

# Diagnostic Provisional Restorations in Restorative Dentistry: The Blueprint for Success

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A famous prosthodontist once wrote, "When esthetics is the prime motivating factor in any restorative procedure, the restoration will assuredly fail."<sup>1</sup> While it is difficult to take issue with the intent of these words, it is certain that a significant number of elective restorative dental services are primarily esthetically driven. It is also certain that even when restorations are placed primarily for functional reasons, it is critical to address the patient's esthetic concerns.

In the authors' experience, the restorative dentist must clearly understand the esthetic expectations of the patient, and the patient must understand the inherent limitations of any type of restorative therapy. One often neglected modality at the clinician's disposal to aid in communication between the dentist and patient is the provisional restoration. These restorations can often be used before any irreversible treatment to preview potential esthetic outcomes and discover the limitations of specific restorative therapies. In other situations, provisional restorations can be placed and readily modified after tooth preparation but before fabrication of the definitive restoration. In these cases, the provisional can be modified until the patient is satisfied, and then the modified provisional restoration serves as the blueprint for the technician fabricating the definitive restoration.<sup>2,3</sup>

This article discusses and illustrates how provisional restorations can be used diagnostically to meet the patient's esthetic expectations before the definitive restorations are fabricated. Techniques for transferring this critical information to the laboratory technician are also described.

## Materials and Methods

Many materials and techniques can be used when fabricating provisional restorations. It is beyond the scope of this article to discuss these material and procedures. The technique generally followed by the authors is the indirect technique that has been adequately described in the literature.<sup>4-7</sup> The material of choice for such restorations is poly (methyl-methacrylate) (Jet Acrylic Resin, Lang Dental Manf. Co., Chicago, IL), which is cured in a pressure pot (Acri-Dense III, GC Dental, Scottsdale, AZ). Research has demonstrated that indirect provisional restorations are stronger and denser and have better marginal integrity than direct provisional restorations.<sup>8-11</sup> In

addition, when the indirect technique is used, the prepared tooth is not exposed to the exothermic reaction inherent with acrylic resin materials. Research has shown that sufficient heat is generated during the setting reaction to potentially result in irreversible pulpal damage.<sup>12-15</sup>

Numerous contemporary materials are available for fabricating acceptable provisional restorations with the direct technique (e.g., Iso-Temp, 3M Dental, St. Paul, MN; Temp-Phase, Kerr Corporation, Orange, CA). Many of these materials have multi-phasic setting reactions and are readily trimmed during a rubbery phase. These types of materials generally are used with conformative dentistry where significant changes in size, shape and general morphology of the teeth are not being considered. While these materials can certainly be very useful in certain aspects of clinical dentistry, they are inferior to the poly (methyl-methacrylate) materials for long-term diagnostic and esthetic provisional restorations.

The following basic approach is used when considering placement of esthetic restorations.

1. A thorough clinical and radiographic examination is completed along with a comprehensive medical and dental history.
2. The patient's chief complaint and esthetic expectations are determined during a detailed initial interview.
3. Impressions are made with irreversible hydrocolloid and the diagnostic casts mounted in an appropriate articulator using a facebow and an interocclusal record made in centric relation.
4. If indicated, a diagnostic wax-up is completed, and an impression of the wax-up is made with irreversible hydrocolloid. A cast of the wax-up is recovered from the impression.
5. Provisional restorations are fabricated using matrices from the cast to determine the morphology of the restorations. These provisional restorations are previewed in the patient's mouth and are adjusted to provide optimum lip support and the desired length, shape, colour and overall esthetic appearance. They are tested for phonetics using fricative and sibilant sounds, and finally are evaluated for comfort and function.



**Fig. 1:** This patient wanted the maxillary central incisors lengthened for esthetic reasons.



**Fig. 2:** Acrylic resin "shells" were fabricated from a cast of the diagnostic wax-up. They will be used to evaluate the length of the central incisors.



**Fig. 3:** The acrylic resin shells have been placed on the incisors before tooth preparation. After they have been adjusted for proper length, they aid in evaluating the optimum length for the lateral incisors. These will be lengthened with direct composite resin bonding.



**Fig. 4:** The maxillary central incisors have been prepared for porcelain laminate veneers; the shells have been relined and will serve as provisional restorations. The lateral incisors have been lengthened with direct composite resin.



**Fig. 5:** The porcelain laminate veneers have been luted to place. Note the excellent soft tissue response and the harmonious length relations of the central and lateral incisors and the canines.



**Fig. 6:** This patient presented with a 6-unit fixed partial denture with gingival recession around the crowns on the abutment teeth.



**Fig. 7:** The diagnostic wax-up deliberately created minor tooth rotations and different incisal edge positions in the hopes of creating a more natural appearance.



