At The Chair

Great Cases From New Places

Our new methods and materials for fixing smiles are becoming more efficient and effective every day. Digital photography, cosmetic imaging, and temporization are improving dentist-patient communication in many ways. This increased emphasis on codiagnosis has had an immensely positive effect on overall patient satisfaction.

Marketing our services to the public has recently taken a great leap through websites, Internet marketing, and search engines. Cosmetic dentistry is a personal decision, and more people are choosing their dentists for elective cosmetic procedures in private—using the Internet. Today's patients have high expectations and demands for their elective procedures, and will often do careful and thorough research before choosing the right dentist. Furthermore, the web can be a convenient, thorough educational tool that allows us to reach an entirely new audience. The following case illustrates this point.

Figure 1—Preoperative full-face view.

Figure 2—Preoperative image showing misaligned teeth and uneven incisal edges.

Consultation

A young woman found my website after searching out cosmetic dentistry on the Internet. Although my office was almost 3 hours from her home, she took time off work and made the trip for her initial consultation. Examination revealed a healthy dentition and Class I posterior occlusion. However, because of the severe bell shape of the maxillary and mandibular incisors, she had crowding and an anterior open bite (Figures 1 through 4).

Figure 3—Preoperative palatal view of the maxillary arch.

Figure 4—Preoperative lingual view of the mandibular arch.

She informed me in no uncertain terms that orthodontics was out of the question. Besides, she was quite satisfied (and rightfully so) with her natural facial esthetics. Moving her teeth might result in an altered facial and lip profile.

Figure 5—Cosmetic image simulating whitening and porcelain restorations.

Figure 6—Laboratory wax-up of the central and lateral incisors.

We began with digital radiographs, study models, and a cosmetic imaging work-up. Digital imaging has always played an integral role in helping my patients accept treatment for cosmetic cases. By using Digital Dentist professional image editing software combined with the Lorin Library of tooth design (Digident.com), in-office imaging can provide simple, accurate, and realistic pictures of the simulated case. The Lorin Library consists of 18 esthetic smiles printed in a full-color Smile Selection Workbook with corresponding digital images. The library was designed by mixing and combining the three major shapes of anterior teeth. The Smile Selection Workbook presents each smile design in portrait, close-up smile, and close-up profile views. The patient then chooses the design from the anterior views and verifies the choice from the profile view. The Workbook is available personalized with the dentist's or laboratory's name on the cover.

The digital image module of the Lorin Library consists of retracted smile views and individual "mini-images" of each tooth of every smile design. The imaging system allows the mini images to be "dragged" with absolute precision into the patient's digital photo for simulation of porcelain veneers, crowns, or even dentures. Once the chosen smile design is used to simulate the new smile, you can further refine the image by altering the gingival contour, shade, and incisal edge position of each tooth. In addition, the patient can receive a copy of his or her simulated smile during that very same appointment. Of course, patients should be informed that the simulated picture gives them a good idea of how their final

Figure 7—Stone models with wax-up, preparation guide, and hard/soft matrices for the provisional.

Figure 8—Teeth whitened from A4 to A1 cervically/A0 incisally after an in-office Rembrandt™ whitening procedure.

Figure 9—The Shofu Shade Eye-Ex™ Chroma Meter.

Figure 10—Dr. Lorin Berland's Contemporary Cutting Kit.

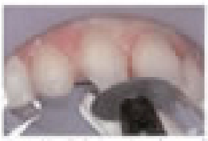

Figure 11—Shofu Super-Snap discs used to round sharp angles of the preparation.

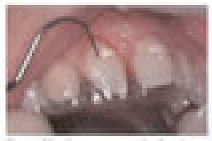

Figure 12—Preparation guide placed over the maxillary preparations to ensure adequate reduction.

Figure 13—Adequate reduction verified with the mandibular preparation guide.

Figure 14—Seating provisional hard/soft matrix filled with autocure temporary crown and bridge material.

teeth will look, but cannot always be reproduced exactly.

