

The “Eggshell” Provisional Technique

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The goal of a provisional restoration is more than to just temporarily replace the crown until the definitive restoration is fabricated. Overall, the provisional restoration should provide a good “fit” and “seal” with the preparation, thereby eliminating tooth sensitivity and enhancing the health of the gingival tissues. By having proper occlusal and interproximal contacts, a provisional is able to maintain tooth position. Lastly, it acts as a “blueprint” for the final restorations. It not only allows patient input as to the color, contours and arrangement, but also helps to transfer this information to the laboratory technician.

Many techniques can be used for the fabrication of provisional restorations. They can be made directly on the teeth by either lining a preformed ion or polycarbonate crown form or by using some sort of a matrix. They can also be made indirectly on a model of the preparations. Generally speaking, the fewer the number of units being prepared, the easier it is to fabricate the provisionals. Essentially, this allows you the ability to “key” off of the unprepared teeth to help secure the matrix. The process becomes much more difficult when all or nearly all of the teeth are to be prepared. In these situations, one option is to prepare some but not all of the teeth. The teeth that are not prepared can then be used to maintain occlusal contact and vertical dimension as well as to help secure the matrix for the provisional re-

storations. Once the restorations are completed, the remaining teeth can then be prepared and restored in a similar fashion. The first difficulty with using this technique is that it is a very inefficient use of time, taking multiple appointments to do what could be done in as little as two appointments. The second problem arises whenever significant changes in tooth position, vertical dimension, and/or occlusion are needed. When such major changes are required, it is usually necessary to perform a diagnostic wax-up. However, it would be difficult to obtain the proper tooth position and occlusion if the waxing were to be done in phases.

One technique that can be used to fabricate provisionals for cases that require all or nearly all of the teeth to be prepared is the “eggshell” technique. Aside from being the most efficient way to transfer the information obtained in the diagnostic wax-up (ie, tooth contours, occlusion, and vertical dimension) to the mouth for large cases, the same technique can be used for a 3-unit bridge or even a single tooth. This article will discuss the rationale and technique for the fabrication and use of an eggshell provisional using Protemp™ 3 Garant™ (3M ESPE, St. Paul, MN) provisional material.

FABRICATION

After the appropriate documentation and initial therapy, diagnostic models are

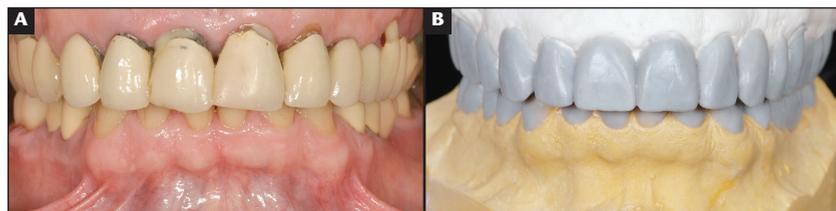


Figure 1A and Figure 1B Initial presentation reveals an extensively restored dentition with caries at the crown margins. Diagnostic models are mounted on an articulator using a facebow and CR record. A diagnostic wax-up is performed on the mounted models.

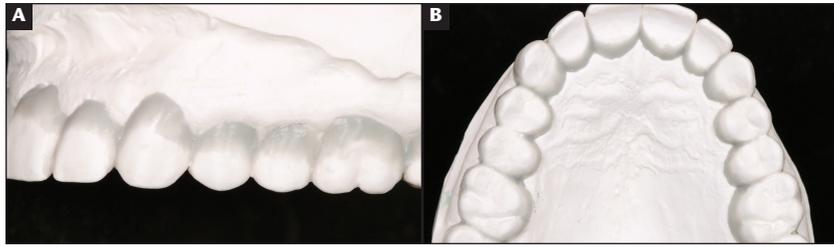


Figure 2A and Figure 2B Using a duplicated model of the diagnostic wax-up, the gingival third is bulked out with wax to overcome the shrinkage of the provisional material.



Figure 3 A putty impression is taken of the model with the cervical bulk-out wax.



