

Predictable Reconstruction of a Healthy Smile: A Case Report



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How good is a new smile if it doesn't last? In Lee's chapter of the *Fundamentals of Esthetics*,¹ he points out the dichotomy between dentists that focus primarily on function, stability, and comfort, and those whose priority is esthetic rejuvenation. Why not try giving patients the benefits of both—a beautiful smile designed to last a long time?

During the past 20 years, porcelain veneers have evolved from a color masking/space closing tool to a restorative lengthening medium for teeth as well. Of course, the ceramic materials have become much stronger. Haupt² correctly points out that dentists should be focusing on the "cause" of accelerated wear on tooth structures, not just the "solution."

Predictable results are achievable by synergistic relationships between:

- The anterior and posterior dentition, supporting periodontium, the temporomandibular joints (TMJ), and the neuromuscular system (the functional

basis of bioesthetics), as well as the single collective of the mouth (lips, smile, and gums).

- Artistically recreating natural beauty with function.
- Interdisciplinary approach between the dentist and laboratory technician/artist.³

When people lose ideal functional masticatory relationships, the mouth loses its ability to chew efficiently. The teeth, mus-

Porcelain veneers have evolved from a color masking/space closing tool to a restorative lengthening medium for teeth.

cles, and/or gums become overloaded/damaged, especially in the anterior dentition and vertical dimension of the lower face. The posterior teeth eventually lose the natural sharpness of the cusps for chewing food. The goal in treating this is to reestablish this harmony while revitalizing the patient's appearance.

The clinical evidence supporting Lee's theory is widely documented. In Hunt's literature

review,⁴ he noted that Dahl and Krogstad reported in 1985 that changes in correcting vertical face height (averaging 1.9 mm) were well tolerated.⁵ Mack's study in 1991⁶ found that "the occlusal plane is ultimately the determining factor in restoring necessary facial height." McAndrews⁷ agreed with the above while going further to say that corrected arch alignments and

interaupal relationships were stable. The key to this positive response is detailed attention "to achieving holding contacts for all teeth in centric relation." Assuming the alveolar bone is capable of remodeling (sclerotic bone and exostoses are contraindicated in this situation), muscle activity will be better managed when posterior disclusion is obtained with harmonious anterior guidance. Decreased elevator

muscle activity by this method allows for the condyles to reach their most superior bone braced position and stabilize the condyle-disc complex, harmonizing the bellies of the lateral pterygoid muscles and making the patient more comfortable.^{8,9}

Full-mouth rejuvenation is a "methodical step-by-step procedure"² taking into account all the parameters above. Form and function are intimately intertwined. To accomplish the goals of functional, esthetic dentistry in full-mouth care, dentists must maximize anterior guidance while staying comfortably in the envelope of function and avoiding eccentric occlusal interferences. According to Lee,¹ nature's most successful unworn stable, esthetic, class I dentitions incorporated the following characteristics (along with the aforementioned):

- Central incisor vertical overlap of 4 mm.
- Central incisor horizontal overjet of 2 to 3 mm.
- Maxillary incisor length of 12 mm (average).
- Mandibular incisor length of 10 mm (average)—shorter to

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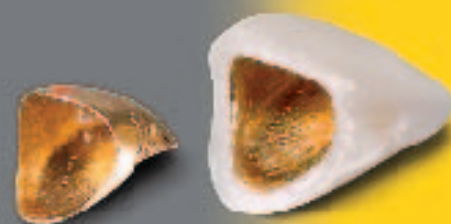
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allow the lower cuspids to pass through during protrusion.

- Approximately 18 mm from upper cemento-enamel junction (CEJ) to lower CEJ on the central incisors.

- Embrasures progressing in size from central incisors to the bicuspids.

The purpose of this article is to demonstrate these ideas in practice. Several reliable ingredi-

ents in this “recipe” of achieving multistructural and multidisciplinary success will be presented.

