USING PROVISIONAL RESTORATIONS TO IMPROVE RESULTS IN COMPLEX AESTHETIC RESTORATIVE CASES

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Provisional restorations provide more than an intermediate functional and protective covering of teeth that have been prepared for indirect restorations. They provide the opportunity to build a relationship with the patient, to more clearly achieve the patient’s aesthetic expectations, to build patient hygiene skills and habits, and to learn what is ideal for patients occlusally, phonetically, and aesthetically. This presentation examines the benefits of provisionalization and how to effectively communicate the information learned in this stage to the laboratory for replication in the definitive restorations.

Learning Objectives:
This article demonstrates how provisional restorations can be used to build a collaborative relationship between the prosthodontist, patient, dental specialists, and laboratory technician. Upon reading this article, the reader should:

• Understand how to use provisional restorations to develop patient expectations and to build a clear understanding of treatment goals.
• Understand how provisional restorations can be used to limit occlusal and phonetic difficulties that can occur in these restorations.

Key Words: aesthetics, provisional, provisionalization, function, phonetics, waxup

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Building a successful aesthetic restorative practice requires more than an ability to sell a case and accurately prepare teeth. The thriving clinician grows and differentiates his or her practice by building personal bonds with his or her patients and working collaboratively with patients and dental specialists to create aesthetic treatment plans that are appropriate and customized for each person.

An appropriate and personalized treatment plan requires clinical photographs of the patient (Figures 1 through 3), radiographs, mounted models, and knowledge of the patient’s expectations. These items should direct exploration of the treatment possibilities. Once a preliminary treatment is established, if the treatment has any complexity, the clinician should share and evaluate the initial records with specialists to develop all parties’ understanding of the treatment options. Meetings with specialists can be as simple as exchanging e-mail images and following up phone calls. There are occasions when the entire interdisciplinary team will need to meet to discuss the case together. It is often of value to have done some additive or reductive waxing to the patient’s models prior to these meetings.

Involving specialists and the patient in the treatment design creates ownership. If one helps create the treatment plan, he or she is more vested in the final result. For example, a patient is often affectively engaged in the treatment design when shown profile view images of his or her “gummy” smile. The natural response of the patient is to ask about treatment options. This approach led the patient in this case presentation to decide how much and where to incorporate crown lengthening (Figure 4).

Allowing the patient time to process the information learned from the workup and consultations will be valued by the patient. It is important for the clinician to bring the patient into the process by sharing what has been learned and asking for his or her input. Many patients may not have the knowledge to describe their goals, but they know when they see it, and appreciate the dentist allowing them to be involved during the workup and treatment stages. With a better grasp of their own circumstances and treatment future, patients usually make wise and personally appropriate decisions. For example, by the time the patient had healed from periodontal surgery and was reevaluated (Figure 5), she chose not to have orthodontics or more perioplastic surgery even though it would further improve aesthetic results.

If the issues in the case are complex, delaying final decisions is appropriate. Encouraging patients to become a student of smiles (eg, by encouraging them to cut out...
Figure 5. Mid-treatment reassessment image taken after crown lengthening. Patient declines orthodontic treatment or further periodontal plastic surgery.

Figure 4. Scribed model and requested tissue reduction guide given to the periodontist, indicating tissue heights and incisal edge reduction agreed upon by the patient and restorative dentist.

Figure 6. The diagnostic waxup demonstrates the clinician’s interpretation of the patient’s aesthetic expectations and the plan to resolve her occlusal and restorative issues.

magazine pictures of smiles that they like and to bring in family pictures of themselves in youth leads to discussion between the dentist and patient about face shapes, lip drapes, Angle’s classifications, arch shapes, and other factors that affect how teeth appear in a smile. This gives the patient a means to communicate desires and build understanding. During the time the patient is involved in learning about aesthetics and discovering what she or he wants to achieve, the clinician is learning more about the patient and the patient’s case, and the patient’s ownership and engagement in the project is growing.