**Fig. 8:** This provisional restoration was made from a cast of the diagnostic wax-up illustrated in Fig. 7.



**Fig. 9:** This provisional restoration was made from a cast of the new diagnostic wax-up after trying in the original provisional restoration, which was unacceptable to the patient. The patient approved the esthetic result provided by the new provisional restoration, and the definitive restorations could be fabricated with confidence.



**Fig. 10:** The definitive restorations for the patient illustrated in Fig. 9 are very similar to the approved provisional restorations.

6. When the patient's esthetic and functional demands are satisfied, an impression is made of the acceptable provisional restorations and the recovered cast is sent to the laboratory to be used as a guide for the definitive restoration.

In certain clinical situations the provisional restorations can be used to indicate the final results without preparing the teeth. If the patient's esthetic demands cannot be met, neither the dentist nor the patient is committed to irreversible treatment. In other situations, the teeth must be prepared before fabricating the provisional restorations, which commits the patient to restoration. Nonetheless, it is always much easier to modify and alter acrylic resin restorations than to modify definitive restorations fabricated with metal, ceramic or metal-ceramic materials.

The following narratives and illustrations demonstrate the utility and flexibility of this approach.

### Patient No. 1

This patient presented with moderate wear on the maxillary anterior incisor teeth (Fig. 1). He sought care primarily because he wanted to lengthen the central incisors for esthetic reasons. A diagnostic wax-up was completed on mounted casts, an impression was made of the wax-up, and a gypsum cast was recovered from the impression. Acrylic resin shells were made to try in the mouth (Fig. 2). When the shells were adjusted to the length preferred by the patient, it became apparent that the lateral incisors would need to be lengthened slightly to harmonize the appearance of the maxillary anterior teeth (Fig. 3). It was decided that the lateral incisors would be lengthened with direct bonded composite resin (Herculite XRV, Kerr Corporation, Orange, CA). The central incisors were prepared for porcelain laminate veneer restorations, and the lateral incisors were restored with direct composite resin.



The acrylic resin shells were then relined and luted to the central incisors as provisional restorations (Fig. 4).

One week later the porcelain laminate veneers were luted to the central incisors using a light curing composite resin luting agent (Opal Luting Composite, 3M Dental, St. Paul, MN). Figure 5 illustrates the completed restorations, with direct composite resin bonded to the incisal edges of the lateral incisors and porcelain laminate veneers on the central incisors. The key to predictability in this case was that the optimum length of the central incisors was determined in the patient's mouth using the acrylic resin shells. The shells were then used to help determine the length of the directly bonded lateral incisors, and the cast of the provisional restorations was used to guide the laboratory technician in fabricating the porcelain laminate veneers.

### Patient No. 2

This patient presented with a fixed partial denture from the maxillary left canine to the right canine, with pontics replacing the two central incisors and the left lateral incisor. Gingival recession had occurred on all the abutment restorations, exposing the cervical margins of the abutment crowns. In addition to the esthetic deficiencies resulting from the recession, the incisal edges of the anterior teeth formed a relatively straight line, which resulted in a rather artificial appearance (Fig. 6). Diagnostic casts were mounted and a diagnostic wax-up completed (Fig. 7). This wax-up intentionally created minor tooth rotations and irregularities in incisal edge position to obtain a more natural appearance.

The fixed partial denture was removed, the abutment teeth were re-prepared, and a provisional restoration was fabricated from a cast of the diagnostic wax-up (Fig. 8). After intraoral evaluation, both the patient and the dentist agreed that the esthetics provided by the provisional restoration were less than optimum. A new wax-up was made taking into account the patient's wishes and comments, and a new provisional restoration was fabricated from a cast of the wax-up (Fig. 9). This provisional restoration more closely resembled the original fixed partial denture, and the patient was very pleased with the esthetic result, even though the appearance seemed somewhat artificial to the dentist's eye. An irreversible hydrocolloid impression of the cemented provisional restoration was made and the resultant cast sent to the laboratory technician along with appropriate directions for shade mapping and pontic design. The definitive restoration was fabricated using the provisional restoration as a blueprint (Fig. 10).

The key factor in attaining predictable success with this patient was the relative ease with which esthetics could be tested and modified with the provisional restoration. Once patient acceptance was obtained, the definitive restoration could be fabricated with confidence.

### Summary and Conclusions

There is no question that patients today demand a sophisticated level of restorative dentistry, in terms of both esthetics and function. No elective restorative dentistry should be undertaken without a clear understanding of the patient's expectations and the limitations of restorative therapy. The dentist should have a clear picture in mind of the final results before initiating irreversible therapy. The use of mounted diag-

nostic casts, diagnostic wax-ups and provisional restorations permits patient acceptance to be obtained before the definitive phase is initiated. Too often the dentist does not take advantage of this important restorative option, with disastrous results when definitive restorations are viewed by the patient for the first time. By following the plan of treatment outlined in this article, such disasters can be avoided. ♦

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