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IMPROVEMENT OF METAL TECHNOLOGY FOR MANUFACTURING BUGEL PROSTHESIS

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Annatation
Clasp prosthetics is a section of removable prosthetics. Unlike a partial removable denture with a lamellar and a cast base, the clasp denture has a one-piece cast frame with support-retaining clasps. Currently, this is one of the most common types of prosthetics for defects in the dentition, if there are indications for it. Indications, selection and planning of the design of the clasp prosthesis begins with the study of diagnostic models that allow you to determine the amount of necessary changes in the oral cavity, which allows you to optimize the conditions of prosthetics. The more accurate the technology of casting the frame of a one-piece clasp prosthesis, the higher the quality of the prosthesis. The correct assessment of the indications underlies the correct choice of the rational design of the future clasp prosthesis.
The aim of the article is to improve the technology of clasp dentures manufacture.

Keywords: clasp denture, attachment, impression.

Introduction

The manufacture of a clasp prosthesis with a locking type of fixation for prosthetics of partial defects in the dentition is the most functional and aesthetic. Clasp prostheses are used: with an insufficient number of supporting teeth for the manufacture of fixed prostheses; the presence of supporting teeth with insufficient reserve forces of the periodontium, with varying degrees of periodontal atrophy; unilateral and bilateral distally not limited defects in the dentition [1]. When using these structures, sometimes it becomes necessary to remove the abutment tooth due to the progression of periodontal diseases, caries and its complications, and a decrease in the reserve forces of the periodontium. Subsequently, these structures cannot be used after the removal of an abutment tooth with unreliable periodontal tissues, so it becomes necessary to manufacture new prostheses. Patients may complain that the removable part of the structure is lost (loss, breakage of the clasp prosthesis), while the non-removable part remains in the oral cavity and is fixed on the abutment teeth [2, 3]. A known method for manufacturing a clasp prosthesis, including taking an impression, obtaining a plaster and duplicated refractory model on it, placing a container attachment around a spherical retainer, modeling a clasp frame from wax, transferring the frame to metal, connecting the container attachment to the frame, installing the clasp frame on a plaster model, placing artificial teeth on a clasp frame, forming a plastic base for the prosthesis, removing the denture from the plaster model and installing the prosthesis in the oral cavity. There is also a method for manufacturing clasp prostheses with attachments with temporary or permanent fixation of bridges with males in the oral cavity [4].

Purpose:

To improve the technology of manufacturing clasp prostheses. Material and methods. Orthopedic treatment was carried out in 27 patients (12 men and 15 women) aged 47–62 years using improved technology for the manufacture of clasp prostheses. These patients were observed at the Department of Orthopedic Dentistry "Samarkand State Medical University" of the Ministry of Health of Uzbekistan "Samarkand Dental Clinic". Fifteen patients (5 men and 10 women) underwent orthopedic treatment using the method of manufacturing a clasp prosthesis with a dubious prognosis of the abutment tooth [5]. This technique allows using the design of a clasp prosthesis, in which the abutment tooth with unreliable periodontal tissues can be removed. Four patients received clasp prostheses for both jaws. With the loss of the clasp prosthesis and the preservation of the fixed structure, orthopedic treatment was performed in 12 patients (4 men and 8 women). A method for manufacturing a clasp prosthesis with locks was used [6]. Patients were selected according to the principle of the presence of defects in the dentition of classes I and II according to Kennedy. The technique of taking impressions from the tooth stump has been improved. In the orthopedic treatment of 27 patients, the method of obtaining an impression was used for prosthetics on implants and teeth [7]. In our study, the classification of impressions according to A.N. Ryakhovsky [8]. A method of manufacturing an individual tray was used to obtain impressions in the case of partial absence of teeth [9]. Digital data were processed on a personal computer by the method of variation statistics using the Statistica software package. Results. Improving the technology of manufacturing a clasp prosthesis was carried out during orthopedic treatment of 27 patients. Using an individual spoon, the orthopedic dentist takes impressions from silicone (for example, Express) or polyester impression material (Impregum Penta Soft). To prevent the formation of a separation at the border of the base and corrective materials, a corrective layer is applied only to the dentition, without applying it to the base layer of the impression. Causes of pull-off may be the different flow characteristics of the materials and the different time required for the two layers of material to cure when using the one-step impression technique. When obtaining a two-layer impression using a one-stage or two-stage technique, a uniform distribution of the corrective layer of the material is achieved, a uniform thickness throughout the entire length of the impression. The thinning of the corrective layer of the material is determined by its transparency. The main layer of the material should not show through the corrective layer or not be covered with the corrective layer. In this case, the orthopedic construction made according to such an impression will not have enough space for fitting. The design can be blocked during fitting, exert excessive pressure on the tissues of the supporting tooth, which can lead to the formation of microcracks and splitting of the tooth. If it is not possible to make a new impression, the fabricated structure is corrected. At the laboratory stage, the dental technician applies one or more layers of insulating varnish to the model in places where the corrective layer of the impression material is thinned. Filling the impression with excessively liquid supergypsum leads to an increase in its shrinkage, and, consequently, to the manufacture of inaccurate orthopedic structures. Thick supergypsum fills the impression with the formation of voids, shells, pores. The finished gypsum mixture from high-strength varieties is immediately poured into the resulting impression. It is not necessary to knead the supergypsum