Figure 4A through Figure 4C Protemp 3 Garant is injected into the putty impression starting in the second molar region. Using the injection tip, the provisional material is manipulated to cover the occlusal surfaces and axial walls while leaving a majority of the internal free of material.

mounted on a semi-adjustable articulator using a facebow and CR record. Using the mounted study models, a diagnostic wax-up can be completed (Figure 1A through Figure 2B). The purpose of the diagnostic wax-up is to functionally and esthetically design the occlusal scheme for the patient. Once the diagnostic wax-up is completed, the goal is to transfer the information obtained in the wax-up (ie, occlusion, vertical dimension, tooth position, and tooth arrangement) to the patient's mouth in the form of a provisional restoration. To do this, a thin "shell" of the external contours of the diagnostic wax-up must be fabricated. To preserve the diagnostic wax-up, it should first be duplicated with alginate or silicone and poured in stone. The next step in the shell fabrication process is critical. It involves using wax to "bulk out" the gingival third of the teeth. The purpose of this overcontouring is to help overcome the shrinkage of the provisional material. Inherently, all provisional materials shrink but some shrink more than others. The type of provisional material that is used and the amount of shrinkage it has will dictate how much the gingival third needs to be bulked out. If the external contours of the shell were to be made with exactly the same contour as the wax-up without bulking out the gingival third, any shrinkage that occurs may cause the shell to bind on the axial wall or shoulder of the preparation and not completely seat. When fabricating

a shell out of Protemp 3 Garant, the bulk-out wax should start on the coronal aspect of the free gingival margin. In this location the wax will have its greatest thickness (~0.5 mm to 0.75 mm). As the wax is carried occlusally, the thickness will gradually diminish down to 0 mm (Figure 3). Once the bulk-out waxing is completed, a putty or silicone impression is taken of the bulked-out model (Figure 4A through Figure 4C). This putty impression will be used to fabricate the provisional shell.

There are two different techniques that can be used to fabricate the shell. The one that most people are familiar with is to minimally prepare the teeth on a diagnostic model, lubricate the model, fill the putty impression with provisional material and seat it over the prepared teeth on the model. The difficulty in using this technique with Protemp 3 Garant is that because the material tends to get brittle when it gets thin, it is difficult to remove the material from the model once it has set without fracturing it in multiple places. A more predictable and easier technique is to make the provisional shell within the putty impression. One option is to completely fill the teeth in the putty with provisional material. However, it must be remembered that the internal of the solid block of teeth must next be hollowed out. To help minimize the amount of grinding that must be done, it is much easier to inject the provisional material in a more

controlled manner, only covering the occlusal and axial walls while trying to leave a majority of the internal pre-hollowed. To do this, the mixing tip is used to manipulate and position the material starting in the most distal abutment and methodically moving around the entire arch (Figure 5A and Figure 5B). Once the material is set it can be removed from the putty impression. To remove the provisional in one piece, it is advisable to use a sharp blade and make multiple cuts in the facial putty. This will allow the facial putty to be easily peeled away so that the provisional can be removed without the risk of fracturing (Figure 6A and Figure 6B). The palatal portion of the putty should be retained because it can serve as an index to re-position and re-join a provisional shell that gets fractured in the trimming process.

Once the provisional shell is removed from the putty, it should first be placed in alcohol for 2 to 3 minutes to remove the air-inhibited layer, which will make trimming much easier. When trimming the provisional shell, two different steps must be followed. The first step is to trim the flash on the buccal and palatal axial walls to the free gingival margin that was created with the bulk-out wax. To do this, the acrylic bur must be oriented perpendicular to the axial wall (Figure 7A). The next step in the trimming process is to hollow out the internal of the shell (Figure 7B). The goal of

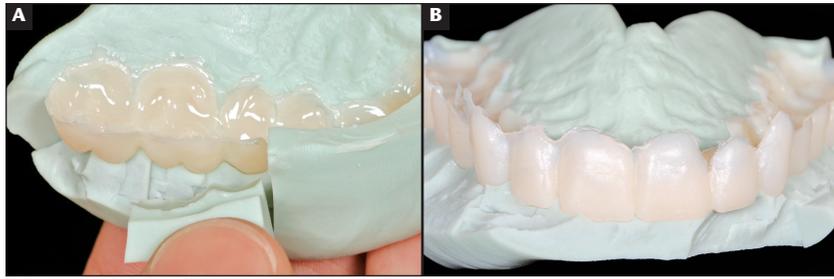


Figure 5A and Figure 5B To ease the removal of the shell, vertical cuts are made in the putty across the facial surface. This allows the facial putty material to be “peeled away.” The palatal putty should be kept to act as an index in case the shell fractures during the trimming process.

