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Clinical application of 940nm Diode laser to remove mandibular labial frenum

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Abstract
Introduction*: A frenum that encroaches on the gingival margin may interfere with plaque removal. Tension on frenum may open the gingival sulcus. In this kind of cases, surgical removal of frenum is indicated. The surgical removal can be performed either with a scalpel, electrocautery or lasers.*
Case report*: A 17 year old patient with a chief complaint of bleeding gums from lower front teeth was referred to department of Periodontology. After careful and detailed evaluation, frenectomy with a diode laser at 940nm, in continuous wave mode was planned for the patient.*
Results*: The patient experienced normal healing process with no post operative complications. Favorable outcome of laser surgery was observed on follow up session.*
Conclusion*: Diode laser has shown to be one of the excellent options for performing this surgery with better bleeding controls, excellent precision, less discomfort and shorter healing time.*
Key words
Diode laser, frenectomy, mandibular labial frenum

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I. Introduction

A frenum is a fold of mucous membrane with enclosed muscle fibers that attaches lips and cheeks to alveolar mucosa, gingiva and underlying periosteum.
Frenum comprises of variable amount of loose connective tissue with elastic and dense collagen fibers, fat cells, occasionally acini of mucous producing salivary glands, muscle fibers.
Classification of frenum by Placek et al. 1994[1]:

- Mucosal
- Gingival
- Papillary
- Papillary penetrating

The labial frenum connects the lip to the gingival tissue covering the alveolar periosteum of both maxilla and mandible. Hypertrophic, fibrotic, fan-shaped or bifid ending constructions are described as abnormal frenum whose development is not dependent upon its point of insertion. [2]

The abnormal frenum can be treated by frenotomy or frenectomy. Frenotomy is the incision of the frenum. Frenectomy is complete removal of frenum including its bony attachment. The surgical technique includes excision of frenum by a scalpel. Patient compliance and bleeding are the risks associated with surgical technique. [3]

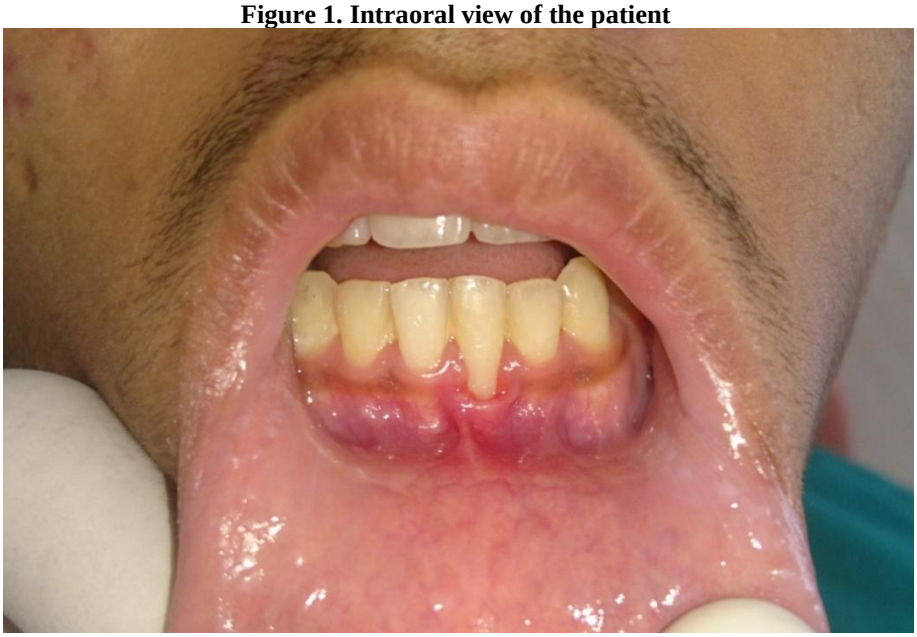
The diode laser frenectomy without infiltrated anesthesia is currently under investigation. [4] The pigmented tissues with hemoglobin, collagen chromophores and melanin are highly absorbed by diode laser; hence they are indicated for soft tissue surgeries. [5] The present article depicts the clinical case of an aberrant mandibular frenum, which was treated using diode laser.

