



**Zaghi MD**

## Ankyloglossia surgery: a verbal dissection of its functional definition and technique.



Soroush Zaghi, MD  
Sanda Valcu-Pinkerton, RDH-AP, OMT  
The Breathe Institute, Los Angeles, CA

[DrZ@ZaghiMD.com](mailto:DrZ@ZaghiMD.com)  
[www.ZaghiMD.com](http://www.ZaghiMD.com)

**Zaghi MD**

### About the Doctor

Soroush Zaghi, MD  
Sleep Surgeon  
Otolaryngology - Maxillofacial Surgery



Dr. Zaghi graduated from Harvard Medical School and completed a 5-year residency training in Head and Neck Surgery at UCLA. He completed Sleep Surgery Fellowship as Clinical Instructor of Otolaryngology at Stanford University. The focus of his specialty training is on Sleep Endoscopy, CPAP Optimization, Frenuloplasty, Myofunctional Therapy, and Maxillofacial Airway Reconstruction for the treatment of nasal obstruction, snoring, and obstructive sleep apnea. He is very active in clinical research relating to sleep disordered breathing with over 50 peer-reviewed journal articles relating to neuroscience, head and neck surgery, and obstructive sleep apnea.

Research interests include: Study design, literature review, and statistical analysis. Special interest in collaborative and multidisciplinary research projects relating to airway and breathing disorders, obstructive sleep apnea, nasal obstruction, catathrenia, myofunctional therapy, rapid maxillary expansion, maxillary mandibular advancement, facial and airway reconstruction.

Clinical interests: Airway and Breathing Disorders, Snoring, Obstructive Sleep Apnea, Nasal Obstruction, Maxillary Expansion, Maxillary-Mandibular Advancement, Facial and Airway Reconstruction Surgery, Hypoglossal Nerve Stimulation, Functional Septorhinoplasty, Turbinate Reduction, Frenuloplasty, Sinus Surgery, and Aesthetic Jaw Surgery (Genioplasty).

Personal Interests: Salsa and ballroom dance.

Guiding Statements:

- To wake up every day grateful for the air I breathe, for the life that has been given to me, for the challenges that make me stronger, and for the people that enrich my life and give it meaning.



**Stanford-Trained Sleep Surgeon:**

- Multidisciplinary perspective to advanced treatment of OSA.
- Sleep Medicine, Otolaryngology (ENT), Sleep Dentistry, Myofunctional Sciences, & Maxillofacial Surgery.
- Clinical Research and Evidence-Based Medicine.



**Individualized Treatment of Snoring and Sleep Apnea**

**Multidisciplinary Perspective**

ENT + Oral Maxillofacial Surgery + Sleep Medicine + Clinical Research

**Stanford**  
**Sleep Surgery Fellowship**  
July 2015- June 2016

**800+ individual patients seen in clinic**

**276 patients for surgery**

**Sleep Surgery**



Robson Capasso, MD  
Clinical Assistant Professor

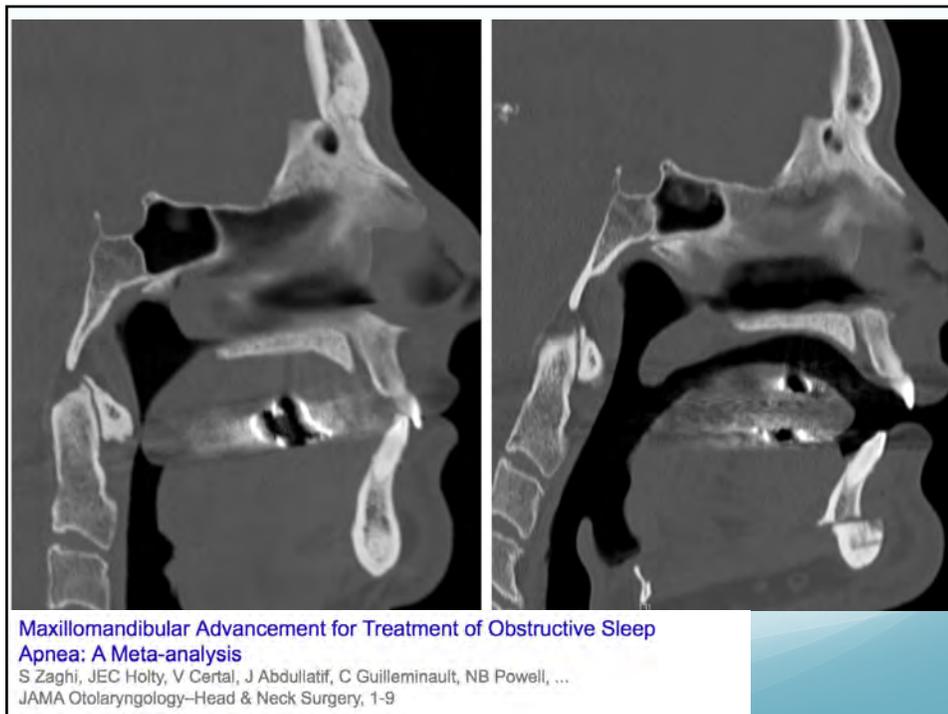
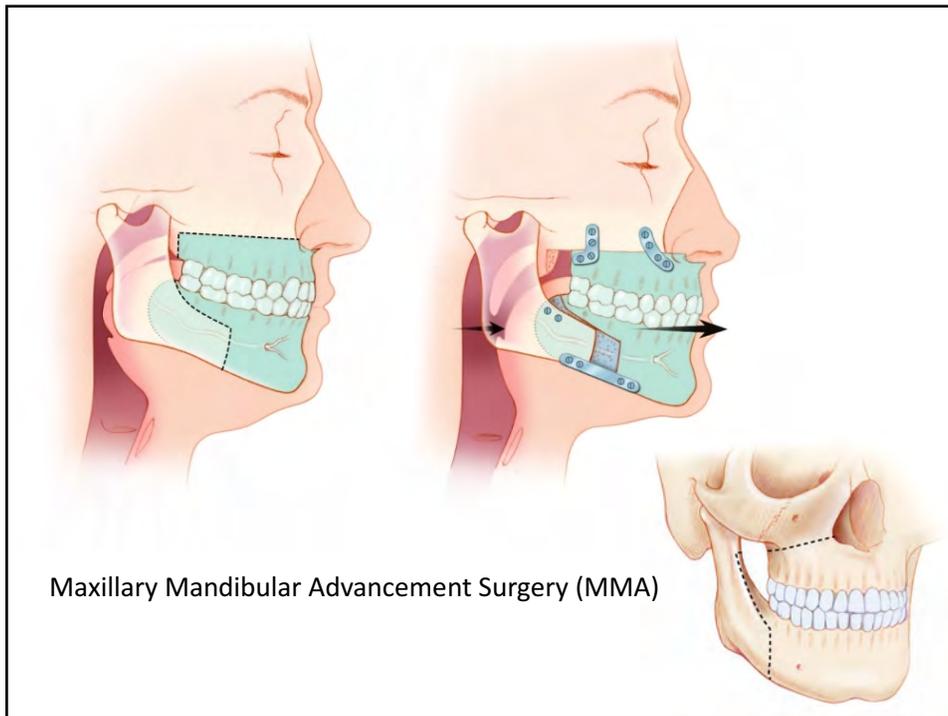


Stanley Liu, MD, DDS  
Assistant Professor



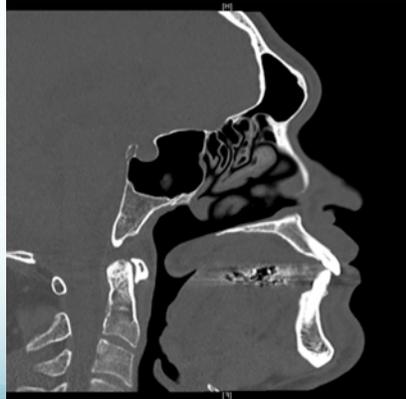
Robert W. Riley, MD  
Clinical Professor

**Procedures:** Sleep endoscopy, Septoplasty, Tonsillectomy with Lateral Pharyngoplasty (UPPP), Extension Lingual Frenuloplasty, Tongue Base Reduction, Genial Tubercle Advancement, Genioglossus Advancement with Genioplasty, Hypoglossal Nerve Stimulator (HGNS), Maxillary Expansion, Hyoid Suspension, Maxillary Mandibular Advancement (MMA).



**Functional restriction after maxillary mandibular advancement surgery:  
Persistent tongue-base obstruction.**

**Pre-Operative CT Scan  
(Before MMA Surgery)**



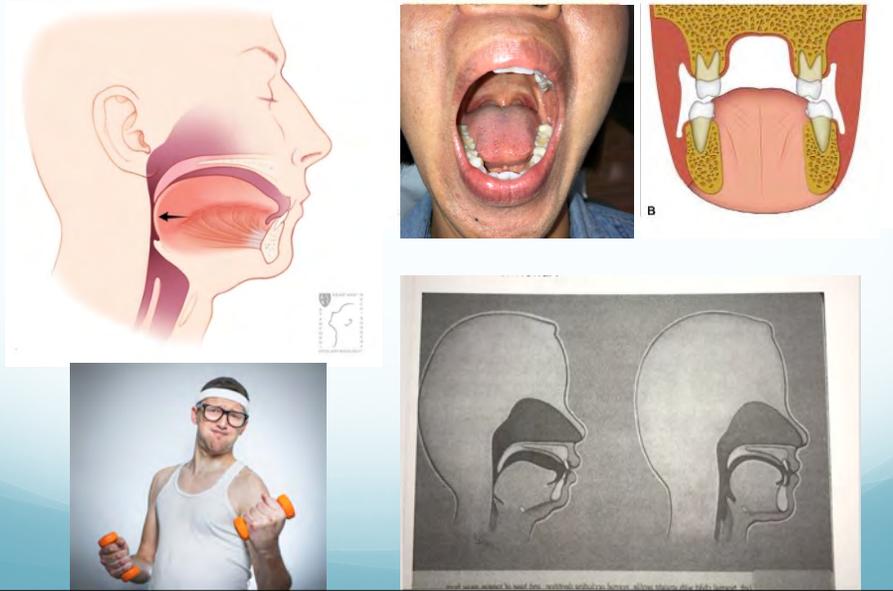
**Post-Operative CT Scan  
(2 Days after MMA Surgery)**



**Functional Limitation:  
Weak and low tone tongue**



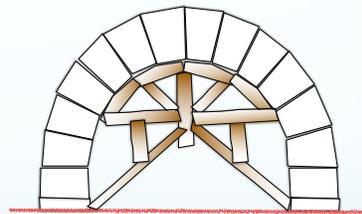
**Principle of Proper Tongue Positioning:** Tongue should rest at the roof of the palate to maintain optimal tone and function.



### Tongue as scaffold for maxillary arch



### U-Shaped Arch

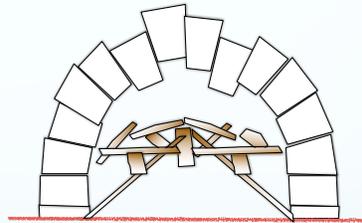


Slide Credit: Barry Raphael, DMD

Low tongue position → dysfunctional scaffold



V-Shaped Arch



Slide Credit: Barry Raphael, DMD

## Myofunctional Therapy

Exercise 3: Touch Chin: Pull the tongue forward and try to touch your chin and hold for 10 seconds, then relax. Repeat 10 times.



Exercise 4: Push Tongue Right: Push your tongue forward and push it to the right and hold for 10 seconds, then relax. Repeat 10 times.



Exercise 5: Push Tongue Left: Push your tongue forward and push it to the left and hold for 10 seconds, then relax. Repeat 10 times.



Oral myofunctional therapy is an individualized program of isometric (static) and isotonic (dynamic) strength and pattern retraining exercises of the tongue and orofacial muscles (for patients with sleep, teeth-grinding, breathing, posture, orthodontic relapse, cervical neck tension, and/or jaw pain issues) to correct maladaptive oral habits and help restore ideal resting oral posture.

## Therapy Goals and Objectives

1. *Promote exclusive nasal breathing.*
2. *Strengthen and tone the muscles of the tongue and orofacial complex.*
3. *Promote ideal resting oral posture (lips together, tongue on the roof of the mouth, nasal breathing).*
4. *Identify compensations of the jaw and neck during chewing, talking, swallowing.*
5. *Become aware of, and eliminate, parafunctional habits (e.g., thumb sucking, hair chewing, nail biting)*

THE  
**DENTAL COSMOS**

Vol. LX.                      OCTOBER 1918.                      No. 10

**ORIGINAL COMMUNICATIONS**

**Exercises for the Development of the Muscles of the Face,  
with a View to Increasing Their Functional Activity.**

By **ALFRED PAUL ROGERS, D.D.S., Boston, Mass.**

[CORRECTED 1918 BY ALFRED PAUL ROGERS.]

(Read before the Eastern Association of the Graduates of the Angle School of Orthodontia,  
May 6, 1918.)

**T**HE study of the human face is intensely fascinating. The least attentive of us at times enjoys observing and speculating on faces, in a more or less thoughtful way, during those moments when the mind is unconcerned with other interests. Unconsciously, sometimes, we are classifying them as strong or weak, attractive or unattractive; and usually this observation occurs without giving much thought to the factors responsible for the various conditions.

because the observer has been so engrossed by other things that he has neglected to study the face from a physiological and anatomical standpoint. Possibly he has allowed himself to issue his easy judgment upon the assumption that psychologic influences are responsible for some developments to him otherwise unexplainable. His common knowledge of the fundamental functions of the human face has been too limited to permit satisfactory judgment.

American Journal of Orthodontics  
November, 1950 (36:11) pages 845-855

©1950 American Association of Orthodontists  
NOTICE: This material may be protected  
by copyright law (Title 17 U.S. Code)

**A RESTATEMENT OF THE MYOFUNCTIONAL CONCEPT  
IN ORTHODONTICS**

ALFRED P. ROGERS, D.D.S., A.M., D.Sc., BOSTON, MASS.

**M**Y ORIGINAL decision to devote my thinking to the value of nutrition and muscular function as it applies to orthodontics has never ceased to fill me with enthusiasm because the laws of human reasoning with which I started many years ago seemed to coincide with the natural laws governing growth and development. The fact that we are able to gain insight into the mechanisms of nature through observation and research makes the quest of these laws appear to me as one of the most important scientific pursuits of life. In my endeavor to clarify my thesis I have tried to express this hypothesis in a manner that I considered to be simple and easy of comprehension; but thus far I fear that I have failed to make a very deep and lasting impression upon many of our profession. It is because of this that I appear once more before you to make one more endeavor to stress the value of myofunctional treatment, not alone because of the satisfaction its intelligent application can bring to the orthodontist, but to the many benefits it can bring to the growing child.

In undertaking a re-evaluation of myofunctional therapy in orthodontic practice, it might be of advantage to attempt a brief general review of some of the nonmechanical requirements in a comprehensive understanding of the practice of orthodontics. Of course, it should be understood that a task such as this can be dwelt with but briefly in one short paper. For some it needs but a suggestion to start the mind toward creative and constructive thinking. It is from such minds that I hope to evoke on this occasion a response to a deeper consideration of all things basic in relation to child growth and development, as it touches oral and facial maturation.

## MYOFUNCTIONAL THERAPY TO TREAT OSA: REVIEW AND META-ANALYSIS

### Myofunctional Therapy to Treat Obstructive Sleep Apnea: A Systematic Review and Meta-analysis

Macario Camacho, MD<sup>1</sup>; Victor Certal, MD<sup>2</sup>; Jose Abdullatif, MD<sup>3</sup>; Soroush Zaghi, MD<sup>4</sup>; Chad M. Ruoff, MD, RPSGT<sup>1</sup>; Robson Capasso, MD<sup>5</sup>; Clete A. Kushida, MD, PhD<sup>1</sup>

1. Myofunctional therapy provides a reduction in AHI of approximately 50% in adults and 62% in children.
2. Improvements to daytime sleepiness and snoring.
3. Shown effective in children and adults of all ages studied thus far.  
Youngest patient: 3 years old  
Oldest patient: 60 years old.
4. Important role in preventing relapse.



**Level 1 evidence supporting myofunctional therapy as a treatment for obstructive sleep apnea.**



**Stanford MEDICINE** | The Stanford Center for Sleep Sciences and Medicine

Sleep Breath  
DOI 10.1007/s11325-016-1429-6



SLEEP BREATHING PHYSIOLOGY AND DISORDERS • ORIGINAL ARTICLE

### Myofunctional therapy improves adherence to continuous positive airway pressure treatment

Giovana Diaffria<sup>1</sup> • Rogério Santos-Silva<sup>1</sup> • Eveli Truksinas<sup>1</sup> • Fernanda L. M. Haddad<sup>1,2</sup> • Renata Santos<sup>1</sup> • Silvana Bommarito<sup>3</sup> • Lulz C. Gregório<sup>2</sup> • Sergio Tufik<sup>1</sup> • Lia Bittencourt<sup>1</sup>

Received: 9 August 2015 / Revised: 17 October 2016 / Accepted: 27 October 2016  
© Springer-Verlag Berlin Heidelberg 2016

#### Abstract

**Purpose** Few studies have investigated myofunctional therapy in patients with obstructive sleep apnea syndrome (OSAS). The objective of this study was to evaluate the effect of myofunctional therapy on continuous positive airway pressure (CPAP) adherence.

**Methods** The study was registered at ClinicalTrials.gov (NCT01289405). Male patients with OSAS were randomly divided into four treatment groups: placebo, patients undergoing placebo myofunctional therapy ( $N = 24$ ); myofunctional therapy, undergoing myofunctional therapy ( $N = 27$ ); CPAP, undergoing treatment with CPAP ( $N = 27$ ); and combined, undergoing CPAP therapy and myofunctional therapy ( $N = 22$ ). All patients underwent evaluations before and after 3 months of treatment evaluation and after 3 weeks of washout. Evaluations included Epworth sleepiness scale (ESS), polysomnography, and myofunctional evaluation.