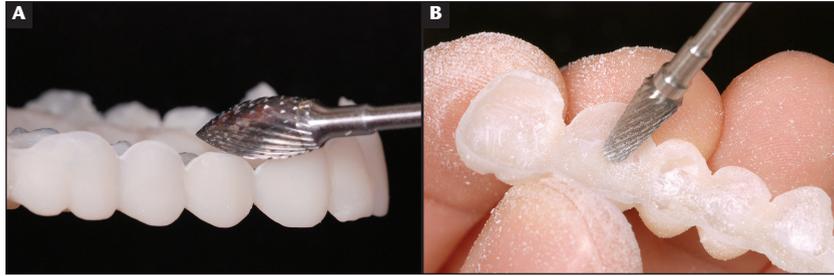


Figure 6A and Figure 6B The first step in trimming the provisional shell is to trim the flash on the buccal and palatal to the level of the free gingival margin created by the bulk-out wax. The second step is to hollow out the internal of the shell, leaving the occlusal/incisal ~ 1 mm thick and the axial walls ~ 0.5 mm thick.

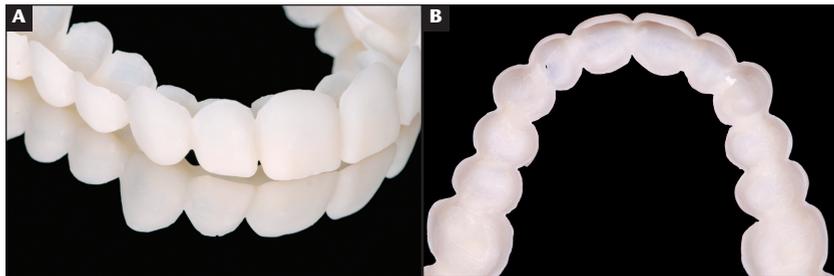


Figure 7A and Figure 7B The completed provisional shell has external contours that follow the contours of the diagnostic wax-up, with the internal completely open to allow the shell to seat freely in the mouth without binding on the preparations.

trimming the internal is to allow the shell to freely seat over the preparations without binding on them. Typically the axial walls are thinned to a thickness of ~ 0.5 mm while the occlusal surfaces/incisal edges can be left thicker (~ 1 mm). The interproximal areas can also be left thicker to provide more strength to the shell. Trimming the internal of the shell can be a delicate process. It is best to keep your fingers on the buccal and lingual of the tooth being trimmed. In addition to keeping the shell stabilized, having your fingers on the tooth being trimmed allows you to “feel” the warmth and vibration of the bur to help inform you when the provisional is getting too thin. The completed shell will have external contours that follow the contours of the diagnostic wax-up, with the internal

completely open to allow the shell to seat freely in the mouth without binding on the preparations (Figure 8). The entire process described above takes place on the laboratory bench and is to be completed before the scheduled appointment with the patient.

TRY-IN/SEATING

In a patient where both the maxillary and mandibular arches are to be restored, starting with the maxillary arch is recommended. The reason for this is that the esthetics and occlusal plane of the upper arch will help guide how the provisional shell is seated. If only one arch is to be restored, then the occlusion can also be used to influence how the shell is seated. If significant changes in tooth position are required, a preparation

reduction guide can be fabricated from the diagnostic wax-up to ensure adequate tooth reduction is achieved.

Once all of the teeth have been prepared and impressions have been taken, it is time to try the shell in the mouth. Assuming that adequate preparation reduction has been provided, the shell should not bind on the preparations themselves. If it does bind on the teeth, most likely the shell was not adequately relieved in that area. The shell must be removed and the internal relieved to provide the necessary clearance. The question then is if the provisional shell does not touch the preparations, what guides the seating of the shell in the mouth? The answer is that the soft tissue, in particular the free gingival margin, helps guide the seating of the provisional shell (Figure 9). When trying the shell in the mouth, carefully observe the relationship of the gingival portion of the shell to the free gingival margin. If the shell has been trimmed correctly and is seated, there should be a minimal gap between the shell and the soft tissue. Calipers can also be used to measure from the free gingival margin to the incisal edge of the shell and compared to the diagnostic wax-up to verify seating. In addition, the esthetics of the occlusal plane both in an antero-posterior and a lateral orientation can be used to aid in the seating of the provisional. If only one arch is to be restored, the patient can be gently guided into centric closure and the occlusion can be used to help seat the shell. When this is done, the amount of adjustment necessary to correct the occlusion is minimal.

