

A PARADIGM SHIFT IN LINGUAL FRENECTOMY - MANAGEMENT BY LASER: A CASE SERIES

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Introduction:

The tongue plays a crucial role in both speech production and mastication, and its normal function depends largely on the proper position and length of the lingual frenum. ¹ During prenatal development, a prominent fibrous band in the floor of the mouth guides the formation of the lingual frenulum. As development progresses, this structure gradually thins and recedes, allowing greater tongue mobility. ² The term ankyloglossia is derived from the Greek words agkylos, meaning “crooked” or “curved,” and glossa, meaning “tongue.” Partial ankyloglossia, commonly known as tongue-tie, is a congenital condition characterized by an abnormally short, thick, or anteriorly attached lingual frenum that restricts tongue movement. ³ Epidemiological studies have reported that the global prevalence of ankyloglossia ranges from approximately 4% to 10.7%, with a slight male predominance. In the Indian population, the reported prevalence is comparatively lower, ranging from 0.02% to 0.4%. ^{4,5}

To assess the severity of tongue-tie, ankyloglossia has been classified into four categories according to the Kotlow classification proposed in 1999. This widely used clinical classification system grades the condition based on the length of the free tongue and the degree of functional restriction. ⁶

Class I: mild ankyloglossia: 12–16 mm;

Class II: moderate ankyloglossia: 8–11 mm;

Class III: severe ankyloglossia: 3–7 mm;

Class IV: complete ankyloglossia.

Class III and IV tongue-tie categories should be given special consideration because they severely restrict the tongue’s movement. ⁷

This article’s goal is to present a case series of ankyloglossia treated with laser. This manuscript was prepared following the CARE guidelines.

Case report 1:

A 12-year-old male Child reported to the dental op of department of pediatric and preventive dentistry, with the complaints of difficulty in swallowing for the past few years. On extraoral examination there were no significant findings noted. On intra oral examination,

the child's tongue was unable to reach the upper incisors, a bifid appearance of tongue during protrusion and a short lingual frenum measuring 4mm which is of class III severe ankyloglossia: 3–7 mm according to Kotlow's classification. (Fig 1)



Fig 1: Pre operative showing bifid tongue appearance

On taking family history there were such case reported in patient's family member in the paternal side. A complete hemogram has been done with all the values within normal limits. On taking consent with patient's parents a treatment plan of frenectomy with LASER was planned.



Fig 2a ,2b: Post treatment and review after 3months

Case report 2:

A 10-year-old female Child reported to the dental op of department of pediatric and preventive dentistry with the complaints of difficulty in speech in for the past few years. On extraoral examination there were no significant findings noted. On intra oral examination, a heart -shaped tongue during protrusion and a short lingual frenum of 8mm which is class II moderate ankyloglossia of 8 – 11 mm according to Kotlow's classification. (Fig 3)



Fig 3: Pre- operative images of tongue tie

On taking consent with patient's parents a treatment plan of frenectomy with LASER was planned.



Fig 4a, 4b: incision using laser and post-operative image

Case report 3:

A 5-year-old Male Child reported to the dental op of department of pediatric and preventive dentistry with the complaints of difficulty in maintain oral hygiene with more deposits on the tooth surface for the past few years. On extraoral examination there were no significant findings noted. On intra oral examination, a heart -shaped tongue during protrusion and a short lingual frenum of 9 mm which is class II moderate ankyloglossia of 8 – 11 mm according to Kotlow's classification. (fig 5)



Fig 5: Pre operative tongue- showing heart shape

On taking consent with patient's parents a treatment plan of frenectomy with LASER was planned.



Fig 6a, 6b: Post treatment and review after 3months

Treatment:

A topical anesthetic (Nummit spray) was sprayed on both sides of the frenulum and a local infiltration with LA was given, a protective eye wear was worn by both the patient and the operator. After which a lingual frenotomy using a diode laser was initiated. The laser used was a diode laser- BIOLASE®, Epic X system, used in a non-contact mode giving both vertical and horizontal strokes to relieve the attachment from the floor of the tongue to the floor of mouth. (fig 2a, 4a, 6a)

Haemostasis was achieved normally; post-surgical instructions were given, which included tongue exercises for the free movement of tongue and to prevent reattachment. Analgesic is prescribed for 48 h after the frenum release. During this time, the patient is advised to maintain a soft diet and to abstain from hot and spicy food or drink. Postsurgical tongue exercises are to commence after treatment. Followed by a review of each case to observe the post treatment outcome of each of the cases. (fig 2b, 4b, 6b)

The tongue exercises are as follows:^{8,9}

- Snake exercise: Form a pointed tip with the tongue, then extend it straight out of the mouth and retract it again, ensuring the tip does not touch the lips during the movement. This sequence is repeated 25 times.
- Waggle flap: Gently place the tongue tip on the upper lip and then on the lower lip, moving it up and down between the two positions. This movement is performed ten times.
- Jawbreaker: With the lips kept closed, push the pointed tongue into the left cheek so that it creates a visible bulge resembling a jawbreaker candy, hold this position for about 10 seconds, and then repeat on the opposite cheek.
- Peanut butter scrapes: Open the mouth wide and position the tongue tip just behind the maxillary incisors, then slide it backward along the palate as far as possible toward the throat. This is done ten times, twice daily.
- Spoon hold: Protrude the tongue and form a pointed tip, then press a spoon against it while simultaneously pushing the tongue forward to resist the pressure for a count of 5 seconds.

