

Use of CO₂ Laser in Lingual and Labial Frenectomy

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ABSTRACT

Ankiloglossia or frenum lingual alteration leads to important tongue dysfunction, which, besides discomfort and pain during function, is generally responsible for the difficulty to express specific phonemes. In other cases, a heavy muscular abnormal attachment of labial frenum can promote clinical changes. In such case, an eventual orthodontic therapy is indicated and aesthetic alteration is observed. In both cases, surgical removal is indicated. The surgery, for prevention purposes, must be done as soon as possible, but considering that the majority of patients are young (5 -14 years old), difficulties during surgery are expected to occur. Correction of speech or orthodontic dysfunction in advanced ages is much more complex and difficult than in childhood. In the present work we demonstrate that the use of CO₂ lasers in these cases are advantageous and simple. The laser energy causes the tissue of the frenum to open in the classic shape with no bleeding and no need for suture, reducing the risk of cross-contamination and of postoperative infection. Scarring and other complications are also minimized. A CO₂ laser (continuous, 8 W, 10.6 micrometers) was used assisted with local anesthesia. The major advantage of laser is the possibility of its application in early ages, preventing further problems.

Keywords: Ankiloglossia, Labial frenum, Diastema, CO₂ Laser, Laser Surgery, Abnormal frenum, Lingual frenum

1. INTRODUCTION

The frenectomy procedure, first described by Hirshfeld¹, is indicated when clinical evidences show that the labial frenum is promoting tension to the teeth, resulting in alterations such as anterior diastema (between central incisors), periodontal problems, interference in orthodontic treatment and aesthetic alteration. The labial frenum is a fold of tissue, usually in triangular shape, extending from the superior midline area to the midportion of the lip.

In the same way, the removal of lingual frenum is indicated when the patient presents alterations during function, either masticatory or phonatory, with or without pain. The lingual frenum appears like a muscular attachment in median line of anterior face of the tongue, responsible by anterior fixing. Ankiloglossia can promote clinical alterations: phonetical problems, appearance of abnormal lingual pression and until secondary malocclusion^{13, 14}.

Its important to distinguish, on the bases of clinical testing, a normal and abnormal labial frenum. Studies of Becker², Bergstroem³, James⁴, Jacobson⁵ e Kaban⁶ conclude that muscle attachment of frenum is not always the responsible for diastema. Its etiology is varied: atypical deglutition, supernumerary tooth, cysts, fibrous dysplasia, and benign and malignant neoplasm⁷. Some studies show that the endocrine gland imbalance may be a systemic etiologic factor in diastema too⁸. Gardiner^{11,12}, in contradiction, found in a cross-sectional survey of 1000 children between 5 to 15 years old, that 80 per cent of patients with diastema were associated abnormal frenum.

When a correct diagnosis is done, the treatment is always the surgical excision of the frenum, which can be the prevention of future disorders, just reducing the natural forces that act keeping the central incisors separated. Where an inadequate area of attached gingival is observed, surgical treatment should include a gingival graft¹⁷. However there is a general agreement among professionals that the frenectomy have clinical validity only in conjunction with orthodontic treatment^{15,16}, although there is also some evidence that frenectomy prior to orthodontic closure increases the speed of tooth movement, if it is really well indicated.

Before presenting the technique using the CO₂ laser, we must consider the difference between *Frenectomy* and *Frenotomy*. In first case, we have the completely removal of the frenum, including its attachment to the bone, while in the second case the procedure represents the partial removal without contact with bone or periosteum.

The conventional scalpel technique is an easy way to remove the frenal tissue, and there is various diversification about this classical surgery: horizontal relaxing incisions at the mucogingival junction, interdental and sub apical osteotomies (by Bell), Z-plasty technique, CSF technique (circumferential supracrestal fiberotomy, developed by Edwards), technique that combines the frenotomy with no excision of the marginal papilla . "curtain type" of gingivectomy of the palatal tissue (by Frish, Jones and Bhaskar)⁹. In all techniques, some considerations must be done: in classical surgery, there is always bleeding, during the procedure, the oral tissues are handled with different instruments which makes easy the contamination of the area; after tissue removal, the incision must be closed and this suture can promote discomfort to patient and create an area for food impaction, difi culting the healing process. Those factors are critical, mainly if we consider that the majority of patients are children. The postoperative period is, sometimes, complicated, with pain, strong edema and hematoma. The literature explain that labial frenum must be removed prior to eruption of the superior incisors and canines; since many studies observed that most diastemas, closed spontaneously with final the eruption of anterior teeth⁹. Taylor¹⁰ describes that the presence of maxillary midline diastema is normal in 98 per cent of 5 to 7 year old children.