Once the patient’s and dental team’s vision is clear, a waxup of the treatment plan should be created. This waxup serves as the first rendering of the final product. All too often, the definitive restoration serves as the only rendering, particularly for implant restorations. This limits the feedback that a waxup and provisional restorations can provide the clinician and patient. Oftentimes, patients do not know what results can be achieved and, even if they do, they cannot envision what the dentistry will look like in their own smiles. Many practitioners have the ability to create digital images of potential outcomes. These images are helpful but can easily give patients unrealistic expectations due to the fact that transforming real teeth is far more difficult than doing it digitally. Applying composite mockups to the teeth also gives the patient an impression of how it could look, but this misses all the other learning that provisional restorations provide. Provisionals help patients to both see and feel the planned dentistry in order to judge it. Wearing provisional restorations serves to develop their understanding of what is possible aesthetically and offers patients the opportunity for involvement in making modifications as the dentist tests how their dentistry will function, look, and feel.

Tooth Reduction Guides and Provisional Restorations

From the aesthetic perspective, the waxup is more than a means to solve the technical issues and a guide for the laboratory to complete the project. The waxup is used in creating reduction guides for tooth preparation. Since the waxup is a rendering of the clinician’s understanding of what the patient wants aesthetically, it serves as the template for the provisional restorations—the second rendering of the final product. The waxup can be used to fabricate the provisional restorations whether the clinician plans to make the provisional restorations directly or indirectly.
The waxup may be created by the clinician, laboratory technician, or a professional waxup artist. While a technician who specializes in waxing may be more likely to create a beautiful wax rendering, the clinician stands to gain significant learning moments by performing the waxup by his or her self. For example, the dentist will get a better feel for just how much reduction needs to be done to move teeth into preferred orientations/positions, as well as for tissue/ridge contours and scallop heights. Cusp/fossa/ridge blade placement and functional issues also will become apparent to the clinician during the waxing process. This useful information can be used by the clinician to better restore the dentition and provide aesthetics that are more in line with the vision outlined by the clinician and the patient.

Once the waxup is completed, reduction guides are prepared, and the patient is scheduled for preparation and provisionalization (Figures 6 through 8). Many patients require other preliminary treatments, and the actual sequencing varies with each patient.

Provisional Adjustments
No matter how well the contours, axial inclinations, and incisal edge positions are planned with preoperative photographs and waxups, one does not know how they will appear or how they will interact with the tissue to create scallop forms and interdental papillae until a provisional restoration is seated. Only with the provisional restorations seated can one determine how far from the margin the interproximal contacts should be placed and if the patient can clean with the new tooth contours.

This also is the first time the patient sees and feels a model of the definitive restorations intraorally. A dialogue can develop between clinician and patient about the aesthetic interpretations the dentist made from previous conversations. The patient is able to see how the amended length, occlusal plane, and incisal embrasures of the teeth appear behind the lips. It is rare that a patient does not have some modification in mind. Often these modifications are subtle, easy to perform, and pertain to embrasure shapes or occlusion. Sometimes the patient’s goal cannot be achieved. In such cases, the clinician has the opportunity to explain why it cannot be achieved before it is sent to the laboratory instead of after the fact.

Phonetic Concerns
Whenever arch forms or the relationships between the lingual aspects of the maxillary incisors to the incisal edges of the mandibular incisors are modified, the patient’s ability to enunciate may change. Most difficulties are
### temporary because patients can adapt to changes.
Lispimg of the “S” can be a more difficult dilemma
because this frequently will not improve with time. The
S sound is usually formed by forcing air between the
maxillary and mandibular incisors that are coapted to
within 1 mm to 2 mm of each other as the S sound is
formed. The mandible moves anteriorly to different
degrees depending on the Angle classification but, with-
out the ability to limit the airflow between the anterior
maxillary and mandibular teeth, a lisp will occur.
Wearing provisional restorations allows for patient
adaptation to changes in the phonetic interplay between
the teeth and any occlusal changes that have been cre-
ated by the prosthetic reorientation of teeth prior to the
delivery of the definitive restorations (Figure 9). If the patient
cannot adapt to the changes the practitioner has created,
it is beneficial to know this and make the needed changes
prior to sending the case to the laboratory.

