

Ankyloglossia: The Diagnostic Dilemma

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ABSTRACT

Ankyloglossia or tongue-tie refers to a minor anomaly in the attachment of the membrane or frenum that attaches the tongue to the floor of the mouth, which may interfere with normal function and mobility of the tongue. This article focuses on how to identify and diagnose infant ankyloglossia. Also in this article, we have discussed an instrument fabricated by the team for clear retraction and visualization of posterior ankyloglossia.

Keywords: Posterior ankyloglossia, Diagnosis, Frenum, Tongue-tie, Frenectomy, Lasers, Er,Cr:YSGG laser, Retraction device.

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INTRODUCTION

The World Health Organization (WHO) and American Academy of Pediatrics (AAP) recommend exclusive breastfeeding for the first 6 months as the best way to nourish and nurture infants. An instinctive and natural process could prove to be a complicated practice in the presence of anatomical anomalies of the oral ecosystem. There has been a resurgence of breastfeeding beginning from the late 1970s. All the health professionals, physicians and researchers unanimously agree that 'breast is best'. The obstacles faced during breastfeeding can be broadly classified into maternal factors and infant factors. In this case report, we are going to focus on posterior ankyloglossia which is an infant mechanical factor which hinders normal breastfeeding.

Ankyloglossia or tongue tie refers to a congenital problem characterized by an abnormal lingual frenum which can limit tongue mobility.¹

The tongue is the major 'player' in breastfeeding. It helps to pull the breast into proper position in the mouth, then grooves along its length to make a channel to keep the breast in place in the mouth and to catch milk to hold it at the back of the tongue in preparation for swallowing. The back of the tongue drops toward the floor of the mouth to decrease the pressure in the mouth, and milk is expelled from the nipple by the combination of positive (compression) and negative (vacuum or suction) pressure.²

Hence immobility of the tongue interferes with the wide gape and consistent suction needed for a good breast latch which results in frequent arching away from the breast. Fatigue within 1 to 2 minutes of nursing contributes to gradual refusal of the breast.

The purpose of the case report is to:

1. To identify and discuss the diagnostic dilemma's of posterior ankyloglossia.
2. To present and discuss a retraction device fabricated by team for the clear retraction and visualization of posterior ankyloglossia.
3. To lay down patient position protocols and laser protocols to treat the same.

CASE REPORT

A 35-year-old multigravida contacted the lactation specialist from the hospital regarding a 30 weeks old gestation premature baby being admitted into the neonatal intensive care unit (NICU). At 3 months, the mother expressed interest to visit the lactation clinic and came in for an evaluation. A detailed history revealed that the mother had a history of hypothyroidism controlled by medication. The history indicated prolonged labor and birth trauma. The lactation specialist recorded the corrected age of the infant at clinic visit as 2 days old infant. The infant birth weight was recorded as 1.8 kg. The infant has gained steadily on expressed mother's milk and some quantity of formula.

Clinical Evaluation of the Maternal

The mother presented with cracked painful and misshapened nipples post-breastfeeding. The mother stated the first attempt at breastfeeding at the hospital was difficult. She reported the baby seemed to try very hard to get to the breast but seemed frustrated at the breast and often unlatched during the feed. The infant achieved shallow latch. The history also included baby episodes of colic, uncomfortable gas, difficulty in burping and reflux post feeds.

Clinical Infant's Oral Evaluation and Digit Test

Lactation specialist observed snorting breathing sound while infant was at rest and it was affirmed by the parents that it existed since birth. An oral motor evaluation revealed thick Class IV attachment of maxillary frenum. During digit test, the infant tongue was unable to sustain cupping around the specialist's finger as normally expected. Tongue retraction was noted after every suck and excessive gum biting was also observed. Deep palpation and assessment under the tongue indicated posterior tongue restriction not easily diagnosable. Infant was referred to the dentist for further evaluation and treatment. A breast and a bottle feeding

observation indicated lack of seal around the nipple causing milk spillage and aerophagia.

