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Functional Changes in Periodontal Tissues during Prosthetics with Metal-Ceramic and Zirconium Dentures

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Актуальность. In orthopedic dentistry, dentures made of precious and base metal alloys are widely used to repair defects in crowns and dentitions. The latter consist of cobalt-chromium and nickel-chromium alloys. The problem of the influence of base metals on the organs of the oral cavity and on the body as a whole is relevant. Among them, galvanosis of the oral cavity is more common. Being in the oral cavity for a long time, a denture, as a foreign body made of a material not peculiar to the human body, causes structural changes in the marginal periodontium. Therefore, modern orthopedic dentistry is faced with the question of the compatibility of metal dental alloys and the human body. The phenomenon of "intolerance", galvanosyndrome, galvanosis, described in the literature, can be explained by the body's reaction to the presence of metal inclusions in the oral cavity, which is expressed not only by intolerance to dentures, but also by the manifestation of a burning sensation of the tongue, hypo- and increased salivation, changes in taste, etc., etc. [2.4.6.8.10.12]. In this regard, the study of the state of galvanosis of the oral cavity with non-removable dentures made of various metals becomes relevant and requires further research in this direction, which will improve the quality of dental care and prevent premature removal of orthopedic structures. The available research in this area is few and fragmentary. Therefore, the identification of causal circumstances contributing to the occurrence and causing diseases of the oral mucosa when using various types of prostheses (metal crowns, ceramics, zirconium) using histological, electron microscopic and histochemical research methods will allow us to develop more effective methods of their treatment and prevention.

The purpose of the study. A comparative assessment of morphological and functional changes in periodontal tissues is carried out when using metal, cermet and zirconium dentures to increase the effectiveness of prosthetics.

Materials and methods. For morphological examination, 1 × 1.5 mm pieces of tissue were taken for transmission electron microscopy. Pieces of bioplast were fixed during glutaraldegesis. Electron microscopic studies were conducted under the supervision of Professor I.M. Baibekov. The bone tissue around the supporting tooth was examined using X-ray machines. The pictures were taken according to Yusupov. Computed tomography was performed to assess the bone structure of the upper and lower jaw. To determine the endurance of periodontal tissues to vertical load, gnathodynamometry was performed using electronic gnathodynamometers. Electrodontometry was performed selectively, and only those teeth that were included in the supporting teeth for bridges and according to indications. The bridges used (cermet, zirconium, metal crowns) create conditions for the development of increased functional load on the periodontal tissues of the supporting teeth. When prosthetics of the included defects of the dentition with bridges, it is necessary to determine possible functional changes in periodontal tissues, which can largely determine the timing of their use. The change in blood circulation in periodontal tissues directly depends on the degree of deformation of the dentition, the length of toothless teeth and the involvement of bridges in the chewing load. Special attention in prosthetics (cermet, zirconium) should be paid to changes in the state of the marginal periodontium at the level of microcirculation, which was one of the goals of this study. To determine the marginal periodontal of the supporting teeth of the first group, we selected 64 patients, the second group - 10 people [1.3.5.7.9.11.13.15.17.19.21].

The study groups consisted of 5 groups: 10 patients (16.0 ± 4.2%) with intact periodontal diseases, 16 patients (24.0 ± 4.9%) with gingivitis, 22 patients (36.0 ± 5.5%) with mild periodontitis, 10 patients (13.3 ± 3.9%) with moderate periodontitis severity, 6 in patients (10.7 ± 3.5%) - periodontitis at the

stage of abscess formation. The condition of periodontal tissues, in particular the marginal gums, was assessed according to clinical and paraclinical research methods in the field of supporting teeth in the dynamics of observations up to 1 year in patients of the main observation group and the comparison group. Statistical processing of the obtained data was carried out using variational statistics of the computer programs "MS Excell" and "MS Access" in a standard volume for biomedical research. Dental deposits were removed before using the electrodontometry method.