CASE REPORT

A 27-year-old man presented with severe wear, vertical breakdown, and generalized decay (Figures 1 and 2). He was a very successful entrepreneur who wanted “perfect teeth” and was aware that he ignored his dental care for years

(except for orthodontics and wisdom tooth removal in the past 5 years). Full evaluation of his mouth included detailed radiographs, models, photographs, and periodontal probings. After full-mouth periodontal debridement and nutrition/oral health care counseling, the following findings were arrived at using Kois’ Diagnostic System.¹⁰

- Periodontal—Generalized gin-

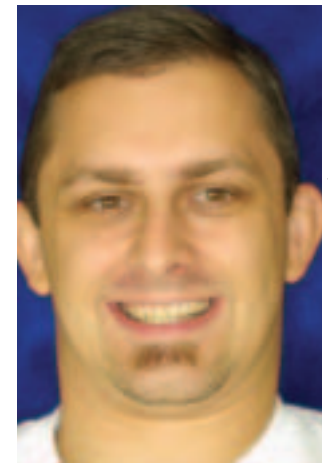


Figure 1—Full face and smile demonstrates decreased youthfulness and health.



Figure 2—Reverse smileline not only ages this patient’s appearance but also functionally compromises the other dentition.



Figure 3—The “Tripod Technique” for getting an accurate centric relation open bite using a composite ball and LuxaBite™. Notice the severity of cervical decay.

givitis with localized recession complicated by decay/abrasion.

- Biomechanical—Generalized caries and four areas of pulpal pathology demonstrating percussion tenderness.

- Functional—Severe attrition with group function but a range of motion of 59 mm and no neuromuscular, TMJ discomfort; the intra-arch CEJ measurement was 13 mm.

- Dentofacial—Severe wear and reverse smile line as well as a lack of uniform color and tooth shapes. Although the lip line was low, there were uneven gingival margins. Tooth color was measured at A2/A3 with generalized white decalcifications.

At a “codiagnostic visit,” the patient was shown the extent of his problems. More importantly, the “causes” and how to get long-term results by dealing with

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Dr. Robert DiPillo, New York City, NY

DR. LARRY ROSENTHAL, D.D.S.

Dr. Rosenthal heads The Rosenthal Group for Aesthetic Dentistry in New York City where he maintains his Aesthetic and Restorative dental practice. Dr. Rosenthal believes that improving his patients smiles, through "conservative cosmetic dental techniques, has a positive impact on their overall appearance and self confidence. He has expounded his philosophies, experiences and expertise in aesthetic dentistry extensively lecturing and teaching throughout the country. He has written numerous articles in many of the leading dental journals as well.

Dr. Rosenthal is an Accredited member of the American Academy of Cosmetic Dentistry.

He is Director of the Aesthetic Continuum at The Advanced Aesthetic Program at New York University and The Palm Beach Community College and lectures and publishes internationally. He has and has been profiled on television, radio and in many leading publications such as Vogue, Town & Country, Forbes, The New York Times and the Wall street Journal. He is on the advisory board of numerous companies and is on the editorial board of Compendium's CERP. Dr. Rosenthal is also the Director of Aesthetic Advantage Inc., a company he formed and has dedicated to continuing education with hands-on courses to share his knowledge and expertise with other dental professionals.

As a pioneer in cosmetic dentistry, Dr. Rosenthal placed over 10,000 porcelain laminate veneers to date. He is in the business of transforming smiles and improving the quality of lifestyles for celebrities on stage and screen, as well as prominent business executives. Many of his patients travel internationally to personally experience Dr. Rosenthal's "Smile Lift", his unique concept developed in the early 1980's.

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Figure 4—The wax-up establishes a “blueprint” of communication and functional/esthetic success.



Figure 5—Vertical and CR positioning can be verified with the “mock-up.”



Figure 6—The patient gets to pre-view his new smile by creating a Luxatemp® “mock-up”; two colors were tried to help the patient make a decision.



Figure 7—“Transfer bites” using LuxaBite™ helps maintain occlusal relationships throughout the preparation visit.



Figure 8—Gingival irregularities and asymmetries are easily modified with electrosurgery.



