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THE PROBLEM OF USING ADHESIVES IN THE FIXATION OF COMPLETE DENTURES

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The purpose of the study was to evaluate the functional efficiency of the prosthesis made by traditional and improved methods for the fixation state of the completely removed lamellar prosthesis. In total, the study covered 609 patients aged 45 to 90 years. Evaluation of the functional efficiency showed that subjective opinion of the patient, 33 days after the application of the prosthesis, in the main group among men: 38.1 % – 7 points (excellent), 9.5 % – 6 points (good), 2.4 % – 5 points (satisfactory); among women: 35.7 % – 7 points, 9.5 % – 6 points, 4.8 % – 4 points. In the control group among men: 3.0 % – 7 points, 3.7 % – 6 points, 4.1 % – 5 points, 40.9 % – 0–3 points; among women: 4.3 % – 7 points, 5.7 % – 6 points, 7.1 % – 6 points, 39.6 % – 0–3 points. So, in the improved method, which provides more clearly and accurately fixation, the use of adhesive gel is not required.

Key words: Secondary complete adentia, complete removable plate prosthesis, orthopedic treatment, prosthetic bed, adhesive gel.

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ПРОБЛЕМА ВИКОРИСТАННЯ АДГЕЗИВНИХ ЗАСОБІВ ДЛЯ ФІКСАЦІЇ ПОВНИХ ЗНІМНИХ ПРОТЕЗІВ

Метою дослідження була оцінка функціональної ефективності протезів, виготовлених традиційними та вдосконаленими методами, для стану фіксації повного знімного пластинчастого протезу. Загалом у дослідженні взяли участь 609 пацієнтів віком від 45 до 90 років. Оцінка функціональної ефективності показала, що суб'єктивна думка пацієнта через 33 дні після накладання протезу в основній групі серед чоловіків: 38,1 % – 7 балів (відмінно), 9,5 % – 6 балів (добре), 2,4 % – 5 балів (задовільно); серед жінок: 35,7 % – 7 балів, 9,5 % – 6 балів, 4,8 % – 4 бали. У контрольній групі серед чоловіків: 3,0 % – 7 балів, 3,7 % – 6 балів, 4,1 % – 5 балів, 40,9 % – 0–3 бали; серед жінок: 4,3 % – 7 балів, 5,7 % – 6 балів, 7,1 % – 6 балів, 39,6 % – 0–3 бали. Отже, при використанні вдосконаленого методу, що забезпечує більш чітку та точну фіксацію, застосування адгезивного гелю не потрібне.

Ключові слова: вторинна повна адентія, повний знімний пластинчастий протез, ортопедичне лікування, протезне ложе, адгезивний гель.

At the end of the 21st century, there is a steady tendency to prolong human life all over the world. Physiological aging in the period of human life causes chronic periapical and periodontal odontogenic foci in the stomatognathic system and their aggravation, as well as tooth loss due to medical errors. Secondary complete adentia (SCA) results from the loss (retraction) of all teeth [5].

SCA causes impairment of functions such as chewing, speech, and aesthetic appearance. Lack of chewing and grinding the received food and its enzymatic processing in the oral cavity leads to additional somatic pathologies [4].

The main treatment method to prevent pathology in the stomatognathic and somatic systems caused by SCA is the development of a completely removable plate prosthesis (CRPP) [3, 9].

The prosthetic treatment of SCA with a CRPP, as in the last century, raises a number of debated issues in the 21st century. Thus, dentists of the younger generation, educated under the new training system, ignore the prosthetic treatment with a CRPP, but treat it as an unnecessary method. Disrupts speech function and increases sensitivity to irritating components of food, perceived as a foreign body. There are inflammatory changes in the mucosa of the denture bed, in particular in the presence of comorbid pathology [4, 8].

The choice of prosthetic treatment for SCA is ten times less than the number of patients prescribed a fully subtractive lamellar prosthesis (SLP). Therefore, the main prosthetic treatment for SCA in patients over 50 years of age is the development of a fully subtractive lamellar prosthesis (SLP) [5].

However, analysis of research materials shows that patients do not use CRPP for various reasons. This is mainly due to the decreased adaptive capacity of patients in SCA, the quality of the design, and unsatisfactory treatment. Therefore, increasing the effectiveness of treatment to improve the quality of life of this group of patients as a result of orthopaedic treatment is still an urgent problem in dentistry [8, 12].

