Diode Laser Frenectomy (Clinical documentation): Case Report.

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Introduction: As an alternative to conventional dental procedures, laser surgery has grown in favor recently. Among other laser types, diode lasers have attracted significant interest in the field of oral soft tissue surgery.

Case Reports: The oral surgery department received referrals for three patients. Following a thorough review of each patient's medical history and oral examination, the following oral diagnosis and treatment plans were developed: (1) A 75-year-old female with a poor denture fit needing vestibuloplasty and frenectomy; (2) A 43-year-old female with anterior midline diastema; (3) A female in her twenties with ankyloglossia. Diode laser surgery at a wavelength of 940 nm, in continuous mode, was the recommended course of treatment for all patients.

Conclusion: In light of the versatility of the 940 nm diode laser in oral soft tissue procedures and the benefits of laser surgery, this study recommends using the 940 nm diode laser in this context.

Keywords: diode laser; oral soft tissue; surgery; frenectomy; vestibuloplasty; ankyloglossia.

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INTRODUCTION

The frenum is an anatomical structure that originates from the vestibular lamina's core cells. It is made up of a fold of connective tissue, mucous membrane, tissue, and muscle fibers. The frenum can vary in size and position depending on where it sits in the oral cavity. It can be divided into different categories:

A: Labial Frenum (superior and inferior labial), B: Buccal Frenum, and C: Lingual Frenum.

On occasion, they might also cause anomalies in the oral cavity. For instance, a tongue tie occurs when the tongue is abnormally short, thick, or congenitally diseased.

This abnormality has been linked to functional impairments. mechanical issues such as improper swallowing, speech articulation issues, and psychological issues like tension and the The inability to properly clean the mouth. It might have a range of outcomes. Variable levels of limitation on tongue mobility. [1]

The research has suggested methods for treating an abnormal frenulum, including observation, speech therapy, and frenectomy.[2]

Frenectomy, also known as excision, is the total removal of the frenum, including its attachment to the underlying periosteum. It is carried out on patients with thick and vascular frenum. It can be carried out using conventional techniques, electrosurgery, or lasers.

conventional technique involves excision of the frenum by using a scalpel, and now we have other modifications of it, e.g., Z plasty, Miller's technique, and V-Y plasty. It is nevertheless subject to the standard risks of surgery, such as bleeding and patient compliance, [3] and in some circumstances, the frenum may be reattached by scar tissue.

Because the laser-based method is safer, more efficient, and causes less bleeding and discomfort, researchers have proposed employing it to avoid these issues. Therefore, a detailed investigation examining bleeding and discomfort in laser-assisted oral surgery, particularly frenectomy, is advised.

The use of lasers in dentistry involving soft tissues and hard tissue procedures was approved by the US Food and Drug Administration in 1995 . [4,5]

According to some research, frenulum surgery with a high-power laser is a superior procedure to one using a traditional or electric scalpel. Patients express greater levels of satisfaction, less difficulty speaking and eating, and less discomfort following surgery, which reduces the need for analgesics or anti-inflammatory drugs. [4,6]

The choice of power is made based on the laser wavelength, biological and optical characteristics of the target tissue, the presence of chromophores, the emission mode, irradiation technique, exposure period, and intensity.

Depending on that, lasers affect soft tissue in a variety of photo thermal ways. [7,8]

Laser assisted surgery produces a precise incision, enhanced haemostasis and the closure of micro-vessels, little to no bleeding, and greater surgical field visibility. Additional advantages include decreased postoperative pain and inflammation, accelerated tissue repair, fewer complications with speech and chewing, patient satisfaction, and immediate resumption of activities. [7,9] The surgical procedure requires applying a small amount of anesthesia (topical anesthesia is occasionally sufficient) and moving along the frenulum's vertical axis until the wound takes on a linear shape. The laser is then applied transversely until the wound assumes a rhomboidal shape. [10]

Diode lasers at in the mid-infrared region are mostly absorbed by melanin and hemoglobin and are regarded as one of the best laser wavelengths for soft tissue procedures in dentistry due to their cutting effectiveness. Additionally, diode lasers have superior hemostasis, cleaning, and healing capabilities.[11]

Given the advantageous properties of diode lasers and their variety in soft tissue treatment, we want to report three successful cases treated by a 940 nm diode laser in different clinical scenarios.

