

BIOMATERIALS USED IN ORAL REHABILITATION OF THE EDENTULOUS ALLERGIC PATIENTS

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ABSTRACT

The aim of this study was to present some practical possibilities of oral rehabilitation by using thermoplastic materials and flexible biomaterials for the removable dentures in edentulous allergic patients. . **Material and Methods:** The study lot included a number of 20 patients diagnosed with total and partially extended edentation showing allergies to classic acrylic prostheses, manifested at the level of the oral mucosa. They presented allergenic reactions when they were treated by removable dentures made by classic PMMA. After methodical clinical and complementary examinations, the patients received a new prosthetic treatment made by thermoplastic materials and flexible biomaterials, according with particularities of clinical case **Results:** The construction of a total denture using the Polyan thermosetting material (modified methacrylate). The main feature of this material refers to the content of residual monomer, which is significantly lower than in the case of conventional dentures based on thermos-polymerizable polymethyl methacrylate. Flexible, monomer-free biomaterials are the ideal therapeutic choice in case of patients diagnosed with partially extended edentation who show allergies to classic acrylates. **Conclusions:** Nowadays, thermoplastic materials, due to their superior properties and their precision of manufacturing in the dental lab represent a better alternative used for removable dentures, comfortable and very well accepted by patients.

Key words: *thermoplastic materials, edentulous patient, removable dentures, flexible biomaterials;*

INTRODUCTION

In the last years, the progress of dental materials and afferent techniques used in prosthetic procedures have made possible for dental practitioners to achieve a better aesthetic and good functional results for their patients[1,2,3]. Materials based on acrylic resins have been widely used for obtain the removable dentures[4,5,6]. Existing acrylic materials contain many potentially toxic chemicals. Thermal polymerized PMMA have high porosity, high water absorption, volumetric changes and residual monomer. Due to the general increase in patients with allergic reactions, dental practitioners are confronted with more patients with allergic reactions to the classical PMMA[7,8]. In case of the removable dentures, as an alternative to the use of conventional acrylic resins were introduced on the market the thermoplastic materials and flexible biomaterials. Removable dentures are basically recommended to all patients showing partial edentation, but mainly to those allergic to acrylates;[9,10] Flexible removable dentures

have their limitations dictated by an altered general condition or unbalanced psychic, by chronic or acute infections or in clinical situations characterized by the presence of pre-cancerous lesions[11,12]. In addition, this type of treatment is not initiated when the oral hygiene is precarious, when the posterior prosthetic field is under 4-6 mm, without neglecting the presence of an overbite in excess of 4 mm or the massive atrophy of the prosthetic field[13,14].

AIM: The aim of this study was to present some practical possibilities of oral rehabilitation by using thermoplastic materials and flexible biomaterials for the removable dentures in edentulous allergic patients.

MATERIAL AND METHODS

The study lot included a number of 20 patients diagnosed with total and partially extended edentation showing allergies to classic acrylic prostheses, manifested at the level of the oral mucosa. Before presentation in the dental office, patients had been treated by removable prosthesis based on polymethyl methacrylate (PMMA). They presented allergic reactions when they were treated by removable dentures made by classic PMMA. After methodical clinical and complementary examinations, the patients received a new prosthetic treatment made by thermoplastic materials and flexible biomaterials, according

with particularities of clinical cases. After specific clinical and technological phases, 18 removable prostheses were made. For the complete removable dentures was used Polyan – Thermopress 400 (Bredent while for partially removable dentures the ‘flexie’ elastic material was used). Polyan is considered an original thermoplastic material used in the implementation of total prostheses by injection technique. This material is supplied by the manufacturing company in cartridges in different colors: pink veined, pink, transparent. For the removable dentures made of thermoplastic resins was used Thermopress 400 injection system(Fig.1).



Fig. 1 Presentation of the material and the afferent equipment

Material	Temperature programmed	Preheating time	Time maintaining pressure	Speed	Power level
Polyan (bre.crystal)	260°C	17 min	60 sec	6	156

Table I The technology used in this study followed the manufacturer recommendation

Already in 1958 the first formula for the high-performance thermal paste bre.crystal (Polyan) was developed in close

cooperation between industrial resin manufacturers and experienced dentists and dental technicians. bre.crystal can be easily and safely processed in the specially developed thermopress 400 injection moulding system. The composition of the material which has been matched to sensitive persons fulfills the current demands of your patients. Closely linked fiber particles form a highly dense cross-linked denture base material with a resistance to fracture that is ten times higher than that of conventional materials. bre.crystal is a transparent, glass-like thermoplastic resin based on polymethyl methacrylate. It does not contain benzyl peroxide or iron oxide, exhibits perfect biocompatibility and minimizes the occurrence of allergic reactions. Scope of polyan application is represented by complete dentures.

