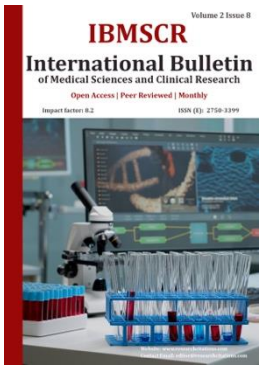

EFFECTIVENESS OF PHOTODYNAMIC THERAPY IN PERIODONTITIS

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Abstract. The patient underwent complex treatment (oral cavity cleaning, plaque removal, curettage of periodontal pockets), then photodynamic therapy (PDT) with 1% Geleofor gel using a LED emitter. It was found that the use of PDT has a normalizing effect on microcirculation and oxygenation in periodontal tissues.

Key words: chronic generalized periodontitis, photodynamic therapy, LED radiation.

Аннотация. Пациенту было проведено комплексное лечение (чистка полости рта, удаление зубного налета, кюретаж пародонтальных карманов), затем фотодинамическая терапия (ФДТ) с 1% гелем Гелеофор с использованием светодиодного излучателя. Установлено, что применение ФДТ оказывает нормализующее действие на микроциркуляцию и оксигенацию в тканях пародонта.

Ключевые слова: хронический генерализованный пародонтит, фотодинамическая терапия, светодиодное излучение.

Xulosa. Bemorga kompleks davolash (og‘iz bo‘shlig‘ini tozalash, tish plastinkasini olib tashlash va periodontal cho‘ntaklarni kuretaj qilish) o‘tkazildi, so‘ngra LED emitent yordamida 1% Geleofor jeli bilan fotodinamik terapiya (FDT) o‘tkazildi. FDT dan foydalanish periodontal to‘qimalarda mikrotsirkulyatsiya va kislorodlanish holatiga normallashtiruvchi ta’sir ko‘rsatishi aniqlandi.

Kalit so‘zlar: surunkali umumlashtirilgan periodontit, fotodinamik terapiya, LED nurlanishi.

Despite certain successes in the treatment of periodontal diseases, the search for new treatment methods remains relevant [1, 2].

In recent years, the use of photodynamic therapy (PDT) has been proposed for the treatment of inflammatory periodontal diseases [3,2,3,4,8]. High antimicrobial efficiency of PDT has been proven [7,9]. In dentistry, photosensitizers of various groups are used for PDT, mainly in the form of gels for topical application. Derivatives of chlorin E6 are most often used as photosensitizers: photoditazine, radachlorin, etc.

There are known studies on the study of photodynamic effects in inflammatory periodontal diseases [5-8]. Recently, a 1% gel based on chlorin E6 has been developed for use in dentistry, however, there is insufficient scientifically substantiated data on the assessment of the effectiveness of this photosensitizer in the treatment of periodontal diseases in the literature.

Objective of the study. Improving the efficiency of chronic generalized periodontitis treatment using PDT by providing a clinical and functional justification for the photosensitizer effect. To achieve this objective, a clinical and functional study and treatment of moderate chronic generalized periodontitis were conducted in 50 people (20 men and 30 women) aged 30 to 55 years without somatic pathology with orthognathic bite.

The patients were divided into two groups depending on the type of treatment: Group 1 (main) — 25 patients (10 men and 15 women, average age of patients 42.5±3.5 years), who received photodynamic therapy in addition to standard anti-inflammatory treatment; Group 2 (control) — 30 patients (11 men and 19 women, average age of patients 43.0±2.1 years), who received only standard anti-inflammatory treatment. Before performing PDT, a standard treatment complex was carried out, consisting of oral cavity sanitation, training in rational hygiene, removal of dental plaque, selective grinding of teeth, and curettage of periodontal pockets. Afterwards, a 1% gel based on chlorin E6 was applied to the gingival margin in the area of half of one of the jaws from a syringe for 5 minutes, after first isolating the gingival margin with cotton rolls, then it was washed off and the patient was exposed to LED radiation with a wavelength of 660 nm in a continuous mode using a special arc-shaped nozzle connected to a phototherapeutic LED device (APS).