The objective of this study is to present another method for the removal of both frenum (lingual and labial), to following the conventional surgical technique but using CO₂ laser. We describe our recent results and its advantages during the surgery itself and during the healing process



Fig 1. Labial frenum promoting tension to the teeth . Note the diastema.



Fig 2. Lingual frenum with very short insertion leading to phonetical disorders in adult.

2. MATERIALS AND METHODS

Fifteen patients, 5 to 14 years old, were treated at the Laser Medical Center - HC – UNICAMP, with indication of ENT Department and Buco Maxillary Surgery Service. The patients were examined and investigated with correct anamnesis. After questioning about general health and preceding diseases, we focused the anamnesis to complaints of patient dysfunction's and alterations such as: pain (just in ankiloglossia), discomfort, atypical deglutition, bucal respiration, what type of phonetical alterations and if the abnormal frenum is causing interference in oral hygiene. The labial frenum was always pulled to observe the "blanching" of the palatal tissue and incisive papilla, and when positive, the sign of a remaining fibrous attachment, confirmed the surgical removal indication.

A panoramical radiography was solicited to comprove the diastema and to control the closure in the future. If necessary, a periapical radiography of the area was solicited, too. In case of lingual frenectomy, the X-Ray is not necessary. In all of the

cases, the photographic documentation is done before the surgical removal, at 15 and 30 days return and also at 6-month revision.

All patients with phonetical disturbs are oriented to search speech therapy after the surgery (sometimes the speech therapists recommend the removal of lingual frenum).

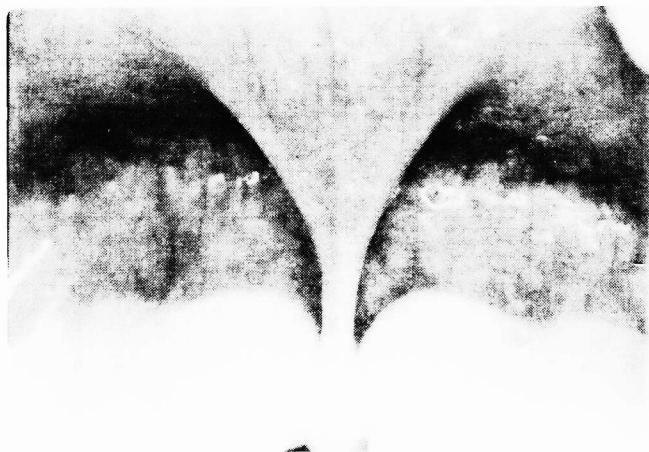


Fig 3. 5 year-old child, with abnormal frenum and diastema. Note the size and extension of the frenum at the papilla.

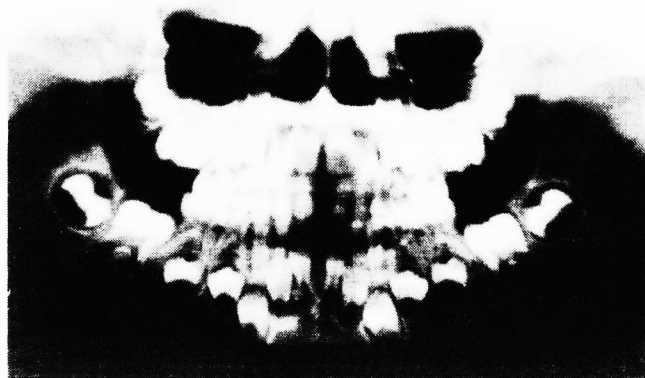


Fig 4. Panoramic X-ray of the same child (fig. 3), comparing the presence of diastema (superior and inferior). Observe the deciduous dentition.

2.1. TECHNIQUE:

Before laser procedure, the protection of patient is taken care: the eyes are protected with gauze imbibed in physiologic solution and orientations about the procedure are presented to children, minimizing the stress. This dialog is important since the children are in a hospital environment , which is always hard for them and also because they have to be kept with their eyes closed during the surgery.

2.1.1. The procedure begins with local anesthesia, using Lidocaine 2% (no vasoconstrictor) and 30-gauge needle. It is infiltrate, a small amount, proximately 1,8 ml of anesthetic, is infiltrate next to the frenum on the upper lip area and incisive papilla (generally, infiltrated inside of incisive foramen) . In case of lingual frenectomy, we must be carefully with the anatomy of the area, because we have important vessels and the ducts of sublingual gland.