Features: very resistant, accurate, guaranteeing exact dentures, thick and shiny surface, very good adhesion, suction and stability, very well tolerated by the organism as it creates comfort, can be coated in the lab, fails to contain residual monomers, fails to allow the accumulation of plaque, has passed all the allergology and toxicity tests.

The injectable acrylate takes the form of granules with a low molecular weight. From a chemical perspective, injectable acrylates are polymethacrylates with linear polymerization, where the percentage of residual monomer is minimum, being beneficial for biocompatibility. Among these we can count: the Valplast type flexible acrylate, Flexite, Termoflex, Bio Dentaplast (Fig. 5). These materials lead to an excellent adaptation of the removable denture at the level of the Ah line, a very important marginal closing area. It is to be noted that the heightening of the occlusion, very frequent in classic technologies, is almost absent.

The basis of the removable dentures made of injectable acrylic resins is characterized by homogeneity, which ensures an

optimum tissue compatibility, to which the low content of residual monomer also plays a significant contribution.

RESULTS AND DISCUSSIONS

The patients repartition upon sex shows a preponderance of female. Before presentation in the dental office patients were treated by complete removable dentures made by acrylic materials. Their dentures had between 6 months and 3 years old. The patients had history of erythema, persistent pruritus and burning sensation of the gums every time they wore their dentures. Clinical examination of the oral cavity revealed the erythema of the mucosa in contact with complete dentures. The diagnosis was supported by the patient's medical history, and complete amelioration of the symptoms upon cessation of classic PMMA denture usage. This thermoplastic material, used by injection technique, has not contained some allergenic constituents, as: benzole peroxide, ethylene glycol dimethacrylate, triethylene glycol dimethacrylate, bisphenol-A-dimethacrylate, butyl methacrylate, dimethyl-p-toluidine, urethane dimethacrylate, hydroxy methoxybenzophenone, colophonium, hydroquinone, iron chloride, BIS-MA, p-tolyl diethanolamine in alcohol, BIS-GMA, dimethyl amino ethyl methacrylate, camphor quinine, cadmium chloride, cobalt chloride. There were three factors underlying the procedure: temperature, time, pressure. A first clinical case showing allergy to classic acrylates, who was diagnosed with total edentation, was rehabilitated by means of total dentures made of Polyan. The clinico-technological algorithm reunited the classic preliminary impression stages, functional impression, the registration of mandibular-cranial relationships, the wax mold of the future prosthetic constructions and the actual dentures resulted following the injection process (Fig.2).



Fig.2 Clinico-technological algorithm of complete removable dentures made by Polyane

This material has advantages because it offers: no residual monomer, high precision of fit, constant suction effect, high homogeneity (reduces plaque adhesion), reduced water absorption, a long-term stability.

The construction of a total denture using the Polyane thermosetting material (modified methacrylate). The main feature of this material refers to the content of residual monomer, which is significantly lower than in the case of conventional dentures based on thermos-polymerizable polymethyl methacrylate. (Pfeiffer, 2004). Furthermore, in comparison to the classic dentures, these

show greater mechanical resistance and higher homogeneity of the chemical structure, which makes them harder to permeate by microbial agents and easier to clean.

Flexite is a translucent material that can be used to avoid metal exposure: in addition, it can be attached to the metallic structure, providing stability on the opposite side of the arch and coating for the crochets. Due to the fact that Flexite has not tensile strength, it should have a design with a larger vertical height and thinner than the metal. Flexite crochets can be made starting from the highest contour of the support area of the tooth to the gingival junction: most of them are 3-4 mm high and 1.5 mm thick. Flexite is

a relatively new material and there are doubts regarding the resistance and stability of crochets inside the oral cavity, in time: as a result, this design should be the last choice in

the creation of an optimum esthetic result(Fig.3).



Fig.3 Aspects of Flexite, flexible partially removable prostheses

CONCLUSIONS

Nowadays, thermoplastic materials, due to their superior properties and their precision of manufacturing in the dental lab represent a better alternative used for removable dentures, comfortable and very well accepted by patients. Thermoplastic materials by injection technique are the solution of choice in prosthetic therapy of the edentulous allergic patients. Bio-morpho-functional integration of the prosthetic appliances in the stomatognathic system balance was conditioned by: a correct selection of biomaterials, a good physician-technician collaboration, an accurate performance of all clinical and technological stages supported by a thorough training of specialized staff.

Flexible, monomer-free biomaterials are the ideal therapeutic choice in case of patients diagnosed with partially extended edentation who show allergies to classic acrylates. Although these dentures can show a natural aging process of the material, they can

be revived by direct cleaning using an ultrasound bath.

The studies in the field show with certitude the biomechanical behavior of these dentures which provide an image for the processes of resorption and atrophy in the context of local and loco-regional factors. That is why the selection of this therapeutic solution should be made in agreement with the particularities of the clinical case, in relation to the clinical and biological factors, as well as the mucous, bone, dental and periodontal indices and the static and dynamic occlusion.

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