

# Speech and Language Outcomes in Patients with Ankyloglossia Undergoing Frenulectomy: A Retrospective Pilot Study

Srihari Daggumati<sup>1</sup>, Jason E. Cohn, DO<sup>2</sup>,  
 Matthew J. Brennan, DO, MPH<sup>2</sup>, Marissa Evarts, DO<sup>2</sup>,  
 Brian J. McKinnon, MD<sup>3</sup>, and Alyssa R. Terk, MD<sup>3</sup>

OTO Open

1-4

© The Authors 2019

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/2473974X19826943

http://oto-open.org



Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

## Abstract

Ankyloglossia is a controversial topic with no standardized treatment guidelines. A retrospective chart review was conducted to identify children who underwent lingual frenulectomy for speech and language impairment. Impairment severity was recorded pre- and postoperatively as mild, mild to moderate, moderate, moderate to severe, or severe. Variables were tested with chi-square analysis for their statistical relationship to improvements in speech and language. Children with preoperative moderate and moderate-to-severe speech and language impairment attained better speech and language outcomes after frenulectomy as compared with children with mild and mild-to-moderate impairment (100% vs 82%,  $P = .015$ ). Sutured closure after frenulectomy was associated with better speech and language improvements (100% vs 83%,  $P = .033$ ). One could consider observation of patients with mild and mild-to-moderate speech and language impairments. Sutured closure might result in better improvements in speech and language impairments. This pilot study sheds light on the potential impact of a larger study currently underway.

## Keywords

ankyloglossia, tongue-tie, frenulum, frenulectomy, pediatric otolaryngology, speech

Received September 28, 2018; revised November 8, 2018; accepted January 8, 2019.

Ankyloglossia, or tongue-tie, is a congenital anomaly characterized by a shortened lingual frenulum that may cause restricted tongue mobility resulting in

several functional limitations.<sup>1-3</sup> Children can present with difficulties with feeding, speech, articulation, and swallowing.<sup>4</sup> Ankyloglossia is typically treated with surgical division of the frenulum with closure (frenuloplasty) or without (frenotomy/frenulectomy).<sup>5-7</sup> However, there are no accepted guidelines on management of ankyloglossia. Few studies examined the relationship between ankyloglossia and speech impairments, but they reported conflicting results. The objectives of our study are to determine speech and language outcomes among patients with ankyloglossia who are undergoing frenulectomy and to identify factors contributing to the success of frenulectomy.

## Methods

After Institutional Review Board approval (DUCOM 1802006100) was obtained, a retrospective chart review was conducted to identify patients who underwent lingual frenulectomy for ankyloglossia-related speech and language concerns from July 2012 to June 2017. Data were collected on patient age, sex, chief complaint, medical history, surgical history, physical examination, and method of ankyloglossia treatment. Patients were included in the study if they were <18 years of age, presented with speech concerns related to ankyloglossia, and underwent frenulectomy. Severity of

<sup>1</sup>College of Medicine, Drexel University, Philadelphia, Pennsylvania, USA

<sup>2</sup>Department of Otolaryngology-Head and Neck Surgery, Philadelphia College of Osteopathic Medicine, Philadelphia, Pennsylvania, USA

<sup>3</sup>Department of Otolaryngology-Head and Neck Surgery, College of Medicine, Drexel University, St Christopher's Hospital for Children, Philadelphia, Pennsylvania, USA

This article was presented at the 2018 AAO-HNSF Annual Meeting & OTO Experience; October 7-10, 2018; Atlanta, Georgia.

## Corresponding Author:

Jason E. Cohn, DO, Department of Otolaryngology-Head and Neck Surgery, Philadelphia College of Osteopathic Medicine, 4190 City Line Avenue, Philadelphia, PA 19131, USA.  
 Email: jasoncohd@pcom.edu



speech impairment was recorded pre- and postoperatively by the evaluating provider as mild, mild to moderate, moderate, moderate to severe, or severe. There were 4 providers in the study who were board certified in otolaryngology, and a chi-square analysis was done to determine if there was a difference in provider-assigned severity. Binary outcome variables were created per symptom improvement and a decrease in severity. Individual descriptive variables were tested with chi-square analysis for statistical relationships to improvements in postfrenulectomy speech. Data were entered into Microsoft Office Excel spreadsheets and exported to SPSS 25 (IBM, Armonk, New York) for analysis.