Figure 9—Stick-bite registration and photographs allow the laboratory technician to maintain a horizontal incisal edge position.

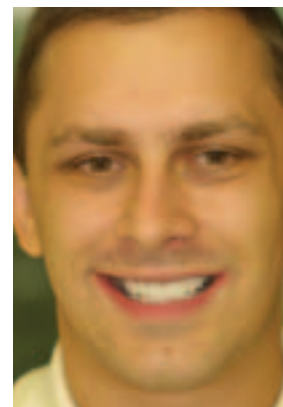


Figure 10—The temporaries add more youthfulness to the patient's appearance and create a prototype for the final design.

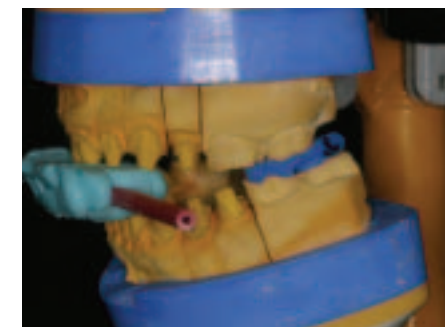


Figure 11—Note the accuracy of model to registration fit available with LuxaBite™—a prerequisite for full-mouth restoration in the laboratory.

them, not just the “curb appeal”/esthetic elements were emphasized. After showing him a similar patient's treatment, he agreed to a comprehensive solution as long as he was kept sedated during his definitive case visits. The plan was to treat the incisors and bicuspids with bonded Authentic® porcelain crowns/overlay veneers (Microstar® Corporation) and the molars with cemented Authentic® Press-to-Metal™ crowns because of the gingival depth of previous decay.

A maxillary guided orthotic (MAGO) was constructed to centric relation and a vertical dimension of 18 mm from upper incisal CEJ to lower incisal CEJ. To add precision to this process, an anterior composite bite was made at a centric relation open bite. The posterior bite was “tripoded” using LuxaBite™ (Zenith™/DMG) because of its superior handling properties and firm set (Figure 3). The ability to easily read and trim the registrations as well as accurately mount the model makes it ideal for creating throughout this patient's case. During MAGO construction, root canals and decay control were done to begin to strengthen tooth structure.

The purpose of the appliance is to create an ideal bite relationship without noxious interferences and allow the condyles to achieve an ideal position in the glenoid fossa relative to disc and muscles. The patient wore the appliance for approximately 24 hours per day for 1 week at the new vertical dimension of occlusion. When he returned with some slight discomfort, modifications were made that closed the vertical dimension from upper incisal CEJ to lower incisal CEJ to about 17 mm.

A critical part of the patient-focused philosophy is to allow the clients to “test drive” their new smile and its functionality.

After another 2 weeks, he reported no difficulty with all his occlusal marks remaining stable. Fortunately for this patient, his adaptive capacity was large, and did not require extended adjustment time that often can take up to 1 year.

When this author realized the patient's comfortable vertical position (approximately 17 mm CEJ to CEJ), it was time to create a “blueprint” of the patient's

vision for the final result. New impressions and a Stratos® 200 (Ivoclar Vivadent®, Inc) face-bow were taken. A new closed reduction (CR) bite was taken using the MAGO as a reference. A small window was cut out in the front of the biteguard to establish an anterior bite reference point. The orthotic was removed and while the patient closed into the anterior bite registration, a LuxaBite™ index was made in the molar area. The result was a very firm vertical bite measurement predictable for mounting at the lab-

the teeth to reverify esthetics as well as the new vertical using the molar bite registrations. With this pre-preparation visit, this author “fine tuned” the communication with the patient and laboratory. This saved chair time as well as “preframe” expectations for the patient as he went through treatment (Figures 5 and 6).

