

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

This article was published in the following Scient Open Access Journal:

Journal of Dental and Oral Health

Received September 15, 2016; Accepted October 12, 2016; Published October 20, 2016

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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 application in the 1960s, the use of lasers has increased rapidly in the last couple of decades. Based on recent advancements and the propagation of minimum interventional principles, lasers have revolutionized various surgical and non-surgical aspects of clinical dentistry. Dental lasers are used for multiple procedures including soft-tissue surgical 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. Herein, we are presenting a case of a 32 years old female patient wherein the esthetic problem of the patient was efficiently managed with the help of soft tissue laser after the required cheiloplasty procedure.

**Keywords:** Soft tissue lasers, Smile designing, Cheiloplasty

### Introduction

The word LASER stands for Light Amplification by Stimulated Emission of Radiation. It has a single wavelength and can be focused into 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. 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 have efficiently been used for the various soft tissue-related, surgical procedures including gingivectomy, gingivoplasty, operculectomy, gingival troughing, crown lengthening, sulcular debridement, flap surgeries, 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 sockets and periapical areas during peri-apical surgical procedures, guided tissue regeneration (GTR), oral papillectomies, reduction of gingival hypertrophy and excision of epulis, papilloma, fibroma and/or, any other exophytic growth [3]. However, only a few clinicians have considered using a soft tissue laser to excise and shape the flabby soft tissues on the lips along the vermilion border. Herein, we are presenting a case of a 32 years old female patient wherein the esthetic problem of the patient was efficiently managed with the help of soft tissue laser after the required cheiloplasty procedure.

### Case Report

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 missing but could not appreciate the full smile-makeover. Clinical examination revealed that the patient had a small fibrous

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papillary growth beneath the vermilion 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 MicroLaser.

Laser classification: Class 4 laser device;

Delivery system: Optical Fiber;

Wavelength: Laser 808nm  $\pm$  5nm;

Maximum power: 2W  $\pm$  20%;

Beam divergence: 617mrad;

Power range: 0.1W to 2.0W;

Pulse frequency: Fixed 10Hz;



Figure 3: Laser unit used



Figure 4: Establishing surgical outline

Pulse duration: Fixed 0.05seconds;

Duty cycle: Pulsed mode 50%;

Continuous wave 100.

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

## 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.



Figure 1: Pre-operative profile view



Figure 2: Pre-operative with upper lip retracted



Figure 5: Laser-assisted circumferential excision of papilla



Figure 9: Follow-up at 1-year



Figure 6: Immediate post-operative view



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



Figure 8: Post-operative view after 24-hours

## Discussion

Lasers are 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 postulated by Neil Bohr in the 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 pulsed-dye lasers for photo-dynamic therapy (PDT), 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 procedures including a wide range of periodontal, restorative and surgical procedures [5].

There are several types of lasers depending on their wavelength range and absorption by biological chromophores like water, hemoglobin and melanin etc. CO<sub>2</sub>, Er:YAG lasers are absorbed by water resulting in a minimal penetration depth and fast heating with effective removal of the soft and hard tissues. CO<sub>2</sub> lasers are mainly used as laser scalpels for the excision of soft tissues [6]. In this day and age of esthetic exploration, we, as clinicians, tend to neglect the soft tissues that have a considerable role 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 first the patient's face, progressing to an evaluation of the individual teeth, and finally moving to material selection considerations [7]. Traditionally, dental and facial esthetics has been defined in terms of macro-and micro-elements. Macro-esthetics encompass the interrelationships between the face, lips, gingiva and teeth although 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 [8,9]. The advantage of Lasers over conventional

scalpel and blade procedures include the exclusion of all possible post-operative complications and morbidity associated with the conventional procedures while simultaneously providing the benefit of a bloodless field with the added advantage of additional augmentation achieved with the help of a see and proceed 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 tissue changes while planning for augmentation. The use of lasers should not be limited to set dogmas and every clinician should venture into new territories of its usage to achieve what was not intended or, even thought of, to be achieved, including cheiloplasties and lip augmentation procedures to enhance the esthetic end results [10,11].

## Conclusion

The application of lasers has been recognized as an adjunctive 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 complications. The main question that exists is to set new dimensions of procedures which can be accomplished with a higher efficacy and efficiency.

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