Case 1

A referral for vestibuloplasty and frenectomy was made from the prosthodontic department to the oral surgery department for a 75-year-old female denture wearer. In her medical background, she had controlled diabetes with fasting blood sugar levels of 79 mg/dl and blood pressure readings of 136/71 mm Hg. Her main problems were loose upper dentures and ulceration while wearing dentures. Oral examination revealed that the upper frenum, which was related to ridge resorption, interfered with the denture's fit (Figure 1.A). For vestibuloplasty, an upper frenectomy with extensive base excision was chosen. The process began utilizing a 940 nm diode laser (BIOLASE EPIC 10TM 940 nm Class IV) with an output power of (3 W) increasing to (3.5 W), continuous (CW) mode in direct contact with the tissue, with the use of initiated surgical tip (400 µm), and minimum use of local anesthesia (1/2 Carpule) and without the need for sutures (Figure 1.B). Following surgery, the patient was instructed to exercise by lifting and moving their upper lips to the right and left in order to prevent reattachment. No wound dressings or surgical sutures were applied.

After 24h, 3 and 7 days, a successful surgical outcome was seen (Figure 1.C: 1.D).

Case 2

The space between her anterior teeth and an ulcer she experienced while brushing her

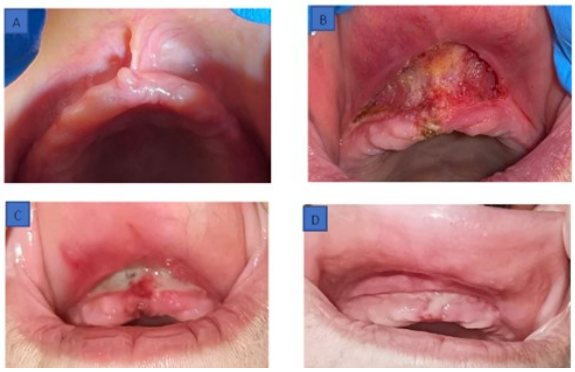

Figure 1. Case 1: A; before, B; after, C; after 24h, D; after 1w.

teeth were the complaints of a 43-year-old female patient (Figure 3.A). High frenum attachment was identified during the clinical examination as a contributing cause, and a laser frenectomy was chosen as the treatment.

A 940 nm diode laser (BIOLASE EPIC 10TM Class IV) with an output power of 3 W in continuous (CW) mode was used with a surgical tip (initiated) of 400 m after local anesthetic was administered. The wound did not receive any surgical stitches or wound dressings.

With the use of surgical gauze, the patient's lip was gently pulled, with the frenulum positioned between the index and middle fingers to prevent distortion. The incision began at the labial surface between the central incisors and extended to the depth of the vestibule (Figure 2.b).

The patient was monitored after 24 hours (Figure 2.C), 3 days, and 7 days (Figure 2.D). She didn't take any painkillers, and after 7 days, her eating and brushing habits had returned to normal

Case 3

A female patient in her twenties who was

Figure 2. Case 2: A; before, B; after, C; after 24h, D; after 1w.

having trouble speaking complained about the way her tongue moved. A lingual frenectomy using a 940 nm diode laser was chosen as the treatment of choice. Systemically, the patient was healthy. After the use of local anesthesia, a 940 nm diode laser (BIOLASE EPIC 10TM Class IV) with an output power of 3.5 W in continuous (CW) mode in direct contact with the tissue was used with an initiated surgical tip of 400 µm. No surgical sutures or wound dressings were applied to the wound (Figure 3.C).

The patient was experiencing little discomfort 24 hours after the operation. The patient was given a description of a painkiller tablet. Myofunctional therapy is incorporated into rehabilitative tongue exercises by asking the patient to protrude and move their tongue in a circle while moving the tip as close to their nose as they can. After three days, the recovery process was complete, and early healing indicators were visible. At the 7-day check-up, the patient mentioned a rise in tongue movement (Figure 2.D)s.