for more than two or three fillings of the impression, the time for pouring the impression is included during the processing of the material. When hardening begins, the formation of crystals occurs, which prevents the reproduction of fine details, reducing the strength of the gypsum. Pouring on a vibrating table has a positive effect on preventing the formation of bubbles, fluidity, vibration should not continue at the beginning of supergypsum crystallization. When making a model from supergypsum, you should not use pressure until it has completely hardened, which allows you to strengthen the model from supergypsum and reduce the number of air bubbles. The impression may contain hidden pores that are not visible during the assessment of the impression, which lead to the formation of defects on the working model. The clinician takes an impression with C-silicone base layer, Speedex, A-silicone, Elite HD, Express, or polyester, Impregum, to make a composite impression crown, Protemp 4, or resin material, Superpont. Produces preliminary odontopreparation, under the impression crown. The dental technician makes an impression crown, on which retention points are created in the form of longitudinal and transverse grooves, perforation of the chewing surface or incisal edge. The impression crown is fitted onto the stump of the tooth. The gums are retracted and the final odontopreparation is performed for a solid cast or ceramic-metal construction and space is created for the corrective material. A light-curing adhesive, Filtek, Supreme XT, is applied to the impression crown from the outer and inner surfaces. A fluid corrective layer is applied to the tooth stump, periodontal groove, dentition and cavity of the impression crown. The impression crown is positioned on the stump of the tooth and an impression is made with a base layer of silicone mass, C-silicone, A-silicone. The impression is obtained by a single-stage technique with a two-phase, A-silicone, C-silicone, or monophasic, polyester, impression material. The impression is removed from the mouth. In the resulting impression, the impression crown remains in the thickness of the impression material. This method of obtaining an impression is universal, as it can be used both with a one-stage and two-stage technique for taking an impression, both with standard and individual trays. Models in the position of central occlusion are fixed in the articulator. On an abutment tooth with unreliable periodontal tissues, which can subsequently be removed, the dental technician models a telescopic cap of uniform thickness from modeling wax, repeating the contours of the tooth. A wax reproduction in a foundry laboratory is cast from a metal alloy. The telescopic cap is again installed on the working model and the framework of the telescopic crown is modeled from modeling wax, restoring the anatomical shape of the tooth. To fasten the facing plastic, metal pearls are fixed on the telescopic crown. In the foundry laboratory, a metal crown is cast from a wax reproduction. Then the telescopic crown is lined with plastic (for example, Sinma, Sinma-M, Superpont). For the manufacture of the frame of the clasp prosthesis, the model is studied in a parallelometer, an equator line is drawn. Then a drawing of the frame of the clasp prosthesis is applied: clasps, locks, arcs, nets. The arch on the upper jaw is located in the posterior third of the hard palate. On the lower jaw, they bend around the frenulum of the tongue in such a way that during any movements the frenulum does not come into contact with the arc. The length of the arc depends on the size of the defect and its topography. With defects in the group of chewing teeth, the arc reaches the middle of the defect, where it connects to the mesh at an angle close to a right one. The shape of the arc in cross section is often semi-oval. Around the

supporting tooth with unreliable periodontal tissues, which can subsequently be removed, covered with a telescopic crown, the arc is drawn circularly, retreating by 1–3 mm. Then the model is prepared for duplication, for which the sections of the abutment teeth, having niches and in which the arms of the retaining clasps will be placed, are filled with refractory wax to the level of the boundary line. To create separation between the arch of the prosthesis, the mesh and the mucous membrane, insulation is installed from clasp wax plates, under the arch on the lower jaw at the upper edge of 0.5-0.6 mm, at the lower edge by at least 1 mm, on the upper jaw by 0, 6-1 mm, which depends on the degree of compliance of the mucous membrane. The model prepared in this way is immersed in water for several minutes to remove air from the pores. Then the model is fixed on the rubber base of a special cuvette and the cuvette is closed. Fill with duplicating mass (eg Dublisil, Laborsil, Dreve). After cooling the duplicating mass, the bottom of the cuvette is removed and the model is removed, a hollow cone is installed in the center of the mold and the model is cast from a refractory mass (for example, Silamine, Christosil, Bugelit), the model is dried. Next, the frame of the clasp prosthesis is modeled from wax. To do this, they transfer from a plaster model to a refractory frame drawing, install a telescopic cap, a telescopic crown. The frame is modeled from standard wax blanks, starting with clasps, locks for abutment teeth, then an arc, mesh. Individual elements are selected according to the size of the teeth, the size of the defect in the dentition. They are placed on the model, guided by the drawing, and connected with wax of the same composition. Around the supporting tooth with unreliable periodontal tissues, which can subsequently be removed, covered with a telescopic crown, the frame of the clasp prosthesis is modeled as follows: the arch is located along the alveolar process or alveolar part, circularly bypassing the tooth, 2-4 mm thick, and the inner edge of the arch is spaced by 1–3 mm from the telescopic crown. Create a gating system. The model is covered with a refractory facing layer, molded, melted wax. Dry and fire the mold. The frame of the prosthesis is cast from a metal alloy. They are freed from the refractory mass and the gating system, ground, polished. The frame is fitted on the working plaster model. Wax bases are modeled from base wax and artificial teeth are set. The wax is replaced with plastic in such a way that the metal telescopic crown is welded into the base of the clasp prosthesis due to the formation of a chemical bond between the plastic lining of the telescopic crown and the base plastic. Process the finished prosthesis. Using the method of manufacturing a clasp prosthesis with a dubious prognosis of the abutment tooth (a design in which the abutment tooth with unreliable periodontal tissues can be removed), orthopedic treatment was performed in 15 patients: 5 clasp prostheses were made for the upper jaw (16.2%), 14 clasp dentures were made for the lower jaw prostheses (45.1%). 3 clasp prostheses for the upper jaw (9.7%) and 9 clasp prostheses for the lower jaw (29%) were made by the method of manufacturing a clasp prosthesis with locks. If the fixed structure in a comprehensive clinical study is consistent and meets all the requirements of prosthetics without requiring replacement, the proposed method should be used. A method for manufacturing a clasp prosthesis with locks: after the loss of the clasp prosthesis and the preservation of a consistent fixed structure fixed on the teeth, a silicone impression is obtained from the jaw, on which the clasp prosthesis will be made, by a two-layer, two-stage or one-stage method. In the impression, a section of the non-removable part of the structure is filled with ashless modeling plastic - an

