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DATA ANALYSIS OF INTERCONNECTION OF REMOVABLE PROSTHESIS BASE WITH TISSUES OF PROSTHETIC AREA (LITERATURE REVIEW)

Prosthetics of patients with complete and partial absence of teeth still remains an unsolved problem. In the process of planning the design of dentures, as well as at the manufacturing stages, a number of medical and technological problems arise, related to the need for optimal unloading of the tissues of the alveolar process and the alveolar part of the jaws from chewing pressure.
At the same time, researches of recent years show that certain problems of improving clinical and technological methods of manufacturing removable dentures have not yet been properly resolved, which became the basis of our review of literary sources.
The aim of our research was to analyze the scientific literature to develop a theoretical basis for creating functionally effective removable orthopedic dental prostheses using modified dental materials.
Materials and Methods. *According to various authors, up to 29±0.9% of patients do not use removable orthopedic dental prostheses due to inflammatory processes in the mucosa under the base of the prosthesis, discomfort, or pain caused by the mismatch between the prosthesis base and the prosthetic area.*
Various factors, such as porosity, internal stresses, deformations, and increased monomer content in base materials, have been studied by many researchers. It has been established that the use of forming materials with increased strength and dispersion, application of silicone separating layers, casting methods, polymerization under air pressure with slow cooling of the mold and subsequent water immersion significantly improves the physicochemical properties of plastics.
It can be concluded that despite current methods and options for fabricating plate prostheses and attempts to improve their physicomechanical properties, further research is needed to enhance the quality of orthopedic treatment with removable dental prostheses.
Key words: *removable prosthetics, acrylic base, prosthetic bed tissues.*

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АНАЛІЗ ДАНИХ ВЗАЄМОДІЇ БАЗИСУ ЗНІМНОГО ПРОТЕЗА З ТКАНИНАМИ ПРОТЕЗНОГО ЛОЖА (ОГЛЯД ЛІТЕРАТУРИ)

Протезування пацієнтів, які втратили всі або частину зубів, залишається складною і невирішеною проблемою. Під час планування конструкції протезів і на етапах їх виготовлення виникають численні медичні та технологічні проблеми, що пов'язані з необхід-

ністю оптимального розподілу жувального навантаження на тканини альвеолярного відростка та частини щелепи.
Останні дослідження показують, що деякі проблеми вдосконалення клінічних і технологічних методів виготовлення знімних пластинкових протезів досі залишаються нерозв'язаними. Це стало підставою для нашого огляду наукових джерел.
Метою нашого дослідження було проаналізувати наукову літературу для розробки теоретичної основи виготовлення функціонально ефективних знімних ортопедичних конструкцій зубних протезів, використовуючи модифіковані зуботехнічні матеріали.
Матеріали та методи дослідження. *Згідно з даними ряду авторів, до 29±0,9% пацієнтів не використовують знімні ортопедичні конструкції зубних протезів через запальні процеси слизової оболонки під основою протезу, дискомфорт або больові відчуття, що виникають внаслідок невідповідності базису протеза і протезного ложа.*
Різні фактори, такі як пористість, внутрішні напруги, деформації та підвищений вміст мономеру в базисних матеріалах, були предметом вивчення багатьох вчених. Встановлено, що використання формувальних матеріалів з підвищеною міцністю та дисперсністю, застосування силіконових розділових шарів, методів ливарного пресування, полімеризація під повітряним тиском при повільному охолодженні кювет з подальшою витримкою протезів у воді значно покращує фізико-хімічні властивості пластмас.
З цього можна зробити висновок, що, незважаючи на сучасні методи та варіанти виготовлення пластинкових протезів, а також спроби покращення їх фізико-механічних властивостей, необхідні подальші дослідження для підвищення якості ортопедичного лікування знімними конструкціями зубних протезів.
Ключові слова: *знімне протезування, акриловий базиз, тканини протезного ложа.*

Connection of work with scientific programs, plans, topics. The research is a part of the comprehensive research program of Kharkiv National Medical University, The Ministry of Healthcare of Ukraine, Department of Orthopedic Dentistry "Restoring the quality of life of patients with major dental diseases of maxillofacial organs and tissues areas with the help of orthopedic treatment and rehabilitation" (State registration number 0122U000350; 2022–2024).

