The treatment is performed by a health care professional [5]. Another method of physical therapy is the use of magnetic or electromagnetic fields that locally alter ion concentrations in cells. Calcium ions are known to be important in regulating membrane potential. In mitochondrial membranes, the concentration of hydrogen ions rises sharply due to the potential difference and is used by the cell to synthesize ATP. Apparatus for magnetic therapy, magnetophoresis, electrophoresis, electrical stimulation, and anesthesia in dentistry - "AMO-ATOS-E". Under the influence of magnetic fields, the elasticity and tone of blood vessels are normalized, the blood flow velocity in the vessels increases, and the diameter of capillaries is increased. The activation response induced by magnetic fields with specific parameters is accompanied by an increase in the functional activity of the adrenal glands and thyroid gland, an increase in the nucleic acid content of the blood, and stimulation or normalization of immunological reactivity. The therapeutic effects of magnetic fields are due to their vasodilatory, antispasmodic, anti-inflammatory, decongestive, immunostimulating, and sedative effects.The AMO-Atos-E device provides dynamic effects due to "traveling" magnetic fields with maximum biomechanical parameters. The device produces resonance effects in the functional range of key body systems. The frequencies are 1 to 2 Hz, close to the normal heart rate; 6 to 12 Hz, close to the normal alpha rhythm of the brain; and 50 Hz, the most physiological frequency in terms of neuromuscular currents. The shocks performed by this device are multi-channel, since this device has multiple outputs and two emitters of the traveling magnetic field can be connected at the same time. With this device, a combined effect of pulsed magnetic field and electric current can be obtained. In addition, the emitters of the magnetic fields can act through a napkin coated with the drug during electrophoresis. At the same time, the combination of electrophoresis and magnetophoresis gives a significantly higher effect than the sum, since the kinetic properties of the magnetic field become more pronounced as the number of drug ions increases and the electrophoresis only contributes to the increase The effects of absorption, anti-inflammatory, vasodilation, and decongestion therapy with the AMO-ATOS-E device are metabolic processes and improvement of axonal conduction. The use of this device in dental treatment is due to its influence on

etiologies such as inflammation, microcirculatory disorders, increased vascular permeability, tissue edema and hypoxia, failure of general and local mechanisms of immunological protection, and allergic phenomena.

The aim of our study was: to increase the effectiveness of treatment of patients with chronic generalized catarrhal gingivitis using dynamic electroneurostimulation and magnetotherapy techniques at the stage of conservative treatment.

Materials and methods: The study for two years (from January 2008 to January 2010), we conducted an examination and conservative treatment of 112 patients with chronic generalized catarrhal gingivitis (44 men and 68 women aged 18 to 26 years). The studies were conducted at the UGMA dental clinic, somatically preserved patients participated in it. During treatment, patients complained of bleeding gums during brushing (42.3% of the examined), bad breath (43.7%), itching, pain in the gums (48.2%). Great importance was attached to the collection of anamnesis, the identification of errors in individual oral hygiene (Green – Vermillion index), when examining the oral cavity, the condition of the oral mucosa, the alveolar processes of the upper and lower jaws (papillary – marginal – alveolar index PMA) was assessed, periodontal Russell index (PI), the index of bleeding gingival papillae were determined in periodontitis (RVI), bite, recorded the index of the CPU of teeth, the state of the dentition, the presence of traumatic occlusion, etc. From the functional methods of the study, we used the assessment of the vacuum resistance of the capillaries of the gum according to the Kulazhenko method in the area of the central incisors of the lower jaw. Orthopantomographic examination for diagnosis (ORTHOPHOS device, the average radiation dose is 36 mcsieverts). The conservative stage of patient treatment provided for the training of all examined patients in the rules of oral hygiene, the selection of individual hygiene products, professional oral hygiene, the elimination of local irritating factors, oral sanitation, anti-inflammatory periodontal treatment. The patients were divided into 3 groups in any order. Group 1 – people who received traditional treatment, the treatment plan of group 2 included the method of dynamic electrical stimulation using the device DiaDENS-PCM, 10 daily procedures. Therapy was carried out by a contact stable technique using a remote electrode applied to the segmental zones for 5 minutes on each side. Dosing of the impact force was carried out individually. Patients of group 3 included in the treatment plan a course of magnetic therapy using the AMO-ATOS-E apparatus for 10 daily procedures. The effect was carried out externally by direct application of a traveling magnetic field emitter to the projection points of gingival inflammation using two remote magnetic coils for 5 minutes for each exposure zone in accordance with the instructions for using the device. The modulation frequency is set to 1 Hz with an increase to 10 Hz by the middle of the course. The duration of the

procedure is 15 minutes. The number of procedures was 10. The effectiveness of the treatment was evaluated 10 days, 3 months, 6 months after the start of treatment. Statistical processing of the obtained research results was carried out using the student's method. The results of the study and discussion of the data obtained during the initial examination of the oral cavity in all patients were revealed congestive hyperemia, swelling of the papillary (98.7%), marginal (84%) gums, slight pasty – in 27%, bleeding during probing, the presence of soft plaque, supra–gingival tartar - 100% of patients. Malocclusion and the position of individual teeth were detected in 48% of patients. The CPI index in patients with catarrhal gingivitis in group 1 was 6.72, in the second – 7.16, in the third – 6.82. The Green– Vermillion index in the first group was 3.34, in the second – 3.32, in the third – 3.37 (unsatisfactory level of oral hygiene), PMA – group 1 – 46.85, group 2 – 48.53%, group 3 – 48.62%. The bleeding index was 1.42, 1.41 and 1.41, respectively. The rate of hematoma formation in the first group was 14.8 seconds, in the second and third – 13.9 and 14.1. There were no statistically significant differences in objective data, index evaluation, additional functional examination during the initial examination in the main and control groups. Index evaluation indicators in patients with chronic generalized catarrhal gingivitis in the main and control groups before treatment and during follow-up (see Table). 10 days after the start of conservative treatment, patients in all groups noted an improvement in subjective feelings, the effectiveness of the treatment. An objective study revealed a decrease in inflammatory phenomena in the periodontium, after professional deposits. However, 62% of the patients of the first group and 32% of the subjects of the third group noted the appearance of hyperesthesia of the hard tissues of the teeth, a feeling of discomfort after professional oral hygiene, persisting from 3-5 days to 1 week. In the second group, these complaints were presented by only 20% of patients who noted the disappearance of unpleasant sensations after the second procedure of dynamic electroneurostimulation. It should also be noted that in the studied groups, the indicators of PMA, bleeding were significantly lower than in the control group at all follow-up periods. In general, the results of conservative treatment of patients with periodontal diseases in all groups can be assessed as satisfactory. Oral hygiene has improved, signs of inflammation have decreased. A questionnaire conducted after treatment showed that the effect of dynamic electroneurostimulation caused a more pronounced analgesic effect.

CONCLUSION

The results of our study indicate the effectiveness of the use of DANCE therapy and magnetotherapy in the conservative treatment of periodontal diseases. The rapidly advancing analgesic effect during treatment allows patients to fully exercise oral hygiene, gives a feeling of comfort.

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