REHABILITATION OF PATIENTS AND MODERN METHODS OF THEIR RESTORATION USING VARIOUS TYPES OF REMOVABLE PLATE DENTURES

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Abstract. *This literature review presents modern views on options for orthopedic rehabilitation of patients using removable plate dentures, including their technological, functional, operational, phonetic, chewing features, as well as information about modern materials for the manufacture of dentures. Based on the literature data, we can conclude that despite the active development of the technological component of the manufacture of removable dentures, the basic principles of their design, methods for assessing the effectiveness and comfort of use have not undergone significant changes. However, there are a significant number of factors, the influence of which on the success of orthopedic rehabilitation with removable dentures has not been fully studied. For example, dentists, orthopedists often do not analyze the volume of atrophy of the bone tissue of the jaws and design the basis of a denture without taking these indicators into account. Another important issue that remains unexamined is taking into account the design and architectonics of the resulting prosthesis and its effect on the speed and direction of respiratory flows in the oral cavity. All this creates a technological window that allows, by complying with the physiological requirements of the factors described above, to significantly increase the functional properties of the denture and facilitate the patient's adaptation to the denture by reducing the adaptation period.Research conducted in this area of knowledge will allow us to obtain both new scientific data and develop a number of practical recommendations aimed at improving the quality of orthopedic rehabilitation using removable dentures made of various materials.*

Key words*: plate prostheses; orthopedic removable prosthetics; prosthetics after surgery; chewing efficiency; acrylic plastics; thermoplastic plastics.*

РЕАБИЛИТАЦИЯ ПАЦИЕНТОВ И СОВРЕМЕННЫЕ МЕТОДЫ ИХ ВОССТАНОВЛЕНИЯ С ИСПОЛЬЗОВАНИЕМ РАЗЛИЧНЫХ ВИДОВ СЪЕМНЫХ ПЛАСТИНЧАТЫХ ЗУБНЫХ ПРОТЕЗОВ

Аннотация. *В данном обзоре литературы представлены современные взгляды на варианты ортопедической реабилитации пациентов с использованием съемных пластинчатых зубных протезов, включая их технологические, функциональные, эксплуатационные, фонетические, жевательные особенности, а также сведения о современных материалах для изготовления зубных протезов. На основании данных литературы можно сделать вывод, что несмотря на активное развитие технологической*

составляющей изготовления съемных зубных протезов, основные принципы их конструирования, методы оценки эффективности и комфортности использования не претерпели существенных изменений. Однако существует значительное количество факторов, влияние которых на успешность ортопедической реабилитации съемными зубными протезами изучено не в полной мере. Так, например, врачи-стоматологи-ортопеды зачастую не анализируют объем атрофии костной ткани челюстей и проектируют базис зубного протеза без учета этих показателей. Другим важным вопросом, который остается неизученным, является учет конструкции и архитектоники получаемого протеза и ее влияние на скорость и направление дыхательных потоков в полости рта. Все это создает технологическое окно, позволяющее за счет соблюдения физиологических требований факторов, описанных выше, существенно повысить функциональные свойства зубного протеза и облегчить адаптацию пациента к зубному протезу за счет сокращения периода адаптации. Исследования, проводимые в этой области знаний, позволят получить как новые научные данные, так и разработать ряд практических рекомендаций, направленных на повышение качества ортопедической реабилитации с использованием съемных зубных протезов из различных материалов.

Ключевые слова: *пластинчатые протезы; ортопедические съемные протезы; протезирование после хирургических вмешательств; жевательная эффективность; акриловые пластмассы; термопластичные пластмассы.*

The leading place in prevalence among all causes of tooth loss throughout life is occupied by dental surgical removal of teeth. Tooth extractions are often an inevitable outcome of caries complications in the form of irreversible periodontal changes with the impossibility of conservative treatment and, as a consequence, the inability to save individual teeth or sections of the dentition. Another, no less common cause is chronic periodontitis, which leads to significant loss of bone tissue of the alveolar process of the jaws, and therefore tooth-preserving manipulations have either a minor or short-lived effect due to the aggressive course of this disease. In this regard, to prevent the formation of chronic inflammation and, against this background, persistent resorption of the bone tissue of the jaws, as well as a significant decrease in the dental health of patients, chronic periodontitis in the severe stage of its course is a direct indication for tooth extraction.

