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THE ROLE OF PSYCHOEMOTIONAL STRESS IN THE DEVELOPMENT OF INFLAMMATORY POST-PROSTHETIC COMPLICATIONS

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ABSTRACT — **RELEVANCE:** Before starting the treatment, the patient's medical history should be carefully studied. Special attention should be paid to the presence/absence of diseases of the cardiovascular system, kidney disease, endocrine pathology, and the psychological state of the body. These diseases can directly affect the dental status and worsen the clinical picture. Psychoemotional stress and inflammatory post-prosthetic complications are reciprocal risk factors. Psychophysiological disorders can lead to the development of dental complications in the oral cavity and vice versa, mucositis can cause a stress reaction in a person. This assumption served as the purpose of this study. **MATERIALS AND METHODS:** During implant treatment, the analysis of the psychophysiological state in patients with inflammatory post-prosthetic complications was carried out according to 3 parameters (the results of the questionnaire, based on heart rate variability and using software), parallel to the assessment of the dental status in 30 patients. Stress and mucositis should be treated simultaneously, with sedation support where necessary. **OUTCOMES:** All patients showed a high level of stress. During the dental examination the presence of inflammation of the parotid tissue was detected. **CONCLUSION:** Psychoemotional stress can be one of the initiating factors in the development of inflammatory complications during dental implantation. The main task of a dentist is, first of all, to identify the early stages of the development of the disease, and secondly, to provide not only symptomatic, but also pathogenetic treatment, taking into account the factors that facilitate the development of this pathology.

KEYWORDS — stress, mucositis, psychoemotional stress, diagnosis, treatment.

INTRODUCTION

Changes are observed in the oral cavity, the severity of which depends on the severity of the course, the age of the patient and the duration of the course of the general somatic pathology [12]. The most characteristic changes in the oral cavity are xerostomia, catarrhal stomatitis and glossitis, fungal stomatitis, mycotic

congestion, paresthesia of the oral mucosa, trophic disorders, lichen planus, gingivitis, periodontitis, mucositis [9]. At the same time, a two-way relationship is monitored [8], as inflammatory diseases in the oral cavity can contribute to the occurrence and exacerbation of chronic diseases of the body, and general somatic pathology can cause changes in the oral cavity [1–6]

Psychoemotional stress is also no exception in the development of inflammatory complications in the oral cavity [10]. It is known that stress is an adaptive syndrome, which is a set of non-specific reactions of the body that mobilize all the resources for a specific restructuring of its various systems. The sympathetic nervous system works as a stress-implementing system, that is, it mobilizes the body's defenses in response to a damaging factor, which, in turn, leads to neuropathologies with prolonged exposure [7]. The humoral component also refers to the stress-implementing system due to the work of hormones of the cortical and cerebral layers of the adrenal glands, as well as thyroid hormones, which leads to endocrine pathology. Early diagnosis of concomitant pathology and timely treatment [11] are one of the key factors for the success of dental treatment of inflammatory diseases of the oral cavity.

The aim of the study is to analyze the influence of predisposing factors on the development of inflammatory periodontal diseases.

MATERIALS AND METHODS

The emotional and personal characteristics of the patients were evaluated using the following methods:

1. Software based on photoplattismography.
2. Questionnaire "PSM-25 scale of psychological stress".
3. LDF-metric data for calculating the centralization index-IC.

To calculate the stress level using software based on photoplattismography, formulas for estimating heart rate variability were used. The actual heart rate of the patient was compared with the normal value of this indicator in healthy people of the corresponding gender and age. The following gradation of the stress level was used: low, medium, high.

Based on the sum of the points received when answering the questions of this questionnaire, we

determined the level of stress of patients. The following gradation of the final result was used: less than 99 conv. units — low level of stress; 100–125 conv. units — average level of stress; more than 125 conv. units — high level of stress.

The assessment of heart rate variability was carried out using the software and hardware complex "Poly-Spectrum" (version 1.0.1.3; LLC "Neurosoft", Ivanovo).

The analysis of the dental status was carried out on the basis of a clinical examination and additional methods of examination. The assessment was performed in 1788 people aged 18–44 years (WHO average age) who sought dental care. The plaque index — PCR, the Schiller-Pisarev test, the Svrakov iodine number, the VOR bleeding index, the periodontal screening — PSR, and the implant stability coefficient (CI) were evaluated. To assess the radiological characteristics, three-dimensional computed tomography and targeted dental radiography were used. The study was conducted on a Hyperion X9 dental digital tomograph (MyRay, France). The shooting mode was 60–75 kW, 7–10 mA, the duration of the system movement was 10–13 seconds. The condition of the existing teeth, periapical tissues, jaw bone tissue, resorption, and osteoporosis of the peri-graft bone tissue were evaluated. Targeted dental radiography was performed on an Evolution X-ray machine (Italy). Shooting mode: 70 kW, 4 mA, the time was adjusted depending on the clinical situation. Sighting images allow you to get the most objective data on the condition of the bone adjacent to the implants, characterized by a minimum of distortion.

