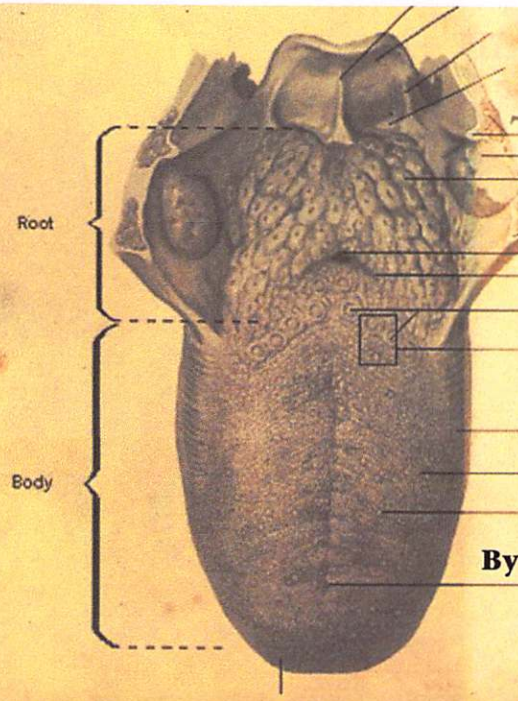


The Ortho Missing Link: Could it be tied to the tongue?

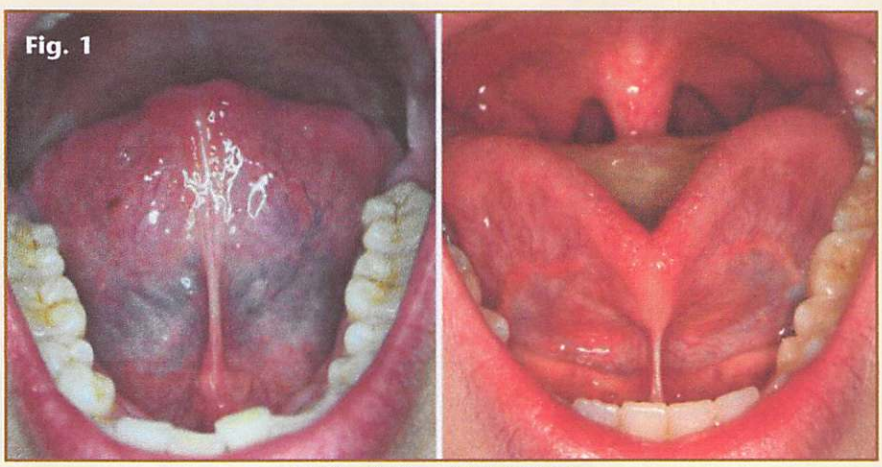
By Lori Cockley, DDS, FAGD and Angie Lehman, RDH, COMT

While dental clinicians are keenly aware of the tongue thrust and its effect on anterior open bites, it leads one to ponder how other dysfunctions of the tongue may warrant orthodontic concerns rarely considered in the past.

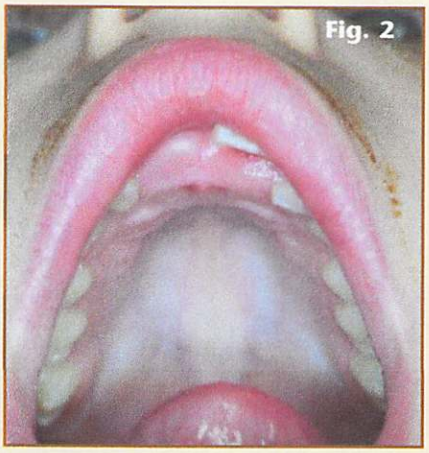
Ankyloglossia, a short lingual frenum or "tongue-tie", while defined as the restriction of normal tongue movement by the embryological remnant of tissue of the midline between the undersurface of the tongue and the floor of the mouth[1] varies greatly in appearance and can be present with widely varying limitations of functional mobility. (Fig. 1) When the restricted tongue acquires compensatory muscle actions in order to function, these unhealthy myofunctional patterns become entrenched as negative sequela. Proactively identifying these difficulties early and addressing them appropriately is what we will be discussing in this article.