**Results** The 100 men had a mean age of  $48.1 \pm 11.2$  years, body mass index of  $27.4 \pm 4.9$  kg/m<sup>2</sup>, ESS score of  $12.7 \pm 3.0$ , and apnea-hypopnea index (AHI) of  $30.9 \pm 20.6$ . All treated groups (myofunctional therapy, CPAP, and combined myofunctional therapy with CPAP) showed decreased ESS and snoring, and the myofunctional therapy group maintained

this improvement after the “washout” period. AHI reduction occurred in all treated groups and was more significant in CPAP group. The myofunctional therapy and combined groups showed improvement in tongue and soft palate muscle strength when compared with the placebo group. The association of myofunctional therapy to CPAP (combined group) showed an increased adherence to CPAP compared with the CPAP group.

**Conclusions** Our results suggest that in patients with OSAS, myofunctional therapy may be considered as an adjuvant treatment and an intervention strategy to support adherence to CPAP.

**Keywords** Obstructive sleep apnea · Treatment · Myofunctional therapy · Continuous positive airway pressure · Polysomnography

#### Introduction

Obstructive sleep apnea syndrome (OSAS) is a disease with multifactorial pathways of pathophysiology that involve anatomical and functional pharyngeal changes [1, 2]. Although the treatment of choice is the continuous positive airway pressure (CPAP) device, adherence to this type of therapy has been

**Level 1 evidence supporting myofunctional therapy to improve CPAP compliance.**

### Effects of orofacial myofunctional therapy on temporomandibular disorders.

de Felício CM<sup>1</sup>, de Oliveira MM, da Silva MA.

#### Author information

#### Abstract

The objectives of the current study were to analyze the effects of orofacial myofunctional therapy (OMT) on the treatment of subjects with associated articular and muscular temporomandibular disorders (TMD). Thirty subjects with associated articular and muscular TMD, according to the Research Diagnostic Criteria (RDC/TMD), were randomly divided into groups: 10 were treated with OMT (T group), 10 with an occlusal splint (OS group), and 10 untreated control group with TMD (SC). Ten subjects without TMD represented the asymptomatic group (AC). All subjects had a clinical examination and were interviewed to determine Helkimo's Indexes (Di and Ai), the frequency and severity of signs and symptoms, and orofacial myofunctional evaluation. During the diagnostic phase, there were significant differences between groups T and AC. There were no significant differences between group T and OC and SC groups. During the final phase, groups T and OS presented significant improvement, however, the group T presented better results and differed significantly from group OS regarding the number of subjects classified as Aiii; the severity of muscular pain and TMJ pain; the frequency of headache and the muscles and stomatognathic functions. The group T differed significantly from the SC group but no longer differed significantly from the AC group. OMT favored a significant reduction of pain sensitivity to palpation of all muscles studied but not for the TMJs; an increased measure of mandibular range of motion; reduced Helkimo's Di and Ai scores; reduced frequency and severity of signs and symptoms; and increased scores for orofacial myofunctional conditions.

PMID: 21032979 DOI: 10.1179/crm.2010.033

**Level 1 evidence supporting myofunctional therapy to relieve pain from temporomandibular disorders.**

## Levels of Evidence



*"Levels of evidence (sometimes called hierarchy of evidence) are assigned to studies based on the methodological quality of their design, validity, and applicability to patient care. These decisions give the grade (or strength) of recommendation."*

Strength	Level	Design	Randomization	Control
High	Level 1	Randomized control trial (RCT)	Yes	Yes
		Meta-analysis of RCT with homogeneous results	No	
	Level 2	Prospective comparative study (therapeutic)	No	Yes
		Meta-analysis of Level 2 studies or Level 1 studies with inconsistent results	No	
	Level 3	Retrospective Cohort Study	No	Yes
		Case-control Study	No	Yes
		Meta-analysis of Level 3 studies	No	
	Level 4	Case Series	No	No
	Low	Level 5	Case Report	No
		Expert Opinion	No	No
		Personal Observation	No	No



**CEBM**  
CENTRE FOR EVIDENCE-BASED MEDICINE



**CEBM**  
UNIVERSITY OF OXFORD

HOME
ABOUT
EDUCATION & TRAINING
RESOURCES
RESEARCH
EVIDENCE OXFORD

## Oxford Centre for Evidence-based Medicine – Levels of Evidence (March 2009)

“What are we to do when the irresistible force of the need to offer clinical advice meets with the immovable object of flawed evidence?”

All we can do is our best: give the advice, but alert the advisees to the flaws in the evidence on which it is based.”

Levels of Evidence for Therapeutic Studies<sup>1</sup>

Level	Type of evidence
1A	Systematic review (with homogeneity) of RCTs
1B	Individual RCT (with narrow confidence intervals)
1C	All or none study
2A	Systematic review (with homogeneity) of cohort studies
2B	Individual Cohort study (including low quality RCT, e.g. <80% follow-up)
2C	“Outcomes” research; Ecological studies
3A	Systematic review (with homogeneity) of case-control studies
3B	Individual Case-control study
4	Case series (and poor quality cohort and case-control study)
5	Expert opinion without explicit critical appraisal or based on physiology bench research or “first principles”

\*From the Centre for Evidence-Based Medicine, <http://www.cebm.net/>.

Oxford Centre for Evidence-Based Medicine. OCEBM Levels of Evidence Working Group. The Oxford 2011 Levels of Evidence. 2011. <http://www.cebm.net/index.aspx?o=5653>.

## Structural Restrictions



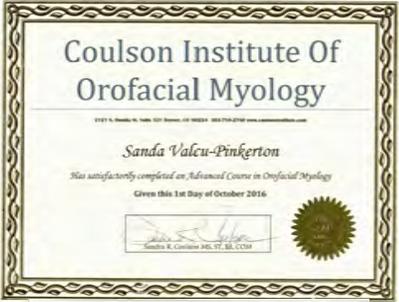

→ Tongue-tie can interfere with efficacy of myofunctional therapy.

Level 4-5 evidence



**Myofunctional Therapist:**  
**Sanda Valcu-Pinkerton, RDH-AP, OMT**





**Coulson Institute Of Orofacial Myology**

*Sanda Valcu-Pinkerton*

*Has satisfactorily completed an Advanced Course in Orofacial Myology*

Given this 1st Day of October 2016



**Certificate of Participation**

*Sanda Valcu-Pinkerton*

Restoring Movement Through Breathing

Level 2

Agoura Hills, CA

June 11<sup>th</sup> and 12<sup>th</sup> 2016

Presented By: *Lois Layner, PhD*

Lois Layner, Ph.D.

INTERNATIONAL ASSOCIATION OF OROFACIAL MYOLOGY

In Association with

Billings Speech Pathology Services, LLC  
& Davidson Orofacial Myology, LLC

certifies that

**SANDA PINKERTON**

Completed her 28-Hour Introductory Certification Track Course

"Orofacial Myology: Make the Connection"

Presented by

Mary Billings, MS, CCC-SLP, COM  
David Davidson, BS, RDB, COM

and is hereby awarded 28 Continuing Education Units/CEUs or 28 Contact Hours in recognition of their participation

JULY 19-22, 2017 | KANSAS CITY, MISSOURI | METRO

*Mary Billings, MS, CCC-SLP, COM*     *David Davidson, BS, RDB, COM*  
Mary Billings, MS, CCC-SLP, COM     David Davidson, BS, RDB, COM  
IAOM Certified Instructor     IAOM Certified Instructor



**Treating Orofacial Myofunctional Disorders:  
Beyond the Symptoms**

Presented by Linda D'Onofrio, MS, CCC-SLP

15 hours of Continuing Education & 1.5 ASHA approved CEUs (0512-001)

May 14-15, 2016  
Clackamas Oregon

Linda D'Onofrio, MS, CCC-SLP  
www.donofrioslp.com  
503-808-9919

*Certificate*

*this is to certify that*

**Sanda Valcu-Pinkerton RDHAP**

*has completed all the requirements for*

**Orthopostural Assessment and Training Level One**

Los Angeles CA October 7-8-9 2016



TRAINER AND EXAMINER



Breathing Well Orthopostural Assessment Division 1425 Broad St., Clifton, NJ 07012



**INSTITUTE FOR TMD/MIGRAINE THERAPY**

**CERTIFICATE OF COMPLETION**

THIS IS TO CERTIFY THAT

**Sanda Valcu**

Has successfully completed the 125 Training on the Therapeutic, Diagnostic, Prophylaxis and Treatment for Temporomandibular Joint Disorders and orofacial headaches, and is therefore awarded the status of completion

Given this 29th Day of March, 2016

*Marie Fagan, D.D.S.*     *Robert Jones, D.D.S.*  
Marie Fagan, D.D.S.     Robert Jones, D.D.S.  
Program Director     Program Director

# the BREATHE INSTITUTE



*Patient care, research, and education.*

Evidence-based, forward thinking, integrative approaches to pediatric and adult sleep and breathing issues.



Breathe In added 3 new photos — with Sanda Valcu-Pinkerton and Soroush Zaghi. August 10 at 9:24am · 🌐

Future co-publisher 🙌🏻🥰 incredibly creative and thoughtful gift from one of our amazing patients. Her own customized myofunctional therapy kids book!  
#futureauthor #creativity #myofunctionaltherapy #thesnake #thebreatheinstitute #ZaghiMD #SandaValcuPinkerton

## Presentation Outline

- **Diagnosis:**
  - Structural and functional
  - The obvious
  - And the not so obvious
- **Protocol:**
  - The role of pre and post-op myofunctional therapy
  - Collaboration between therapist and surgeon during procedures
  - Surgical Technique Demonstration: tongue, lip, and buccal ties.
  - Post-operative care
- **Advances:**
  - Research supporting this work.
  - The role of fascia, craniosacral therapy, cranial nerve re-integration.



## Tongue – Tie: Obvious



Type 1 - Tip of the tongue

Type 2 - Almost at tip, thin

Type 3 - Almost at tip, thick

Type 3 - Thick "Eiffel tower"

Type 3 - "Eiffel Tower"

Type 4 - Submucosal

Type 4 - Submucosal

Type 4 - Submucosal

**The Tongue-Tied Bunch**

www.DrMikelNewman.com

www.NewmanFamilyDentistry.com

NEWMAN Family Dentistry

LAWRENCE A. KOTLOW DDS

**SOS 4 TOTS**

Tethered Oral Tissues™ • Tongue-Ties & Lip-Ties

*Exposing the myths about breastfeeding and healing the heartbreak to make breastfeeding a joy*

## Statement from the American Academy of Pediatrics 2012



**Examination of infants**  
*The **key** to correctly examining an infant is proper placement on you lap. Place his face facing the mother.*

Lawrence Kotlow DDS 3

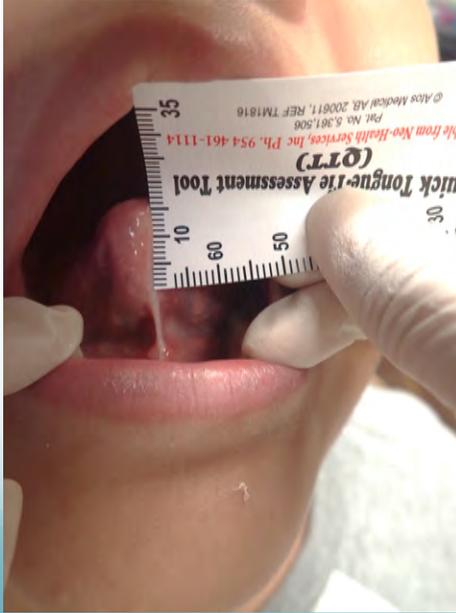
### Dr. Lawrence Kotlow Examination of Posterior Tongue-Tie for Infants



Examining your newborn for a posterior tongue tie. Place the infant on your lap facing the same direction as your face and push down on either side of the lingual frenum area. The lingual tie will appear.

Lawrence Kotlow DDS | [Kidsteeth.com](http://Kidsteeth.com)

**Kotlow, L. A. (1999).** "Ankyloglossia (tongue-tie): a diagnostic and treatment quandary." *Quintessence International* **30**(4).



**Kotlow's Free-Tongue Measurement:**

*Ages 18 months to 14 years*

Clinically acceptable, normal range of free tongue: greater than 16 mm.

Class I: Mild ankyloglossia: 12 to 16.

Class II: Moderate ankyloglossia: 8 to 11 mm

Class III: Severe ankyloglossia: 3 to 7 mm

Class IV: Complete ankyloglossia: < 3 mm

**Kotlow, L. A. (1999).** "Ankyloglossia (tongue-tie): a diagnostic and treatment quandary." *Quintessence International* **30**(4).

*Ages 18 months to 14 years: Developed primarily to evaluate for swallow issues.*



**6.5 mm = Severe Ankyloglossia**



**15 - 17 mm = Mild to Normal**



**31 mm = Normal**

## Importance of Early Diagnosis and Treatment



6 year-old girl with restless sleep, frequent nighttime awakening, nightmares, anxiety, and social/emotional behavioral issues.



→ Structural definition does not adequately describe this “functional” ankyloglossia.

Sleep Breath  
DOI 10.1007/s11325-016-1452-7

EPIDEMIOLOGY • ORIGINAL ARTICLE

**Toward a functional definition of ankyloglossia: validating current grading scales for lingual frenulum length and tongue mobility in 1052 subjects**

Audrey Yoon<sup>1</sup> • Soroush Zaghi<sup>2,3</sup> • Rachel Weitzman<sup>4</sup> • Sandy Ha<sup>5</sup> • Clarice S. Law<sup>1</sup> • Christian Guillemainault<sup>6</sup> • Stanley Y.C. Liu<sup>2</sup>

Received: 18 October 2016 / Revised: 25 November 2016 / Accepted: 28 December 2016  
© Springer-Verlag Berlin Heidelberg 2017

**Abstract**  
*Purpose* Alterations of the lingual frenulum may contribute to oromyofacial dysfunction, speech and swallowing impediments, underdevelopment of the maxillofacial skeleton, and even predispose to sleep breathing disorder. This study aims to assess the utility of existing instruments for evaluation of restricted tongue mobility, describe normal and abnormal ranges of tongue mobility, and provide evidence in support of a reliable and efficient measure of tongue mobility.  
*Methods* A prospective cohort study of 1052 consecutive patients was evaluated during a 3-month period. Age, gender, ethnicity, height, weight, BMI, maximal interincisal mouth opening (MIO), mouth opening with tongue tip to maxillary incisive papillae at roof of mouth (MOTTIP), Kotlow's free-tongue measurement, and presence of severe tongue-tie were recorded. Secondary outcome measures include tongue range of motion deficit (TRMD, difference between MIO and MOTTIP) and tongue range of motion ratio (TRMR, ratio of MOTTIP to MIO).

*Results* Results indicate that MIO is dependent on age and height; MOTTIP and TRMD are dependent on MIO; Kotlow's free-tongue measurement is an independent measure of free-tongue length and tongue mobility. TRMR is the only independent measurement of tongue mobility that is directly associated with restrictions in tongue function.  
*Conclusions* We propose the use of tongue range of motion ratio as an initial screening tool to assess for restrictions in tongue mobility. "Functional" ankyloglossia can thus be defined and treatment effects followed objectively by using the proposed grading scale: grade 1: tongue range of motion ratio is >80%, grade 2 50–80%, grade 3 < 50%, grade 4 < 25%.

**Keywords** Ankyloglossia · Frenulum · Tongue tie · Oromyofacial dysfunction · Classification of ankyloglossia · Tongue tie grading scale

**Introduction**



Yoon et al. (2017). "Towards a functional definition of ankyloglossia: validating current grading scales for lingual frenulum length and tongue mobility in 1052 Subjects." *Sleep & Breathing*

**Tongue range of motion ratio (TRMR):**

Tongue extension as percentage of maximum vertical opening.



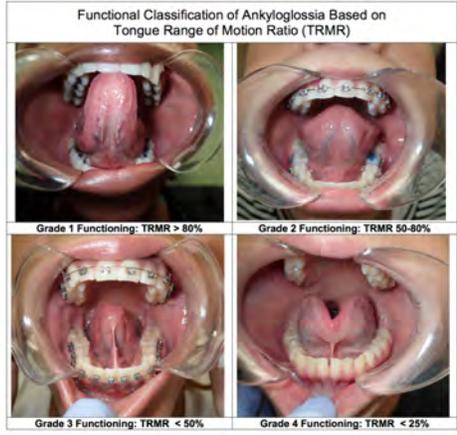
Mouth Opening with Tongue Tip to Incisive Papilla (MOTTIP, Example: 38 mm)



Maximal Interincisal Mouth Opening (MIO, Example: 50 mm)

76%

**Tongue Range of Motion Ratio**  
Objective Tool to Assess *Tongue Mobility*



Vertical mouth opening measurements are assessed under different conditions:

- (1) Tongue to Incisive Papilla
- (2) Maximum Interincisal Opening (MIO)

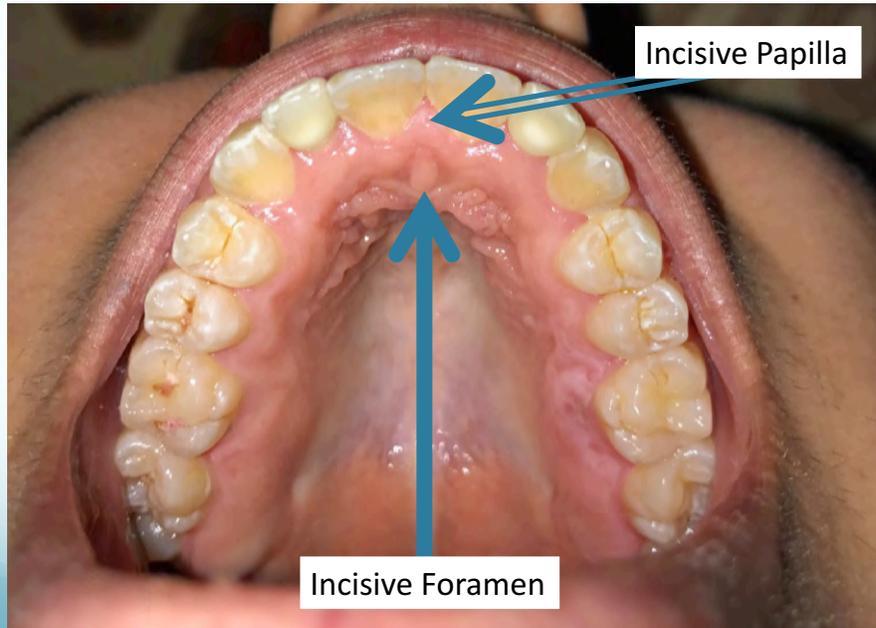
The TRMR- IP is now a validated objective tool to allow clinicians of various disciplines to effectively communicate ranges of tongue mobility.

