

## TECHNOLOGICAL ASPECTS IN AESTHETIC REHABILITATION OF FULL DENTURES

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### ABSTRACT

Full Dentures represents the classic therapeutic solution for complete edentulous patients, due to their advantages. The choice of the optimal therapeutic solution must be based on a correct and complete clinical and complementary examination. The difficulties of choosing a therapeutic strategy consist in finding a balance in satisfying the patient's requirements and the objective demands of the individuality of the oral cavity. The aim of this article is to present a clinical case that illustrates the technology of restoring the physiognomic function of a total edentulous case by rendering the aesthetic aspect of artificial gum, for a complete maxillary denture. The polychromy method is a technique that consists of the superimposition of different shades of colors in order to restore the most natural appearance of artificial gingiva. This method allows obtaining prostheses with a better aesthetic appearance, comparing to the classical ones.

**Keywords:** complete edentulous, complete denture, aesthetic rehabilitation

### INTRODUCTION

The major concern in complete edentulous therapy is the restoration of facial aesthetics according to biological and biomechanical behavior of the individual and to the patient's needs and desires. Therefore, it requires the development of an artificial substitutes which gives wearer the feeling of existence of his natural teeth, in the context of psycho-affective personality, preserving the patient's aesthetic characteristics [1].

The full denture represents the therapeutic solution used in the treatment of complete edentulous, due to the numerous advantages: easy-to-achieve technology, rapid and optimal resumption of stomatognathic system functions, very good biocompatibility, the possibility of optimization or repair. At the same time, the disadvantages of these prosthesis (the atrophy of the alveolar ridges, difficulties in ensuring the retention and stability, diminishing the taste sensitivity, discomfort due to the large volume), cannot be ignored [2].

Hard and soft tissues can be replaced with modern materials and the wide variety of artificial teeth, with varied shapes and shades, meet the aesthetic requirements of patients. But all their advantages and disadvantages must be carefully analyzed before designing the treatment strategy for complete edentulous.

The insertion into the oral cavity of a prosthetic construction of such amplitude it doesn't mean just the restoration of altered or lost functions, but it also means to achieve a new balance between all the elements of the stomatognathic system. Planning the therapeutic steps having previously informed patient consent, is fundamental for the dental treatment success [3].

The choice of the optimal solution must be based on a correct and complete clinical examination, on the results of the general, loco-regional, local and complementary examinations, on an objective evaluation of the patient's wishes and expectations. The difficulties of choosing a therapeutic treatment consist in finding a

balance between satisfying the patient's requirements and the objective possibilities in the oral cavity [4, 5].

Although the realization of a full denture does not, theoretically, represent a big difficulty, neither from the point of view of the dentist, nor from the dental technician's, it is often difficult to achieve due to the particularities of the patient's oral cavity. A correct prosthodontic treatment does not only mean to restore the continuity of the dental arches, but it also means a holistic approach of the situation, in order to seamlessly integrate the construction into the prosthetic area. It should be taken into account that the complete edentation does not only mean the absence of teeth but also the occurrence of loco-regional imbalances, affecting all the elements of the stomatognathic system and even the appearance of general dysfunctions [6, 7]. The prosthesis aims not only to replace the missing natural dental arches but also to restore the altered functions and to limit the installed imbalances to the maximum. The application of an artificial substitute involves a relationship between two component elements: the prosthesis and the biological support on which it is inserted; changes between the two elements occur over time, which may impede normal functionality [8]. Therefore, the prosthetic treatment should not be considered completed after the application of the prostheses in to the oral cavity, but must be continued after this step, following the patient, through periodic checks, to detect and correct any changes that have occurred, both at the level of the biological support and at the level prosthetic construction [9,10].

Aesthetics in full denture is achieved by restoring the correct vertical occlusion dimension, the facial contours, choosing the appropriate shape, size, color of artificial teeth and artificial gingiva. In the realization of a full individualized denture, a particularly importance is played by the vestibular slope of the saddles, which must reproduce all the morphological details and to restore the physiognomic aspect by volume, relief, color. The volume of the artificial gum contributes to the rehabilitation of the appearance of the

harmonious contour of the lips, to the blurring of the perioral grooves, in accordance with the age of the patient; it also offers the *Orbicularis* and *Buccinator* muscles a proper support and optimal conditions for action, in order to ensure the retention and stability of the prosthesis [11,12].

Replicating the root eminences is also important for the aesthetic aspect. These morphological elements correspond to the roots of the teeth, the most marked being the canine eminence. The prominences become progressively less marked in the premolar and molar region. Special attention must also be paid to the modeling of interdental papilla and to the free gingival margin [13]. The color of the artificial gum must be correlated with that of the oral mucosa, but also with the skin of the patient's face. There are different color keys capable of accurately reproducing the color variations of the natural gums, in order to create the illusion of natural.

