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Functional Frenectomy Using Laser: A Rare Case Report of Adult Ankyloglossia.

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ABSTRACT:

Ankyloglossia, often known as tongue-tie, is a congenital disorder that develops when the inferior lingual frenulum is too short and affixed to the tongue's tip, restricting the tongue's ability to move normally. Ankyloglossia can cause a variety of issues, including poor dental hygiene, difficulty breastfeeding newborns, speech obstacles,embarrassment from peers during infancy and adolescence, and speech impediments. The surgical treatment of a patient with ankyloglossia and restricted tongue mobility is described in this case study. The lingual frenum was surgically removed as part of the treatment, and the wound recovered normally. In conclusion, at subsequent visits in the treated instance, a noticeable improvement in tongue movement was seen.

Keywords: Adult Ankyloglossia, Ankyloglossia, Tongue-tie, Frenectomy, Laser Frenectomy, Lingual Frenectomy.

I. INTRODUCTION:

At around the fourth week of intrauterine life, the tongue begins to form. The development of the various tongue parts is influenced by the first, second, third, and fourth pharyngeal arches(1).

A fold of integument (skin) or mucous membrane that restricts the movements of an organ or particular structure is referred to as a "frenum" (2). The mid-ventral tongue and the floor of the mouth are connected by the lingual frenum (LF)(3). In addition to attaching and supporting the ventraltongue to the floor of the mouth, the LF also directs tongue movement to prevent any unintentional deviations fromits normal functions. Anomalies of LF (for example, length or site of insertion) may affect tongue function similarly to other human body structures, and they are frequently connected to systemic, genetic, or developmental conditions (4).Etymologically, ‘‘ankyloglossia’’ originates from the Greek words ‘‘agkilos” (curved) and ‘‘glossa” (tongue)(5).Ankyloglossia, also known as tongue-tie, can be observedin neonates, children, and rarely adults. Ankyloglossia (tongue tie) occurs when LF extends from the tip of the tongue and attaches to the lingual gingiva in the space between the mandibular central incisors(6). Ankyloglossia is an anatomical malformation that restricts the movement of the tongue and frequently poses medical issues, such as pain in nursing newborns that could affect speech if treated at a young age (4).

Ankyloglossia is often due to a single mutation in the oral cavity, despite the possibility that it could be a component of a rare condition (such as X-linked cleft palate and van der Woude syndrome)(7). Various LF developmental defects have been identified in the literature and are connected to other genetic disorders and syndromes, like infantile hypertrophic pyloric stenosis (IHPS) and Ehlers-Danlos syndromes (EDS)(8,9).

A paucity of literature reflects the occurrence of ankyloglossia in adolescents and adults because most investigations on this condition have concentrated on neonates and young children. However, people think it's uncertain in adults. Along with functional restrictions on the tongue, older kidsand adults frequently experience social shame as a result of limited tongue mobility affecting their quality of life, which necessitates surgical intervention and treatment of the issue.

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II. CASE REPORT:

A 39-year-old male patient reported to the Department of Periodontics and Implantology in Sri Venkateshwara Dental College and Hospital, Chennai, with a chief complaint of bleeding gums. Healso complained of difficulty inpronunciationalong with limited tongue movements which lead to poor oral hygiene maintenance.

Intraoral examination revealed Generalized chronic marginal gingivitis along witha thick lingual frenum from the tip of the tongue (Fig.1).

FIGURE 1: PRE-OPERATIVE VIEW SHOWING THICK LINGUAL FRENUM FROM THE TIP OF THE TONGUE.

