

ELECTROMYOGRAPHIC EXAMINATION OF EDENTULOUS PATIENTS AT THE STAGES OF ADAPTATION TO COMPLETE REMOVABLE PROSTHESES WITH USING OF AN ADHESIVE CREAM FOR FIXING "STOMAFIX"

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Abstract. For economically developed countries, typically an increase in older people [1, 5]. In Ukraine, there is also an increase in the population, citizens of the older generation, both urban and rural [2, 7, 8]. Recently, the number of people with complete loss of teeth has been increasing [3, 5]. Orthopedic treatment of adentia in elderly patients is associated with certain difficulties, taking into account the patient's mental and physical status. In addition, there are functional and physiological changes in the organs and tissues of the maxillofacial region [1, 4].

As a result of tooth loss in the chewing system, there may be important changes affecting the bone, mucosa and muscles. The bone of the alveolar process can be resorbed, the construction of a new bone slows down, a decrease in the number of receptors is observed in the covering mucosa, as a consequence, afferent impulsation decreases. Sensitive impulses of people with edentulous jaws, changes [1, 7, 8]. The amplitude of the masticatory cycle, the effectiveness and strength of the reduction of masticatory muscles, decreases in such patients. The opening and closing speed of chewing processes decreases, and the occlusion pause increases. The result of using of dentures in modification of peripheral information requiring adaptation of the moving control [2, 6].

One of the physical factors that affects of the fixation removable dentures, and the adaptation of patients to them, is adhesion. Therefore, for its improvement, it is advisable to use adhesive materials, increase fixation and stabilization of removable dentures as a simpler and more convenient method with complete removable prosthetics. Using of adhesive materials to improve the fixation of removable dentures increases the functional value of not only new, but old prostheses [1, 2]. The displacement of the prosthesis from the prosthetic plate is reduced when eating, getting excess of the food under the prosthesis, using of the prosthesis becomes more comfortable, what qualitatively exert on the adaptation and organization of the chewing musculature [3, 4, 6].

The examination of the process of adaptation to a new prosthesis is important for understanding the ways of control the chewing musculature and can be provide valuable information for determining the further way of solving various dysfunctions, what qualitatively affects on the adaptation to the prosthesis. Analysis of EMG activity and kinetics of masticatory movements is necessary for understanding the system of motor activity [3, 5, 8].

Electromyography is a type of diagnostics for recording oscillations of biopotentials that occur in the muscle at the moment of its excitation. The detected potentials are captured by surface electrodes. After amplification, they are transferred to a device that allows visualizing potential oscillations. Cutaneous electrodes allow you to record the activity of several muscles in total. The method of electromyography is painless and harmless, which makes it possible to actively use this method to determine the bioelectrical activity of the chewing apparatus [4, 6, 7].

Electromyographic examinations (EMG) of the muscles of the maxillofacial area are one of the leading diagnostic methods in dental practice all over the world. EMG studies of masticatory and facial muscles allow to determine changes in the functional state of muscles in the phase of masticatory movement, as well as in mimic loads. EMG studies allow to diagnose neuromuscular imbalance, to detect displacement of the occlusion center at the stages of prosthetics [3, 4, 5].

Keywords: prosthetics, complete removable prostheses, adhesive cream, chewing musculature, electromyographic examinations.

Materials and methods: The purpose of our investigation was to study the activity of the chewing musculature (EMG method) of patients using the adhesive cream «Stomafix» manufactured by OJSC STOMA at different types of patient adaptation to complete removable prostheses.

Patients who received orthopedic care who used complete removable dentures for the first time were divided into 2 equal groups of 15 people each.

The first (control) group is patients with a traditional technique for manufactures complete removable dentures, without application, during adaptation stages, adhesive materials for fixing prostheses. The second (experimental) group of patients who during the adaptation stages used an adhesive cream to fixing prostheses "Stomafix" OJSC STOMA.

The analysis was performed in patients of both groups at the same time, on the first day of application of the prosthesis, on the 7th day and after a month of using the prosthesis.

During the examination, the patients were comfortably placed in the dental unit, EMG electrodes were superimposed on the chewing muscles on both sides. Patients asked to fix their attention on the object located at a distance of 1 meter, which would exclude lateral movements of the patient's head.

Each record of the examination began with the closing of artificial teeth with maximum contact in the central occlusal ratio. The patient asked to speak in hearing count from 1 to 10, and then tightly compress the jaws.

The recording of the electromyogram performed with the help of the computer-based neurophysiological diagnostic system "M-TEST". As discharge electrodes were used superficial, cutaneous, self-adhesive current collectors.