Results and analyses. All design features and the type of material from which the bridges were made, age indicators are given in the section "Materials and research methods". In the comparison group (control group), studies of 24 teeth with intact periodontium on the upper and lower jaws were carried out on the basis of basic and paraclinical research methods (percussion, the condition of the gingival margin using a bulbous probe), X-ray and sighting images, electrodontometry - to determine the condition of the pulp and periodontium. In the main patient observation group, in addition to determining the type of structural features of bridges, all supporting teeth were examined in the same sequence as in the comparison group. All patients were familiarized with the treatment plan and manipulations (removal of bridges, if necessary, upcoming stages of treatment, replacement of structures, exclusion of possible side effects and pathological conditions), written consent and financial costs signed by patients [18.20.21.22].

The errors that we identified were most often associated with the wrong choice of supporting teeth for bridges, the choice of the prosthesis design not according to indications (irrational prosthetics), violation of the regime during the preparation of hard dental tissues, traumatization of the periodontal edge due to non-compliance with the immersion of dentures. crowns in the periodontal furrow. The criteria for the quality of crowns were assessed by the discrepancy of anatomical shapes, taking into account the group of teeth, excessive or insufficient insertion of crowns into the gingival groove, causing retraction of the neck of the tooth or leading to hypertrophic gingivitis, supercontacts - to changes in the periodontal complex.

Taking into account the radiological, functional parameters and the state of the periodontal complex, electrodontometry (EOM) was used: the supporting teeth were subjected to depulpation or root canal transplantation with poor-quality obturation. During prosthetics, the supporting teeth were subjected to odontopreparation for cermet or zirconium according to a generally accepted technique: the design of the protrusion, retraction of the periodontal edge using appropriate filaments. The impression was obtained using silicone sandwich technology. Laboratory and clinical stages: installation of frames, prosthetics, fixation were carried out in accordance with the rules of orthopedic dentistry.

The clinical condition of the marginal periodontium was assessed visually and using an operating microscope, the Schiller-Pisarev test and the papillary-marginal alveolar index (PMA), where hyperemia, edema, bleeding and vascular pattern were determined. In case of bridge prosthetics, when odontopreparation was performed and the gums were injured (periodontal pathology), the depth of the gingival groove in 50% of cases reached 3 mm. These data related to the indicators of the marginal gum of the supporting teeth around the defect during repeated prosthetics of patients. The condition of the periodontal fissure served as the basis for the assessment of marginal periodontal disease in people wearing non-removable prostheses, both during repeated prosthetics and during future orthopedic interventions. We studied the magnitude of electrochemical potentials in connection with the presence of various design features in the oral cavity of prostheses, as well as the materials from which they were made: solid, cermet, zirconium. It is known that dentures made of various materials lead to a violation of the homeostasis of the oral cavity and have an adverse effect on the body as a whole. In particular, there are violations in the triggering mechanisms in the development of allergies, hyperergic conditions, ulcerative and trophic processes. In this regard, the definition and understanding of causal factors in the conditions of the galvanic environment of the oral cavity is based on the use of paraclinical methods, in particular, on the study of electrochemical potentials. Our data on electrochemical potentials (ECP) are consistent with the indicators of numerous studies and are usually up to 50 mV. Analyzing the identified EDS frequencies, it is obvious that the wear of metal structures is directly related to an increase in the level of galvanic currents. Thus, when studying ECP in patients

using structures made of dissimilar materials, the average measurement values tended to higher potential differences and reached the level of 100-150 mV. Poor, inadequate endodontic treatment leads to changes in the periodontal complex, which ultimately leads to side effects and premature removal of bridges.

Conclusions. Activation of the inflammatory process in periodontal tissues has been established, manifested by an increase in the concentration of pro- and anti-inflammatory cytokines already on the 7th day after fixation of the prosthetic structure.It was revealed that with zirconium prosthetics, there is a positive dynamics of local immunity in gastric cancer in patients of this group. During the examination, there were no foci of inflammation caused by dentures, which indicates satisfactory regeneration of the tissues of the prosthetic bed, and, according to the patients, they were fully adapted to the denture.

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