Limited tongue motions were noticed, including protrusion and lateral movement movements, and an inability to touch the palate with the tongue tip. A bifid or heart-shaped tongue tip was noticed on the protrusion (Fig.2)

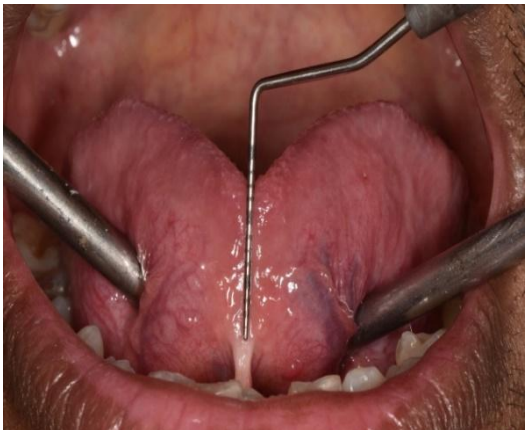

FIGURE 2: A BIFID OR HEART-SHAPED TONGUE TIP WAS NOTICED ON THE PROTRUSION

He was categorized as having Class II "Moderate ankyloglossia" in Kotlow's system, which is tongue movement between 8 mm to 11 mm (Fig.3).

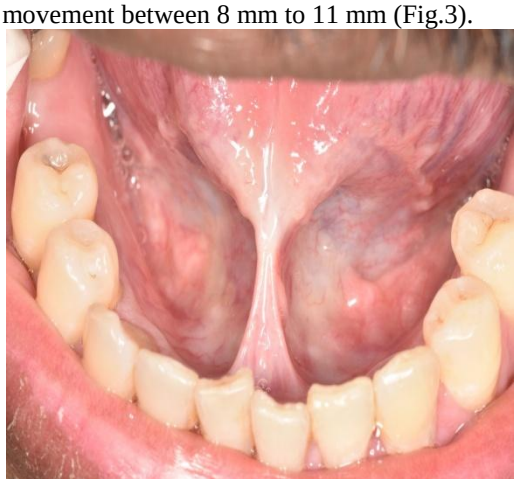

FIGURE 3: CLASS II "MODERATE ANKYLOGLOSSIA" IN KOTLOW'S SYSTEM, WHICH IS TONGUE MOVEMENT BETWEEN 8 MM TO 11 MM.

The appearance score was 2 (which was <8) and the functional score was 5 (which was <11) based on Hazelbaker's assessment method, indicating that frenectomy was recommended.

After the informed consent, non-surgical periodontal therapy was done followed by lingual frenectomy which was planned by using a soft tissue diode laser. Surgery was planned after a routine haematological assessment of the haemoglobinpercentage, bleeding time, clotting time, random blood sugar, total leukocyte count, and differentialcount revealed results that were within the normal range.

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After the application of Topical anaesthetic spray (Nummit), a local anaesthesiainjection (0.5ml of 0.2% lignocaine hydrochloride in 1:80,000 adrenaline) was infiltrated bilaterallyin the lingual frenum and at the tip of the tongue. The tongue was firmly retracted at the tip using a silk 3-0 traction suture. Lingual frenectomy was performed using a soft tissue diode laser at (970 nm) witha power of 3W in continuous wavemode. The lingual frenum was relieved on either side by brush strokes (Fig.4).

FIGURE 4: THE LINGUAL FRENUM WAS RELIEVED ON EITHER SIDE BY BRUSH STROKES WITH A SOFT TISSUE DIODE LASER

A gauze dipped in salinewas used to remove the ablated tissues whichintended to remove the charred tissues and prevent excessive thermal damage to the underlying soft tissues. There was no bleeding observed on the site (Fig.5A, B).

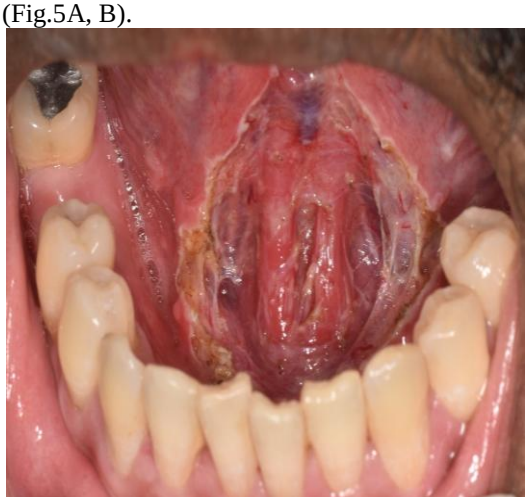

FIGURE 5A: IMMEDIATE POST-OPERATIVE VIEW

FIGURE 5B: IMMEDIATE IMPROVEMENT IN TONGUE ELEVATION.

