

Impacts of Ankyloglossia on Speech and Feeding

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What is Ankyloglossia?

Ankyloglossia, or tongue tie, is a condition that restricts tongue mobility as a result of the presence of a short, tight lingual frenulum. It can also be characterized as having a “square, heart shaped, or indented tip of tongue at rest and/or upon attempted protrusions” (Potock, 2015, para. 5). A majority of individuals have some sort of webbing underneath their tongue, but those who have tongue ties tend to have more of that webbing than usual. To better understand the details of ankyloglossia, Baxter et al. (2018) compared the condition to syndactyly. As with tongue ties, patients with syndactyly have too much webbing; however, theirs occurs between their fingers. They struggle with mobility just the same.

Professionals tend to disagree on whether or not individuals with tongue ties are asymptomatic or if tongue ties lead to mechanical, speech, and feeding issues. Mechanical issues are their own type of problem, but they end up affecting speech and feeding later on. Mechanical issues can include “cuts or discomfort beneath the tongue and difficulties with kissing, licking the lips, eating an ice cream cone, keeping the teeth clean, and doing tongue tricks” (Lalakea & Messner, 2003, p. 748). According to Pompéia et al. (2017), those with ankyloglossia are 5.5 times more likely to have restrictions with lingual mobility during mastication than those whose lingual frenulum developed correctly. There are also some rare syndromes associated with ankyloglossia. These include Van der Woude syndrome, Opitz syndrome, Kindler syndrome, and

X-linked cleft palate syndrome. While it is possible to experience one of these syndromes with a tongue tie, it is typically unlikely (Kale et al., 2019). Although ankyloglossia is considered the most common developmental anomaly of the tongue, the prevalence can range anywhere between 0.1% and 10.7% because of inconsistencies in the definition of ankyloglossia. More specifically, 5-10% of babies are affected, and it is more likely for boys to have a tongue tie than girls as found by the Health Services Executive (2015). No matter the statistics, ankyloglossia can be seen in anyone.

Assessment

A specific sign that gives professionals reason to believe patients may have a tongue tie is how much the patients are able to lift their tongue. Significant restriction is apparent when the patients can only elevate their tongue 50% or less. This is one reason to be referred for further assessment (Baxter et al., 2020).

To specifically assess feeding, the Academy of Breastfeeding Medicine recommends the use of the Hazelbaker Assessment Tool for Lingual Frenulum Function (ATLFF). Ricke et al. (2005) and Kale et al. (2019) discussed how professionals can use this tool to determine how severe a tongue tie may be in an infant through the five items that assess appearance and the two that assess function. After the assessment, the individual item scores are combined for a total score that can be used to diagnose the tongue as either perfect, acceptable, or function impaired. A perfect total score has a function score of 14 regardless of appearance. Acceptable means there is a function score of 11 and an appearance score of 10, and function impaired means the function score is less than 11. Ricke et al. (2005) used this assessment tool in their study. They ultimately determined that the tool was ineffective. According to their findings, “there clearly is a need for a tool that clinicians can use to identify those tongue-tied infants who are likely to

have breast-feeding problems. However, based on our study findings, the ATLFF is not adequate for this purpose” (p. 7). Despite finding evidence on warning signs and what exactly tongue ties affect, there is still some ambiguity when trying to determine the severity of tongue ties during evaluations and assessments.

Professionals lack a uniform grading system to reference during assessment (Lalakea & Messner, 2003). Nevertheless, there have been various methods that professionals have examined. One method that has been widely used for identification of ankyloglossia is one by Fletcher and Daly as cited in Lalakea and Messner (2003), and their method looks at aspects of tongue mobility. If a patient shows an “inability of the tongue tip to elevate to contact the upper alveolar ridge or to protrude beyond the lower gum, a restriction of side-to-side motion, or the presence of notched tongue,” there would be evidence to suspect a tongue tie (p. 751). Despite the use of this method, it still has not been the most widely accepted.

