Case Report

University J Dent Scie 2024; Vol. 10, Issue 3

Maxillary Frenectomy Iin Pediatric Patient Using Diode Laser – A Case Report

Abstract:
Abnormal/aberrant frenum is very common and causes various problems in function and aesthetics. These attachments pose problems like difficulty in maintaining oral hygiene, gingival recession, and diastema. Hence, correcting abnormal frenal attachments becomes essential. Such a condition has to be treated by Frenectomy, which can be performed using Scalpel, Electrocautery, or with Soft Tissue Lasers. Among all these, Diode lasers are gaining popularity due to their suitability for soft tissues, ease of operation, and versatility. In this article, we report a case of successful non-surgical management of high frenal attachment using diode laser. An 8-year-old female patient presented to the department with malaligned maxillary anterior teeth. The dental examination revealed a high frenal attachment with midline diastema. This case report describes the process of performing maxillary labial frenectomy using Diode Laser in pediatric dentistry.

Key-words: Diastema; Frenectomy; Diode Laser.

Introduction:

Aesthetic concerns have led to an increasing trend of seeking dental treatment, with the purpose of achieving a perfect smile.[1] The continuing presence of a diastema between the maxillary central incisors, has often been considered as an aesthetic problem. A thick, high frenum attachment in the maxilla, is commonly regarded as a contributing etiology for midline diastema and delayed upper jaw development. Hence, a focus on the frenum has become necessary. Frenum is derived froma Latin word 'frenulum' which means 'little bridle'. They are triangular shaped folds found in the maxillary and mandibular alveolar mucosa, and are located between the central incisors, canine and premolar area.[2] It is an anatomic structure formed by a fold of mucous membrane and connective tissue fibers that attach the lip and cheeks to the alveolar mucosa, and/or gingiva and the underlying periosteum. Depending on the attachment of the fibers, frenums have been classified according to Placek et alas follows[3]:

- **Mucosal:** Fibers that are attached up to the mucogingival junction
- **Gingival:** Fibers inserted within the attached gingiva
- **Papillary:** Fibers extended into the interdental papilla
- **Papilla penetrating:** When the fibers cross the alveolar process and extend up to the palatine papilla

Access this article online

Website: www.ujds.in

Quick Response Code

DOI: https://doi.org/10.21276/ujds.2024.10.3.14

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Received : 5 July, 2024, **Published :** 30 Sept., 2024

How to cite this article: Vaishanvi Patil. (2024). Maxillary Frenectomy In Pediatric Patient Using Diode Laser – A Case Report. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 10(3).

Sewerin Classification (1971)[4]

This classification is based on the morphotypes.

- Simple frenum
- Persistent labial frenum
- Simple frenum with an appendix
- Simple frenum with a nodule
- Double frenum
- Frenum with niche
- Bifid frenum
- Frenum with two or more variations at the same time.

According to Miller, the frenum should be characterized as pathogenic when it is unusually wide, or there is no apparent zone of attached gingiva along the midline, or the interdental papilla shifts when the frenum is extended. Clinically, papillary and papilla penetrating frenum are considered as pathological. These pathogenic frenums can lead to midline diastema, gingival recession, interference with retention of denture, and compromised gingival health because of poor plaquecontrol.[5] Once the indication for frenectomy has been established there are several surgical techniques that the clinician can use, like conventional scalpel technique, electrosurgery, or soft tissue lasers.[6] Conventional scalpel technique and laser surgery are the most commonly used techniques. Patients who undergo conventional frenectomy procedures using a scalpel, often have advantages like its user friendliness, cost effectiveness, precision, control, conservation of tissue integrity and superior associated wound healing. But the disadvantages of the scalpel include greater requirement of anaesthesia, necessity of suturing, poor hemostasis, adverse post-operative sequelae such as pain, swelling and discomfort.

There is another method forfrenectomy i.e electrosurgery, which has been used for a variety of soft tissue proceduresin Dentistry since 1928. It's coagulative effect ensures a bloodless area and clear view of the operative field. However, the disadvantages of Electrosurgery are - it may lead to delayed healing and increase the risk of wound dehiscence.[1]

In addition to these techniques, which have been used for a long time, laser surgery has become a preferred technique in recent years. This is due to it's suitability for soft tissues, portability, cost-effectiveness, ease of operation, simple setup, and versatility.[6] It has an accurate and selective interaction with the injured tissue, minimized damage to adjacent tissues, reduced scarring and contraction, and perfect hemostasis. In addition to a considerable decrease in the need for suturing, this method reduces the stress level of patients. Depending on tissue interactions and properties such as wavelength and frequency, various types of lasers can be used for soft tissue surgeries, including CO2, Nd:YAG, Er:YAG, and diode lasers.[7] Diode lasers are semiconductor, and they are indicated for soft tissue surgeries, as their wavelength approximates the absorption coefficient of pigmented tissues containing hemoglobin, melanin, and collagen chromophores.[3] It has an affinity for wet tissues and has become popular in recent years, for its effectiveness and ease of use in intraoral soft tissue surgery.