- Grade 1: >80% (Top 10th percentile)
- Grade 2: 50-80% (Average)
- Grade 3: <50% (Below average)
- Grade 4: <25% (Bottom 10th percentile)

Higher grades reflect more severe functional impairments of tongue mobility.

*In addition, we are also measuring TRMR with :*

- Tongue to Incisive Foramen (Spot)
- Tongue in Suction Hold (Cave)



## Tongue-Tie → Tongue Mobility



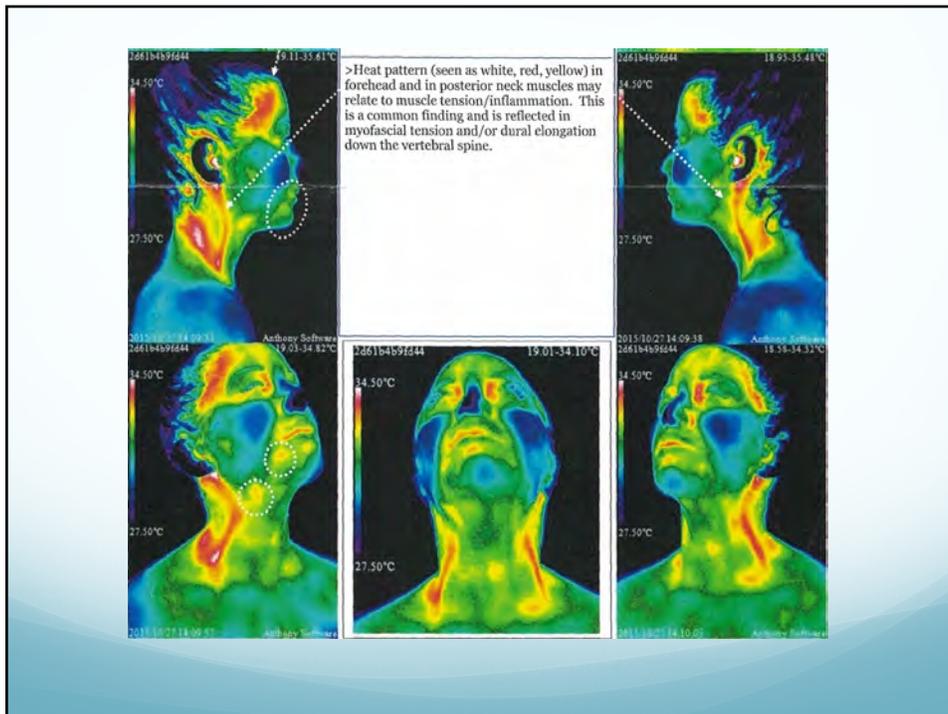
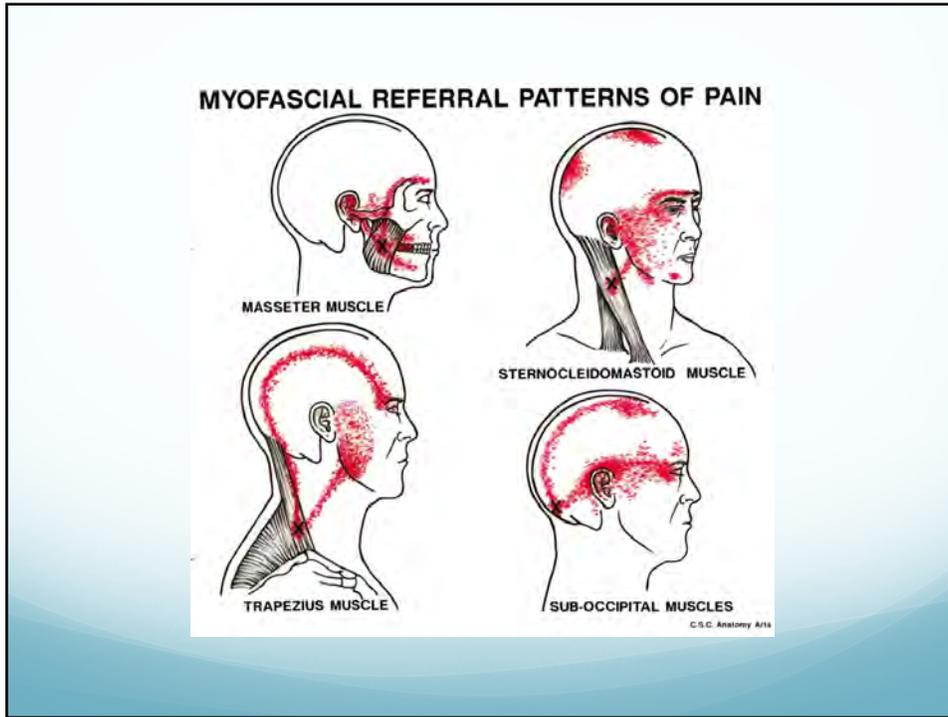
Grade 1 Functioning TRMR > 80%    Grade 2 Functioning TRMR 50-80%    Grade 3 Functioning TRMR < 50%    Grade 4 Functioning TRMR < 25%

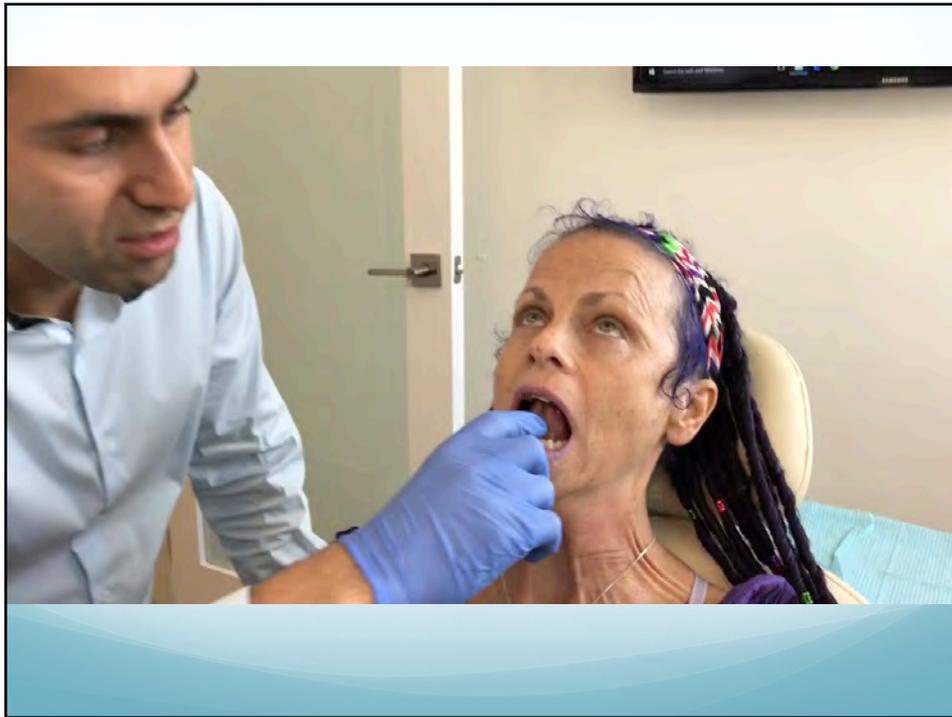


→ Grade 2 Tongue Range of Motion (with extensive strain)

## Controlling for Compensation with Functional Ankyloglossia







**Looks like Grade 1  
(extensive strain)**

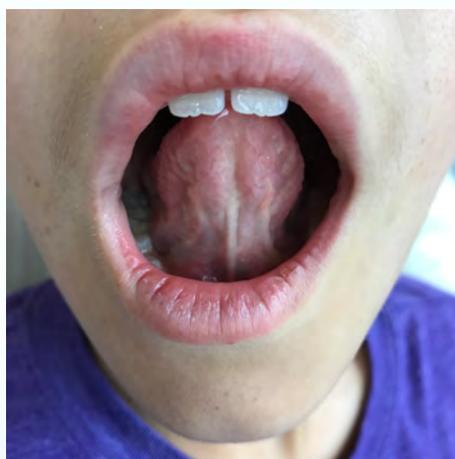


**Actually Grade 3  
(no compensation)**





**Grade 3 compensating to Grade 2  
with extensive strain**



**Grade 3 compensating to  
Grade 2 with strain**

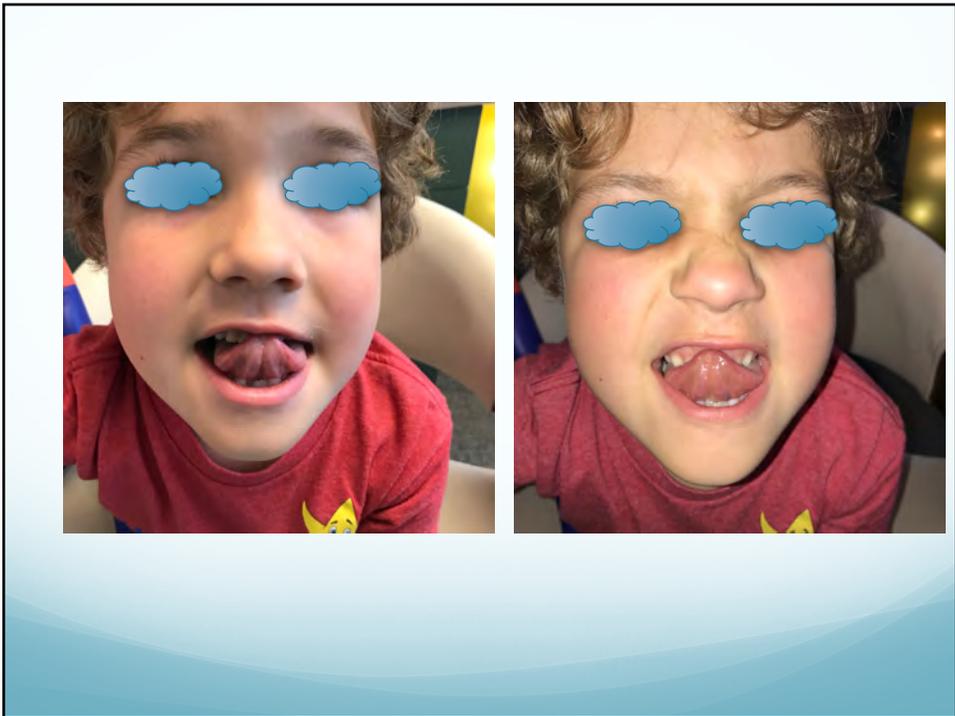
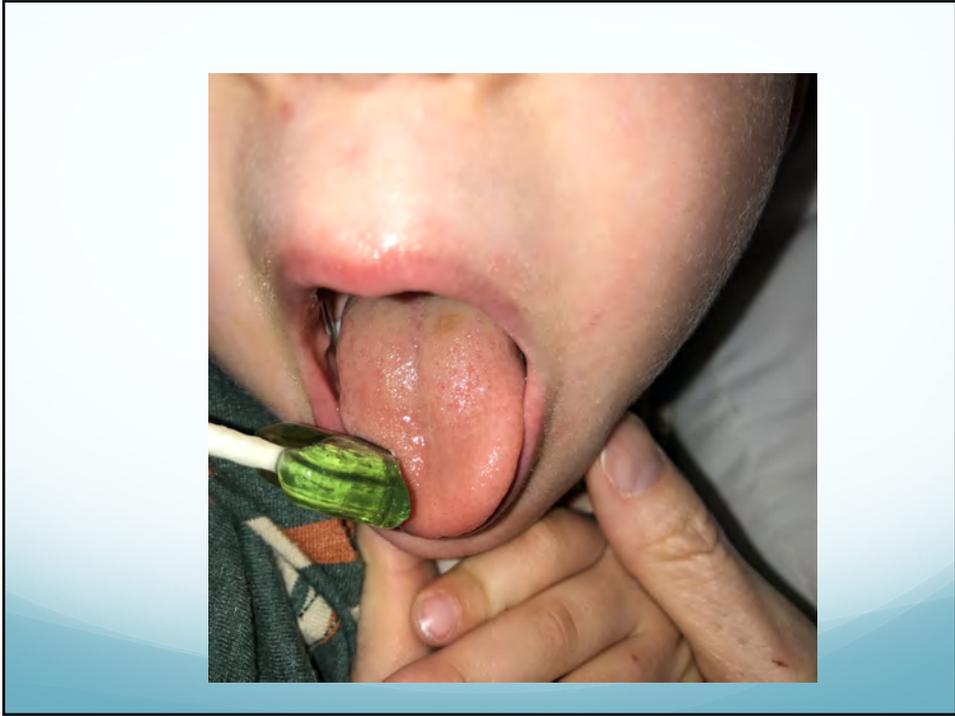


**Extensive strain**



**Dorsal Dimpling**





## CT Scan: Low tongue resting posture = Functional ankyloglossia

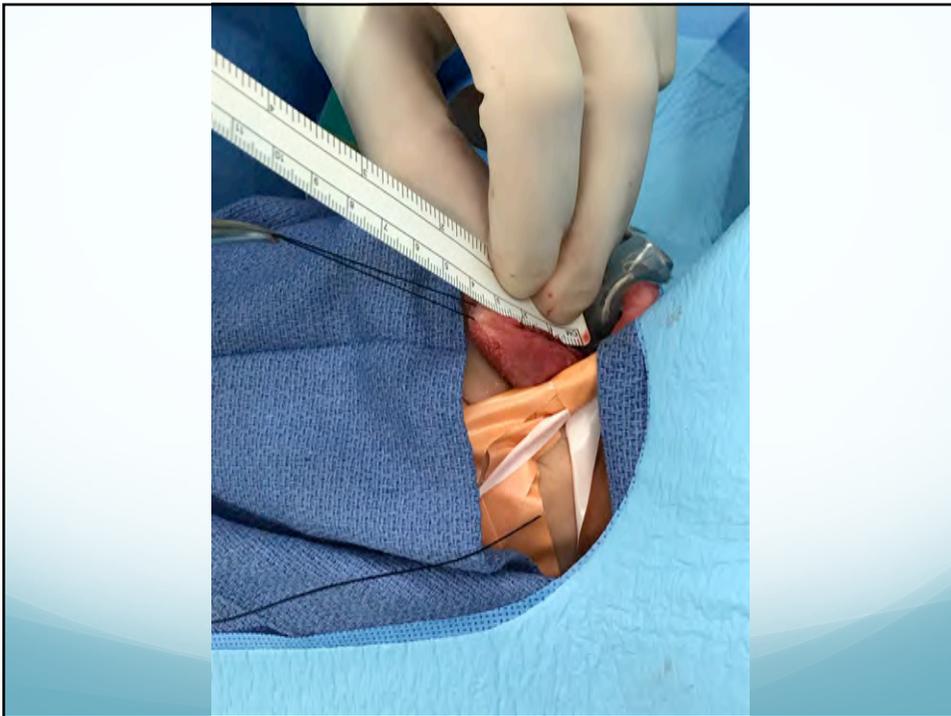
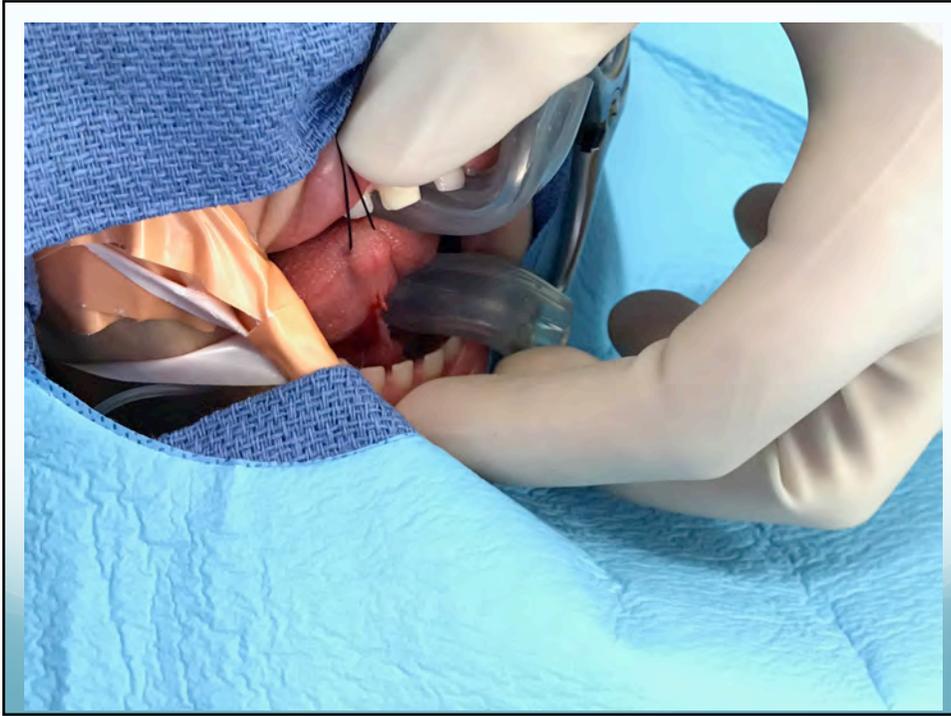