In this article we present a clinical case that illustrates a technique for restoring the physiognomic function through an individualized aspect of the artificial gingiva of the full denture [14]. The polychromy method consists of the superimposition of some layers of resin, in different shades of colors in order to restore the most natural appearance of artificial gum. This technology allows to obtain physiognomically optimized full dentures, compared to the prostheses obtained through the classical technology. An aesthetic aspect as close to natural as possible will make patients to accept faster the prosthesis

## MATERIAL AND METHOD

We present the case of a 71years old patient with masticatory and physiognomic disturbances as a result of total maxillary edentation. The patient wasn't previously treated with a removable denture. From the anamnesis we learned that his general condition is affected by high blood pressure and type II diabetes. Following the clinical and paraclinical examinations, we excluded the dental implants solution and we decided to make a full maxillary denture.

The working flow for making the full denture consisted in realization of the: preliminary impression, preliminary models, individual impression tray, master impression, master casts, occlusion rims; maxillo-mandibular relationships record, the mounting into articulator, and the wax-up of the full denture.

Artificial acrylic teeth were chosen according to the patient's gender, age and skin colour and mounted according to Gysi's general and individual rules.

After the artificial teeth set-up, the trial denture was received in the dental office for the clinical try-in stage and adaptation in the patient mouth.

The aesthetics of the anterior teeth, lip support, arch form, tooth size, tooth shape, and shade were analyzed. The incisal,

sagittal and transversal curves and the occlusal contacts were verified. The vertical dimension of occlusion (V.D.O.) was checked as well.

The wax-up was sent to the dental technician for the festooning, procedure defined as the contouring of the wax base of a trial denture into the desired final form, to simulate natural gingival contours.

Next step was processing the denture, the transformation of the wax-up into the final acrylic prosthetic piece. The wax channels for injection were attached and the wax pattern was placed inside a flask in order to obtain the mould (fig. 1). After investing, injection and polymerization, divesting, finishing and final check of the prosthesis were done (fig. 2).

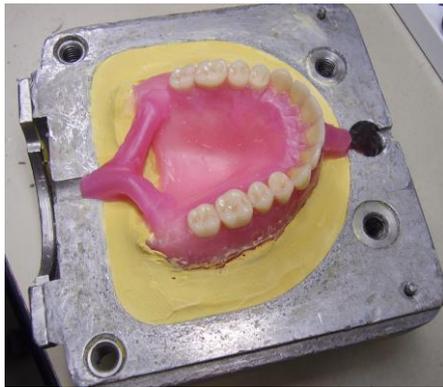


Fig.1. Preparation for investing



Fig.2. The device after divesting and finishing

For the optimal restoration of the aesthetic function, the areas with different coloration and translucency from the artificial periodontal tissues should be identified. Thus, the marginal gingiva, located around the cervical line of the artificial teeth, with a size about one millimeter, has a pale-pink color, which sometimes turns up to shades of white. Artificial attached gingiva, representing the slopes of the denture also has a variable coloration; thus, at the level of root eminences, the shades are pink-light, while at the level of fossa, the color turns to dark red or purple. The interdental papillae represent the dark red colored area, but the shades vary from individual to individual, depending on

age, skin pigmentation or ethnicity. For this purpose, we modeled and make up the respective areas, according to the anatomical particularities and the aesthetic requirements.

To improve and customize the aspect of the artificial gum, the external surface of the vestibular slope was prepared with burs by reducing 1-1,5mm of resin layer, in order to ensure sufficient space for the veneering process. The material used was SR Nexco® /Ivoclar light-curing composite resin with micro-opal fillers which allows to achieve a lifelike shade even if space is limited, a durable shade stability and a long lasting gloss (fig. 3).



Fig.3. SR Nexco Paste® /Ivoclar

The rough surface structure is required to obtain optimum bond strength between the denture resin and the light-curing pigments. Subsequently, the surface of the denture base material was conditioned using SR Connect

bonding agent, that reacts for 2 to 3 minutes and light-cured in the Lumamat 100 for 11 minutes. Then a pink to pale resin shade was applied. A glycerin-based gel was applied to promote the polymerization reaction (fig.4).



