Case report

DIODE LASER AIDED FRENECTOMY FOR SEVERE ANKYLOGLOSSIA – A CASE REPORT

ABSTRACT:

Ankyloglossia is a congenital disorder that develops when the inferior lingual frenulum is excessively short and attaches to the tip of the tongue, restricting its movements. It results in limited tongue mobility, which in turn affects speech and also leads to growth discrepancies. Diode lasers can be utilized as a secure surgical tool for correcting tongue tie using a minimally invasive dentistry technique and for also easing young patients' anxiety towards dental treatment. The use of a diode laser with a 976 nm wavelength for frenectomy procedures has been reported only in a few numbers till date. Hence, this paper describes the case of 13 year old male patient with the complaint of restricted tongue movements and speech difficulties and its management. Early detection and appropriate surgical intervention are the crucial factors to avoid problems related with Ankyloglossia and help the patients to lead a better life.

Key Words: Ankyloglossia, Diode Laser, Frenectomy, lingual frenulum

INTRODUCTION:

Ankyloglossia is a term originally from the Greek words skolios (curved) and glossa (tongue). Ankyloglossia, commonly known as tongue-tie, is a rare congenital disorder characterized by a lingual frenulum that is unusually short and thick in the genioglossus muscle or fusion of the tongue's underneath to the floor of the mouth, which restricts the movement of the tongue tip. In 1963, Wallace published the first literary description of ankyloglossia.[1,2] The accurate etiopathogenesis of tongue tie is unclear. This condition can lead to skeletal development, malocclusions, gingival recessions in the lingual aspect of mandibular anteriors, obstacles to swallowing, feeding issues in infants, and difficulties with eating in young children as well as social problems in school-aged children, it is challenging to pronounce consonants like d, t, n, ch, z, and l as well as roll a "r" in syllables.[1,3] Additionally, mouth breathing and snoring are mentioned as potential effects of limited tongue mobility.[2] It is more common in males (2.5:1) and has been found to affect between

0.02% and 11% of the general population and 4.4% to 4.8% in neonates (newborns) and having male to female ratio 3:1.[3,4]

Ankyloglossia is frequently asymptomatic; those who are affected might either learn to adjust for their reduced lingual movement on their own or the condition may resolve on its own. However, some people benefit from surgical treatment for their tongue-tie, including frenotomy, frenectomy, and frenuloplasty.[5] The Blanch test is the most frequent technique for identifying high frenum attachment. Canine and premolar areas, as well as the central incisors of the maxilla and mandible, are the most frequently affected regions by frenum anomalies.[6] Scalpel, electrocautery, and most recently lasers have all been used for surgical removal of frenum. Among these, the adoption of the laser approach has produced excellent outcomes.[6] Lasers was first invented by Maiman in 1960, due to their increased accuracy, improved visualisation, decreased haemorrhage, and decreased postoperative complications, lasers are quickly replacing traditional surgical techniques as the standard of care for many surgical procedures. Numerous procedures can also be carried out using lasers without the need for anaesthesia. Since it causes less discomfort, the patient accepts it well. The fundamental idea behind laser surgery is photothermal interaction with tissue. The most recent generation of diode lasers has demonstrated an excellence in outcomes attained superior to earlier CO2, neodymium, and erbium models.[7,8] In this case report study, we present a case of ankyloglossia management using diode laser aided frenectomy.

CASE REPORT:

A thirteen year old male patient reported to the department with the chief complaint of difficulty in complete tongue projection and minor impairment of speech. His medical and dental history revealed to be insignificant. His psychosocial history found that his speech issues had previously caused him to lack confidence and to be reluctant to engage in conversation with his fellow students. No aberrant results were found during extraoral examination. On intra oral examination, it revealed that patient has short lingual frenum, V shaped notch in tip of tongue, completely restricted tongue movements, mild crowding in mandibular anteriors, there was no gingival recession with respect to lingual aspect of mandibular anteriors, labially placed 13,23 and missing 42 (Fig.1). The results of the speech evaluation indicated that sibilant consonants as well as the r sound were difficult to pronounce. He was diagnosed with class IV ankyloglossia with Kotlow's classification (Fig.2). Laser assisted frenectomy was planned and patient was priorly notified about the

treatment plan and informed consent was obtained. Further, patient were advised for routine blood investigations and results were found to be within normal ranges.

