



Clinic-Laboratory Characteristics of Periodontal Tissues When using Orthopedic Structures on Dental Implants

**Babajanov Omon Komiljonovich., Qurbonov Dilshodbek Farxod O'g'li.,
Karimov Rasulbek Xasanovich**

Urgench Branch of Tashkent Medical Academy

Relevance. Dental diseases, the tasks of providing import-substituting technologies that make it possible to achieve full rehabilitation of all patients with dental defects and dentition rows come to the fore. An analysis of modern literature has shown that over the past 10 years, more than 40% of the population over the age of 30 have dental defects and limited dentition defects that require replacement with aesthetic orthopedic structures. In this regard, the problem of replacing dental rows with dental implants followed by prosthetics of patients using non-removable structures, especially metal-ceramic ones, is very relevant. Dental implantation has long been a routine practice, and the aesthetic properties of ceramics give patients a sense of comfort, inner satisfaction and confidence. At the same time, such structures are quite often the cause of periodontal tissue diseases, both of the supporting teeth, and inflammation of the periimplant zone in the area of the supporting dental implants. Pathological changes in periodontal tissues can occur as a result of the impact of the prosthesis material on the adjacent gum tissue, as a result of the interaction of the dental implant with the oral environment. The negative effect of non-removable dentures on peri-implant tissues in the area of supporting implants may be aggravated by the design features of the prosthesis, poor oral hygiene, and other factors. For a long time, research has been conducted in surgical dentistry and periodontology to develop and improve methods of treating periodontitis, however, the issues of relieving inflammation in the periimplant tissues around dental implants loaded with metal-ceramic structures remain poorly understood. The specificity of the problem lies in the fact that the widespread use of dental implants began relatively recently - no more than 20 years ago, with their more frequent use in practice, previously unknown and poorly documented pathological conditions of periodontitis, such as peri-implantitis or mucositis, appeared. Research on the causes and mechanisms of development of pathological changes in periodontal tissues during implantological interventions followed by prosthetics of patients using metal-ceramic structures. In some publications, the leading role in the development of the pathological process in periodontal tissues is attributed to the violation of free radical oxidation of lipids and the immune system. However, there is still no information in the literature about the state of periodontal tissues, the quantitative and qualitative composition of the microbial flora of the periimplant zone, the antioxidant and immune systems in individuals after dental implantation and prosthetics of dental defects and dentition rows with non-removable metal-ceramic structures. The study of this aspect of the problem determines the relevance of the present scientific study aimed at optimizing the methods of treatment and prevention of pathological changes in the periimplant zone in the area of supporting dental implants in patients with prosthetics with non-removable metal-ceramic structures. For the first time, as a result of the conducted research, new information was obtained and the already available information on the pathophysiological reactions of periimplant tissues in the field of dental implants during their operation using metal-ceramic structures was supplemented. For the first time, an



immunohistochemical and morphological assessment of the regenerative potential of peri-implant tissues around supporting dental implants was performed in patients with prosthetics with non-removable metal-ceramic structures. For the first time, data have been obtained on the localization and distribution of HLA-DR+, CD3+, CD4+, CD8+, CD16+, CD20+, CD23+ immunocytes in the epithelium and the intrinsic plate of the alveolar process mucosa in patients with non-removable metal-ceramic structures on dental implants. Based on the study of a number of indicators of the pro-oxidant-antioxidant, immune systems and the composition of the microflora of the oral cavity, it has been proved that the treatment of periodontal injuries in patients with prosthetics with non-removable metal-ceramic structures on dental implants requires the use of antibacterial and antioxidant drugs, depending on the severity of the pathological process.