Because the goal was to lengthen this patient's teeth, the preparation phase became simplified. Little to no incisal or occlusal reduction was needed to accomplish our goals. On the other hand, maintaining a constant vertical/CR relationship to match our blueprinted plans was critical to the execution of our functionally esthetic philosophy. Furthermore, because of the esthetic demands, this author had to treat this patient more “macrodentally” to achieve the goals. In cases such as this, the incisors and bicuspids are prepared at the same time for their new restorations. Through the use of serial “transfer bites”¹¹ that began with pre-preparation indices based on the original bite registrations, the author was able to maintain the occlusal/TMJ relationships that he had devel-

oratory. The laboratory can make an accurate full-mouth wax-up to get all involved parties “on the same page.” The molar wax-up is removable to allow verification of the new vertical on the wax-up and later on in the mouth (Figure 4).

Before any alterations occurred in the mouth, the patient was brought in for a “mock-up visit.” At that visit, Luxatemp® (Zenith™/DMG) was placed over

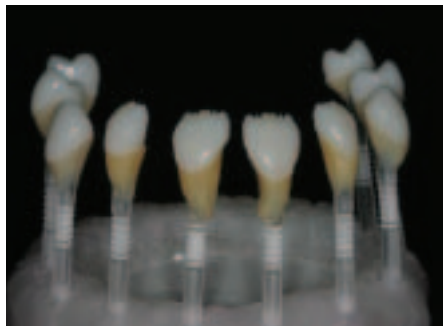


Figure 12—The “lost-wax technique” allows Authentic® restorations to have a very precise fit marginally and occlusally.

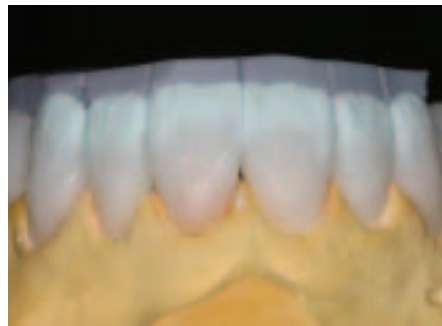


Figure 13—Layering the porcelain after “cutting back” enabled the technician to create natural incisal translucence.



Figure 14—Seeing the “big picture” helps maintain vital esthetic and functional requirements.

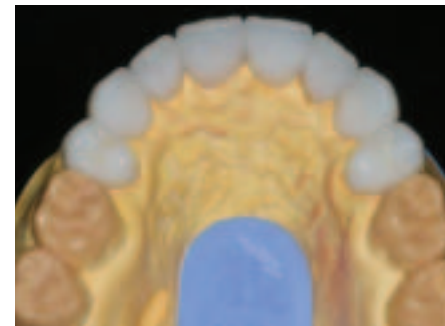


Figure 15—Waxing-in the molar occlusion “dials in” the posterior restoration phase.

oped before this visit (Figure 7). It also allowed fine tuning of some of the gingival asymmetries (and change those landmarks) without losing the orientation (Figure 8). This precision was further enhanced with new stick-bite and face-bow measurements (the former being done with the patient in a closed position using the vertical/CR bite registrations in place [Figure 9]). Digital photographs of the bites as well as the preparation colors gave the laboratory detailed knowledge “beyond the stone models.” By carefully taking each bite during this phase, this author created continuity of our original game plan.

Provisionalization with bleach shade Luxatemp® was simplified when the laboratory created an accurate wax-up that was indexed with Siltec putty. Esthetics and function needed minor attention when precise records were made and used. It also allowed this patient, who was sedated with alprazolam, to have no unpleasant surprises when he saw his new smile (Figure 10).

A critical part of the patient-focused philosophy is to allow the clients to “test drive” their new smile and its functionality. It allows them (and their significant others) to “critically evaluate their new appearance and their ability to chew, speak, swallow, and kiss.”¹² After the patient had a week to do this, this author fine-tuned the provisionals. By taking this extra time to do this, patient participation and satisfaction was greatly increased. Communicating these results with impressions and photos to the laboratory technician allowed him to know three-dimensionally all the details of the prototypes.

The laboratory phase of the functional-esthetic journey was critical. Using all the registrations, the models were carefully mounted to a Stratos® articulator (Figure 11).