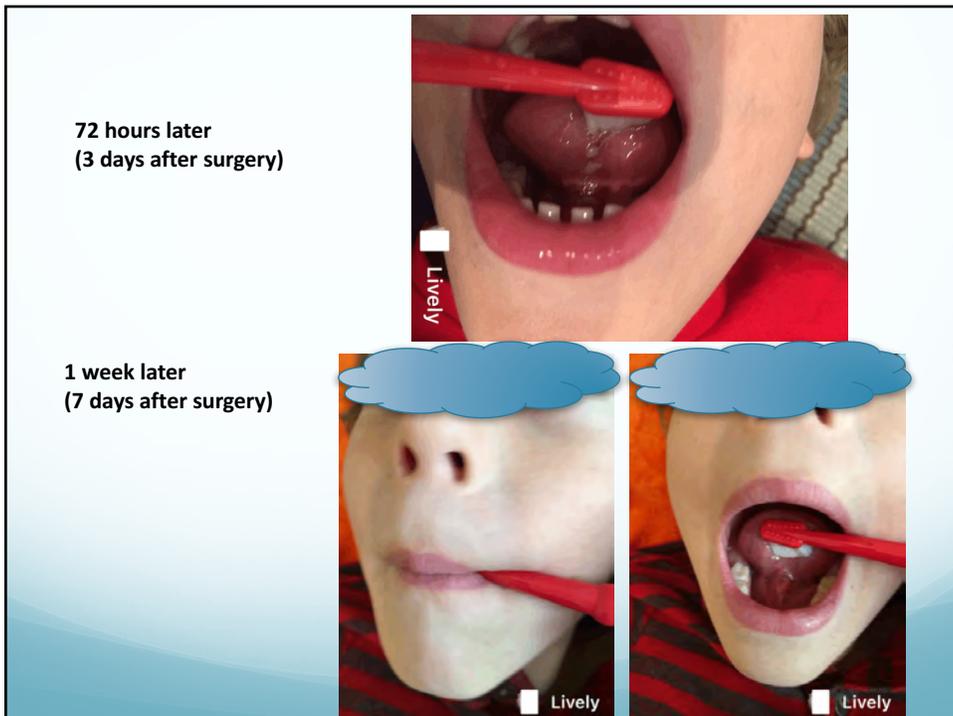
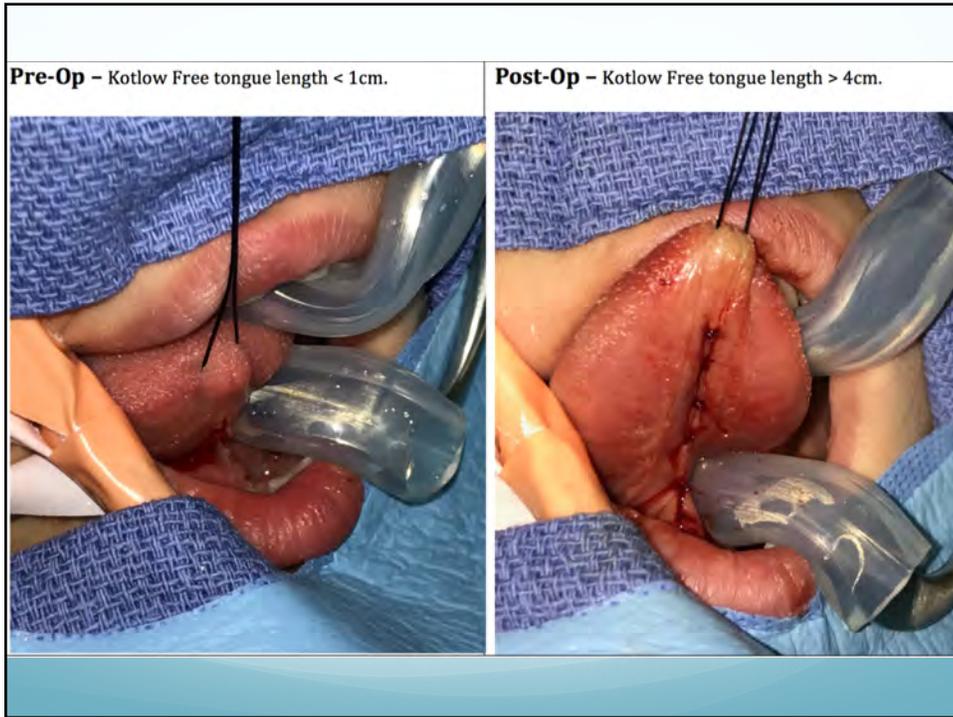
## Frenuloplasty: How I do it .... In the OR

**5 1/2 year old boy** with a long-history of severe tongue-tie.

- Affecting his capacity for speech articulation and swallowing function.
- He is a “slow eater” and takes about 30 minutes to complete a meal.
- Demonstrates parafunctional habits: sucking on objects and nonfood items.
- There is frequent throat clearing, nasal drainage, and nasal congestion.







**2 weeks later**

“Tongue movement is dramatically better and he doesn’t chew on things like he used to before the surgery.”



**8 weeks later**

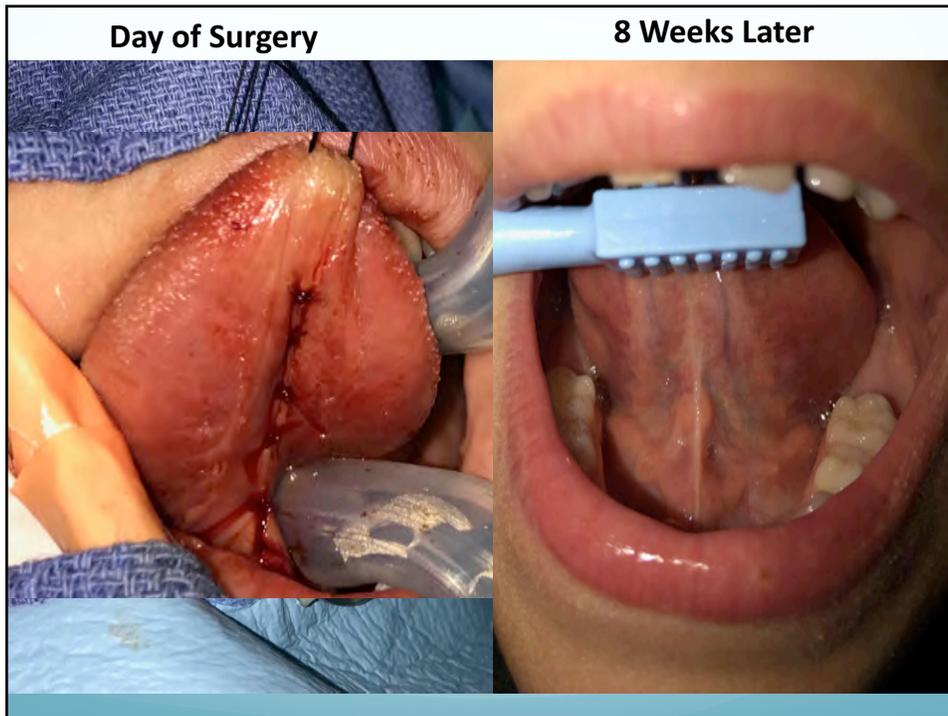
“He is really doing well. He coughs less, sleeps better, swallows water easier, and can chew up his food better.”



## 8 Weeks Post-Frenuloplasty



“He really has a large range of motion that he is learning how to use with the exercises. Doing great now with his new tongue thanks to you.”



## Frenuloplasty: How I do it ... in the clinic

**8 year old girl** with a mild tongue-tie associated with tongue thrust, orthodontic open bite malocclusion.

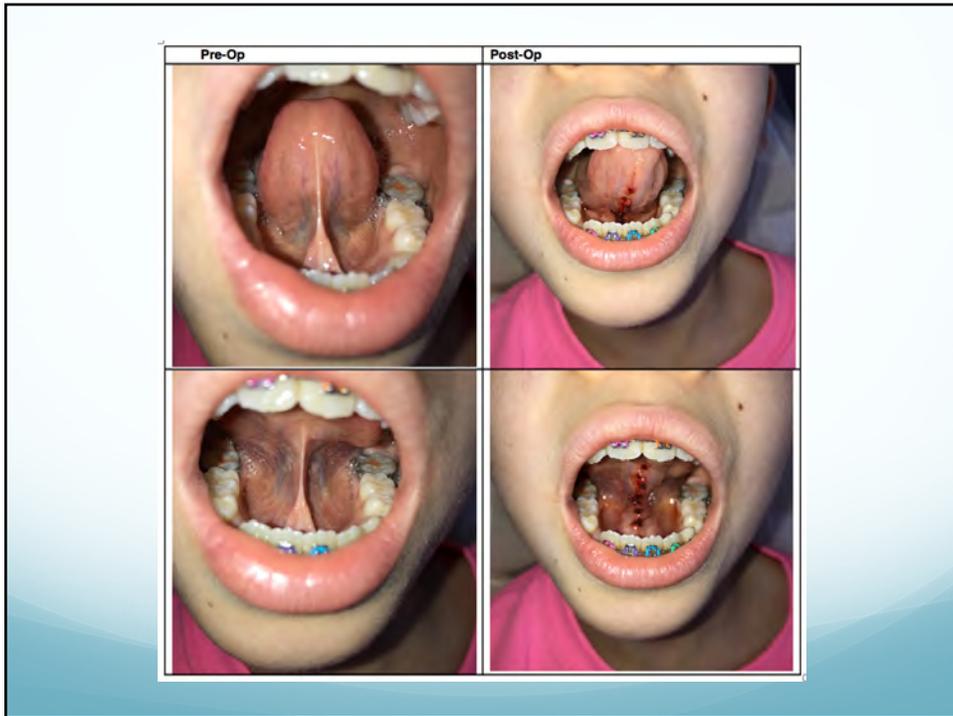


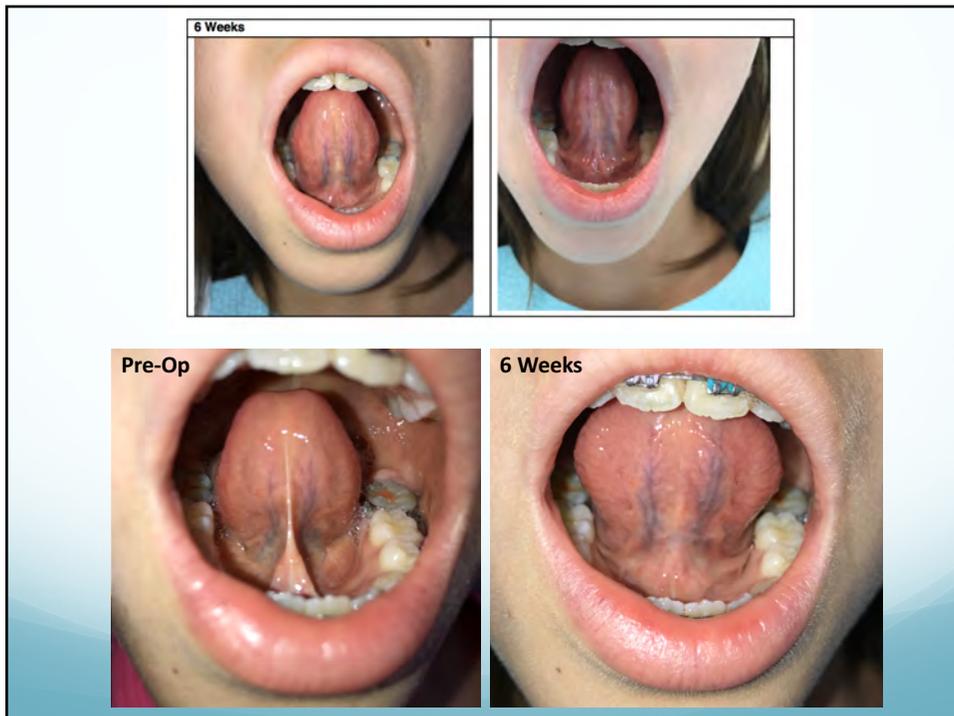
Veggie Tales | Where Is My Hairbrush? | Veggie Tales Silly Son...  
161,175 views • 2 months ago

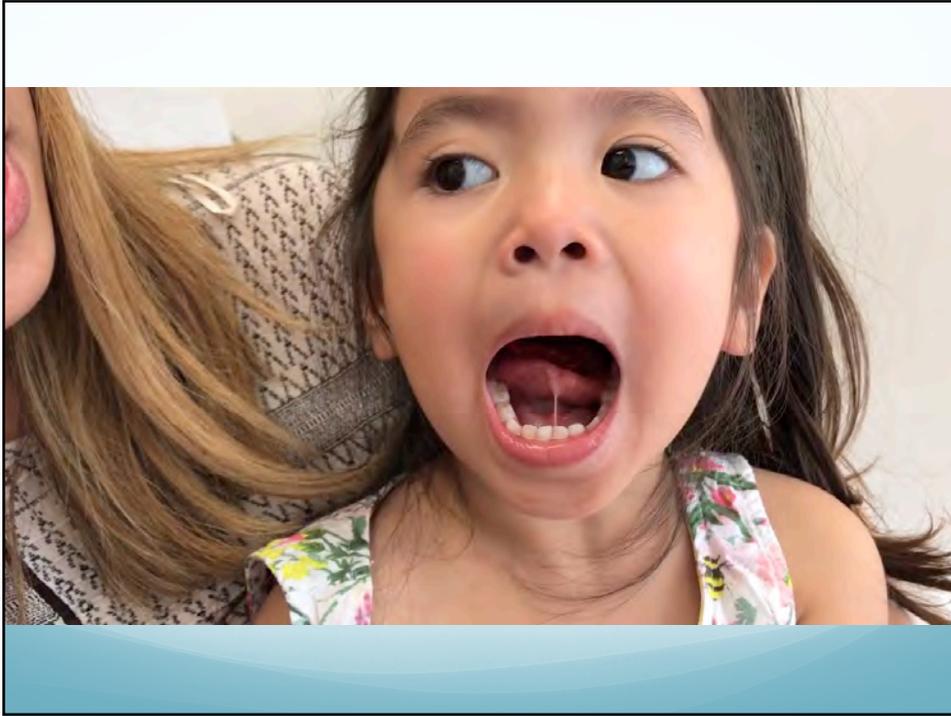
**Versed Sedation Protocol**  
(0.25 mg/kg of 2mg/mL midazolam hydrochloride)

- Administer 5 - 10 minutes prior
- Duration of 30 - 60 minutes

Weight (lbs)	Dose in mg	Dose in ml
20	2.3	1.1
30	3.4	1.7
40	4.5	2.3
50	5.7	2.8
60	6.8	3.4
70	8.0	4.0
80	9.1	4.5
90	10.2	5.1
100	11.4	5.7
110	12.5	6.3
120	13.6	6.8
130	14.8	7.4
140	15.9	8.0
150	17.0	8.5
160	18.2	9.1
170	19.3	9.7
180	20.0	10.0







Madelyn 2 Months Post-Op



Thank you: Jeanine Murdock, SLP

## When to Intervene- Evidence?



Grade 1 Functioning TRMR > 80%    Grade 2 Functioning TRMR 50-80%    Grade 3 Functioning TRMR < 50%    Grade 4 Functioning TRMR < 25%



### ORIGINAL ARTICLE

WILEY | Research & Evidence

## Ankyloglossia as a risk factor for maxillary hypoplasia and soft palate elongation: A functional – morphological study

A. J. Yoon<sup>1</sup> | S. Zaghi<sup>2,3</sup> | S. Ha<sup>4</sup> | C. S. Law<sup>1</sup> | C. Guilleminault<sup>5</sup> | S. Y. Liu<sup>2</sup>

<sup>1</sup>Sections of Pediatric Dentistry and Orthodontics, Division of Growth and Development, UCLA School of Dentistry, Los Angeles, CA, USA

<sup>2</sup>Division of Sleep Surgery, Department of Otolaryngology, School of Medicine, Stanford University, Stanford, CA, USA

<sup>3</sup>UCLA Health, Santa Monica, CA, USA

<sup>4</sup>UCLA School of Dentistry, Los Angeles, CA, USA

<sup>5</sup>Sleep Medicine Division, Stanford Outpatient Medical Center, Redwood City, CA, USA

#### Correspondence

A. J. Yoon, Section of Pediatric Dentistry and Orthodontics, Division of Growth and Development, UCLA School of Dentistry, Los Angeles, CA, USA.  
Email: jungdds@gmail.com

#### Structured Abstract

**Objectives:** To characterize associations between restricted tongue mobility and maxillofacial development.

**Setting and Sample Population:** Cross-sectional cohort study of 302 consecutive subjects from an orthodontic practice.

**Material and Methods:** Tongue mobility (measured with tongue range of motion ratio [TRMR] and Kotlow free tongue measurement) was correlated with measurements of the maxillofacial skeleton obtained from dental casts and cephalometric radiographs.

**Results:** Tongue range of motion ratio and Kotlow measures of restricted tongue mobility were associated with (i) ratio of maxillary intercanine width to canine arch length, (ii) ratio of maxillary intermolar width to canine arch length and (iii) soft palate length. Restricted tongue mobility was not associated with hyoid bone position or Angle's skeletal classification.

**Conclusions:** Restricted tongue mobility was associated with narrowing of the maxillary arch and elongation of the soft palate in this study. These findings suggest that variations in tongue mobility may affect maxillofacial development.

#### KEYWORDS

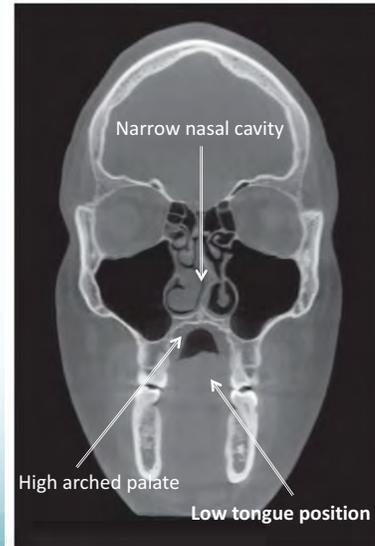
ankyloglossia, frenulum, maxillofacial development, myofunctional dysfunction

Level 3 evidence

## Background

Maxillary morphology plays an important role in the pathophysiology of OSA

Maxillary Deficiency  
Transverse



Question:

**Could altered tongue mobility affect development of the maxillary arch?**



**Restricted Tongue Mobility**

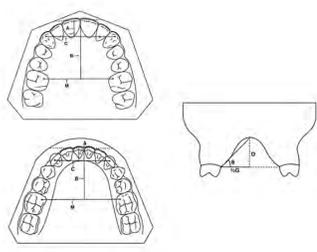


**V-Shaped Maxillary Arch**

## Methods

302 consecutive subjects from Dr. Audrey Yoon's orthodontic practice.