During that very same appointment, we took a full-face digital photograph of the patient using a digital camera and improved her smile through the simulation of whitening and porcelain restorations (Figure 5). Using the Lorin Library, we chose square-round incisors (Smile Design 10) to complement her flat cuspids. We then printed the simulated image on photo-quality Kodak paper using the Kodak 1200 medical image printer. After seeing her cosmetically enhanced smile, the patient did not want to waste any time or trips before starting treatment.[1] Her treatment would consist of whitening all of her teeth, followed by all-porcelain restorations for her four maxillary and mandibular incisors.

Preoperative models were sent to Westbrook and Associates for the fabrication of the wax-ups as detailed by the images (Figure 6). The incisors were reshaped, straightened, and lengthened. The wax-up was then duplicated in stone. This duplicate model was placed in a Biostar vacuum (Bausan Group). A clear rigid splint material was used to make the preparation guide. This was removed, trimmed, and a 1-mm hole was drilled on the gingival, midfacial, and incisal of each tooth to be restored. At the preparation appointment, by placing a periodontal probe in each hole, adequate reduction according to the wax-up can be ascertained.

Next, using the same vacuum unit, a soft splint was adapted to the same duplicate model. These were removed and trimmed. The hard/soft matrices allowed for the easy creation of temporaries in the mouth that duplicate the diagnostic wax-up—based on an image (Figure 7).

Tooth-Whitening Procedure

By using the Rembrandt® 1-hour, one visit whitening procedure (Den-Mat Corp.), you can initiate any cosmetic case during the first visit and achieve an average nine shades whiter in just over an hour.[2] The patient's soft tissues were protected with a liquid rubber dam. A 35% hydrogen peroxide whitening gel was then applied to her teeth, and the light was positioned to activate the gel for 20 minutes. The whitening gel was removed to apply fresh gel, and this process was repeated for two more 20-minute sessions. In just one appointment, the patient's teeth had whitened from an A4 to A1 cervically, and A0 incisally (Figure 8).

Custom Color and Shade Eye-Ex™

The Shofu Shade Eye-Ex™ Chroma Meter is a highly accurate electronic shade-taking device designed to identify the base shade of the tooth being measured (Figure 9). For this case, we looked at the untreated maxillary cuspids. After using the Shade Eye-Ex™ to record a shade, including hue, chroma, and value, the device then prints out an exact "recipe" for duplication using Vintage® Halo porcelain (Shofu Dental Corporation). To verify agreement of the shade measurement and provide an observation of characteristics of the tooth to be matched, the recommended Vintage® Halo shade tabs noted in the printed recipe are placed in the Gentry Tri-Color Set (Shofu Dental Corporation). Because the tooth shade is influenced by the color of the gum tissue, the visual shade needs to be verified in a tissue-color-corrected environment. A digital picture is then taken and printed out on Kodak quality paper to help communicate incisal characteristics and translucent qualities.

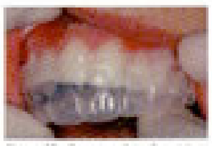

Figure 15—Removing the soft matrix to reveal a smooth-surfaced provisional.

Figure 16—Polishing of the provisional with Shofu Super-Snap discs.

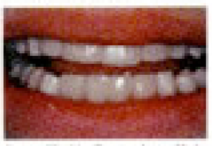

Figure 17—Maxillary and mandibular provisionals in place.

Preparation

Along with local anesthesia, nitrous oxide was used to reduce patient anxiety. Diamond burs from Dr. Lorin Berland's Contemporary Cutting Kit (Shofu Dental Corporation) were used for the preparations (Figure 10). A small round diamond bur (0872-1) outlined the preparations. A depth cutter (0897-1) was used to create grooves in the facials of teeth Nos. 23 through 26 and 7 through 10. These grooves greatly facilitate gross reduction. Round-end taper diamonds (0835-1 course and 8065-1 superfine) were used to prepare the facial and peripheral aspects of the preparations, and a small flame-shaped fine diamond (0859-1) was used to reduce the incisal lingual line angles and complete the preparation.

Whenever there is crowding or overlapping, the interproximal contacts should be opened at least 1 mm to allow the ceramist to correct the problem in porcelain. According to the author's experience, in such cases, the finish line must be placed lingually and approximately 0.5 mm subgingivally to create proper interproximal contours. Shofu Super-Snap discs rounded any sharp areas (Figure 11).

