



Role of Soft Tissue Diode Laser in Cheiloplasty to Enhance Smile-Makeover: A Case Report

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Abstract

Lasers were introduced into the field of clinical dentistry with the hope of overcoming some of the drawbacks posed by the conventional surgical procedures. Since its first experiment for dental application in the 1960s, the use of laser has increased rapidly in the last couple of decades. Based on recent advancements and the propagation of minimum interventional principles, lasers may revolutionize various surgical and non-surgical aspects of dentistry. Dental lasers are used for multiple dental procedures including soft-tissue procedures. Soft-tissue lasers are available at varying wavelengths and powers and can be used for procedures that would otherwise be performed using a scalpel, or, possibly an electrosurgical unit. Soft-tissue lasers enable safe and effective removal of soft tissues when used properly and contribute to the efficiency of the dental office. Herein, we are presenting a case report of a 32 years old female patient wherein the esthetic problem of the patient was efficiently managed with the help of soft tissue laser.

Keywords: Soft tissue lasers; Smile designing; Cheiloplasty

Introduction

The word LASER stands for Light Amplification by Stimulated Emission of Radiation. Laser light is different from regular light. It has a single wavelength and can be focused in a very narrow beam. This makes it both powerful and precise. The use of lasers in dentistry has increased over the past few years. The first laser was introduced into the fields of medicine and dentistry during the 1960s [1]. Laser technology is developing with phenomenal speed and new lasers with broad characteristics are available for use in different fields of dentistry. Laser therapy is based on induction of biologic responses through energy transfer. The emitted wavelength determines the effective depth of penetration. Dental lasers function by producing waves of photons that are specific to each laser wavelength. This photonic absorption within the target tissue results in an intra-cellular and/or, inter-cellular change to produce the desired results [2]. Soft tissue lasers are used in dentistry for gingivectomy, gingivoplasty, operculectomy, gingival troughing, crown lengthening, sulcular debridement, flap surgery, soft tissue management around the abutments, tissue retraction for impressions, removal of granulation tissue from bony defects, Laser-assisted soft tissue curettage of the post-extraction tooth sockets and the periapical areas during apical surgery, guided tissue regeneration (GTR), oral papillectomies, reduction of gingival hypertrophy and excision of epulis, papilloma, fibroma or, any other exophytic growth [3]. But very few practitioners have considered using a soft tissue laser to excise and shape the flabby soft tissue on the lips along the vermilion border. Much of importance is given to the teeth and their investing structures that so much importance is given to the teeth and their investing tissues that we tend to overlook the importance of the lips in the overall appearance of the smile. Ultimately, the lips are the curtains to the stage that hosts a beautiful smile and if the lips are not pleasing and shaped esthetically, a smile-makeover done perfectly well can leave a patient desiring more without knowing what's missing.

Case Presentation

A female patient aged 32 years reported to our dental set-up with a chief complaint of large gaps between teeth and an inability to smile in public due to low self-esteem and confidence. Medical history revealed nothing significant. Following digital smile-designing, wax mock-ups and study models, the patient underwent a smile-makeover with 10 maxillary and 6 mandibular anterior IPS Emax full jacket crowns. However, after the end result, the patient felt that something was

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Figure 1: Pre-operative profile view.



Figure 2: Pre-operative with upper lip retracted.



Figure 3: Laser unit used.



Figure 4: Establishing surgical outline.

missing but could not appreciate the full smile-makeover. Clinical examination revealed that the patient had a small fibrous papillary growth beneath the vermillion border of the upper lip (Figure 1) that had formed over the years due to persisting midline diastema. Following the smile-makeover, the papilla had no place to rest and was giving the lip a bulbous look. (Figure 2) It was, then, decided to go for a minor cheiloplasty where the excess flabby, fibrous tissue, would be excised using a Laser with the flabby tissue being re-shaped

and augmented.

Technique

Topical anesthetic gel was applied in the labial vestibule (Precaine-Lidocaine 8%, Dibucaine 0.8%, Pascal Dental- USA). Following topical soft tissue anesthesia, local infiltration injection was given in the labial vestibule (Lignospan Special- Lidocaine hydrochloride 2% with adrenaline 1:80,000, 1.8ml cartridge- Septodont, France). The adequacy of soft tissue anesthesia was tested with objective and subjective signs and symptoms to the patient.

Laser Specifications:

Portable Diode Laser (Figure 3) was used for carrying-out the procedure.

Name: NV Portable cordless Micro Laser.

Laser classification: Class 4 laser device;

Delivery system: Optical Fiber;

Wavelength: Laser 808nm ± 5 nm;

Maximum power: 2 W ± 20%;

Beam divergence: 617mrad;

Power range: 0.1 W to 2.0 W;

Pulse frequency: Fixed 10 Hz;

Pulse duration: Fixed 0.05 seconds;

Duty cycle: Pulsed mode 50%;

Continuous wave 100

Hypertrophic tissue contact Continuous 1.3-1.5 W power was used pre-programmed for soft tissue procedure.



Figure 5: Laser-assisted circumferential excision of papilla.



Figure 6: Immediate post-operative view.



Figure 7: Immediate post-operative view with relaxed lip musculature.