The most relevant issue to solve this problem in recent decades is the proposal of the use of adhesive substances to improve the fixation of prostheses. Patients using adhesive try to improve their performance and eliminate inflammatory changes in the denture bed. As a result, patients are deprived of information about the use of the prosthesis and its functional performance because of the specialist's erroneous judgment [10].

The second is due to the fact that the physician, for various reasons, has violated the indications and steps in the preparation of CRPP and has developed prostheses that do not fully meet clinical requirements, considering them not a very effective treatment method. Therefore, clinicians have suggested the use of adhesives to solve the problems associated with prosthesis fixation [11].

The purpose of the study was to evaluate the functional efficiency of the prosthesis made by traditional and improved methods for the fixation state of the completely removed lamellar prosthesis.

Material and methods. The study was carried out in the Dental Clinic of Azerbaijan Medical University.

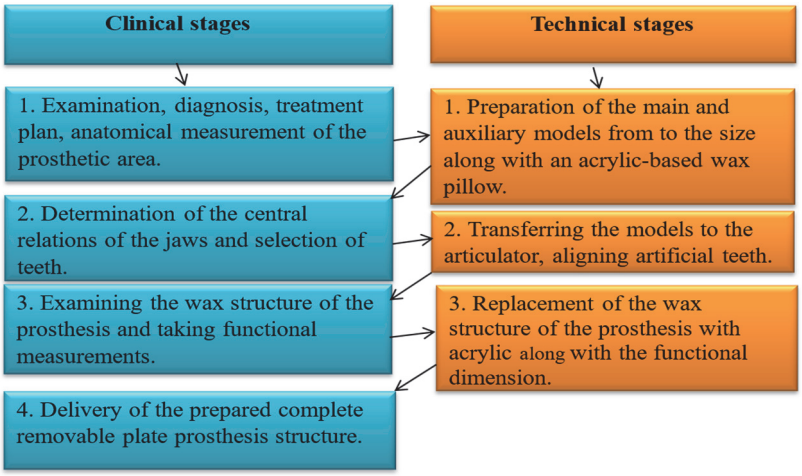

Fig. 1. Clinical and laboratory stages of preparation of CRPP by applying our improved method.

Before treatment, patients were examined for anamnesis collection and oral cavity examination. Fully removable plate prostheses were developed and fabricated using conventional methods. In total, the study covered 609 patients aged 45 to 90 years. The hard tissue resorption of the denture site was assessed using the I. M. Oxman classification, and soft tissue mobility was assessed using the Supple classification. The clinical and laboratory stages of CRPP preparation by improved method are presented in Fig. 1.

In the study, CRPP preparation was performed using the improved method in 204 patients aged 45 to 90 years, including 102 (50.0 %) men and 102 (50.0 %) women with secondary complete dentition, which constituted the main group. According to I.M. Oxman's classification, the condition of the alveolar protrusion in the maxilla was type I in 69 (33.8 %), type II in 53 (26.0 %), type III in 39 (19.1 %), and type IV in 43 (21.1 %). The condition of the alveolar protrusion on the mandible was type I in 50 (24.5 %) individuals, type II in 75 (36.8 %), type III in 40 (19.6 %), and type IV in 39 (19.1 %). The mobility of the soft denture site was type I, 52 (25.5 %) type II, 41 (20.1 %) type III, and 41 (21.1 %) type IV in 70 (34.3 %) people on the maxilla. Mobility of the denture site soft hilum on the mandible was type I in 50 (24.5 %), type II in 75 (36.8 %), type III in 39 (19.1 %), and type IV in 40 (19.6 %). The stages of CRPP preparation using the traditional method are presented in Fig. 2.

