

Diagnostic Wax-Up - an extremely important method of communication between the dental office and the dental laboratory

Sergiu DRAFTA¹, Viorel PERIEANU¹, Radu COSTEA¹, Oana EFTENE¹, Mihai BURLIBASA¹, Raluca Maria MANEA², Florentina CAMINISTEANU², Mircea CARABELA², Ioana-Cristina NEAGOE³, Raluca COSTEA², Irina Adriana BEURAN¹, Nicoleta MARU¹

¹ "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

² Private practice Bucharest, Romania

³ University of Pitesti, Romania

ABSTRACT

Communication between the clinical department (dental office) and the technical department (dental laboratory) is one of the topics that often comes to the mind of every dental technician or dentist. This communication can be done by different methods as a type of inter-compartment communication, but diagnostic wax-up, along with Digital Smile Design and mock-up, is not only one of the most effective, but also one of the clearest and precise ways of transmitting information from the dental technician to the dentist, and implicitly to the patient, but also vice versa.

Keywords: diagnostic wax-up, dentist, dental technician

INTRODUCTION

The aspect related to the inter-departmental communication in dentistry, refers mainly to the communication between the dental office and dental laboratory. However, this communication was initially made only in written or oral form (directly, from person to person), or, nowadays, the transmission of information from the dental office to the dental laboratory in both ways has evolved a lot nowadays, through the possibility the use of newer and more efficient digital methods, such as e-mail, WhatsApp, etc.

OBJECTIVES

In general, the stages of communication between the clinical department (dental office) and the technical

department (dental laboratory) can be achieved, as already mentioned, by several methods, namely [1-6]:

- *Direct communication.* For this type of communication to be feasible, the dental office and the dental laboratory must be in the same place or at least close enough. This type of communication is effective because the dental technician has access to all the necessary information and can obtain valuable details;
- *Indirect communication.* Graphic markings on the working model, wax-up, signs or photographs are examples of indirect communication.
- *Oral communication.* It is done by phone or face to face.
- *Written communication.* Lab sheet, e-mail or text messages are methods of written communication.

Corresponding authors:

Viorel Perieanu

E-mail: viorelperieanu@yahoo.com

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OUTCOMES

Case Presentation No. 1

This first case concerns a female patient who wants a simulation of a prosthetic restoration in the maxillary frontal area, comprising the maxillary incisor group, from the right lateral incisor to the left lateral incisor (1.2, 1.1, 2.1, 2.2).

The dentist requested in the lab sheet (the written communication channel between dentist and dental technician, through which indications are transmitted in both ways) that he wants an anatofom modeling with vestibular relief as complex as possible and irregular incisal edges.

Impression of the prosthetic field was performed using a standard impression tray, and the material used for the impression was irreversible hydrocolloid (alginate). In the case of alginate impressions, it is known that the models must be cast as quickly as possible (in about 20 minutes), because the impressions taken with this material deform as quickly as possible (Figure 1).



FIGURE 1. Impressions of the maxillary and mandibular arches made with irreversible hydrocolloid (alginate)

The impressions were washed and decontaminated according to specific protocols and sent to the dental laboratory for casting working models. Although the practical recommendations require the use of class III dental plaster for such procedures, in this case class II dental plaster was used for experimental reasons. After the setting of the plaster (approximately 30 minutes), the impressions were removed and the models are finished with the help of a trimmer, to remove excess material and smooth the plaster surfaces. The models obtained after trimming are to be mounted in the articulator according to the known technique, in centric relation (the determination of the centric relation was made, beforehand, by the dentist, in dental office) (Figure 2).

In order to be able to make a diagnostic wax-up according to the specifications received from the dentist on the lab sheet, the vestibular surfaces of teeth were

But, as a type of inter-compartment communication, diagnostic wax-up, along with Digital Smile Design and mock-up, is not only one of the most efficient, but also one of the clearest and most accurate ways of transmission of information from the dental technician to the dentist and to the patient, but also vice versa.

