The Aesthetic Edge

A New Approach to Smile Design

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Dentists who are experienced with cosmetic treatment know that subtle variations in the shapes of the teeth can mean the difference between successful treatment and hours of reshaping, recontouring, shortening, or worse of all, restarting a case. To minimize extended or failed delivery visits with removable or fixed prosthetics because of patient dissatisfaction with the smile design, several smile guides have been developed over the years. These guides have attempted to serve as a communication tool to help the doctor understand what the patient wants, and for the doctor to communicate those desires to the laboratory.

The first smile guides were printed manuals showing various smile designs. Some authors used personality preferred shaped teeth to demonstrate various designs, while others categorized the designs based on mesiodistally changing the incisal line angles of the anterior teeth. To demonstrate these shapes, some authors removed each design on a single patient, while others selected different individual natural smiles to show each design. Some printed these designs in manuals showing only close-up views of the smiles, while other manuals were printed with only portrait views of each design.

As the popularity of cosmetic imaging programs increased, some of these guides evolved into digital form to act as digital smile libraries. However, until now, no smile guide had been developed specifically to show the aesthetic effects of the subtle variations in incisal line angle while simultaneously incorporating the requirements of cosmetic imaging programs.

DESIGNING SMILES

Let's first examine the dynamics of the smile. The lower ten teeth in the aesthetic zone have only one good option: straight, even, and white. Of the ten teeth in the upper aesthetic zone, the four bicuspids can be considered to have one universal aesthetic shape: a rounded point. This leaves the variations for aesthetic smile design strictly to the six upper anterior teeth.

There are three shapes of incisal and labial incisors based on the shape of the incisal line angles: square, square-round, and round. There are also three shapes of the cuspids: printed, round, and flat. All possible combinations of these teeth would result in twenty-seven smile designs. We can, however, eliminate those designs that result in the lateral incisor being more "square" than the central incisor. It has been my experience that these designs simply do not look good. The remaining aesthetic combinations make up the eighteen basic smile designs. There can be variations of these basic designs such as shorter or longer centrals or laterals, and narrower or greater angles of the incisal

Figure 1. Before treatment, full face.

Figure 2. Before treatment, retracted view.

Figure 3. Before (retracted), left profile.

Figure 4. Digital radiograph showing interproximal fillings.

Figure 5. Recent digitized cephalometric analysis of patient.

Figure 6. Electric recession scissors used to harvest tissue autograft.

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embrasures. Variations in the incisal contour (the shape of the incisal edge of each tooth) such as flat, round, or characterized can also be considered.[1] Each variation of a basic smile design can be easily discussed with the patient, drawn onto copies of the base design, or computer imaged. The final choice coordinates the "aesthetic incisal edge".

CLINICAL TECHNIQUE

The prescription of a beautiful smile is created by the combined efforts of the patient, dentist, and laboratory technician. The patient's desires are communicated to the dentist, who then transfers the information to the laboratory technician. The laboratory technician then creates the restorations that will fulfill the patient's desires.

Because the model for the smiles was a young attractive woman, many of our patients who do not share these qualities (different gender, age, or ethnicity) may have difficulty imagining how the chosen smile might look on them. This is where the power of imaging comes into play.[2]

Once the smile design is selected from the printed guide, the corresponding digital smile can be used for cosmetic imaging. The digital smile library enables images to simply drag-and-drop a new smile into their patient's portrait images. If a digital smile library only provides a single retracted version of each smile design, to use these images effectively it is required that the initial portrait photo be captured at precisely the same angle as the library image. This is highly unlikely and often results in a poor simulation. The key to successful "smile transfer" imaging with library smiles is to have the library images include the arch posteriorly all the way to the molars, and include four specific versions of each retracted design. The four versions compensate for the two ways in which patients smile (with their teeth slightly parted or with their teeth together), and for the variations in incisal-occlusal plane (the plane can be straight or curved depending on the patient's anatomy and the angle from which the photo was taken) (Figures 17 and 18).