The analysis and statistical processing of the research results was carried out by the method of mathematical statistics using a personal computer and the program "Microsoft Excel" to the software operating system MS Windows XP /Microsoft Corp., USA/ in accordance with the generally accepted methods of medical statistics, as well as the statistical software package Stat Soft Statistica v6.0. The data analysis was carried out using descriptive statistics. For each parameter, the following values were calculated: the arithmetic mean values (M), its average error ($\pm m$). The significance of the differences between the groups (p) was evaluated by the Student's criterion (t). The differences were considered statistically significant at $p < 0.05$ and at $p < 0.01$; $t \geq 2$.

The clinical trial was approved by the Regional Ethics Committee, Protocol No. 2115/1-2019 of April 19, 2019.

RESULTS

Out of the total number of patients, 214 patients had post-prosthetic complications with dental

implants. At the same time, 185 patients had disorders of the psychophysiological state of the body, characterized by tension, which probably occur under the influence of a strong emotional load. Also, the patients had a feeling of anxiety, anxiety, loss of strength, and the manifestation of negative emotions. According to the survey data, a high level of stress was revealed — 154.8 ± 12.4 lu, standard units. High levels of stress were also shown by data obtained using software based on photoplattismography. The value of the centralization index (the ratio $(LF+VLF)/HF$, reflecting the degree of predominance of the activity of the central circuit of regulation over the autonomous one) before the start of therapy was 5.8 standard units. Thus, for the group of patients, the conclusions about the level of stress obtained with the help of special medical equipment were fully consistent with the conclusions made on the basis of self-assessment and data from household electronic devices.

During the survey and dental examination, patients complained of pain, swelling, bleeding of the parotid region, and discomfort during meals. In rare cases, loss of appetite, weight loss, increased body temperature for a long period, inflammation of the submandibular lymph nodes. Objectively, the oral mucosa is swollen, hyperemic, with signs of bleeding during probing. Radiologically, there are no changes, there is no bone loss in this pathology. On objective examination, all patients had poor oral hygiene, the simplified plaque index PCR was $72.7 \pm 1.79\%$, while the Schiller-Pisarev test was positive, and an intense inflammatory process was observed — the Svrakov iodine number was 3.7 ± 0.3 points (Fig. 1).

The VOR bleeding index is 57.0 ± 3.5 points. The PSR (periodontal screening) score was 1.7 ± 0.2 , which indicates the need to remove plaque and soft residues, in some cases tartar. This indicator confirms the diagnosis of mucositis. The implant stability coefficient (CI) was 62.3 ± 2.0 , which characterizes a relatively high stabilization of the implant (Fig. 2).

In 45 patients, edema of the perimplant tissue was observed in the oral cavity, the gum mucosa around the implant is bright red, and bleeds when probing. In some cases (8 people), there was suppuration with the formation of a fistula. The gum mucosa is loose, exfoliates from the implant by an average of 1.0–1.5 mm with the formation of a periodontal pocket (Fig. 3).

At the same time, patients complained of pain, especially when chewing, pressing, and even with a simple touch of the tongue. At the same time, the implant is mobile, in some cases with displacement. The implant stability coefficient was 35.2 ± 1.8 , which indicates a low stability of the artificial tooth. The depth of the pathological peri-implant pocket was 4.7 ± 0.3



Fig. 1. Conducting the Shiller-Pisarev test



Fig. 2. Determination of the implant stability coefficient in the oral cavity



Fig. 3. Clinical picture of peri-implantitis

mm. The data of the X-ray examination corresponded to the clinical picture. The study of sighting images and orthopantomogram data showed the presence of horizontal and vertical bone resorption of the alveolar process around the implant from 0.25 of its length to complete destruction. Foci of osteoporosis and osteo-

sclerosis with a decrease in bone mineral density were rarely observed. The clinical and radiological picture corresponded to the diagnosis of *peri-implantitis*. This disease is irreversible, often ends with the rejection of the implant and removal.

When interviewing and filling out questionnaires about the identification and presence of stress in patients, no one was interested in this. The treatment is based only on local anti-inflammatory therapy.

CONCLUSION

All patients with post-prosthetic complications with dental implants showed a high level of stress, which is confirmed by the conclusions made on the *PSM-25 Psychological Stress Scale* and the mobile application. The presence of psychoemotional stress can be a triggering factor for the development of inflammatory complications after dental implantation. The main task of a dentist is, first of all, to identify the early stages of the development of the disease, and secondly, to provide not only symptomatic, but also pathogenetic treatment, taking into account the factors that provoke the development of this pathology, while it is necessary to reduce the time of exacerbation, increase the periods of remission. The solution of these problems is facilitated by conducting a thorough diagnosis, drawing up a treatment plan and preventive programs at a dental appointment.

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