Suturing was not necessary. Analgesics and topical ointments were given to facilitatewound healing.

Follow-up at one week exhibited uneventful healing with the development of a "white soft scab" (Fig.6)and complete healing at four(Fig.7)and twelve (Fig.8) weeks with an increase in tongue mobility of about 16 mmfrom the lingual frenum to the tip of the tongue after laser frenectomy. The patient was followed up at 1- and 3-monthsintervals.

FIGURE6:1 WEEK POST-SURGICAL HEALING SHOWS WHITE SOFT SCAB FORMATION.

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FIGURE 7: 4 WEEKS POST-SURGICAL HEALING.

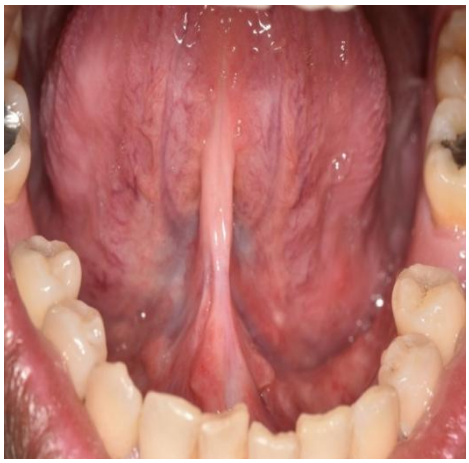
FIGURE 8: 12 WEEKS POST-SURGICAL HEALING.

III. DISCUSSION:

Ankyloglossia or Tongue tie is a congenital condition that is more common in Males than females with aratio of2.3:1. (10).

The tongue serves as the primary articulator for speaking. The tongue's incredible range of motions during speech includes tip elevation, grooving, and protrusion. The tongue is very short at birth, but as we age, it lengthens and becomes thinner at the tip. The tongue has avariety of functions in addition to communication including sucking, chewing, swallowing, eating, drinking, maintaining healthy teeth and gums, kissing, cleaning food particles and other debris (such as hairs) from the mouth, and warming the air during mouth breathing.

The length of the tongue from where the lingual frenum enters the base of the tongue to the tip is referred to as the "free tongue". The usual range of the free tongue is greater than 16mm, which is clinically acceptable.

The following criteria showthat the tongue has a normal range of motion. When the tongue is retracted, it should not blanch the tissues lingual to the anterior teeth without exertion, the lingual frenum should not be cleft, and the tip of the tongue should be able to emerge beyond the mouth without difficulty and not leave a space between the mandibular central incisors.

The tongue's ability to move is restricted by ankyloglossia. Patients with ankyloglossia have limited tongue mobility, which places the tongue in a low position and creates downward and forward pressure that favours the development of mandibular prognathism and maxillary hypo-development, which results in class III malocclusion.

Speech issues can occur when there is reduced mobility of the tongue owing to ankyloglossia. Consonants with sounds like "s, z, t, d, l, j, zh, ch, th, dg" are particularly difficult to articulate, and rolling an "r" is very challenging.

Ankyloglossia can also be a symptom of several uncommon disorders, such as Smith-Lemli-Opitz syndrome, orofacial digital syndrome, Beckwith Weidman syndrome, Kindler syndrome, Simpson-GolabiBehmel syndrome, and X- linked cleft palate with an autosomal dominant or recessive trait. Nevertheless, the majority of ankyloglossiais seen in people without any other diseases or congenital abnormalities.

Ankyloglossia can be classified into 4 classes based on Kotlow's assessment (1999): (11)

S.No	CLASS	STAGE	DEGREE OF MOVEMENT OF THE TONGUE
1.	Class I	Mild ankyloglossia	12 to 16mm
2.	Class II	Moderate ankyloglossia	8 to 11mm
3.	Class III	Severe ankyloglossia	3 to 7mm
4.	Class IV	Complete ankyloglossia	Less than 3mm

Hazelbaker's assessment was established for the lingual frenal function (12).

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Corylloss tongue tie classification (2009) (12).