II. Case

A 17 year old boy with chief complaint of bleeding gums from lower front tooth was referred to department of Periodontology by orthodontist on post treatment follow up visit. The medical history was non contributory. The clinical examination revealed the presence of a class II marginal tissue recession of 3mm in

tooth 31 and high frenum attachment encroaching on the marginal gingiva of the same tooth with inadequate width of attached gingiva (Figure 1).

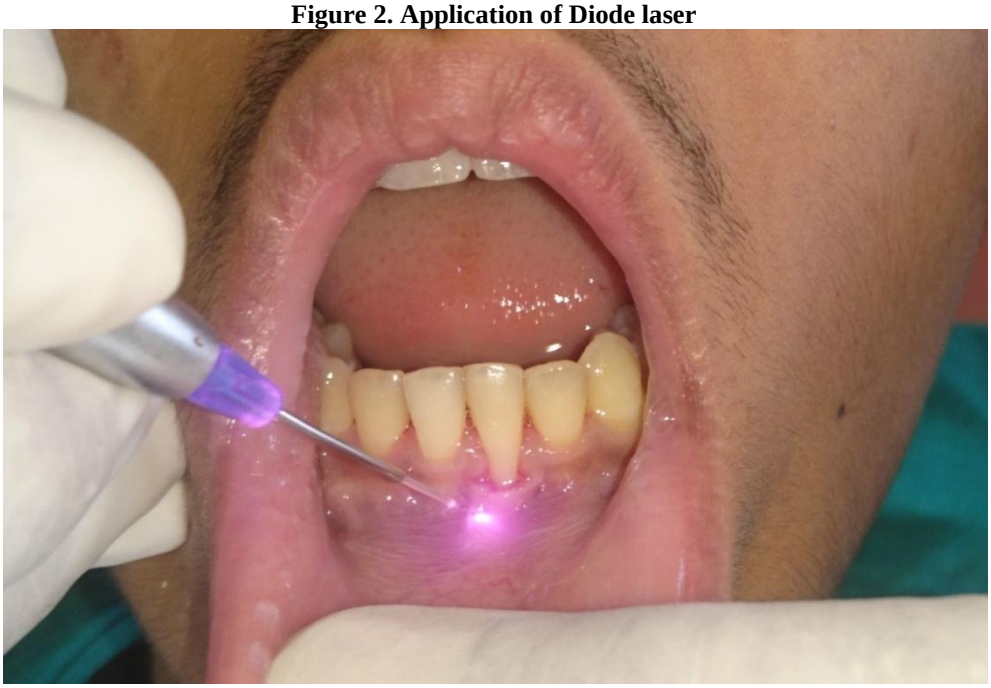
Figure 1. Intraoral view of the patient



After complete evaluation and a detailed history, the treatment of choice was to perform scaling and laser frenectomy without infiltration anesthesia using specific laser parameters. Root coverage procedure will be performed later. The rationale for choosing laser was to make minimal invasive site preparation. Orthodontic patients requiring frenectomy are best favorable candidates for laser procedures with topical anesthesia. After explaining the intra and post-operative aspect to the patient, informed consent was obtained to perform frenectomy.