Ideal reduction to allow for the necessary porcelain thickness was verified using the preparation guide. The thin, transparent preparation guide, made from the image-inspired wax-up, is a good way to ensure adequate tooth preparation (Figures 12 and 13). Mere tenths of a millimeter are often crucial to obtaining an acceptable result, and the preparation guide is an absolute necessity to prevent errors that might diminish the success of a case.

Generally, final preparations are based on caries, previous restorations, alignment, shape, occlusion, and color. The porcelain pieces and the teeth should fit together like pieces in a jigsaw puzzle.

Figure 18—Dr. Lorin Berland's Contemporary Finishing Kit.

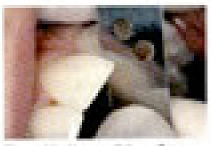

Figure 19—Using a C-Spacer™ to open up the interproximal contacts after cementation.

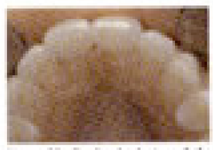

Figure 20—Final palatal view of the maxillary veneers.

Figure 21—Final lingual view of the mandibular veneers.

When the preparations were completed, Impregum® Penta® Soft (3M ESPE) impressions were taken. Because polyether impression material is hydrophilic, the teeth are not desiccated, and the set around the preparations and in the tray results in even better "wetting" and improved abutment adaptation.

Temporization

Today, temporization is required in most cosmetic cases, even for conservative veneer preparations.[3] Few patients are willing to live with an unesthetic smile for even a few days. Even though "it is only a temporary," patients want and expect to see something that has an esthetic appearance. I have found that attractive temporaries are crucial to the success of a case and are extremely important to building referrals.

Hard/soft matrices made from the wax-up help to solve temporization problems and allow dentists to produce results that can often imitate the cosmetic image in only a few minutes. The double-layer soft and hard construction and adaptation of the templates produce provisionals that have correct incisal positioning and tooth contours, fine margins, and good occlusion. Excess material is minimal and takes a short time to trim and polish with a bur or discs.

Steps for Temporaries With Hard/Soft Matrices

Insert the soft matrix into the hard matrix and try it on the prepared teeth to verify fit. Apply a coat of desensitizer (Hemaseal & Cide Desensitizer™ with chlorhexidine, Advantage Dental Products, Inc.) and bonding agent on the teeth to help retention. Fill the soft matrix inside the hard matrix with dual-cured CBV Temp bis-acrylic (Den-Mat Corp.) and place it on the teeth (Figure 14). The excess material can be removed with a microbrush. Dimensional accuracy is maintained by the hard outer matrix. Allow the resin to cure before removing the hard matrix. Remove the soft matrix to reveal a polished resin surface (Figure 15). The soft matrix gives great surface detail while also acting as a cushion so the matrices can be removed without sticking to or breaking the temporaries. Remove any excess resin with finishing burs and discs, adjust the occlusion, and polish (Figures 16 and 17).

Because in this case the temporaries were based on the wax-ups that were in turn based on the cosmetic image, satisfaction was almost guaranteed.[4]

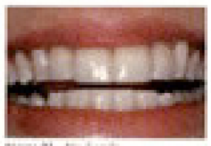

Figure 22—Final smile.

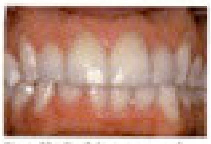

Figure 23—Final close-up, retracted.

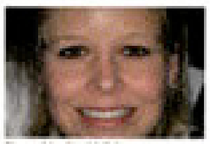

Figure 24—Final full-face view.