The recording electrode applied to the motor points of the muscles, the indifferent electrodes located closer to the site of attachment of the nerve muscles. A grounding electrode applied to the patient's wrist. The low-pass filtering was set at 3 Hz, for high frequencies 10,000 Hz. Registration was carried out simultaneously on 2 channels, with right and left chewing muscles.

Estimated the presence of bioelectric excitation at the maximum tension, as well as during the chewing of 800 mg of almonds, before of a swallowing reflex in patients. Also recorded the maximum amplitude in μV and the general amplitude in 1 second of time in mV / s .

Results of the investigation: The maximum amplitude on the 1st day of applying of dentures, according to the EMG examination, during chewing 800 mg of almonds in the first and second group of patients did not differ significantly: 1 group - $501.05 \pm 104.02 \mu\text{V}$ and group 2 - $517.80 \pm 87, 47 \mu\text{V}$. The second analysis was carried out on the 7th day of using of prostheses, after a minor correction of the basis, in consequence with the complaints of patients. Electromyographic parameters are vastly different. In the control group, the maximum amplitude decreased to $431, 50 \pm 90.95 \mu\text{V}$, which means that the chewing muscles are not ready to perceive the contact of the prosthesis basis with the prosthetic plate of the patient. In the patients (group 2) who used the adhesive cream «Stomafix», on the day of applying and on the 7th day of using prostheses, to improve adaptation, the maximum amplitude was slightly different from each other ($527,80 \pm 87,47 - 532,80 \pm 87, 49$ microvolts), which means successful adaptation of the masticatory muscles to the manufactured prostheses.

Parameters of electromyographic investigation of chewing muscles when chewing nuts (Maximum amplitude)

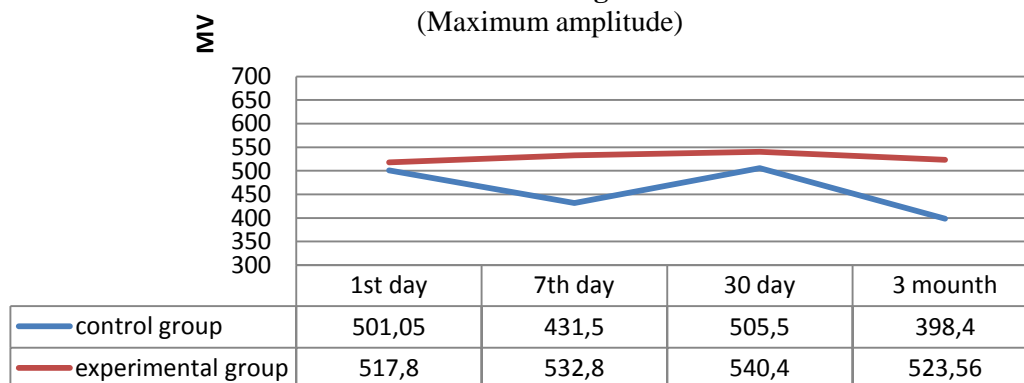


Fig. 3.



Fig. 1.



Fig. 2.

The results of the investigation after a month showed that the maximum amplitude indicators increase at two groups of patients, which indicates the muscle adaptation of patients. For the first group this is 505.50 ± 94.67 . The parameters of the second group are $540.40 \pm 88.45 \mu\text{V}$. An increase in the parameters of electromyographic examinations indicates the rapid and qualitative adaptation of patients to complete removable dentures. The highest parameter of the maximum amplitude of the masticatory muscles during chewing of 800 mg of almonds was observed after a month of using by patients of the 2nd group ($540.40 \pm 88.45 \mu\text{V}$). These parameters indicate complete adaptation of the patient to removable dentures.

Analyzing the data of the EMG investigation, the total amplitude for 1 sec of the chewing muscles with the maximum compression of artificial dentition in group 1 was $25.98 \pm 3.78 \text{ mV / s}$ at the stage of applying of prostheses, in the second group - $26.28 \pm 4.14 \text{ mV / s}$. After a week of active using of prostheses, the total amplitude for 1 second was significantly different. In the 1st group, the indices decreased to $24.81 \pm 4.02 \text{ mV / s}$, and the increased in the 2nd group was $26.19 \pm 3.78 \text{ mV / s}$.

