

# The Impact of Restricted Oral Frenula on Oral Structure, Function, Feeding & Articulation

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## Agenda

- 7:00-7:10 Introduction & Disclosures
- 7:10-7:30 Identifying oral restrictions
- 7:30-7:50 Evaluation Considerations
- 7:50-8:10 Referral Criteria
- 8:10-8:30 Treatment Options
- 8:30-8:50 Case Studies
- 8:50-9:00 Questions

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## My Disclosures

- I am a practicing clinician and paid lecturer and I receiving an honorarium for this presentation.
- I am affiliated and an unpaid member of the
  - American Speech Language Hearing Association (ASHA)
  - Academy of Orofacial Myofunctional Therapy (AOMT)
  - Academy of Applied Myofunctional Sciences (AAMS)
  - American Cleft Palate Association (ACPA)

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## My clinical experience & scope of practice

- Structural & Sensory-Motor Based Speech Disorders
  - Craniofacial Disorders & Cleft Palate
  - Dysarthria – childhood & adult
  - Dyspraxia – childhood & adult
  - Poor coordination & low tone
  - Poor sensory feedback
  - Stuttering
- Feeding, Swallowing & Oromyofunctional Therapy
- Social-Cognitive Therapy for Autism & Asperger's
- Developmental Speech & Language
- Family Communication Support

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## My Contentions

- Most medical and dental providers do not properly check for restricted oral frenula. This results in poor early intervention and prevention of a number of disorders.
- Because our caseloads can be highly specialized, we may not appreciate the long term affects of unaddressed tongue tie and lip ties.
- Few people know who to refer for evaluation, proper diagnosis, surgery if required, and post procedure treatment.

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## Learning Objectives

- Identifying oral restrictions
- Review the recent research & protocols available
- Evaluation Considerations
- Referral Criteria
- Treatment Options
- Case Studies

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## Identifying Oral Restrictions



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## Identifying Oral Restrictions



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## Northcutt 2009

- Frenum is a fold of tissue inside the oral cavity which connects structures like the lip, tongue and buccal musculature to the alveolar bone. The frenums in the oral cavity include the maxillary midline frenum, mandibular midline frenum, the right and left upper and lower buccal frenums and the lingual frenum. The primary function of the frenum is to keep a balance between the growing bones, the tongue and the lip musculature during the development of the foetus and limit the movement of the muscular tissues like the lip, tongue and cheeks.
- More frequently discussed frenal anomaly in the literature is thick fibrous labial frenum, which causes maxillary midline diastema. Abnormal attachment of lingual frenum, called as ankyloglossia, is a congenital anomaly characterized by short lingual frenum.

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## Francis et al 2014

- Ankyloglossia is a congenital condition characterized by an abnormally short, thickened, or tight lingual frenulum that restricts mobility of the tongue. While it can be associated with other craniofacial abnormalities, it is most often an isolated anomaly. It variably causes reduced tongue mobility and has been associated with functional limitations in breastfeeding, swallowing, articulation, orthodontic problems including malocclusion, open bite, and separation of lower incisors, mechanical problems related to oral clearance, and psychological stress.

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## Francis et al 2014

- Anterior ankyloglossia is defined as tongue ties with a prominent lingual frenulum and/or restricted tongue protrusion with tongue tip tethering. The diagnosis of posterior ankyloglossia is considered when the lingual frenulum was not very prominent on inspection but is thought to be tight on manual palpation or is found to be abnormally prominent, short, thick, or fibrous cord-like with the use of the grooved director. Although treatment is similar in anterior and posterior cases, posterior ankyloglossia is more subtle in presentation. Posterior ankyloglossia is more likely to require revision surgery due to the relative difficulty of accurate diagnosis and treatment. In essence, posterior ankyloglossia is under-recognized compared to the anterior variant.