The following methods were used: clinical - to determine the condition of periodontal tissues in healthy individuals and patients with periodontal injuries that occur after prosthetics with non-removable metal-ceramic structures on dental implants; morphological and immunohistochemical methods; biochemical, immunological, cytological, microbiological methods; statistical - to process the research results. The subject of the study was the development of the most effective therapeutic measures for inflammatory diseases of periimplant tissues in the field of supporting dental implants that occur in people with prosthetics with non-removable metal-ceramic structures. The results of the study. Partial tooth loss and defects in their hard tissues are the most common pathological condition of modern humans. Bridges are more often used to replace dental defects. To restore the aesthetics and function of the tooth, complete artificial crowns are made, which are indicated in cases where there are no other possibilities for further treatment and restoration using therapeutic and gentle orthopedic methods. However, in the presence of metal and combined dentures in the oral cavity, various pathological changes may occur. Regarding the causes and mechanisms of development of changes in the organs of the oral cavity when using non-removable metal structures, there are a number of opinions that have not been confirmed by research. Prostheses can have mechanical traumatic, toxic, and toxic-allergic effects on the tissues of the prosthetic bed. Clinical observations for 2-3 years or more of patients with prosthetic cermet structures and the revealed disorders associated with local gum recession allowed us to conclude that these prostheses have an effect on the periodontal support teeth. Like all functionally determined tissue complexes, periodontal disease has a unity of structure and function. The organization of the vascular system and its relationship with the structural elements of the periodontal ligament are responsible for the periodontal functions. The deep relationship is confirmed by the dependence of the metabolism of the bone substance of the alveolar process on the functional activity and condition of the periodontal ligament. The reasons for the functional overload of the periodontium during prosthetics with non-removable metal-ceramic structures may be incorrect planning of dentures with large defects in the dentition, insufficient number of supporting teeth of bridges, modeling of crown bumps and facets that do not correspond to the features of the movement of the lower jaw, insufficiently carefully adjusted occlusion before glazing of dentures. It should be noted that even with an optimally formed occlusal surface, the supporting teeth in a non-removable bridge prosthesis always experience functional overload due to the fact that chewing pressure is applied not to the tooth itself, but to the prosthesis, that is, at some distance from the support. Periodontal diseases can occur at the stages of prosthetics and as complications associated with the presence of orthopedic structures. Shcherbakov A.S. and co-authors (1994) introduced the term "marginal prosthetic periodontitis" into dentistry, applicable to periodontal diseases that occur during the use of dentures. There is a close relationship between the inflammatory process in periodontitis and damage to its tissue structures. Damage, regardless of the type - infection, mechanical injury, exposure to toxins - is the trigger for inflammation. In the process of prosthetics, the gingival margin is adversely affected, primarily during tooth preparation. Mechanical damage to the marginal and interdental gums is one of the main etiological factors in the occurrence of localized periodontal diseases. According to the results of rheoparodontography, pronounced changes in the functional state of blood vessels occur in the periodontium of depulped



teeth after their preparation. Changes in the hemodynamics of the microcirculatory bed of the periodontium significantly affect the metabolic processes in it, its functional properties, reactivity, the formation of adaptive and compensatory reactions, increase the ability to develop inappropriate reactions, inflammatory and dystrophic processes. A violation of the microcirculatory system and the exclusion of one of the components of the maxillary segment (pulp) causes a change in the reactivity of periodontal tissues and the system as a whole.

When prosthetics are made with solid denture structures, gum retraction in the area of the supporting teeth is necessary to obtain a high-quality double impression. The study of this stage of prosthetics led to the conclusion that deep retraction leads to traumatic damage to the marginal periodontium and the development of destructive changes. Many studies show the influence of the depth of the crown edge on periodontitis. There are three variants of the location of the edge of artificial crowns: supragingival, subgingival and at the level of the gingival margin. Periodontal inflammation with a subgingival location of the crown edge is caused by direct mechanical irritation of the tissues by the crown edge. Long-term results of the use of metal-ceramic prostheses indicate frequent inflammation of periodontal tissues in the area of teeth covered with metal-ceramic crowns extending under the gum. Out of 360 teeth with subgingival crowns, gingivitis was detected in 242 (67%) teeth, while 82 (14.3%) out of 570 teeth covered with crowns reaching the gums. The cause of this complication is injury to the gingival margin. If the fixation of the crown is accompanied by an indentation of the multilayer epithelium, aseptic chronic inflammation develops in the tissue, followed by atrophy of the interdental septum and mucous membrane. With deeper penetration and injury by the edge of the crown of the attachment epithelium in the gum, an acute inflammatory reaction develops, which becomes chronic after a few days. Those who did not reveal a difference in the effect on periodontitis of the depth of the crown edge consider the main factor of inflammation not mechanical irritation of the gums by the edge of the crown, but the quality of the marginal fit of the prosthesis. The shape of the ledge, the angle of inclination and the height of the stump of the prepared tooth, the presence of space for cement under the crown, the force applied during cementing, the viscosity of the cement, compensation for alloy shrinkage, and perforation of the crown to facilitate the displacement of excess cement affect the accuracy of the fit of solid-cast non-removable dentures to the prosthetic bed. One of the factors determining the presence of inflammation of the marginal periodontal is the form of preparation of the tooth under the crown. When the edge of the crown is positioned at the gum level, there are no changes in the periodontium, regardless of how the tooth was prepared: with or without a ledge. If the edge of the crown goes under the gum, the formation of a ledge is necessary to prevent injury to the soft tissues of the marginal periodontal and reduce the retention of food residues and soft plaque in the cervical region.

Conclusion. The shape of the edge of the artificial crown has a significant effect on periodontal tissue. The cause of marginal periodontitis may be a mismatch between the edge of the crown and the width of the created ledge, loose coverage of the tooth neck with a solid crown, and a significant thickness of its edge. Inflammatory periodontal changes during prosthetics with non-removable structures are also caused by the property of lining materials to swell in the humid environment of the oral cavity. The study of water absorption by various dental materials used for the manufacture of non-removable dentures has shown that porcelain mass absorbs liquids twice as much as plastic and photopolymer composites.

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