Orofacial muscles play a critical role in proper craniofacial growth and development. The tongue, when resting gently inside the palate, acts as a natural orthodontic expander. The light, constant pressure from the tongue countered with the pressures provided by a proper lip seal act as a guide to the growing maxilla. This muscle placement, or Oral Rest Posture, helps to dictate whether an individual will have a well-developed, "U Shaped" arch that can easily accommodate the permanent teeth, or if the arch is high, narrow and "V Shaped", resulting in crowding of the permanent dentition.[2-6] (Fig. 2)

Proper Oral Rest Posture can be disrupted in a variety of ways causing a low and forward tongue position. The two most recognized situations that we observe with a low tongue posture are individuals with sucking habits and those with a chronic airway obstruction. When a sucking habit is present, the thumb, pacifier or other object forces the tongue to leave its proper place, causing new muscle memory to be formed. Even after the thumb is removed from the mouth, the tongue tends to stay in a low, forward position. Likewise, chronic airway obstructions such as enlarged tonsils/adenoids, or chronic allergies, will encourage the mandible and tongue to drop, opening the oral airway and subsequently causing an improper tongue position. In each situation, the tongue is no longer providing the pressures necessary to guide maxillary growth in the appropriate direction. When the source of the



Varying degrees of Ankyloglossia.



A "V-Shaped arch" as a result of low tongue posture. Notice the residual food around the mouth because the tongue is not free to cleanse after eating.

Poor oral rest posture and Class III occlusion as a result of a tongue-tie. Notice the lip incompetence and bunched mentalis muscle.

malocclusion is not addressed, orthodontic retention is poor and relapse is common.[2]

Most skilled clinicians are aware of the negative impact of thumb sucking and mouth breathing on the dentition, but many have overlooked a third, and often more subtle barrier to the stability and retention of orthodontic treatment: the presence of a tongue-tie. When the tongue is tightly tethered to the floor of the mouth, it is physically unable to rest on the roof of the mouth, potentially leading to a high narrow palate, crowded teeth and poor stability after orthodontic treatment is completed. In some instances of severe restrictions, the position and pressure of the tongue will be a contributing factor in the presence of a Class III occlusion. An improperly positioned tongue should not be overlooked. (Fig. 3, Fig. 4)

Proper Identification

Most medical and dental professionals are able to readily identify severely restricted frenums. We are taught to look for the classic "heart shape" when the patient protrudes their tongue. We recognize poor elevation when the frenum extends to the tip of the tongue and only the lateral borders are free to move. But what other factors are taken into consideration when deciding whether or not the patient in our chair is tongue tied? How do we know if this patient's Oral Rest Posture is incorrect? Is it based solely on a visual inspection, or are there other criteria that should be considered?

One of the barriers to diagnosing tongue-tie is the lack of consensus on how it should be evaluated. There exists no clear, measurable standardization for tongue-ties.[5] Classifications could guide us in assessing severity, favoring a more uniform documentation of incidence, treatment plans and outcomes. Currently, different professions are using their own means of assessment with little consistency. Unfortunately, due to this lack of uniformity, an accurate statistical incidence of ankyloglossia is difficult to determine. Until a standardized assessment protocol is adopted, it is unlikely that we will have generally accepted statistics.

We do know that each patient's mouth is unique, therefore visual inspection alone will never suffice, yet we cannot diagnose effectively if we do not first understand the complex role of the tongue. Consider all of the "jobs" that belong to the tongue. We use it for speaking, so the tongue must be able to help with articulation. We use it for eating; it helps to gather food, move it around the oral cavity, and act as a spatula while we form the bolus of food in preparation for the swallow. During swallowing, a lingualpalatal seal is created in order