DISCUSSION

A Smile Style Shape Guide offers major benefits, with or without imaging. The most straightforward use of a smile library is simply to guide the patient in choosing their favorite smile. If they request modifications of an existing library smile, a black and white photocopy of the design that is the closest to the design that is the closest to the patient's desires can be made. Drawn changes can act as a crude simulation showing variations in incisal edge length, incisal edge contour, and preferred depth of incisal embrasure shape.[3] The drawing can confirm what the patient is trying to communicate, and can be sent to the lab as a blueprint for wax-up or final restoration.

For offices with cosmetic imaging, the library has even greater benefits. Use the guide as described above. Then use the corresponding digital image to create a simulation of the chosen smile as it would appear on the patient's portrait. For greater diversity, the library of digital photos discussed in this paper has been formatted to work with any cosmetic imaging program capable of inserting smiles into portraits. You can use the image to drag-and-drop the entire smile into the patient's portrait in one step. Depending on the capabilities of the imaging software, the digital photos can be segmented into sections of the arch or into individual teeth. These segmented can then be used to more diagnostic imaging techniques such as tooth-by-tooth imaging.

When used with the Digital Dentist imaging system the digital images have been preformatted for segmental imaging. You can use the digital photos for full smile transfers (image the entire smile in one step), or to image your cases one tooth at a time to create a diagnostic-quality simulation.

CONCLUSION

It is difficult, time consuming, and psychologically challenging to meet the demands of anterior dentistry. Comprehensive cosmetic treatment requires a systematic approach to combining the various factors that create a smile. Excellent aesthetics cannot be achieved without excellent communication between the patient, the dentist, and the laboratory. The use of a shape guide is therefore an essential tool for treatment management, from case acceptance to patient satisfaction.[4]

An ideal smile guide should be useful for both smile shape selection and cosmetic imaging. The combination of the printed smile style guide and digital photo CD as discussed in this paper has been deliberately named the Lorin Library. These tools give the practitioner the ability to define the elements of aesthetic choices and to select, design, communicate, and deliver appropriate treatment. The use of a smile style shape guide can make both fixed porcelain and removable dental treatment more predictable, more successful, and most of all, more fun (Figure 19).

References

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

Figure 7. Gold-foil retainers are placed and tooth preparations are made (temporary veneers are removed).

Figure 8. Applying Gentle Gel to tissue.

Figure 9. Abutment and mandibular temporaries.

Figure 10. Lateral view, Lorin Library shade GB-LL03.

Figure 11. Smile: Lorin Library shade GB-LL03.

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The final impression was then poured in type IV die stone. Because we want our patients to consider only the effects of the shape of the teeth on aesthetics, all other variables were eliminated.[3] A simple method to eliminate all variables other than the shape of the teeth is to create all smile designs on a single individual. To accomplish this, a patient in need of a full smile makeover was selected (Figures 1 and 2). Following two orthodontic treatments, once as a teenager and again as a young adult, she still had an open bite (Figure 3). In addition, her teeth were riddled with numerous interproximal fillings (Figure 4). From her pretreatment impression we did a wax-up of her anticipated treatment, duplicated this in stone, and made prep guides and hard/soft matrices for transitionals.

Anesthesia was administered. The teeth were prepared for twenty porcelain veneers using the Shofu Contemporary Dahlog Kit. The peripheral margins were outlined using the round diamond (Figure 5). A depth cutter was used to score the facial to facilitate rapid removal of old composite and some enamel. The uniform rounded-tapered diamond did the bulk reduction. The preparation nuts and margins were simultaneously finished using the superfine, round-end tapered diamond.[3]

The Hideo Shofu electrosurgery device performed a bloodless "gum lift" to create gingival harmony around the lateral incisors (Figure 6). Excess gingival tissue was easily removed on the facial. Inflamed interproximal tissue was excised for clean margins and recontouring.