- **Tongue mobility**
  - Tongue range of motion ratio
  - Kotlow free tongue measurement
  
- **Dental cast dimensions**
  - Maxillary and mandibular: inter-canine width(C), canine arch length(A), inter-molar width(M), and molar arch length(B).
  - Depth of the deepest point of palatal vault (D) and the distance between the gingival margins of the first molars (G)
  - Ratio of Maxillary Canine Width to Arch Length
  - Digital caliper with the average of three consecutive measurements blinded to other measurements.
  
- **Cephalometric radiographs**
  - Skeletal Classification (ANB Angle)
  - Mandibular Plane (sella-nasion to gonion-menton)
  - Hyoid Position (⊥, hyoid to mandibular plane)
  - Soft palate length (⊥, post. nasal spine to soft palate tip)
  - Standardized Measurements -- Dolphin Image Software 9.0





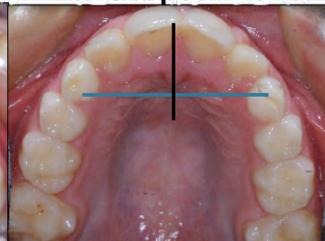

### Outcome Measure: Ratio of Maxillary Canine Width to Arch Length



**Gothic V- Shaped Arch**



**Roman U- Shaped Arch**

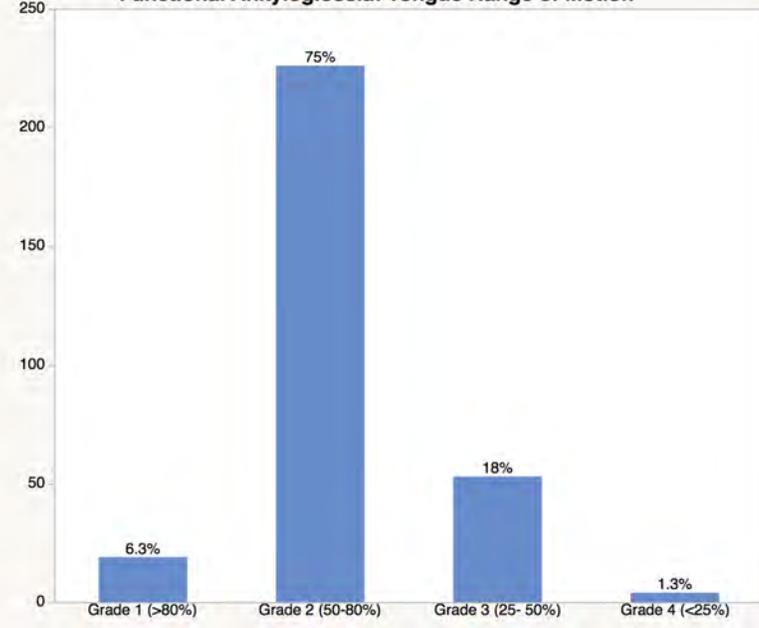


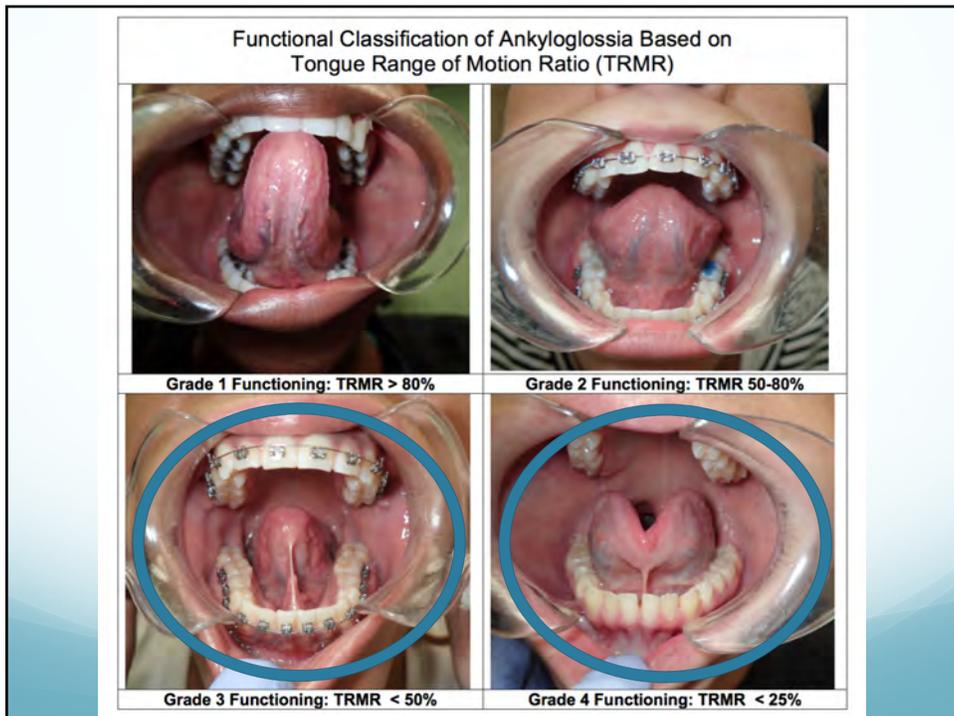
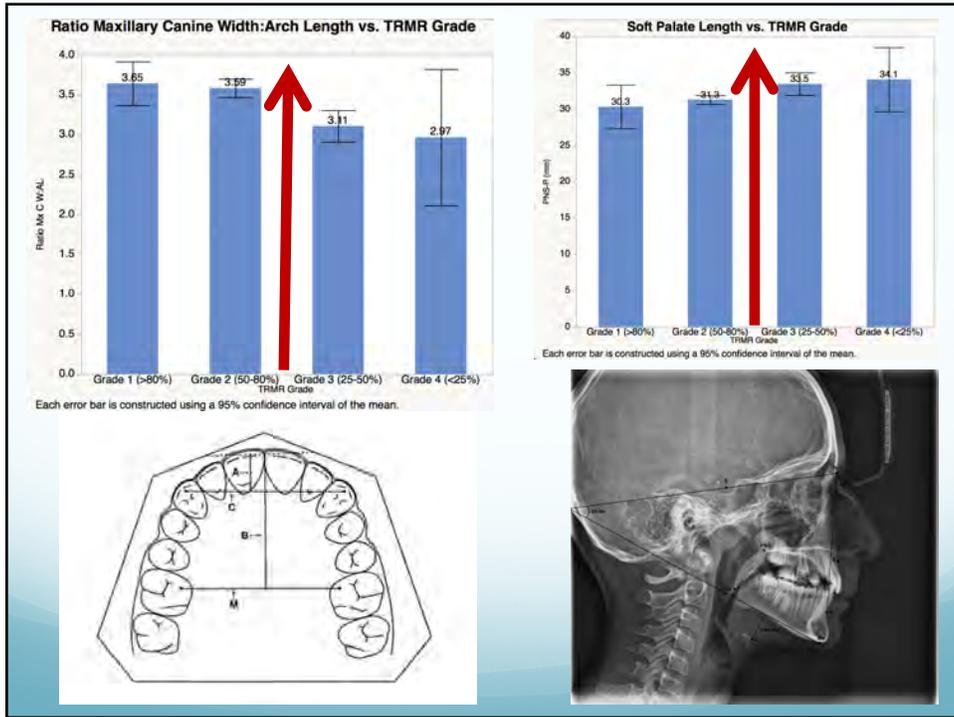
**Outcome Measure: Soft Palate Length**



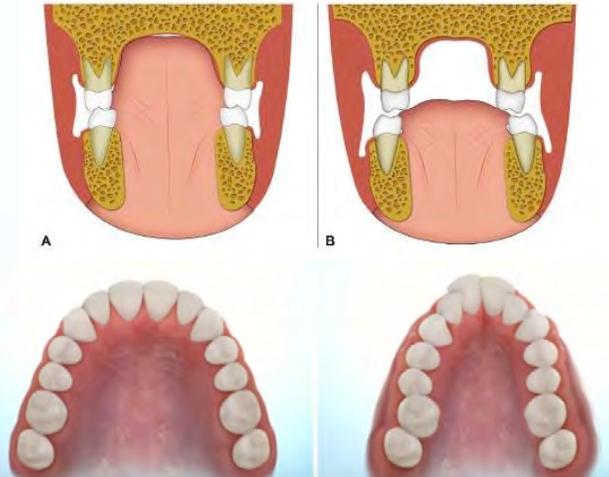
**Results**

**Functional Ankyloglossia: Tongue Range of Motion**





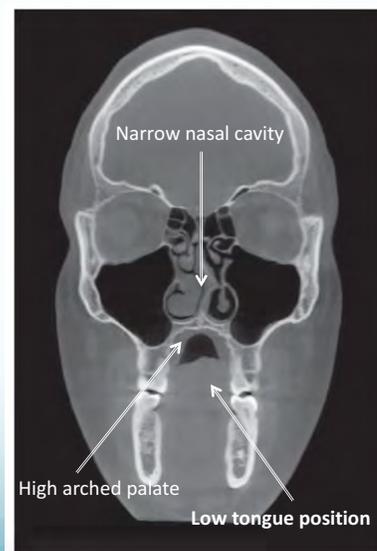
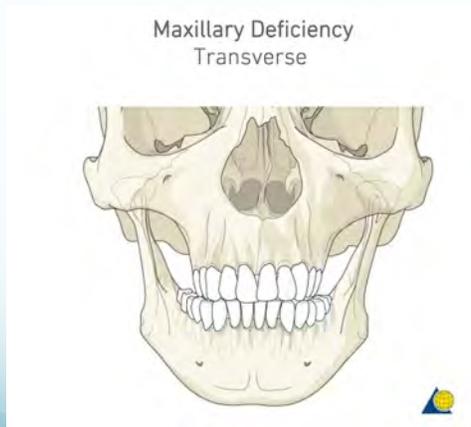
**Conclusion: Restricted tongue mobility is associated with narrow V-shaped maxillary arch**



Level 3 evidence showing that Grade 3+ functional ankyloglossia is associated with alterations of orofacial morphology

**Maxillary morphology is an integral component of the sinonasal complex**

High Arched Palate → Narrow Nasal Cavity





**Trevor - 23 year-old with:**

- Recurrent sinus infections.
- Tightness in his neck and shoulders
- TMJ pain
- Sleep issues
- Anxiety/depression due to chronic fatigue.

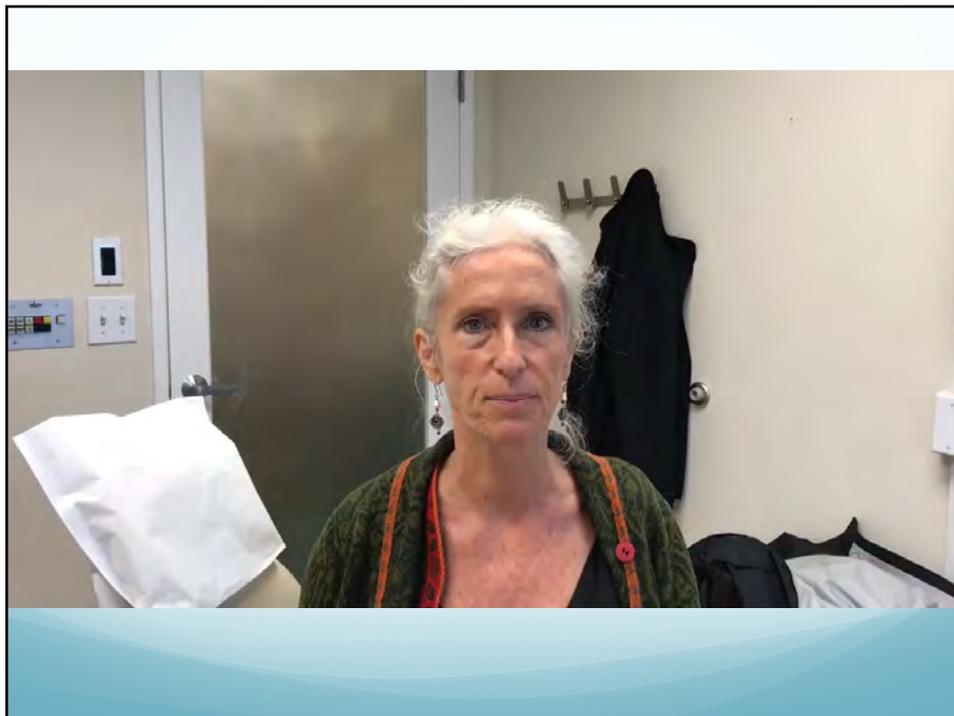


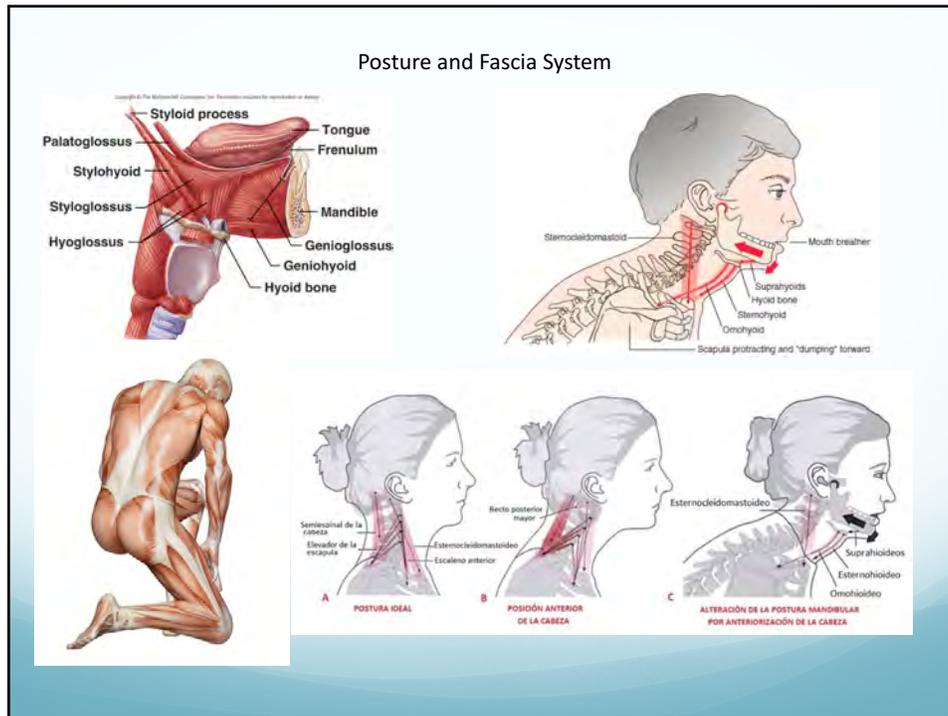
## Frenuloplasty: WHY I do it .... Grade 2

**59 year-old female** with a long history of headaches, chronic sinus infections, forward head posture, jaw tension, and cervical neck discomfort.

- Prior “incomplete” frenectomy at age 7.
- Maxillary expansion that was completed 3-4 years ago → resolved her sinus infections.
- Now presenting with worsening sleep quality over the last few years and especially the past 4-5 months.





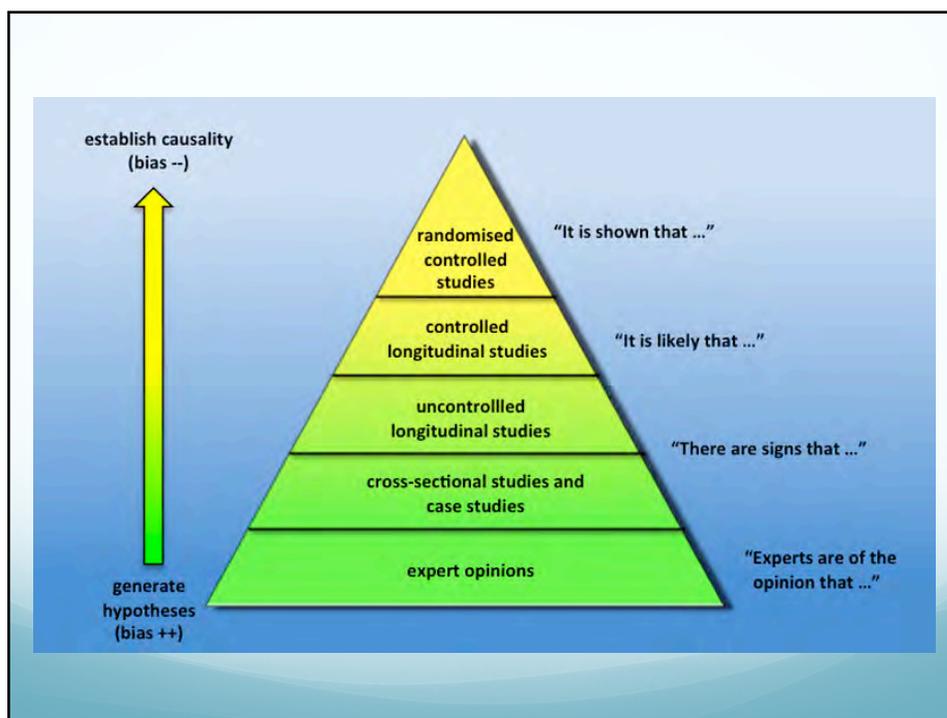


## Feedback on my video

“Soroush,

*I will be honest and say that I think you are better than this 1-patient testimonial would suggest. Anecdotal experiences like this can form the basis of scientific evaluation, but it is pretty useless in itself. I would strongly recommend that you develop an evidence basis with higher-quality science than this.”*





## Case Study #2

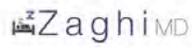
### 55 y/o F with Upper Airway Resistance Syndrome

**INDICATIONS:** 55-year-old female with a long history of insomnia, poor sleep quality, head and neck pain, TMJ pain, cervical neck and shoulder tension. She has a long history of ear pressure, ringing in ears, and difficulty swallowing. She reports that it is difficult for her to sleep on her back. She has extremely poor sleep quality. Two prior sleep studies were negative for the presence of sleep apnea.

On physical exam, she has evidence of Grade 2 functional ankyloglossia associated with the posterior tongue-tie, as well as forward head posture, transverse maxillary deficiency, and high arched palate.



# Frenuloplasty Success Story



Pre-Op



Post-Op



### Case Study #3





Level 4 evidence showing that UARS with Grade 2 functional ankyloglossia can improve with functional frenuloplasty.