## Results

A total of 188 patients were initially identified with speech and language concerns related to ankyloglossia who underwent frenulectomy. Forty-eight patients were followed up postoperatively and included in the study. The mean age was 2.86 years at initial evaluation, with 72% being male. Fifteen (28%) children were concurrently enrolled in speech and language therapy. There was no difference in assigned preoperative severity among the 4 providers (data not shown).

Children with preoperative moderate and moderate-to-severe speech and language impairment attained better speech and language outcomes after frenulectomy when compared with children with preoperative mild and mild-to-moderate speech and language impairment (100% vs 82%,  $P = .015$ ). Patients who underwent sutured closure experienced better improvements in speech and language than did unsutured patients (100% vs 83%,  $P = .033$ ). Additionally, patients who experienced readhesion of the frenulum had less improvements in speech and language (50% vs 78%,  $P = .045$ ). Only 2 patients experienced readhesion, both of whom underwent frenulectomy without sutured closure. Age, sex, concurrent speech therapy, a combined procedure (ie, with myringotomy tube placement or adenotonsillectomy), and the presence of cognitive/developmental delay were not significant predictors of surgical success (**Table 1**).

## Discussion

Ankyloglossia is a common congenital anomaly that can restrict tongue mobility and cause limitations among children, such as feeding and speech difficulties.<sup>1-4</sup> Many experts recommend surgical intervention owing to the ease of operation and low complication rates. However, there are no universally accepted guidelines regarding the treatment for ankyloglossia. Several studies documented improved breastfeeding after frenulectomy in children.<sup>8-10</sup> However, only a few studies examined the efficacy of surgery for children with speech concerns related to ankyloglossia. One study determined that parents of neonates reported improved speech outcomes and tongue mobility after surgery as compared with neonates whose parents declined surgery for ankyloglossia.<sup>11</sup> Another study found similar results and determined that tongue mobility, protrusion, and speech improved among children after frenotomy.<sup>12</sup> On the contrary, other studies suggested that tongue division surgery

**Table 1.** Demographics and Clinical Characteristics of Patients Who Underwent Lingual Frenulectomy for Ankyloglossia-Related Speech and Language Impairment.

	No Symptom Improvement	Symptom Improvement	<i>P</i> Value
Sex			.098
Male	2	36	
Female	3	12	
Age, y			.256
<2	1	11	
2-5	2	31	
>5	2	6	
Preoperative symptom severity <sup>a</sup>			.015 <sup>b</sup>
Mild	4	8	
Mild to moderate	0	10	
Moderate	0	29	
Moderate to severe	0	1	
Severe	0	0	
Sutured closure			.033 <sup>b</sup>
Yes	0	24	
No	5	24	
Concurrent speech therapy			.542
Yes	2	13	
No	3	35	
Combined procedure			.401
Yes	0	6	
No	5	42	
Developmental/cognitive delay			.520
Yes	1	5	
No	4	34	
Readhesion			.045 <sup>b</sup>
Yes	1	1	
No	4	47	

<sup>a</sup>Preoperative symptom severity was defined by the physician in the chart at the initial encounter.

<sup>b</sup> $P < .05$ .

does not improve articulation and speech among children.<sup>13,14</sup> These conflicting results leave providers with unanswered strategies for the management of ankyloglossia.

Our study demonstrated that patients with moderate and moderate-to-severe speech and language impairments experience greater symptom improvements from frenulectomy when compared with patients with mild and mild-to-moderate impairments. Additionally, patients in our study who underwent sutured closure experienced better speech and language improvements than did those not sutured after frenulectomy.

The results of our study should be interpreted within the context of certain limitations. Our study was retrospective, which can result in incomplete and variable data. Specifically, 188 patients were initially screened, with follow-up data on only 48 patients. Patients who improved may not have followed up, which can create selection bias

by leaving the most severe patients for analysis. However, this can be attributed to the poor follow-up of our patient population due to a variety of factors, namely socioeconomic. Several providers evaluated the patients; therefore, the grading of speech and language impairments could be variable. However, upon further examination, there was no difference in assigned preoperative severity among the 4 providers. Furthermore, providers graded only the severity of speech and language impairment rather than the degree of ankyloglossia. The results of this study were demonstrated in a small sample size. Despite this, our study showed that surgical intervention may not always be indicated for children with mild or mild-to-moderate speech and language concerns related to ankyloglossia. In our study, we attempted to associate sutured closure with readhesion of the frenulum. Patients who underwent sutured closure experienced better speech and language improvements postoperatively. Although 2 unsutured patients experienced readhesion, this is too small of a sample size to make a conclusion regarding sutured closure preventing readhesion and subsequent lack of speech improvements. Therefore, our results should be viewed as hypothesis generating rather than conclusive.

