

Clinical Realities

MAXIMIZING AESTHETICS AND HEALTH USING A CLOSED-FLAP ER: YSGG LASER TECHNIQUE

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The creation of ideal cosmetic, biological, and functional results in the aesthetic zone has always been challenging, particularly when biologic width violations have occurred iatrogenically. While plaque accumulation is problematic, the supracrestal fibers also become interrupted, causing the tissues to become further inflamed and aesthetically unmanageable. It is critical that the anterior gingival margin mimics the osseous scallop while maintaining the dentogingival complex (DGC). Further complicating these situations is the degree of inflammation in the soft tissue affecting the clinical development of health and aesthetic symmetry.

Often, the patient will also become frustrated by the poor aesthetic results achieved previously. Even more challenging is the extended healing time created by reflective mucoperiosteal surgery, affecting the chronology of final restorative care in addition to delaying the patient's ultimate satisfaction for a minimum of 2 to 3 months. Dental lasers have evolved considerably as an adjunct and alternative treatment to safely, conservatively, and reliably decrease bacterial levels and improve the hard and soft tissue contours. In selected cases, long-term aesthetic and functional parameters are satisfied with precise restorative

planning and technique and by utilizing minimally invasive procedures. Furthermore, patients are provided with optimal results more comfortably and efficiently.

Patient Presentation

A 36-year-old female patient presented with a disappointing second attempt at enhancing her smile. Excessive gingival display and asymmetries were evident in the anterior region, and the tissue biology was inflamed by four poorly contoured porcelain-fused-to-metal (PFM) crowns with open margins that were impinging on the periodontal fibers. Functionally, the maxillary and mandibular canines were severely worn and had been left untreated. In addition, the smile line did not follow the curvature of the mandibular lip. Several diastemata were originally present prior to initial treatment. The creation of ideal tooth shapes for her smile would involve cosmetic augmentation of the adjacent teeth as well as surgical intervention of the inflamed asymmetrical gum tissues. The patient desired a minimally invasive periodontal treatment. This article presents a conservative laser approach to resolve the patient's compromised gingival framework for functional and aesthetic results.



Figure 1A. Preoperative retracted facial view demonstrated unhealthy periodontium as well as cosmetic liabilities.

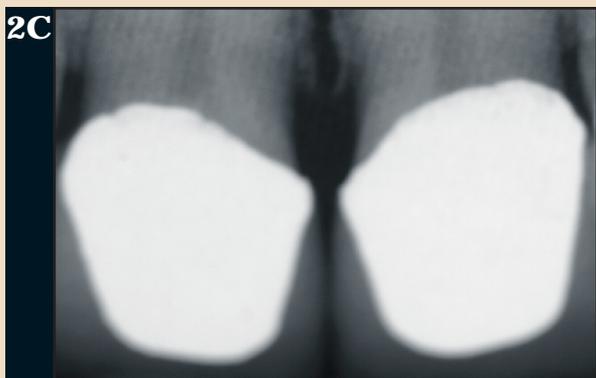


Figure 1B. Postoperative facial view following laser rehabilitation of the surrounding tissue and bioesthetic restorative care

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Figures 2A,B,C. Aesthetic evaluation revealed optimal lip symmetry and a deficient posterior buccal corridor architecture that prevented a wide smile and emphasized the anterior complications. Furthermore, the width-to-length ratio of tooth #9(21) was approximately 0.90, which indicated that the patient's golden proportion required restoration. Functionally, the wear on the canines required enhancement to preserve the longevity of the smile lift. Radiographically, the crowns demonstrated inadequate marginal seal and cleansability. In spite of the gingival irritation, a normal osseous scallop was evident and the tissue was thick enough to allow for a 3 mm DGC.

