Treatment of Marginal Parodontites with Ozonated Liquids Activated with Laser Radiation

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***Abstract* — The given work presents the results of researches concerning the treatment of marginal parodontites with ozonated liquids administered concomitantly with laser radiation. For this purpose an installation to ozonate the liquids with programming concentration was projected and realized. Application of laser radiation and of ozonated liquid as aerosol on the surface of tissue is performed concomitantly.**

***Index Terms* — aerosol, laser radiation, marginal parodontitis, ozonated liquid.**

More and more attention is being paid lately to nonmedicinal therapy methods, which could reduce significantly or substitute the usage of medicinal substances, acting from different aspects on pathological processes, being able to regulate the impaired homeostasis, the functional improvement of various organs and systems, the development and intensification of the body's defence.

Ozonotherapy may be as a perspective method of treatment of marginal parodontites.

Parodontitis is situated on the II place of frequency of buccal cavity ilnesses, and has the trend to become more and more as the incidence of dental caries. [1,2]

As method of therapy with ozonated solutions to treat the marginal parodontites, it can be an alternative to medicinal treatment.

The ozone has a bacteriostatic effect which acts on the bacterial cell's membrane, causing the disturbance of integrity, caused by the oxidation of phospholipids and lipoproteins.

The ozone is considered to be the strongest known oxidant. The additional radical of the oxygen from the ozone molecule binds rapidly with every compound coming in contact with ozonic molecule. This is due to the instability of the ozone molecule that tends to return to its initial state O_2.

In this way the organic materials can be oxidated, and the inorganic ones (oxidation) or the microorganisms viruses, bacteria or the fungi.

The features of ozone are well studied such as: bactericidal, fungicidal, antiviral, antiinflamatory, immunocorrective and it is a strong antioxidant causing antihypoxic action, improves rheological qualities and activates bioenergetic features. [3]

The work includes a study carried put of the influence of ozonated liquids and radiated with laser in the therapy of marginal parodontitis of different grade of affectation in a group of patients.

The patients addressed with gingival bleedings during brushing, dolorific sensations in the dental necks region of the teeth beginning with thermal and chemical irritants, changing of the colour and configuration of the gum, fetid smell from the buccal cavity, paradontal sacs, dental motility.

During marginal parodontitis therapy, it was carried out the removing of calculus, professional brushing, later on the parodontal sacs and the gums underwent laser radiation and simultaneously treated with aerosol from the ozonated liquid.

Figure 1 represents the photo of the buccal cavity of the patients before (A) and after therapy (B), this state on the next day.

The success of researches in terms of the study of interaction's mechanism and of determining of doses to be administered of ozone in dissolved gaseous state in different solutions depends on:

- the purity the oxygen-ozone mixture where can be introduced impurities during ozonizing;
- of the ozone concentration in oxygen and in the solutions;
- of the way of administering;

The work also presents the findings of researches in working out of ozonizing method of liquids and intensification with laser radiation in the process of administering as aerosols to treat marginal parodontitis.

The experimental installation has been made based on a photochemical method to obtain ozone in oxygen flux under the action of radiation in ultraviolet field with a wave length up to 210 nm.

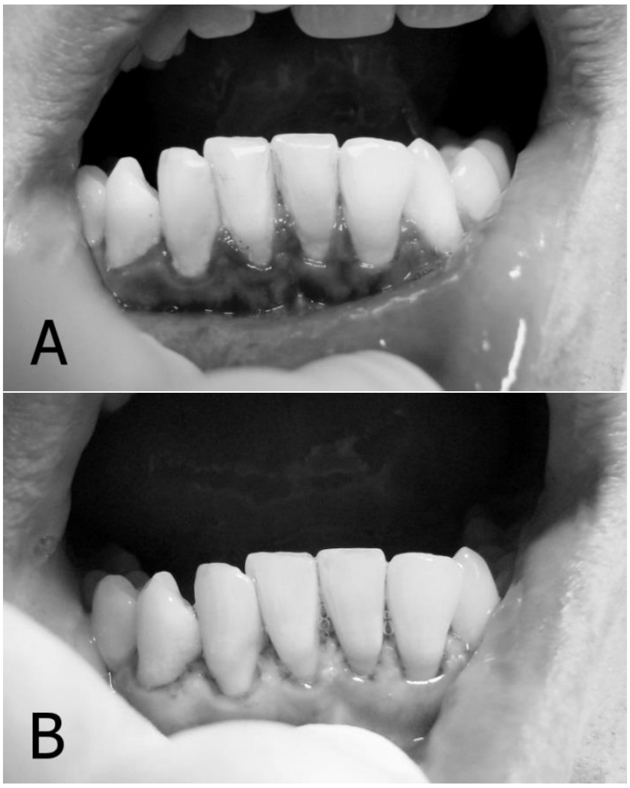

Fig.1 Bucal cavity before (A) and after therapy (B).

To supply with oxygen we use the cylinder 1 to which the reduction gear is connected 2 with the limits of pressure in the cylinder from 20 to 1 MPa and the exit pressure 0,4 MPa ± 0,05 MPa and equiped with a safety valve from 0,6 to 0,8 Mpa.