Statement of the problem. Prosthetics of patients with complete and partial absence of teeth still remains an unsolved problem. In the process of planning the design of dentures, as well as at the manufacturing stages, a number of medical and technological problems arise, related to the need for optimal unloading of the tissues of the alveolar process and the alveolar part of the jaws from chewing pressure [1].

The natural processes of atrophy, at this stage of the development of dentistry and medicine in general, cannot be stopped, and after a certain period of time in patients with missing teeth, the discrepancy between the profile of the tissue structures of the jaw and the profile of the prosthesis base increases [2; 3].

Solving the problem of the relationship between the base of the removable denture and the tissues of the prosthetic area was the basis of many scientific works of this century. This is despite the fact that there is a fairly high frequency of complications when using removable dental lamellar prostheses, despite the current stage of development of modern dentistry [4].

Such a discrepancy progresses and, as a result, after a few years, the removable orthopedic structure is replaced by a new one. It is much worse in cases with increased intensity of atrophic processes of jaw tissues – which is the result of complex clinical conditions of prosthetic area and problems of further orthopedic dental rehabilitation.

In the clinic of orthopedic dentistry, up to 48±0.5% of patients, according to researchers, have unfavorable conditions for prosthetics.

At the same time, researches of recent years show that certain problems of improving clinical and technological methods of manufacturing removable dentures have not yet been properly resolved, which became the basis of our review of literary sources [2; 5].

The purpose of the study was an analysis of the literary sources of the authors' research, as a further theoretical basis for the manufacture of functionally effective removable orthopedic structures of dental prostheses using modified dental materials.

Research materials and methods. According to a number of authors [4; 5; 6], the percentage of patients who do not use the removable orthopedic structures of dental prostheses made for them is up to 29±0.9%. This group of people does not use prostheses due to inflammatory processes of the mucous membrane based on the basis of the used structures [6], discomfort or pain between the base of the prosthesis and the prosthetic area [7].

The results of the statistical analysis show that of the total number of manufactured complete dentures, 18.5±0.2% of patients do not use them due to pain, 21.0±0.75% – due to poor fixation, 3.9±0.5% – due to the difficult way of inserting the prosthesis, 8.2±0.3% – due to frequent breakdowns [8; 9], 5.9±0.8% – due to the inability to chew, 2.5±0.3% – due to an allergic reaction to plastic or other components of the removable orthopedic structure, 3.2±0.2% – due to the vomiting reflex, 2.4 ±0.57% – due to dissatisfaction with the appearance of the structure, 6.2±0.8% – due to impossible adaptation to the orthopelic structure, and 33.8±0.2% – due to a complex of the above reasons, the values of which are reflected in diagram (Fig. 1).

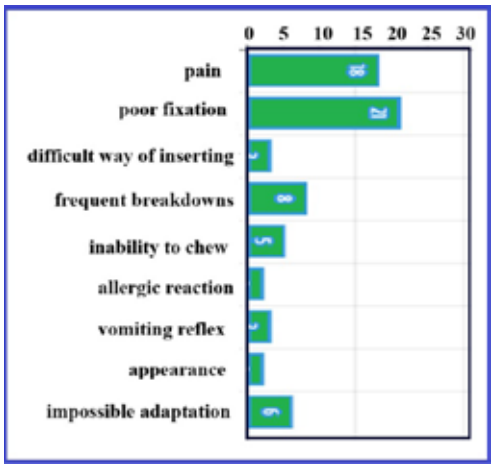

Fig. 1. The most identified reasons for non-acceptance removable orthopedic structures of dental prostheses patients with partial and complete dentition

It is well known that adaptation to removable prostheses, as noted by numerous researchers, is definitely related to their quality [8; 9; 10]. It should be emphasized that this physiological indicator primarily depends on the physical and mechanical properties of the packaging material [10; 11], which is used to make working models. However, it can be noted that currently used gypsum as the main packaging material does not sufficiently meet the requirements for it. Therefore, in connection with the increase in the service life of removable dentures, the percentage of structures that are not suitable for use due to poor fixation is increasing [12]. This is caused by the discrepancy between the base of the prosthesis and the prosthetic area [13] and indicates intensive atrophic processes of the supporting tissues of the prosthetic area.