### Aesthetic Concerns
Sometimes patients are startled by the changes that can
be made by dental care. Provisional restorations allow a
temporary, intermediate placement in order to accustom
the patient to the changes. Occasionally a patient will
express difficulty in adapting to the new look and express
a desire for less significant change. If the practitioner gives
the patient time to “live” in the provisional restorations
prior to making final impressions, the patient has the oppor-
tunity to adjust and to consider his or her decisions, often
accepting the changes without additional modification.
In the author’s office, patient-requested modifications
to the original provisional restorations are accomplished
in front of the patient. This allows patients to appreciate
the skill it takes to manifest their wishes in the provisional
restorations. Making these modifications also solidifies
the partnership between clinician and patient, creating
dual ownership and responsibility for the project.
Willingness on behalf of the practitioner and the techni-
cian to follow the patient’s wishes is a key factor in the
ideal clinician/technician/patient relationship. Giving the
patient permission and time to consider the modifica-
tions made to the provisional restorations can result in
the patient asking to restore the original contours and can
lead to increased respect for the practitioner’s judgment.

### Occlusal Concerns
The subtleties of mandibular guidance may go underdetected
by the practitioner. As the mandible moves into excurs-
sive positions, the edges of the mandibular anterior teeth
move against the guide planes of the maxillary teeth.
In extended movements, the incisal edges of the mandibular anterior teeth function against the edges of the maxillary anterior teeth. Wear occurs in natural teeth on these edges, which creates flat facets rubbing against flat facets. In nature, these opposing facets will be parallel in three dimensions. When reconstructing anterior teeth in porcelain, it is rare to find technicians and practitioners planning these functional surfaces in the definitive restorations (Figures 10 and 11). Especially rare is the planning for the functional edges of the incisors passed crossover the canines.

Due to the hard and brittle nature of porcelain, as the patient rubs his/her edges together subsequent to prosthetic delivery, tooth wear, porcelain fracture, or debonding can result rather than what occurs in nature, which is the slow milling in of these edges. Accordingly, most practitioners demand less abrasive porcelains or more effective bonding agents to retain the porcelain. Successful, long-lasting restorations benefit from planning for these functional positions and not violating the patient’s guidance patterns.

When forces are introduced into a system, there will always be some type of response (e.g., tooth wear, breakage, mobility, movement, sensitivity, muscle soreness, joint breakdown). The natural response will be proportional to the forces generated by the patient. More force is required to push something over a steep hill than a shallow gradient. It is important, when restoring teeth, not to increase the gradients or guidance, or the forces in the system will increase as well as the likelihood of the above natural responses. Porcelain fracture is a very common manifestation of this response when restorations are squared out in the smile design process. The porcelain is being placed in the way of normal border movements of their patients’ occlusal function. More durable restorations and resins only serve to shift the eventual natural response from the restoration to something else.

The same issues apply to posterior restorative dentistry. After designing the cusp fossae relationships and guide pathways on the posterior occlusal surfaces of...
the provisional restorations, the clinician should consider
confirming that the developing wear facets are small and
round instead of large scuffs, streaks, or comets.2,3,4,5,6

Modern practitioners construct provisional restora-
tions from different materials with varying degrees of sur-
face hardness. Acrylic (ie, methyl methacrylate) is an
excellent material to use for the first set of provisional
restorations due to its superior marginal fit, unsurpassed
aesthetics, nonbrittle nature, and its ability to wear. This
ability to slowly wear becomes extremely diagnostic
because wear facets appear within days of delivery (Figure 12).

Wear facets will be shiny when lighted, and they
allow the practitioner to see the individualized guide path-
ways that each patient habitually takes. Some facets will be
very subtle even after months of wear. Others will be
heavy and destructive to the provisional restoration.
Sometimes a multunit splinted provisional restoration will
repeatedly decement or fracture on one side or even on
one tooth. Does the patient have a history of bruxism or
of being hard on his or her teeth? The clinician should
look at the nonrestored teeth in the mouth and confirm
whether they have heavy wear or mobility. If not, then it
is probably an occult design that requires reexamina-
tion. This is strong evidence that the envelope of function
has either been steepened in that area or the excursive
movements are bumpy. Occlusal rehabilitation should seek
to recreate the patient’s original envelope of function or
to create one just a little shallower.