Specifically, diagnostic wax-up is a method of previewing the final outcome of the treatment plan. Specifically, wax-up helps the patient to accept the treatment more easily and makes it more communicative, as he can express his wishes, preferences regarding prosthetic restoration, tooth color, shape or size, etc. [1-6].

This technique for making the diagnostic model is very useful in transmitting information between the dental laboratory and the dental office, making the communication between dental technician and dentist more efficient [1-6]. In the following material we will try to exemplify through some well-defined cases, what is the diagnostic wax-up, to explain its role in previewing the future prosthetic restoration and, at the same time, we will try to demonstrate the importance of this tool in the flow of communication between the dental office and the dental laboratory.

MATERIAL AND METHODS

In general, the diagnostic wax-up is a tool of real significance for the final result of the proposed prosthetic treatment [1-13].

As a means of diagnosis, wax-up represents [1-6]:

- A way to visualize the possible results, following the recommended prosthetic treatment.
- An early analysis of possible difficulties that may arise during prosthetic treatment
- An emphasis on the need to perform dental reconstitution and additional work, as appropriate.
- An effective means of communication with the patient.

As a tool used during the prosthetic treatment, the diagnostic wax-up can serve as [1-6]:

- Carrying out immediate temporary prosthetic restorations (mock-ups) or transitional ones, until the completion of the final prosthetic restorations.
- Preparation of surgical guides used in dental implant insertion procedures.
- Recording device of occlusal relations and their transmission to the dental laboratory.

This diagnostic wax-up is usually performed by the dental technician in the dental laboratory, depending on clear indications and instructions from the dentist, after prior consultation with the patient. To perform the diagnostic wax-up, the dental technician will use the equipment, instruments and materials specific to a usual dental technique laboratory.



FIGURE 2. *Trimmed models*

reduced using a plaster cutter. Thus, enough space is created for anatofom modeling with vestibular relief as complex as possible, avoiding its overload (Figure 3).



FIGURE 3. *Models mounted in the articulator in a centric relationship, with reduced vestibular surfaces*

Before starting the diagnostic wax-up, the midline is drawn on the surface of the plaster model. In this case, the median line of the soft tissues tends not to correspond to the median line of the dental arch, but the modeling will respect in broad outline the imposed limits. The primary diagnostic wax-up will be presented to the patient by the dentist and will be established in the dental office, the steps to be followed in order to obtain a satisfactory result for both the patient and practitioners (Figure 4).

Case Presentation No. 2

The following case belongs to a male patient, who wants the diagnostic wax-up of the first premolars (bi-



FIGURE 4. *Working models after performing the diagnostic wax-up*

cuspid) and the entire frontal group in the area of the upper maxillary arch. The modeling will include the modifications of the first maxillary premolars, the two canines and the lateral and central incisors (1.4, 1.3, 1.2, 1.1, 2.1, 2.2, 2.3, 2.4).

The patient has gaps between 1.2 - 1.3 and 2.2 - 2.3 (between the central incisors and canine) and diastema. Also, the vestibular surfaces of the central and lateral incisors do not have the same curvature. The dentist stated in the lab sheet that he wants to close the spaces (elimination of diastema and other gaps), bringing the vestibular surfaces and incisal edges to the same plane.

For the impression of the prosthetic field, the same impression material was used as in the previous case, the irreversible hydrocolloid (alginate), which has the peculiarity that it faithfully reproduces the details of the prosthetic field and transfers them to the plaster model if casted as soon as possible, in order to avoid dimensional changes (Figure 5).