abutment tooth containing a locking element or several abutment teeth with locking elements. After the final hardening of the ashless plastic, the impression is filled with supergypsum and a working model is made. After separating the impression from the model, a lock sleeve is installed on the lock part made of ashless plastic. To prevent displacement, deformation of structural elements on the model, the impression is pre-cut before separation from the model. The working model is installed on the table of the milling-parallelometric device. The space between the sleeve and the prosthetic bed, the undercuts are filled with modeling wax. The working model is prepared for duplication. Duplicate using silicone mass for the accuracy of displaying the details of the lock fasteners. The frame pattern is transferred to the refractory model from the working model, according to which the future frame of the clasp prosthesis is modeled. The wax frame is covered with a finishing varnish and transferred to the foundry laboratory for casting the frame. In order to speed up the polishing process, an electrochemical polishing device is used. The working model is installed in the articulator and artificial teeth are placed. In the finished prosthesis, elastic bushings of the lock fastening are installed and the accuracy of manufacturing the clasp prosthesis with the lock fastening is checked.

Discussion

In the manufacture of clasp prostheses for 27 patients at the Department of Orthopedic Dentistry of the Samara State Medical University, the clinical and laboratory stages were improved. To obtain a high-quality impression due to the absence of braces and pores on the surface of the tooth stump, a greater depth of penetration of the impression material into the periodontal sulcus, the method of obtaining an impression during prosthetics on implants and teeth and the method of manufacturing an individual tray for obtaining impressions in the partial absence of teeth were used. When using a clasp prosthesis in case of doubtful prognosis of the abutment tooth (a design in which the abutment tooth with unreliable periodontal tissues, covered with a telescopic cap, can be removed due to the progression of periodontal diseases, caries and its complications), after removal, the clasp prosthesis is relined, filling the telescopic crown with base resin. At the same time, the design of the clasp prosthesis remains unchanged. The traditional method of restoring a lost clasp prosthesis with locks involves the manufacture of a new non-removable structure. This method has a number of disadvantages: replacing the design of a clasp prosthesis with locks is an expensive manipulation; the locking element is located directly in a single crown or in a bridge, the removal of a structure fixed on the teeth can lead to undesirable damage to the supporting teeth or their removal. Aspects of these methods, which prompted us to improve the technology of manufacturing a clasp prosthesis, are as follows: the elements of the lock fastening of a fixed structure are made of gypsum, the gypsum is brittle, which leads to the breaking off of part of the locks, care must be taken, with inaccurate separation of the impression from the plaster model, the elements of the lock fastening are made of gypsum break; the elements of the lock fastening are cut off, which leads to inaccuracies in the manufacture of a removable structure; inaccuracies in the manufacture of locking elements are compensated by using a rigid matrix; receive impressions with an alginate mass, which does not have sufficient accuracy and shrinks; the technique is described only for one of the firms producing locking fasteners. Conclusion. Thus, the use of an improved technology for

manufacturing a clasp prosthesis made it possible to solve the problem with unreliable periodontal tissues of the supporting teeth, the problem of losing the removable part of the clasp prosthesis and maintaining a fixed structure on the supporting teeth. The use of the method of manufacturing an individual tray for obtaining impressions in the case of partial absence of teeth and the method of obtaining an impression during prosthetics on implants and teeth made it possible to improve the quality of the obtained impression. Conflict of interests. The work was carried out within the framework of the scientific direction with the support of young scientists and designers working in the Samarkand region in 2022.

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