Discussion:

According to the 2022 guidelines issued by the American Academy of Pediatric Dentistry (AAPD), a restrictive oral frenulum can negatively impact a child's overall health by causing functional difficulties such as poor speech articulation, pronunciation issues, and challenges during breastfeeding.¹⁰

The lingual frenulum consists of a midline connective tissue band on the ventral tongue surface that attaches it to the floor of the mouth.¹¹ Ankyloglossia refers to a condition characterized by a short frenulum positioned close to the tongue tip, restricting mobility. This congenital condition affects approximately 4- 10 % of the population worldwide.^{12,4} Obtaining an accurate diagnosis is essential before surgical intervention, as studies have shown a positive correlation between tongue-tie and speech-related disorders.¹⁴

Damini Kulkarni et al. (2025)²³ compared the clinical outcome of tongue tie cases using different techniques. They concluded that both surgical approaches are effective for treating ankyloglossia in children. Technique selection should consider patient comfort, clinical findings, and surgeon expertise. The scalpel method ensured complete fiber release, while the laser technique offered enhanced comfort and minimal bleeding. Yadav et al. (2019)³¹ suggested that sutures after frenectomy might be a cause affecting oral hygiene at the surgical

While traditional scalpel frenectomy is a viable option, it often leads to excessive bleeding that obscures the operative field; in contrast, the diode laser offers superior visibility through its bactericidal and anticoagulant properties, resulting in minimal haemorrhage.¹⁵

Additionally, laser-assisted procedures typically produce less postoperative discomfort compared to conventional surgical techniques.¹⁹

Mezzapesa et al. (2020) conducted a study to show the safety and efficacy of frenotomy they concluded that the use of diode laser in frenectomy surgeries is safe and efficient in patients of all ages. Based on the literature available we planned to treat all the patients of different age groups with tongue tie under laser.

When used for managing vascular lesions with high hemoglobin content, lasers such as diode, Nd: YAG, and CO₂ demonstrate excellent efficiency in soft tissue incision, contouring, and excision. These lasers promote rapid hemostasis and aid in wound sterilization, often eliminating the need for suturing after the procedure.¹⁶

Postoperative rehabilitation through targeted exercises is essential in improving speech outcomes for patients affected by tongue-tie. Tongue mobility and articulation can be significantly enhanced with consistent speech and tongue exercises, which help reshape and retrain the tongue for proper function.¹⁷ In children under six years of age, collaborative evaluation by pediatric dentists and pediatricians is recommended. Following treatment, referral for speech therapy is crucial to assess tongue movement, as the preoperative habit of maintaining a lowered tongue position must be corrected. Such exercises assist in achieving optimal mobility and improving the clarity of speech in young patients.¹⁸

In a study by Messner et al., more than 75% of patients showed significant improvement in speech clarity following surgery, which on assessment by a speech-language pathologist relative to their baseline status.²¹ Patel et al. reported that patients undergoing conventional scalpel frenectomy demonstrated superior wound healing after 7 days and at 1 month postoperatively compared to those treated with laser techniques.²⁰ The inherent bactericidal action of laser energy also minimizes the risk of intraoperative infection compared to conventional scalpel techniques.²²

Haytac et al. (2006)²⁴ reported that patients experienced less postoperative pain with CO₂ laser for frenectomy, while Tambuwala et al. (2014)²⁵ concluded that postoperative pain after laser excision was not significantly different compared with scalpel.

In this current case series, all the patients began tongue exercises on the same day after laser frenotomy to facilitate improvements in speech function.

Furthermore, studies are required with various levels of severity of Ankyloglossia with longer patient recall and treatment in special kids.

Conclusion:

This case series highlights the effectiveness and clinical advantages of laser-assisted lingual frenotomy as a preferred treatment modality for pediatric patients with ankyloglossia. Compared with conventional scalpel techniques, laser-assisted procedures offer several benefits, including reduced intraoperative bleeding, minimal postoperative pain and swelling, shorter operative time, and improved patient comfort. These advantages are particularly important in pediatric dentistry, where patient cooperation, anxiety levels, and limited attention spans often influence treatment outcomes.

The use of laser technology allows for precise tissue ablation with excellent hemostasis, resulting in a clear surgical field and minimizing the need for sutures. Furthermore, the bactericidal properties of lasers may reduce the risk of postoperative infection and promote favorable wound healing. The minimally invasive nature of the procedure also contributes to faster recovery, enabling children to resume normal feeding, speech, and oral functions more quickly.

With increasing parental awareness of advanced and less traumatic treatment options, there is a growing demand for procedures that prioritize safety, efficiency, and patient comfort. Laser-assisted frenotomy addresses these expectations by providing a predictable and child-friendly approach that can often be completed with minimal discomfort and reduced psychological stress. Additionally, the procedure can be effectively performed across different pediatric age groups, making it a versatile treatment option for managing tongue-tie.

The positive clinical outcomes observed in this case series, including improved tongue mobility, enhanced functional performance, and high levels of patient and parent satisfaction, support the incorporation of laser technology into routine management of ankyloglossia. As laser systems continue to evolve and become more accessible in clinical practice, laser-assisted lingual frenotomy is likely to play an increasingly important role in pediatric oral surgery, offering an effective, safe, and patient-centered alternative to conventional surgical techniques.

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