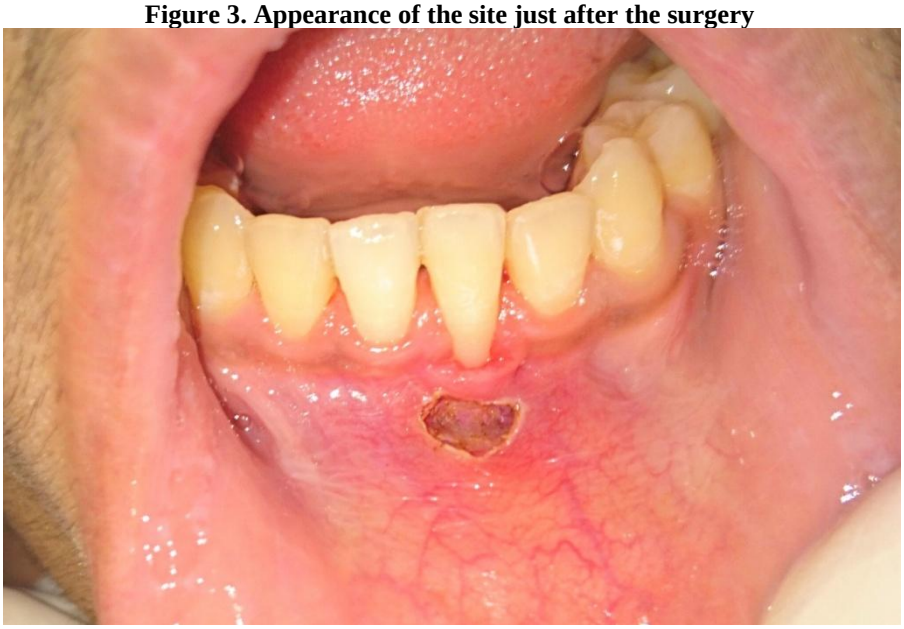
The labial frenum was anesthetized with lidocaine spray 15.0% w/w. All the safety precautions were followed strictly and frenectomy was performed with 940nm diode laser (Ezlase^{TM}, Biolase® technology, USA). The laser was operated at a power of 3.0 watt in continuous wave mode, with a 400μm core diameter single use fiber optic tip. The laser beam was applied both vertically and laterally to the frenum to disrupt the mucosal continuity, which enables the deeper horizontal cut of the frenum (Figure2).

Figure 2. Application of Diode laser



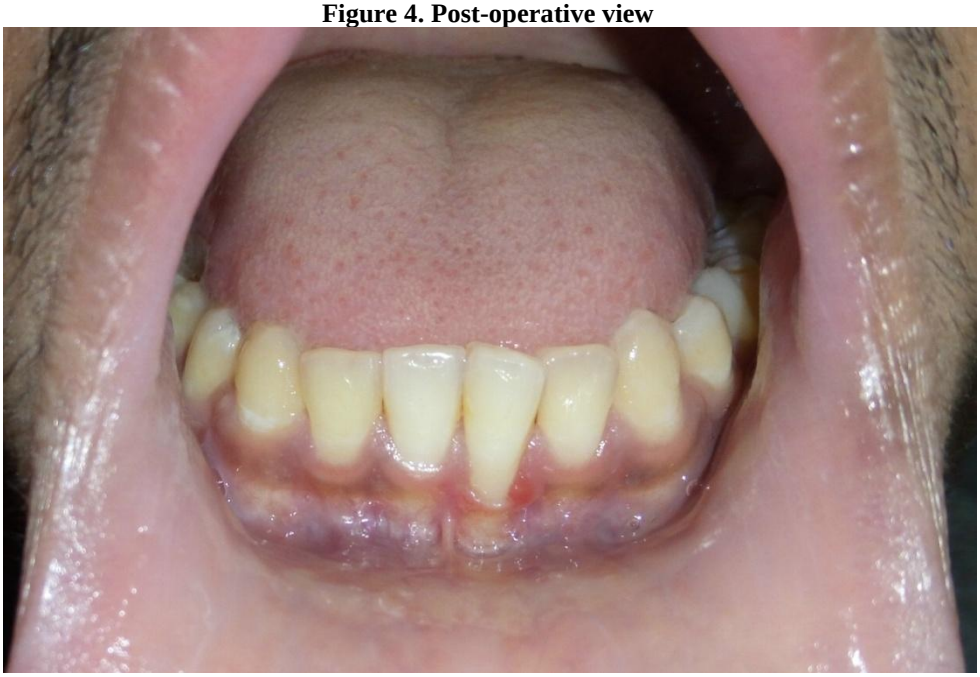
Throughout the procedure, the wavelength specific goggles were worn by the patient and all the staff and high speed evacuation was employed to reduce the slight charred odor and remove laser plume. After end of laser exposure, the surgical site was flushed with normal saline (Figure 3).

