

# Patient–Dentist–Technician Communication within the Dental Team: Using a Colored Treatment Plan Wax-Up

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## ABSTRACT

Communication among the restorative dental team must include the patient. The patient wants to know the details of the anticipated restorations; but because a patient is not aware of many dental innovations, care must be taken to provide them with a clear explanation of all anticipated treatment parameters. Many patients have little understanding of today's advancements in restorative procedures, and they may or may not understand all of the possibilities.

Through effective communication, the patient gains confidence in the dental team and better understands the proposed restorative treatment. Patient satisfaction is significantly enhanced through effective communication.

## CLINICAL SIGNIFICANCE

This article describes the use of a diagnostic wax-up to facilitate optimal communication between the dental team and the patient.

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## INTRODUCTION

A patient looks to the dental professional to restore his or her teeth to ideal health, function, and esthetics. Upon arrival at the dental office, a team is created. The restorative team consists of the dentist and the dental technician. In order to achieve all expectations, it is important that the team work together and establish optimal communication with the patient.

A situation may occur where the dentist may have made an impression, sent it to the dental laboratory, received the restoration, and

cemented it in place. But, for whatever reason, he or she is not happy with the result. The dentist may have tried many laboratories and have experienced similar results. He or she begins to question himself or herself and wonders what is wrong. The preparation guidelines met the materials specifications, so that was not the problem. The directions on the prescription slip were followed, so that was not the problem. Possibly the dental technician was not involved in the initial steps of treatment planning, and this lack of communication may have been partially to blame. The dentist

ultimately finds that it is important to work with the dental technician at the treatment planning step, especially with regard to complex cases. Establishing optimal effective communication and teamwork with the dental laboratory technician helps to build confidence for all cases and helps ensure consistent and successful results.

Communication among the restorative team is imperative and must also include the patient. Often, the patient explains to the dentist what he or she is expecting. The dentist in turn will attempt to communicate

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this to the dental technician. However, many patients have little understanding of today's advancements in restorative procedures, and they may or may not understand all of the possibilities. Psychologically, through informative communication, the patient gains confidence in the dental team and the restorative proposal. The patient wants to know the details of the restorations, but dentists need to remember they are talking to a patient with limited dental knowledge and not someone in the dental industry.

Many patients have the general perception that restorative dentistry is expensive. Therefore, it may not be the patient's inclination to immediately buy into a comprehensive treatment plan. The patient may need time to consider the extent of the treatment he or she is willing to pursue or how much they can afford. By presenting a complete and understandable proposal of what is achievable, it is more likely that the patient will accept the entire proposed treatment plan. Presenting a treatment plan that offers realistic options is best in helping the patient understand the possibilities they are to consider. This can be facilitated by optimal communication with the dental technician and is enhanced with the treatment plan wax-up.

A traditional rehabilitative approach is to use acrylic resin

provisional restorations as the blueprint for the definitive restorations.<sup>1</sup> This article describes the use of the treatment plan wax-up, which is a detailed three-dimensional full-color wax-up of the proposed restorations and a valuable tool for the dentist. With this realistic wax-up, the patient can see and understand what is being proposed and what can be achieved. The patient may have little understanding of the specific restorative possibilities. The wax-up is a powerful communication tool for increasing case acceptance and obtaining the best esthetic result for the patient. Each patient presents an individual challenge and will communicate his or her esthetic, phonetic, or occlusal problems.<sup>2</sup> The dentist and the dental technician understand concepts of anatomy and function and will address the patient's concerns in the context of the treatment plan. After patient consultation, the dentist will review special requests from the patient and discuss them with the dental technician. Necessary alterations for phonetic or esthetic considerations may include revising incisal edge position and length.<sup>3</sup> The treatment plan may include procedures that address anterior guidance, incisal length, centric stops, posterior occlusion with cuspid disclusion, tooth reduction, or preplan necessities such as gingival tissue recontouring.<sup>4</sup> The esthetic changes are a vital part in creating

a positive psychological impact as well.

Although the needs may differ from patient to patient, the treatment plan to achieve the objective of a proper restoration should not. The treatment plan wax-up serves as a valuable template via a matrix for the provisional restorations and shows the patient a virtual blueprint of the finished restorations. The provisional restorations thereafter can be adjusted in the patient's mouth, and adjustments can be relayed subsequently to the technician via impressions of the provisional restorations.