2.1.2. Small rollers of gauze imbibed in sorus are positioned in vestibule area (between teeth and lip) to protect the teeth and others soft tissue of laser radiation. A SHARPLAN 40C CO₂ Laser, with 10.6 micrometers wavelength equipment is used for surgical procedures. A continuous 8-Watts focussed power was used to "cut" the frenum. The laser is applicated perpendicularly to the tissue, opening the triangular area. The same power, operating in continuous "Swift Mode"(beam focus of 1 mm, approximately) is used, after the removal, to vaporize the margins, molding the area. During the application, the auxiliary pulls the lip to facilitate and improve the results. An efficient aspiration system is required.

2.1.3. The final assistance consists in orientations about cautions with regular diet on first day, avoiding hard and acid foods that can injure the residual bloodstained area. These orientations are given to patient and also to responsible considering that most of them are children. Cold food or iced compress is recommended to minimize an eventual pain or edema. Only systemic analgesic is prescribed, to be used only if necessary.

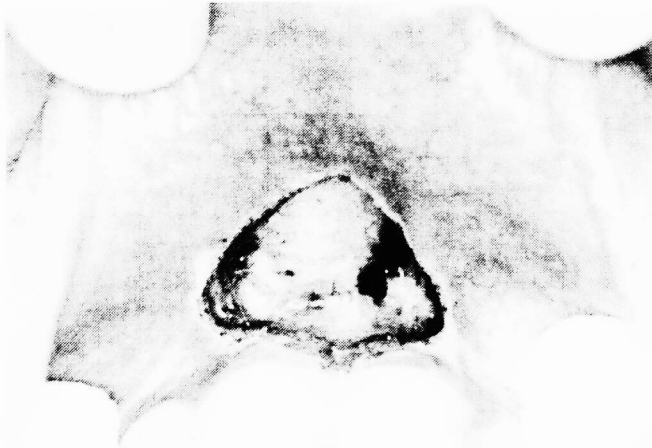


Fig 5. Immediately postoperative aspect after labial frenectomy with CO₂ laser. Note the absence of bleeding and no suture.



Fig 6. Immediately postoperative aspect after lingual frenectomy using CO₂ laser. This is the result of frenectomy on patient of fig. 2. Same observations as in fig 5 concerning surgical condition.

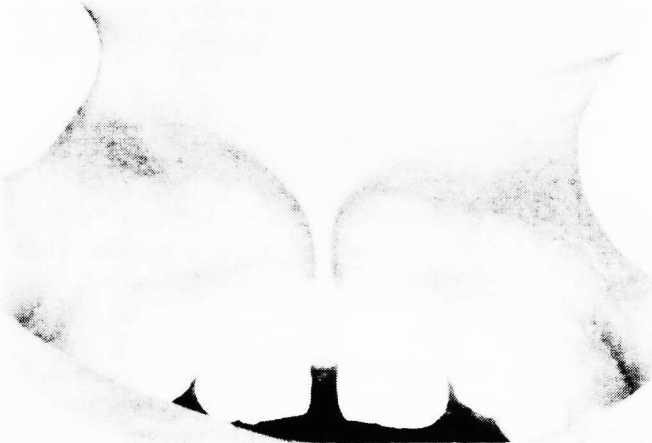


Fig 7. A 9 year-old boy with anterior diastema. The orthodontist indicated the frenectomy. Prior to surgery, the space between incisors was 5 mm.



Fig 8. Clinical aspect after 30 days of the surgery. Here, we already had a spontaneous small reduction of the diastema (1 mm).

3. DISCUSSION AND RESULTS

The laser therapy results in successful elimination of the abnormal frenum, besides being a secure and fast procedure method. The CO₂ laser has a wavelength of 10.6 microns, which is well absorbed by water and, so, by tissues that have a high water content (biological tissues are composed of 70% to 90% water). The resulting effect is that of highly localized tissue removal through evaporation or vaporization. Unlike the scalpel surgery, the laser has the capacity to coagulate, vaporize or cut and this interaction of the laser with the oral tissue promotes many advantages over conventional surgery .

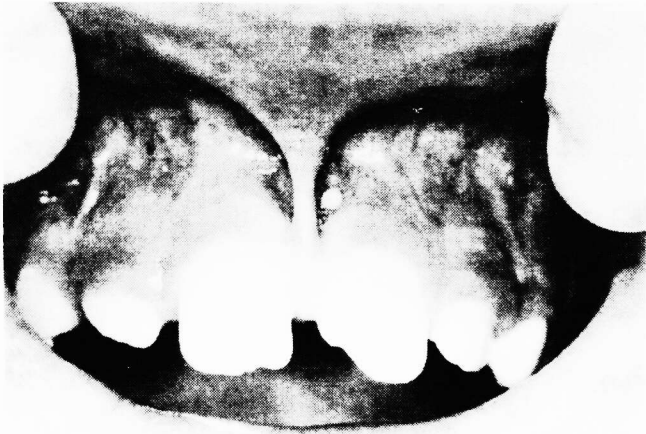


Fig 9. Initial clinical aspect of labial frenum and papilla. This was the only patient that had a slight complicated postoperative, because she traumatized the area.

