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Gummy Smile Esthetic Correction with 940 nm Diode Laser

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ABSTRACT

Background: Esthetic dentistry is emerging as one of the most popular fields of dentistry. Gummy smile is the general idiom for excessive gingival display (EGD) which denotes maxillary gingival overexposure during smiling.

The aim: This clinical study aimed to implement and assess the clinical availing of diode laser 940nm in gummy smile esthetic correction.

Methods: A total of 28 patients were studied, including 5 (= 18%) males and 23 (= 82%) females aged between 21 and 38 years, who attended Razi Private Hospital, Rashid Private Hospital, and Private Dental Clinic in the Anbar province, Iraq. Painless surgical operation was conducted where only 2 (7.14%) patients experienced mild pain during the first three postoperative days and bloodless intraoperative field, which gives us a clear surgical field.

Results: There was great overall satisfaction with regard to the patient's smile after the treatment, regardless of the technique and follow-up period. A gummy smile has a major influence on one's self-respect, relationships, and personal attractiveness. The esthetic correction of gummy smile improve facial beauty, admiration for oneself, and the patient's confidence in general.

Conclusion: There was great overall satisfaction regarding the patient's smile after the treatment, respect to the surgical technique during follow-up period

KEY WORDS

diode laser, gummy smile; gingival display, esthetic, esthetic dentistry

INTRODUCTION

Facial beauty is largely predicated on an esthetic smile. A concordant and symmetrical teeth size in correlation with a visible gingiva and lip contours and position constitute the principles of an esthetic perception of one's face^{1,2)}. The normal display of gingiva is about 1-2 mm, which lies between the gingival margin of the central incisors to the inferior edge of the upper lip during a normal smile. On the other hand, excessive gingival display is marked as unattractive and occurs when it is 3-4 mm or more³⁾. Miaman introduced lasers in dental practice for the first time in 1960⁴⁾. Since then, we have come a long way in enhancing the efficacy of the traditional treatment methods⁵⁾. Besides lasers, ultrasound waves are not only used as diagnostic waves but are also being used recently in tissue engineering strategy, by enhancing tissue regeneration around dental implant fixtures with low intensity pulsed ultrasound therapy (LIPUS)⁶⁾. The coming of laser therapy, as a method without any distress to the patient and minimally invasive procedures, made a huge impact on the delivery of dental care. Such an idea and practice will remain because laser technology promises to develop and evolve unceasingly.

The American Academy of Periodontology (AAP) has recognized gummy smile as a deformity and a condition of the mucogingival junction that rebounds the area surrounding the teeth. However, the perception of excessive display of the gingiva is subjected to ethnic and cultur-

al preferences. In European countries, display of the gingiva up to 4 mm or more is acceptable, while in the USA greater than 2-3 mm is considered unsightly^{2,7)}.

The main etiological factors involved in excessive gingival display (EGD) or gummy smile are gingival, skeletal, and muscle characteristics and the condition's prevalence is about 10% among the population group whose age ranges from 20 to 30 years. It is more common in women and with age, gummy smile or excessive gingival display decreases, owing to muscle tone loss of both upper and lower lips^{8,9)}. Plenty of treatment options for excessive gingival display are followed, including crown lengthening procedures, botulinum toxin injections, intrusion and lip repositioning surgeries, and orthognathic surgeries^{10,11)}. This clinical study aims to implement and evaluate the clinical availing of diode laser 940nm in gummy smile esthetic correction.

MATERIALS AND METHODS

This clinical trial was achieved at Razi Private Hospital, Rashid Private Hospital, and Private Dental Clinic, in the province of Anbar, Iraq. Twenty-eight patients including 5 (= 18%) males and 23 (= 82%) females aged from 21 to 38 years old were studied. Demographical and clinical statements regarding the patient's name, age, gender, case presentation, family history, past dental history, as well as medical history,

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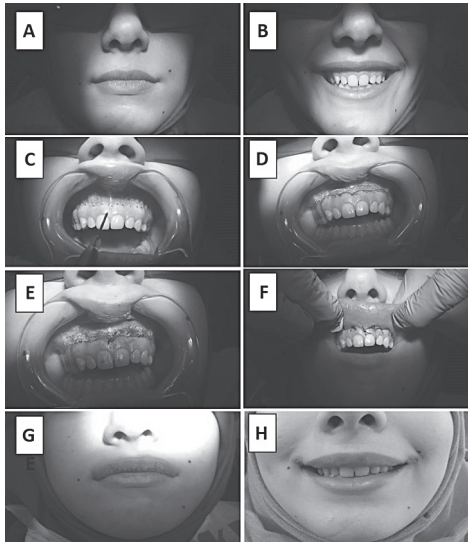


Figure 1. A & B- Preoperative anterior view of the patient (closed mouth & smiling), C- Small dotted label was indicated every 2-4 mm, D & E- Removal of the excised gingival tissues, F- Suturing with 3/0 black silk suture, G & H- Postoperative anterior View of the patient (closed mouth & Smiling).

were obtained and chronicled. The laser procedure details were thoroughly elucidated to the patients. All patients signed an informed consent form. They were assessed by clinical checkup and digital photos of documentations. They were also requested to complete questionnaire sheets during follow-up visits.

