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PRACTICAL ASPECTS OF THE USE OF ACRYLIC BIOMATERIALS IN DENTAL MEDICAL PRACTICE

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Abstract

The aim of this study is to identify the technological peculiarities of the use of bio-acrylic materials in accordance with the clinical parameters of the case, arguing the usefulness of these biomaterials in everyday dental medical practice.A number of 25 partially mobilizable acrylic prostheses were made from different types of biomaterials following the clinical-technological algorithm specific to their type of prosthesis.The variety of clinical cases in which we used acrylic biomaterials as a result of careful analysis of all clinical factors, paraclinical, provides a clear picture of the corroboration of the general condition with local and loco-regional features of the clinical case with the chosen mobilizable therapeutic solution.Partially removable acrylic prostheses remain a viable transient therapeutic solution, in social cases taking on a long-term character managing to ensure a good quality of life through the evolved structure of new acrylic biomaterials in the context of rehabilitation of all stomatognathic system functions.

Keywords*:* biomaterials; removable prostheses; acrylate

Introduction

Polymeric materials have dominated prosthetic technology for several decades, being used in the complete achievement of mobile prostheses or as a part of their structure. Methyl polymethacrylate was introduced in 1937; it is chemically stable, but has affinity for water (0.3 - 0.4% at 24 hours); mechanically, has satisfactory properties, hardness KNOOP 18-20, tensile strength of 60 N, and modulus of elasticity -2, 4, having a low abrasion resistance. Acrylic resins can be classified as follows:

- ✓ Thermopolymerizable methyl polymethacrylate, which includes 2 categories of resins:
- ✓ conventional - has 2 aspects, can be unloaded (without filling), the other variant being represented by resins reinforced with Polyfibron or carbon.
- ✓ high impact.
- ✓ Self-curing methyl polymethacrylate - comprising resins used in the manufacture or immediate repair of partially mobile prostheses, as well as injectable resins [1,2].

Conventional acrylic resins it comes in a two-component system - liquid and powder, packaged separately. The liquid is represented by the monomer, materialized by the polymerizable methyl methacrylate. The liquid component of polymethyl methacrylate is a clear, volatile liquid with a strong aromatic odor; it is flammable, bactericidal, soluble in organic solvents; its boiling point is 1030C; it is characterized by the spontaneous tendency of polymerization under the action of heat and light. It is preserved by the addition of a polymerization inhibitor (hydroquinone and pyrogallol)[3,4,5]. At 650 the polymerization reaction is triggered throughout the mass of the material; by polymerization, the monomer

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undergoes a very strong contraction, the elimination of this shortcoming being achieved by mixing with the methyl polymethacrylatepowder [6-8]. The powder is represented by methyl polymethacrylate, a chemically stable element: the mechanical properties of polymethyl methacrylate are appropriate in terms of hardness, tensile strength; a drawback that characterizes this component is the low abrasion resistance; in terms of optical properties, we can see that they are remarkable due to the refractive index close to that of enamel [9-12]. The coloring options offer a wide range of combinations, giving the prosthetic restoration a more natural look. For this purpose, tiny colored nylon or acrylate fibers can be added to the powder, which simulates the capillary network in the mucosa, mimicking vascularity, which has an important impact on the final aesthetics [13-16].

Purpose of the study

The aim of this study is to identify the technological peculiarities of the use of bio-acrylic materials in accordance with the clinical parameters of the case, arguing the usefulness of these biomaterials in everyday dental medical practice.

Material and method

A number of 25 partially mobilizable acrylic prostheses were made from different types of biomaterials following the clinical-technological algorithm specific to their type of prosthesis.

The variety of clinical cases in which we used acrylic biomaterials as a result of careful analysis of all clinical factors, paraclinical, provides a clear picture of the corroboration of the general condition with local and loco-regional features of the clinical case with the chosen mobilizable therapeutic solution.

Results and discussion

A representative clinical case was selected for the problem developed in this article, represented by a 67-year-old patient, diagnosed with partially extended edentation.

The stamp represents the clinical stage of recording the negative image of the prosthesis. Alginate is used as the impression material; this impression must be poured as soon as possible so as not to suffer changes.

After the stamps were registered, they were checked, washed with water to remove traces of blood and saliva and then decontaminated with solutions that help the disinfection process, these were done in two ways, namely: solutions by immersion in antiseptic solutions, antimicrobial, antifungal and antiviral (sodium hypochlorite 1%), glutaraldehyde (2%), glutaraldehyde with phenol bromocet (2%) and by spraying with special sprays dimenol / septodont-spray disinfectant, based on isopropyl alcohol; spray imprint, wait 15 minutes and rinse thoroughly). It does not attack the surface of the stamp and does not produce dimensional variations.

Two types of gypsum were used to cast these fingerprints, namely: third-class gypsum and second-class gypsum.

Given that the same prosthetic construction is performed on both the jaw and the mandible, the preliminary stamps will be cast in the same way. Removing the impression consists in disinserting the model from the impression, this I did with the help of a plaster knife.

The realization of the individual impression holders was materialized at the level of a series of individual impression holders from different materials here using a light-curable plate due to the numerous advantages they offer.After the creation of the functional models, the occlusion templates were made (these templates being necessary for the registration of the vertical occlusion dimension).

In the clinical stage there were drawn: the midline, the smile line and the canine line essential landmarks in the teeth.

With the help of the occlusion models, the mounting in the occlusion was made. At this stage, the installation rules were taken into account, namely:

1.The median-sagittal plane of the models should correspond to the plane of the occlusion and be perpendicular to the hinge axis;

2.The occlusion plan is parallel to the table plan;

3.The distance between the inter incisive point and the occlusal axis should be approximately 10, 5 mm.

