Comprehensive Dentistry:
The Key to Predictable Smile Design

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The focus on aesthetics has bombarded today's patients with images and perceptions of what the ideal smile should look like. This has encouraged patients to inquire about options for improving the appearance of their teeth and smiles. It is the responsibility of clinicians through comprehensive diagnostic examination and evaluation to develop a treatment plan that fulfills not only the aesthetic but the functional requirements of a case as well.

The authors have heard several so-called practice management experts recommend that patients desiring cosmetic dentistry should be scheduled and started as quickly as possible. The supposed rationale is that, for many patients, cosmetic dentistry is impulse-driven, therefore, it is best to begin treatment of such patients before they change their minds. While such an approach may be good for our wallets, rarely is such an approach in the best interests of the patient.

What today's practitioner requires is a logical and systematic methodology in approaching cosmetic/restorative cases that will lead to a reasonably predictable final result. The place to start this approach should always be the comprehensive examination. A primary tenet of comprehensive dentistry is that all components of the masticatory system (ie, teeth, muscles, soft tissues, joints, bones) are intimately related and dependent on one another for ideal function.[1] This interrelationship is mediated by the central nervous system via the exquisite proprioceptive nerve network that permeates the entire gnathic system. An understanding and evaluation of all components of this system are an integral part of any comprehensive examination and are indispensable in consistently providing truly excellent dentistry. Presented is a cosmetic/restorative case that emphasizes a comprehensive and methodical approach to achieve a specific, predictable final outcome.

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FIGURE 1. Full-smile photograph demonstrating excessive anterior gingival display, dark teeth, and diastemata.

FIGURE 2. Preoperative retracted view demonstrating patient concerns.

FIGURE 3. Diagnostic waxup depicting the new incisal edge and gingival margin position. Note the decrease in the overbite (upper pencil line) as compared to the original position of the teeth (lower pencil line).

FIGURE 4. The surgical stent is an invaluable guide during crown lengthening procedures. It is used prior to flap elevation to score the tissue and after flap elevation as a guide in positioning the osseous crest of bone.

CASE PRESENTATION

A healthy 43-year-old female patient was referred for a consultation regarding improving the appearance of her teeth and smile. Prior to her first visit, the patient was mailed a registration, health history, and aesthetic evaluation form, which is reviewed by the dentist prior to the first appointment and provides valuable information during the initial consultation. It is during this initial consultation that a viable relationship is developed between the clinician and patient. Her aesthetic concerns included dark teeth, diastemas, and excessive gingival display (Figures 1 and 2).

At this initial appointment, the authors explain to the patient the concept of the comprehensive examination and how the information obtained from it can be used to develop a treatment plan. The authors also explain how the information will be used to formulate a concise report discussing patient concerns, clinical findings, one or more treatment options, advantages and disadvantages of each option, and the fee for each alternative. The patient will return to review the report together with models, photographs, often a diagnostic waxup, and sometimes PowerPoint presentations of similar cases. The patient is given a copy of the report, and a copy signed by the patient is entered into the permanent record. When cases are presented in this fashion, the authors' case acceptance rate is extremely high. Just as importantly, it provides a methodical and sequenced "game plan" with a specific endpoint in mind to allow full treatment visualization before the case begins.

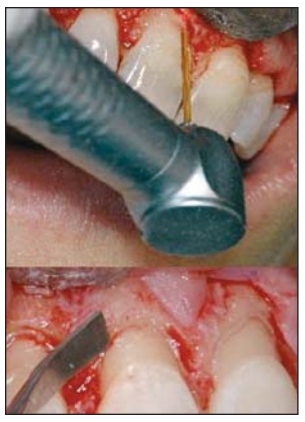

FIGURE 5. Following gingivectomy, marginal incisions utilizing a full-thickness flap were performed with the laser.

FIGURE 6. Two-week post surgery shows excellent healing.