S.No	TYPE	EXPLANATION
1.	Type I	A thin and elastic frenulum; attaches the tip of the tongue to the alveolar ridge, and the tongue forms a heart shape
2.	Type II	Thin and elastic frenulum; 2–4 mm behind the tongue tip, attaches by the alveolar ridge,
3.	Type III	Thick, fibrous, and non-elastic frenulum; attaches mid-tongue to the floor of the mouth,
4.	Type IV	The frenulum is not seen, but felt, with a fibrous or submucosal thick and shiny attachment from the base of the tongue to the floor of the mouth

Three different surgical treatments can be used in the management of ankyloglossia. Cutting the frenulum is known as a frenotomy (of neonates). Complete excision, or removal of the whole frenulum, is referred to as a frenectomy and occurs at or after the age of six months.Frenuloplasty uses several techniques to loosen the tongue tie and make the necessary anatomical adjustments(13).They can be done using scalpels, electrocautery, and lasers.Scalpels are generally used, but the tissues in the tongue's lingual aspect and on the mouth's floor are highly vascularized, and intraoperative bleeding is a major discomfort to the patient and the clinicians.Electrocautery is strictly contraindicated in patients with poorly shielded pacemakers, bone necrosis is seen when the tip touches the bone, and cannot be used near inflammable gases.Laser on the other hand has a shorter operating time, tissue thermal ablation anddisinfection, blood coagulation, a reduced need for local anaesthesia, and fewer postoperative problems are a few of the benefits that laser technology offers over conventional procedures (pain, swelling, and infection) (14).

The laser also improves access and visibility due to a reduction in the number of operative instruments and a more bloodless field. Moreover, the laser does not warrant the necessity of post-operative suture unlike the scalpel this provides an even depth at the surgical site and lessens additional trauma to the tongue muscles. (15,14,16)

POSTOPERATIVE TONGUE EXERCISE:

Taking into account that the patient has been in restricted movement of the tongue so far and the post-operative tissue changes it is wise to suggest post-operativeexercise for the tongue for proper articulation of speech and other functions. Some of the post-operative tongue exercise as stated by Tecco et al (17) includes;

The below-mentioned exercises are repeated 10- 15 times, thrice a day for four weeks. The patient is encouraged to perform these exercises in front of the mirror for better compliance

S.No	TONGUE EXERCISE
1.	The tongue is protruded as much as possible
2.	The tip of the tongue is moved forward and upwards as much as possible, trying to touch the tip of the nose.
3.	The tongue is protruded outside the mouth and rotated to perform circular movements, first clockwise and then anti-clockwise.
4.	The tip of the tongue is positioned on the incisive papilla and in that position, the mouth is opened and closed
5.	The above exercises are repeated with the tongue position secured in themed–palate and posterior palate
6.	The entire tongue is pushed against the palate, and a vacuum is created by sucking the air. Now, the mouth is opened slowly to the maximum extent possible, until the tongue gets released from its position.

The purpose of post-operative exercises (17) after tongue-tie surgery was not to build up muscles or speech but rather to,

i) Develop new muscle movements, especially those involving tongue-tip elevation and protrusion, inside and outside of the mouth;

ii) Heighten kinaesthetic awareness of the full range of movements the tongue and lips can make;
iii) Encourage tongue movements related to cleaning the oral cavity, such as sweeping the insides of the cheeks, fronts, and backs of the teeth.So, this orofacial myofunctional therapyaids to improve the muscle memory of the tongue post-surgical frenectomy.

IV. CONCLUSION:

A tongue tie interferes with the tongue's routine function and restricts its movement. This in turn affects the quality of the life of the individual. Speech interference is the major difficulty encountered by the patient with a tongue tie which has a psychological impact during the growing phase of the child. Thus, treatment at the early stage is ideal to prevent the consequences of thecondition. Frenectomy with laser is considered a viable alternative to other procedures due to faster healing time and less postoperative bleeding and discomfort.

The patient featured in this report was delighted with the improvement in his tongue movement at the conclusion of a 12-week follow-up period. He was especially pleased with his ability to pronounce words with letters like T, D, L, S, and N, which he had previously found difficult, directly improving his self-esteem.

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