DIGITAL TECHNOLOGY FOR REMOVABLE PARTIAL DENTURE REALIZATION. CASE REPORT

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DIGITAL TECHNOLOGY FOR REMOVABLE PARTIAL DENTURE REALIZATION. CASE REPORT (Abstract): The conventional fabrication of removable partial dentures is a complex process, which involves a lot of clinical and technological steps. The design of the elements must be performed in order to maintain the homeostasis and to rehabilitate, in optimal conditions, the functions of the stomatognathic system. Digital technology-Computer-aided design/computer-aided manufacturing (CAD/CAM) method for partial denture fabrication brings a lot of advantages: high accuracy of the denture, increases the strength and durability, avoid changes of the volume and, time working economy. This clinical report aims to illustrate the stages of getting a removable prosthesis, using the computerized method and to emphasize that digital prosthesis can be effective and accurate, eliminating or replacing steps that can lead to complications. Keywords: REMOVABLE PARTIAL DENTURE, CAD-CAM TECHNOLOGIES, METALLIC FRAMEWORK.

Removable partial denture is a device of great complexity, both in terms of choosing a correct design, adapted to the clinical situation, and in terms of effective technological execution. The elements of this removable prosthesis come in contact with the remaining teeth, but also with the oral mucosa and the bone support. In this case, the choice for the connector design and for the direct and indirect retainers will be made in order to restore homeostasis and the functions of the dento-maxillary system (1). An incorrectly made prosthesis will generate a series of pathological dental, periodontal, occlusal or physiognomic manifestations. The design of the removable prostheses must be realized according to the prosthetic area, not to overload the remaining teeth and the periodontium; thus, all functions altered by edentation will be rehabilitate in optimal conditions. The elaboration of a removable partial denture supposes a succession of clinical and technological steps; the rigorous observance of the steps and the knowledge of their particularities, as well as of the characteristics of the materials used will allow the realization of some prosthetic constructions with optimal resistance and with great clinical longevity. (2). The development of dental materials has diversified the technologies for prosthetic constructions, and knowing the particularities of each method, with their advantages, disadvantages, and limitations, allows choosing an appropriate therapeutic solution and solving the most diffi-
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cult clinical situations, in optimal conditions. Modern digital technologies for prostheses realization are currently preferred, because they offer multiple advantages compared to classical methods: decreased number of appointments, high accuracy of the appliance, decreased duration of realization, superior quality control by clinicians and technician, possibility to change the design and to remanufacture without the need to restart the entire process; also, digital solutions allow the application of advanced materials, reduce material costs and casting equipment, so it will allow less wasted alloy, no wasted wax and no wasted investment material (3, 4). The development of the precise design procedures, including computer-aided design and manufacturing CAD/CAM, for fabrication partial dentures is justified because there is still a large group of patients who would benefit on improving the accuracy of these solutions (5, 6).

**CASE REPORT**

Patient S.O., 59-year-old came to the dentist's office with functional disorders caused by the loss of several masticatory units, both on the maxillary and on the mandible (fig. 1).

**Fig. 1. Clinical examination**

After performing the clinical and the paraclinical examinations (orthopantomography and model study) the diagnostic was of partial maxillary and mandibular edentation; as a therapeutic solution was chosen, for the maxilla a removable partial denture, with two saddles, reduced palatal plate as main connector and encircling clasps, as elements of retention, support, and stabilization. For the mandible, a removable partial denture was indicated: with two saddles, a lingual bar as connector and also clasps, for the retention.

The process for fabricating removable partial dentures has three major steps: the impression procedures, the denture design, and the denture fabrication. The first step consisted into an optical impression of the maxillary and mandibular prosthetic area and occlusal contacts in maximum intercusal registration (fig. 2).

To realize the prosthetic device, we used the DIGISTELL system, 3D CAD software for removable partial frameworks. The data were sent to the CAD-CAM work unit and, based on the recorded images, the CAD component will analyze the prosthetic area and provide indications which teeth will be applied the clasps, the dental areas to be prepared for the application of the occlusal rests and the teeth for possible coronoplasty; it will also propose a design for the future.
prosthesis, indicating the types of connector, the most appropriate clasps for the clinical situation, as well as the relationship with the abutment teeth (fig. 3).

![Fig. 2. Optical impression](image1)

![Fig. 3. The design of the future framework](image2)

The doctor will make the preparations on the support teeth, will prepare the organic substructure, in order to apply a crown on 2.5 premolar. Then, a new optical impression is registered, with the prosthetic area prepared for the device.

Based on the second impression, virtual models will be developed, corresponding to the new clinical situation, on which virtual frameworks of the future prosthesis will be created (fig. 4).

After establishing the design of the partial removable dentures, the information was transmitted to the CAM unit where the
actual milling of the metal infrastructures is done, using chromium-cobalt-tungsten-based alloy blocks. The framework was checked in the oral cavity, then the dental technician, in the laboratory, made the acrylic component of the saddles and the mounting of artificial teeth. After processing and finishing the prosthesis, they are sent to the dental office for verification and intraoral adaptation (fig. 5).

**DISCUSSION**

Making removable partial dentures using CAD-CAM methods has many advantages recording with high precision all the details of the prosthetic area due to the optical impression, designing the framework on a virtual model and analyzing the therapeutic possibility depending on clinical situations, material economy, as a result of eliminating laboratory steps, high accuracy in realizing each element of the prosthesis (7, 8, 9).

For a correct adaptation of the prosthesis, the relationship between elements of retention, support and stabilization and abutment teeth is extremely important. In general, bone resorption at the level of edentulous ridges is asymmetric, which determines an uneven distribution of pressures; therefore, any deviation, even a minor one, of the metal framework geometry can lead to a destabilization of the prosthesis (10, 11).

Computerized technologies eliminate the risk of errors in the design and execution of removable partial dentures, allowing the realization of high-precision prosthetic constructions, correctly adapted and with great longevity over time.

**CONCLUSIONS**

The individualized treatment of the par-
Partial edentation requires an in-depth knowledge of the clinical situation and of the elements of the edentulous prosthetic area, in order to adapt the therapeutic possibilities to the clinical particularities, so as to ensure an optimal morpho-functional rehabilitation. The multitude of prosthetic technologies and the diversification of materials over time, on the one hand make it difficult for the doctor and dental technician to provide the choice of the best solution and, on the other hand, offer a wide range of technological possibilities, allowing individualization of the treatment plan.

Nowadays, there are a large number of devices, technologies and materials that are available to the doctor, but especially to the technician for the realization of removable partial prostheses that correspond to the mechanical, biological, and prophylactic desideratum.

The development of the precise design procedures, including computer-aided design and manufacturing CAD/CAM, for fabrication of partial dentures is justified by many advantages compared to the classical methods.

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**REFERENCES**