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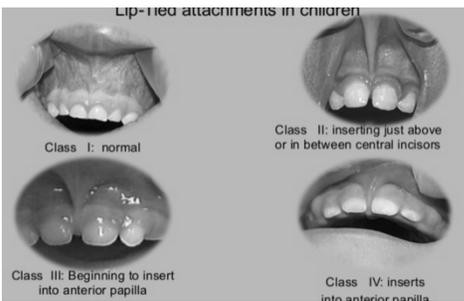
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## Lawrence Kotlow, DDS



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## Evaluation Considerations for Lingual Restriction

- Structure
- Function
- Behavior
- Other Observations

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## Structure

- Frenum placement
  - Anterior, Midblade, Posterior
- Quality of tendon
  - Thickness, Rigidity, Depth

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## Function

- Tip Elevation & Retraction
- Blade Elevation
- Lateralization
- Protrusion & Retraction
- Jaw Involvement
- Ability to clear molars & buccal cavities
  
- *Poor function is not limited to ankyloglossia*

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## Behavior

- Low forward rest posture
- Tongue thrust swallow
- Inefficient or messy eating; Grazing; Negative behaviors around food
- Oversalivation; Drooling
- Using fingers to clear food
- Excessive jaw involvement
- Poor articulation
- Sleep disordered breathing

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## Queiroz & Marchesan (2004).

- Evaluated 1402 patients' frenulum with an age range of 5 years to 62 years over many years. Measures of maximal mouth opening, with and without tongue suction, were taken with a sliding caliper. Speech samples were also taken. Frenulum were then classified as normal; short; with anterior insertion, and short with anterior insertion.
- 127 (9%) presented with an altered frenulum insertion. For this study we considered only those with short or with anterior insertion. For those who had an altered frenulum, 62 (48.81%) presented with speech disorders.
- The lingual frenulum was classified as normal, short and with anterior insertion. An altered frenulum may predispose the individual to exhibit an accompanying speech disorder.

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## Guilleminault & Akhtar (2015)

- Sleep-disordered breathing (SDB) in children could be resolved by adenotonsillectomy (T&A). However, incomplete results are often noted post-surgery. Because of this partial resolution, long-term follow-up is needed to monitor for reoccurrence of SDB, which may be diagnosed years later through reoccurrence of complaints or in some cases, through systematic investigations.
- Children undergoing T&A often have small upper airways. Genetics play a role in the fetal development of the skull, the skull base, and subsequently, the size of the upper airway. In non-syndromic children, specific genetic mutations are often unrecognized early in life and affect the craniofacial growth, altering functions such as suction, mastication, swallowing, and nasal breathing. These developmental and functional changes are associated with the development of SDB. Children without genetic mutations but with impairment of the above said functions also develop SDB.

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## Guilleminault & Akhtar (2015)

- When applied early in life, techniques involved in the reeducation of these functions, such as myofunctional therapy, alter the craniofacial growth and the associated SDB. This occurs as a result of the continuous interaction between cartilages, bones and muscles involved in the growth of the base of the skull and the face.
- Recently collected data show the impact of the early changes in craniofacial growth patterns and how these changes lead to an impairment of the developmental functions and consequent persistence of SDB. The presence of nasal disuse and mouth breathing are abnormal functions that are easily amenable to treatment. Understanding the dynamics leading to the development of SDB and recognizing factors affecting the craniofacial growth and the resulting functional impairments, allows appropriate treatment planning which may or may not include T&A. **Enlargement of lymphoid tissue may actually be a consequence as opposed to a cause of these initial dysfunctions.**

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## Huang et al 2015

- A retrospective study of prepubertal children referred for suspicion of obstructive sleep apnea, found 27 subjects with non-syndromic short lingual frenulum. The children had findings associated with enlarged adenotonsils and/or orofacial growth changes.

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## Huang et al 2015

- Children with untreated short frenulum developed abnormal tongue function early in life with secondary impact on orofacial growth and sleep disordered breathing (SDB). After presence of SDB, analysis of treatment results revealed the following:
  - The apnea-hypopnea index (AHI) of children with adenotonsillectomy (T&A) performed without frenectomy improved, but surgery did not resolve fully the abnormal breathing. Similar results were noted when frenectomy was performed simultaneously with T&A. Finally, frenectomy on children two years or older without enlarged adenotonsils also did not lead to normalization of AHI. The changes in orofacial growth related to factors including short lingual frenulum lead to SDB and mouth-breathing very early in life.
  - Recognition and treatment of short frenulum early in life—at birth, if possible—would improve normal orofacial growth. Otherwise, myofunctional therapy combined with education of nasal breathing is necessary to obtain normal breathing during sleep in many children.

