Methods of treating periodontitis in patients who have had a covid infection

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Introduction

Treatment of periodontal diseases is an important issue in dentistry. Due to the global coronavirus epidemic, this task has become even more urgent. A number of studies have noted a link between inflammatory periodontal diseases and previous COVID infection [1, 2]. A hypothesis has been put forward about the role of peripheral inflammatory processes (including the oral cavity) in the development of systemic subclinical vascular inflammation due to reprogramming of the bone marrow function as a central node of the immune response [3]. Thus, COVID-19 can affect the oral mucosa: the sensitivity of the gums to local factors such as bacterial plaque, tartar, dentures, etc. increases. In response, their volume increases, bleeding and swelling occur, up to the development of periodontitis in some cases. All these changes occur at the level of the oral microbiome with an increase in the number of anaerobic and aerobic bacteria, such as Bacteroides melaninogenicus, Prevotella intermedia and Porphyromonas gingivalis [4, 5].

Periodontitis, due to the secondary inflammatory reaction, negatively affects the surrounding periodontal ligament and alveolar bone. If left untreated, loss of attachment structures may eventually lead to tooth loss. Currently, the use of lasers in dentistry is widespread, including for the treatment of periodontal diseases [6, 7]. It has been found that the use of lasers reduces the growth of pathogenic bacteria in periodontal pockets and affected areas, and also reduces swelling of the soft tissues of the periodontium [8], so this treatment method was chosen for our study.

Purpose of the study– to compare the effectiveness of standard therapy for inflammatory periodontal diseases and combined treatment using laser therapy and liposomal gel in patients who have had a COVID infection.

Material and methods

This study included 101 patients, all patients had a history of COVID-19 in the last one to six months. Patients sought dental care, periodontal diseases were defined as the main or concomitant diagnosis. Among the patients included in the study, there were 56 (55.4%) men and 45 (44.6%) women. The average age of patients was 47.6 ± 11.7 (26–72) years, men - 48.9 ± 12.5 (26–72) years, women - 46.0 ± 10.3 (27–72) years.

The duration of COVID-19 varied from one to six months (Fig. 1). Thus, 16 (15.8%) patients had COVID-19 a month ago, 29 (28.7%) two months ago, 22 (21.8%) three months, 20 (19.8%) four months, 9 (8.9%) five months, and 5 (5%) six months ago.

70 patients were treated on an outpatient basis, 31 patients required hospitalization. Based on the randomization performed, all patients were divided into three groups:

the first (33 patients) – standard dental treatment;

the second (33 patients) – in addition to standard therapy, a course of low-intensity laser radiation was used;

the third (35 patients) – in addition to standard therapy, a course of pulsed low-frequency laser radiation was used using a restorative liposomal gel.

Standard dental treatment included professional oral hygiene with ultrasonic scalers and curettes of the Piezon Master 700 device (EMS, Switzerland). Dental plaque was removed using the Air-Flow air-abrasive technology (EMS, Switzerland). Individual oral hygiene training and control were provided. Medication therapy was performed using an antiseptic - 0.2% aqueous solution of chlorhexidine in the form of mouth baths lasting one to two minutes, three times a day for 10 days.

Factors that contribute to the development of inflammatory periodontal diseases, namely carious cavities, wedge-shaped defects, and overhanging edges of fillings, were also eliminated.

During the procedure, the emitter was located at a distance of at least 1.5 cm from the mucous membrane surface in segments. The exposure time per field was up to two minutes. The course of treatment consisted of five procedures, carried out every other day.

The restorative liposomal gel was applied as a thin layer to the gum area, followed by activation with low-intensity laser radiation.

The clinical condition of periodontal tissues was assessed using hygienic and periodontal indicators, such as:

hygiene index (HI) for assessing the condition of dental plaque and tartar in the oral cavity;

periodontal index (PI) for assessing both the presence of gingivitis and tooth mobility, as well as the depth of the clinical pocket, etc. [9];

Mullman index (PBI) for assessing the degree of bleeding of the periodontal sulcus [10, 11];

papillary-alveolar-marginal index (PMA) to assess the extent and severity of periodontitis [12].

The quantitative data obtained in the work were processed using the methods of system analysis generally accepted in medical and biological research using Excel and IBM SPSS Statistics (version 17.0) (StatSoft Inc, USA) programs, in accordance with modern requirements for conducting medical data analysis.(10)

At the first stage, the normality of the distribution of quantitative indicators in the sample was assessed using the Kolmogorov–Smirnov criterion.

For normal distribution, quantitative data were assessed using Student's t-test and presented as mean values ± standard deviation (M ± SD) and 95% confidence interval.

Spearman's correlation analysis was used to identify correlation dependencies.

When testing statistical hypotheses, the probability of erroneously accepting an incorrect hypothesis (p) did not exceed 0.05 (5%).

Results

After the treatment in the first group, significant differences were observed in the mean values of all indicators - IG, PI, PBI and PMA before and after treatment (p

< 0.05). IG decreased from 2.7 ± 0.3 conventional units before treatment to 1.1 ± 0.3 conventional units after treatment (59%), PI - from 3.4 ± 0.9 to 1.6 ± 0.5 conventional units (53%), PBI - from 2.1 ± 0.4 to 1.2 ± 0.3 points (~ 43%), PMA - from 42.2 ± 11.6 to 18.2 ± 6.4% (~ 57%). The decrease in indicators after treatment in the first group is statistically significant.(11) Also after treatment, significant differences were observed in the average values of all indicators – IG, PI, PBI and PMA before and after treatment ($p < 0.05$) in the second group. IG decreased from 2.6 ± 0.4 conventional units before treatment to 0.9 ± 0.3 conventional units after treatment (65%), PI – from 3.4 ± 0.9 to 1.2 ± 0.3 conventional units (~65%), PBI – from 2.3 ± 0.4 to 1.1 ± 0.2 points (~52%), PMA – from 45.5 ± 12.2 to 14.5 ± 4.2% (~65%). The decrease in indicators after treatment in the second group is statistically significant.(12) Significant differences were observed in the mean values of all indicators – IG, PI, PBI and PMA – before and after treatment ($p < 0.05$) and in the third group. IG decreased from 2.6 ± 0.3 before treatment to 0.8 ± 0.2 after treatment (69%), PI – from 3.4 ± 0.8 to 0.9 ± 0.4 (~74%), PBI – from 2.1 ± 0.3 to 0.6 ± 0.2 points (~71%), PMA – from 43.1 ± 12.5 to 8.7 ± 5.4% (~79%). The decrease in indicators after treatment in the third group is statistically significant.

To assess the effectiveness of treatment in three groups, the results obtained after the treatment were compared.

Before the therapy, the groups were comparable. The hygiene index after the treatment decreased in the three groups by 59, 65 and 69%, respectively. The periodontal index after the treatment – by 53, 65 and 74%, respectively. The PBI index after the treatment decreased by 43, 52 and 71%, respectively. The PMA index after the treatment decreased by 57, 65 and 79%, respectively.

After treatment, the maximum positive dynamics were noted in the third group, on the basis of which it can be assumed that treatment using laser therapy and liposomal gel is the most effective.(13)

Conclusion

Laser therapy with liposomal gel has a higher efficiency compared to the standard one, which is confirmed by a significant reduction in the indicators of hygienic and periodontal indices.

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