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Case Series

Lingual Frenectomy using Diode Laser – A Case Series

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Abstract

Ankyloglossia (tongue-tie) is a rare congenital oral anomaly that can cause difficulty breast-feeding, speech articulation, and difficulty in cleaning teeth thus hampering the oral hygiene. Frenectomy is a procedure in which frenum is completely excised and can be performed using scalpel, electrosurgery, and laser. This is a case series of 3-month follow-up of three lingual frenectomy cases performed using diode laser. Class II ankyloglossia and Class I ankyloglossia were noted in Case 1 and 3 and Case 2, respectively. Lingual frenectomy was performed under local anesthesia using diode laser. The healing was assessed after 1 week, 1 month, and 3 months.

Key words: Ankyloglossia, Diode laser, Frenectomy, Healing, Suture

INTRODUCTION

Lingual frenulum is a fold of mucous membrane that attach from floor of mouth to the base of tongue. "Ankyloglossia" also called tongue-tie originates from the Greek words "agkilos" (curved) and "glossa" (tongue).[1,2]

Wallace defined tongue-tie as "a condition in which the tip of the tongue cannot be protruded beyond the lower incisor teeth because of a short frenulum linguae, often containing scar tissue."[3] The exact etiopathogenesis is not known, but it has been put forward that there is a possible involvement of human Leucine-rich repeat-containing G-protein coupled receptor gene playing a genetic role.[2,4]

Free tongue is defined as the length from the insertion of the lingual frenum into the base of the tongue to the tip of the tongue. As tongue is a muscle, which is flexible in young children, also often difficult to stabilize, its measurement is determined by placing a dental instrument at the insertion point and approximating the tip of the tongue. Boley gauge is used for the purpose of measuring the distance.[5]

Kotlow's classification of tongue length which classified as:[5]

1. Clinically acceptable, normal range of free tongue: >16 mm
2. Class I: Mild ankyloglossia: 12–16 mm
3. Class II: Moderate ankyloglossia: 8–11 mm
4. Class III: Severe ankyloglossia: 3–7 mm
5. Class IV: Complete ankyloglossia: <3 mm

This case series will be discussing use of diode laser for the management of ankyloglossia.

CASE REPORTS

Case I

A 22-year-old male patient reported to the Department of Periodontology, D Y Patil School of Dentistry, Navi Mumbai, Maharashtra with c/o speech difficulty. General examination and physical examination were normal. On examination, Class II ankyloglossia was noted according to Kotlow's assessment. Patient had difficulty in pronouncing words starting from "s". After detailed examination, Lingual frenectomy using diode laser was performed for the patient [Figure 1].

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Case II

A 27-year-old male patient reported at the outpatient department of Department of Periodontology, D. Y. Patil School of Dentistry, Navi Mumbai, Maharashtra with c/o speech difficulty with receding gums in the lower front teeth. General and physical examination conducted was normal. On examination and Phase I therapy, Class I ankyloglossia was noted according to Kotlow's assessment. 31 was congenitally missing and 41 showed microdontia. Gingival recession developed on lingual aspect of mandibular teeth. After detailed examination and Phase I therapy, laser lingual frenectomy was performed [Figure 2].

Case III

A 26-year-old female patient reported to the Department of Periodontology with c/o difficulty in speech and protrusion of tongue while talking. On examination, Class I ankyloglossia was noted. Patient was asked to pronounce certain words starting with "s" where slight impairment in speech was noticed [Figure 3].

Figure 1: CASE I - Baseline

Figure 2: CASE II - Baseline

Surgical Procedure

Lingual frenectomy was performed using a diode laser (Biolase-Epic™, USA). An informed consent was taken. About 0.2% of lignocaine was injected in the frenum and tip of the tongue. A suture inserted through the dorsal surface of tongue facilitates manipulation of tongue during the procedure. Biolase diode laser with delivered optical power of 1.5 W maximum, with an initiated fiber optic tip of 400 mm in pulse mode, was used. The tongue was held with suture and the excision of tissue was done when diode laser worked in a contact mode. The laser tip was used slowly in a brushing method from apex to base excising the frenum. A diamond-shaped wound was seen after excision and protrusion of tongue was checked by asking the patient to touch the tip of tongue to the palatal surface of incisor. Bleeding was minimal and 4–0 non absorbable braided silk sutures were placed to enhance faster healing. Patients were prescribed analgesics and followed up for 3 months [Figures 4,5,6].

RESULTS

Healing was uneventful and satisfactory. The protrusion of tongue was improved in all cases. Patient was advised tongue exercises (physiotherapy) during the follow-up intervals.

DISCUSSION

Tongue tie is an abnormal condition of lingual frenum.[3,6] The frenum may be attached near the tip of the tongue and held close to the gingival margins of the lower anterior teeth.[6,7] Sometimes, it may extend across the floor of the mouth attaching to the mandibular alveolus.[6,8] In general, diastema is not formed between the mandibular central incisors because of the lingual frenum, but it can