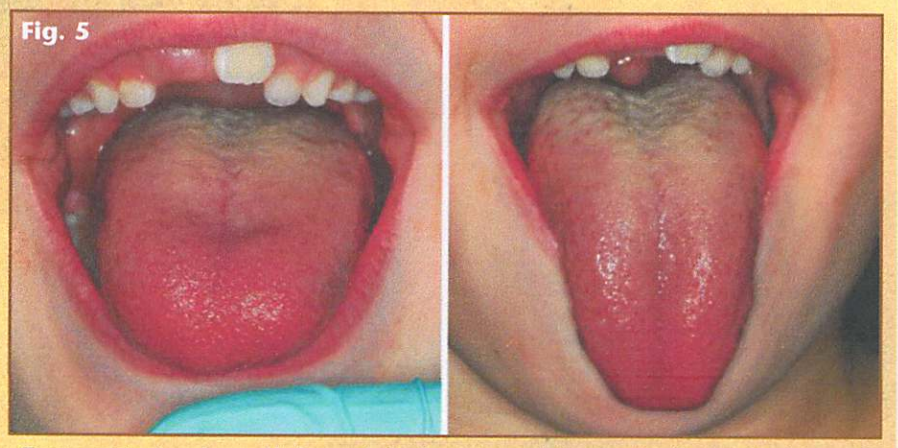


Fig. 5

Tongue protrusion observed before and after frenectomy. Notice the dimpling on the dorsum of the tongue prior to revision.

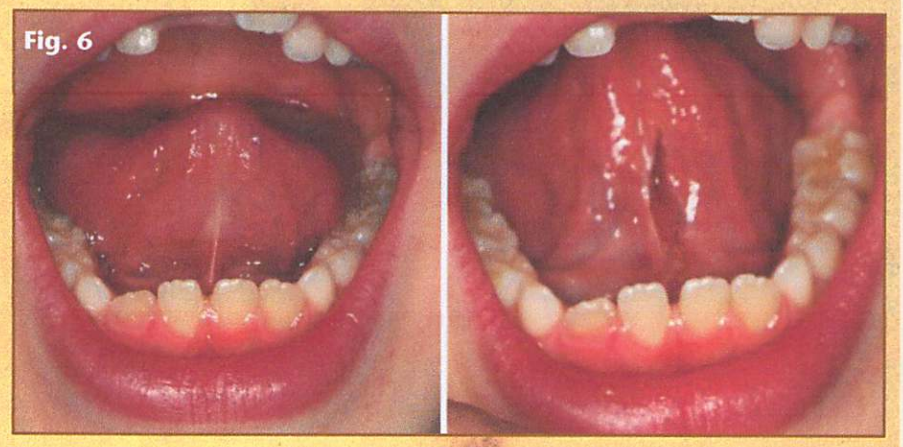


Fig. 6

Tongue elevation observed before and after frenectomy.

for the bolus of food to be moved from the oral cavity down the esophagus. The tongue also acts as the "janitor" for the oral cavity; after swallowing, the tongue needs to be free to sweep remaining food particles from the oral cavity, especially food caught behind and around the molars. This "cleanup swallow" is the first line of defense against poor oral hygiene that leads to decay and periodontal disease.

In Speech Pathologist Carmen Fernando's book, "Tongue-Tie: From Confusion to Clarity", Fernando lays out the seven criteria encompassed in her Tongue-Tie Assessment Protocol, or TAP. The seven criteria include: Cosmetic appearance, Oral hygiene and dental health, Feeding skills, Lingual movements, Oral Kinaethesia, Speech and Emotional status.[7] Fernando's TAP moves far beyond the traditional approaches of evaluating the lingual frenum based solely on physical appearance and speech. Each category requires a score of 0 to 4 with a total score of 15 or less indicating that a frenectomy is warranted.

Cosmetic appearance is the first criteria. The tongue is observed at rest as well as during speech, yawning and eating. The clinician should be observing the shape of the tip of the tongue, looking specifically for the classic "heart shaped" appearance or lack of ability to point the tip of the tongue. The thickness of the frenum as well as the location of the attachment should be observed. Dimpling on the dorsum of the tongue should also be noted. (Fig. 5)

Fernando describes the second criteria of oral hygiene and dental health as "a most significant but little known consequence of tongue-tie". Drooling and extra saliva while speaking may indicate a tie as well as food debris around the teeth or around the mouth. Commonly, salivary profusion is dealt with by the patient in different ways. Whereas the younger child may dribble profusely, older patients will mal-adapt, keeping the oral aperture small during speech, reducing the length of utterances or slurping loudly. Involuntary splashing of saliva during speech occurs frequently and embarrassingly. Some individuals may develop a rash around the lips or on the chin. Dental caries and periodontal issues often arise because of the poor range of motion and inability of the tongue to properly cleanse the oral cavity.

Feeding skills should be evaluated. It may be helpful to question the mother about difficulties with breastfeeding when the child was an infant. Problems may include mothers experiencing pain and infant feeding difficulties ranging from milk dribbling out of the baby's mouth to failure to thrive. Older children and adults may present with texture sensitivities and rely on drinking excess liquid during meals to aid in swallowing and cleansing the oral cavity.