Breastfeeding management continued to maintain mother's milk supply and mother was encouraged to incorporate therapeutic skin to skin contact several hours a day pre- and post-treatment procedure.

The Pradhan Retraction Device

On examination, the dentist concurred with the lactation specialist's findings (Figs 1 and 2).

A special retraction device was fabricated by the team in the clinic. It is a grooved plastic device of 1 cm thickness which helps in retraction and visualization of the frenum. It is different from the grooved surgical retractor in material and in size. The surgical ones are made of steel and are thinner and longer in size (Fig. 3). The grooved retractor helps you to diagnose in the following ways:

1. Visualization
2. Gives you the anterior posterior length of the frenum
3. And, the depth of attachment of the frenum.

It also gives a clear view during treatment and stabilizes the tongue.



Fig. 1: Preoperative views of posterior ankyloglossia

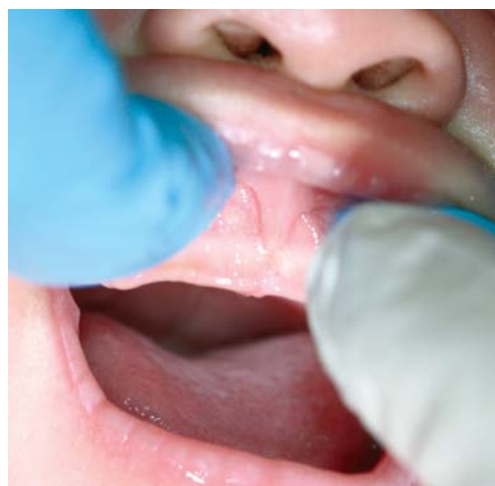


Fig. 2: Preoperative view of maxillary frenum



Fig. 3: Pradhan retraction device

On examination, it was concluded that the infant had posterior ankyloglossia and a high maxillary frenum which needed to be relieved for the infant to breastfeed without difficulty.

Preparation of the Infant for Laser Surgery

Psychological preparation of the mother and the emotional support from the dentist and lactation consultant are the foundation for a successful treatment outcome for the neonates.

'The Indian baby bath' position was devised to stabilize the head and jaws. The head of the baby was placed between the legs of the mother and the baby's legs were positioned near the mother's thighs. The head low placement of the head allowed the tongue to roll back making the surgical site easily accessible. Additionally, the baby's movement in a vertical direction was controlled by a stabilizing hand. Two fingers were placed on either side of the frenum. As the baby's jaws clamped on the fingers, some amount of jaw stabilization was achieved. The standard laser safety norms were followed.³

Treatment

The treatment was done using Er,Cr:YSGG which is a free running pulsed soft and hard tissue laser, also known as the Waterlase MD. It has a wavelength of 2,780 nm. Local anesthetic gel was applied and the laser light was transmitted through a flexible fiber optic device.

For soft tissue procedures, the laser itself does the cutting with the water stream acting as a coolant. Since the Er,Cr:YSGG laser irradiation causes splashing of water and blood as a result of explosive ablation, adequate high speed evacuation was required to prevent contamination.

Laser Setting

The laser settings were checked and test fired.

The settings used on infants are lower than adult patients since an infant has tissue which is less fibrotic compared to an adult patient (Table 1).

Power output	0.5-1 W
Repetition rate	20 Hz
Water flow	4%
Pulse energy	25-50 mJ
Air flow	11%

Treatment

Prior to the treatment, the operatory was secured and the following safety precautions were followed:

1. The operatory was secured and proper laser warning sign was placed at the door of the operatory. The laser was set and test fired for proper operation and tip function.
 2. The infant, mother, staff and the dentist were given appropriate eye protection.
 3. The patient's record and treatment plan was reviewed.
- Both the procedures were done a week apart.

Lingual Frenectomy

The infant's head was steadied using the 'Indian baby bath' procedure as described above. The laser tip was used in non-contact mode with continuous and controlled movement to avoid any injury to the floor of the mouth where salivary glands, blood vessels as well as the Wharton's duct are located. Once the tissue was ablated, it was checked for any remnants of tissue or any interference. After the completion of the surgery, the infant was allowed to suck on cotton.