#### PATIENT HISTORY

The patient, a woman in her fifties, presented with two fractured maxillary anterior porcelain units. After a comprehensive examination, it was noted that the patient exhibited posterior malocclusion resulting from premature loss of posterior molars, resulting in posterior bite collapse. The patient would not smile because of the appearance of her front teeth.

#### INITIAL TREATMENT PLAN

The first phase of the treatment plan was to pursue orthodontics to correct the occlusal plane, upright the tipped posteriors, and achieve a better curve of Spee and curve of Wilson.<sup>5</sup> Provisional restorations (Figure 1) were placed on the involved anterior teeth. The



Figure 1. Preoperative view. Provisional postorthodontic treatment; the provisional was in the mouth for over 2 years.

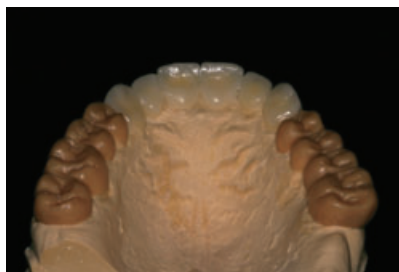


Figure 2. Full view of the treatment plan wax-up.

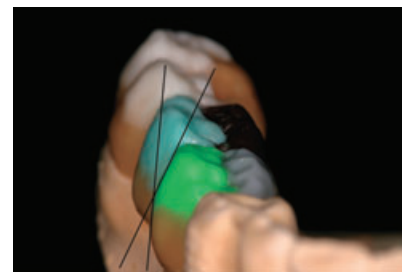


Figure 3. View showing the emergence profile. The different colors are used as a teaching tool to identify the travel paths of the opposing cusp.



Figure 4. Protrusive view shows functional and nonfunctional areas.

orthodontic treatment was completed in just over 2 years and resulted in repositioning the canines in a more optimal position.

Following orthodontics study, casts were made. Bite registrations (centric relation and protrusive function) were made, as well as a face-bow transfer record. A treatment plan wax-up (Figure 2) was generated to help ensure a successful outcome.

When fabricating a treatment plan wax-up, variables that may influence the outcome of the occlusal morphology must be addressed. A

programmed articulator can minimize articulator-generated occlusal errors.

It is not only form-function elements that develop the important structural components of molar relief in the shaping of enamel labial line angles, triangular beads, auxiliary line angles, and fissures. Everything is brought together under the essential mechanical principle of the mortar-pestle type adjustments.

The right posterior mandibular quadrant (Figure 3) was fabricated using colors for teaching purposes. Differences can be seen early in cusps (buccal and lingual) as well as in teeth. After evaluation, it was decided that unless minor adjustments were needed, the mandibular anterior teeth would be untreated. The maxillary posterior, mandibular posterior, and maxillary anterior teeth would be restored. Because the patient was worried about the esthetic appearance, pink

wax was added to replicate tissue. The pink wax gives a realistic (Figure 4) and more natural appearance to the restorations, which helps promote case acceptance by the patient.

#### PREPARATIONS AND IMPRESSIONS

The provisional restorations that were worn during orthodontic treatment were evaluated. Excessive wear was seen and the provisional restoration had worn quite thin on the maxillary right canine. Because the provisional restoration was so thin in this area, it was important to compensate with the tooth preparation.

All the restorations must have adequate tooth structure reduction to allow for marginal placement to be positioned at or below the gingival margin. After removing the provisional restorations, the existing preparations were slightly modified. In the preparation of the teeth (Figure 5), to ensure proper anatomic form, the preparation



*Figure 5. Preparations for the three-unit fixed partial denture and the single units in the maxillary anterior region. The maxillary left central incisor is an endodontically treated tooth.*



*Figure 6. From duplicate models, clear hard surgical and clear flexible stents are made.*



*Figure 7. The flexible clear stent is used as a preparation guide.*



*Figure 8. Provisional is made using the flexible stent placed inside the hard surgical type stent. This will be used as a template for the provisional. The hard surgical-type stent will have less distortion.*

consisted of placing a shoulder preparation of 1.0 mm, at a 90- to 110-degree angle. Facial and lingual reduction was at least 1.5 mm and the incisal resolution was 2.0 mm.