Fig.4 Application of the first layer of composite resin and glycerin-based gel

We started with the application of pigments for free gingiva, root eminences and labial frenum. Next, SR Nexco Gingiva 5 was applied into the alveolar spaces of the attached mucosa, in order to achieve depth effects and contrasts in interproximal areas. To reconstruct the attached mucosa, two shades were used. Firstly, an orange-coloured paste, SR Nexco Paste Gingiva 1, was applied towards the mobile gingival parts as a transition area and secondly, this layer was covered with the pink-colored SR Nexco Paste Intensive Gingiva in order to obtain a 3D effect.

In the next step, Nexco composite resin was applied to the other areas on the vestibular slope, in successive layers. Before building each layer, the bonding agent was applied, and each layer was separately polymerized.

For the simulation of the capillary vessels, SR Nexco Stains clear and red are mixed together and applied on the attached mucosa. This method allows the capillary vessels to be imitated as naturally as possible (fig.5).



Fig.5. Simulation of the capillary vessels

Before the final polymerization, a thin layer of SR Gel - an oxygen-impermeable masking gel - must be applied on the reconstructed gingiva, to prevent the formation of an inhibition layer. After polymerization, SR Gel must be removed completely, from the entire surface.

The finishing steps and the modeling of the surface texture of the final denture are performed using customary tungsten carbide burs and polishing tools brushes and polishing pastes, to ensure a proper gloss on the external surfaces (fig.6)



Fig.6. Finishing and polishing the denture surface

After finishing process, the complete denture was checked again on the master cast and sent to the dental office for final try-in and adaptation in to the oral cavity.

## RESULTS AND DISCUSSIONS

The technique of using SR Nexco composite resin (Ivoclar), can be applied for both complete or partial dentures and allows an optimal aesthetic restoration, which leads to a rapid acceptance of this prosthetic construction by the patient.

SR Nexco Paste light-curing lab composite has a lot of advantages: fast and easy aesthetic restoration due to the true

optical properties of the micro-filling material, homogeneous and quick shade reproduction, due to layer thickness tolerance, free choice of polymerization equipment, easy to apply and handle, suitable for a wide range of indications. In addition, the resin, which is delivered in syringes, has a multitude of variants for the aesthetic restoration of different areas of the prosthesis: SR Nexco Paste Gingiva®, Gingiva® and Intensive Gingiva®. SR Connect® adhesive, SR Gel® final curing gel and the SR Modeling Liquid® complete the external make-up procedure of the full denture [15].

This method of individualization is easily to realize and brings an additional

aesthetic dimension to the full denture. The external make-up solution using SR Nexco®, after acrylic resin polymerization, is an accessible possibility to restore the physiognomy of the prosthetic edentate area. The immediate visualization of the result of each step allows a permanent and efficient control in each stage of the restoration; the

optimum mechanical properties of these materials allow the application of layers of small thickness, but with a high resistance and a very good aesthetic appearance (fig. 7). The studies performed so far do not indicate bacterial infiltration, color change or detachment of the composite material from the surface of the prosthesis [7, 16].



Fig.7. Final aspect of the complete maxillary denture

The transition from partial to full denture is often a difficult state for patients, total edentation being considered as a serious mutilation of the dental-maxillary system. Despite the numerous technical advances made over the years to improve comfort and optimize the parameters of the materials for complete denture, the aesthetic appearance has often been neglected. Fortunately, nowadays, many techniques allow us to customize these prosthetic appliances, both on the artificial teeth and on the artificial periodontium; thus, dental prostheses being perfectly integrated into the facial architecture [17].

## CONCLUSIONS

The patients ask for a perfect denture appearance or for a supernatural teeth form, shade and arrangement, a natural look and a perfect smile. In order to reach this result, a real effort is required, both from dentist and dental technician. Achieving a natural look in complete dentures needs skills, scientific back up information, regarding the set up of teeth, but most of all the collaboration between the dentist and the patient, to find a reasonable compromise between what is expected and

what can be done. The patient will be able to express his expectations, and the practitioner will make the patient understand the possibilities and limitations of such a therapeutic solution..

Even the main role of the removable dentures is to restore the dental arches, masticatory function and occlusal contacts, for most patients regaining the aesthetic aspect is the most important goal of the treatment. The material used for the aesthetic restoration of the presented clinical case allowed us to give the artificial gingiva a more natural look, using different shades of color for the alveolar spaces of the attached mucosa, for the alveolar processes, the mobile gingival parts, upper labial frenulum and the capillary vessels.

Individualization of a denture is a challenge for the entire dental team. Practitioners can no longer achieve a complete denture only following some generally valid principles, these rules have to be adapted to each clinical case, doing an artificial substitute according to the personality, age and wishes of the patient.

Prosthesis respecting the individuality of the patient and restoring the aesthetic

aspect will have a positive impact on self-confidence, self-assurance, and the patients

will feel more comfortable and will accept their dentures more easily.

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