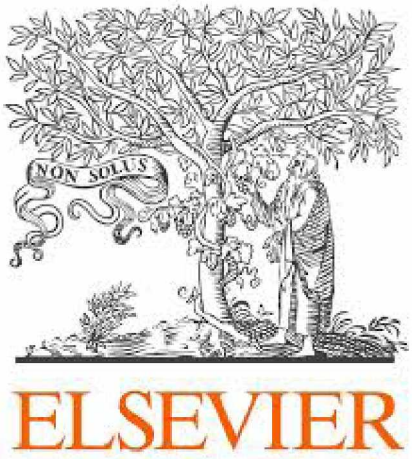

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Experimental Study the Conformity of Base of Complete Removable Dentures

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Abstract: Based on the results of clinical and experimental studies, the basal-tidal effect has been determined, which makes it possible to prevent an occurrence, to identify and eliminate the defects of stabilization of the prostheses at the stages of their manufacturing, which finally improves the quality of treatment for patients with edentulous jaws.

The proposed method of polymerization of polymethylmethacrylate is a good starting point for development of new methods of prosthetics which helps to solve the problems of fixation and stabilization of removable dentures on the prosthetic area of edentulous jaws, including the different degrees of atrophy on prosthetic areas.

Keywords: base-area effect, fixation, stabilization, plastic denture, polymerization.

Medical rehabilitation of patients with complete adentia is actual and completely depends of the effective restoration of function of masticatory apparatus by plastic dentures [1, 3, 7, 11]. The quality of these dentures is conditioned by the polymerization of plastics, which is one of the components of a denture, and the quality of artificial dental teeth, which affects the fixation and stabilization of complete removable dentures [2, 6, 12]. At the same time, it is not always possible to achieve sufficient fixation and stabilization of prosthetics if they are made according to the generally accepted technology at the clinical and laboratory stages on patients with extraordinary anatomical and topographic features of the masticatory apparatus [5, 9, 13].

Confirmation is that 20-24.9% of patients do not use prostheses, and near 37% of cases they are forced to adapt to use their prostheses with insufficient stabilization and fixation [4, 8, 14].

At the same time, these patients have cases of negative effects of residual monomer, inflammation of the mucous membrane of prosthetic area, fractures of the

prosthetic base, and others. It should be noted that the clinic and the technology of prosthetic production on the edentulous jaws are thoroughly investigated with the main fundamental directions: taking a functional impression, determining the central occlusion, constructing artificial teeth and accuracy of casting of the plastic basis of prostheses. But because of many factors doctor and dental technicians, in practice, can't use practical recommendations [10, 12].

Working with adentia patients at the current level of development in orthopedic stomatology makes a difficult question to creation of functional and aesthetic dentures. Also, some recent statistics show that this problem has not been solved yet [4, 10, 12]. Results of research of individual anatomical topographic figural features of the masticatory apparatus in patients with complete loose of teeth and observation of their use of complete removable dentures indicate that the most insufficient stabilization of prosthetics is observed in the following cases:

- firstly, the unusual individual anatomical-topographic and functional features of the masticatory apparatus;

- secondly, the inconsistency of the orientation the occlusal of the prosthesis according the height of the alveolar processes in the areas of the lips, the degree and localization of atrophy of the alveolar process and their correlation in the sagittal, transversal and vertical sides with a central occlusion; - thirdly, poor adhesion of the plastic prosthesis to the mucous membrane of the prosthetic area due to the polymerization shrinkage and the emergence of the stress of the prosthetic base and its defection during the polymerization. As a result, there are changes in the prosthetics of the prosthetic area of edentulous jaws during the functions of: chewing, closing artificial teeth with multiple contact in the central and functional occlusions, during communication.

The purpose is to study the accuracy of the bases of prostheses, which are polymerized by the generally accepted and proposed technology, the reasons for the shift from the prosthetic area of the removable dentures, which causes its unsatisfactory stabilization.

MATERIALS AND METHODS

The objects of the study were:

1. Basis of dentures on the upper adentia jaw and the impression, by which these bases are made.

2. Gypsum molds for the polymerization of plastic prostheses according to the instructions of the manufacturer and on the boundary of directed excess air, which are manufactured on the same time with the help of a dental cuvette and a device for the polymerization of polymethylmethacrylate in a medium of compressed air.

3. The impression of the jaw - plastic, decorated with marking points for determining the lines with x-y-z axis orientation. Plastics "Etacryl" (ACR-15) of one series, medical gypsum (one packing), water tap (temperature t = + 20 ... + 22 ° C). The period of using of the model of the jaw, during which the polymerization of the prosthesis from the time of its make to the beginning of the polymerization - 24 hours.

4. Pressing was carried out after filling the plastic molds of the same masonry plastics for polymerization in a water bath and in a medium at the boundary of excess air pressure (405 kPa).