Diode laser 940 nm (Epic™, Biolase, USA) applies 3W Power, CP1 Mode, 100 milliseconds pulse duration with fiber optic delivery system. BIOLASE epic X 940 nm is considered as a class IV laser; therefore, skin and eyes should be safeguarded with safety goggles. All patients had undergone the same surgical technique carried out under local anesthesia (Septodont, 2.2 ml cartridge containing 2% lidocaine with epinephrine 1:80,000, France). Preoperative intraoral antiseptics was performed with Listerine mouth wash (Johnson & Johnson Limited, UK) for 30 seconds. Bilateral infraorbital blocks and incisive canal anesthetic blocks were used. With a high power diode laser 3W on continuous-wave (CW) mode, the proposed surgical incision lines were marked with dots indicated every 2-4 mm along the proposed lines from the midline extended posteriorly to the molar area. The inferior border line was demarcated from the mesial aspect of the first molars bilaterally, while the superior border line was demarcated a bit (1 mm) below the labial frenum crossing the canine zone and tapered posteriorly, forming a moustache-like shape. Much care was taken to prevent the deterioration of minor salivary glands in the area with the removal of the excised gingival tissues. The operative site was irrigated with normal saline and then sutured by 3/0 black silk suture from the midline, intermitted posteriorly and bilaterally.

Post-operative instructions were clarified for all patients, which included applying ice packs, soft diet ingestion, meticulous oral hygiene with gentle brushing and mouth wash rinsing, limitations of lip movements while smiling or talking for the first 2 weeks postoperatively. They were asked to complete the questionnaire sheet during the follow-up appointments at 3 days, 1, 2, 4, and 6 weeks to evaluate edema, pain, bleeding, functions, esthetic correction as well as overall satisfaction (Figure 1).

RESULTS

The study consisted of a total of 28 patients consisting of 5 (= 18%) males and 23 (= 82%) females aged from 21 to 38 years old who attended Razi Private Hospital, Rashid Private Hospital, and Private Dental Clinic. All the patients underwent laser surgical procedure under local anesthesia; thus, no patient revealed pain throughout the surgical operation and only 2 (7.14%) patients had mild pain throughout the first three

days postoperatively. In all patients, the operative field was bloodless and that offers a clear surgical field. The surgical wound was sutured by a 3/0 black silk suture that was removed after 21 days postoperatively to ensure adequate healing and proper lip positioning without any complications and collateral infections. 3 (10.71%) participants were signed in for an edema during the first three days postoperatively, that in turn subsided gradually in all cases. The postoperative functional capabilities returned to normal within the end of the first week. 26 of them (92.85%) revealed improvement in their esthetic concerns during the second week. At the end of the third week, all patients were comfortable with marked excellent overall satisfaction during the entire postoperative period.

DISCUSSION

Photothermal laser-tissue interaction is considered as a fundamental concept of diode laser, when the emitted light is absorbed by the tissue, thereby changing its structure by transforming and converting it to thermal energy and causing laser-tissue interaction that could produce output backlashes ranging from cleaving, vaporization and coagulation when applied properly^{12,13}. Diode lasers emit laser light in the near infrared spectrum of the electromagnetic radiation (810nm-980nm). This diode laser wavelength has an affinity for dark melanin pigments and has strong blood hemoglobin absorption¹¹⁻¹³.

Laser application served as an adjunctive or alternative treatment option after considering conventional therapy, as a result of its variable peculiarities, including hemostasis, sterilization and ablation or vaporization^{11,14}.

A smile is an indispensable factor of an individual's personality. A person with a winsome smile is considered intelligent and more successful while in contrast, a gummy smile is a passionately challenging esthetic concern for many patients. The most contested part in the management of a gummy smile is the formulation of an accurate diagnosis. Once that is established, the treatment plan prediction becomes easier^{12,13,15}.

Patients with excessive gingival display or gummy smile can avail of various alternative treatments, for example, reverse vestibuloplasty (lip repositioning), botulinum toxin injections and orthognathic surgical procedures. In this study, reverse vestibuloplasty was used to treat excessive gingival display or gummy smile patients, which was considered relatively minimally invasive, stable, precise, convenient for the patient's acceptance, with a short and plain surgical procedure (lasts only 30 minutes), cost-effective, not requiring hospitalization, having no deleterious effect or damage on the root surface, and performed easily under local anesthesia in out-patient departments⁶⁻⁸.

Although excessive gingival display or gummy smile is a common medical condition, few clinical reports are published on the topic. Indeed, there is a higher prevalence of women in all the study samples by virtue of the fact that it is most commonly seen in the female gender. With respect to the desire for an attractive smile, women have sought surgical treatment greatly because of an esthetic need in last decade¹⁹⁻²².

CONCLUSION

There was remarkable overall satisfaction regarding the patient's smile after the treatment, related to the surgical technique and the follow-up period. A gummy smile has a major influence on one's self-respect, relationships, and personal attractiveness. The esthetic correction of gummy smile often improves facial beauty, admiration for one's appearance, and the patient's confidence.

ETHICAL STATEMENT

All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or other comparable ethical standards.

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