The impression was made with a vinyl polysiloxane impression material (Examix, GC America Inc., Alsip, IL, USA). Making an accurate impression requires selecting a technique with which the dentist is comfortable. The dentist must take into consideration appropriate tooth preparation, soft-tissue man-

agement, management of blood or saliva contamination, and correct size of the impression tray. But if the dentist is not comfortable with the material or technique, he or she will lose accuracy that is so important. The vinyl polysiloxane impression accurately captured the tooth preparation.

#### PROVISIONAL RESTORATIONS

Instead of using a silicone matrix of the wax-up for the fabrication of the provisional restorations, a duplicate model was made of the wax-up and a flexible clear stent was fabricated (Figure 6). The stent was also used as a reduction guide in generating the preparations (Figure 7). The clear stent also can be used as a matrix for the fabrication of the patient's provisional restorations, but to avoid distortion, a hard surgical stent (Figure 8) was fabricated and placed over the clear stent to afford support. The clear stent is a flexible material. When fabricating the provi-

sional restorations, one may lose shape or experience some distortion from the excess provisional acrylic. The harder-type stent will exhibit less distortion. The harder stent, when positioned over the inner more flexible stent, will result in a more precise contour and shape that is not achievable with the flexible material alone. However, it is important to have the flexible material stent used inside of the harder outer stent, as it is much easier to remove the provisional material from the inner flexible stent. The hard stent, if used alone, would stick to the provisional acrylic and be difficult to remove.

The provisional restorations were made with a bisacryl material. The patient was pleased with the appearance, and no modifications were needed. The provisional restorations (Figure 9) were worn for 4 weeks until delivery of the final restorations.

## LABORATORY PROCEDURES

**Treatment Plan Colored Wax-Up**

The treatment plan colored wax-up is a full-contour wax-up of the restorations. The colored wax is hard enough to withstand try-in in the mouth (Figure 10) for the individual crowns and the fixed partial denture. The wax try-in (Figures 11 and 12) allows the dentist to check midline, size, shape (Figure 13), and pontic tissue adaptation (Figure 14); it also allows the dentist to show the esthetic qualities of the restorations to the patient. If the patient requests changes, the dentist can change the wax-up immediately to achieve the desired contour (Figure 15). Upon completion of the final restorations, the dentist can interchange them to show the

patient how the restorations resemble the wax-ups (Figure 16). The colored wax-ups are valuable to the dental technician as well during the porcelain build-up and contouring stages of the restorations.

**Material Selection**

Material selection is crucial in the success of any restoration.<sup>6</sup> In choosing the right material, one factor to consider is longevity. No matter how esthetically beautiful the restorations are, if they do not last, it is inconvenient for the patient, the clinician, and the dental laboratory.

Preparation design factors will determine the material you choose.

In the best interest of the doctor and the health of the patient, it is the dental technician's responsibility to be educated in the latest materials, techniques, proper function of occlusion, and the longevity properties of the materials to be used. This information should be shared and discussed among the entire team: doctor, patient, and technician. After this team meeting, the final decision as to which restorative materials are used rests with the dentist.

The material chosen in this case was Captek (Captek, Altamonte Springs, FL, USA). Captek is a thin gold coping that is internally reinforced. It is not a cast alloy, and it is not a foil. The system is nonoxi-



*Figure 9. The provisional is completed. The patient is able to wear what she saw in the treatment plan wax-up.*



*Figure 10. The treatment plan colored individual wax-up (individual crowns and FPD) is tried in the mouth. The wax try-in allows the midline, size, shape, pontic-to-tissue fit, and esthetic values to be checked. A patient's request for changes can be made immediately to the wax-up.*





Figure 11. The colored wax-up is checked for size, horizontal view, and three-dimensional evaluation.



Figure 12. Protrusive view of wax-up. Maxillary left central incisor shows a gray gingival area with internal silver metal post/core underneath.



Figure 13. The distal of the maxillary left canine has chipped from the heavy stress forces of biting. Care must be taken to make changes for freedom in this area.



Figure 14. The treatment plan colored wax-up—three-unit fixed partial denture is tried in.



Figure 15. Incisal view checking for centric stops, occlusal pattern, lip support, occlusal table, and tooth form.



Figure 16. Colored wax try-in of the maxillary left central incisor and canine to check the three-dimensional room for the maxillary left lateral incisor.

dizing so there is no darkening that occurs as with traditional porcelain fused-to-metal systems. Because it is nonoxidizing, there also is no dark background that can interfere with the optical qualities of the porcelain. Having a warm gold color and no oxides, the material needs less opaque, which allows for additional porcelain thickness. This translates into better esthetic vitality.