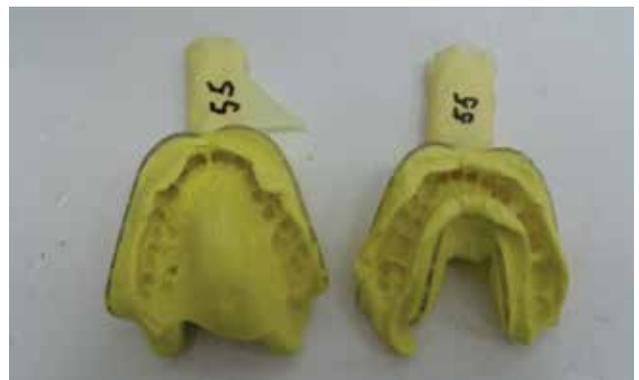


FIGURE 5. *The two impressions (maxillary and mandibular) made with irreversible hydrocolloid*

After washing and decontaminating the impressions according to the recommended protocols, the casting of the working models followed the specific work phases. The models were cast using class III dental plaster.

The working models will have abrasive surfaces with irregular and sharp edges, especially in the base area. Smoothing the base of the model and reducing it to the desired dimensions, ideal for easy handling, is done by trimming. In order to be able to move to the modeling stage of the diagnostic wax-up, it is necessary to mount the models in the centric relationship in the articulator based on the occlusal registration made by the dentist in dental office (Figure 6).



FIGURE 6. Fixing and holding the models in the desired position for mounting in the articulator

Mounting of the models in the articulator was done using occlusal recording, class II dental plaster and specific instruments. The dental technician drew on the surface of the model the median line of the arches, in order to have a fixed reference mark, during the realization of the wax-up (Figure 7).



FIGURE 7. Working cast mounted in articulator in centric relation

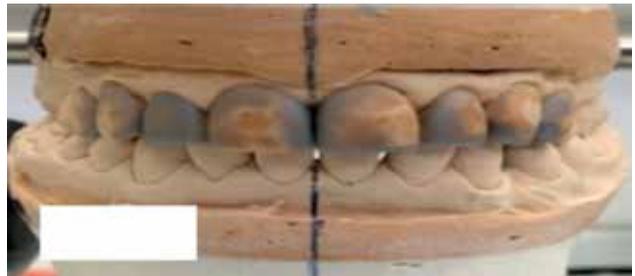
Once the aforementioned work steps have been completed, the diagnostic wax-up can be started. In order to carry out a diagnostic wax-up that respect the wishes and needs of the patient, the laboratory file where the indications sent by the dentist can be found, must be consulted.

The modeling will include the maxillary frontal region among the first premolars. Closure of the interdental spaces will be considered, as the patient wants to eliminate the diastema and gaps. Also, the patient presents on the upper left quadrant the first premolar with rotation and wants to mask it, by oversizing the mesial third of the vestibular surface (Figure 8 a, b, Figure 9 a, b).

In making the diagnostic wax-up, modeling spatulas and electric spatula were used as tools, and gray wax was used as the modeling material, which allows the practitioner and the patient to better observe the places where material was added and differences obtained by correction.