During assessment, criteria for describing and classifying tongue ties vary but can include descriptors ranging from simple to more complex (Lalakea & Messner, 2003). Using descriptors like simple versus more complex leaves room for subjectivity because, without a standard to compare to, what does “simple” really mean? A tongue tie that is considered simple on two different people can have different effects based on the individuals’ lifestyles. Nevertheless, there is a method that uses simple to complex classifications. This is the Modified Coylos classification which classifies the level of severity of the tongue tie based on the percentage of attachment, the details of both the superior and inferior attachments, and the characteristics of the frenulum. There is also a section specifically for the submucosal tongue tie for newborn infants. The way that the Health Services Executive outlines this classification in their 2015 reference

guide defines the criteria more clearly based on how attached the tongue is, but it has not been determined as the best method to use due to its ambiguity (Health Services Executive, 2015).

Effects on Speech

Multiple components, including articulation, oral resonance, voicing and air supply, and fluency, all go into the process of speech production, and tongue tie can affect all of these components. Articulation involves the movement of the articulators to various points in the mouth to create the sounds used in speech. Due to the restriction in tongue mobility, it can be difficult for patients to move their tongue to various points of articulation. For example, they may not be able to lift the back of their tongue in order to produce a /k/ or /g/ sound (Baxter et al., 2018). Oral resonance is the manipulation of airflow as it comes out of the oral and nasal cavities for speech. Due to ankyloglossia, sounds can become distorted through mumbling or using a softer tone resembling a whisper. Tongue ties do not directly affect air supply, but with the extra effort it may take in order for one to move their tongue, this can lead to inefficient use of air while speaking. Regarding fluency, a stutter may develop because of the way the patient has to work harder to produce sounds and words with a tongue tie (Baxter et al., 2018). There are also some specific effects on speech that result from a tongue tie. These include frustration with communication, poor speech intelligibility in connected speech, strange errors, stuttering, slow or slurred speech, apraxic-like speech, errors with vowel sounds, avoiding certain words or speaking situations, and speech delays or disorders (Baxter et al., 2018). While tongue ties affect speech in many ways, a patient most likely will not experience all of the effects.

In one study, Messner and Lalakea (2002) researched the effects of ankyloglossia on speech in children. Feeding, speech, and medical histories were gathered at the initial visit. If a tight lingual frenulum accompanied by difficulties with feeding, speech, or socializing was found

during examination, the child was considered an eligible candidate for surgery. Of the problems reported by parents regarding their child's ankyloglossia, speech was most common. In a later study conducted by Lalakea and Messner, speech was also the most commonly reported issue (2003). These studies on children show that speech can be affected by a tongue tie.

Effects on Feeding

As stated by Lalakea and Messner (2003), articulation disorders were once thought of as the "hallmark of symptomatic ankyloglossia" (p. 750). While this may have been true at one point in time, new research has found that there is also a relation between tongue tie and feeding. Specifically, some of the difficulties that individuals with tongue ties experience include "increased oral transit time, decreased bolus mobility, choking, gagging, expelling food, frustration with eating, diet selectivity, pocketing food, and tongue thrusting" (Baxter et al., 2020, p. 885). Specific feeding difficulties include breast and bottle feeding as well as spoon and finger feeding.

If a patient has a tongue tie, their lingual frenulum restricts the tongue from moving too far from the floor of the mouth. This does not allow the tongue to move past the lower gum. As a result, a breast-feeding infant can experience difficulty forming a seal adequate for feeding. While the infant has difficulty feeding, the mother may experience negative effects such as "insufficient milk drainage, mastitis, and decreased maternal milk supply" (Ricke et al., 2005, p. 1). Potock (2015) also researched breastfeeding and tongue ties and found that mothers also can experience pain during nursing, and infants may experience poor weight gain. Infants with tongue tie may be more likely to bottle feed when experiencing issues with breastfeeding (Ricke et al., 2005). "The tongue-tied infants in this study were three times more likely to be exclusively bottle-fed at one week than matched control subjects with normal tongues" (Ricke et al., 2005, p.

6). In the study conducted by Messner and Lalakea (2002), 25 mothers of infants with ankyloglossia attempted breastfeeding. Of these, 21 mothers noted there were no problems; however, the remaining four were unable to breastfeed. The findings of this study show that “there does appear to be an association between ankyloglossia and feeding difficulties for some, but not all, affected infants” (p. 542).