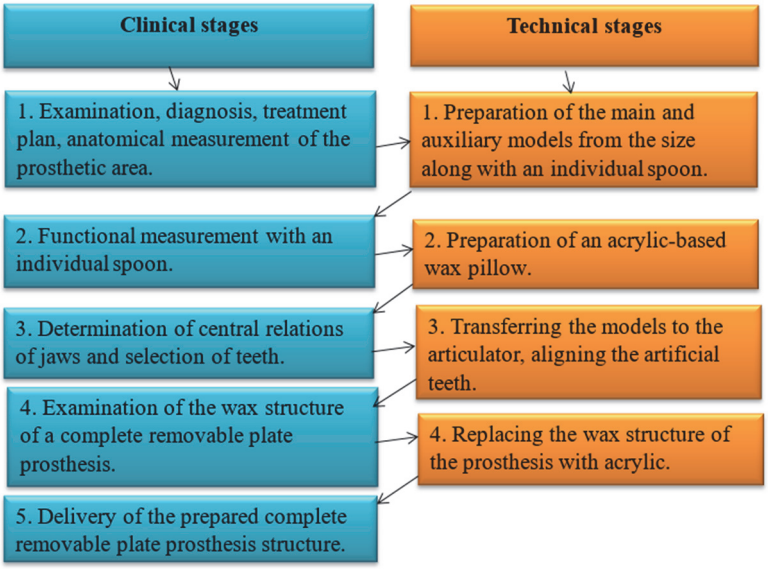

Fig. 2. Clinical and laboratory stages of CRPP preparation applying the traditional method.

Traditional preparation of CRPP was performed in 405 patients aged 45 to 90 years, including 206 (50.9 %) men and 199 (49.1 %) women with second complete adenia, and formed a control group. The state of the alveolar protrusion in the maxilla was type I in 111 (27.5 %) people, type II in 78 (19.3 %), type III in 134 (33.2 %), and type IV in 81 (20.0 %). The condition of the alveolar protrusion on the mandible was type I in 88 (21.7 %), type II in 102 (25.2 %), type III in 91 (22.5 %), and type IV in 124 (30.6 %). Denture site mobility soft was type I in 112 (27.7 %) individuals, type II in 78 (19.3 %), type III in 82 (20.2 %), and type IV in 133 (32.8 %). Mobility of the denture site soft hilum on the mandible was type I in 85 (22.0 %), type II in 100 (24.7 %), type III in 124 (30.6 %), and type IV in 92 (22.7 %).

Three subgroups were created, depending on the dental status of both groups.

The functional efficacy of the fully protruding lamellar prosthesis was assessed according to the patient's subjective opinion (special test by BV Svirin, 1998) 33 days after application of the prosthesis (Table 1).

Table 1

Evaluation of the functional efficacy of the prosthesis with a fully removable plate

Serial No.	Testing the functional stability of the prosthesis	Score
1.	Movement of the tongue in the oral cavity	1
2.	Various movements of the mandible	
2.1	Openıng Mouth	1
2.2	Interruption of food	1
2.3	Chewing food	1
3.	The act of swallowing	1
4.	Background of pronunciation	1
5.	All aesthetic needs are satisfied	1

A score of 7 points is considered “excellent”, 6 points – “good”, 4–5 points – “satisfactory”, 0–3 points – “unsatisfactory”. Items 2.2 and 2.3 are performed specifically to assess the quality of the prosthesis. If any of them are unsatisfactory, the evaluation is scored at 0 points. Statistical analyses were performed using MS Excel 2019 and IBM SPSS–26 programs.

Results of the study and their discussion. In the first subgroup of the main group, 84 patients, including 42 (50.0 %) males and 42 (50.0 %) females, and in the first subgroup of the control group, 140 patients, including 71 (50.7 %) males and 69 (49.3 %) females, do not undergo prosthetic treatment of CRPP after tooth loss. A prosthesis was designed for them for the first time.

In the second subgroup of the main group, 60 patients, including 30 (50.0 %) males and 30 (50.0 %) females, in the second subgroup of the control group, 147 patients, including 74 (50.3 %) males and 73 (49.7 %) females, for both jaws, ‘was a CRPP designed by the traditional method. During orthopaedic treatment, the CRPP was fabricated using the traditional method, but they did not use it for a single day for reasons such as pain, poor fixation, inability to chew food, and speech impairment.

In the third subgroup of the main group, 60 patients, including 30 (50.0 %) males and 30 (50.0 %) females, and in the third subgroup of the control group, 118 patients, including 61 (50.0 %) males and 57 (50.0 %) females, have CRPP due to SCA. CRPP in orthopaedic treatment was developed by the traditional method and is not considered satisfactory because it has been used for more than three years, creates difficulties in use, and needs to be updated.

Also, in each subgroup of the control group (10 people, including 5 males and 5 females), CRPP was simultaneously developed by both the improved and traditional methods. An adhesive gel is recommended when denture retention is disturbed during use.

