



MODERN ASPECTS OF PATIENT ADAPTATION TO REMOVABLE DENTURES (LITERATURE REVIEW)

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Article history:	Abstract:
Received: September 4 th 2022 Accepted: October 4 th 2022 Published: November 8 th 2022	One of the key modern orthopaedic dentistry problems related to rehabilitation of patients with complete edentulism is the process of their adaptation to artificial orthopaedic constructions. According to fundamental and modern scientific research, the biological factor, i.e. the complex of all reactions of the organism to the prosthesis including psychological reactions that is individual for each user, is the most important one. Development of new conditioned-reflex connections and formation of cortical inhibition of active stimulus, that a full removable denture is, depends directly on the balance and dynamics of patient's neural processes despite having several common characteristics including chronometric ones that can be revealed in the majority of patients of this category. This article discusses the processes of adaptation and optimization of orthopedic dental care tactics.
Keywords: Removable dentures, adentia, chewing apparatus, mucous membrane	

The anatomical and physiological features of the masticatory apparatus determine the nature of the preliminary therapeutic, surgical and orthopedic (orthodontic) preparation before prosthetics, the design features of the future prosthesis, its boundaries and corresponding materials, and the doctor's work methods. The following clinical data depend on their correct accounting and the quality of the manufactured prosthesis: the degree of restoration of the functions of chewing and speech, the patient's appearance, fixation and stabilization of the prosthesis, the frequency and nature of breakdowns, changes in the mucous membrane of the prosthetic bed, the presence of pain, etc. Great influence to the increase of the timing of adaptation to the denture have arising painful sensations from the pressure of the denture (sharp edges of the jaws, bedsores). This is due to the fact that in these cases the prosthesis has an increasing irritating effect, due to which inhibition is not generated and the prosthesis is felt as a foreign body. Inhibition is possible only after all additional stimuli have been removed. It should be noted that not only the anatomical and physiological features of the masticatory apparatus affect the clinical data, but also vice versa. Thus, the targeted distribution of the chewing loads on the prosthetic bed prevents the previously temporary atrophy of the alveolar arch and

the formation of excess of mucous membrane in the form of a "dangling ridge". This allows for a long time to maintain favorable anatomical and physiological conditions of the oral cavity for prosthetics, especially if it is necessary to repeat it after several years.

In case of poor-quality manufacturing of prostheses, reduced ability of the mucous membrane to endure mechanical pressure, unfavorable anatomical conditions (narrow alveolar arches with thinned mucous membrane) of the prosthetic bed, violation of oral hygiene on the mucous membrane, local and diffuse inflammatory processes can develop [K. Sydygaliev, 2002; T.N.Yushmanova, Yu.L. Obratsov, 2010].

In the full absence of teeth, V.N. Kopeikin (2006) recommends changing dentures every 3-4 years, which is due to progressive atrophy of bone tissue in the area of the prosthetic bed. Research by V.P. Naumov (2004) also showed that a decrease in the area of edentulous jaws depends on the terms of use of full removable dentures, since after three years the area of the prosthetic bed of the upper jaw decreases by 6.7%, of the lower - by 10.3% of original value.

When making bridges it is also necessary to decide on the number of teeth that can be used as abutments. This is facilitated by the use of a simple



and affordable static method for assessing the functional value of the chewing apparatus.

To take into account the role of each tooth in ensuring the chewing function, static systems for accounting for chewing efficiency have been proposed. At the same time, in the system of N.A. Agapov, the value of teeth does not depend on the state of the periodontal tissues; when calculating the chewing efficiency of the residual dentition the degree of damage is determined by 100% deduction from the total sum of the coefficients of the extracted teeth and their antagonists. In addition, for wisdom teeth with antagonists a coefficient is set equal to the size of their chewing surface, which in some cases makes the value of the functional ability of the chewing apparatus more than 100%.

The system of I.M. Oksman also provides that the loss of a tooth entails the loss of the function of its antagonists and in the absence of wisdom teeth, it is recommended to take 28 teeth for 100 units. Loss of chewing ability can be determined separately for each jaw, which is difficult when interpreting the indicators of chewing efficiency in individual groups of patients.