Strength	Level	Design	Randomization	Control
High	Level 1	Randomized control trial (RCT)	Yes	Yes
		Meta-analysis of RCT with homogeneous results	No	
	Level 2	Prospective comparative study (therapeutic)	No	Yes
		Meta-analysis of Level 2 studies or Level 1 studies with inconsistent results	No	
	Level 3	Retrospective Cohort Study	No	Yes
		Case-control Study	No	Yes
		Meta-analysis of Level 3 studies	No	
	Level 4	Case Series	No	No
Low	Level 5	Case Report	No	No
		Expert Opinion	No	No
		Personal Observation	No	No

## Frenuloplasty: How we do it

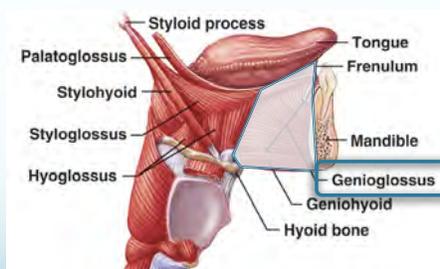
### Goal #1: Restore Mobility

- Excise the frenulum or prior scar tissue
- Release lingual septum and superior myofascial fibers of the genioglossus muscle as necessary (partial genioglossectomy)



### Goal #2: Optimize healing

- Minimize scarring due to excessive dissection or indiscriminate use of cautery.
- Primary intention healing with placement of sutures.
- Prepare the tissues pre-operatively with myofunctional therapy (at least 3-4 weeks).
- Post-operative oral hygiene (colgate peroxyl mouthwash or salt water rinses).
- Gently brush the granulation tissue as stitches fall out.
- Take it easy for 2-3 days and then continue post-operative therapy for at least 2 months.



### A Three-Dimensional Atlas of Human Tongue Muscles

IRA SANDERS<sup>1</sup> AND LIANCUI MU<sup>2\*</sup>

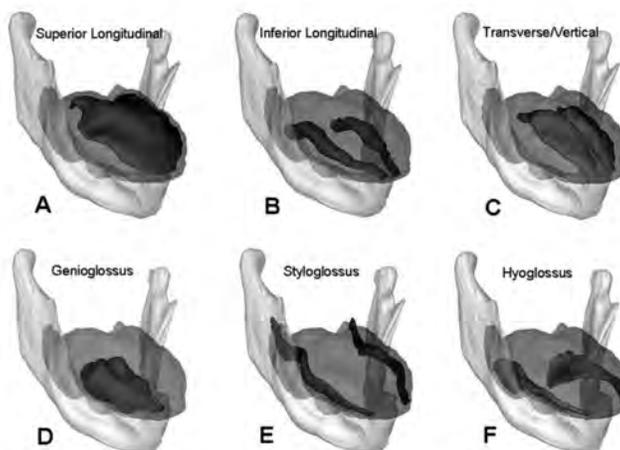


Fig. 4. Muscles of the human tongue. (A) The superior longitudinal (SL) muscle is the only unpaired muscle of the tongue, which spans the length of the tongue just beneath the mucosa of its superior surface. (B) The inferior longitudinal (IL) muscle spans the length of the tongue just above the mucosa of its inferior surface. (C) The transverse and vertical (T/V) muscles. The T muscle connects the medial septum to the lateral aspect of the tongue. The V muscle connects the inferior surface to the superior surface. (D) The genioglossus (GG) muscle is midline muscle, which originates from the posterior surface of the mandible. (E) The styloglossus (SG) muscle originates from the styloid processes and insert along the inferior-lateral margins of the tongue. (F) The hyoglossus (HG) muscle originates from the hyoid bone and also insert into the inferior-lateral margins of the tongue. The muscles are all rendered as separate objects for the sake of clarity, but in reality there is extensive overlap. One example is that the GG muscle becomes the vertical muscle in the medial third of the tongue. The other example is that the T/V muscles are rendered as a single object.

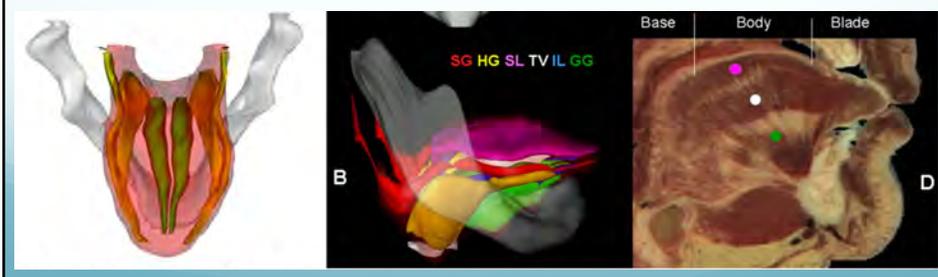
The **Genioglossus** (*Geniohyoglossus*) is a flat triangular muscle with its apex corresponding with its point of origin from the mandible and its base at the insertion into the tongue and hyoid bone.

It *arises* by a short tendon from the superior mental spine on the inner surface of the symphysis menti, immediately above the Geniohyoideus, and from this point spreads out in a fan-like form.

The **inferior fibers extend downward**, to be attached by a thin aponeurosis to the upper part of the body of the hyoid bone, a few passing between the Hyoglossus and Chondroglossus to blend with the Constrictores pharyngis. The inferior fibers protrude the tongue.

The **middle fibers pass backward**, and the **superior ones upward and forward, to enter the whole length of the under surface of the tongue**, from the root to the apex. The middle fibers depress the tongue, and the superior fibers draw the tip of the tongue back and down.

The muscles of opposite sides are separated at their insertions by the **median fibrous septum** of the tongue; in front, they are more or less blended owing to the decussation of fasciculi in the median plane.



the  
BREATHE  
INSTITUTE

Zaghi MD

Lingual frenuloplasty for posterior tongue tie: How We Do it.

[www.TheBreatheInstitute.com](http://www.TheBreatheInstitute.com)

[www.ZaghiMD.com](http://www.ZaghiMD.com)

Hello Dr. Zaghi,

I wanted to let you know the experience was incredible. Truly one of the most profound experiences and outcomes my life.

This is just a few of the more describable things I've noticed:

1. Sleep has drastically improved.
2. Dreaming again
3. Much easier to move air through my nasal cavities.

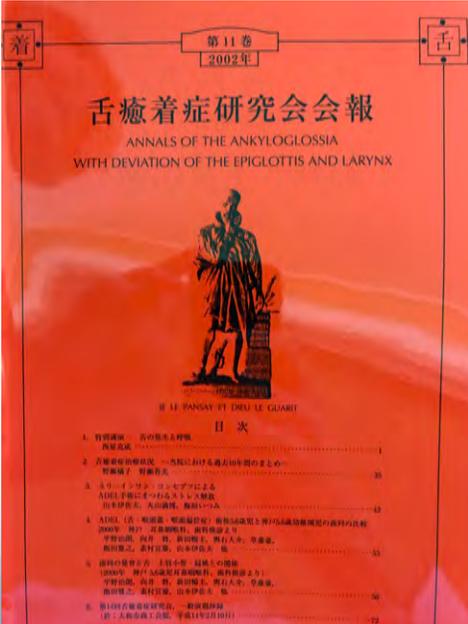
I no longer need Breathe Right strips and my nasal valves do not collapse on inhalation anymore.

4. My top teeth have, for the first time in 20 years (since extraction/retraction orthodontics), come forward further of my bottom teeth.

Thank you so much again for everything.

Adam L.

Level 5 evidence





**Dr. Nakako Uritani and Dr. Soroush Zaghi**

**Level 3 evidence in the Japanese literature by Dr. Mukai to support dissection of genioglossus fibers during frenuloplasty for posterior tongue-tie in UARS and OSA patients.**

### Sleep Breathing Disorders

#### The expansion of the hypopharynx by correction of glosso-larynx

MASAYOSHI NITTA, SUSUMU MUKAI AND CHIKAKO MUKAI  
Mukai Clinic and Mukai Research Institute of Biology, Kanagawa, Japan

**Abstract** The width of the hypopharynx and oropharynx before and after the operation correction of glosso-larynx (CGL) was compared by cranial X-ray film. After the operation, the hyoid bone was seen to have moved downward, and the cranial base was observed to have rotated forward. As a result, the hypopharynx and the oropharynx were expanded. Expansion of the hypopharynx resulted in the decreased resistance of flow decreased and the increased in airflow.

**Key words** airway, ankyloglossia with deviation of the epiglottis and larynx, larynx, partial genioglossotomy, sleep, tongue.

#### REFERENCES

1. Mukai S, Mukai C, Asaoka K. Congenital ankyloglossia with deviation of the epiglottis and larynx. *Ann. Otolaryngol.* 1991; 100 (Suppl.) 153: 1-20.
2. Mukai S, Mukai C, Asaoka K, Nagasugi S. Digit sucking. *Lancet* 1992; 339: 1545-1546.
3. Mukai S, Mukai C, Nagasugi S. Sound analysis through subjective evaluation of colic cry. *Jpn. J. Logopedics Phoniatrics* 1997; 38: 1-10 (in Japanese with English abstract).
4. Mukai S, Mukai C, Nagasugi S, Ogiyama M. Postoperative changes in Ankyloglossia infants. *Ann Ankyloglossia with Deviation of the Epiglottis and Larynx* 1991; 1: 35-45 (in Japanese with English abstract).
5. Mukai S, Mukai C, Asaoka K. Congenital ankyloglossia with deviation of the epiglottis and larynx: Symptoms and respiratory function in adult. *Ann. Otolaryngol.* 1993; 102: 620-624.
6. Mukai S. Change seen in reports after correction of glosso-larynx. *Ann Ankyloglossia with Deviation of the Epiglottis and Larynx* 1994; 1: 1-156 (in Japanese).

#### INTRODUCTION

Sleep disorders occur in humans of all ages. Symptoms of sleep disorders in infants are waking up easily, colic cry, snoring and apnea.<sup>1-3</sup> Children with sleep disorders move around during sleep and display bad temper when waking in the morning.<sup>4</sup> Adults exhibit snoring, apnea, and fatigue. We have already performed correction of glosso-larynx (CGL) or partial genioglossotomy (PGG) in such patients. After the CGL, we observed a decrease of apnea, an increase of SaO<sub>2</sub>, an increase in volume capacity (VC) and an increase in 1%VC.<sup>5</sup> After the CGL, all patients report that they are able to breathe easier than they could before the operation. This suggests that resistance in the airway decreased.<sup>6</sup> We measured changes of the hypopharynx before and after the CGL, and found after the operation the hypopharynx had expanded.

Correction of glosso-larynx or partial genioglossotomy involves cutting the connective tissue of the tongue, including the septum linguae and the several frontal bundles of the genioglossus muscles. As a result, the tongue and the larynx go down and the larynx becomes aligned with the nasopharynx.<sup>1,4</sup> The operation has to finish the wound open.

Correspondence address: Susumu Mukai, Mukai Clinic and Mukai Research Institute, 2-8-9 Yamatominami, Yamato, Kanagawa 242-0000, Japan. Email: s-mukai@da2.so-net.ne.jp

### Congenital Ankyloglossia with Deviation of the Epiglottis and Larynx: Symptoms and Respiratory Function in Adults

Susumu Mukai, MD, Chikako Mukai, MD, Kazuyuki Asaoka, MD

First Published August 1, 1993 | Research Article

Download PDF

Article information

Altmetric 0

#### Abstract

We operated on 38 adult patients with congenital ankyloglossia with deviation of the epiglottis and larynx. The results were as follows. 1) Most patients had Angle's class III malocclusion, irregular alignment of the upper teeth, and high hard palate. 2) Fifty percent of the patients in our study population had obstructive respiratory failure. Their vital capacity increased significantly after the operation, but changes of forced expiratory volume in 1 second were not prominent. 3) Subjective symptoms of this disease were stiffness of the shoulders, a cold feeling in the extremities, an obstructed feeling in the throat, insomnia, fatigue, dry skin, irritability and/or anxiety, and nervousness. These improved postoperatively. 4) Objective symptoms included snoring, muscle cramps, difficulty in playing wind instruments, hoarseness, and incorrect articulation. The objective symptoms, except for incorrect articulation, improved postoperatively.

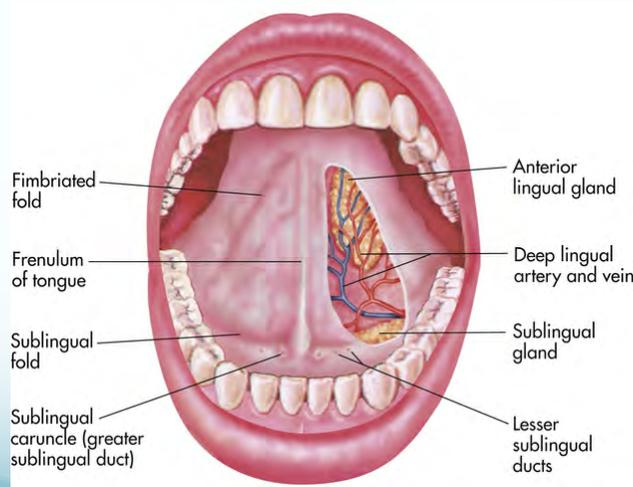
Level 3 evidence

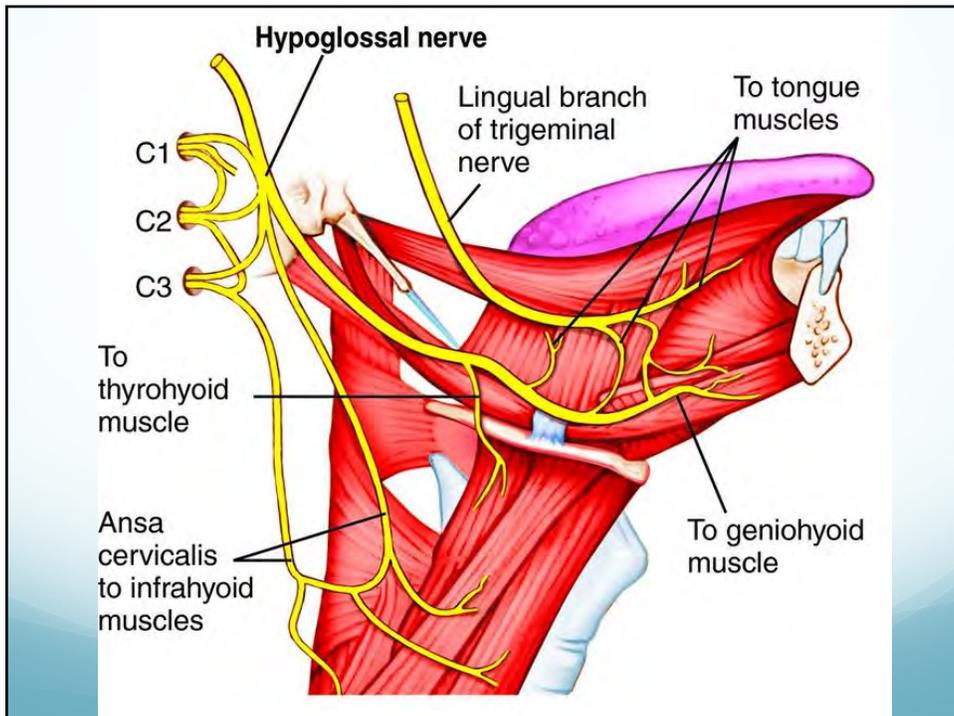
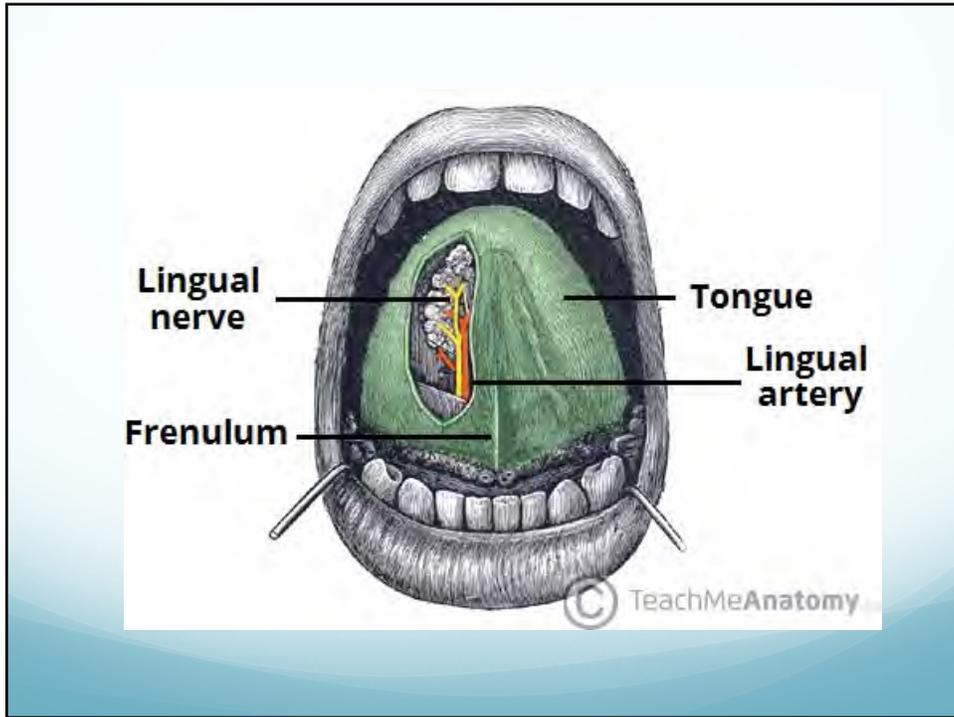
## Pre-Operative Myofunctional Therapy

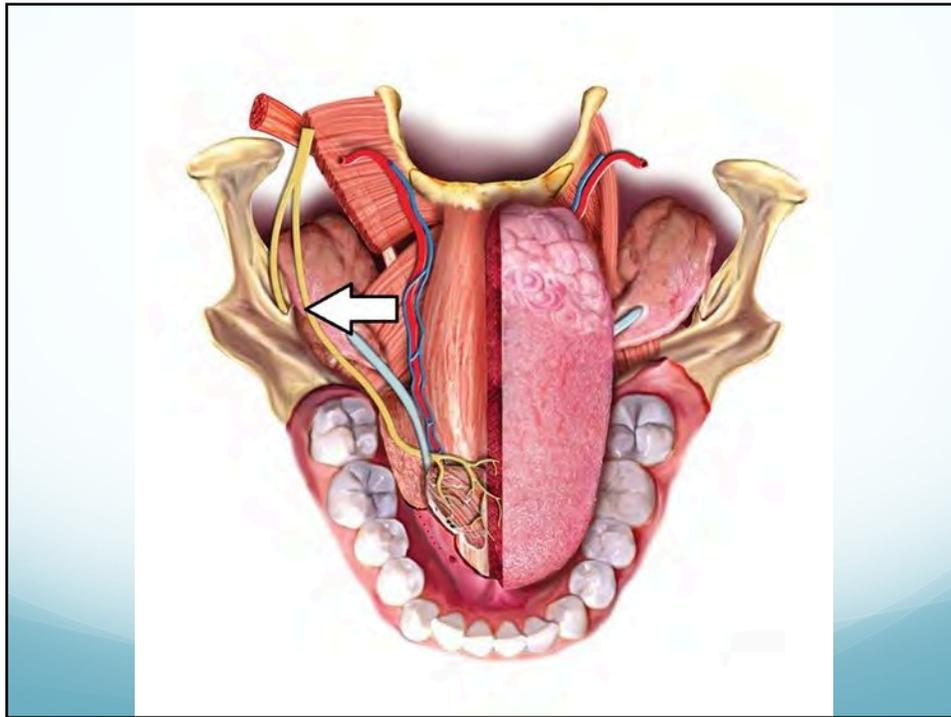
- ESSENTIAL to OPTIMIZE OUTCOMES.
- Much easier surgical dissection with less bleeding and trauma when tissues have been well prepared.