Evaluation of the functional efficacy of the completely removed lamellar prosthesis according to the subjective opinion of the patient, 33 days after the application of the prosthesis, in the first subgroup of the main group 32 (38.1 %) men 7 points – excellent, 8 (9.5 %) men 6 points – good, 2 (2.4 %) men 5 points – satisfactory, 30 (35.7 %) women 7 points – excellent, 8 (9.5 %) women 6 points – good, 4 (4.8 %) (women) 4 points – satisfactory 84 patients, in the first subgroup of the control group 8 (3.0 %) men 7 points – excellent, 10 (3.7 %) men 6 points – good, 11 (4.1 %) men 5 points – satisfactory, 42 (40.9 %) men 0 – 3 points – unsatisfactory, 6 (4.3 %) women 7 points – excellent, 8 (5.7 %) women 6 points – good, 6 points – good 10 (7.1 %) women rated 140 patients, of whom 5 were satisfied and 45 (39.6 %) were 0–3 points unsatisfactory.

In the second subgroup of the main group 20 (34.0 %) men gave 7 points to excellent, 8 (13.4 %) men gave 6 points to good, and 2 (3.4 %) men 4–5 points to satisfactory, 18 (30.0 %) women 7 points to excellent, 10 (16.7 %) women 6 points to good, and 2 (3.3 %) women 4 points to satisfy 60 patients, 2 (3.3 %) women in the second subgroup of the control group 10 (6.8 %) men 7 points to excellent, 8 (5.4 %) men 6 points to better, 8 (5.4 %) men 5 points to satisfactory, 48 (32.7 %) men 0–3 points to unsatisfactory, 8 (5.4 %) women 7 points to superior, 10 (6.8 %) women 6 points to better, 8 (5.4 %) women 5 points to satisfactory, 8 (5.4 %) 47 (32.1 %) women rated 147 patients with 0–3 points unsatisfactory.

In the third subgroup of the main group, 18 (30.0 %) men received 7 points for excellent, 10 (16.7 %) men received 6 points for good, and 2 (3.3 %) men 4–5 points for satisfactory, 16 (26.7 %) women 7 points for excellent, 10 (16.7 %) women 6 points for good, 4 (6.7 %) women 4–5 points for satisfactory, 60 patients in the third subgroup of the control group 8 (6.8 %) men 7 points for excellent, 8 (6.8 %) men

6 points – good, 8 (6.8 %) men 5 points – satisfactory, 37 (31.4 %) men 0–3 points – unsatisfactory, 8 (6.9 %) women 7 points – good, 8 (6.9 %) women 6 points – good, 6 (5.2 %) women 5 points – satisfactory, and 35 (30.3 %) women rated in 118 patients with 0–3 points – unsatisfactory.

Also, 10 patients of the first subgroup of the control group (5 males and 5 females) were not treated orthopaedically with a blaspdenture fully removed after tooth loss, so after 33 days, when these patients used a denture made of them by the improved method, 3 males and 2 women received 7 points (excellent), 3 women received 6 points (good), and when these patients used the denture made by the traditional method, 1 man and 1 woman received 6 points (good), 2 men and 2 women rated 4–5 points as satisfactory, and 2 men and 2 women rated 0–3 points as unsatisfactory. They rated the 3 males and 2 females who used adhesive gel for denture retention failure as 7 points excellent, and the 2 males and 3 female as 6 points good. They noted that adhesive gel was not necessary with the improved prosthesis.

The control was a CRPP made by the traditional method for both jaws of a patient of 10 people (5 males, 5 females) in the second subgroup of the group. Totally removed plastic prostheses during prosthetic treatment were made by the traditional method, but they were not used for a single day due to reasons such as pain, poor retention, inability to chew food, and speech impairment. After 33 days, when they used the prostheses made by the improved method, there were 3 males, 3 females, 7 points, and 2 males. 2 women, 6 points to beam, 1 man, when these patients used the prosthesis made by the traditional method 1 woman 6 points: good; 3 men, 2 women: 4–5 points: satisfactory; 1 man, 2 women: 0–3 points: unsatisfactory. They rated the 2 males and 2 females who used adhesive gel for denture retention failure as 7 points excellent, and the 3 males and 3 females as 6 points good. They noted that there was no need for adhesive gel when using the advanced denture.