A typical comprehensive examination requires about 60 to 90 minutes and includes a full set of radiographs, full maxillary and mandibular alginate impressions, diagnostic digital photographs, earbow transfer, and centric relation and/or maximum intercuspal position bite record. In addition to an intraoral examination, a temporomandibular joint and muscle screening examination is performed. Stable and comfortable joints are essential prior to definitive treatment. The alginates are poured in stone and the models mounted on a semiadjustable articulator.

The authors determined that correction of the excess gingival display was essential in achieving an aesthetic result. Options for correction of excess gingival display include orthodontics, periodontal crown lengthening, and orthognathic surgery. Orthodontics was a viable option as the clinical crown length of the anterior teeth was acceptable and the gummy smile was confined to the anterior segment (thus allowing the posterior teeth to be used for leverage to intrude the anterior teeth). This option was rejected by the patient in part due to her time constraints. The next best option was periodontal crown lengthening followed by prosthetic repositioning of the incisal edges. This would decrease the gingival display and excessive overbite and place the incisal edges in a more aesthetically pleasing position. This option was selected by the patient.

A diagnostic waxup of the case was fabricated based on a new gingival margin and incisal edge position (Figure 3). The diagnostic waxup should be viewed as the "best educated guess" as to what the case should look like in

FIGURE 7. Solid model of preparations demonstrating slice preparations which were utilized in some areas to help manage the spacing requirements of the case.

FIGURE 8. Right lateral view of preparations.

FIGURE 9. Incisal reduction guide showing adequate incisal reduction.

FIGURE 12. The finished case three weeks after placement.

FIGURE 10. Facial reduction guide shows additional tooth structure that requires removal from the facial aspect of tooth #10.

FIGURES 11. Finished restorations on soft tissue model. The soft tissue model is utilized to help optimize gingival embrasure form and avoid dark triangles.

its final form. The waxup was then used to fabricate incisal and facial reduction guides as well as a matrix for provisional restorations during the prosthetic phase of treatment. Also fabricated is a surgical template that was used by the periodontist during crown lengthening procedures.

SURGICAL CROWN LENGTHENING

On her first periodontal appointment, a comprehensive periodontal examination was performed. The results of the examination indicated no underlying periodontal issues, and crown-to-root ratios were deemed favorable for anterior aesthetic crown lengthening. Evaluation of the gingiva to tooth relationship was viewed at rest and within the frame of the smile. Excessive gingival display was noted, especially in the central and lateral incisor areas.

Local anesthetic was administered so "bone sounding" could be performed and the relationship of the osseous crest to the free gingival margin could be determined.[2] The authors view bone sounding as an adjunctive diagnostic tool and never as a substitute for flap access and direct visualization of the underlying osseous structures. Following examination and consultation, the patient was scheduled for crown lengthening of teeth #5 through #12 via an osseous surgical procedure.

The patient was prepared and anesthetized. A surgical template was provided, indicating the desired free gingival margin position and the new incisal edge position (Figure 4). The template was placed in position, and a laser (ie, Waterlase, Biolase, San Clemente, CA) was used

FIGURE 13. Retracted view of finished restorations.

FIGURE 14. Full smile of finished case.

to score the gingival margin heights. Laser gingivectomy was done up to the score lines. Following gingivectomy, marginal incisions utilizing a full-thickness flap were performed from tooth #5 through #12 with the laser (Figure 5). The papilla was split at the midproximal, and care was taken not to elevate the flap beyond the mucogingival junction at the facial aspect. This reduced postoperative discomfort and allowed more predictable placement of the tissues upon suturing. Osseous resection was accomplished with the laser at a setting of 3.5 watts with a 50% water/40% air mixture. Final osseous contouring was done to refine the osseous crest anatomy.

Whenever possible, it is the authors' preference to leave considerable thickness in the form of a shoulder at the osseous crest. This thickness maintains adequate blood supply to the bone crest and will minimize the risk of recession postsurgically. The new osseous crest position was placed 3 mm apical to the desired free gingival margin. This helped ensure the reformation of a stable and healthy biologic width upon healing.[3,4] Finally, gingivoplasty was performed to blend and refine the contour of the gingival tissues. The flap was closed utilizing 5-0 sutures. The flap was sutured coronal to the revised osseous crest to maximize tissue preservation and allow for the change in the level of the gingival margins once healing from the osseous procedure was completed.[5]

After only two weeks, excellent healing was observed and the sutures were removed (Figure 6). The authors recommend a minimum of 8 weeks of healing prior to final tooth preparation and impressions. Healing in this case was excellent, and the patient returned for the reconstructive/aesthetic phase of treatment.

