Laser Revision of Tethered Oral Tissues in Nursing Infants

Timothy D. Voss, DDS

Diplomate, American Board of Pediatric Dentistry
Fellow, American Academy of Pediatric dentistry
Associate Clinical Professor, University of Toledo Medical Center Pediatric Dental residency
Team member, Cleft Palate and Facial Anomalies Clinic of Northwest Ohio

Course Objectives

1. Identifying tethered oral tissues
2. Directing nursing dyads to appropriate ancillary care providers
3. Understanding the role of laser therapy in the release of tethered oral tissues

Contemporary Prevalence

- Historically infants that struggled to nurse had no alternative
- Emergence of support team (Kotlow 2017)
  - Wet-nurses, lactating community/family members, midwives
- Societal views shunned
  - Victorian era idealized new feminine form
  - Socioeconomic
- Scientific push
  - Lab synthesized nutrition, ‘formulated’
  - Solids added earlier

Advantages of Nursing

- Mother-Infant bonding
- Immunocompetency
  - sIgA, lymphocytes, nucleotides, cytokines, lactoferrin (Breakay 2015)
  - Feedback mechanisms
- Nutritional composition
  - Gut flora (Pia 2017)
- Post-partum health
  - Includes father in ‘Triad’

Ineffective Latch Symptoms - Infant

- Reflux
- Hiccups
- Vomiting
- Leaking Milk
- Gas
- Colic
- Grunting / Snorting
- Clicking
- Coated Milk Tongue
- Unable to hold pacifier
- Short Sleep Episodes
- Prolonged Nursing Attempts
- Poor Weight Gain
- Thrush / coated-milk tongue
- Lip blanching
- Choking / Gagging
- Chewing / Biting

Ineffective Latch Symptoms - Mother

- Pain
- Incomplete drainage
- Mastitis
- Cracking / Bleeding
- Nipple infection
- Vasospasms
- Deformation

Evaluation of Nursing Success

- Hospital Births
  - OB, RN, Midwife, IBCLC, SLP / OT, Family, Friends
- Lactation Consultants
  - Outpatient Follow-Up
- Medical home
  - 1-Week Check, 1-Month Check
- Body-Workers
  - CST, Chiropractors
- Pediatric Dentists

Nursing Physiology
-Initiation

- Cradle
- Football hold
- Insertion – ‘Sandwich’ technique
- Lips deflect outward
- Areola completely intraoral
- Infant opens maximally
- Tongue cradles nipple to palate cushioning mandibular alveolus
- Infant closes to gently secure the latch

Nursing Physiology
-Function

- Elevation of root of tongue
- Nipple compression with middle third of tongue
- Repetitious compression / relaxation initiates let-down
  - 'Na-Na'
- Tongue funnels milk to esophagus
- Swallowing follows compressions
- During respirations root of tongue approximates palate
  - Allows for compartmentalized nasopharyngeal airway

Where is the Upper Lip?

- Flanged outward
  - Personal mirror or assistant
  - Border of labial mucosa visible
- Suction-Cup Seal
  - Minor salivary grains of labial mucosa
- Thickness of maxillary lip
- Anchorage of orbicularis oris to alveolus and anterior nasal spine

Maxillary Labial Frenulum

- Originates from maxillary labial tubercle
- Rises under labial mucosa to height of vestibule
- Descends behind unattached alveolar mucosa
- Continues through attached gingiva
- Terminates at Incisive Foramen on palatal alveolus

Maxillary Labial Frenulum

- Connective Tissue filament
  - Guitar string
- 2 and 3 filament variants
- Little elastomeric potential (Gartner 1991)
  - Type I collagen
  - Disorganized muscle
  - Anchorage to periosteum

Maxillary Labial Frenulum - Clinical Evaluation

- Lap-Method
- Nursing callous at tubercle
- Generalized chafing of bimaxillary labial tissue
- Index fingers lateral to frenulum
- Elevate lip to demonstrate depth of vestibule
- Blanching at inferior alveolus

Maxillary Labial Frenulum - Classification

- Kotlow Classification
  - Hazelbaker Assessment Tool via IBCLC
- KI – not frequently observed, clinically absent
- KII – inserts above MucoGingival Junction (MGJ)
- KIII – terminates between MGJ and anterior alveolar ridge
- KIV – traverses alveolar ridge to incisive papilla