Many domestic and foreign scientists made a significant contribution to the practical study of the problem of reducing the atrophic phenomena of the supporting tissues of the prosthetic area and increasing the effectiveness of orthopedic treatment of patients with complete and partial absence of teeth [4; 5; 6; 13] and the development of this section of materials science [3; 9; 13; 14].

Until now, the problem of uniform distribution of masticatory pressure of the base of the removable dentures on the tissues of the prosthetic area has not been properly solved. As a result, the ridge of the alveolar process is overloaded, which leads to pathological changes in the tissues of the prosthetic area, that is, atrophic processes of the mucous membrane and bone tissue [14].

The functional value of removable dentures of a full set of teeth is assessed by the degree of their fixation on the jaws, as well as the possibility of reducing atrophic processes in the soft and bone structures of the jaws. The majority of domestic scientists [1; 10; 15] believe that the stability of the prosthesis under functional loads is ensured by a combination of methods of fixation and stabilization. The main role in this is played by the anatomical and physiological features of the tissues of the prosthetic field and organs of the oral cavity, the condition of the mucous membrane of the prosthetic bed and the shape of the alveolar ridge [5; 7; 10; 12; 16].

In order to increase the fixation of the base of the removable dentures to the tissues of the prosthetic area, the technique of replacing the material of the base, changing the size and using a lighter base, partial or complete replacement of the fluid-layer, activation of adhesion forces by introducing surface-active substances into the phase interface zone was used [3; 8; 11; 15; 16]. Cohesion, adhesion and surface tension were found to be factors contributing to the fixation of prostheses. Recently, adhesive materials on a different basis have been recommended for use again, increasing the viscosity of saliva and acting as an adhesive base [12; 13; 17].

The authors investigated the stabilization of removable dentures depending on the placement of artificial teeth. In order to increase the degree of fixation of removable dentures, it is proposed to form the edge of the prosthesis from elastic plastic in accordance with the shape of the transitional fold, thereby creating a reliable marginal closing valve [17; 18].

The use of traditional methods of polymerization of base materials led to a violation of the structure and quality of plastic [1; 2; 6; 9; 14; 15; 19]. It is more acceptable to carry out polymerization in a dry environment, in a dry air cabinet at a temperature of 120–130 °C [19].

To reduce the percentage of cases of toxic-allergic stomatitis, it is recommended to make a removable base of colorless plastic with a coating of colored base material only on its vestibular surface [20].

Many scientists have studied the effect of various factors of porosity, internal stresses, deformations, and the presence of increased monomer content in base materials [2, 4, 18, 19]. It has been established that when using molding materials of increased strength and dispersion, the use of a silicone separating layer, the method of casting pressing, polymerization carried out under air pressure with slow cooling of the cuvette with subsequent exposure of the prostheses in water, significantly increases the physical and chemical properties of plastics [20, 21].

In order to reduce toxic-allergic reactions of the mucous membrane of the oral cavity [22], increase

the strength of prostheses, various basic materials have been developed and modified.

Conclusions. Based on the above, it can be concluded that, despite modern methods, the variety of proposed options for the manufacture of removable dentures, methods of their modification and attempts to improve physical and mechanical properties require further research and, as a result, improvement of the quality of orthopedic treatment with removable structures of dental dentures.

Thus, the need for removable dentures is a topical issue of orthopedic dentistry and, as mentioned above, it is associated with numerous factors, including the quality of the packaging material, which affects the condition of the tissues of the prosthetic area in the process of using various types of removable dentures of the base of a removable lamellar prosthesis.

Based on the research of the authors, it can be noted that the atrophic processes occurring in the region of the top of the ridge of the alveolar part of the lower jaw are caused by a number of factors: distribution of the chewing load on the prosthetic area, inconsistency of the relief of the surface of the base of the microrelief of the mucous membrane.

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