



Function Can Be Beautiful

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Advances in aesthetic dentistry have enabled today's clinicians to achieve unprecedented restorative excellence. Patients have also become increasingly cognizant of the myriad of restorative treatment options. With a thorough comprehension of the stomatognathic system, clinicians can balance patients' desires for superior aesthetics with restorations that exhibit harmonious function. The following article demonstrates a case presentation that was initially driven by a patient's desire for enhanced aesthetics. Using a function-based approach, however, a well-balanced occlusion was accomplished as well.

Today, it is nearly impossible to peruse a dental journal that does not have at least one aesthetic restorative case presentation. At times, it seems as though the entire dental profession has jumped on the aesthetic bandwagon. A quick glance through the yellow pages of the telephone book will confirm that it is difficult for one to find a dental professional that does not advertise himself or herself as a "cosmetic dentist."

While it is certainly imperative to strive for superior aesthetics, emphasis is often placed on beauty at the expense of function. There is truth to the axiom that form follows function. Armed with a proper comprehension of the masticatory system, clinicians can provide restorative treatments that are functional and predictable, as well as aesthetically pleasing.

Case Presentation

A 44-year-old female patient had recently relocated to the area and was in search of a new dentist. Upon initial consultation, she expressed an interest in simply "brightening" her smile. Following further questioning, it became obvious that she desired more than just whiter teeth. She had modeled in the past and requested an entire smile enhancement (Figure 1).

Initial Clinical Examination

In order to achieve superior aesthetics and functionality, the foundation of the masticatory system—the temporomandibular joints (TMJs)—required examination. Upon questioning, the patient stated that she was unaware of any TMJ problems or pain, but did report some intermittent "clicking" in her left TMJ.

Clinical examination revealed her left TMJ to demonstrate some tension during loading in centric relation (CR). Upon loading the joints using the bimanual manipulation technique discussed by Dawson,¹ the left lateral pterygoid had some tenderness on palpation. Including a thorough examination of the masticatory system prior to the commencement of the treatment plan may identify potential occlusal muscle difficulties.

A full-mouth series of radiographs that included vertical bitewing imaging was also obtained. All teeth were examined for hypermobility, excessive wear, areas of abfraction, gingival recession, and caries detection (Figure 2). Although some imbalance in the gingival architecture was found (Figure 3), the patient's periodontal health was



1. The patient presented with a desire for an entire smile enhancement.



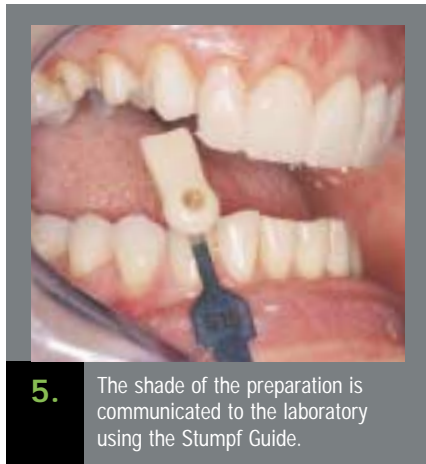
2. The teeth were examined for excessive wear, gingival recession, and caries detection.



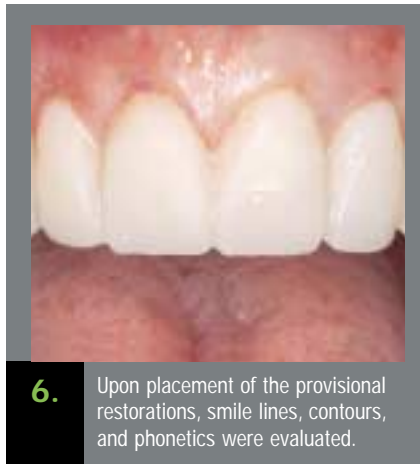
3. Facial view demonstrates asymmetry of the gingival architecture.



4. The CR bite was confirmed in the laboratory.



5. The shade of the preparation is communicated to the laboratory using the Stumpf Guide.



6. Upon placement of the provisional restorations, smile lines, contours, and phonetics were evaluated.

load tested with three pressure increments with no tension or tenderness noted in the TMJs. This evaluation enabled an accurate CR bite record. It was decided to restore the dentition in CR, where the joints are most physiologically sound, rather than in neuromuscular occlusion.²

The case was mounted on the Stratos™ 200 articulator (Ivoclar Vivadent, Inc, Amherst, NY). Once the maxillary model has been mounted, the CR bite and mandibular model were sticky waxed into place. The CR bite had to fit the model exactly as it did intraorally (Figure 4). No spaces should be detected between the model and the bite. If the bite does not fit or if there is rocking, the model should be examined for bubbles and soft tissue infringement. The models were then equilibrated to determine if any adjustments were necessary. A comprehensive equilibration protocol can be found at www.signatureon-line.com, click on Signature Journals, Volume 9, Number 1.

The patient was equilibrated to CR with equal intensity contact on all dentition.³ A two-month joint evaluation was also scheduled. At this time, the clicking was eliminated, and the patient was load tested without tension or tenderness. The patient's lower plane of occlusion was also confirmed.

Gingival contouring was accomplished from tooth #4 to #13 to achieve symmetry of the gingival architecture.⁴ The bone must first be sounded to prevent impingement of the biologic width. The procedure was performed utilizing an electrosurge (Sensimatic™ Electrosurge 600SE, Parkell, Farmingdale, NY). The mounted models, CR bite, slides, and instructions were forwarded to the laboratory for diagnostic wax-up.