Using the esthetics of the upper arch and the occlusion to help guide the seating of the shell are the two key points that make the shell technique easier to use than taking a putty or matrix to the mouth. The difficulty with trying to use some form of matrix is that it solely “keys” off of the soft tissue on the palate without enabling the esthetics of the teeth to be used because the matrix is in the way. In addition, when seating the matrix, if more pressure is used on one side as compared to the other, the occlusal plane would come out canted. The problem is that this could not be discerned until after the matrix had been removed and the material is set.

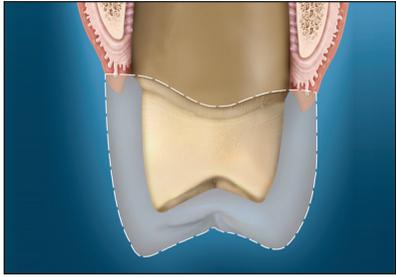


Figure 8 The soft tissue, in particular the free gingival margin, helps guide the seating of the provisional shell in the mouth.



Figure 9 When trying the provisional shell in the mouth, carefully observe the relationship of the gingival portion of the shell to the free gingival margin. There should be minimal gap between the shell and the soft tissue. Note the blanching of the tissue in the papilla areas where the shell needs to be trimmed.



Figure 10 Before relining the shell, dentin adhesive is applied to the internal and external one half of the shell and light-cured. A second coat of adhesive is then applied and left uncured to act as a wetting agent for the new material.



Figure 11 The internal of the provisional shell is filled with Protemp 3 Garant for the relining procedure.



Figure 12 The provisional shell is seated in the mouth during the reline procedure.



Figure 13 The completed provisional restorations after custom staining and polishing.

RELINING

Once the seating of the shell has been verified in the mouth, it must be air-abraded internally and externally before it is ready to reline. This creates a matte surface to promote better adhesion of the shell with the new material used to reline. It will also allow the external junction of the two materials to blend together seamlessly. After it has been air-abraded, cleaned and dried, the entire internal and external one half should be painted with dentin adhesive and light-cured. The easiest way to cure the adhesive is to place the entire shell into a Triad oven. The last step before relining is to paint a second coat of adhesive over the entire internal and external one half of the shell (Figure 10). This second layer should not be light-cured. Its purpose is to act as a wetting agent for the new material to help promote good adhesion. The shell is now ready to reline. A thin coating of Vaseline is recommended over the preparations to keep the material from sticking. The shell should be completely filled with Protemp 3 Garant, working from one end to the other. Care should be taken to avoid trapping air

bubbles. Once the shell has been loaded, it is immediately seated over the preparations using the same visual clues as previously discussed (Figure 11 and Figure 12). Excess material can be wiped away before the initial set. Once the initial set has been achieved, the provisional can be spot-cured to begin setting the uncured adhesive. To prevent the material from locking onto the preparations, gently lift the provisional on and off throughout the setting process. This helps overcome the fact that the teeth were not prepared to draw with one another. The more divergent the preparations, the more attention must be given to this process. Upon removal of the provisional from the mouth, it should again be placed in the Triad oven to ensure that the adhesive is fully set.

Once the air-inhibited layer is removed, it can be trimmed like any other provisional. If desired, the provisional can be kept in one piece or it can be sectioned distal to the canines to create three pieces. The easiest way to do this is to trim the junction between the canine and first premolars to ideal contour. Rather than just cutting the joint

with a disc and creating an open contact that must now be closed, a sharp scalpel blade should be used to score around the entire joint. Light pressure can then be used to fracture the provisional in the location that was scored with the blade. Now rather than creating an open contact, the edges of the fractured joint can be smoothed, thereby leaving interproximal contact. The provisionals can be tried back in the mouth to check and adjust occlusion as well as to verify the marginal integrity and esthetics. If needed, dentin adhesive and the Protemp add-on material can be used to pick up any missed margins. Once the provisional is properly trimmed, finished and polished, it can be conventionally cemented in the mouth (Figure 13).

CONCLUSION

This article described a technique that can be predictably used to fabricate provisionals for a variety of clinical situations ranging from a full arch to a single unit. When used correctly, the convenience and time saved in the clinic more than makes up for the added laboratory time and cost.