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EFFICACY OF OZONE THERAPY IN TREATMENT OF EROSIVE AND ULCERATIVE LESIONS OF ORAL MUCOSA

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ABSTRACT — Ozone therapy has been widely used as an effective non-drug method for treatment of dental diseases. It has a pronounced therapeutic activity, ease of use, good tolerability, enables reducing the drug load and facilitates recovery processes. The work investigates antibacterial efficacy of ozone therapy in comparison with two alternative antibiotic medications for erosive and ulcerative lesions in the oral cavity. The study was carried out using the method of clinical and CITO-bacterioscopic research. The results of the CITO-bacterioscopic study showed effective antibacterial and antifungal activities of all three therapies. In 14 days, the inflammation was subdued and the total populations of coccal flora and Candida albicans were decreased. Moreover, the results of the clinical examination demonstrated higher efficacy of the therapy with ozonated olive oil. Already on the second day, relief of pain and improvement of the condition were observed. The obtained data confirmed the antibacterial activity of ozone therapy for treatment of oral mucosal erosions and ulcers. These benefits suggest its use for geriatric patients. However, further study with a focus on antioxidant properties of medical ozone in a reparative process is required.

KEYWORDS — ozone therapy, erosive and ulcerative lesions of oral mucosa, cytobacterioscopic studies.

INTRODUCTION

The choice of laboratory and clinical methods for assessing the dental status of a patient is determined by the nosological form of the disease, as well as by the relationship with the level of his somatic health. Along with the use of traditional laboratory and clinical research methods, the doctor also uses other modern informative methods and tests to identify the disease and make a final diagnosis [1–11].

The problem of treatment of erosive and ulcerative lesions of the oral cavity is relevant for dentists of all directions due to the chronization of the process [12, 13]. The treatment should have an etiopathogenetic orientation. Geriatric dental disorders may be caused by infectious, autoimmune processes, trauma, allergic reactions, irrational orthopedic treatment. Besides, questions of etiology and pathogenesis still cause scientific disagreement among scientists [14]. In addition, due to the anatomical features of the oral cavity, any erosion of this area is in constant contact with 300 or more types of microbes. Hence, the most commonly prescribed drugs are antibacterial [15]. However, this therapy in many cases entails consequences in the form of dysbiosis and the development of fungal infection, the emergence of resistance of microorganisms, sensitization of the body [16, 17]. Among other medical areas, medical ozone has become particularly popular as an antibacterial agent.

Ozone kills all kinds of bacteria, viruses, fungi and protozoa. The antiseptic effect of pure ozone is three hundred times stronger than that of chlorine. Ozone has no destructive and irritating effect on tissues. Therapeutic doses of ozone have an antihypoxic, immunocorrective effect, potentiate the action of antibiotics, improve the rheological properties of blood and enhance microcirculation [18–22].

Ozone therapy increases the delivery of oxygen to tissues, inhibits lipid peroxidation, and activates the antioxidant system in the lesion [23–25]. One of the important properties of ozone is its antibacterial effect, and the absence of a selective effect for antibiotic-resistant strains, as well as the absence of other consequences of traditional drug antibiotic therapy [26–29]. There are few studies that confirm the effectiveness of these properties of ozone in the treatment of diseases of the oral mucosa, which encourages further research of the use of this method in the oral cavity.

MATERIAL AND METHODS

On the basis of VOXP in the city of Volgograd, 43 patients with erosive and ulcerative lesions in the oral cavity due to trauma were examined and treated. 30 patients were affected due to sharp edges of their teeth, failed fillings and substandard orthopedic structures. All patients were divided into 3 groups. At the end of the examination, the patients of all three groups underwent oral sanitation, professional hygiene, elimination of traumatic factors (replacement of fillings, grinding of sharp edges of teeth, replace-

ment of orthopedic devices). In the first group, therapy included applications of ozonated olive oil at a concentration of 5 mg/l lasting 15 minutes for 2 weeks. In the second group, patients were assigned to oxygen–ozone irrigation of the lesion for 10 minutes daily for 2 weeks. And in the third group, patients were assigned to apply Metrogil Denta gel for 15–20 minutes twice a day for a course of 7 days (traditional treatment). To assess the quality of treatment, we used: a clinical examination, including a survey, clarification of complaints, and a visual examination. For a more detailed study, a CITO-bacterioscopic study was used.