Maxillary Frenectomy

The maxillary frenectomy was performed using the laser settings similar to the lingual frenectomy. The patient's head

was stabilized, all the necessary precautions were taken and the laser was applied to the maxillary frenum in a non-contact mode and the tissue was ablated (Figs 4 to 7).

Postoperative Care

Any restriction in the body once released requires care and support. Postoperative prevention of frenum reattachments is one of the most critical elements of a successful treatment outcome. Educating the parent and instilling a regimen of daily surgical site massage during and after breastfeeding for at the minimum of 15 days after the laser surgery was implemented.

Postoperative Management of Pain

To prevent or reduce postsurgical soreness and discomfort, it is recommended to give homeopathic medications, such as hypercium and arnica as per a detailed protocol for postoperative care for frenectomy developed by Jennifer Tow—an International Board Certified Lactation Consultant (IBCLC).



Fig. 4: Preoperative preparation

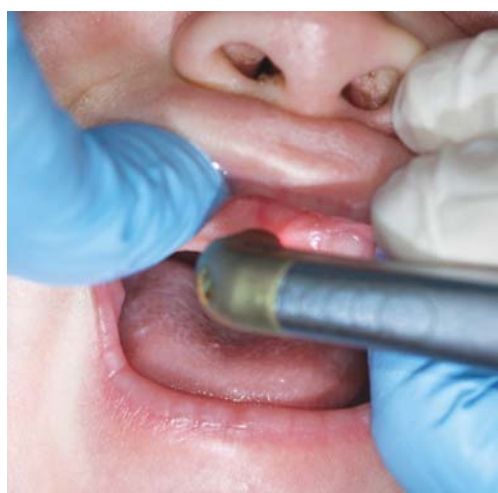


Fig. 5: Treatment of the maxillary labial frenectomy using the Er,Cr:YSGG



Fig. 6: Treatment of posterior ankyloglossia using the Er,Cr:YSGG (waterlase)

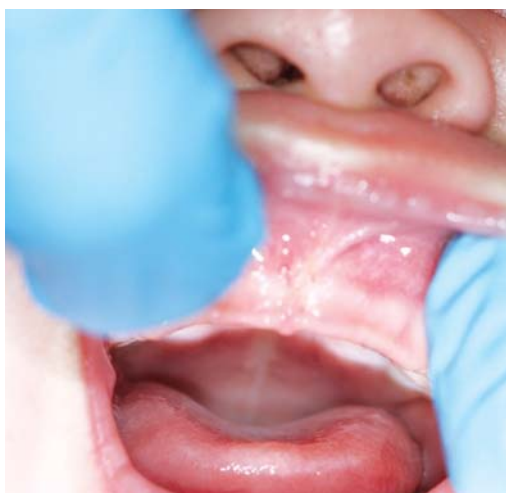


Fig. 7: Postoperative after laser frenectomy

Virgin coconut oil is profoundly healing with its anti-infective and antifungal properties. Three of the identified mechanisms behind these healing effects are its ability to accelerate reepithelialization, improve antioxidant enzyme activity, and stimulate higher collagen crosslinking within the tissue being repaired.⁴

In case of allopathic care, the infant may require an appropriate dose of acetaminophen/paracetamol at the time of surgery and again 4 and 8 hours postsurgery.

Patient Recall

The infant was recalled for a checkup on the following day and was reported to find it difficult to latch on due to soreness. With additional lactation support and care, infant successfully returned to breastfeeding with a deeper and painless latch. To check the healing, the parents were called to visit the lactation consultant, after 7 days. The mother reported that the snorting noise during breathing disappeared as the result of the frenectomy. The breastfeeding was calmer with a good latch, with a good seal, no spillage and no biting.

DISCUSSION

Definition of Ankyloglossia and Classification

The term ‘ankyloglossia’ comes from the Greek words *agkilos* for crooked or loop and *glossa* for tongue.⁵ Tongue-tie or ankyloglossia is described as a congenital condition with an unusually thickened, tightened or shortened frenum (membrane or string under the tongue; Hillan 2008; Wallace and Clarke 2006).