In figure 2 it is shown the scheme of the experimental installation to ozonate the liquids and intensification with laser radiation in the process of administering as aerosols.

The oxygen from the ampoule with double walls 3 is exposed to the flow of radiation generated by the lamp of discharge in mercury vapors. Under the action of radiation with the wave length up to 210 nm the molecules of ozone are formed.

The degree of ozonizing exposed to radiation depends on the time duration, the pressure of the oxygen from the ampoule and the temperature.

The pressure of the gas in installation is established with to eliminate the gas from installation after it passes through the distilled water.

The efficacy of the dissolved ozone in water is determined by the dispersion of the gas flow by the porous element 7 and the formation of bubbles of small diameter. At higher temperatures of 35-40ºC of the liquid gas mixture the quantity of dissolved ozone increases. To maintain a constant temperature the ozonizer 6 is equipped with a cooling system. Under the action of the pressure exerted by the gas, ozonized water is directed to the dozer 14.

To determine the concentration of dissolved ozone in installation, we use the method of spectrophotometry which is performed with a spectrophotometer 10. During the interval of wave length 200-300 nm the absorption spectrum of ozone contains a wide track maximum at 254,7 nm while for the oxygen with vapors of water the water, the absorption at this length of wave lacks which allows its use to determine the ozone concentration in respective mediums.

The spectrophotometer of the installation to determine the concentration of the dissolved ozone in liquid consists of a minimonochromator with a network of

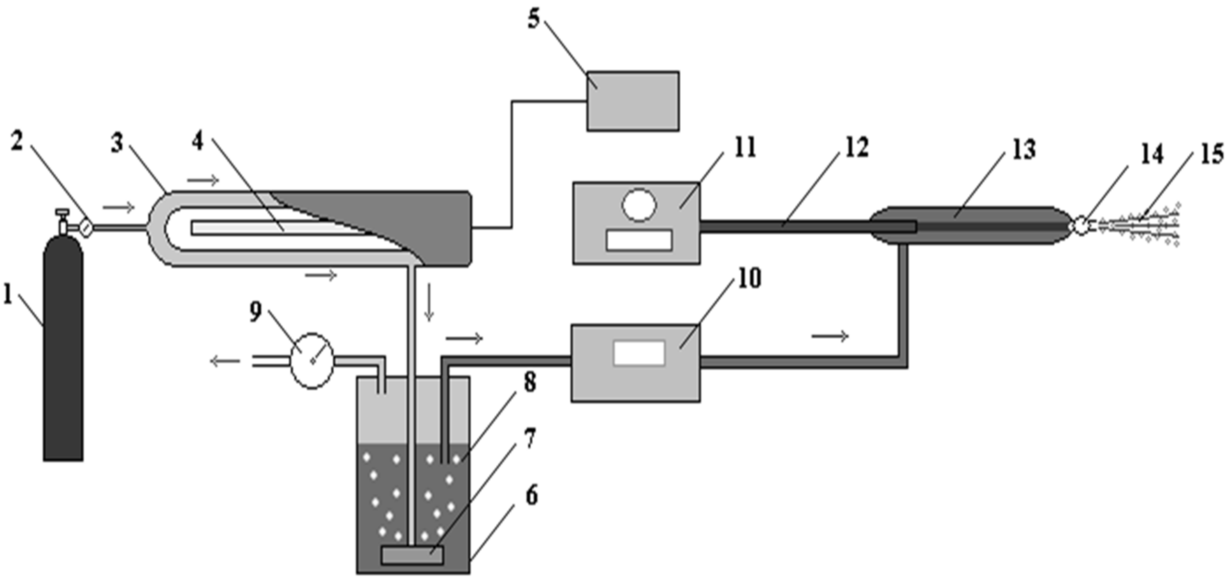

Fig.2 The scheme of the experimental installation.
1-Oxygen cylinder; 2-reduction gear; 3-ampulla with quartz with double walls;4-lamp with discharging of mercury vapors; 5-source of supply; 6-ozonizor; 7-porous material element; 8-distilled water; 9-reduction gear;
10- spectrophotometer; 11-laser; 12-optic guide; 13-precincts to intensify the solution with laser radiation;
14-dozer; 15-aerosol.

diffraction adjusted at the wave length of 254 nm, a lamp with hydrogen and a quartz tub connected to the network of the installation, a receiver to record the flow of radiation and a device for reading of the data.

To activate the liquids and the surface of the tissue in the precincts 13 the laser radiation is transmitted through the optic guide 12 from the laser HeNe. Under the action of the pressure of the liquid with the dozer 14 the aerosol flow is established which concomitantly with the laser radiation is applied on the surface to be treated.

The method of treatment performed with the present installation in this work has a whole range of priorities to increase the efficacy of treatment:

- to produce ozone, to dissolve ozone in liquids and its application is performed with him a single technological process;
- the application of laser radiation and of aerosol flow allows to determine the doses for various diseases;
- the presence of laser radiation in the process of application of aerosol, increases the absorption ability of the tissue and could promote the passage of the oxygen from third state into a singled state in case as in case of photodynamic therapy.

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