



GUMMY SMILE CORRECTION WITH DIODE LASER: A CASE REPORT

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ABSTRACT

In the modern day practice of dentistry, it is no longer acceptable to revive single teeth. Patients anticipate a final appearance which is not only physiologically and mechanically sound but also aesthetically pleasing. A gummy smile poses a restorative challenge for dentists attempting to achieve ideal aesthetics. Also, excessive gingival display space is a major concern for a large number of patients visiting the dentist. Cosmetically acceptable smiles show a gingival display of up to 3 mm. Gingival display of greater than 3 mm results in a gummy smile which is often unsightly for the individual and correction is sought. However with the advances in cosmetic dentistry; bleaching, bonding, veneering and laminates have opened doors to a wide variety of elective dental treatments to enhance aesthetic appearance, often reversing the visual signs of aging. A case is reported here on the cosmetic correction of gummy smile wherein periodontal plastic surgery for esthetic crown lengthening was performed in a single appointment using a diode laser and the teeth were restored with laminates for aesthetic enhancement.

KEYWORD: Bleaching, bonding, veneering and laminates.

INTRODUCTION

Esthetic dentistry is emerging as one of the most popular fields of dentistry. However, during esthetic correction, understanding of the gingival tissues is an important aspect of any restorative treatment plan. Ideally, an esthetic smile line should reveal minimum amount of gingival tissue. "Gummy smile," i.e., excessive display of gingival tissue while smiling might be due to a number of reasons such as gingival enlargement, incomplete passive eruption, short lips, hyperactive muscle of lips, and maxillary protrusion.^[1] Before correction of gummy smile, accurate diagnosis for the cause of gummy smile should be established.^[2] If gummy smile is due to gingival excess, gingivectomy can be planned. Crown lengthening is a procedure designed to increase the amount of surgingingival tooth structure for restorative or esthetic purposes.^[3] Surgical blade, electrosurgery, and lasers are often used for carrying out crownlengthening.

During smile designing, esthetics and function should go hand in hand to provide long-term functioning restorations and high patient satisfaction. Poorly

executed esthetic and restorative procedures can compromise the immediate or long-term health of the soft and hard tissues. It is important to use minimally invasive treatment protocols so as to minimize loss of healthy tooth structure.^[4,5] Available treatment options and techniques should be critically evaluated to achieve the desired clinical outcome while maintaining but certainly not compromising our patient's health.^[6] One such option is soft-tissue diode laser treatment for gingival tissue management.^[7,8]

Digital smile designing is the latest development in the field of smile designing. It employs digital editing software (Photoshop Adobe Systems Inc., San Jose, CA, USA) along with digital photography to provide digital simulations. Digital smile design (DSD) is extremely user-friendly as it simplifies and demonstrates various steps involved in treatment planning. It also confirms patient expectations thus resulting in greater treatment acceptance. These simulations can provide various treatment possibilities and projected outcomes to patients seeking esthetic correction. It is also possible to compare a patient's existing smile to previous similarly treated

cases. It can demonstrate the improvements achieved earlier and thus motivate the patient for esthetic correction. However, patients should be informed that identical results might not be obtained in the clinical scenario but do provide a preview of Possible treatment outcomes.^[9,10]

This case report presents a minimally invasive surgical technique for correction of excessive gingival display. It describes the application of novel concept of digital smile designing along with crown lengthening using diode lasers of 810 nm to improve and enhance a compromised smile.

CASE REPORT

Diagnosis and treatment planning

A 20-year-old female presented with a chief complaint of gummy smile [Figure 1]. Although she had undergone previous orthodontic treatment, she was still dissatisfied with her smile. On clinical examination, periodontal status was normal. Her medical history revealed that she was in good health with no significant findings.



Accurate diagnosis is of paramount importance to the success of any esthetic case. On thorough dentogingival examination, a diagnosis of delayed passive eruption was made. Cementoenamel junction was not visible clinically. Therefore, the patient's main problem was periodontal rather than being a tooth problem.

Clinical Protocol

Comprehensive smile assessment was done which revealed 5 mm of gingival exposure when smiling. Thorough esthetic evaluation was done to determine the cause of gummy smile. Facial analysis showed no midline discrepancy. The patient's lip length was found to be average, and incisal edges of the anterior teeth showed no signs of wear. Hence, it was concluded that the patient's gummy smile was dentogingival rather than skeletal. Thus, the problem could be addressed periodontally. Once the etiology was identified, DSD software was used to assess the outcome.

Gingival level, tooth form, and contour were evaluated for each tooth using keynote version 2.6.2 (Apple, Cupertino, CA). Next, the golden proportion was applied

for the central incisors (the central incisor height is approximately 62% of the two central incisors' width), and the midline was confirmed by measuring the distance between the maxillary canines. Within the software, there is an option to adapt the proportions so that the desired proportion may be reached. Once the central incisor width was determined, the golden proportion was applied again to determine the lateral incisor width (62% of the central incisor width) and canine width (62% of the lateral incisor width). From the initial smile analysis, it was found that there was almost negligible horizontal discrepancy between the teeth. Only a vertical disparity was present. Measures and proportion thus obtained were transferred to the stone cast allowing an appropriate wax-up. The gingival portion of the wax-up was duplicated in clear acrylic resin, and the mock-up was inserted in the patient's mouth which served as a stent for gingivectomy. With the patient's esthetic approval, gingivectomy was performed guided by the gingival contour of the clear acrylic stent.