CLINICAL PROCEDURE:

The manufacturer's recommended safety protocol was strictly followed. The operator, the patient, and the assistant were worn safety eyewear (Fig 3A). In order to prevent the LASER beam from reflecting, highly reflective or mirror-like objects were avoided. Prior to administering local anaesthetic, a topical anaesthetic gel was administered. 2% lignocaine and 1:80,000 adrenaline (LOX 2% Adrenaline) were used to anaesthetize the surgical area. The frenulum and tongue were held by a needle holder to facilitate visualization and retraction near the operating field (Fig.3B). The frenectomy procedure was carried out using Diode Laser (LX 16 Plus Diode Laser System, Guilin Woodpecker, China) with the wavelength of 976± 20nm × 10 Hz frequency, at the maximum power of 3W, with an initiated fiberoptic tip of 300µm and long pulse mode as recommended by the manufacturer's instructions in contact mode to control the depth of penetration. In order to excise the frenum, laser tip was applied in a brushing motion from the apex of frenum to the base of the frenum. On both the right and left sides, a cut in the form of an inverted "V" is ideal (Fig.3C). By making the cut deeper towards the midline, this treatment caused tractions to loosen gradually yet quickly, allowing the tongue to be lifted immediately towards the palate. To ensure quick and accurate execution of the procedure, the fibre required to be triggered each time, Whenever the cutting power was turned off. This required combining residue removal with gauze dampened with physiological solution. Following excision, a diamond-shaped wound was evident (Fig 3D) and protrusive tongue movement was checked post operatively (Fig.4). No sutures were required, and there was no bleeding after surgery. Post-operatively, the patient had reported no pain. Further, he was advised to use analgesics, if necessary and post operative instructions were given. Additionally, the adjacent structures in the tongue and floor of the mouth must be taken into account while performing lingual frenectomy, in order to maintain the tongue sensation and to prevent bleeding, care must be made to avoid bilateral lingual arteries and nerves. Follow up was done after one week, healing was found to be uneventful.

DISCUSSION:

Ankyloglossia has been a contentious topic for many years, with practitioners from a variety of professions holding wildly divergent opinions on its importance and treatment..

However, some people with tongue ties benefit from surgical intervention, such as frenotomy, frenectomy, or frenuloplasty. Patients should be advised of the potential long-term implications of tongue-tie so they can choose an appropriate course of treatment.[10]

The tongue's ventral surface and the oral pavement's mucosa are connected by the lingual frenum, a fibro-mucosal fold. This unusual congenital condition happens as a result of cellular degeneration failure, which causes the tongue's anchorage to the floor of the mouth to be longer.[11] Despite the fact that ankyloglossia, is not a significant symptom, it can cause a variety of issues, including difficulties with infant feeding, malocculsions and social problems because the tongue is unable to protrude. Above all, difficulties with speech might arise when the tongue's mobility is restricted by ankyloglossia.[12] In this present case as well, patient had difficulties in pronouncing the letters s, z, d, t, l, ch and zh, especially roll an “r”.

The free-tongue is the total length of the tongue, measured from the base of the tongue to the tip, where the lingual frenum enters. The clinically appropriate range for the normal tongue is higher than 16 mm.[13] According to Kotlow's evaluation, in our case, restricted tongue movement of less than 3 millimetres was seen, and it was determined that there was severe ankyloglossia..

Patients with ankyloglossia have reduced tongue mobility, resulting in the tongue being in a lowered position and putting pressure forward and downward, favouring the development of mandibular prognathism and maxillary hypodevelopment. The development of the typical arch width of the maxillary and mandibular arches are caused by the tongue and buccinator muscle functioning in harmony. Researchers showed that people diagnosed with ankyloglossia were more likely to have constricted maxillary arches, protruding maxillary anteriors, crowding, and open bites.[14] In this case also, patient exhibited maxillary arch constriction, crowding in maxillary anteriors, missing of mandibular right lateral incisor due to constricted mandibular arch were encountered.

In this case, it was discovered that the tongue tie had persisted from birth. However, the patient did not start looking for treatment until he developed social worries about his condition. There are several surgical procedures available for treating lingual frenectomy, including surgical excision, electrocautery, and laser frenectomy. Although it is more intrusive and challenging to conduct a frenectomy on younger children, as was done in this case, the outcomes are more predictable and the recurrence rate is lower.

In this present case, we used Diode laser for frenectomy since, in contrast to the traditional procedure, it has the key advantages of no bleeding, not causing pain or edema during surgery, as well as not causing discomfort thereafter. because it decreases post-operative problems and has strong tissue affinity. Protein coagulation at the wound surface functions as a biological dressing, sealing the ends of sensory nerves, which reduces the perception of pain. Due to decreased collateral damage and lymphatic closure caused by Laser, the postoperative periods were more comfortable.[16]

In this case report, laser frenectomy was successful, and the surgical site recovered after one week, potentially reinserting itself in the ideal anatomic position. The patient's not experiencing post-operative problems shows the laser's efficiency. The use of a laser for surgical frenum removal is well tolerated by patients because of its shorter recovery periods, lack of sutures, reduced postoperative pain and discomfort, less scarring, and lower recurrence rates.