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## Other Observations

- Malocclusions
  - Upper central incisor flaring
  - Anterior open bite
  - Class III - underbite
- Molar cavities
- Lesions on buccal aspects of teeth
- Facial and TMJ pain in older patients
- Poor self image

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## Meenakshi S & Jagannathan N (2014)

- This study was performed to analyze the lingual frenal lengths in skeletal class I, class II and Class III malocclusion and to correlate relationship between both.
- The lingual frenum was found to be longest in class III malocclusion, with a statistical significant value of  $p < 0.01$ . The class II and class I malocclusion did not show much difference. The maximum mouth opening position was also increased in class III malocclusion, followed by class II and class I malocclusion, in a descending order.
- The lingual frenum exerts erratic forces and a long lingual frenum pushes the mandibular anteriors forwards, resulting in malocclusion. Hence, a relationship between the lingual frenum and malocclusion is essential, so that the erratic forces can be eliminated and excellent results can be achieved, following the correction of malocclusion.

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## Referral Criteria for Labial Restriction

- Diastema between incisors
- Rotated incisors
- Recessed gums at incisors
- Dental decay at incisors
- Pocketing liquids at foods in anterior vestibules

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## Treatment Options for Lingual Restriction

- Stretching program no surgery
- Surgery no stretching program
- Stretching program, surgery, stretching program

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## Olivi et al (2012)

- When ankyloglossia is relatively severe and generates mechanical limitations and functional challenges, surgical reduction of the frenum is indicated.
- They found the laser technique is an innovative, safe and effective therapy for frenectomy in both children and adolescents.
- Usually after laser frenectomy, the postoperative symptoms and relapse are absent.
- Early intervention is advisable to reduce the onset of alterations correlated to the ankyloglossia. A multidisciplinary approach to the problem is advisable, in collaboration with orthodontist, physiotherapist and speech therapist, to better resolve the problem.

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## Referral Criteria for Lingual Restriction

- Anterior placement
- Inflexible tendon
- Stretching has not improved function
  - Obvious jaw involvement for lateralization, elevation, tip mobility
- Tongue is falling in airway when sleeping
- High arched palate secondary to poor lingual-palatal suctioning
- Molar cavities
- Lingual gum recession
- Forward head posture
- Co-occurring face or neck pain
- Negative impact on feeding or oral care
  - Nursing, messy eating, debris, fatigue
- Articulation Errors
  - R & L, Backing, Mumbling, Jaw is lifting tongue

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## Frenectomy Referral

- Otolaryngologists
- Pediatric Dentists
- Oromaxillofacial Surgeons

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## Ferres-Amat et al 2016

- A descriptive study of healthy patients, without any diagnosis of syndrome, ranging between 4 and 14 years that have been surgically treated and rehabilitated post-surgery within a period of 2 years.
- 101 frenectomies and lingual plasties have been performed and patients have been treated following the protocol of action that we hereby present. After the surgical intervention, the degree of ankyloglossia has been improved, considering correction in 29 (28%) of the patients (95% CI: 20%, 38%), reaching, with the post-surgical orofacial rehabilitation, a correction of 97 (96%) of the participants (95% CI: 90%, 98%).

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## Ferres-Amat et al 2016

- The treatment of choice for ankyloglossia is the frenectomy and lingual plasty associated to lingual myofunctional rehabilitation. Myofunctional rehabilitation begins one week before the surgical intervention, and the patient is explained the lingual praxis that will be carried out in the following weeks. The objective of this protocol is that the patient learns the exercises without pain. The results of our study demonstrate that the surgical technique of frenectomy with rhomboid plasty, the patient improves its lingual mobility. If this is reinforced with rehabilitation exercises and good patient collaboration, the results are excellent. (Ferrés-Amat E, et al. 2016)

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## Treatment Goals for Improved Lingual Function

- Stability
  - Elevated to the rugae/alveolar ridge at rest and during swallows
- Mobility
  - Full range of motion; Reaching behind back molars
- Typical Functioning
  - Using the tongue like a finger; Differentiated movement from jaw

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## Typical Functioning

- Tip Elevation & Retraction
- Blade Elevation
- Lateralization
- Protrusion & Retraction
- Circumlocution
- Differentiated movement from jaw

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## Post Frenectomy Stretching