Figure 3: CASE III - Baseline

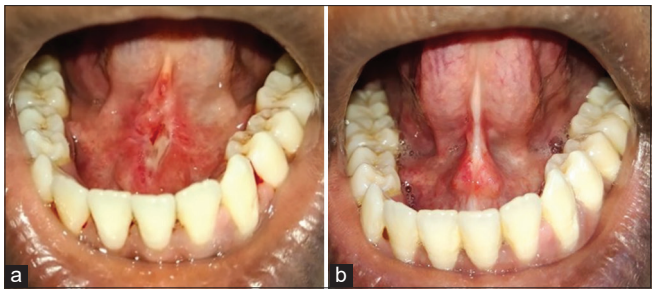

Figure 4: Case I: (a) Post-operative and (b) 3-month follow-up

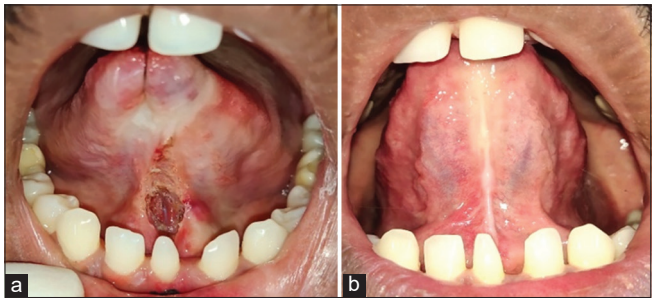

Figure 5: Case II: (a) Post-operative and (b) 3-month follow-up

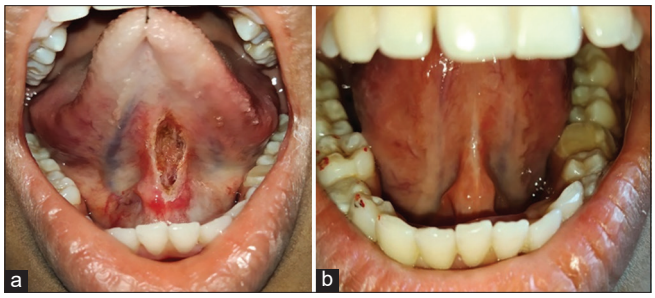

Figure 6: Case III: (a) Post-operative and (b) 3-month follow-up

cause tension in the floor of the mouth, pulling the tissue behind the mandibular incisors resulting in recession or the development of a diastema between the mandibular central incisors.[5,6] Some authors have claimed that there is development of anterior open bite due to the inability to raise the tongue to roof of mouth, which prevents the development of a normal swallowing pattern.[6,9]

Management of ankyloglossia can be done by various methods, by conventional technique such as frenectomy by simple excision of frenum; Z plasty, as explained by Kaban that has an advantage of scar lengthening and providing increased potential for the post-operative mobility of tongue; however, the technique is more difficult.[10]

Based on theories and principles first put forth by Einstein in the early 1900s, laser is an acronym for laser. In 1960, Maiman introduced the first actual laser system.[6,11] Laser light is a simulated single-photon wavelength. The lasing process occurs when an excited atom is stimulated to remit a photon before it occurs spontaneously. This stimulated emission of photons bring about a very coherent, collimated, and monochromatic ray of light.[12]

Laser technology is also considered as an alternative to the conventional technique, presenting several advantages such as shorter operative working time, tissue cauterization and sterilization, hemostasis, minimal local anesthesia requirement, and few post-operative complications such as pain, swelling, and infection.[13] Laser also has an advantage of accessibility and visibility due to the lack of insinuate instruments and bleeding at the operative field.[14] Laser also contribute to uneventful healing of the wound due to low level laser therapeutic effect and being bactericidal in nature.[15]

Erbium: YAG lasers and diode lasers are becoming popular over conventional techniques since laser is a less invasive method and it has ability to seal lymphatic channels resulting in reduced post-operative edema, sealing of nerve endings leading to reduced inflammatory response, and formation of a fibrin clot over the surgical wound protecting the wound from external irritation, causing less pain after surgery, and avoiding the use of analgesics.[16]

Basic concept of surgical laser is the photothermal interaction with tissue. In this process, the radiant light is absorbed by the tissue and transformed to heat energy causing changes in tissue structure. On contact with the tissue, laser light is converted to thermal energy leading to laser tissue interaction which when applied aptly can produce reaction varying from the incision, vaporization, and to coagulation.[10,17,18] Laser's wavelength has an affinity for melanin or dark pigments and is firmly absorbed by the blood hemoglobin, which contributes to their thermal effect. As a result, this laser works more effectively when the energy is applied in the presence of pigments; therefore, homeostasis occurs at this wavelength. Another economical alternative is electrosurgery; however, its use is limited to the milder form of ankyloglossia and a second visit is required for releasing the tongue.[10,19]

Physiotherapy of tongue was advised to the patients following the surgery.

Post-frenuloplasty tongue exercises are as follows:[20]

1. Push tongue in and out of mouth (5 repetitions)
2. Open the mouth as wide as possible and attempt to touch the tip of the tongue to the back of the upper teeth (five repetitions)
3. Move the tongue from one side of the mouth to the other, without moving the jaw (five repetitions)
4. Place food of choice on one side of the mouth between the cheek and back teeth. Using the tongue, move the food from one side of the mouth to the other, and then

back again (five repetitions). (Patients are instructed to perform the above series of exercises 3–5 times daily for several weeks postoperatively).

These exercises are not considered to increase muscle strength, but to:[21]

(i) Develop new muscle movements, involving elevation and protrusion of tip of the tongue
(ii) Encourage movements of tongue for cleaning the oral cavity such as sweeping of inside the cheeks, front, and back of the teeth, and licking right around both lips.

All subjects underwent tongue exercises after surgery as protrusion, position of tongue in the lingual papilla against the cheeks, and lateralization with food.[20,22,23]

CONCLUSION

Early diagnosis and prompt treatment is required in avoiding long-term effects of problems. It is important to assess the subjects before and after surgery, resulting in assurance in cases of lingual frenum alteration.

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