In order to simulate identical conditions for a comparative characteristics of the accuracy of the manufacture of bases of complete removable dentures that have been polymerized in different ways, next lines were determined - the axis of the study: the ***y*** axis passes through the incisor papilla and between the foramen palatinum; axis ***x*** passes through the hills of the upper jaw and foramen palatinum and is a perpendicular to the y axis. A method for polymerization of base plastics is proposed to determine the change in the size of the surface of the base that is in contact with the micro- and macro-relief of the prosthetic area, which arise from polymerisation of polymethylmethacrylate.

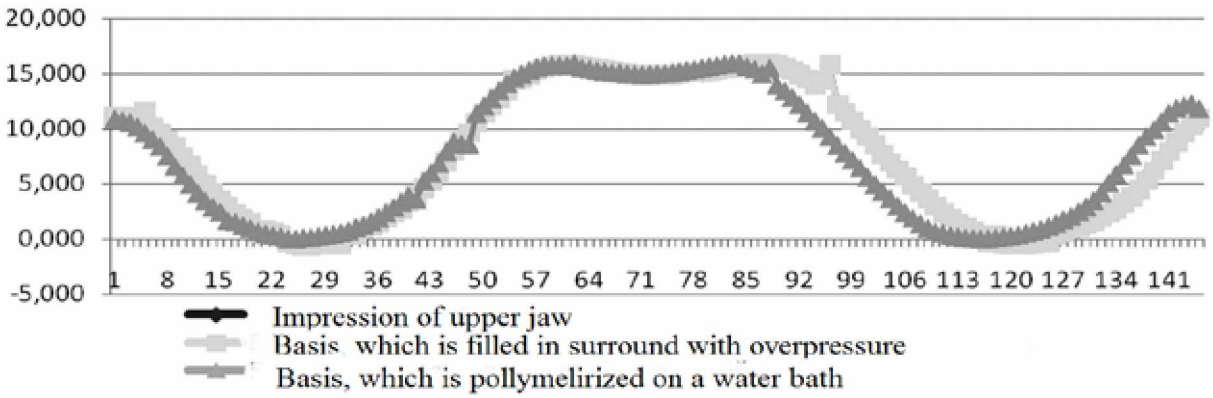
The coordinate measuring device consists of a time-type indicator (TTI), a mechanism for the displacement of TTI in a horizontal plane in two coordinates (x and y) and a table. The TTI has a moving knob with a needle at the end, which is set perpendicular to the table-bed, and two scales with a magnitude dividing 1 mm and 0.01 mm.

The TTI holder allows you to move the TTI's in a vertical plane and set the zeros on the scale, that is, the beginning of counting in the measurements. The mechanism of the transfer of TTI allows you to set the probe with the rotation of the steering wheel to a given point in the horizontal space along the table-frame (axis *x*) and across it (axis *y*). On measuring the position of the end of the probe is determined relative to the point, which is selected at the beginning of the coordinate, in the number of full turns of the wheel and on the arrow on the scale with a magnitude of 0,05 mm. The coordinate measuring system allows for the discrete measurement of the

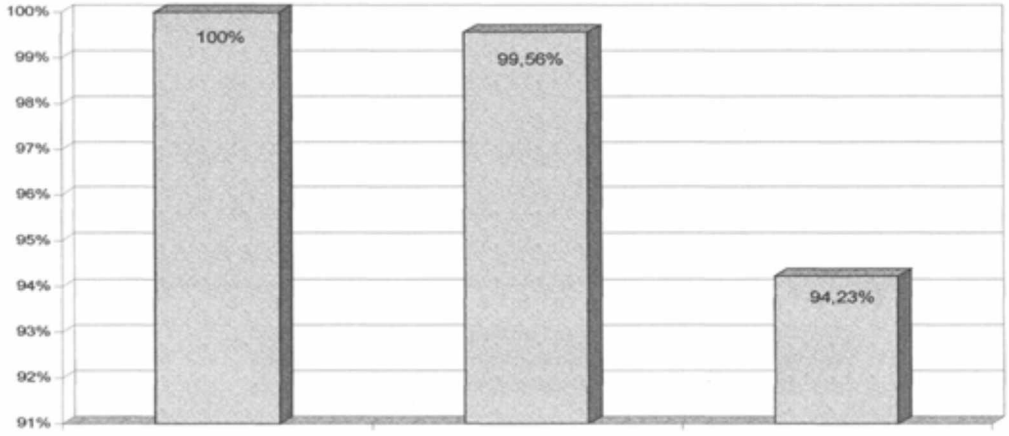
surface of the impression and prosthesis. To do this, turning the wheel, moving the TTI along the *x*-axis or with the selected dispersion step, lowering the TTI probe to contact the surface of the impression and prosthesis, and recording the TTI reading. During our research, the step of moving along the *x*-axes, has been chosen to be 0.25 mm. The accuracy of the manufacture of basis of the prosthesis was checked by determining the size of the gap between the surface of the impression and the surface of the base of prosthesis and in the case of combining them according to the graphs of the lines of the sections (profiles) of these surfaces by vertical planes, the grafts which accord to the measurements during the scanning along the axes *x, y.*