Clinical procedure

Local anesthetic (2% lignocaine with 1:100,000) was administered before examination. To determine the location of the osseous crest and cemento-enamel junction, a periodontal probing was done. A periodontal probe (Hu-Friedy) with 3 mm marking was used for assessing depth of the gingival sulcus in all the anterior teeth to be treated. It was determined that the bone and cemento-enamel junction were in the proper biological positions. Bone sounding revealed a probing depth of 3 mm which further confirmed the diagnosis of passive eruption. Therefore, crown lengthening procedure using soft-tissue diode laser was carried out.

Before commencing with crown lengthening, gingival tissue was marked using the digital Boley gauge (Erskine Dental) according to the determined length of the central incisor.

All proper laser hygiene protocols were followed as per the manufacturer. The premeasured and carefully planned tissue removal was carried out with the diode laser starting first on tooth number 11. Under infiltration anesthesia with 2% lignocaine with 1:100,000 adrenaline, a 940 nm diode laser (Epic 10 diode laser, Biolase) was used in comfort pulsed mode at 1 W power settings for gingivectomy. It was followed by gingivoplasty for achieving the desired contour of gingiva. The patient experienced no discomfort during the procedure. No periodontal pack or dressing was applied postsurgery. The patient was instructed to apply Vitamin E gel over the surgical site thrice daily for 2 days. Antibiotic (capsule amoxicillin 250 mg thrice daily) and an analgesic (ibuprofen 400 mg safety of nonsteroidal anti-inflammatory drugs) were prescribed for 3 days to prevent infection of the surgical site exposed to oral cavity. Bone sounding was again done using periodontal probe to check if proper biological

width has been established or not. Once treatment of tooth number 11 was completed, tooth number 21, 12, 22, 13, and 23 were treated sequentially in the same manner. Once completed, final measurements were recorded [Figure 2] shows the immediate postoperative results obtained.



On follow-up examination at 6 weeks, healing of gingival tissues was complete. The patient was happy and satisfied with the final results. The patient stated that she experienced no pain postoperatively and that healing was complete in about 3 days. The final healed length of tooth number 11 and 12 was 10.2 and 8.6 mm, respectively, which are in accordance with the golden proportion commonly used in esthetic dentistry. On 6 month follow-up, the patient's gingival health was good. The patient reported no adverse effects or discomfort during the postoperative healing phase.

DISCUSSION

Smile is an important determinant of the personality of an individual. A person with attractive smile is often considered more successful and intelligent. Gummy smile is often emotionally challenging esthetic concern for the patient. It is more commonly seen in females and has a incidence of 10% among the individuals of 20–30 years of age.^[11] The most challenging part in the management of gummy smile is formulating an accurate diagnosis. Once correct diagnosis is established, formulating a predictable treatment plan becomes easier.

In the era of digitization, digital smile designing has emerged as a very powerful tool in field of smile designing. It allows the clinician and patient to visualize the final results. However, to utilize DSD to its maximum potential, it is essential to follow a photographic protocol. Correct positioning of the patient while photography can provide crucial information to the esthetic planning.^[12] Whereas an incorrect photography may lead to a distorted picture, which in turn may result in incorrect interpretation. The information gathered from the photographs is fed into the software which develops an esthetic treatment scheme. Once esthetic evaluations are done, provisional restorations or wax mock-up will provide the patient and the clinician with the preview of result.^[13]

For esthetic rehabilitation, different proportions between the teeth (62%–82%) can be used as a guide. However, before following any proportion, it is important to bear in mind the format of the arch and also the alignment of the teeth. Golden proportion does not affect the actual width of the teeth but does indeed affect the width they seem to have when viewed from the frontal plane.^[14] In the present case, the patient showed good alignment according to a clear arch. In this way, the golden proportion proved to be more appropriate for esthetic correction of this case. This fact was further confirmed by the position of the canines which were fully within the virtual plan made according to the golden proportion.

After all these evaluations, surgical procedures are often necessary to achieve a correct tooth form. In the present case, only gingivectomy was planned due to the small amount of gum resection. Furthermore, osseous crest position and biologic width were favorable. The patient presented a probing depth of around 3 mm in the anterior region. The crest should be around 2.6 mm from the margin of the restoration to ensure a correct biological width. Ideal biological width ranges from 2.15 to 2.30.^[15,16] In this case, osseous contouring was not done as the amount of gingival recontouring would not invade the biological width. However, if the recontouring seems to invade the biological width, flap surgery must be planned.

A diode laser has become an indispensable tool in the management of soft tissues due to its exceptional ease of use. The diode laser is well absorbed by hemoglobin, melanin, and other chromophores that are present in periodontal tissue.^[17] Hence, it is quite advantageous when it comes to periodontal surgery. It coagulates, ablates, and vaporizes the gingival tissue with minimum trauma. It cuts with extreme precision thus resulting in improved postoperative healing and faster recovery time.^[18]

Conventional procedures for gingivectomy involve the use of scalpel, electrosurgery, or a coarse diamond bur. However, laser is more predictable and less invasive method for this procedure.^[18] It requires minimal or no anesthesia and causes very low collateral tissue damage.^[19] No deleterious effect on the root surface has been reported by the use of diode laser. Thus, soft-tissue laser surgery can be performed safely without causing any damage to hard tissue.

This article demonstrates that the patients with excessive gingival display can be safely and effectively managed with minimal or no discomfort in the dental operatory with soft-tissue diode laser and digital smile designing through proper training.

CONCLUSION

Long-term esthetic results can be achieved in patients presenting with gummy smile through proper diagnosis and treatment planning. DSD not only analyzes the

patient's facial and dental features but also helps in visualizing the desired outcome. As the final result can be seen on the computer, it can be used by the clinician in demonstrating the proposed result.

Collaboration of digital smile designing with lasers marks the beginning of new era in esthetic dentistry.

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