In the third subgroup of the control group, 10 patients (5 males and 5 females) have a CRPP associated with SCA. A complete CRPP in orthopaedic treatment designed by the traditional method for more than three years is not considered satisfactory because of its use, creates difficulties in use, and needs to be updated so that after 33 days when they use the prosthesis made by the improved method, 4 men, 4 women, 7 points for the hand, 4 women, 1 man. 1 woman rated 6 points for the best hand; these patients rated 1 man and 1 woman. 6 points for the best hand; 2 men, 2 women, 4–5 points for the satisfactory hand; 2 men, 2 women, 0–3 points for the unsatisfactory hand when using the traditional method's prosthesis. They rated the 4 male and 4 female who used adhesive gel for denture retention failure as 7 points excellent, and the 1 male and 1 female as 6 points good. They noted that adhesive gel was not necessary with the improved prosthesis.

SCA is not formed over a short period of time as teeth are lost, but over a period of time in the patient's life. The main prosthetic treatment for SCA is the preparation of a CRPP. In this case, the patient's performance of various functions (mastication, speech, swallowing) with prostheses depends on the functionality of the designed prosthesis [2, 9]. Sghaireen and Al-Omiri noted that 10 % of the subjects were not satisfied with their technically successful removable dentures [10].

The functionality of the prosthesis lies in its attachment to the prosthetic site. The fixation of the prosthesis consists in the fact that the prosthesis does not fall out of the prosthetic area, i.e., stops or sticks if the patient does not perform any function (in a state of relative jaw tranquillity). The retention of the denture depends on the compliance of the working surface of the denture base with the denture area [1, 2].

Shawi H, et al with the purpose to improve the retention of complete dentures used 3 different approaches: spacer, posterior palatal seal area, and undercut area. Three dentures were prepared, with variations in certain steps based on the retention technique being employed. According to their results, all 3 dentures had improved retention compared to standard complete dentures [11]. In our work, we obtained satisfactory results, but they were different and depended not only on the manufacturing method but also on gender characteristics.

The compatibility of the denture base with the denture area depends on the size the clinician receives. The fixation of the fully removed plastic denture is of particular importance due to physical factors such as adhesion, cohesion, surface tension and adhesion, capillary weight, atmospheric pressure, and the weight of the denture. CRPP are physical factors that play a key role in the fixation of the prothesis after anatomical factors. The role of physical factors starts after the measurement of the complete prosthesis is obtained from the prosthetic area according to the clinical and laboratory stage, models are obtained, and the prosthetic design is prepared wth them. In the prosthetic design, the inner surface of the base reflects the topography of the prosthetic area, creating conditions for physical factors to ensure the fixation of the prosthesis [7].

Kalashnikov DV et al., having conducted a study of 149 patients (41–74 years old), came to the conclusion that it is possible to recommend the use in orthopedic dentistry clinics of the method of

manufacturing partial lower plate dentures from “Fluorax” and “Etacryl–02” plastics in three ways: in a “water bath”, in devices for surface polymerization and in a certifying device for cast coating. in a certifying device for pediatric treatment [6]. In our study, complete removable dentures were assessed, which initially suggests a different state of the gums.

In normal cases, the use of adhesive in complete dentures should be prescribed. The use of adhesive in denture retention means that the denture has failed. According to our data, with the acrylic base wax–up prosthesis design, the use of adhesive gel is not required.

When making a CRPP by the traditional method, the doctor would seem to think that the pressure exerted by the patient on the prosthesis when using a completely CRPP to be prepared would be equal to the pressure exerted by the doctor when measuring. But it doesn't. Because the prosthesis area and surrounding tissues change their location as a result of pressure. When the pressure is removed, the displaced tissue returns to its place. Therefore, the prepared area and boundaries of the prosthesis are not accurate, fixation is disturbed, and adhesive gel is necessary [3].

Conclusions

1. Evaluation of the functional efficiency of the completely removed lamellar prosthesis according to the subjective opinion of the patient, 33 days after the application of the prosthesis, in the first subgroup of the main group, 32 (38.1 %) men and 30 (35.7 %) women was 7 points – excellent.

2. In the second subgroup of the main group, 20 (34.0 %) men and 18 (30.0 %) women gave 7 points, In the third subgroup of the main group, 18 (30.0 %) men and 16 (26.7 %) women received 7 points.

3. A complete CRPP in orthopaedic treatment designed by the traditional method for more than three years is not considered satisfactory because its use creates difficulties.

The pressure applied during measurement in the improved method is the pressure applied by the patient himself and not by the clinician. It provides fixation by reflecting more clearly and accurately the area and boundaries of the prosthesis that will be fabricated at the functional measurement. With the acrylic base wax–up prosthesis design, the use of adhesive gel is not required.

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