Lingual movements are important to observe as there are many anomalies seen in tongue-tied individuals. The clinician should check for limitation of movement when the tongue is in the following positions: protrusion with downward pointing; horizontal pointing; protrusion with upward pointing; circumlocution; lateral movement; and retraction of the tongue. Poor protrusion with upward pointing is particularly important because these individuals may be more likely to be tongue thrusting when swallowing. Observe any difficulty with coordination. (Fig.6)

Observing oral kinesthesia in older children and adults tells the clinician if the patient is able to "visualize the oral space" and to copy and perform certain tasks. Tongue tied individuals are often unable to distinguish "between labial, lingual and palatal contacts without visual clues."[7] Older children and adults use a mirror, a photograph, or the clinician's face to copy movements while

toddlers are asked to copy simple grimaces and sounds.

Sound production during speech must be evaluated in connected speech rather than just in isolation. Many tongue tied individuals, especially adults, have learned a variety of adaptations that may mask a speech problem. Fernando states that "Frequently, nonverbal aspects...are also affected, including flexibility of pitch, rhythm, volume and variations of facial expression".[7]

Lastly, the patient's emotional status is important to consider. We must be aware of any detrimental effects that the tongue tie has had on the patient's self- esteem. Feelings of frustration are not uncommon. Many tongue tied individuals have social difficulties such as struggling to kiss or lick an ice cream cone. Mothers of tongue-tied babies may also carry emotional scars because of the impact that tongue-tie has on the breastfeeding relationship. It is imperative that we consider this aspect as we evaluate the need for intervention.

The beauty of Carmen Fernando's TAP is that it provides not only a standardized way to evaluate the need for a Frenectomy, but a benchmark to measure progress post treatment. The clinician can gauge a patient's progress by re-assessing all seven criteria throughout the course of their treatment. In addition to Fernando's TAP, the authors have found that the "Quick Tongue-Tie Assessment / R.O.M." tool developed by Orofacial Myologist Sandra Holtzman, is extremely useful in quantifying both the degree of restriction as a baseline as well as the increased range of motion gained by a frenectomy. This individualized method compares the relationship between the patient's Maximum Opening (MO) and their Maximum Opening With Suction (MOWS). The MOWS should be equal to or greater than ½ of the MO. Any measurement less than 50% is considered restricted. (Neo-Health Services, Inc., Orlando, FL) (Fig. 7)

Other observations are not limited to but may include blanching of the gingiva and separation or inward tilting of the mandibular incisors. The patient may report untidy or loud eating habits, habitual choking or gagging while eating, headaches, tightness or pain in the TMJ, neck and/or shoulders, gastric disturbances such as reflux as a result of aerophagia, sleep apnea and snoring from the low tongue positioning and interference of the airway, or a high palate and narrow arch as previously discussed.

Fig. 7

Holtzman's Range of Motion tool in use. Patient's Maximum Opening (MO) is measured and recorded. Maximum Opening With Suction (MOWS) is recorded while patient creates a lingual-palatal seal. If the patient's MOWS is equal to or less than their MO, then frenectomy should be considered.

Treatment

Once a diagnosis has been rendered, a dialogue should follow with the patient or parent to discuss the removal of the restriction of the frenum (frenectomy). Treatment of the structural defect has been shown to improve basic tongue mobility and can be accomplished in one of 4 ways: surgical or electrocautery under general anesthesia or snipping or laser revision with no general anesthesia. This improvement stays on into adulthood in almost every case.[6]

Oral Myofunctional Therapy is a necessary adjunct to post care, ensuring that the tongue is able to reverse the unhealthy functional patterns and gain proper rest posture and healthy functional range of motion. Neuromuscular exercises are used to create new muscle memory, creating a lasting effect. It is recommended that the patient be evaluated by a Certified Orofacial Myologist prior to the frenectomy as well as within 3 days after the treatment is complete.

Conclusion

The influence of tongue position on arch development is well documented,[2-4] yet it is rarely given the attention that it deserves in the clinical setting. As we grow in our understanding of tongue-ties and their effect on craniofacial growth, we will be able to use that knowledge to better treat them appropriately, allowing for the most optimal environment of orthodontic stabilization as well as healthy growth, development and function.

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