In total the functional value of the dentition will be 100 units. The loss of one tooth on one jaw is equal to the loss of the coefficient of this tooth and the loss of 1/2 of the coefficient of the antagonist tooth (due to the violation of its function). With mobility of teeth of the 1st degree they are assessed as normal. With the mobility of the tooth of the II degree they are estimated at half the coefficient and with the III degree they are considered absent. Teeth to be removed are also referred to as missing. Chewing efficiency is expressed in one number. In the case history of the disease, in addition to this, it is possible, in brackets, through a fraction, to give an indicator of chewing efficiency for each jaw separately.

According to R. Grum and G. Rooney (2008) the rate of atrophy of the alveolar arches of the jaws in patients using full removable dentures is 1 mm per year and in the absence of dentures - 0.1 mm per year on the upper and 0.4 mm per year - on the lower jaw.

In addition, in orthopedic treatment, it is important to plan and manufacture phonetically optimal dentures. B.K.Kostur, G.P. Fisenko, S.N.Barmashov (2006) indicate that in order to ensure the optimal timing of phonetic rehabilitation of patients, it is necessary that the thickness of the base of the lamellar removable or arch of the arch prosthesis of the upper jaw should be minimal - 0.9 - 1.2 mm; moreover, the arch should not be more than 0.5 mm away from the mucous membrane of the palatine arch and should be located in the area of

maximum rise of the palatine arch with a repetition of its configuration. The boundaries of the zone of maximum elevation of the palatine arch must be clearly marked on the impression with a chemical pencil, so that when receiving the model, they would be imprinted on it. When prosthetics for people who have a torus on the palatine arch, it is possible to make an arch of the clasp prosthesis, located in the anterior third of the palatine arch in the form of a solid base of minimum thickness; the same base design is recommended to apply for people with an S-shaped palatine arch [G.F.Fisenko, 2007]. Clinical studies by Z.V. Ludilina (2003) showed that the variants of the form of the palatine arch unfavorable for sound formation in the manufacture of complete removable prostheses are the "Gothic" (narrow and deep) palatine arch, a steep palatine arch, when the area of maximum rise is closest to the frontal area of the upper jaw and the S-shaped palatine arch with a sharp thickening of the alveolar arch in the area of the anterior teeth. In such cases speech correction is carried out by designing the basis of the removable prosthesis, creating the basis of the prosthesis with a dome-shaped or flatter form of the palatine arch in the sagittal and transversal directions [GP Fisenko, 2007]. Clinical and experimental studies of S.N. Barmashov (2007) proved the possibility of moving the front teeth up to 2 mm in the vestibular direction and the inexpediency from the phonetic point of view of their movement in the oral direction.

It was established that phonetic adaptation, taking into account the fatigue of the speech-forming organs and the state of discomfort in the process of mastering fixed prostheses, as a rule, lasts from several hours to 7-10 days, and in the manufacture of removable prostheses or mixed prosthetics can last from one day to 2-3 weeks [B.K.Kostur, G.P.Fisenko, S.N. Barmashov, 2006].

An important feature of orthopedic dentistry is the participation of two specialists (an orthopedic dentist and a dental technician) in providing the patient with assistance. Obviously, the outcome of treatment will be determined by the coordinated and high-quality work of each of them.

Currently, dental technicians deal with modern technologies, with complex equipment, the correct operation of which largely determines the quality of dentures and consequently, the nature of the patient's response to the prosthesis inserted into the oral cavity. The modern materials used for dental prosthetics are also varied. Compliance with the technology of working with them is an important factor in the prevention of many complications of prosthetics in the



clinic during the adaptation of patients to dentures [E.M. Ter-Pogosyan, A.K. Iordanishvili, 2005; M.Z. Steingart, 2009].