Palatal Variations

- Broad, shallow dome
  - Narrow, Highly-Vaulted, Bubble
- Clefting
  - Submucosal, Bifid uvula
- Closure of secondary palatal shelves at 9 weeks in utero
- Tongue serves as modifier (Yoon 2017)
- Roll index finger across palate gauging depth and width

Palatal Variations

- Highly-vaulted / narrow palate prevents approximation of tongue
  - Ineffective stimulation of suction-based compressions
- Supine infants unable to distinguish nasal airway
- Long-term modification through orthopedic remodeling
  - Hastened by maternal estrogen effects on cartilaginous composition through first 6 weeks (Mandwe 2014)

Two Types of Frena
-Anterior

- Commonly cited as “tongue tie” (TOTS)
- Thin veil of oral mucosa
- Rarely vascular
  - Leading edge has a branch of lingual vein
- Historically ‘snipped’ with scissors
  - Midwife fingernail
- Release rarely leads to cessation of symptoms

Two Types of Frena
-Posterior

- Submucosal, Invisible, Hidden
- Anchors at midline of lingual mandibular alveolus
- Traverses floor of mouth bisecting Wharton's Ducts
- Extends superiorly up ventral surface of tongue
- All Anterior presentations have Posterior component
- Posterior always present

Lingual Frenulum
- Classification

- KI – clinically absent
- KII – inserts on lower half of tongue
- KIII – inserts on upper half of tongue
- KIV – tip of tongue tethered to alveolus

Lingual Frenulum - Examination

- Lap method
- Parent / Caregiver supports hands and shoulders
- Provider at 12 o'clock position
- Always use headlamp
- Elevate tongue with tips of index fingers
  - Attempt to approximate tongue to palate
- Lingual frenulum lies just submucosally
  - Instantly visible
  - Able to demonstrate structures readily

Ineffective Latch Symptoms - Infant

- Reflux - aerophagia
- Hiccups - aerophagia
- Vomiting - aerophagia
- Leaking Milk - seal
- Gas - aerophagia
- Colic - aerophagia
- Short Sleep Episodes - aerophagia
- Prolonged Nursing Attempts - aerophagia
- Poor Weight Gain - aerophagia / ineffective tongue motion
- Thrush – ‘coated milk tongue’ lack of physical approximation of tongue to palate

Ineffective Latch Symptoms - Mother

- Pain – chewing during shallow latch
- Incomplete drainage – shallow / ineffective latch
- Mastitis – incomplete drainage
- Cracking / bleeding – chewing during shallow latch
- Nipple infection –trauma
- Vasospasms – incomplete drainage

TOTS

- Maxillary Labial Frena
- Lingual Frena – Anterior / Posterior
- Buccal Frena
  - Rarely clinically significant
  - Affect size of oral aperture
  - Asymmetric presentation
- Mandibular Labial Frena
  - Rarely clinically significant
  - May be continuous with Lingual KIV

TOTS Releases

- Performed with laser surgery
- Anesthesia
  - EMLA
  - TAC
  - Lidocaine injection
  - None
- Immediate nursing
  - Calms infant and mother
  - Soothes surgical sites
  - Hemostasis (if necessary)

Surgical Presentation
- Labial

- Inferior portion
- Circumscribe lateral extension
- Horizontal interruption of vertical filament
- Vertical extension to crest of alveolar ridge
- Presents as diamond shape
- Irregular borders
- Areas devoid of pigmentation
- Occasionally bleeding at margins
- Full extension immediate

Surgical Presentation - Lingual

- Bisect right angle of tongue to floor of mouth
- Horizontal incision posterior to Wharton's ducts
- Extend incision bilaterally
- Manually elevate tongue to ascertain disruption
- Presents as diamond shape
- Irregular borders
- Areas devoid of pigmentation
- Occasionally bleeding at margins