The actual installation consisted of immersing the plaster so that the plaster does not set quickly so that there is time for the correct positioning of the models.

After making a class II plaster with a creamy consistency, we put plaster on the lower arm of the occluder and positioned the models so as to follow the installation rules.

We put the remaining plaster on the base of the upper model and on the upper arm of the occluder. We removed the excess plaster with water.

It was then checked once again that the models were positioned correctly before the plaster set. The next step was to adjust the vertical occlusion height.

In the centric relationship, maximum intercuspation is achieved between the two arches. In this way multiple contacts are established in the movements of the mandible or at least 3 in propulsion, and laterally contacts both on the active side and on the balance side. After we mounted the teeth, the next step we did was to finalize the model that pursues the following objectives:improving physiognomic, phonic function, maintenance and stabilization, mechanical strength, hygienic-prophylactic. (Fig.1)

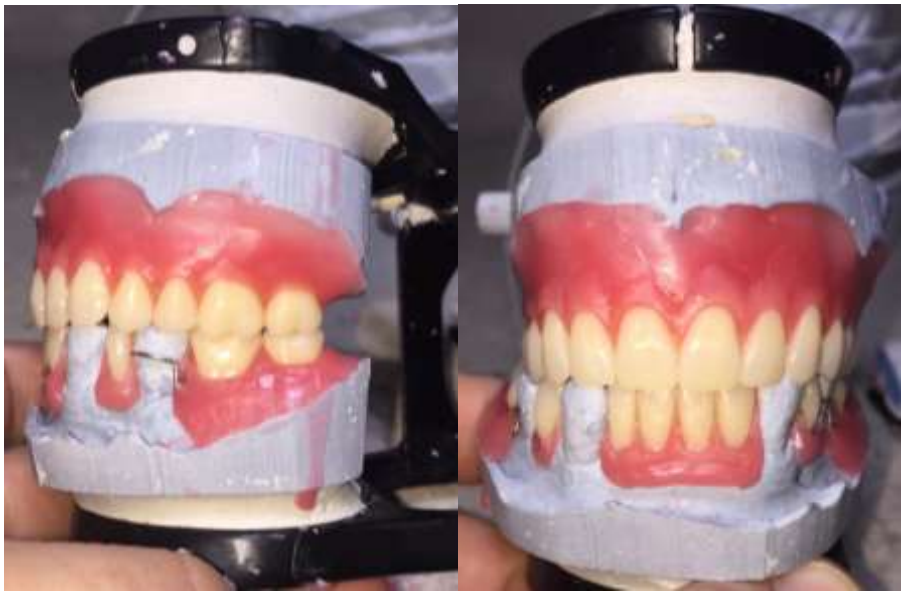

Fig. 1. Technological stage for improving physiognomic function

In order to improve the physiognomic function, the teeth were mounted properly, the V-shaped model of the saddles, root canals, interradicular pits, canine pits, which have the role of supporting the buccal commissures, the modeling of the artificial gum, the interdental papillae. In the case of the mandible, it was not necessary to make bumps and pits, as they were not visible.

The improvement of the phonetic function was achieved respecting the maximum thickness of the 2mm model, we modeled the reliefs of the mucous membranes in the area of

phonetic articulation (retro incisive papilla, fibrous median raphe). We made the L side of the mandibular model slightly concave.

The improvement of the maintenance and stability was achieved through hooks, first of all, these contributing to the stabilization of the prosthesis.

We made the edges of the model in such a way that they bypass the brakes and the alveolo-jugal envelopes, we rounded and thickened them. We designed the vestibular sidein such a way as to favor the training of the tonicity of the orbicularis and buccinator muscles. We made the lingual side of the lower model slightly concave to preserve the space needed for the tongue.

The objective of the mechanical resistance was the thickness we made of 2mm, uniform.

The hygienic-prophylactic objective was achieved by modeling certain smooth, non-retentive surfaces that would favor the accumulation of food debris. The outer surface must be perfectly polished.

The wire clasps were made using crampon pliers and 0.8mm vipla wire, by bending the wire in one direction so as not to change its structure. The free portion is placed in the subequatorial retentive area, and the tail has a wavy shape to fix the acrylate.

Indirect or wave-free packaging was used. It is the most widely used method. It is characteristic that the teeth are in one half and the model and the hooks in the other half. The advantages of the technique are:simpletechnique,the teeth keep their position in the pattern,insulation of the pattern is easy.The downside is that there is a risk of the occlusion rising.

Once the pattern is clean, it is insulated to facilitate unpacking and to prevent the physical and chemical contact that the acrylic resin and the plaster from which the pattern is made make. And for a better grip between the acrylate and the teeth we used the liquid acrylate, and with a stick we hit the side of the teeth that come in contact with the acrylic plate (Fig.2).

Fig. 2. Technological stage involved in removable prostheses realisation

We made acrylic paste according to the instructions on the packaging of the acrylate used. (Meliodent Rapid Repair). We inserted the acrylic paste by pressing. The polymerization was carried out according to the instructions of the acrylate, namely 15 minutes at a temperature of 55

degrees. Barrooom polymerization was used. Unpacking was performed using the pneumatic delta thus obtaining the final prosthesis.

And the polishing was done on the big engine with the brush and the fluffy polish. This is the last step in the algorithm for making the partial prosthesis with wire hooks.

Conclusions

Partially removable acrylic prostheses remain a viable transient therapeutic solution, in social cases taking on a long-term character managing to ensure a good quality of life through the evolved structure of new acrylic biomaterials in the context of rehabilitation of all stomatognathic system functions.

The evolution of their biomaterials both biomechanically and aesthetically leads to a good integration in the oral cavity of the patient ensuring an optimal social insertion.

Technological aspects are particularly important in obtaining optimal results from both a biomechanical and aesthetic point of view.

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