Moving onto spoon and finger feeding, some of the common struggles include but are not limited to over-use of lips, especially the lower lip, difficulty with progression from munching to chewing, gagging and vomiting when food is caught on the tongue, and potential for the development of picky eating (Potock, 2015). When one does not have the ability to elevate their tongue up to their palate due to their tongue tie, this continues to encourage an infantile swallow. As a result, the development of the adult swallow is delayed, leading to feeding difficulties as the individual grows older (Kale et al., 2019). While a patient will most likely be affected by a tongue tie in some form, there are ways to treat it.

Treatment

Treatment options for ankyloglossia range from conservative practices to more invasive surgical procedures. Some of these options include observation, speech therapy, otolaryngotherapy, frenotomy, frenectomy, and laser frenectomy. Lactation support can also be beneficial for infants, and some of the treatment options can be used simultaneously. For example, both speech therapy and otolaryngotherapy may be recommended for a given patient. If problems still persist, they may consider advancing to some of the surgical options. Kale et al. (2019) state that the surgical options are safe for all age groups, and Kotlow developed guidelines to determine whether or not a patient would be eligible for surgery. These guidelines are as follows:

- “1. If the tip of the tongue clefts during the act of protrusion
2. If the tip of the tongue cannot sweep the upper and lower lips easily, without straining
3. If retrusion of tongue blanches the tissue lingual to the anterior teeth
4. If the tongue places excessive forces on the mandibular anterior teeth
5. If the frenum interferes with normal deglutition process
6. If lingual frenum creates diastema between mandibular central incisors
7. If the child experiences speech difficulty due to limited tongue movements
8. If infants, it shows abrasion at the underside of the tongue
9. If the frenum prevents infant from attaching to the mother’s nipple during nursing” (p. 75).

Frenotomies are one surgical option and have been around since the 1600s, dating back to when Louis XIII, King of France underwent the procedure himself (Baxter et al., 2018). This procedure involves freeing the tongue and correcting the anatomy using various methods. In a study conducted by Braccio et al. (2016), the focus was on using frenotomies for tongue tie treatment and how this procedure can impact breastfeeding infants and their mothers. According to the National Institute for Health and Care Excellence (NICE), a frenotomy is considered safe for patients. While the procedure may be considered safe, there are inconsistencies in its effectiveness because the degrees of effectiveness tend to vary from case to case (Braccio et al., 2016). Messner and Lalakea (2002) also looked at frenotomies, and after their findings, they developed their current treatment practice around using a frenotomy. If there are difficulties with breastfeeding and a notable tongue-tie, they will offer this procedure to patients and families. As a result, they have had high satisfaction among parents of patients.

Frenectomies can sometimes be referred to as frenulectomies when the frenum is called the frenulum. Frenectomy and frenulectomy basically refer to the same procedure. This procedure is done by extracting the tissue of the frenum using either cautery, scissors, or a laser. According to Murzyn-Dantzer (as discussed in Potock, 2015), laser frenectomy can be conducted safely within a clinic setting with minimal use of anesthetics. This is due to the laser providing the patient with some analgesia. Other benefits of the laser treatment include controlled bleeding and minimal to no need for stitches. The laser also “offers precision when cutting tissue, and if the patient moves even slightly, the controls allow the beam to be stopped almost instantly” (Potock, 2015, para. 10). For these reasons, Murzyn-Dantzer recommends this treatment over electrocautery techniques due to the ways that electrocautery may burn tissue and affect inferior cell layers.

Ankyloglossia varies from patient to patient, and this is something important to remember during the treatment process. What works for one patient may not work for another, and it is crucial to develop a plan that will meet the needs of the given patient.

Post-operative Speech Improvements

After treatment, significant speech improvements were noted. In Baxter et al.’s (2020) study, post-operative speech improvements were found as soon as one week after undergoing a frenectomy. Of the parents of the 30 patients who completed the study, 76% noticed improvements in their child’s speech. Specifically, less frustration with communication was experienced, the children were more easily understood, and they had an easier time speaking quickly, making previously difficult sounds, and getting words out more quickly. Additionally, children with speech delays were able to produce new words. On the other hand, one child’s parents noticed significantly worse speech (Baxter et al., 2020). Despite the drawbacks with one

child and their parents, the study by Baxter and his colleagues provides readers with positive correlation between a lingual frenectomy tongue tie release and speech improvement. Kale et al. (2019) found similar results postoperatively also using a frenectomy, and they further maximized the improvements by implementing oral kinesthesia and diadochokinesis which help sense movement of the tongue and perform rapid tongue movements. As a result, speech improved in their patients because they were better able to move their tongue and open their mouth.

