Diode Laser-Assisted Maxillary Labial Frenectomy: A Case Report

Abstract

A high maxillary labial frenum attachment can contribute to midline diastema, gingival recession, and impediments to oral hygiene. Conventional scalpel techniques often result in increased bleeding, postoperative discomfort, and longer healing times. This case report presents the management of an aberrant maxillary labial frenum using a diode laser in a 20-year-old patient. The laser-assisted procedure resulted in minimal bleeding, no suturing, reduced postoperative discomfort, and rapid healing. Laser frenectomy is shown to be a safe, effective, and patient-friendly alternative to traditional surgical methods.

Keywords: Frenectomy, laser, labial frenum, frenum, diode laser, diastema

Introduction

The maxillary labial frenum is a fold of mucous membrane that connects the upper lip to the alveolar mucosa and periosteum of the maxilla. An aberrant or hypertrophic frenum may contribute to midline diastema, interfere with orthodontic therapy, or cause gingival recession [1,2]. Frenectomy, the complete removal of the frenum, is often indicated in such cases. Traditional scalpel techniques, while effective, are associated with intraoperative bleeding, the need for sutures, and longer healing times [3]. In recent years, lasers—especially diode lasers—have emerged as minimally invasive alternatives, offering advantages such as haemostasis, reduced pain, bactericidal effects and improved patient compliance [4,5]. This report presents a clinical case of a laser-assisted maxillary labial frenectomy using diode laser in a young adult, highlighting clinical advantages of diode laser.

Case Report

A 20 year old male patient presented with a chief complaint of spacing in the upper front teeth for which he had undergone orthodontic treatment and to prevent relapse, frenectomy was advised before debonding. Clinical examination revealed a thick, papillary maxillary labial frenum extending into the interdental papilla (Fig. 1). A positive blanch test and history of diastema present before orthodontic treatment confirmed the need for frenectomy.

Initial examination and treatment planning discussion was done following which the patient underwent scaling. Written informed consent was taken from patient and a treatment plan of labial frenectomy with Diode laser was made.

Procedure:

Pre-operative Assessment: The area was examined clinically and radiographically to rule out additional pathology. Informed consent was obtained from the patient.

Anaesthesia : The labial frenum was sprayed with topical lidocaine followed by infiltration of 2% lidocaine with epinephrine (1:80,000) in the labial vestibule.

Laser Settings: The frenectomy was performed with Biolase EPIC 10 diode laser with a wavelength of 980nm. The laser was operated at a power of 2.0 watt in continuous wave mode, with a 400µm optical fiber.

Frenectomy: The lip was stretched to delineate the frenum and the laser was used in a sweeping motion from the base to the apex. Initially the mucosa continuity was disrupted. Laser fibre was then applied vertically to excise the band to the periosteum and laterally to give relaxing incisions at the mucogingival junction. Minimal bleeding was observed and no sutures were required. Safety procedures were followed. Protective eyewear was worn by the all the staffs.

Postoperative Care: The patient was advised to avoid hot and spicy foods, maintain oral hygiene, and use chlorhexidine mouthwash (0.2%) for one week.

Follow-up: Healing was uneventful. The patient reported no pain or complications. At the two-week review, the site showed complete healing with no scarring.

Fig.1 Pre-operative

Fig.2 Pre-operative

Fig.3 Laser procedure

Fig .4 Laser incision

Fig.4 Immediate post-operative

Fig.5 Healing after 2 weeks

Fig.6 Healing after 1 month

Discussion

Laser-assisted frenectomy has gained widespread acceptance in clinical practice due to its minimally invasive nature, reduced postoperative discomfort, and improved patient satisfaction. Among the various types of lasers used in dentistry, the diode laser is particularly popular for soft tissue procedures like frenectomy due to its favourable properties.

Physics of Diode Laser

The diode laser is a semiconductor-based device that emits light in the near-infrared spectrum, typically in the 800–1,100 nm range, with 980 nm being one of the most commonly used wavelengths in dentistry [6]. This wavelength is selectively absorbed by pigmented tissues, particularly haemoglobin and melanin, and poorly absorbed by water, making it ideal for soft tissue surgery [8].

Laser energy is transmitted to the tissue via a flexible fiberoptic cable, often with a 400 µm tip. The laser interacts with tissues through photothermal effects, where absorbed light is

converted to heat, resulting in coagulation, vaporization, and carbonization of target tissues [9].

Clinical Advantages of Diode Laser in Frenectomy

Hemostasis and Clear Surgical Field- Diode lasers promote instant coagulation of small blood vessels, resulting in a bloodless field and excellent visibility during the procedure [10].

Reduced Need for Sutures- Due to coagulation and tissue shrinkage, suturing is often unnecessary, reducing the complexity and duration of the procedure [11].

Antimicrobial Properties- The laser has a bactericidal effect, reducing bacterial contamination and lowering the risk of postoperative infection [12].

Minimal Pain and Swelling- Sealing of nerve endings and lymphatics results in reduced postoperative discomfort, edema, and inflammation [13].

Faster Healing and Minimal Scarring- Diode lasers encourage faster epithelialization and healing with minimal fibrosis, contributing to better aesthetic results [14] although early wound healing was better seen in the conventional scalpel technique. This can be explained by the primary closure of scalpel surgery, which leads to better healing during early postoperative days, while delayed healing was observed in laser surgery due to the charring and carbonization generated by laser radiation .Less scar tissue was seen in the laser due to coagulation of protein forming bandage over the wound area .In addition to this, a greater incidence of edema and swelling may be seen in the scalpel technique due to longitudinal incisions made during surgery. However, minimal swelling and scarring would be seen in lasers due to healing by secondary intentions. This is also associated with tissue regenerations for new tissue formation on the involved areas. Therefore, the laser technique provides better healing in comparison to the surgical techniques. [15].

Precision and Tissue Preservation

The laser allows for precise cutting, minimizing collateral tissue damage, and preserving adjacent structures.

Improved Patient Acceptance

The laser’s quiet operation, reduced bleeding, and absence of sutures lead to higher acceptance, especially among young adults and anxious patients.

Time Efficiency

The reduced need for suturing and bleeding control translates to shorter chair time, which is advantageous in both private and institutional practice.

Orthodontic Compatibility

In orthodontic cases, the ability to schedule frenectomy at precise timepoints with minimal disruption to appliance therapy is beneficial.

However, clinicians must be trained in laser safety and use. Improper technique or excessive power settings can result in thermal damage. Protective eyewear is mandatory for both the patient and the dental team during laser operation [7].

Conclusion

Laser-assisted maxillary labial frenectomy using a diode laser is a minimally invasive, effective, and patient-friendly procedure, particularly suited for adult patients concerned with aesthetics and comfort. The diode laser provides excellent haemostasis, minimal postoperative discomfort, and rapid healing with improved aesthetic outcomes. With proper technique and safety, this method offers clear advantages over conventional surgical approaches.

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