CONCLUSION:

In order to retain acceptable function and aesthetics, frenectomy was performed. There are numerous frenectomy techniques that can be used, however the best technique should be chosen according to the type of attachment and any potential consequences. Prior to treatment planning, cost-effectiveness should also be taken into account. In recent years, Diode lasers-assisted frenectomy has gained popularity because to its minimally invasive nature, low pain threshold, no sutures, no requirement of antibiotics, and high level of patient satisfaction.

Consent

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

Ethical Approval:

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

REFERENCES:

1. Garrocho-Rangel A, Herrera-Badillo D, Pérez-Alfaro I, Fierro-Serna V, Pozos-Guillén A. Treatment of ankyloglossia with dental laser in paediatric patients: Scoping review and a case report. European journal of paediatric dentistry. 2019 Jun 1;20(2):155-63.
2. Jaikumar S, Srinivasan L, Kennedy Babu SPK, Gandhimadhi D, Margabandhu M. Laser-Assisted Frenectomy Followed by Post-Operative Tongue Exercises in Ankyloglossia: A Report of Two Cases. Cureus. 2022 Mar 17;14(3):e23274.
3. American Academy of Pediatric Dentistry. Management considerations for pediatric oral surgery and oral pathology (Reference manual). Pediatr Dent 2018;40:373-82.
4. Khan MK, Jindal MK. Successful rehabilitation of a child patient with ankyloglossia using the diode laser of wavelength 808 nm and speech therapy. Saudi J Oral Sci 2022;9:135-40.
5. Reddy NR, Marudhappan Y, Devi R, Narang S. Clipping the (tongue) tie. J Indian Soc Periodontol. 2014 May;18(3):395-8.
6. Yadav RK, Verma UP, Sajjanhar I, Tiwari R. Frenectomy with conventional scalpel and Nd:YAG laser technique: A comparative evaluation. J Indian Soc Periodontol 2019;23:48-52.
7. Subramanyam D. Laser Assisted Labial Frenectomy-A Case Report. Research Journal of Pharmacy and Technology. 2019;12(8):3883-5.
8. Tancredi S, De Angelis P, Marra M, Lopez MA, Manicone PF, Passarelli PC, Romeo A, Grassi R, D'Addona A. Clinical Comparison of Diode Laser Assisted "v-Shape Frenectomy" and Conventional Surgical Method as Treatment of Ankyloglossia. Healthcare (Basel). 2022 Jan 4;10(1):89.
9. Kotlow LA. Ankyloglossia (tongue-tie): A diagnostic and treatment quandary. Quintessence Int 1999;30:259-62.
10. Chaubal TV, Dixit MB. Ankyloglossia and its management. J Indian Soc Periodontol. 2011 Jul;15(3):270-2.
11. Saskianti T, Aprillia Z, Puteri MM, Zahra AA, Tedjosasongko U. Lingual Frenectomy as Treatment of Ankyloglossia in Children: A case report. Indonesian Journal of Dental Medicine. 2018;1(1):18-21.
12. Pattanshetty et al., Lingual frenectomy with diode laser therapy: A case report.2018:4(1);39-44

13. Suter, V.G.; Bornstein, M.M. Ankyloglossia: Facts and myths in diagnosis and treatment. J. Periodontol. 2009, 80, 1204–1219.
14. Srinivasan B, Chitharanjan AB. Skeletal and dental characteristics in subjects with ankyloglossia. Progress in orthodontics. 2013 Dec;14(1):1-7.
15. Kale AM, Sethi KS, Karde PA, Mamajiwala AS. Management of ankyloglossia. J Oral Res Rev 2019;11:72-5.
16. Akhil S, Paul J, D'Lima JP, Parackal ST, Thomas D, Archana NV. Management of ankyloglossia by diode laser-a case report. IP International Journal of Periodontology and Implantology. 2020;5:41-44.