Home After-Care

- Stretches
  - Dr. Kotlow: TID x 2 weeks (Kotlow 2017)
  - Dr. Ghaheri: 5 + 1 x 3 weeks, step Down drops 1 each day thereafter
- Cheek massages
- Push-Pull Exercises
  - Strengthen Tongue
  - Mother's Milk, formula, sugar-water
- Palatal Massages
  - Mother's Milk, formula, sugar-water
- 1 week follow-up visit enables re-opening site

Post-Operative Comfort
-Lip

- Highly-variable
  - Infant thresholds
  - Duration / frequency of suckling and pacifier usage
- Lip mainly stationary, gentle suckling posture
  - Improvement of orbicularis oris for spontaneous flanging
- Laser wounds are sterile and anesthetized

Post-Operative Comfort
-Tongue

- 4 pairs of extrinsic muscles:
  - Genioglossus, hyoglossus, styloglossus, palatoglossus
- 4 pairs of intrinsic muscles:
  - Superior longitudinal, inferior longitudinal, transverse, vertical
- Excessive suckling leads to fatigue
  - Encourage cluster feeding
- Limit pacifier usage when feasible

Post-Operative Comfort

- Benzocaine derivatives contraindicated
- Homeopathic remedies containing belladona not standardized
- Tylenol when infant refuses to nurse
- Ibuprofen contraindicated <6mos
- Mother's milk / formula frozen into baby bottle nipple or chips of frozen, pumped mother's milk
  - Apply minimally to surgical site
- After cord-clamp falls off, shower or bath
- Skin to skin

Ancillary Providers
- IBCLC

- Pre- and post-
- Establishes nursing home
- Evaluates positioning, latch, flow, transfer, weight gain
- Emotional advocate
- Second opinion

Ancillary Providers
- Body Workers (CST / Chiro)

- Contiguous fascial plane encapsulates oral, thoracic, and vertebral structures (Kotlow 2017)
- Abnormal vertebral asymmetry / tension
  - Torticollis
- Birthing trauma (Ghaheri 2016)
  - Prolonged birth
  - Use of forceps, suction, intrauterine monitoring
  - Positioning: Breach, Posterior
  - Twins restrictive in positioning

Ancillary Providers
- Medical Home (Peds, DO, MD)

- Formal medical evaluation
- Weight / growth rates
- Confounding evaluation
  - Contradicting assessment?
- Referral to appropriate providers
  - ENT, SLP/OT, Plastics, OMFS

Concurrent Deficiencies

- Aesthetics of upper lip position
- Dental caries / oral hygiene compliance
- Maxillary diastema
- Dietary / texture avoidances
- Swallowing difficulties
- Obligate mouth breathing
  - Behavioral issues / accompanying medications
- Restricted mandibular growth
- Reflux and accompanying medications
- Speech deficits

Citations

- Breakey AA, Hinde K, Valeggia CR, Sinofsky A, Ellison PT. Illness in breastfeeding infants relates to concentration of lactoferrin and secretory Immunoglobulin A in mother's milk. *Evol Med Public Health*. 2015;2015(1):21-31.
- Ghaheri, B. Treatment of infant tongue tie and lip tie. 28 May 2016. Henry B. Gonzalez Convention Center. San Antonio, TX.
- Gartner LP, Schein D. The superior labial frenum: a histologic observation. *Quintessence Int*. 1991;22:443–445.
- Kotlow, L. Advanced pediatric dentistry course: diagnosing and treating tethered oral tissues (TOTS). 9 Sept 2017. Marriott at RiverCenter. Cincinnati, OH.
- Kotlow, L. SOS 4 TOTS. Troy, NY. 2017.
- Mandwe RS, Puri S, Shingane S, Pawar G, Kolhe VR, Alsi A. Presurgical nasoalveolar remodeling - an experience in the journey of cleft lip and palate. *Clin Cosmet Investig Dent*. 2014;7:1-7.
- Pia S, Fan L, Chiara C. Association Between Breast Milk Bacterial Communities and Establishment and Development of the Infant Gut Microbiome. *JAMA Pediatr.* 2017; 171(7):647-654.
- Yoon AJ, Zaghi S, Ha S, Law CS, Guilleminault C, Liu SY. Ankyloglossia as a risk factor for maxillary hypoplasia and soft palate elongation: A functional – morphological study. Orthod Craniofac Res. 2017;20:237–244.