RESULTS AND THEIR DISCUSSION

The gap between the surface of the basis of the impression and the base of the prosthesis (base-tidal effect) in patients with complete adentia destabilizes removable prosthetics in 43 patients. New prosthetics had on 15 patients, which they did not use at all, 28 patients prosthetics were made according to the classical technology, of which 7 - for two pairs of prosthetics according to the classical and proposed technologies. The total number of dentures in which the base-tidal effect was determined - 99. The accuracy of the manufacture of prosthesis bases is one of the most important characteristics in the case of comparison of the generally accepted and proposed technologies. The processes occurring in the polymerization of acrylic plastics and, in the case of cooling the cuvettes, cause a three-dimensional change in the base of the removable prosthesis. The quality of the bases of prosthesis was rated by determining the accuracy of the adherence of the prosthetic base to the tissues of the prosthetic area in the system of three coordinates. The accuracy of making the basis of the prosthesis was rated by determining the value of the gap between the surfaces of the impressions and the prosthesis base in the case of their connection, which was carried out according to the graphs of the lines of the section (profiles) of these surfaces by vertical planes, specially the graphs constructed according to the measurements during scanning along the axes *x, y, z*. The results of the calculations (for *x, y, z*) were entered in the computer, which on the screen of the display constructed the graph of the micro- and macrorelief in the impression and the prosthesis base by that impression, and also stability of relief in the transversal (Picture 1, 2) and sagittal (Picture 3, 4) places.

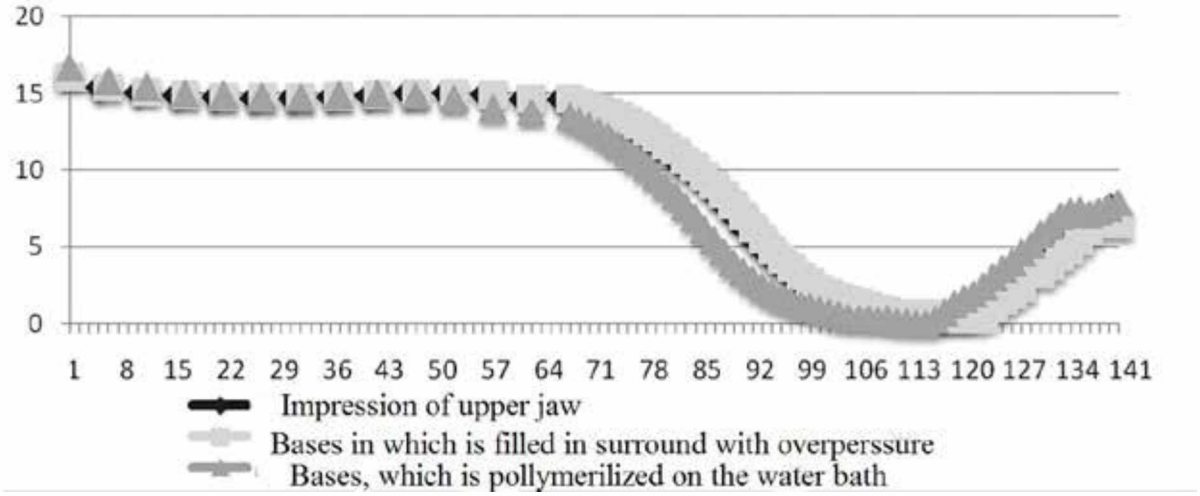


Pic. 1. A graph of measurements in the transversal plane along the "x" axis of the line, which passes through articulars of the upper jaw and foramen palatinum of the palate.

