Troubleshooting Technology

Mock-Up—No Time for Laboratory Wax-Up

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Ideal treatment planning requires a full diagnostic wax-up for an esthetic, functional result. But what if the patient requires a fast turn-around of the case? If the preoperative study casts are sent to the laboratory for diagnostic wax-up, it can take up to 1 week for the delivery. What if the patient had an accident that led to an emergency visit? There surely would not be time for a wax-up. Do you make the patient wait?

Treatment Plan
The dentist performs a clinical evaluation and radiographic examination, and the assistant then pours the preoperative models twice, using an alginate-equivalent material such as the recently released Alginit (Kerr Corporation) or StatusBlue (Zenith Dental Products). The first pour is used for the patient record, and the second pour is used for the mock-up, periodontal charting, face-bow transfer (Denar Slidematic, Waterpik Technologies Inc), and separate bite and smile analysis. At this time you may want to show the patient case examples. It may be necessary to have the patient look at a smile selection (Esthetic Dentistry/SmileGuide: A Patient’s Guide). This will help the patient to choose the shape they are looking for. Do not assume that the patient will want to keep the current shape of their teeth.

Steps to a Beautiful Smile
The facial midline is the starting point of the esthetic treatment plan. Whenever possible, the midline between the maxillary central incisors should coincide with the facial midline; if not, the midlines should be parallel. Asymmetrical facial features, including the eyes being in different planes, are not useful reference points in determining the smile line. This is why a face-bow transfer is needed. The lip line should follow the smile line. The amount of maxillary tooth revealed below the smile line relates to the viewer’s perception of age. In a youthful smile, it is my opinion approximately 75% to 100% of maxillary teeth will show below this line. The dentist may plan to adjust the gingival contour, which should be 1 mm lower than the centrals and cuspids. The location of the gingival zenith should be the following: the centrals near the distal, the laterals near the mesial, and the cuspids near the distal. Incisal embrasure form gets deeper as you move distally. Evaluate the width relationship of the 6 maxillary front teeth. As a rule, the centrals should be 1.6, the laterals 1, the mesial 0.33, and the cuspids 0.6. Evaluate the width-to-length ratio of the central incisors, the ideal of which is almost 75%. The central embrasure space is parallel with the center of the face and perpendicular with the central incisor edges. When doing a larger mock-up that involves more than just the anterior segment of the smile zone, keep in mind that posterior teeth become shorter as they move distally. The more the buccal corridor is filled with teeth, the more feminine and youthful the smile.

The Golden Proportion
The principle of proportion has been known since the time of Ancient Greeks. The first Golden Proportion relationship, and the most important to be discovered, is a simple tooth-to-tooth Golden Proportion. The Golden Proportion is the relationship of the sizes of the 3 maxillary anterior teeth (centrals, laterals, and canines). The front teeth, from central incisor to premolar, are the most significant part of the smile and they must be in the Golden Proportion. A proportion ruler (The Nash Institute Proportion Ruler) can be used to perfect the esthetics of the 8 anterior teeth. The number in the center refers to the width and lengths. By
placing the model on the card, it will show which card pertains to the patient’s Golden Proportion.

**Composite Mock-Up**

To begin the composite mock-up, you must have the following:

- Mounted study models (Denar Combi Articulator, Waterpik Technologies Inc) and Virtual Bite Registration (Ivoclar Vivadent, Inc)
- Composite syringe (4 Seasons, Ivoclar Vivadent, Inc)
- OptiBond No. 2 Unfilled Resin
- Nos. 2 and 4 sable brush (Keystone Industries)
- OptraSculpt (Ivoclar Vivadent, Inc)
- Mixing well
- Curing light (BluePhase, Ivoclar Vivadent, Inc)
- Sandpaper mandrel (Brasseler USA) and extra fine garnet disc (Cosmedent, Inc)
- Picture of the patient’s full face, smile, retracted smile, and mirror shots

**Step One**

If some teeth are rotated and crowded, minor preparations with a sandpaper disc to remove corners may be needed (Figure 1). Always start with the centrals. This allows you to establish a guide. Start by moistening the model with unfilled resin (OptiBond No. 2) and No. 2 sable brush and then light-cure.

**Step Two**

Roll or flatten the composite material (on a pad) and place it onto the model. Using the OptraSculpt, gently sculpt the shape that the patient has been shown and has accepted. Add resin to the OptraSculpt to maneuver the composite as needed (Figure 2). Remember the Golden Proportion (width-to-length ratios). Place the composite over the incisal edge of the model because the final restoration would not stop there.

**Step Three**

Light-cure when the desired shape has been obtained. Do not light-cure the composite until you are satisfied with the shape. Move on to the next central, followed by the laterals, and finally the canines. Remember that teeth Nos. 8 and 9 should be mirror images of each other in both shape and size. Make sure that the composite material is thick enough so that when the provisionals are fabricated they are not too thin and breakable. Make sure the mock-up has a smooth finish; if it has bumps and groves so will the coping or Sil-Tech (Ivoclar Vivadent, Inc) stint.

**In-Office Wax-Up**

**Emergency Exam Visit**

The patient fell down and chipped the edges of her anterior teeth. The maxillary central (tooth No. 8) was almost completely avulsed. Her central was not...

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salvageable. Her teeth were loose and her remaining central was lacerating her lip with its sharp fractured edge. At this appointment digital photographs (Canon 20D with Canon 100-mm macro lens and Ring Flash Norman Camera, Canon USA, Inc) were taken along with digital radiographs (Sidexis XG, Sirona Dental Systems). The treatment plan was to extract the tooth and restore with an all-ceramic bridge. A polyvinyl alginate substitute (StatusBlue, Zenith Dental Products) impression was taken and poured with reinforced stone (Shake and Pour Earth Stone, TAK Systems). After 10 minutes the models were separated from the impressions and mounted.

The pontic site was prepared by carving out an ovate depression and outlined with a pencil where the emergence of the tooth will be. A rectangle-shaped wax form (Architect Wax Forms, Lab Innovations) was used to match the shape of No. 9 (Figure 3). By choosing a rectangle wax form to fill the pontic space, a broader contact for the pontic can be achieved. The large-sized wax form was used as the closest size that fits the space. It is better to choose a wax form that is slightly too large and carve it back so it fits snugly into the space rather than to choose a wax form that is too small. The wax forms are very durable and do not break easily. This makes them very easy to work with. Because this is for a bridge restoration, the space between her teeth at the gingival area was closed even though she had spaces between her existing teeth.

The wax form was then trimmed using a No. 15 scalpel interproximally and cervically until it fit the proper interproximal and incisal positions. It was then placed with positioning wax to its final position. The sides were tacked into place with wax. The pontic site was now filled to the root outline that was drawn in earlier. The lingual anatomy was then built up, followed by the facial side. When using premade wax forms the root surface is primarily replaced with wax. The wax form’s anatomy and texture is already there. When matching existing teeth or restorations that are very flat labially, then it only takes a minute to smooth the wax form with a sponge.

The lingual occlusion was then developed. The occlusal contacts were kept very light because the tooth acted as a pontic. The wax-up was then smoothed and refined with a sponge or a brush. The incisal edge of tooth No. 9 was waxed up and refined as well. This entire wax-up only took about 15 minutes. A stint (coping or Sil-Tech) was then made for the fabrication of the provisional bridge.

Conclusion

Do not be too critical of your mock-up or wax-up; it takes time and practice. Remember you are not a laboratory technician, but you can save your practice time and money by fabricating small mock-ups in your office. You can create a beautiful blueprint for your patient’s new smile.