Introduction

From the author’s viewpoint, it’s always a good idea for technicians to spend time talking to a patient who is particular about his/her case before the work is begun. Some patients have elevated expectations regarding shade, porcelain color, bleaching, brightness, high or low value, tooth shape and black triangles – regardless of their adjacent teeth color. If we are going to meet a difficult patient’s goals, it’s best to try and determine what they are first. Even the clinician may not be sure exactly what the patient is seeking because he/she might change his/her mind often, or just not be able to express it very well. It’s safe, then, to assume that the time spent with a patient
pre-operatively is not wasted. However, it’s another matter to communicate effectively with someone who is not in the dental field. Most patients are not trained in the esthetics and considerations that go into the formation of their cases. This is why communication tools are of such importance.

Our discussion will revolve around a patient who visited another laboratory but was not happy with what they were able to offer her. She had several complaints regarding teeth numbers 7, 8, 9, and 10 that she wanted addressed:

- Black triangles
- Discoloration
- Unmatched color
- #10 Mesial Protruding

In addition, the author noted that tooth #8 was slightly longer than #9. This did not seem to bother the patient, but the author felt it needed to be corrected. He also discovered in talking to her that she liked the prominent appearance of #8 and 9 so he knew he would have to follow this outline as he began the case, even if he did not personally care for the way it looked.

To narrow down exactly what she wanted changed took one hour's time, but in the end it led to results with which she was happy because it produced a guideline for the author to follow in the mouth.

**Laboratory Procedures**

Pre-operatively, the author noticed discoloration due to several issues: tooth #7 had composite bonding, #8 and 9 had been repaired with ceramic restorations and #10 a porcelain-to-metal crown (Fig.1). With so many material choices used within such close proximity to each other, it is no wonder the teeth did not match. The author recommended that the patient take care of all four of these teeth at once in order to ensure a proper color value match, suggestion she agreed to do.

For total color (Figs. 2, 3, 4) evaluation including posterior enamel, occlusion and translucence enamel, the author put his Chair Side Shade Selection Guide to use and took the custom shading procedure steps necessary for a perfect match. Among other things, he noted that the amalgam in tooth #5 lent a blue tint to her shade in the posterior and the fake crowns on 3 and 4 were monochromatic in tone.

After the patient had been prepped, she returned to the lab for a “stump shade” check (Fig. 5). Using his Simple Enamel and Prep Color Guide, the author noted that each of the teeth presented with something a little different:

- #7 was fine, a plain white color that would not need disguising
- #8 was a post, core - a dark color that needed masking
- #9 had an orange tint in the cervical 1/3
- #10 was a dark brown color in the gingival area

If the technician does not accurately record that internal stump color, he will not be assured of a perfect match when he completes his porcelain work. By using proper shade taking tools and making note of what he finds, he can map out his color application in a way that will disguise any disfiguration that may otherwise occur. For instance, the silver color of her post core on tooth #8 is not monochromatic and needs a proper material choice to be effectively masked.

During the conversation with the patient, the author showed her several types of translucency choices (Fig. 6). With her provisionals in the mouth, the patient’s smile shines (Fig. 7).
Fig. 1: The author noted discoloration on teeth numbers 7-10 due to several different issues: #7 had composite bonding, #8 and 9 had ceramic crowns and #10 had a porcelain-to-metal crown.

Figs. 2, 3, 4: The author used the LSK121 Chair Side Selection Guide™ in order to evaluate the patient's posterior enamel color and occlusion as well as translucence enamel.

Fig. 5: The patient returned to the lab for a “stump shade” she had been prepped for color check at the clinician’s office.

Fig. 6: With the provisionals in place, the patient and the author discussed translucency choices.

Fig. 7: The patient has a beautiful smile with the provisionals in place.
By using the Renfert’s GEO Aesthetics Chart the technician can depend on easy wax-up processing and excellent anterior esthetics (Fig. 8). The author selected the preferred tooth wax-ups (Fig. 9) and attached them to the model, then performed an incisal edge check in order to ensure that the alignment was a match (Fig. 10).

The porcelain build-up is easy with the Renfert system because the incisal area position can be cut and checked on the model with the putty index for predictable tooth positioning (Fig. 11). Before investment the facings were fixed firmly to the model using GEO wax-up with sprue (Fig. 12). After pressing and divesting, the fit to the die was checked using a bleaching ingot (BO), with 50% translucency and 50% opacity (Fig. 13).