Statistical processing of the obtained results was carried out using the Statistica 10 application software package using Student t-test. Differences were considered significant at $p < 0.05$. To assess the relationship between different indicators, Pearson's linear correlation coefficient was used, the level of statistical significance of which began with $p<0.05$.

RESULTS

The effectiveness of the treatment was evaluated on day 7 and 14 days later. When compared with traditional dental treatment, the advantage of using ozonated olive oil was noted. Already on the second day after the treatment, patients reported a decrease in pain. Less effective was the method of oxygen–ozone irrigation. The subjects of the third group, who were treated with Metrogil Denta applications, showed the worst results, and clinical improvement was noted on 6–7 days after treatment. Erosive and ulcerative lesions were fully epithelized in all patients within 14 days. Evaluating CITO-bacterioscopic indicators, we can draw the following conclusions: absence of macrophages, in the first and second groups and absence of coccal flora, in all three groups, as well as a decrease in the number of lymphocytes on the 7th day and after 14 days up to the minimum value of 1 that signals the resolution of inflammation. Quantitative evaluation of lymphocytes and coccal forms have a direct correlation. The reduction of the coccal flora index to zero indicates the effectiveness of antibacterial activity of all three treatment methods. High values of the Candida (fungus) population before treatment indicate an acute period, and a gradual decrease during treatment occurred due to the restoration of homeostasis of the affected area and normalization of the species composition of the microflora (Table 1).

CONCLUSION

As a result of the conducted clinical study, the advantage of ozone therapy compared to both conventional methods has been proved, and the statistical significance of differences was noted between the comparison groups at all periods of ablation. At the same time, this method is more promising due to the absence of subsequent complications typically occurring during the use of dosage forms. Also, based on the data of CITO-bacterioscopic indicators, the process of inflammation was better and faster stopped in groups with the use of ozone, which can be explained by its other properties (antioxidant effect, restoration of microcirculation, etc.). The most effective method was a combination of ozone and olive oil, which can be explained by the additional keratoplastic effect of the oil, and the clinical reduction of pain symptoms was achieved due to the analgesic properties of ozone therapy. For laboratory confirmation of the findings, further study of ozone in comparison with anti-inflammatory drugs is necessary.

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Table 1. *Dynamics of cytobacterioscopic indicators in patients with erosive and ulcerative lesions of the oral mucosa at different times after treatment, M=m (number in the field of view)*

Indicator	Ozonated olive oil			Oxygen-ozone irrigation			Gel *Metrogyl Denta*		
	Before treatment	7 days	14 days	Before treatment	7 days	14 days	Before treatment	7 days	14 days
Macrophages	2,5±0,4	0,5±0,2*	0	2,3±0,1	0,9±0,3	0	2,6±0,3	1,5±0,1*	0,8±0,4
Neutrophils	17,9±1,7	4,5±0,3*	3,6±0,2*	17,4±2,4	5,5±1,8	4,2±0,6	16,5±1,5	6,8±0,4*	5,4±0,4*
Lymphocytes	4,3±0,3	1,2±0,4	0,5±0,1*	4,8±0,4	1,4±0,2	0,9±0,1	3,5±0,6	1,7±0,4	1,5±0,1*
Fungi of the genus Candida	10,4±1,3	4,2±0,1*	2,9±0,1*	10,6±1,7	5,6±1,2	3,5±1,2	11,1±1,5	6,1±0,4*	4,8±0,3*
Cocca flora	2,1±0,5	0,2±0,1	0	1,9±0,4	0,5±0,1	0	2,0±0,7	0,9±0,1	0

** — The statistical significance of differences between comparison groups, with p<0.05*

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