Moreover, this nosology tends to be generalized, which leads to multiple tooth extractions. Various traumatic situations, in particular mechanical injuries and non-gunshot lesions of the maxillofacial area in peacetime, also often result in the need to remove teeth for preventing inflammatory complications and relieving pain in patients seeking dental care. In addition,

traumatic situations themselves lead to tooth loss.

The above reasons for tooth loss significantly increase the population's need for dental orthopedic treatment. At the same time, a large proportion of patients in need of orthopedic restoration of dentition defects need to be treated with removable orthopedic structures.

This is due to the fact that the impossibility of using fixed structures supported by teeth or dental implants lies in the lack of conditions for their fixation due to multiple missing teeth, terminal defects of the dentition, deformation of the jaws and resorption of their bone tissue.

Currently, there is a wide variety of materials for the manufacture of removable laminar dentures. One of the first and most widely used technologies for manufacturing plate dentures is the technology for producing a denture by polymerizing acrylic plastics. These plastics are chemically acrylates. The advantages of this material are that it has a relatively low percentage of side substances that irritate the oral mucosa, which will be discussed in more detail below; in addition, it has good color stability and a high level of chemical adhesion to artificial teeth that recreate the patient’s dentition.

Along with acrylic materials, there are wide possibilities for using thermoplastic and elastic polymers for the manufacture of laminar dentures. These materials differ from classic acrylic ones in that they have the ability to control their shape when exposed to a higher temperature environment. Such materials include nylons, polyamides, ethylene vinyl acetates, polypropylenes, polyoxymethylenes. A feature of the polymers from which prostheses are produced using injection technology is the absence of residual monomer. Other positive qualities of these dentures are elasticity, high strength, and a more uniform distribution of the chewing load between the tissues of the denture bed and natural teeth.

The peculiarity of these technologies is that the finished design of the plate prosthesis is formed in a closed ditch by injection or injection of the material for the base of the prosthesis under pressure, supplied in special cartridges, through a gating system brought to the place of the wax base of the prosthesis, plastered directly, into the ditch.

At the same time, in this technology, as well as in the technology of hot polymerization of plastics, there is a stage of melting wax, which allows you to create the necessary space between the layers of gypsum for filling it with plastic directly on the working model of the jaw plastered in a ditch.

For dental orthopedic structures, polymers are currently used, which are macromolecules with a molecular weight from several thousand to several million, consisting of two or more units of different composition. The synthesis of polymers occurs using a polymerization reaction, the essence of this reaction consists in the fact that molecules of low molecular weight substances, which are monomers by nature, attach to the active centers of polymers, which are high molecular

weight substances. During this reaction, the above macromolecular units are formed, which differ in composition from the original monomers and are formed by their sequential “cross-linking” with the release of low-molecular-weight by-products. Due to the peculiarities of their polymer structure, plate prostheses have a certain fragility, as a result of which they are dependent on excessive mechanical loads. Thus, there are common methods for assessing the strength properties of prostheses, including tensile, bending, impact, torsion, and compression tests.

In addition to the listed parameters, the most important is the assessment of the hardness or elastic modulus of the prosthesis. It is this parameter that characterizes the wear resistance of the plate structure, which is especially important under constant mechanical loads that can cause abrasive wear of the polymer.

Thus, plate prostheses, despite the long history of their existence, still remain the subject of research. This is due to the fact that modern, constantly improving materials are endowed with not only the functional properties necessary for the successful use of a prosthesis, but may also contain some unstudied side effects. In addition to the study of physical, functional and biocompatible properties, plate prostheses were the subject of an in-depth study of the patient’s adaptation processes to these structures, including occlusal and phonetic-speech, which is also used to assess the quality of removable prosthetics.