Figure 14 illustrates the appearance after the first dentin application, using a thin layer of GC Press material. In the next step, GC Initial BLD-2 Low Fusing porcelain was applied to the copings (Figs. 15, 16). In figures 17, 18, Low Fusing Porcelain was mixed together with Second Dentin and Enamel application as part of the porcelain build-up.

As a guide for creating texture, the author painted special markings onto the bisque bake crowns so he would know where and how to apply the surface texture differentiations (Fig. 19). Gold paint on natural, extracted teeth helped him determine how to achieve a natural effect on his restorations by studying their distinct
Fig. 13: After pressing and divesting, the fit to the die was checked using a bleaching ingot (BO), with 50% translucency and 50% opacity.

Fig. 14: Appearance after first dentin application, using a thin layer of GC Press material.

Figs. 15, 16: GC Initial BLD-2 Low Fusing porcelain was applied to the copings.

Figs. 17, 18: Low fusing porcelain was mixed together with second dentin and enamel application as part of the porcelain build-up process.

morphology (Fig. 20). When creating the lingual anatomy of natural teeth in his restorations, the author uses a diamond burr for surface grinding (Fig. 21).

The bisque bake crowns were tried in the mouth (Fig. 22) and Lustre Paste applied as a final check on the color. At that time, the author could ask the patient what she liked or did not like, for instance; should he increase or decrease the chroma? She was very clear that she wanted the color to be bright. For his part, the author was glad to be able to get her final approval while she was in the chair and could communicate openly with him about her expectations.
Fig. 19: The author applied surface texture differentiation markings to the surface of the bisque bake restorations.

Fig. 20: Gold paint was applied to natural teeth in order to determine how to create a natural and effective tooth morphology.

Fig. 21: A diamond burr was used to grind the surface of the restorations and create a natural appearing lingual anatomy.

Fig. 22: After the bisque bake try-in, the author applied GC Initial™ Lustre Paste color as the final step in the process.

Fig. 23: The crowns were placed on a mirrored surface as a final color check.

The finished restorations, with final Lustre Paste applied, were placed on a mirrored surface to check for brightness and translucency (Fig. 23). In the try-in stage, the author verified that the post core color on #8 was masked efficiently (Fig. 24) before final cementation.

The patient offered a right view smile for the camera (Fig. 25) and then a left view (Fig. 26) and lastly a front smile photo was taken (Fig. 27).

**Conclusion**

In order to get the best cosmetic design, the technician should be armed with knowledge about porcelain techniques and communication skills/tools. The following will come up if he really considers the patient’s case and how to achieve the best possible results:

- Incisal Corner
- Color
- Emergence Profile
- Length of Restorations

The tools a technician uses to help the patient understand the process of fabricating a restoration will advance the communication process tremendously if they are effective. The author has found that explaining teeth
characteristics such as translucency and color variations lead to greater comprehension on the patient's part before the case is fabricated. Often, patients have no idea about how difficult it is to catch all the little nuances that go into matching their color and special characteristics. Giving them a demonstration with a special tool, such as a book or the Chair Side Shade Selection Guide is very helpful to their overall grasp of the magnitude of what's involved.

Inviting the patient to try-in the crowns before final cementation can go a long way toward saving time and remakes as well. It is highly recommended by the author, that if it's possible, to have the patient and clinician visit the lab beforehand, or have the technician go to them.

This particular patient traveled from out of state to have this work done. Because of this, it was even more imperative to have her case done correctly and not waste time with remakes or adjustments. As discussed already, she was particular about her wishes which meant she required extra care from the beginning. Material choice, final outcome and her dislikes were all covered in these discussions, with no real possibility of error.

About the author

Luke Kahng, CDT is the owner of LSK121 Oral Prosthetics, a dental laboratory in Naperville, IL. He has published over 50 articles in major dental publications. He is the author of three recently published books, including Anatomy from Nature, with 50 illustrated pages of full contour wax-ups, stone models and porcelain teeth, all re-created using natural teeth as a guide, the Esthetic Guide Book features 31 patient cases from a single anterior tooth to a full mouth reconstruction and Smile Selection + CS³ Clinical Cases, a complete supplement to the Chair Side Shade Selection Guide Standard Kit. He invented the Chair Side Shade Selection Guide and the Simple Enamel and Prep Color Guide, featuring over 150 zirconia fabricated restorations based on patient enamel and translucency research, with patent pending, in 2009.