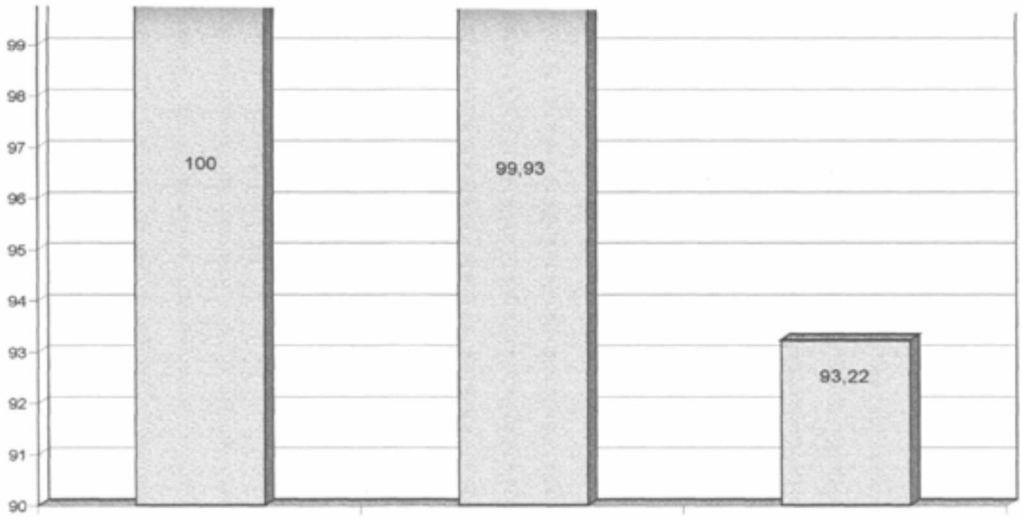


Pic. 2. Dimensional stability of the relief in the transversal plane (%)

The transversal place the lay of the basis relief, which is polymerized on the way of excessive air pressure, is stored 99.56%, and the polymerization of the plastic, which gives us the instruction is 94.23%. The sagittal place the lay of the base, which is polymerized on the way of an excessive air pressure, is stored 99,93 %, but polymerized according the instruction of the plastic — 93,22 %.



Pic. 3. Graph of measurements in the sagittal plane along the "y" axis along the line that passes through the incisor papilla and between the foramen palatinum.



Pic. 4. Dimensional stability of the relief in the saggital plane (%)

The comparative characteristics of these graphs and their stability suggests that the micro- and macrorelief of the bases of prosthesis, which are polymerized according to the proposed method, exactly the same with the micro- and macro-relief of the impression and, conversely, the micro- and macrorelief of the prosthesis bases that are polymerized according to the instructions of a manufecturer, is not the same with the micro- and macrorelief of the impression. In addition, the size of the gap between the surfaces of the impression and the bases in the case of their combination in different areas is not the same.

The results of the observations showed that the thickness of the impression on the basis of the prosthesis, which is polymerized with directed polymerization shrinkage, is practically identical throughout all surface of the prosthetic area, and during the polymerization with commonly accepted technology is different. In some places it is almost absent, while in others it reaches 2.5 mm. This suggests that due to polymerization shrinkage and deformation of the prosthesis basis, the micro- and macrorelief compliance is violated on the basis of the prosthetic surface of the mucous membrane of the prosthetic area.

As a result, during the fixing of the teeth in the central or functional occlusion, the prosthesis moves from the place of the prosthetic area. As a result, insufficient fixation of the prosthesis on the adentia jaw, trauma of the prosthetic area and so on, is laid down in the most classical polymerization technology of the plastic base. We can avoid them only by creating conditions for directed polymerization shrinkage and preventing the deformation of the basis. Such conditions are created when the bases polymerization is carried out using the directional air pressure. So, an improvement of the fixation of plastic prostheses is possible and is achieved by the creation on the basis of a denture exact copy of the micro- and macrorelief of the prosthetic area. The study of the results of the physical and mechanical properties of basic acrylate "Etacryl" (ACR-15) has shown that samples of this material, polymerized in plaster molds with compressed air, are better than samples from the same material that are made in a water bath: shock the viscosity is higher by 15%, the destructive intensity for the statistical bending - by 10%, the stretching - by 26%, the compression - by 15,6%, the microhardness by 35%, the abrasive wear resistance - by 33%, the water absorption decreased by 5%, linear shrinkage decreased by 44%.

The improvement of physical and mechanical properties is associated with the absence of contact of a polymer-monomer composition with water vapors and polymerization under compressed air pressure (405 kPa) throughout the term of heat treatment. Prolonged pneumoforming is carried out, which provides a purposeful linear and volume shrinkage of plastic prostheses. The surface of the base, which is closely fitted to the mucous membrane of the prosthetic area, is not sutable for shrinkage.

CONCLUSIONS

1. A comparative analysis of the bases of the dentures with the impression, with help of which these bases were made, shows that on the basis of the prosthesis almost exactly the copy of the macro- and microrelief of the mucous membrane of the prosthetic area if the polymerization was carried out in an environment at the boundary of the excessive pressure of the area. In addition, the quality of the physical, mechanical and chemical properties of the polymerase improves.

2. Improvement of the strength and adhesive properties of the prosthetic to the toothless jaw is obtained with the improved method of polymerization and the cuvettes for its implementation. In addition, the classical technology does not change, except that gypsum press-forms water and polymerization occurs in the environment at the boundary of excess air pressure.

With the help of clinical and experimental studies, it was determined that the base-tidal effect, which allows preventing the occurrence of defects in the stabilization of prosthetics during the stages of their manufacture, as well as to identify and eliminate them, *is* promising, and it also improves the quality of treatment for patients with complete absence of teeth.

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