Figure 3. Appearance of the site just after the surgery



The procedure took ten minutes without any pain and optimum hemostasis achieved immediately. Suturing was not needed for the surgical site. The patient was given post-operative instructions not to take hot, sour and highly spiced food and should take only soft food, and maintain proper oral hygiene. During the postoperative period, practice the physio-exercises i.e. separate the lip from the gingival tissue by pulling down the lip frequent times a day. Charters brushing technique was advised in immediate postoperative period for 1 month, followed by modified stillman brushing method after initial healing of the wound at 1 month.
An analgesic containing diclofenac sodium 50mg was prescribed and advised to use when needed. There was no evidence of post-operative complications as reported by the patient. On follow up, patient showed good oral hygiene and mucosal type of frenal attachment with 2mm of marginal tissue recession. On recall visits, improved oral hygiene with easy access to cervical region was claimed by the patient (Figure 4).

Figure 4. Post-operative view



III. Discussion

There are many pros and cons for the use of lasers in periodontal therapy. There are also many different surgical techniques using sharp metallic instruments that give preferred results. Yet, a laser might be a more direct and efficacious path to achieve the same goal, with easier healing and less side effects.

Laser assisted labial frenectomy is easy to perform with excellent precision, less discomfort and short healing time compared to the conventional technique. [6, 7] The light that the laser emits is of single wavelength which is generated by active medium that can either be solid (diode) or gas (CO_2 or Argon). [8, 9] The semiconductor chip present in diode laser makes the device smaller and lighter. The wavelengths in diode lasers are near the infrared spectrum, typically from 800nm to 980nm. [9] In clinical applications, lasers can be used as a sole treatment tool or adjuvant to other procedures and they provide clear advantage over conventional surgery such as hemostasis, wound disinfection and no suture requirement. [10, 11] However, they have certain disadvantages such as slow work, prolongation of operation time, heat, and at times tissue carbonization due to improper handling. [10, 11]

Despite those disadvantages, studies showed successful results of lasers in treatment of soft tissue lesions.[12,13] Boj et al. reported that lasers increased the success of the procedures and improved the prognosis in crown lengthening, pericoronitis, frenectomy, pulpotomy, and excision of pyogenic granuloma.[14,15] Soft tissue laser both coagulate and produce a mild anesthetic effect during excision, which makes it feasible to replace local infiltration with topical anaesthesia.[2,4,16] Sterilization of wound by laser reduces the need for post operative care and antibiotics.[7] Laser treatment has fewer functional complications as it does not cause any damage to adjacent healthy tissue, resulting in minimal wound contraction during healing. So post-operatively there is reasonable mobility of the tissue and minimal oral dysfunction. [17, 18, 19, 20] Frenectomy with diode laser showed clean, bloodless site during surgery, normal healing with no pain, discomfort, swelling post operatively in eight patients. [21] Haytac et al. reported less pain on 1st day and 7th day post-operatively in patient treated with CO_2 laser compared to scalpel surgery in 20 patients. [22]

All these above mentioned advantages were evidently experienced in this case report. During the procedure there was definitely no bleeding. Likewise, post-operatively no discomfort was experienced by the patient and no swelling or any other signs of discomfort were noticed. However, the patient will be advised sub-epithelial connective tissue graft which involves esthetic and functional correction of the region; laser has added advantage over scalpel surgery by preventing mucosal scarring of the site. All these factors justify the use of laser in the present case. These favorable aspects of diode laser can facilitate clinical practice and make dental surgeries more tolerable to the patients.

IV. Conclusion

Diode laser equipment may be considered a modern laser technology in the field of dentistry. The ability to quickly complete the procedures with very little discomfort in clinic makes laser dentistry an important concept for the patients. Dental laser offers revolutionary advantages over traditional cosmetic dental treatments. The judicious use of diode laser results in satisfactory and remarkable alternative for frenectomy operations.

References

[1]. Dibart serge, Karima Mamdouth. Practical periodontal plastic surgery. Germany: Blackwell Munksgaard; Labial frenectomy alone or in combination with a free gingival autograft; p. 53.

[2]. Olivi G, Chuamanet G, Genovese MD, Beneduce C, Andreana S. Er, Cr: YSGG laser labial frenectomy: A clinical retrospective evaluation of 156 consecutive cases, Laser Therapy. General Dentistry, May/June 2010; 58: 126-133.