LEGENDS:

1. **Fig. 1: : Labially placed 13,23 and missing in relation to 42.**
2. **Fig. 2: Preoperative (Kotlow's Class IV Ankyloglossia)**
3. **Fig.3A to D: (A) LASER safety measures (B) Accessibility for operating field using needle holder (C) Application of Diode Laser (D) Diamond shaped wound after excision**
4. **Fig.4: Immediate post operative photograph**

FIGURES:

Fig.1: Labially placed 13,23 and missing in relation to 42

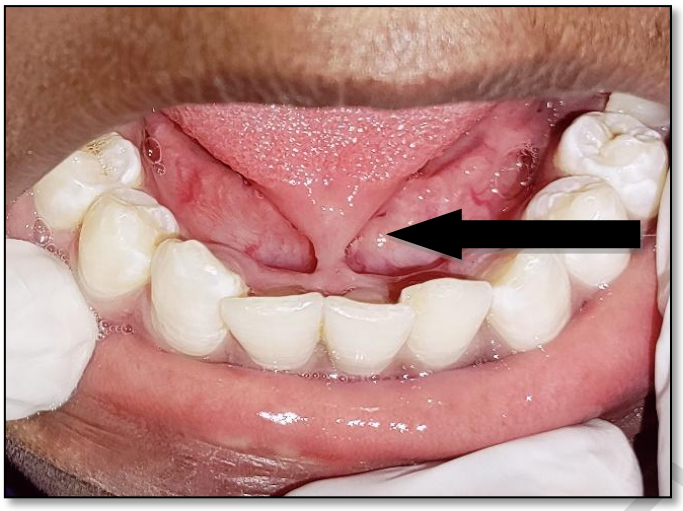

Fig.2 : Preoperative (Kotlow's Class IV Ankyloglossia)

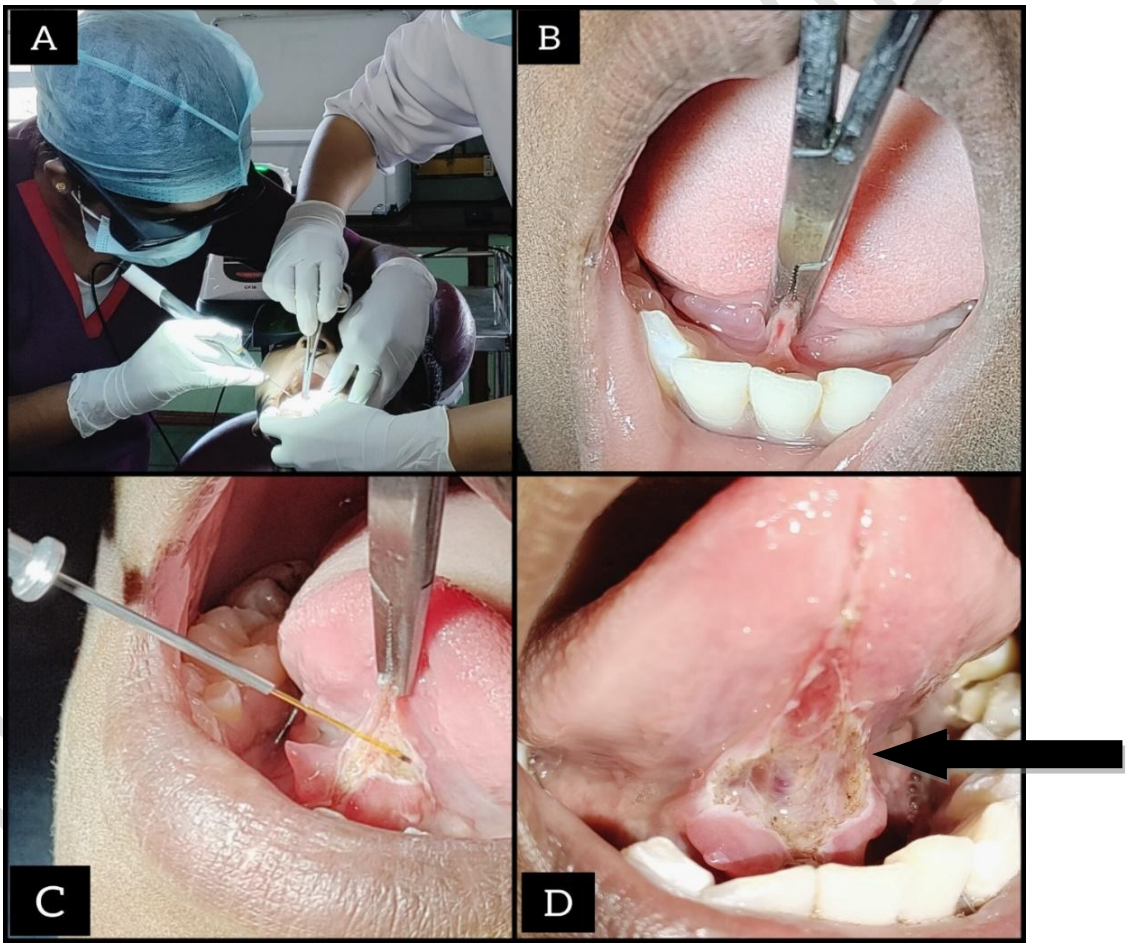

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Fig.4: Immediate post operative photograph