Figures 3A,B,C. The preexisting crowns were carefully removed and a pulpal hyperemia that required endodontic therapy and buildup was observed on tooth #7(12). Well-contoured and sealed provisional restorations (Luxatemp Plus, Zenith DMG, Englewood, NJ) were used to facilitate tissue healing, as well as improved lingual contours and incisal edge positions. Prior to cementation, sulcular decontamination was performed using a Er:YSGG laser (Waterlase, Biolase Technology, San Clemente, CA) at 0.75 W, 15% water, and 11% air. An up-and-down motion — angled directly toward the tissue — was utilized for 15 to 20 seconds per surface. The tissues were also irrigated with 0.12% chlorhexidine gluconate (Oris, Dentsply Professional, York, PA). The preexisting cement was thoroughly removed and the teeth were reirrigated. A final set of diagnostic impressions and bite measurements were taken.

Figures 4A,B,C. The tissue required approximately 1 mm to 4 mm of elevation, primarily on teeth #6(13) through #9(21). The incisal edge position required adjustment on the canines and incisors to protect the posterior teeth. The blueprint for this data was generated via a three-dimensional waxup on a semi-adjustable articulator (Stratos 500, Ivoclar Vivadent, Amherst, NY) by the laboratory technician. The technician collaborated with the patient and clinician to realistically preview the final result.

Figures 5A,B,C. Canine guided occlusion is fundamental to creating a long-term functional and aesthetic result. Because of this patient's worn canines, laser treatment was optimal, particularly following the delivery of anesthesia on the maxillary arch. The laser was used at 1.5 W/30%, air/30%, water setting. With proper angulation and focus, a 360° chamfer was created. The teeth were treated (All-Bond 2, Bisco, Schaumburg, IL) and the matrix was placed during application of the composite materials (Herculite XRV, Kerr, Orange, CA; Renamel Microfill, Cosmedent, Chicago, IL). The rebuilt canine tip was then polished.

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Figures 6A,B,C. The inflammation of the gingival tissues had significantly dissipated 1 month following laser treatment. The free gingival margin was scalloped using the laser, and the tissues were treated to expedite healing of the ablated cells and collagen. Crown preparations were refined on teeth #7 through #10(22) to follow the desired gingival scallop. Teeth #4 through #6 and #11 through #13 were prepared for porcelain veneers. The incisal edges of teeth #22 and #27 were augmented using the laser to ensure a minimally invasive approach. A defocused distance of 2 mm was utilized at 3.5 watts, 50% water, and 50% air. Final impressions were then taken.

Figures 7A,B,C. Provisional restorations were generated from a silicone putty matrix of the diagnostic waxup. The prototype restorations were cemented, and the margins were cleansed and irrigated. Great precision was required to create an osseous scallop as well as maintain a 3-mm DGC. A specially-tapered T4 tip (Biolase, San Clemente, CA) was used to place an intra-sulcular closed flap recontouring of the osseous crest. The tip was measured and marked to 3 mm in order to maintain controlled adjustments and facilitate placement of a machine stitch. The resection was smoothed with a 7/8 curette and the patient was placed on a home care regimen.

Figures 8A,B,C. All models, including working and approved provisional models, were assembled on the articulator. Putty matrices of the provisionals allowed the technician to accurately duplicate contours necessary for a healthy periodontium in addition to functional phonetic and occlusal comfort. Furthermore, detailed digital photography provided insight into the patient's natural color scheme. Pressable ceramic crowns and veneers (Authentic, Microstar Corporation, Lawrenceville, GA) were used to create natural warmth and aesthetics. The emergence profiles of the restorations were modified using a solid model of the preparations prior to final impression procedures. Utilizing the vast array of materials, the laboratory was able to meet and exceed the patient's expectations.

Figures 9A,B,C. After carefully removing the provisionals and cement from the teeth, each restoration was tried in to verify fit. The restorations were then trial-placed together with translucent gel to match the color. Upon patient approval, the porcelain was bonded using the two-by-two technique following tissue isolation. Following thorough removal of the excessive bonding material, the occlusion was adjusted (T-scan, TekScan, South Boston, MA). A protective nighttime appliance was fabricated for the maxillary dentition to add longevity to the rehabilitation. The patient, clinician, and laboratory technician were satisfied with the definitive results following conservative rehabilitation using laser and restorative technologies.

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