## Tongue Anatomy







## Potential Risks

- Pain / Soreness (3-5 days)
- Swelling/ Inflammation
- Mild wound infection (Granulation tissue)
- Bleeding or Bruising
- Numbness of the tongue-tip
- Potential Scarring
- No improvement or worsening of symptoms

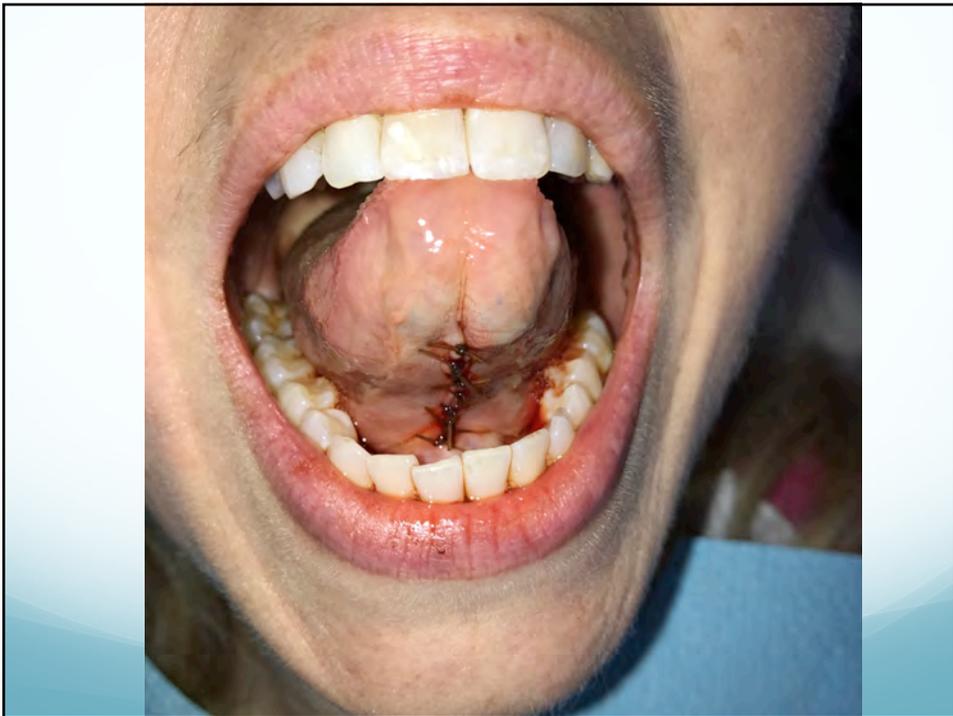
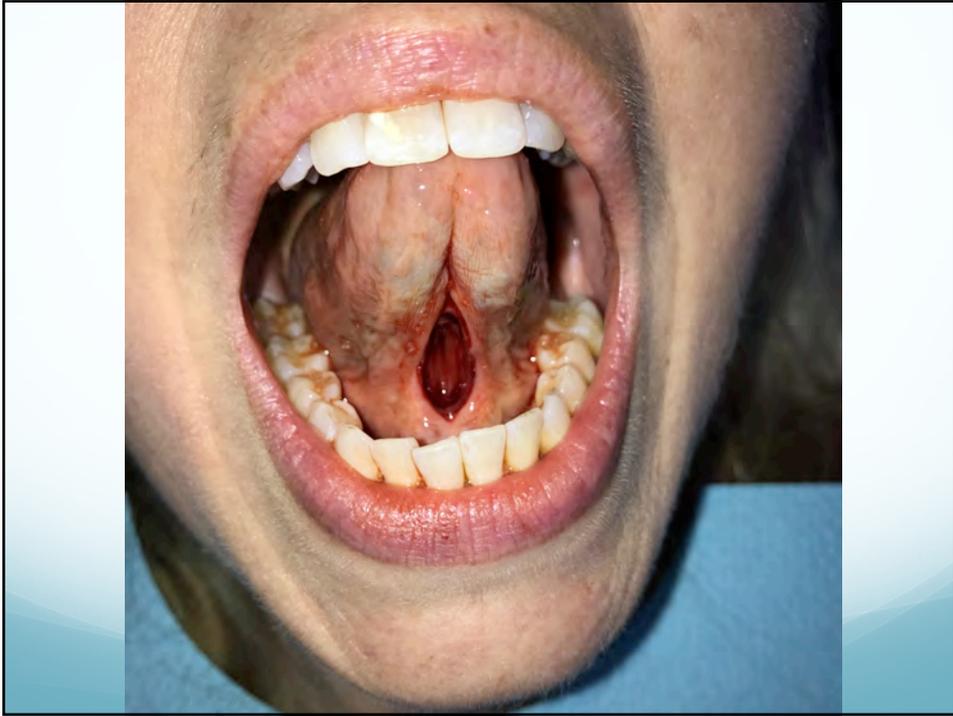


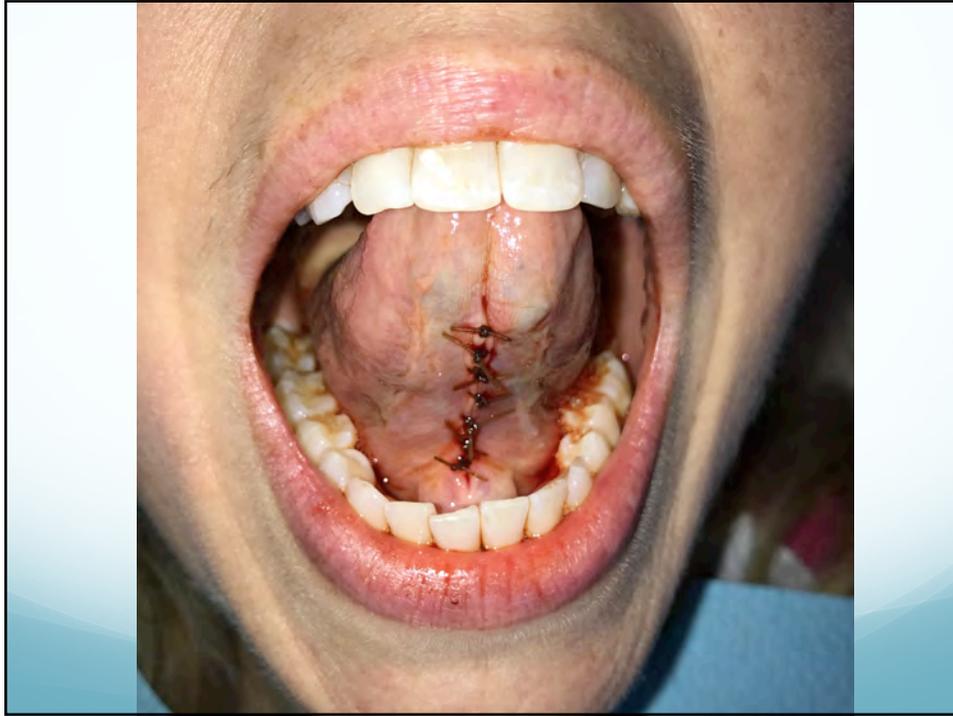
**Frenuloplasty:**  
How We do It (Photos)

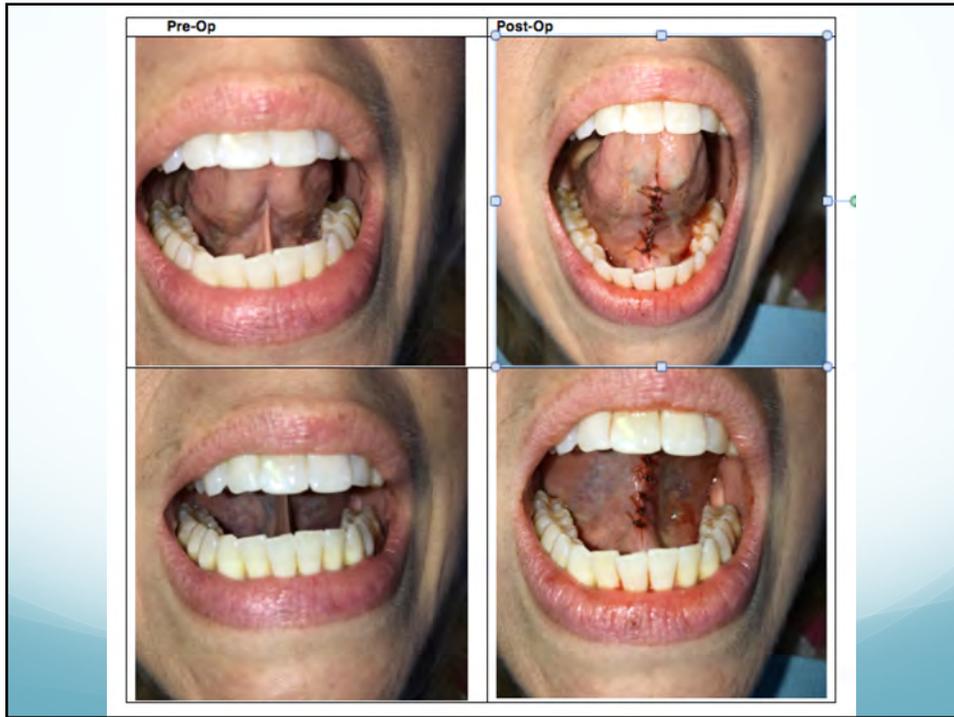






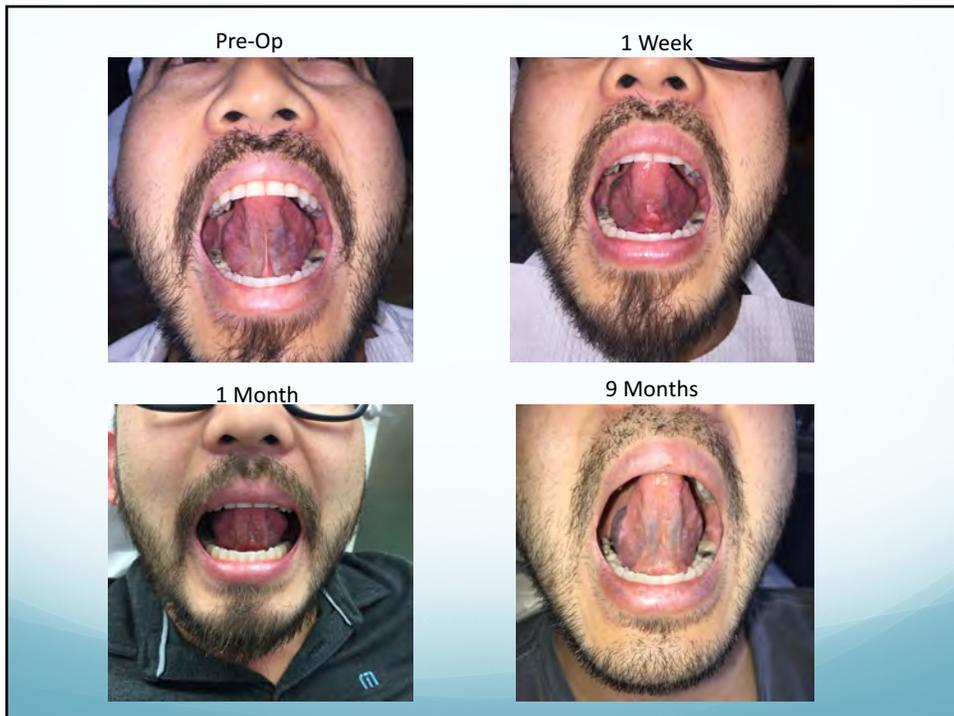
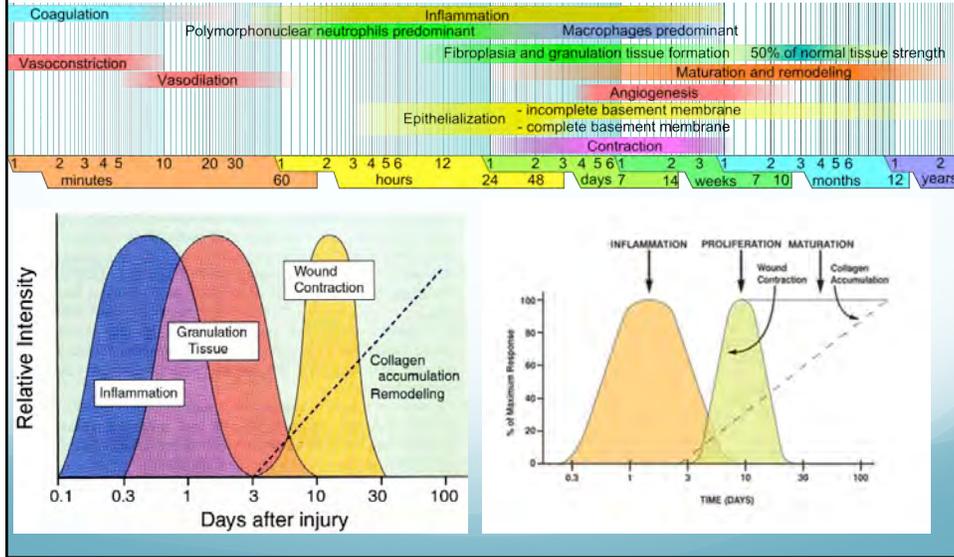








# Wound Healing



## Lingual frenectomy with CO2 Laser



©Lawrence Kotlow DDS 2017

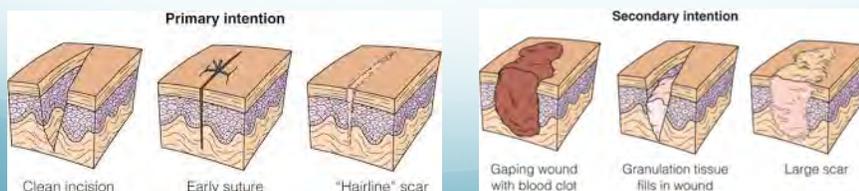
## Laser Frenectomy Pros /Cons

### Pros

- Much easier technique
- Faster
- No injections
- Less pain
- Less risk of bleeding

### Cons

- Secondary wound healing
- Risk of severe scarring
- Not advised for partial genioglossectomy or removing prior scar tissue



## Lip Tie

### Indications for Release:

- (1) Class 3 or Class 4 lip-tie that inserts into the anterior papilla between the central incisors.
- (2) Oral incompetence — lips not together at rest— refractory to therapy, which would benefit from lip lengthening.
- (3) Myofunctional therapist or patient determines that the lip-tie is interfering with compliance of prescribed exercises.



Original Article

### The Superior Labial Frenulum in Newborns: What Is Normal?

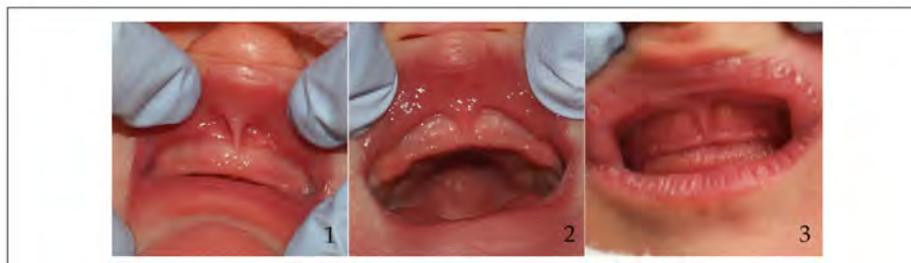
Chloe Santa Maria, MBBS, MPH<sup>1,2</sup>, Janelle Aby, MD<sup>1,2</sup>,  
Mai Thy Trong, MD<sup>1</sup>, Yogita Thakur, DDS, MS<sup>1</sup>,  
Sharon Rea, BA, IBCLC<sup>2</sup>, and Anna Messner, MD<sup>1</sup>

Global Pediatric Health  
Volume 4: 1-6  
© The Author(s) 2017  
Reprints and permissions:  
sagepub.com/journalsPermissions.nav  
DOI: 10.1177/2333794X17718896  
journals.sagepub.com/home/gph



Santa Maria et al.

3



**Figure 1.** Stanford superior labial frenulum classification. Type 1: Insertion of the frenulum is near the mucogingival junction. Type 2: Insertion is along the mid attached gingiva. Type 3: Insertion is along inferior margin at the alveolar papilla, and can continue to the posterior surface.