## Conclusion

Ultimately, it appears that surgical intervention does improve speech outcomes for children with greater severity of symptoms. Future prospective studies with larger sample sizes are encouraged, particularly ones that objectively grade the severity of ankyloglossia. This will help to surgically stratify cases of ankyloglossia.

## Author Contributions

**Srihari Daggumati**, substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved; **Jason E. Cohn**, substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved; **Matthew J. Brennan**, the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved; **Marissa Evarts**, substantial contributions to the conception or design of the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of

any part of the work are appropriately investigated and resolved; **Brian J. McKinnon**, Substantial contributions to the conception or design of the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved; **Alyssa R. Terk**, substantial contributions to the conception or design of the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## Disclosures

**Competing interests:** Brian J. McKinnon, salary from hearLIFE clinic Nassau and Medical Resonance—neither of which is pertinent to this work.

**Sponsorships:** None.

**Funding source:** None.

## References

- Berry J, Griffiths M, Wescott C. A double-blind, randomized, controlled trial of tongue-tie division and its immediate effect on breastfeeding. *Breastfeed Med*. 2012;7:189-193.
- Buryk M, Bloom D, Shope T. Efficacy of neonatal release of ankyloglossia: a randomized trial. *Pediatrics*. 2011;128:280-288.
- Miranda B, Milroy C. A quick snip—a study of the impact of outpatient tongue tie release on neonatal growth and breastfeeding. *J Plast Reconstr Aesthet Surg*. 2010;63:e683-e685.
- Webb AN, Hao W, Hong P. The effect of tongue-tie division on breastfeeding and speech articulation: a systematic review. *Int J Pediatr Otorhinolaryngol*. 2013;77:635-646.
- Bullock N Jr. The use of the CO2 laser for lingual frenectomy and excisional biopsy. *Compend Contin Educ Dent*. 1995;16:1118, 1120, 1122, 1123.
- Saleh HA, Cain AJ, Mountain RE. Bipolar scissor division of tongue-tie under tubeless anesthesia. *Laryngoscope*. 1999;109:838-839.
- Crippa R, Paglia M, Ferrante F, Ottonello A, Angiero F. Tongue-tie assessment: clinical aspects and a new diode laser technique for its management. *Eur J Paediatr Dent*. 2016;17:220-222.
- Dollberg S, Botzer E, Grunis E, Mimouni FB. Immediate nipple pain relief after frenotomy in breast-fed infants with ankyloglossia: a randomized, prospective study. *J Pediatr Surg*. 2006;41:1598-1600.
- Wallace H, Clarke S. Tongue tie division in infants with breast feeding difficulties. *Int J Pediatr Otorhinolaryngol*. 2006;70:1257-1261.
- Segal LM, Stephenson R, Dawes M, Feldman P. Prevalence, diagnosis, and treatment of ankyloglossia: methodologic review. *Can Fam Physician*. 2007;53:1027-1033.
- Walls A, Pierce M, Wang H, et al. Parental perception of speech and tongue mobility in three-year olds after neonatal frenotomy. *Int J Pediatr Otorhinolaryngol*. 2014;78:128-131.

12. Lalakea ML, Messner AH. Ankyloglossia: the adolescent and adult perspective. *Otolaryngol Head Neck Surg.* 2003;128:746-752.
13. Dollberg S, Manor Y, Makai E, Botzer E. Evaluation of speech intelligibility in children with tongue-tie. *Acta Paediatr.* 2011; 100:e125-e127.
14. Webb AN, Hao W, Hong P. The effect of tongue-tie division on breastfeeding and speech articulation: a systematic review. *Int J Pediatr Otorhinolaryngol.* 2013;77:635-646.