RESTORATIVE/AESTHETIC RECONSTRUCTION

After the tissues had stabilized, teeth #5 through #12 were prepared for porcelain veneers with standard veneer preparations with one modification. Due to diastemata and spacing issues, slice preparations were used at the interproximal regions of several teeth (Figures 7 and 8). This type of preparation design provides greater leeway to the ceramist in terms of space management. Facial and incisal reduction guides fabricated from the diagnostic waxup were used as a guide during preparation (Figures 9 and 10).

Although the concept of "no-preparation" veneers has been widely marketed, the authors' experience is that the majority of veneer cases require definitive tooth preparation if the goal is to achieve an optimal aesthetic and physiologic result. This said, care should be taken during preparation to leave as much enamel to bond to as possible. Long-term bonding to phosphoric acid-etched enamel surfaces has proven to be reliable and predictable; long-term bonding to dentin and/or cementum is not as predictable.[6-9] If significant amounts of dentin are exposed during preparation, then full coverage may be a more predictable long-term restorative option.

Final impressions were taken with a polyether material. Provisional restorations were fabricated utilizing a template fabricated from the diagnostic waxup. The patient was brought back after two or three days to assess aesthetics, comfort, and function. Once the provisionals were deemed satisfactory, photographs and an alginate impression were taken. The photographs and solid model of the provisional restorations were forwarded to the laboratory so the ceramist could duplicate this as closely as possible in the definitive restorations.

Eight pressed veneers (ie, Authentic, Jensen Industries, North Haven, CT) were fabricated by the ceramist. A soft tissue model was utilized to help optimize gingival embrasure form and avoid dark triangles (Figure 11). The restorations were tried in to confirm fit and aesthetics. Once the restorations were approved, the teeth were anesthetized and isolated. The authors prefer sequential placement, first bonding in the central and lateral incisors, followed by the canine and premolar(s) on one side and then the other. With this method, attention can be focused on fewer teeth at a time, thus helping to ensure a precise bonding protocol. The authors also prefer to use total-etch systems when bonding in veneers. In this case, the total etch system (ie, One-Step Plus, Bisco, Schaumburg, IL) was used in conjunction with a wet bonding protocol.[10,11] The veneers were sandblasted, etched with hydrofluoric acid, and treated with hydrolyzed silane prior to placement. For this case, shade B 0.5 resin (ie, Rely X Veneer Cement, 3M Espe, St. Paul, MN) was chosen. After the central and lateral veneers were bonded into place, excess resin was carefully removed, and the canine and premolar veneers on the right side were retried in to reconfirm proper seat and orientation. These were subsequently etched, silanated, and bonded into place. This process was repeated for the left canine and premolar. After all restorations were bonded, final finishing and polishing were performed under high magnification. The occlusion was checked in centric closure and excursive movements, and the patient was given written and oral instructions on proper home care and maintenance. The mandibular teeth had also been whitened prior to tooth preparation. The patient returned one week after the veneers were placed for final adjustments, photographs, and the insertion of a flat plane, acrylic maxillary night guard. The patient was delighted with the final result (Figures 12 through 14).

CONCLUSION

Dental excellence is not about calling your office a "dental spa" or having juice bars in your reception room as some "practice management" experts recommend. It is not about having a dental concierge or offering your patients cappuccino and 15 different types of herbal tea. It is not even about giving foot massages to your patients while having their dental work. Dental excellence is really about *knowing* what to do, being *proficient* at actually doing it, taking *pride* in what you do, *sincerely* caring about your patients' well-being, doing the best you can for them, having *empathy* for your patient, and *conveying* all of the above to your patient. The key to successful and predictable dentistry begins with the comprehensive exam, thoughtful planning, and the commitment to excellence.

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