Final Restoration Fabrication

At the laboratory, all preoperative models were mounted using a face-bow transfer on a KaVo PROTAR articulator (KaVo America). A custom incisal guide table was fabricated to maintain the patient's habitually acquired envelope of function, because she was comfortable and displayed no symptoms of temporomandibular disorder. The prepared models were mounted using centric bite records. Because of the complexity of this case, it was important to accurately mount the models to ensure proper occlusion and esthetics.[5]

The laboratory-fabricated wax-up of the four maxillary anteriors was returned with the case. A putty matrix was made on these models to capture the incisal edge and incisal third of the facial. This would allow the laboratory to match the diagnostic wax-up exactly. The final restorations were expected to fit perfectly into this matrix. The platinum foil was adapted on all dies. Shofu Vintage® Halo porcelain was stacked (A1+ bright value dentin shade) at the gingival half, blending to a B1+ bright value dentin at the incisal half. The author found the Halo Vintage® Value Plus to be 15% higher in value than standard A1 or B1 without any additional modifications. Shofu Vintage® Halo porcelain was selected because of its reduced potential for abrading the opposing dentition, and the wear characteristics of Shofu Vintage® Halo porcelain closely imitate those of natural enamel, in the author's opinion. Shofu Vintage® Halo porcelain is opalescent (absorbs yellow/red and reflects blue/green), has a low leucite content, small crystal size, and can easily be polished chairside.

Cuspid rise and anterior protrusive guidance were carefully maintained, any lateral interferences were eliminated, and the lateral protrusive guidance was adjusted. Long-term success of these cases frequently depends on sound occlusion and function.[6] After the veneers were baked and function, contour, and surface texture were refined, they were glazed, etched, and internally silanated.

Placement

After 1 week, the resin temporaries were sectioned and removed with a spoon excavator. The teeth were then prepared for bonding. Any residual resin was removed with air abrasion (AirDent, Air Techniques). The abutments were etched with 34% phosphoric acid for 15 seconds before they were thoroughly rinsed and dried. Hemaseal & Cide Desensitizer™ with chlorhexidine was applied and blot-dried, and self-cure Tenure™ (Den-Mat Corp.) dental adhesive was generously applied to the teeth until they had a glossy appearance. The mandibular teeth should never be lighter than the maxillary teeth. Because the porcelain tends to be thicker on the incisal third of the mandibular incisors, the author chose a light shade for the maxillaries and a medium shade for the mandibulars (Autosmix Ultrabond® Quick, Den-Mat Corp.). Cement was syringed onto the teeth to prevent air bubbles and the porcelain was filled with more luting agent and seated on the abutments. After placing the centrals, the laterals were added. This author always seats in contralateral pairs to ensure proper alignment.

The contacts were flossed and excess resin removed with a sable brush. The chosen luting agent was thixotropic, which allowed for low viscosity during seating and high viscosity to prevent sliding or rebounding before curing. Dab-ear® (Den-Mat Corp.) was used to remove excess cement and seal the margins. The restorations were cured using a Rembrandt® Sapphire™ Xenon Power Arc curing light (Den-Mat Corp.), and when polymerization was complete, the gingival marginal flash was removed with a Bard-Parker™ blade No. 12 (Becton, Dickinson and Company).

Final polishing and finishing was completed with Dr. Lorin Berland's Contemporary Polishing Kit (Shofu Dental Corporation) which, includes six shapes of fine and superfine T&F diamonds and six Ceramiste midi points and cups from prepolish and polish to an ultrapolish (Figure 18). The diamonds were used to smooth the lingual incisal margins and interproximals. A C-Spacer™ (Westbrook and Associates) was placed between the interproximals to separate the teeth after bonding. The contacts were then verified with floss (Figure 19). The margins were finished and polished with Ceramiste cups and points, and the lingual margins were polished with Ultra II® diamond paste (Shofu Dental Corporation). The patient was given a complimentary Rotadent® toothbrush (Professional Dental Technologies, Inc.) and was advised to avoid using mouthwashes containing alcohol.

Conclusion

The result was a beautiful smile (Figures 20 through 24). It all began with communication via the Internet. Codiagnosis with the patient through cosmetic imaging, proper treatment planning, preparation, temporization, and final restorations, contributed to the success of the final restoration.

Imaging is crucial to developing a treatment plan, especially for elective procedures in which patients should expect the best. Without the web, this patient might have never learned about cosmetic dentistry. Without imaging, this case might never have happened. Appearance-related dentistry will increase even more in the future through the Internet and advances in technology.

References

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