Upon completion of tooth preparation, final impressions and bite registrations were taken. The full-arch matrices were filled with resin-rein lab-acrylic and secured over the prepared teeth to insure the temporaries (Figure 7). After the outer matrix was removed first, the soft matrix was removed to reveal a smooth, polished surface. The margins of the temporaries were finished with fine finishing diamonds from the Shofu Contemporary Finishing Kit. Gentle Gel (Shofu), a soothing tissue containing aloe vera, tea tree oil, and Vitamin E, was applied to the soft tissues to further promote healing (Figure 8). The resulting provisionals were beautiful and durable (Figure 9).

CEMENTATION AND PHOTOGRAPHY

The laboratory constructed eighteen sets of veneers corresponding to the basic smile designs determined by our earlier analysis. The veneers were organized according to tooth shape, creating the blueprint for placing each veneer for each design with as few steps as possible.

Digital photography was chosen because of its inherent ease of use for layout design of our extended printed Smile Style Guide, and to facilitate the digital qualities needed to use the photos in cosmetic imaging programs.

The temporaries were cleaned and prepped off with a spoon excavator. Each set of veneers were placed with crystic paste, cleaned, and photographed. Seven views were completed for each design before moving on to the next. These included portrait, close-up smile, lateral smile, and four anterior retracted views.

The patient began to choose her preferred smile design from the resulting eighteen choices. After much deliberation, she narrowed her decision to two, but could not make up her mind between these two choices. Interestingly enough, it was the profile view that made the final decision easier. This is significant because it shows the importance of the lateral shot. This "social angle" is the view from which other people view the patient. No other library contains this. The patient's choice was set, but bonded into place. To complete the case, the margins and occlusion were adjusted and polished with the Shofu Contemporary Finishing Kit.

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RESULTS

The case selection, laboratory specifications, digital photography, and photo-compositions were all carefully planned to fulfill the needs of both a printed smile guide and a digital smile library. The printed smile guide needed to be capable of helping the patient and doctor towards selecting the preferred aesthetic design. The guide needed to show the entire aesthetic complex, and was therefore printed in full color with each of the 18 designs being shown in portrait, close-up smile, and lateral views. The guide was arranged to create a three-step smile selection process, beginning with selection of the ovoid shape from the lateral view. This lateral view is first observed often view the patient's smile, yet the patient rarely sees themself from this angle (Figure 10). As we found with our model, this is a very important step.[4]

Step 2 is the selection of the shape of the four incisors

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Figures 12 through 15: LL12 with four varying incisal length options.

Figure 16. Portrait; Lorin Library shade GB-LL03.

Figure 17. Lorin Library shade GB-LL03 (retracted occlusion, flat arch digital image).

Figure 18. LL14 (retracted occlusion, curved arch digital image).

Figure 19. Final Portrait.

from the close-up smile view (Figure 11). Step 3 is the selection of the relative incisal edge length from the four variations presented (Figures 12 through 15). Upon completion of the smile selection process the patient can confirm their choice by seeing how the smile looks on the corresponding full portrait, which is printed on the adjacent page to the side and close-up views (Figure 16). This smile guide is unique because it shows all designs on a single face (minimizing aesthetic variables) and includes lateral smile views.

You can use the digital photos for full smile transfers (image the entire smile in one step), or to image your cases one tooth at a time to create a diagnostic-quality simulation.

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Dr. Berland is both a prosthodontist and a fellow of the American Academy of Cosmetic Dentistry. He is one of the most sought after speakers and published authors on cosmetic dentistry in America. He has been featured in national and regional magazines, major dental journals, and recently NBC News, The News, and ABC's [illegible]. For more information on Digital Practice Builder—A Digital Imaging and Smile Design Seminar, or any of Dr. Berland's seminars, call [illegible] or contact [illegible]. Disclosure: Dr. Berland is the developer of the Lorin Library.

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