This case report describes the procedure of performing maxillary labial frenectomy using diode laser in a pediatric patient.

Case Presentation

An 8-year-old female patient with the chief complaint of malaligned teeth in the maxillary anterior region, was referred to the Department of Pediatric and Preventive Dentistry for the evaluation of malaligned teeth. On intraoral examination, midline diastema and high frenal attachment were observed. Also the labial frenum was thick and wide. Tension test was performed (by applying tension over it blanching was produced). After detailed explanation of procedure, written consent was obtained from the patient. All the precautions and care were taken before performing the laser treatment.

Procedure:

The labial frenum was sprayed with topical anaesthetic spray, and infiltration anesthesia was given to the frenum. The laser was activated before performing the procedure. Tip at 400 µm was used with a power of 1 W (Biolase) and was applied in contact mode(fig 3). The incision was started with the frenum from the attached gingiva, and interdental papilla on the labial surface, between the central incisors, extending upward from inner side of upper lip to the depth of vestibule - ending in a rhomboidal area causing separation of the fibers(fig 2). Hemostasis was optimal and no sutures were given. The patient was given verbal instructions to avoid taking hot and

spicy food for a few days, and to maintain meticulous oral hygiene. Postoperative analgesics were given to the patient. After one week of follow-up, significant healing with normal mucosal type of frenal attachment was observed(fig 5).

Figure 1- Papillary Penetrating Frenum Preoperative

Figure 2 - Excision of The Frenum with Diode Laser

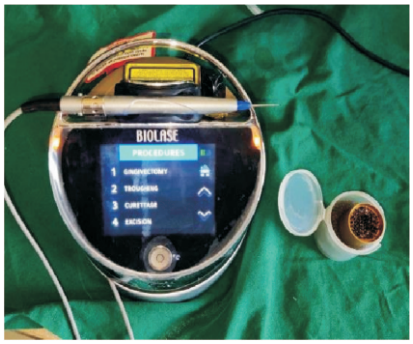

Figure 3 - BIOLASE Laser

Figure 4 - Immediate Postoperative View

Figure 5 - Follow up After One Week

Discussion :

Aberrant maxillary labial frenum is common in children with primary or mixed dentition. The presence of an aberrant frenum being one of the etiological factors for the persistence of a midline diastema, the focus on the frenum has become essential. The aberrant frenum can be treated by frenectomy or by frenotomy procedures.[2]Scalpel methods have conventionally been the first treatment of choice for frenectomy. However, minimally invasive surgical techniques are increasingly gaining importance as alternative treatment modalities.[6] Lasers now offer an optional mode of surgery, showing higher precision when compared to surgical tools, which results in less pain, bleeding, swelling and scarring. The procedure is less time consuming, easy to perform and no sutures are required, which decreases the risk of post-operative infection. Currently, numerous laser systems are available for dental use, like neodymium-doped yttrium aluminum-garnet (Nd:YAG), carbon dioxide (CO2), semiconductor diode lasers , erbium-doped.[3] Its applications include frenectomies, ablation of lesions, incisional and excisional biopsies, gingivectomies, gingivoplasties, deepithelization, soft tissue tuberosity reductions, operculum removal, coagulation of graft donor sites and certain crown lengthening procedures.[9] Surgical hard lasers, however, can cut both hard and soft tissues.

In the present case, diode laser, which characteristically uses a blend of gallium, arsenide, and other elements such as aluminum and indium was used. The wavelength of this laser is feebly absorbed in water but extremely absorbed in hemoglobin and other pigments. Diode laser is considered as an excellent soft tissue laser as it does not interact with dental

hard tissues.[3] They provide excellent wound sterilization along with hemostasis and reduced postoperative pain. As it transmits energy to the cells, causing warming, welding, coagulation, protein denaturization, drying, vaporization and carbonization.[8] It has a coagulation effect on small vessels, which provides hemostasis and seals the sensory nerve endings, providing reduced need for anesthesia.[9]

In this case, we have reported a diode laser frenectomy with no complications and excellent patient satisfaction. We used infiltration anesthesia and local anesthesia spray for the procedure. Most of the studies conducted on laser frenectomy have been performed using topical spray with or without infiltration anesthesia.[9] Haytac et al. and Butchibabu et al. suggested that soft tissue laser treatment used for frenectomy operations provides better patient perception in terms of postoperative pain and function, than that obtained by the scalpel technique.[3] Diode lasers are exclusively used for soft tissue surgeries and there is no risk of etching or injuring the enamel, because the wavelength of diode laser does not interact with tooth structure. In addition, they are relatively compact and low cost.[10]All these factors justify the use of diode laser in these cases, and make diode laser a perfect choice for frenectomy.

Conclusion:

This case report clearly shows that diode laser definitely has an advantage over conventional methods of frenectomy, as it prevents bleeding and swelling, and is associated with minimal or no postoperative pain. Thus, practitioners should consider integrating diode laser in soft tissue surgical procedures for the benefit and comfort of the patient. In the modern dental practice using laser technology, similar procedures can be accomplished with less invasive methods, resulting in a more relaxed appointment and less postoperative discomfort.

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