**Parameters of electromyographic investigation of masticatory muscles
with maximum compression of dentition**
(The total amplitude for 1 sec)

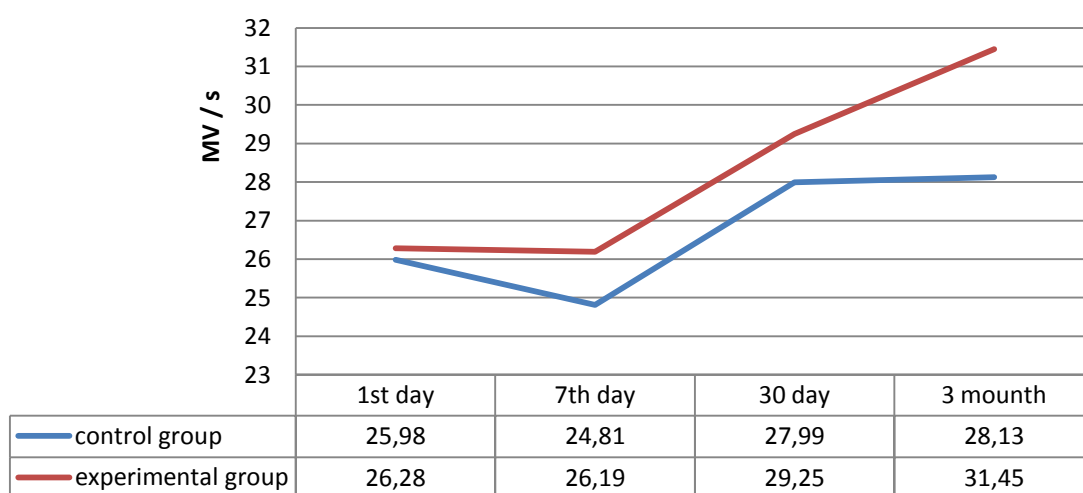


Fig. 4.

The functioning done by the chewing muscles of patients which did not use an adhesive cream to fixing the prosthesis becomes less, as a result, adaptation to the prosthesis will be difficult. During the month of using complete removable prostheses, the functioning of the chewing muscles increases for two groups and reaches its maximum by the end of the month ($27,99 \pm 4,51 \setminus 29,25 \pm 3,95$).

Conclusions: On the first days using of complete removable prostheses with the applying of an adhesive cream, were already observed distinctive indicators of masticatory muscles, an increase in the 2nd group of subjects. The maximum amplitude of chewing muscles when chewing 800mg of almonds by patients who used the adhesive cream "Stomafix" OJSC STOMA during the month increased and did not decrease during the whole period of the investigation, which indicates an early adaptation to the manufactured prosthesis already on the first day using. It should also be noted that there was a reduction in the traumatic factor using of removable dentures in the 2nd group of patients who used an adhesive cream, which explains the early adaptation of patients to complete removable dentures.

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ОЦІНКА ЯКОСТІ ОРТОПЕДИЧНОГО ЛІКУВАННЯ ЧАСТКОВИМИ ЗНІМНИМИ ПЛАСТИНКОВИМИ ПРОТЕЗАМИ З БЕЗКЛАМЕРНОЮ ФІКСАЦІЄЮ

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Abstract. *Adaptation of patients with removable partial dentures (RPD) is one of the most important problems of prosthetic dentistry. This is due to the mechanical trauma of prosthetic bed mucosa, changes in the microflora of the oral cavity, as well as allergic and toxic-chemical changes under the influence of substances included in the composition of the material of the prosthesis. Therefore, our primary objective is the development of structural materials to reduce side effects and enhance patient adaptation to dentures.*

The aim of the study was to improve the effectiveness of orthopedic treatment of patients with dentition defects due to the manufacturing RPD by proposed method and assess the quality through a comparative analysis of the number of corrections of the partial removable dentures with clasp and clasplless fixation.

The patients with RPD were divided into two groups: control (30) – manufacture of acrylic dentures with clasp fixation according to traditional methods; II (30) – fabrication of dentures using a-silicone material for claspless fixing by the proposed method.

The average number of adjustments of the basis of acrylic dentures was $2,2 \pm 1,8$ ($p < 0,05$), and in patients who have dentures with a layer of A-silicon material "PM-S Extra" – $0,5 \pm 0,5$ ($p < 0,05$).

The obtained data gave the possibility to state the fact of reducing the number of adjustments of basis of clasplless denture $0,5 \pm 0,5$ ($p < 0,05$) compared to clasp fixation $2,2 \pm 1,8$ ($p < 0,05$). The results of the study can be explained by the fact that denture with clasplless fixation is less traumatic on the mucosa of the oral cavity, which positively affects the process of adaptation.

Keywords: *removal partial dentures, A-silicone material, correction of denture base, clasplless denture, the quality of orthopedic treatment.*

Адаптація пацієнтів до ЧЗПП є однією із найважливіших проблем сучасної ортопедичної стоматології. Це обумовлено механічним травмуванням слизової оболонки протезного ложа, зміною мікрофлори ротової порожнини, а також алергічними і токсико-хімічними змінами під впливом речовин, що входять до складу матеріалу протеза. Тому першочерговим завданням залишається розробка конструкційних матеріалів для зниження побічної дії та підвищення адаптації пацієнтів до зубних протезів [1].