DISCUSSION

This report details the successful use of the

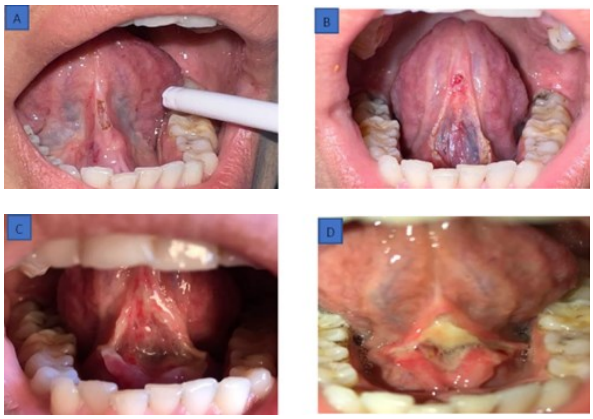

Figure 3. Case 3: A; During, B; after, C; after 24h, D; after 1w.

940 nm diode laser for frenectomy procedures in three separate cases. Although these treatments could have been completed with traditional surgery and the use of a scalpel and suture, we preferred the diode laser surgery due to its benefits, which included a shorter operating time, a quicker recovery, and higher patient satisfaction. [12,13] Bloodless surgical fields, minimal discomfort, and excellent healing were all noted following the follow-up in cases 1 ,2 and 3.

Similar results have been reported in another recent research. [14,15,16] making laser-assisted frenectomy a better surgical choice than the traditional technique employed in previous years. Nammour concentrated on the decreased need for sutures, while Brignardello-Petersen, [18] and Viet, [19] highlighted various positive outcomes in diode laser frenectomy when compared to

the conventionnel surgical method, such as decreased patient discomfort, decreased operation time, and decreased need for infiltration anesthesia.

A lingual frenectomy was our third case. According to Masone A [20] early identification and lingual frenectomy promote the restoration of the stomatognathic system's functionality as well as the restoration of the tongue's biological movements in the period following surgery. Similar to our findings, laser-assisted lingual frenectomy has had documented successful outcomes in the literature.

Five clinical examples of a short lingual frenulum were reported by Reddy et al. [15] Three of them received electrocautery therapy, one a diode laser treatment, and one a typical surgical procedure. Following a 7 and 30-day follow-up, it was found that instances treated with laser technology had better tissue management than those treated with conventional surgical methods, which produced more discomfort and swelling. With reduced pain and improved tongue function, the use of lasers for frenectomy treatment can be regarded as safe and trustworthy. [21]

In the current study, patients generally reported little discomfort during the post-operative course. In accordance with other studies, were patients treated with the diode laser required less infiltration anesthesia and had rapid postoperative hemostasis with no sutures and an improved postoperative comfort and bio-stimulation effect. [21]

The reduced oedema can be explained by the ability of lasers to seal lymphatic channels, which in turn results in less postoperative discomfort, as well as less inflammatory response and the formation of a fibrin clot over the surgical wound, which can all be explained by precision surgical laser procedures without having an adverse effect on surrounding normal tissue. [22] Plasma proteins, hemoglobin, and peri-vascular tissue denaturation leads to hemostasis. The low fluid extravasation and limited inflammatory reaction around the tissues being managed surgically may be explained by this hemostasis. [23,24] Due to the developed coagulated layer over the wound area, sutures were not required in any of the cases. The laser-assisted treatment's minimally invasive procedure enables patients to quickly resume their regular day-to-day activities.

The diode laser's energy is primarily absorbed by hemoglobin and melanin, making this wavelength ideal for soft tissue procedures in dentistry. Providing a high level of coagulation and disinfecting properties. [2] Diode laser as an alternative solution to conventional electrosurgery and scalpel are recommended. However, choosing appropriate parameters during diode laser surgery is one of the main concerns. In our investigation, taking into account the kind of tissue, accessible laser wave length, and required surgical method, a 940 nm diode laser (BIOLASE EPIC 10TM Class IV) with an initial surgical tip of 400 µm and an output power of 3-3.5 W in continuous (CW) mode was used.

CONCLUSION

This study emphasizes the benefits of performing a frenectomy with a 940 nm diode laser, including minimal scarring, no bleeding, decreased oedema, and no suture requirement, in the field of oral soft tissue surgery, we support the use of diode lasers as an alternative to traditional surgical methods.

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