No matter what material is used as a framework, the application of the porcelain is the most important step to achieving the highest esthetics. The skill and knowledge of the dental technician and the thickness of the porcelain used greatly affect the esthetic beauty of the restoration. Many ceramic restorations are very esthetic but the metal framework

with opaque is thicker than for a Captek framework with opaque. This quality allows for additional porcelain thickness, because of the thinner Captek frame. Additionally, its warm gold color enhances the esthetics.

#### **Fabrication of the Captek Framework**

The Captek copings and the separate pontic are fabricated. The pontic needs to be attached to the abutment copings. Rather than using post-solder or complete laser welding (Figure 17), the new Inconnect (Captek) material is used. The Captek fixed partial denture with the new Inconnect material allows the dentist to feel comfortable with the connectors to the pontic. The pontic is tacked to the abut-

ment copings with a laser welder. The tacking occurs in small areas on the facial and lingual surfaces in order to hold the pontic securely. The Inconnect is then applied to the whole joint area. The Inconnect is a pastelike material that will seal the joint area with a solderlike consistency to create a solid connector. This feature represents an advantage over mere laser welding, which often results in inconsistencies. It is also an advantage over a post-soldering approach, because no time is needed for investing.

After framework completion, normal procedures are followed for the application of UPC bonder, opaque, and porcelain. The UPC bonder (Captek) is a bonding material (Figure 18) for Captek. Because



*Figure 17. Captek framework is fabricated. The pontic is tacked into place with a laser welder and then attached to the abutments using Inconnect. The Inconnect works like a solder to make a solid connector and will flow in to form a solid joint.*



*Figure 18. Finished Captek framework with the UPC bonder applied and ready for opaque..*

Captek does not oxidize, a bonder is needed to secure the porcelain.

The opaque material (Initial MC, GC America Inc.) is applied in a thin coat; thinner than would be necessary for coating an oxidizing type material. This allows for additional porcelain, which even in the slightest amount is helpful in achieving better esthetics.

The multilayered porcelain (Initial MC, GC America Inc.) build-up technique is used to give a natural appearance. The colored wax-ups are used during the porcelain build-up while building to full contour. Without the colored wax-ups, porcelain may become overbuilt, resulting in the removal of a desired color when adjusting the contour. The full colored wax-ups are superior to a putty matrix (Figure 19),

because they are a three-dimensional copy of the desired restoration.

#### Cementation

Because Captek requires no special bonding or cementation technique, the restorations were cemented with Rely-X Unicem (3M ESPE, St. Paul, MN, USA). Unicem is a self-adhesive universal resin cement. The self-adhesive resin helps to eliminate some of the technique-sensitive and time-consuming steps associated with traditional resin bonding cements.

#### CONCLUSION

Optimal esthetics and proper anterior guidance were established with the Captek restorations. The patient was comfortable with the occlusion and the posterior

quadrants were then slated for subsequent restoration.

Patients have many different questions about how their new crowns, including: what material is used, color choices, shapes, etc. What they are really asking is “Will this crown or restoration look like natural teeth? Will they look like my own teeth?” The patient has high expectations and needs to understand what is available to them.

A treatment plan wax-up accurately shows the patient what the anticipated new smile will look like and ensures that their full expectations will best be met. It is a three-dimensional tool that, coupled with good team communication (Figure 20), is very informational to the patient. More importantly, these realistic and thorough



*Figure 19. The porcelain first bake of the maxillary left anterior teeth. The contours of the crowns are compared with the three-unit colored wax FPD (maxillary right anterior teeth) instead of using a silicone putty matrix.*



*Figure 20. Completed restorations next to maxillary left lateral incisor colored wax-up, showing the patient how similar they are with regards to shape, contour, size, and form.*





Figure 21. Maxillary left anterior teeth colored wax FPD, maxillary left central incisor Captek crown, maxillary left lateral incisor colored wax, and maxillary left canine Captek crown.



Figure 22. Immediate postoperative view in resting position.

communicative tools (Figure 21) build confidence, which will help the patient accept the proposed optimal treatment plan. The better the team communication, the more successful the outcome will be for everyone involved (Figure 22).

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