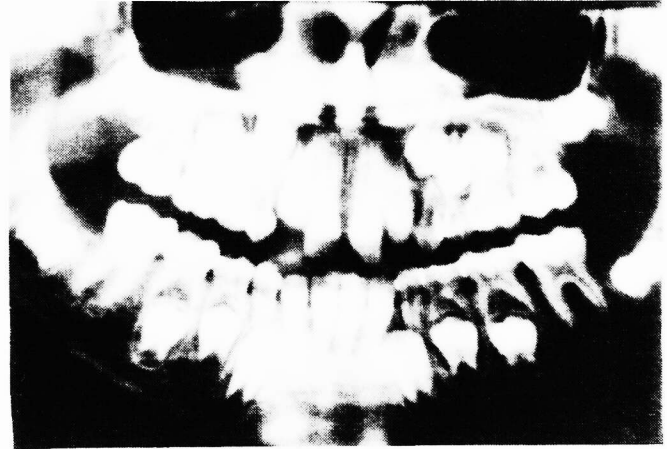


Fig 10. Panoramic X-ray of patient (fig 9). Observe the superior incisors area comprising the diastema.

The laser surgery presents *hemostasis*, because the laser coagulates most of small vessels along the incision, resulting in a clean site and because of the high temperature in the cut or vaporized area, a good sterilization of the surgical wound is achieved. Decreased swelling, postoperative trauma, scarring and time of surgery is also observed. The laser energy cause the tissue of the frenum to open in classic shape with no bleeding and no need for suture, reducing the risk of cross-contamination and of postoperative infection so, permitting a simple and fast ambulatorial procedure.

Fifteen cases using the CO₂ laser for removal of lingual or labial frenum have been performed at our institution over this year and all of them present perfect results. The surgical procedures took no more than 10 minutes and the patients had a satisfactory postoperative without pain or edema. In three cases, the analgesics were used only for prevention reasons, not for necessity. After five days of lingual or labial frenectomy, all of patients were in normal diet and habits. The healing process is completed by secondary intention.

In only one case we had complaints during healing process, and it happens because the patient, an 8 year-old girl (fig 9), kept handling the local for curiosity . All others patients presented a perfect healing and the area of frenum incised with laser were totally healed after 15 days.

The laser, in our concept, offers the surgeon a viable alternative to the scalpel and excellent results on its use in frenectomies.

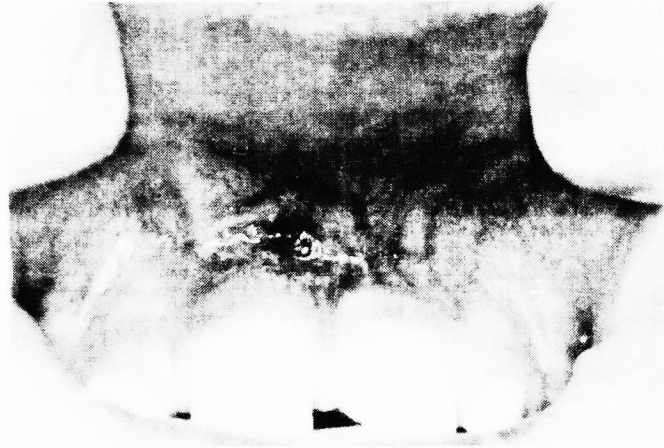


Fig 11. Final clinical aspect (fig 9), after only 15 days after the frenectomy.

4. CONCLUSION

Surgical Lasers offer to the general practitioner an extended and successful alternative for soft tissues treatment. The CO₂ laser, in special, through the controlled penetration and its effects on oral tissue, permits a precise surgery and satisfactory results. Minimal postoperative trauma without pain and edema, as well as the elimination of sutures and the easiness to natural healing process, benefits the patient and the clinician. The use of laser to remove the lingual and labial frenum, permits the surgery in early ages which helps the natural closure of diastema and, in some cases, avoid orthodontic treatment. Even when frenectomy do not succeed to promote spontaneous closure of diastema, it surely speeds the teeth movement in orthodontic therapy.

ACKNOWLEDGMENTS

The first author thanks the CAPES for financial support. All authors thank the UNICAMP (Audiovisual Department) to technical support.

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