- Typical function is not automatic
- Maladaptive behaviors need be retrained
- Tendon & muscle can reattach
- The age of the patient and the type of frenectomy dictates post procedure stretching
  - Infants – wait until wound heals before aggressive stretching
  - Children & adults – dependent of if sutures are used

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## Guilleminault & Akhtar 2014

- All our children with short mandibular frenulum had an association with SDB when seen untreated between 2 and 6 years of age. They all had a narrow and high hard palate. (Guilleminault & Akhtar 2014).
- Example of a short frenulum in a child that presented with speech difficulties early in life and developed SDB associated with a narrow hard palate. The abnormally short structure limits normal movements of the tongue and keeps it in an abnormally low set position when at rest. While the child had orthodontic treatment for his abnormal maxillary growth, the presence of his short frenulum was not recognized. It impaired successful results of orthodontia due to its continued restriction of tongue movements as indicated by persistence of high apnea-hypopnea-index (AHI) at polysomnogram (PSG).

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## Case Studies

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## NP

- Age: 4:3
- Complaint: Poor articulation & intelligibility
- Presenting: Fronting & Backing
- Evaluation: Articulation, OMF & Feeding
- Recommendations: Frenectomy before treatment
- Treatment: Stretching & Articulation
- Results: 15 sessions; Doing well 3 months post discharge

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## JD

- Age: 11:0
- Complaint: Dyspraxia & Oromyofunction
- Presenting: Severe malocclusion, Articulation Distortions
- Evaluation: Articulation, OMF & Feeding
- Recommendations: Frenectomy & Orthodontics before treatment
- Treatment: Stretching
- Results: 20sessions of OMT; Discharged

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## JW

- Age: 7:11
- Complaint: Frontal Lisp, deviated to right
- Presenting: Interdental rest posture, Tongue thrust swallow, Mild dysmorphology
- Evaluation: Articulation, OMF & Feeding
- Recommendations: Frenectomy & Neurological Evaluation
- Treatment: Stretching, Oromyofunctional & Articulation
- Results: 13 sessions; Making good progress

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## AB

- Age: 7:3
- Complaint: Tongue stimulation habit
- Presenting: Interdental tongue posture
- Evaluation: Articulation, OMF & Feeding
- Recommendations: Stretching program then Frenectomy
- Treatment: Stretching, OMF, Articulation
- Results: 16 sessions; Fair; Tx suspended

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## EB

- Age: 3:7
- Complaint: Poor language development, intelligibility
- Presenting: Phonological assimilation
- Evaluation: Articulation & Language
- Recommendations: Stretching
- Treatment: Stretching, Articulation, Language
- Results: 30 sessions; Normalizing function & articulation

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## EG

- Age: 6:10
- Complaint: Poor articulation & intelligibility
- Presenting: S, Z & R distortions
- Evaluation: Articulation, OMF & Feeding
- Recommendations: Stretching Program
- Treatment: Stretching & Articulation
- Results: 24 sessions; Doing well; Elevation & retraction require jaw support

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The screenshot shows the top portion of a website page. At the top is a dark navigation bar with the RDH logo on the left and the text 'SUBSCRIBE BLOGS FREE SAMPLES' on the right. Below this is a horizontal menu with links: HOME, CURRENT ISSUE, ARCHIVES, DENTAL HYGIENE, RDH PRODUCTS, DIGITAL MAGAZINE, SUBSCRIBE, and RDH LINKS. The main content area features a breadcrumb trail: 'Home > Lingual, labial frenums: Early detection can prevent health effects associated with tongue-tie'. Below this is a promotional banner for 'Colgate Optic White' with the text 'RECOMMEND ONE SIMPLE STEP' and 'EXPAND'. The article title is 'Lingual, labial frenums: Early detection can prevent health effects associated with tongue-tie', dated 'December 23, 2015'. At the bottom of the screenshot, there is a sub-headline: 'Early detection can prevent cascading health effects associated with tongue-tie' and the author information: 'By Marthe Macaluso, M.T., RDH, BS, and Dana Hockenbury, CCC-SLP, COM'.

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## Websites

- <http://www.kiddsteeth.com/articles/websitesInbew.pdf>
- <http://www.rdhmag.com/articles/print/volume-35>
- <http://tonguetie.net/the-book/>
- <http://realfoodwithkids.com/visual-indicators-of-tongue-lip-ties/>
- <http://www.ankyloglossiabodyworkers.com/>

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