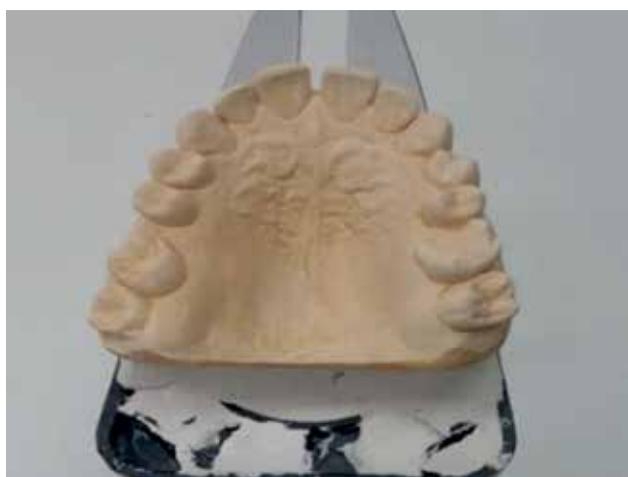
a



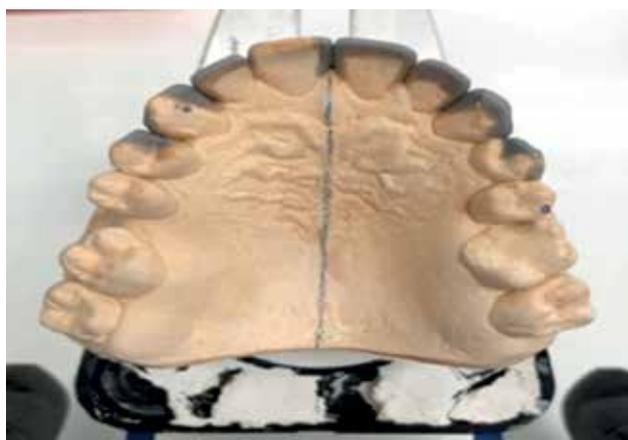
b

FIGURE 8 a, b. Models before and after the diagnostic wax-up, frontal view

After the completion of the primary modeling, the diagnostic wax-up is sent to the dentist's office, to be analyzed by the dentist together with the patient. Following a thorough analysis and discussion based on the diagnostic wax-up, it is determined whether changes or minor tweaks are needed. If the diagnostic wax-up requires modifications, the model is sent back to the dental laboratory to make them. If the diagnostic model meets the wishes and specifications of the dentist and the patient, it is possible to proceed to the actual prosthetic restorations (temporary and/or definitive).



a



b

FIGURE 9 a, b. Models before and after the diagnostic wax-up, frontal view, occlusal view

DISCUSSIONS

The current requirements in terms of dentistry and the restoration of the functionality of the masticatory units also require the achievement of an aesthetic effect, more than satisfactory for the patient. Thus, a correctly drawn up treatment plan involves simulating and testing it as accurately as possible from the idea stage, in order to avoid further inconveniences [14]. Diagnostic wax-up, together with mock-up and temporary prosthetic restorations, does this by highlighting possible errors (errors such as harmonious aesthetic integration in the patient's physiognomy, functional disorders in the dento-maxillary apparatus etc.) [14-17].

The creation of diagnostic wax-up that correspond to the wishes and needs of the patient, requires a firm

and precise collaboration between the dental office and the dental laboratory and, implicitly, between the dentist and the dental technician [18,19]. This collaboration involves the transmission of complete data between the dental office and the dental laboratory (photographs of the patient in the initial condition, accurate impressions, clear and concise communication on the treatment plan, possible mentions that appear along the way etc.) [20,21].

For the success of the prosthetic treatment, it is necessary that from the diagnostic wax-up phase to take into account the imposed aesthetic desideratum and the realization of diagnostic layouts, which can be adapted to the patient's situation.

Creating the diagnostic wax-up requires the exact observance of all the manufacturing stages, starting with the control and disinfection of the impressions and ending with the anatofom modeling of the teeth.

To create a pleasant aesthetic effect, the dental technician must look beyond the plaster model he has for making wax-up. He must integrate the model in everything related to the smile (smile line, interdental spaces, coverage of the incisors, lips, etc.) and the physiognomy of the patient's face (skin color, age and sex of the patient, face shape etc.) [22,23].

Aesthetic requirements require a high degree of exigency. Thus, in order to be able to keep up and satisfy the patient's wishes according to his needs, dental practitioners are required to master special techniques in order to achieve notable aesthetic effects. One of the ways to achieve beauty is to respect the golden ratio, a method that requires extensive study and measurement, but which offers a remarkable result in practice [24,25].

CONCLUSIONS

Diagnostic wax-up is a good way to achieve, first and foremost, communication between patients and dental practitioners and to establish a starting point for prosthetic treatment. At the same time, the diagnostic wax-up is a very firm, clear and extremely precise way of communication between the dental office and the dental laboratory, but also vice versa. Thus, the diagnostic wax-up represents the validation that the proposed prosthetic treatment completes the wishes and needs of the patient.

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