Currently, there is no consensus regarding the precise definition of ankyloglossia and while several classification systems have been proposed to grade the degree of ankyloglossia none of the systems have been correlated to symptomatic severity.⁶

The severity of the ankyloglossia is determined by classifications by Elizabeth Coryllos.⁷

- *Type 1:* Tip of the tongue to in front of the alveolar ridge
- *Type 2:* Two to 4 mm behind the tongue tip, attaches on or just behind the alveolar ridge
- *Type 3:* Attaches midtongue to the floor of the mouth
- *Type 4:* Sits at the base of the tongue is thick, shiny and very inelastic also called as posterior or submucosal tongue-tie.

The condition of posterior ankyloglossia is a recently identified condition and therefore has inconclusive literature. The more known ankyloglossia which often refers to a tight frenulum and inability to extend the tongue beyond the lower lip is now emerging to be just a small percentage of various presentations of ankyloglossia and can be termed as anterior ankyloglossia.

The Academy of Breastfeeding Medicine Protocol defines ankyloglossia as ‘a sublingual frenulum which changes the appearance and/or function of the infant’s tongue because of its decreased length, lack of elasticity or attachment too distal beneath the tongue or too close to or into the gingival ridge.’⁸

DIAGNOSIS

Currently, there is no specific protocol to diagnose ankyloglossia.

The Hazelbaker Assessment Tool for lingual frenulum function (HATLFF) was developed to provide a quantitative assessment of ankyloglossia and has been proven to be highly reliable. However, it is not widely used as the process of scoring is lengthy and complex.⁹

Anterior infant ankyloglossia is easily diagnosed by physical prominence, tightness, location of the lingual frenum on inspection and palpation. The classic feature of an anterior tongue tie is a heart-shaped tongue.

However, the diagnosis of posterior infant ankyloglossia is a challenging prospect because it cannot be visualized.

Table 2: Maternal and infant factors to be considered for diagnosis of ankyloglossia³

Maternal factors	Infant factors
Creased or blanched nipples after feeding: Flattened cracked, bruised or blistered nipples	No latch
Bleeding nipples	Unsustained latch
Severe pain with latch	Slides off nipple
Incomplete breast drainage	Prolonged feeds
Infected nipples	Unsatisfied after prolonged feeds
Plugged ducts	Falls asleep on the breast
Mastitis and nipple thrush	Gumming or chewing on the nipple
Vasospasm of the nipple due to compression	Poor weight gain or failure to thrive if infant on exclusive breastfeeding
	Aerophagia (swallowing of excessive air while feeding)
	Reflux and colic

Murphy maneuver is a test to diagnose posterior ankyloglossia which involves running a finger along the underside of the baby's tongue to assess possible frenum restriction. The most critical aspect is complete retraction of the tongue to visualize posterior ankyloglossia which Murphy maneuver fails to achieve. This can be achieved with the help of a grooved retractor. The grooved retractor helps you to diagnose in the following ways:

1. Visualization
2. Give you the anterior-posterior thickness of the frenum
3. Depth of attachment of the frenum.

Along with the morpho-functional analysis, the function of the tongue mobility, elasticity, elevation and lateralization is better assessed by palpation and breastfeeding, maternal, infant and family history the breastfeeding history comprises of maternal factors and infant factors (Table 2).

CONCLUSION

Dentists are engaging in new roles as advocates for health promotion and disease prevention beyond the oral cavity. Substantial evidence exists supporting the many health benefits associated with breastfeeding. However, the extent of dental professionals' knowledge is uncertain.

Craniofacial growth and development are affected by functional stimuli, such as breathing, swallowing, chewing and sucking.¹⁰ The sucking mechanism used during bottle feeding differs from that used during breastfeeding.¹¹⁻¹³ These different sucking mechanisms have the potential to predispose a bottle-fed infant to development of a malocclusion.¹¹

Hence, it is extremely important for oral and general well-being of an infant that oral hindrances, such as posterior ankyloglossia are identified and treated.

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