According to the findings of Messner and Lalakea's (2002) study, it is difficult to predict whether or not children will develop speech or social and mechanical problems based on findings of initial exams. Additionally, if ankyloglossia goes uncorrected, it is unknown how that will affect speech down the road' however it "is not associated with failure to develop or delay in developing speech" (p. 544). After undergoing a frenotomy, some of the patients in Messner and Lalakea's (2002) study demonstrated significant improvements in their speech. In the study, 14 children completed both pre- and post-operative evaluations. Of these children, four had normal speech prior to the procedure. The remaining 11 had abnormal speech originally, and nine of these children improved after the procedure. Parents reported high satisfaction with speech intelligibility following the frenulum release.

Post-operative Feeding Improvements

Following treatment, researchers have found improvements in feeding following a frenectomy. Braccio et al. (2016) found benefits in many aspects of breastfeeding, such as increased feeding rate, fewer problems, significantly less pain to the mothers, shorter feeds, and less fussiness, all within roughly 48 hours after the procedure.

Frenectomies also have evidence to support their use. Pompéia et al. (2017) refer to a study conducted by Ballard which found that frenectomies have helped babies suckling on the

breast and have provided pain relief to their mothers. Patients who underwent the procedure showed improvements with breastfeeding. Specifically, “the results showed improvement in breastfeeding within two weeks after the procedure for 77% of the mothers, indicating a relationship between ankyloglossia and difficulties in breastfeeding” (Pompéia et al., 2017). Baxter et al. (2020) also found improvements following a frenectomy. Sixty-nine percent of the parents noted feeding improvements at one-week post-operation. Some of the improved behaviors regarding feeding included eating more rapidly, being less picky, and experiencing less choking and gagging. At one month, however, one parent reported that feeding with her child appeared worse. Nevertheless, the children who experienced previous feeding issues with solids showed improvements in a number of areas such as frustration with eating, choking, texture pickiness, and slow eating. Baxter et al.’s (2020) study was actually the first prospective study reporting changes with solid feeding post tongue tie release. The results of this informative study show that “children with dysphagia, difficulty managing a food bolus, and other feeding issues should be evaluated for tongue-ties” (p. 889).

Significance for Speech-Language Pathologists

While speech-language pathologists (SLPs) can have a significant role in the diagnosis of a tongue-tie, not all of them are able to do so. This is because not all SLPs are able to do routine exams of the mouth especially those employed in school systems (Baxter et al., 2018). They must receive special permission to do so in those settings. Because a tongue-tie is often treated with a multidisciplinary approach, speech-language pathologists should be prepared to work closely with the professional who performed the surgical release. This is due to the fact that patients are often recommended to receive speech therapy before and after the procedure (Baxter et al., 2018). Having sessions with a speech-language pathologist beforehand allows patients and

families to become comfortable with both the procedure and the exercises that will need to be done following the surgery. According to Kale et al. (2019), surgical interventions “strictly require postsurgical speech therapy to achieve pleasing results” (p. 74).

As Messner and Lalakea (2002) stated, ankyloglossia does not contribute to a lack of speech development or a delay in speech development. Some parents, even ones in their study, believed that ankyloglossia was associated with speech differences in their children. “The astute clinician must be aware that ankyloglossia does not cause a lack of speech but rather, at most, articulation problems with otherwise normal language development” (p. 544). If a parent comes to a clinician with these concerns, they should be sent for further assessment to find the true etiology of the speech delay. These assessments can include those of speech-language pathologists, audiologists, and neurologists. Once an answer has been found, it can be decided whether or not the tongue-tie should be corrected for the benefit of speech improvement (Messner & Lalakea, 2002).

As a whole, speech-language pathologists need to be prepared to work with other professionals both in and out of their field, explain to parents and clients what is going on in a way that is understandable for them, and work with the patients before and after surgery to help maximize their results of the frenulum release procedure.

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