Putty matrices of the “temporary model” allowed the technician to precisely recreate the contours developed with the patient. Porcelain restorations were created using a lost-wax technique and ingots of Authentic® porcelain (Figure 12). Characterization of colors with a cutback modality allowed the technician to create natural textures and translucency to give a masterful touch to the contours and occlusion already established (Figure 13). Correct axial inclinations, embrasure forms, tooth lengths, and proportions created the building blocks to facial harmony and beauty as


well as the engineering guidance for comfort and longevity (Figure 14). The molars were also waxed-in at this occluso-esthetic relationship to allow completion of the posterior region (Figure 15). The patient wore the anterior provisionals for 4 weeks, the time it took to complete this laboratory phase.

The restorations were tried-in individually and as a group to verify fit, color, and occlusion (Figure 16). The patient was able to give his approval of the esthetics (Figure 17). All restorations were placed while using rubber dam isolation to prevent contamination and improve the bond strength of the Syntac® system (Ivoclar Vivadent®, Inc). Restorations were luted and light-cured with translucent Variolink® II (Ivoclar Vivadent®, Inc) base cement employing the “two-by-

two technique.” After removing any excess, occlusion was fine tuned with a computer-generated report using the T-Scan™ System (Tekscan, Inc) while checking in CR. Although the molars had not been treated yet, the patient commented about how comfortable the bite felt.

The final phase of the rehabilitation was begun 2 weeks later and took an additional 4 weeks to complete. The occlusion was slightly touched up and reindexed before anesthesia. The molars were restored at this relationship using Authentic® porcelain-pressed-to-yellow gold because of the existence of many subgingival margins from the preexisting decay. All seven crowns were luted using Vitremer™ (3M ESPE) glass ionomer cement. The patient was also fitted for an nighttime upper orthotic to pro-

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Figure 16—The vertical positioning was verified when trying-in the restorations.

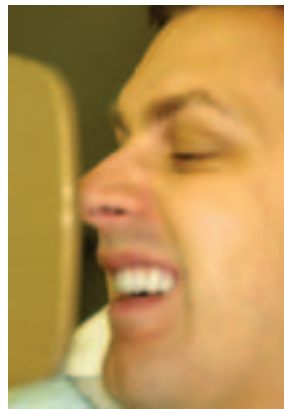


Figure 17—Final patient approval with different try-in gels creates better service and ensures agreement when the restorations are finally bonded.



Figure 18—The patient's smile looks brighter and healthier, and the musculature looks more relaxed.

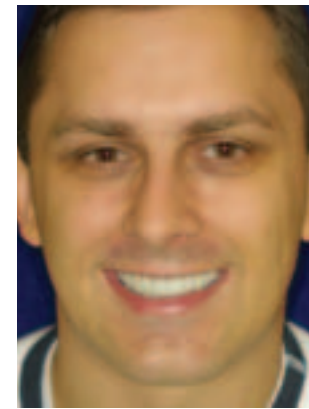


Figure 19—A congruent smile line not only adds confidence to an appearance, but when functionally harmonious, it increases the likelihood of comfort and longevity.

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Figure 20—Unhealthy occlusion often leads to gingival irregularity.



Figure 21—Postoperative view of the natural esthetic and biologic harmony created by the synergy of preplanning and action.

protect his new restorations from nocturnal bruxing. All were checked using the T-Scan™.

CONCLUSION

Using the techniques described above allowed the restorative team (including the laboratory technician/artist) to rejuvenate this patient's smile to an appearance that allowed his dental condition to better match his age (Figures 18 and 19). Using a series of linked steps, we were able to match the patient's esthetic demands and the bioesthetic principles established by Lee.¹ Biologically, it was gratifying to see the harmony improved gingivo-restoratively (Figures 20 and 21). By focusing on both esthetics and function, this patient should enjoy many years of health, comfort, and confident esthetics. There is no doubt that enhancing his future with this type of care was very rewarding. Controlled planning and care was definitely the key to our success. ○

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