Preparation

Teeth #4 through #13 were prepared for restoration with IPS Empress® veneers/onlays (Ivoclar Vivadent, Inc, Amherst, NY) following proper preparation protocols. The shade of the preparation was communicated using the Stumpf Guide (Ivoclar Vivadent, Inc, Amherst, NY) (Figure 5). After proper retraction, all preparations were impressioned using a vinylpolysiloxane material and the heavy body wash technique. Virtual™ is a new impression system (Ivoclar Vivadent, Inc, Amherst, NY) that offers a range of viscosities from Extra Low to Putty, provides enhanced

excellent except for unusual hypertrophy of the gingiva on the facial aspect of tooth #8.

Treatment Plan

Following the initial examination, diagnostic impressions and a face-bow record were then obtained. The Universal Transferbow System (Ivoclar Vivadent, Inc, Amherst, NY) was utilized for the face-bow recording. This enabled the Bonwill triangle to be transferred to the joint elements of the articulator. The impression

models were oriented according to Camper's plane (CP), the Frankfort horizontal (FH), and the sagittal median plane (SMP). Depending upon the reference plane chosen, the CP or FH registration joint holders may be selected. The clinician preferred to use the CP, as the occlusal plane of the models were oriented in a more horizontal fashion.

Once preoperative photographs were taken, cotton rolls were placed between the patient's premolars for 15 minutes. The patient was then



7. and 8. Both the left and right lateral postoperative views of the definitive restorations demonstrate natural appearance of the restorations and symmetry of the gingiva.



9. Occlusal view of the maxillary arch following placement of the definitive restorations.



10. In addition to functionality, the definitive restorations exhibit superior color and aesthetics.

wetting of hard and soft tissues⁵, and improved moisture displacement.⁶ Additionally, its color combination—consistently beige and blue, regardless of technique or viscosity match—contrasts nicely and provides easy readability of the margins both chairside and at the bench.

Provisional restorations were fabricated and equilibrated to ensure stable static centric stops and proper anterior guidance, and not encroach on the patient's envelope of function. To evaluate the natural, whiter smile that the patient requested, shade A1 was selected for the provisional restorations. The provisional veneers were placed for one week (Figure 6); smile lines, contours, and phonetics were analyzed. At this time, another impression was obtained and forwarded to the ceramist to communicate the size and shape of the preferred definitive restorations.



11. The patient, clinician, and technician were extremely satisfied with the final results.

Upon return from the laboratory, the final restorations were evaluated on the hard model for marginal integrity, contacts, and occlusion. A similar evaluation of fit, contacts, and shade evaluation were performed intraorally using Variolink® II try-in pastes (Ivoclar Vivadent, Inc, Amherst, NY). Following try-in, the restorations were cleaned (37% phosphoric acid, Total Etch, Ivoclar Vivadent, Inc, Amherst, NY) and silanated (Monobond-S™, Ivoclar Vivadent, Inc, Amherst, NY) in preparation for bonding. The preparations were isolated, cleaned, etched for 15 seconds (Total Etch), and then sealed using a one-component, broad-spectrum dentin adhesive (eg, Excite®, Ivoclar Vivadent, Inc, Amherst, NY). Due to the minimal film thickness of the adhesive, the adhesive was precured (10 seconds halogen light) to seal the tooth surfaces in preparation for luting. Variolink II was placed onto each restoration and then they were seated with firm intermittent pressure. Using the Wave technique (www.signatureon-line.com, click on **Signature Shorthand**), excess Variolink II was easily removed from the margins prior to final curing of all restorations for 40 seconds from each aspect using a high-powered halogen light. Occlusion was checked, and only minimal adjustments were required as a result of the thorough preliminary examination and intricate laboratory detail.

Conclusion

Due to the availability of today's advanced restorative procedures and materials, it is now realistic for clinicians to facilitate treatments that are functional and predictable, as well as

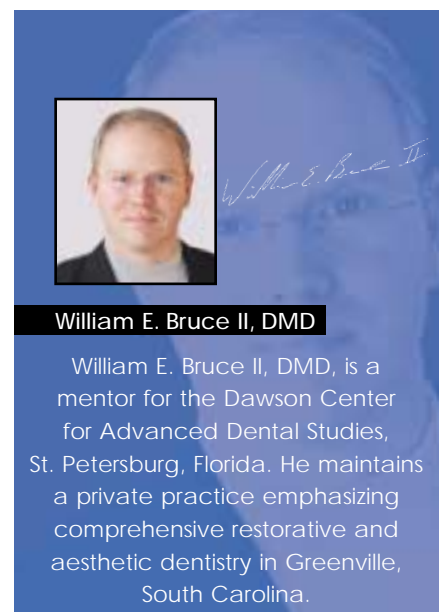
aesthetic (Figures 7 through 11). Vigilant attention to functionality, in addition to aesthetics, results in a dramatic definitive restoration with a healthy, well-balanced occlusion.

Acknowledgment

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References

1. Dawson PE. Evaluation, Diagnosis, and Treatment of Occlusal Problems. 2nd ed. St Louis, MO: CV Mosby; 1989:41-47.
2. Dawson PE. Evaluation, Diagnosis, and Treatment of Occlusal Problems. 2nd ed. St Louis, MO: CV Mosby; 1989:32.
3. Dawson PE. Evaluation, Diagnosis, and Treatment of Occlusal Problems. 2nd ed. St Louis, MO: CV Mosby; 1989:434-456.
4. Kois J. Altering gingival levels; The restorative connection. Part I: Biological variables. J Esthet Dent 1994;1:3-9.
5. Sorensen, JA. Video contact angle measurement of impression materials on various substrates. J Dent Res 2001;80.
6. Norling R. Virtual scientific documentation: Moisture displacement. Report presented at the University of Texas Health Science Center, San Antonio, Texas.



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