Neglecting attitude to the recommendations on the use of dental materials and technical equipment, violation of the polymerization mode of plastics, metal burning and processing of the finished prosthesis, etc. (technical and technological aspect) lead to defects in the manufactured dentures in the form of an inhomogeneous crystal lattice of metal structures, their shrinkage, the presence of bubbles in the base of the prosthesis, porosity, stains, areas with increased internal stress, the presence of residual monomer, etc. Such defects cause the emergence in the clinic of such complications as the phenomenon of galvanism, allergization of the body, changes in the oral mucosa, cracking and breakage of prostheses, etc. (medical aspect) and therefore reduce the functional, aesthetic and hygienic qualities of dentures or make them intolerable. It is obvious that adaptation to such prostheses will be prolonged or impossible. Therefore it is necessary to pay special attention to the instructions of industrial manufacturers on the use of dental equipment and materials and follow them. It should be noted that this aspect for the most part relates to dental technicians, since the above mentioned errors occur during the dental production process. Consequently, dental technicians also need to follow deontological guidelines when performing their duties. It is no coincidence that speaking about medical deontology, they mean not only the system of relationships that are established between the doctor and the patient, but also the principles of behavior of medical personnel aimed at maximizing the usefulness of treatment and eliminating adversely affecting omissions in medical activities [E.M. Ter-Poghosyan, A.K.Iordanishvili, 2005; M.Z. Steingart, 2006, 2008]. Compliance with the technology of working with dental materials and the correct operation of technical equipment are important factors in the prevention of many complications of prosthetics that arise in the clinic during the adaptation of patients to dentures.

Interesting and practically significant are the studies of A.V. Tsimbalistov (1996) on the study of the rehabilitation of patients with a secondary reduced occlusion from the position of a systemic response. It was established by them that with the growth of morphological and functional disorders in the development process of pathological conditions the adaptive-compensatory demand for the organ system of the maxillofacial region increases.

At the same time the volume of design and therapeutic measures required to replace the lost

organs is increasing. According to A.V. Tsimbalistov (2000), the success of rehabilitation measures in the clinic of orthopedic dentistry is the result of an adequate impact on all components of pathological processes in maxillofacial localization, namely: syndrome of endogenous intoxication of complex etiology, including diseases of the oral cavity, toxic effects of structural materials and somatic disorders.

In addition, it was proved that the integral assessment of the metabolic status for substances of low and medium molecular weight (S_{LandMMW}) of oligopeptides in patients with oral pathology corresponds to the general clinical somatic assessment of the state of the patient's organs and systems. These indicators simultaneously indicate the existing chronic endotoxemia in the presence of pathological changes and dental structures in the oral cavity. The change in the coefficient S_{LandMMW} urine / S_{LandMMW} saliva in the course of treatment and the approximation of its indicator to normal values (1.4 + 0.3) may indicate the effectiveness of the treatment, and the indicator itself, being very informative, can be successfully used in clinical dentistry for registration of adaptation of patients in the process of rehabilitation.

Our clinical experience has confirmed the opinion of N.N. Urazaeva (2007) that the use of adhesive agents can significantly increase the efficiency of fixation of full plate prostheses under unfavorable anatomical and physiological conditions of the masticatory apparatus. It is no coincidence that abroad, in particular in Great Britain, adhesives are widely used, and about 88 tons of them are consumed per year [G.D. Stafford, 2000]. In addition to improving the fixation and stabilization of removable dentures, the application of adhesives with appropriate pharmacological preparations allows the treatment of fungal lesions of the prosthetic bed [E.H.Scher, G.M. Ritchie, D.J. Flowers, 2008].

The effectiveness of adhesives has been proven using objective research methods. So, N.N. Urazaeva (2007), when studying the functional state of the temporal, masticatory and chin muscles, established that the amplitude of electromyograms (EMG) of the temporal and masticatory muscles during compression of the dentition in patients using adhesives was 25-42% higher than similar indicators of prosthetic carriers who did not use adhesive compositions.

At the same time, the amplitude of the EMG of the chin muscles during chewing in cases of applying adhesive agents was 1.7 times lower than without them. At the same time the time for adaptation to full dentures was reduced from 15-30 to 5-8 days.



Gnatodynamometric studies made it possible to establish that when using an adhesive preparation the maximum compression force of the jaws increased 2.5-3 times [N.N. Urazaeva, 2007].