During the next visit (in 1-2 days), this procedure was repeated on another area. The course of treatment included 4 procedures. In the control group, standard treatment was carried out with the application of a protective dressing (zinc oxide and artificial dentin) for 2 hours, without the use of any medication. Rinsing with a 0.1% chlorhexidine solution was prescribed for 10 days. The study of microcirculation in periodontal tissues was carried out using the laser Doppler flowmetry (LDF) method using a tissue blood flow analyzer. The state of microcirculation was assessed by the microcirculation index, which characterizes the level of tissue blood flow; the parameter, which determines the variability of the erythrocyte flow; the coefficient of variation, which characterizes the vasomotor activity of microvessels.

According to the wavelet analysis of LDF-grams, the dynamics of the neurogenic tone (NT), myogenic tone (MT) of microvessels and the shunting index (SI) in periodontal tissues were determined. The study of oxygenation in periodontal tissues by the method of optical tissue oximetry was carried out using the LAKK-M device in the spectrophotometry mode: the index of perfusion oxygen saturation (Sm) of tissues, the index of specific oxygen consumption in tissues (U) and the oxygenation level (SpO2) were determined.

Dynamic observation was carried out before treatment, immediately after treatment and 6 months and 12 months after treatment. Statistical processing of the results was carried out using MS Excel programs.

Results and discussion. In chronic generalized periodontitis of moderate severity, patients complained of bleeding gums when brushing teeth and eating, bad breath. During the examination, pronounced hyperemia, swelling of the gingival papillae, periodontal pockets 4-6 mm deep, serous exudate in the periodontal pockets were noted. In the main group, the Green-Vermillion oral hygiene index (OHI-S) was 2.36Ґ}0.10. The periodontal index (PI) was 4.58±0.20, the bleeding index (SBI) was 2.30±0.17, which is 1.2 times and 2 times higher, respectively, than with an intact periodontium.

In the control group, the clinical indices did not differ significantly from those in the main group. After the treatment, the main group showed a decrease in the values of all the above indices, the effect persisted after 6 months and 12 months. In 72.8% of patients in the control group, the values of clinical indices increased by 0.5-1.5 times after 6 months. In 17.3% of cases, inflammation in the periodontal tissues worsened. After 12 months, the clinical condition of the periodontium worsened in 10.5% of cases in the main group and in 48% of cases in the control group. According to LDF, after PDT, the increase in the M index

was 65%, as a result of which its values approached the norm; blood flow activity (index σ) increased by 48%, indicating increased blood flow in the microcirculation system; the Kv index, which characterizes the vasomotor activity of microvessels, increased by 48%.

The dynamics of LDF data indicate the normalization of the blood flow level in the microcirculation system, the indicators of which have been restored to the level of normal values. The results of treatment of patients of the 1st group after 6 months demonstrated the stability of the achieved positive changes in the microcirculation system in all parameters.

After 12 months of treatment, 90% of patients after PDT maintained the achieved effect on the main indicators of microcirculation.

Thus, the use of photodynamic therapy in the complex treatment of chronic generalized periodontitis of moderate severity showed a positive effect of this treatment method on microcirculation in the gum tissues both in the immediate and long-term observation periods.

According to the wavelet analysis of LDF-grams, after PDT in the treatment of chronic generalized periodontitis of moderate severity, the NT and MT indicators of microvessels in the microcirculatory bed consistently decreased, the initially elevated PS decreased by 63%, which indicates the prevalence of nutritive blood flow and the normalization of blood circulation in the microcirculatory bed, the effect persisted after 6 months and 12 months. In the control group, PS decreased by 66% compared to the initial values, indicating a decrease in shunting blood flow due to the relief of inflammation in the periodontal tissues, but later, after 6 months and 12 months, PS increased to the initial level. Thus, according to the wavelet analysis of LDF-grams, the mechanisms of tissue blood flow regulation were restored after the use of PDT in the complex treatment of chronic generalized periodontitis of moderate severity, the effect persisted after 6 months and 12 months. According to oximetry data, in the 1st group after PDT in the gum tissues, the Sm index increased by 32%, and the U index by 21%. At the same time, the oxygenation level increased by 12%, indicating an increase in oxygen metabolism due to the relief of hypoxia in the periodontal tissues, the effect persisted after 6 months and 12 months.

In the control group, after treatment, the oxygen metabolism indices in the gum tissues increased by 12-36%, but after 6 months they decreased by 14-18%, and after 12 months they returned to the initial level.

Conclusions. Photodynamic therapy using 1% gel based on chlorin E6 in the treatment of chronic generalized periodontitis of moderate severity is effective for normalizing the clinical and functional state of periodontal tissues, it stably improves the indices of microhemodynamics and oxygen metabolism in periodontal tissues.

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