[3]. Kaur P, Dev YP, Kaushal S, Bhatia A, Vaid R, Sharma R. Management of the upper labial frenum: A comparison of conventional surgical and lasers on the basis of visual analogue scale on patients perception. Journal of Periodontal Medicine and Clinical Practice 2014; 1(1):38-46.

[4]. Kafas P, Stavrianos C, Jerjes W, Upile T, Vourvachis M, Theodoridis M. Upper lip laser frenectomy without infiltrated anesthesia in a pediatric patient: A Case Report. Cases Journal 2009; 2:7138.

[5]. Gontijo I, Navarro RS, Haypek P, Ciamponi AL, Haddad AE. The application of diode and Er: YAG lasers in labial frenectomy in infant patients. Journal of Dentistry for Children. 2005; 72(1):10-5.

[6]. Suresh S, Sudhakar U, Merugu S, Kumar R. Management of ankyloglossia by diode laser. Journal of Interdisciplinary Dentistry. 2012;2(3):215-7

[7]. Kotlow LA. Lasers in pediatric dentistry. Dental Clinics of North America. 2004; 48(4): 889-922.

[8]. Walsh L. The current status of laser applications in dentistry. Australian Dental Journal. 2003; 48(3): 146-55.

[9]. Ayoub AH, Negm SA. 980nm diode laser in oral surgery. Laser removal of hemangioma. International Journal of Dental Clinics. 2012; 4(4): 48-49.

[10]. Andreana S. The use of diode lasers in periodontal therapy: literature review and suggested technique. Dentistry Today. 2005; 24:130,132-135.

[11]. Slot DE, Jorritsma KH, Cobb CM, Van der Weijden FA. The effect of thermal diode laser (wavelength 808-980nm) in non-surgical periodontal therapy: a systematic review and Meta analysis. Journal of Clinical Periodontology. 2014; 41: 681-692.

[12]. Goharkhay K, Moritz A, Wilder-smith P, et al. Effects on oral soft tissue produced by a diode laser in vitro. Lasers in Surgery and Medicine. 1999; 25: 401-406.

[13]. Akbulut N, Kursun ES, Tumer MK, Kamburoglu K, Gulsen U. Is the 810-nm diode laser the best choice in oral soft tissue therapy? European Journal of Dentistry. 2013; 7: 207-211.
[14]. Boj JR, Poirier C, Harnandez M, Espassa E, Espanya A. Case Series: Laser treatments for soft tissue problems in children. European Archives of Pediatric Dentistry: Official Journal of European Academy of Pediatric Dentistry. 2011; 12:113-117.
[15]. Boj JR, Poirier C, Harnandez M, Espassa E, Espanya A. Review: Laser soft tissue treatments for pediatric dental patients. European Archives of Pediatric Dentistry: Official Journal of European Academy of Pediatric Dentistry. 2011; 12:100-105.
[16]. Hilgers JJ, Tracey SG. Clinical uses of diode lasers in orthodontics. Journal of Clinical Orthodontics. 2004; 38: 266-273.
[17]. White JM, Goodis HE, Rose CL. Use of pulsed Nd: YAG laser for intraoral soft tissue surgery. Lasers Surg Med. 1991; 11(5): 455-61.
[18]. Kotlow LA. Using Er: YAG laser to correct abnormal lingual frenum attachments in new borns. Journal of Academy of Laser Dentistry. 2004; 12(3): 22-23.
[19]. Puthussery FJ, Shekar M, Gulati A, Downie IP. Use of carbon dioxide laser in lingual frenectomy. Br Journal of Oral & Maxillofacial Surgery. 2011; 49(7): 580-581.
[20]. Fornaini C, Rocca JP, Bertrand MF, Merigo E, Nammour S, Vescovi P. Nd: YAG and diode laser in surgical management of soft tissue related to orthodontic treatment. Photomed Laser Surg. 2007; 25(5): 381-92.
[21]. Awooda EM, Osman B, Nadia A Yahiya. Use of diode laser (810nm) in frenectomy. Sudan JMS. 2007; (2)1.
[22]. Haytac MC, Ozecelik O. Evaluation of patient perceptions after frenectomy operations: a comparison of CO_2 laser and scalpel techniques. J Periodontol. 2006; 77(11): 1815-1819.

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