The study of the strength of fixation of the prosthesis on the lower jaw by the method of detachment from the prosthetic bed without an adhesive immediately after its application and after 1.3 and 24 hours showed that the strength of fixation of the dentures in 95.3% of cases increased immediately after the application of the adhesive, in 85.7% - after 3 hours and only in 33.3% - after 24 hours [F.D.Mizza, J.V.Dikshit, N.S.Muradia, 2003]. A study of the clinical efficiency of a domestic adhesive powder (CSRIS MH USSR and ICD Latvian SSR) showed that it significantly improves the strength of fixation of the base: after 3 minutes - by 436 g, after 1 hour - by 338 g and after 3 hours - by 136 g. Strength fixation decreased over time, but the positive effect of this adhesive was statistically significant within 3 hours [N.N. Urazaeva, 1991].

The use of adhesives was also effective when using dento-maxillofacial prostheses and made it possible to maintain the "tightness" of the prostheses for 2 hours [N.N. Urazaeva, T.A.Katargina, V.M. Chuchkov, 2000].

To optimize the periods of adaptation of patients to removable dentures, dento-maxillofacial prostheses, to improve their functional suction, fixation and stabilization, as well as to eliminate pain and better regeneration of traumatic erosions on the oral mucosa the authors proposed a gel adhesive containing anesthesin, carotolin, methyluracil and medical gel hydrosil. If it was necessary to treat fungal lesions of the oral mucosa (including the prosthetic bed and the margin), levorin was additionally injected into this therapeutic dental gel.

The developed gels are placed on the inner surface of the prosthesis base, as well as the foreign analogue Protal (Septodont) before its application, as well as during repeated visits to patients after the prosthesis correction. These gels can be used at home, but with regulation of the duration of the course of treatment, especially when antibacterial agents are included in the gel.

M.G. Gatamov (2004) recommends using Falimint for a favorable course of orthopedic treatment and shortening the time of adaptation to removable dentures.

The integration of knowledge and the systematization of factors affecting the timing of the process of adaptation to dentures allow it possible to most fully and efficiently combine the possibilities of

dentistry with the individual characteristics of the body of the denture carrier and to avoid a number of complications of dental prosthetics.

Dentures are perceived by the tissues of the human prosthetic bed as a foreign body and are a strong irritant to the nerve endings of the oral mucosa. Irritation of sensitive receptors is transmitted along a reflex arc to the center of salivation, speech, etc., as a result of which salivation, urge to vomit appear, speech, chewing food and swallowing are impaired.

Patients who are re-fabricated prostheses adapt to them much faster - in 5-7 days. The speed of adaptation is also influenced by fixation, stabilization of the prostheses and the absence of pain symptoms. During the adaptation period, the doctor not only carries out the necessary correction of prostheses, but also assesses the quality of orthopedic treatment in general. The results of orthopedic treatment can be considered positive if speech is well restored after prosthetics; fixation and stabilization of prostheses is good; aesthetic standards are observed; there was an opportunity to take solid food; the patient himself positively assesses the prostheses. Objective methods for assessing the effectiveness of prostheses in a functional relation are chewing tests, masticography and audiography. The term of use of plate prostheses (on average) is determined at 3-4 years. After 3 years, the chewing efficiency remains high, but is achieved by a significant increase in the time of chewing food compared to the data obtained by the end of the first year. By this time, as a result of jaw atrophy, the inconsistency of the prosthetic bed with the basis of the prosthesis is determined, which manifests itself in the form of balancing and deterioration of fixation of the prostheses. In addition, if artificial teeth made of plastic are placed in the prosthesis, the incisal edges and masticatory tubercles are worn out as a result of which the height of the lower part of the face decreases. Such patients need to make new prostheses. If the dentures have porcelain teeth, then the elimination of balancing and the restoration of functional suction can be achieved by relining the dentures using a clinical or better laboratory method.

Considering the above stated the goal of our further research is to study the adaptation processes and optimize the tactics of orthopedic dental care.

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