Figure 8: Post-operative view after 24-hours.

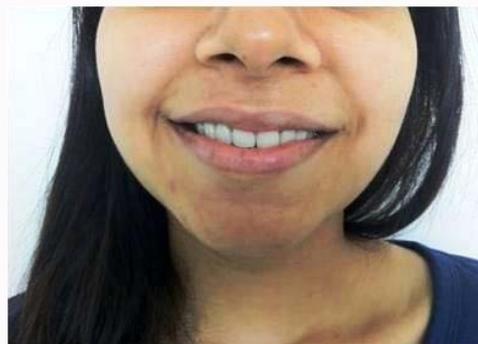


Figure 9: Follow-up at 1-year.

Procedure

The lip was retracted completely (Figure 4) to reveal the complete extent of the fibrous papillary growth. A rough outline of the papillary growth was established. Following this, surgical assistant used a pair of surgical tweezers/surgical hemostat (Figure 5) to engage and hold the growth gently and pulled it. Once the tissue was taut, the papilla was gently excised at the point of attachment (Figure 5) making sure that the papilla was pulled in the opposite direction of the attachment, so, the operator could excise it completely till the base. The patient was asked to smile (Figure 6) to get a clear idea of the post-operative esthetic results. Any further flabby tissue was re-shaped using the Laser, thereby, giving full retraction of the curtains in the smile window. Post-excision (Figure 7) surgical site revealed no bleeding as the surgery was done with a cautious, minimally invasive procedure. Post-operative instructions were given to the patient. Topical anti-inflammatory gel (Dologel), Topical Vitamin E Oil (Discuss Dental-USA) and Topical Anesthetic Gel were prescribed to the patient to aid in post-operative healing and patient comfort. The patient was followed-up after 24 hours post-procedure (Figure 8) and no complications were seen. The patient was, then, advised to come for a review after one week, one month, 3 months, 6 months and 1 year (Figure 9) to evaluate the healing process and the healing was found to be uneventful.

Discussion

Laser is a device for generating a high intensity, ostensibly parallel beam of monochromatic electromagnetic radiation. This innovative technology works on the principle of stimulated emission theory which was proposed by Einstein in 1917 based on the concept of spontaneous emission theory which was postulated by Neil Bohr in early 1900s. Based on these concepts, Maiman developed the first laser

prototype in the 1960s using ruby crystals as an active medium. The first experiment with lasers in dentistry was reported in a study about the effects of a pulsed ruby laser on human caries [4]. Several laser systems, such as the diode, ruby, Ho: YAG, Er: YAG, Nd: YAG, and yellow light lasers, as well as dye lasers for photo-dynamic therapy, have been used for treating various diseases. With the recent advances and developments of a wide range of laser wavelengths and different delivery systems, lasers could be applied for the dental treatments including periodontal, restorative and surgical procedures [5]. There are several types of lasers used in dentistry depending on their wavelength range and their absorption by biological chromophores like water, hemoglobin, melanin etc. CO₂, Er-YAG lasers are absorbed by water, resulting in a minimal penetration depth and fast heating, with effective removal of soft and hard tissue. CO₂ lasers are mainly used as laser scalpels for the excision of soft tissues [6]. In this day and age of esthetic exploitation, we, as practitioners, tend to neglect the soft tissue window that has a huge role to play in the over-all appearance in the smile of a patient. Despite the modern age of smile design, which enables the use of technology to create and design an ideal smile, ceramists involved with the fabrication process, still, rely on sound concepts and principles of facial and dento-facial esthetics. The smile design process begins at the macro-level, examining the patient's face first, progressing to an evaluation of the individual teeth, and finally moving to material selection considerations [7]. Traditionally, dental and facial esthetics have been defined in terms of macro-and micro-elements. Macro-esthetics encompasses the interrelationships between the face, lips, gingiva, and teeth and the perception that these relationships are pleasing [8]. Lasers can be the cornerstone in soft tissue dentistry. Lasers can be used to do intricate soft tissue re-shaping of the lips as well as other soft tissues that can transform the overall appearance of the smile manifolds [9]. The advantage of Lasers over conventional scalpel and blade techniques include the exclusion of all possible post-operative complications and morbidity associated with the conventional surgical procedures simultaneously providing the benefit of a bloodless field with the added advantage of additional augmentation achieved with the help of a sea and proceeds procedure. The surgical esthetics can be checked peri-operatively and modified accordingly. The best part about Lasers is the minimal post-operative complications including inflammation and hence, the end result can be seen immediately post-operatively with no need to overcompensate for post-inflammatory healing while planning for augmentation. Hence, the use of Lasers should not be limited to set dogmas and every practitioner should venture into new territories of its usage to achieve what was not intended or, even thought of, to be achieved, including cheiloplasty and lip augmentation to enhance the esthetic end results [10,11].

Conclusion

The application of lasers has been recognized as an adjunctive and/or, alternative approach in soft tissue surgeries. Laser treatments have been shown to be superior to conventional surgical procedures with regard to easy ablation, decontamination and hemostasis, as well as, minimal surgical and post-operative pain and other associated complications. The main question that exists is to set new dimensions of procedures which can be aided and done with a higher efficacy and efficiency today.

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