The maximum functional efficiency of plate prostheses occurs when there is no discomfort or pain during its use and phonetic and motor adaptation is formed. The time of adaptation to a removable prosthesis depends on the onset of the phases of partial and complete nervous inhibition.

The presence of painful sensations when using a prosthesis can delay the onset of final adaptation, while the prosthesis is felt as a foreign body. Based on the classical understanding of physiological adaptation to a prosthesis, three phases of habituation are considered according to V. Yu. Kurlyandsky: irritation, partial inhibition, complete inhibition.

A correctly selected occlusion scheme is one of the most important functional, as well as phonetic and aesthetic components of creating plate prostheses. Analysis of the accuracy of placement and position of artificial dental arches and individual teeth is an important criterion for assessing a plate prosthesis, determining the degree of recreation of chewing and speech functions, which allows for a qualitative assessment of orthopedic treatment.

In addition, it is worth paying attention to the chewing function formed by artificial dentition. The issue of monitoring chewing efficiency is one of the most important aspects affecting the quality of treatment, rehabilitation and life of patients with partial or complete loss of teeth, since especially in the latter case there is a complete decrease in chewing ability due to morphofunctional changes in all elements of the dental system.

For the chewing process, it is customary to use the concept of "chewing efficiency", which

is characterized by the degree of grinding of food by the dental system during the physiological function of chewing. It is this concept that provides a qualitative characteristic, with the help of which can be used to evaluate the chewing process in conditions of tooth loss or in conditions of the patient using a plate prosthesis. To control the increase and restoration of the degree of chewing efficiency using removable plate prostheses, various studies are used, which include static, functional and graphic methods and tests.

To control the increase and restoration of the degree of chewing efficiency with the help of removable plate dentures, various studies are used, which include static, functional and graphic methods and tests. For the most accurate and objective measurement of the degree of chewing efficiency after complete or partial replacement of dental defects, it is customary to use functional chewing tests.

They often consist of three main stages: 1 - selection and preparation of a portion of the test product; 2 - chewing the test portion; 3 - granulometric (sieve) analysis of the crushed material and processing of the results. Most functional chewing tests are reduced to chewing specially selected food or a special synthetic material for a certain time or taking into account the amount and hardness of the test material with subsequent calculation of the chewing efficiency coefficients.

The most common tests were proposed by I. S. Rubinov, A. N. Ryakhovsky, V. N. Trezubov. Thus, these studies allow us to obtain a dynamic assessment of the effectiveness of plate dentures, which directly affects the quality of orthopedic dental treatment of patients with partial or complete loss of teeth. Static methods for assessing chewing efficiency are more applicable to assessing the chewing ability of those patients who are indicated for prosthetics using fixed structures. However, such methods can also be effective in the case of using partial removable plate dentures combined with fixed orthopedic structures; such methods include the systems proposed by N. I. Agapov and I. M. Oksman. Graphic methods for assessing chewing efficiency can be implemented using masticatiography with subsequent interpretation of the study results and compilation of tables of chewing ability coefficients.

Conclusions: based on the literature data, it can be concluded that despite the active development of the technological component of the manufacture of removable dentures, the basic principles of their design, methods for assessing the effectiveness and comfort of use have not undergone significant changes. However, there are a significant number of factors, the influence of which on the success of orthopedic rehabilitation with removable dentures has not been fully studied. For example, dentists and orthopedists often do not analyze the volume of atrophy of the jaw bone tissue and design the base of the denture without taking into account these indicators. Another important issue that remains unconsidered is taking into account the design and

architectonics of the resulting prosthesis and its effect on the speed and direction of respiratory flows in the oral cavity. All this creates a technological window that allows, due to compliance with the physiological requirements of the above factors, to significantly improve the functional properties of the denture, facilitate the patient's addiction to the prosthesis by reducing the adaptation period. Research conducted in this area of knowledge will allow us to obtain both new scientific data and develop a number of practical recommendations aimed at improving the quality of orthopedic rehabilitation using removable dentures made of various materials.

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