## Lip Tie Release



## Lip Tie Release



## Lip Tie Release



Pre-Op



Post-Op



1 Week

## Buccal Tie Release



Pre-Op



Post-Op



 Zaghi MD

Labial and Buccal Frenuloplasty: How We Do It.

[www.TheBreatheInstitute.com](http://www.TheBreatheInstitute.com)

[www.ZaghiMD.com](http://www.ZaghiMD.com)



**Lily Corley**

I have to report that not only is my tongue resting on the roof of my mouth, the amazing release of my labial buccal ties (lips) is incredibly phenomenal. I have been breathing through my nose, during the day and at night, which feels incredibly profound. When both the buccal ties were released I felt a release in my suboccipital muscles. I believe that lip ties are very important to release, not just for breastfeeding but for breathing. My posture is much more effortless, my breathing is coming from my diaphragm, spinal twists are much easier, and I also am noticing that eating is much less messy and easier. I am waking much more refreshed, with my lips firmly pressed together. I am interested to see how yoga and Mouth exercises go hand in hand as I feel like I can really build my core strength now that my tongue is released. I have to say that talking to people is different too. While my tongue and lips are sore, I feel a fluidity in my speaking that was not there before. And while my tongue definitely is more fluid, it also is a fluidity in my ability to use my facial muscles and express subtle feelings, and eye contact with people that had not be quite so easy. It feels like social interactions are easier.

15 minutes ago · Edited · Like · Reply · 1



Level 5 evidence

## Maxillary lip-tie frenectomy



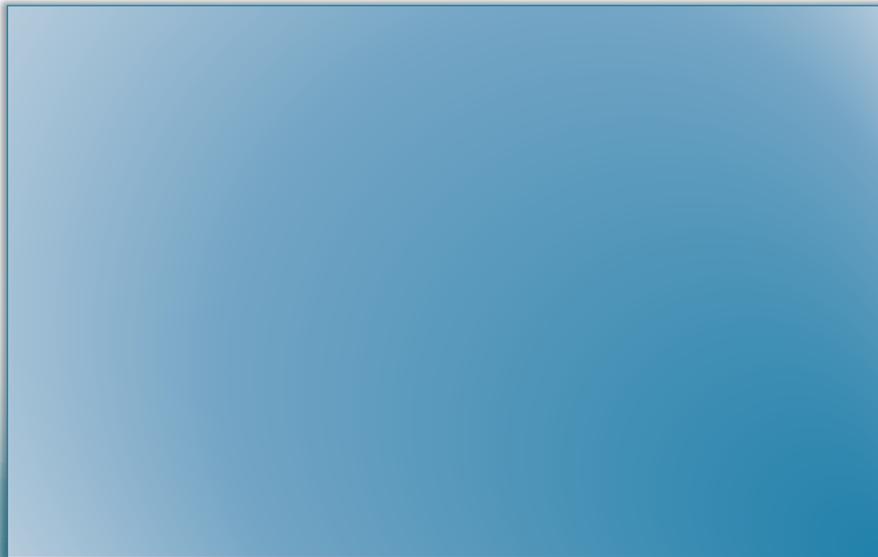
©Lawrence Kotlow DDS 2017

135

Poor Outcome :  
First Do No Harm



## Poor Outcome : First Do No Harm



## Revision Frenuloplasty



Prior to surgery



After first surgery

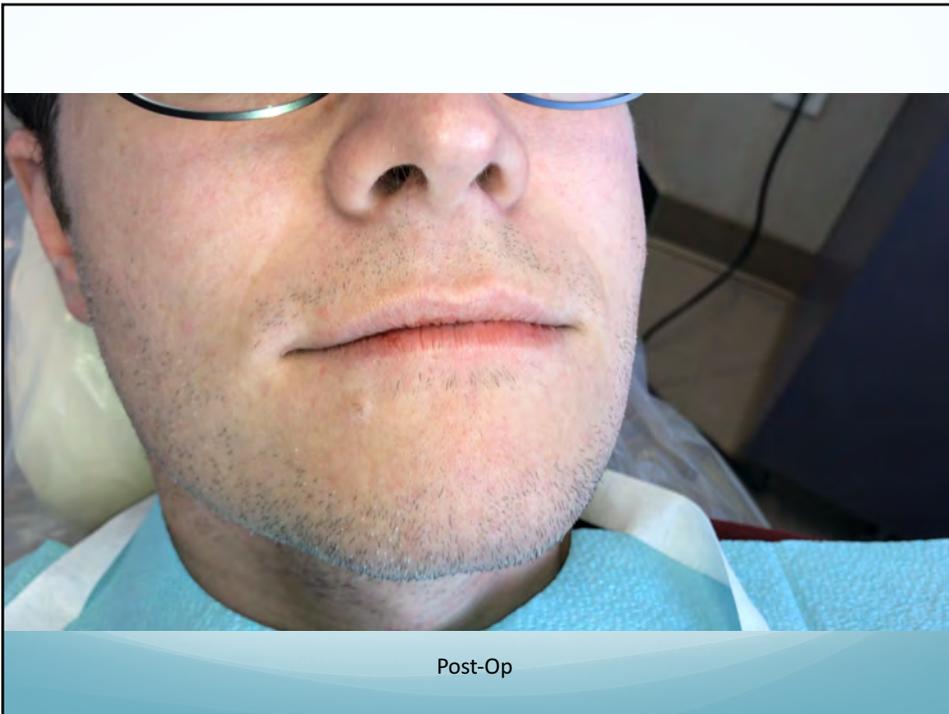


After second surgery

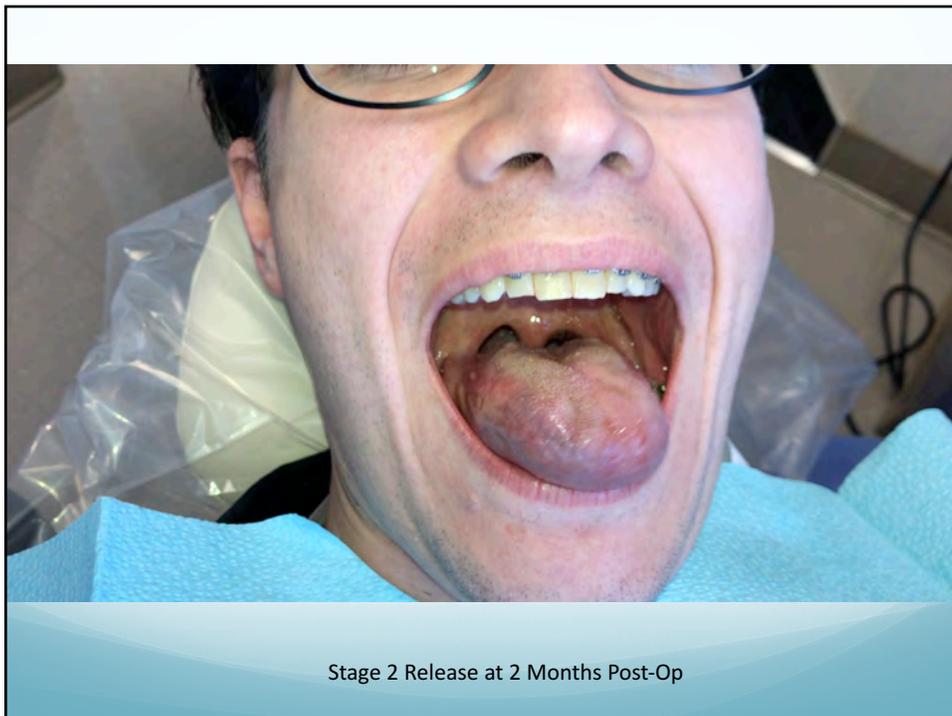
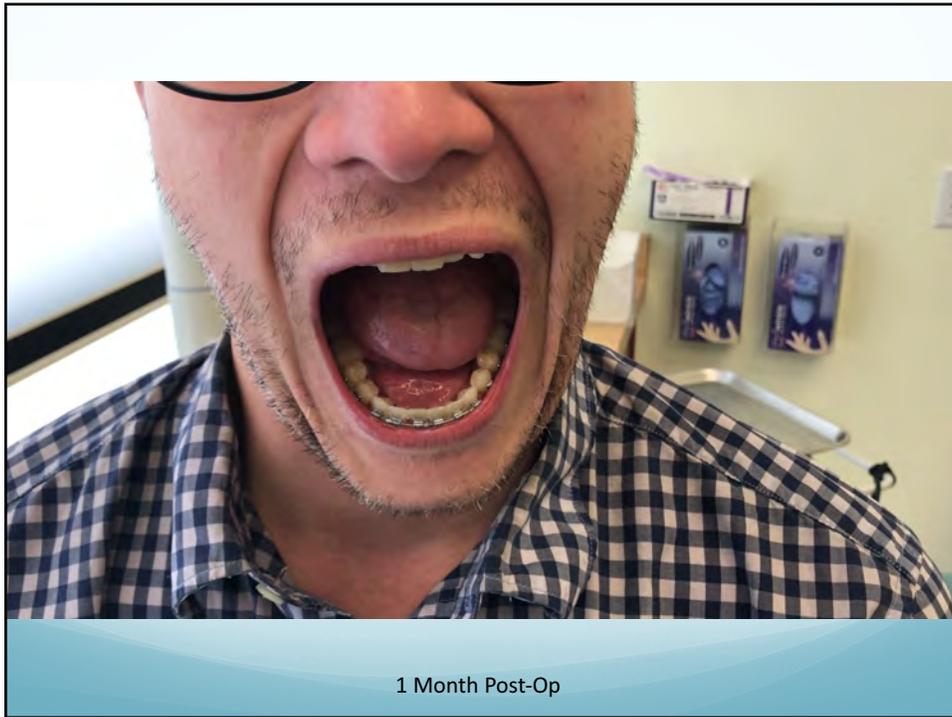
Thank you:  
Rebecca Thorsen, SLP

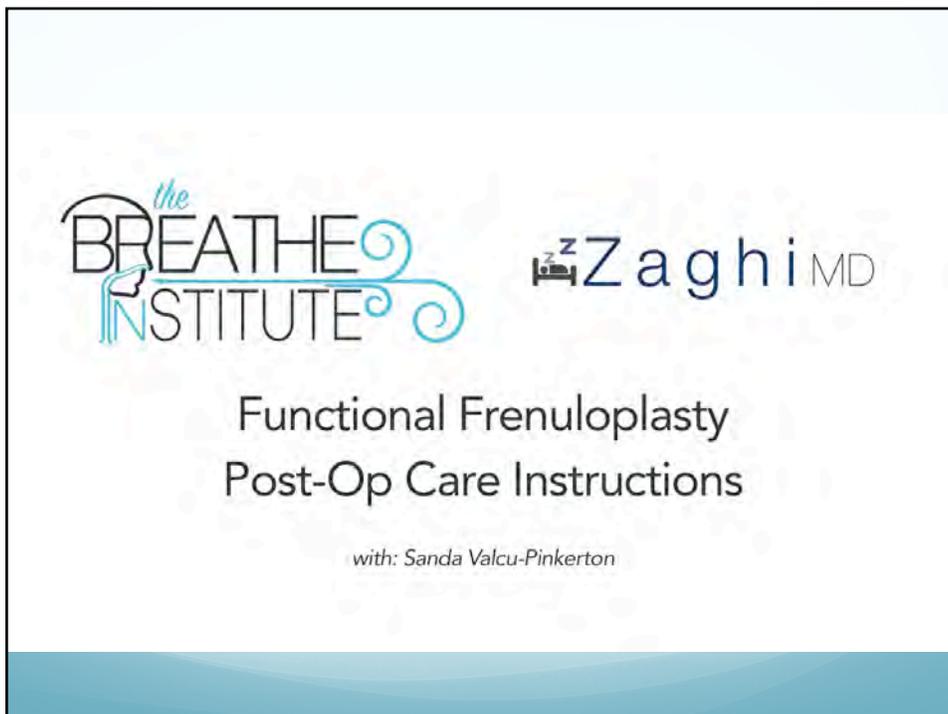
### Most Severe Case

(Referred to me from my mentors at Stanford for Frenuloplasty)



Post-Op





POST-OP Instructions

After the surgery:

Patients can expect some mild swelling, pain, and/or discomfort as a normal process of wound healing. Generally, this is fairly mild and can be controlled with over-the-counter pain medications. Possible (but very rare) complications of frenuloplasty may include anesthesia complications, bleeding, pain, numbness, failure of procedure, voice and swallowing changes, infection, injury to adjacent structures, and scarring.

Immediately after surgery:

- 1. Bleeding:** It is normal to experience some bloody oozing during the first 1-2 days. If steady bleeding occurs, place gauze under the tongue to hold pressure and call Dr. Zaghi. If heavy bleeding persists, please go to your local emergency department.
- 2. Wound Care:** You will be provided with 2% viscous lidocaine and gauze. Apply 5mL (one teaspoon) of lidocaine to the gauze and place on surgical site. Leave the gauze in place for as long as you can for the first 24- 48 hours. Replace the gauze as needed.
- 3. Pain Medications:** We recommend using Tylenol and/or ibuprofen as needed for pain. If you are already taking chronic pain medications, we have an outstanding in-house pharmacist who is available to take your questions and customize a pain control strategy.
- 4. Sutures:** We use absorbable sutures that will fall off on their own within a week after surgery. After the sutures come out, we then encourage you to brush the surgical site with a soft toothbrush.
- 5. Oral Hygiene:** We recommend rinsing with salt water and/or alcohol-free mouthwash several times a day to keep the wound clean and reduce the risk of infection. Colloidal silver spray is an excellent antimicrobial option.
- 6. Myofunctional Therapy Exercises:** It is extremely important to perform the stretches and exercises as prescribed by your therapist to obtain the most optimal results. We especially encourage: *waggle spot, flat tongue (aka puppy tongue), skinny tongue (aka pointy tongue or snake), light clicks, and caves (aka suction)*. See our website for more resources.

Lip and buccal ties: Place a gauze at the wound site for 30 minutes, three times per day for the first 2 days.

Be gentle with exercises for the first 3-5 days.

Stretching exercises are better than strain.

At any time, call our practice if you experience any of the following:

- Severe pain that does not improve with medication,
- Brisk bleeding,
- Severe swelling at the site of surgery,
- Difficulty breathing,
- Fever higher than 102°F

- For emergencies, please call or text Dr. Zaghi directly: 818-489-2444.

Post Surgical Exercises

Timeline	Exercise	Frequency
Day of surgery	Tongue tip elevation to spot/partial jaw opening/hold 10 seconds	2x/day
	Salt water rinse/always swish for 20 seconds	2x/day
Day 2	Tongue tip to spot and hold 10 seconds/partial jaw opening/repeat 2x	3x/day
	Left right tongue movement inside mouth 5x	3x/day
	Tongue tip to spot (hold); make K sound 10x	3x/day
Day 3	Salt water rinse	3x/day
	Tongue tip to spot and hold 10 seconds/full jaw opening/Repeat 5x	3x/day
	Left right tongue movement inside mouth 10x	3x/day
	Tongue suction/partial jaw opening/hold 10 seconds/Repeat 5x	3x/day
	Tongue trace/repeat 3x (discontinue if painful)	3x/day
Day 4-6	Salt water rinse	3x/day
	Tongue tip to spot and hold 10 seconds/full jaw opening/Repeat 5x	3x/day
	Left right tongue movement inside mouth 10x	3x/day
	Tongue suction/partial jaw opening/hold 10 seconds/Repeat 5x	3x/day
	Tongue trace/mouth open partial/repeat 5x (discontinue if painful)	3x/day
Day 7-14	Salt water rinse	3x/day
	Tongue suction/pull jaw downward stretch and hold 10sec/5x	3x/day
	Tongue push into each cheek/hold 5 seconds/repeat 5x	3x/day
	Tongue trace/mouth open wide/repeat 5x	3x/day
	Tongue protrusion/narrow/ hold 10 seconds/repeat 5x	3x/day
	Tongue sweep of teeth/upper and lower/repeat 5x	3x/day
	Salt water rinse	2x/day
Day 15-22	Continue stretching tongue (choose one exercise from above)	1x/day

Credit:  
Rebecca Thorsen, SLP

Joy L. Moeller, RDH, BS  
 (310) 454-4044 joyleamoeller@aol.com

Name: \_\_\_\_\_ Next Visit: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Week: Frenectomy Follow Up...Day 1 to 7 Sheet # \_\_\_\_\_

Exercises	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Waggle Spot 10x 3x per day (Tongue from corner of mouth to corner of mouth 5 x and then spot)							
Waggle Flap 10x 3x per day (Tongue touch upper and lower lip)							
Tongue Pops 20x 3x per day (Smile big)							
Snake 25x 3x per day (Tongue in and out)							
Neck Stretch Down Count to 10, 10x 3x a day							
Fork Tickle 3x 3x a day Scratch top of the tongue to stimulate primitive gag reflex <b>YOU MUST MOVE YOUR TONGUE!</b>							
Rinse with warm salt water and dab on Vitamin E oil, 40,000 IU's							
If lip/buccal tie released: Puff count to 5 5x 3x a day Upper lip stretch count to 20 5 x							

Joy L. Moeller, RDH, BS  
 (310) 454-4044 joyleamoeller@aol.com

Name: \_\_\_\_\_ Next Visit: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Week: Follow up Day 7 to 14 Post Surgery Frenectomy Sheet # \_\_\_\_\_

Exercises	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Jaw Breaker 25x 3x per day Push tongue into cheek							
Caves count to 10 10x 3x per day Make a vacuum seal up to the hard palate							
Pencil Pull count to 5 over and under pencil and resist May use a chop stick							
Peanut butter rub 25x 3x a day (Rub palate to remove imaginary peanut butter with tongue)							
Tongue depressor push-up Count to 10 10x 3x a day (Push tongue depressor into tip of tongue and push in and up with resistance)							
Tongue Point and Trace 10x 3x a day Stick out tongue into a point and count to 10 and then place tip up to palate and trace back to soft palate)							
Keep Tongue Moving!							



Thank you to my teachers, colleagues, and collaborators!



*And to ALL of the patients who allow us to learn through their experiences.*



[DrZ@ZaghiMD.com](mailto:DrZ@ZaghiMD.com)  
[www.ZaghiMD.com](http://www.ZaghiMD.com)

