

## IMPLICATIONS OF BIOMATERIALS AND ARCHITECTURAL DESIGN IN THE SUCCESS OF REMOVABLE DENTURE THERAPY

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### Abstract

The study aimed at individualizing the factors that underlie the therapeutic decision of choosing removable therapeutic solutions as far as the biomaterials used and the architectural design of the removable dentures are concerned, in view of obtaining optimum long-term results in a systemic context and in agreement with the socio-economic criterion. The design of the main connectors of partially removable prostheses should be characterized by biomechanical efficiency, should have minimum interferences with the oral functions, such as mastication, speech, and deglutition. On the evolutionary scale, with the improvement in the structure of biomaterials and the working techniques, the main connector models need to be in agreement with the patient's acceptability and satisfaction, as well as with the fulfillment of the biomechanical parameters required to withhold masticatory forces. The studies suggest that patients express their concern regarding the entire palate area that is covered by the main connectors, as well as the localization of a main connector, most opting for medio-palatine models. The main connectors with a small design at the level of the palatine arch are more comfortable for the patient, in line with the previous observations which state that thinner removable dentures lead to minimum speech disorders.

**Keywords:** dental biomaterials, removable prostheses, design of main connector

### INTRODUCTION

Planning the construction of removable dentures in the clinical case under analysis, as well as the social impact on the patient turns the choice of the biomaterials by the dentist into a decision based on pertinent arguments,

depending on the particularity of the clinical case and the esthetic and functional requirements. The elaboration of the fixed elements within mixed prostheses have certain common elements that underlie their conception, and these are represented by the morphological and the biomechanical elements[1,2,3,4].

The design of the main connectors of partially removable prostheses should be characterized by biomechanical efficiency, should have minimum interferences with the oral functions, such as mastication, speech, and deglutition. On the evolutionary scale, with the improvement in the structure of biomaterials and the working techniques, the main connector models need to be in agreement with the patient's acceptability and satisfaction, as well as with the fulfillment of the biomechanical parameters required to withhold masticatory forces. Despite progress in the structure of biomaterials, as a large part is anchored in the non-metallic field, certain patients show difficulties in adaptation to very well technically executed removable dentures, and the choice of the design being made in agreement with the status of the clinical and biological indices. This phenomenon is attributed to various patient specific psychophysiological factors. A certainty is represented by the fact that patients prefer an architecture as small as possible for the main connectors; however they need to be superopposable on a factorial cumulation which stands at the basis of the application of the treatment principles[5,6,7].

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of choosing removable therapeutic solutions as far as the biomaterials used and the architectural design of the removable dentures are concerned, in view of obtaining optimum long-term results in a systemic context and in agreement with the socio-economic criterion.

## **MATERIAL AND METHOD**

The factual material was represented by a lot of 28 patients diagnosed with partially extended and sub-total edentation, aged between 40 and 75, an age group nearly synonymous with the targeted pathology and accompanied by the entire range of modifications and disorders of local, loco-regional and general parameters, which play a very important role in the choice of the therapeutic plan), who were examined and treated for a period of two years (2018-2020), at the discipline of Partially Removable Prosthesis within the Clinical Educational Facility of Dental Medical Education within "GR. T. Popa" UMF from Iasi.

## **RESULTS AND DISCUSSIONS**

All the patients were diagnosed with partial, sub-total or total edentation of various etiology and showed various complications

in the absence of an efficient therapy or even

due to improper prostheses.

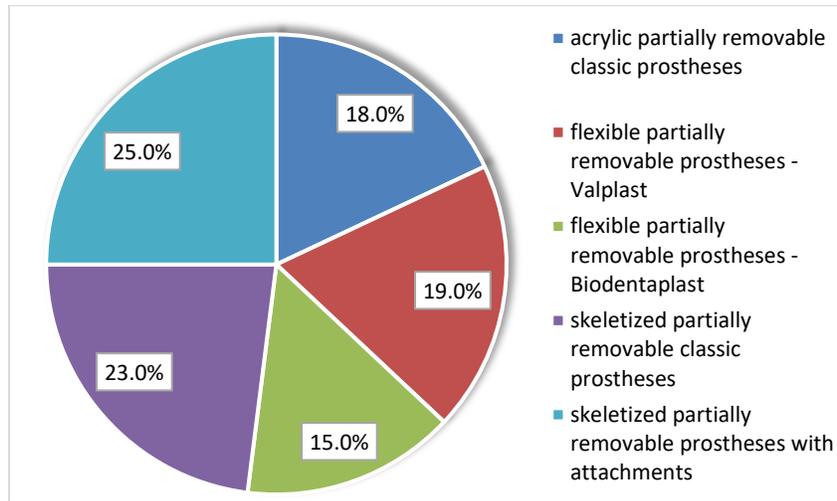


Fig.1 Distribution of removable prostheses types

Regarding the removable prostheses used, we remark an important percentage by skeletized partially removable with attachments (25%), followed by classic skeletized partially removable prostheses (23%), by flexible partially removable prostheses-Valplast(19%). According with clinical situations we used acrylic partially removable classic prostheses (18%) and flexible partially removable prostheses – Biodentaplast (15%)(Fig. 1).