Laboratory Concerns

When the provisional restorations have passed all the
tests for aesthetics, function, phonetics, and maintenance,
it is time to document them and send the case to the
laboratory. If all criteria have been satisfied during pro-
visionalization, then the laboratory only has to dupli-
cate the buccal, incisal, and lingual contours of the
provisional restorations to achieve an aesthetic—and
comfortable—result (Figures 13 through 16).10,11,12 The clin-
ician will help the technician achieve improved results
by providing a critique of the provisional’s from the per-
pective of the dentist and the patient.

Conclusion

Laboratories are often requested to deliver impeccable
restorations that aesthetically and occlusally blend into
the dentition without receiving the information required
to provide these characteristics. Typically, there is little
planning for provisional restorations by the clinician prior
to treatment; these provisional are usually similar in shape
and occlusion to the original teeth. By spending more
time in the provisional stage, the clinician enjoys the
opportunity to build a better relationship with the patient,
to differentiate the practice, to demonstrate restorative
skills, and to learn what is ideal for the patient occlusally
and phonetically. This information can adddress and con-
firm the patient’s aesthetic agenda, which increases
patient satisfaction with the results.

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CONTINUING EDUCATION
(CE) EXERCISE No. 8

1. For which of the following are laboratory putty impressions of the waxup used?
   a. A guide for axial tooth reduction.
   b. A guide for incisal tooth reduction.
   c. A template for provisional construction.
   d. All of the above

2. Which of the following is true regarding acrylic-based provisional?
   a. They have the same hardness as composite-based provisional.
   b. They are more likely to fracture than composite-based provisional.
   c. Have no more diagnostic ability for aesthetics and occlusion than composite-based provisional.
   d. None of the above.

3. Wearing provisional for extended periods allows for which of the following?
   a. Tissue development.
   b. Evaluation of aesthetics.
   c. Evaluation of occlusion.
   d. All of the above.

4. In a Class I jaw relationship, the mandibular incisors often are in contact with which teeth in extended right and left excursive movements?
   a. They contact the maxillary cuspids.
   b. They contact the maxillary incisors.
   c. The mandibular incisors do not normally contact anything in right and left movements because the molars prevent it.
   d. None of the above.

5. What concerns may arise when dental care is provided?
   a. Improper occlusion.
   b. Changes in enunciation.
   c. Difficulty accepting the dramatic aesthetic change.
   d. All of the above.

6. When creating anterior restorations, what is the best way to design the incisal edges?
   a. Keep them as rounded as they were when the teeth originally erupted.
   b. Make them flat and parallel in three dimensions to the occlusal plane.
   c. Make them flat and parallel in three dimensions to the wear facet on the opposing teeth.
   d. Make them flat and parallel in three dimensions to the eminence.

7. Which of the following is the first step after discussing goals?
   a. Creating a waxup.
   b. Creating provisional restoration.
   c. Lingual beveling to mask polymerization.
   d. None of the above.

8. If your provisional continually fracture or de-cement, it is most commonly caused by which of the following?
   a. Luting cement failure.
   b. Excessive preparation.
   c. Inappropriate occlusal design.
   d. Inadequate material strength of provisional.

9. The concept of ownership in this article has which of the following effects?
   a. Incorporates a larger team of specialists.
   b. Places responsibility for treatments rendered.
   c. Increases active participation in treatment planning.
   d. Alleviates the responsibility of the patient and specialists.

10. Which of the following was NOT a tool used to formulate a treatment plan in this case?
    a. Radiographs.
    b. Family history.
    c. Patient’s expectations.
    d. Diagnostic photographs.

To submit your CE Exercise answers, please use the answer sheet found within the CE Editorial Section of this issue and complete as follows:
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The 10 multiple-choice questions for this Continuing Education (CE) exercise are based on the article “Using provisional restorations to improve results in complex aesthetic restorative cases,” by James F. Fondriest, DDS. This article is on Pages 217-223.