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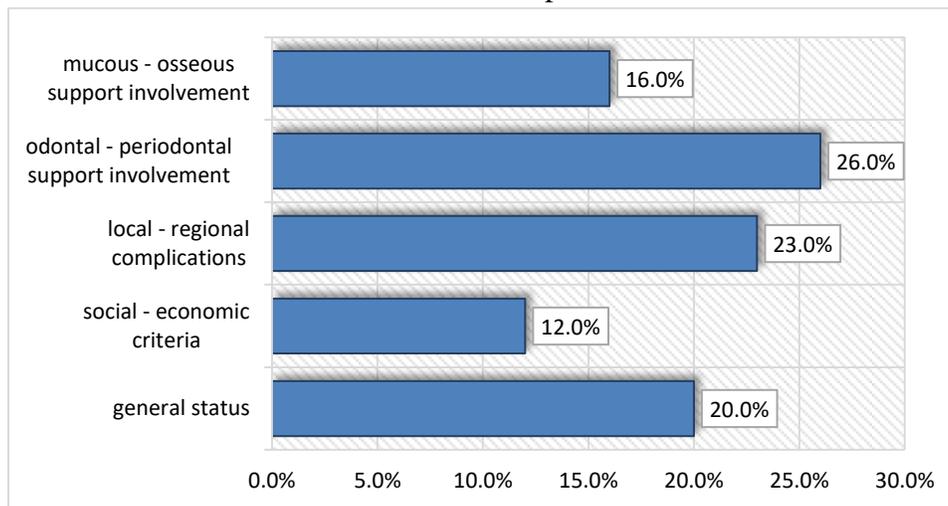


Fig. 2 Distribution of the therapeutic choice

The particularization criteria of the therapeutic choice (Fig. 2 ), based on the morpho-functional particularities specific to the age group under analysis, refer to the clinical and biological indices that characterize the dento-periodontal support(26%), a significant percentage being covered by the local complications, the degree of damage of the mucous bone support covering a percentage of 16%%, 23% the complications generated by the loco-regional complications which certainly influence the therapeutic approach, while the socio-economic criterion that stands at the

basis of the final therapeutic solution also plays a significant role.

*Bio-Dentaplast* is a mainly crystalline thermoplastic resin, a polyoxymethylene in the group of acetylic resins. It is indicated on a multiple variety of prostheses, coming under the form of a pre-dosed cartridge. The density of this resin is 1.41 gr/cm<sup>3</sup>, it becomes liquid for a short time at a temperature of 150°C, and then it becomes a crystalline thermoplastic resin. Unlike classical acrylate, it is not affected by a pH < 4, and once hardened it becomes micro-retentive(Fig.3).



Fig.3 Aspects of Biodentaplast flexible removable prostheses

The Bio Dentaplast resin is available in 4 dental nuances, the colors being coded as follows: A2, A3, B2, B3. It is a very resilient material from a biomechanical

perspective, and it satisfies the most rigorous physiognomic requirements.

The removable prostheses of the biodentaplast type are the most modern form of prosthesis. The clasps are esthetic (of the

teeth color – non-metallic, unlike metallic skeletal prostheses) and have a certain dose of elasticity. The elasticity is ensured by the material they are made of. As long as the optimum thickness of the bracket is observed, it won't break. In case of biodentaplast prostheses special methods of preservation and support can be used as well (slides, staples)[8.9.10].

The biodentaplast prostheses have the following advantages which plead for the choice of this therapeutic solution, its design being in full agreement with the particularities of the clinical cases:

- Clasps with very good elasticity (the insertion and disinsertion of the prosthesis is carried out without affecting the pillar teeth);

- The material is indicated by its name (biodentaplast), currently one of the best accepted material by the tissues);
- The color of the brackets is the same as the color of the teeth, so the presence of the prosthesis goes unnoticed;
- The good resilience of the material in time (it doesn't get impregnated with food debris, it doesn't change its chemical composition).

Regardless of the benefits of partial skeletal removable prostheses regarding aspect and functionality, a series of studies showed a low acceptance and satisfaction level of the patients(Fig.4).



Fig.4Aspects of accepted removable prostheses with attachments

The positive influences on the use of partial skeletal removable prostheses seem to be represented by the presence of a replacement of former teeth, the number of prosthetic

teeth and the number of opposite posterior teeth. In a random study on an experimental witness group, in Denmark, which compared the use of partial skeletal removable

protheses or cemented bridges used for the treatment of intercalated edentations, significant improvement was reported with regard to the satisfaction levels for both treatments, but a higher clinical effect was recorded for the group with fixed protheses. Evidence regarding the patient's low compliance and satisfaction regarding partial skeletal removable protheses indicates a significant discrepancy between the professionally evaluated necessity and the patients' requests. An explorative, qualitative study-interview that identified the factors that influence the dentists' indication and the use by the patients of partial skeletal removable protheses in UK reported clear differences regarding the dentists' and the patients' attitude towards partial skeletal removable protheses. The motivation for using partial skeletal removable protheses is often centered on the patients' fears

regarding aspect. The analysis suggests that it might be better to conceptualize these fears as problems related to the social functions of patients and their social identity, more than vanity and esthetics. The use of partial skeletal removable protheses has been influenced by the change between the improved aspect and the non-perceived presence at the palatine level of partial skeletal removable protheses in the oral cavity[11-21]. A qualitative study on an Irish population with partial edentation reported similar tendencies but, additionally, it focused on explanations and preferences for the current and future treatment. There were significant expectancies from all participants regarding the loss of dental units and the participation of patients in decision taking, but there was an effect of the group's age with higher expectations for those in the age group of 45-64.

## CONCLUSIONS

1. It is essential to underline the fact that the optimum rehabilitation of the partially extended edentation is obtained after a thorough comparison between the classical vs modern option.

2. It is necessary to underline the fact that both the indices of the prosthetic field, of the dental – periodontal support and of the mucous – bone support, namely the influence of the socio-economic status, condition the long-term success of the treatment.

3. It is important to analyze the fact that the optimum rehabilitation traces a demarcation line between the success and failure of the treatment.

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