Tethered Oral Tissues and Infant Oral Assessment

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Tongue-tie is nothing new

- Recognized since the days of Aristotle in third century BC
- Tongue-tie or ankyloglossia from the Greek “agkilos” (curved) and “glossa” (tongue).
- 7th century AD has medical reports of dividing a tongue-tie
- In Middle Ages, competition between midwives who used a sharpened fingernail and surgeons who could use instruments
- Tongue-ties were routinely released through the early 1900s
- When bottle-feeding became the norm in the 1950s, tongue-ties and their division fell out of favor
- Resurgence of breastfeeding caused this to become controversial
- In diagnosis of tongue-tie in US by 834% from 1997-2012 (Walsh et al, 2017)
- Incidence 0.02-12%

Definition of lingual frenulum

- Variously defined as “midline submucosal string,” “band,” “mast,” “cord”
- Upon dissection, it was seen as a dynamically layered structure formed by oral mucosa and the underlying fascia covering the floor of the mouth
- Tongue mobilization creates tension in the fascial layer, raising the fascia and overlying mucosa into a midline fold that is recognizable as the lingual frenulum or anterior lingual frenulum (Mills et al, 2019)

Posterior lingual frenulum

- Low attachment of floor of mouth fascia
- Can normally occur in up to 35% of infants without necessarily interfering with breastfeeding
The posterior tongue
- Base of tongue retracts against posterior pharyngeal wall generating pressure that helps move bolus through back of mouth
- Reduced base of tongue movement could interfere with swallowing
- During breastfeeding, could see nasal regurgitation, gagging, choking, coughing, aspiration
- May be altered in infants with congenital Zika syndrome (Fonteles et al, 2018)

Upper lip (superior) labial frenulum
- Small, non-muscular triangular fold of connective tissue that extends from the midline maxillary gingiva into the vestibule and central upper lip
- Involved in creating a seal around breast tissue
- Has many morphological components with varying distributions
- Attachment site for maxillary labial frenulum alone is not a sufficient population discriminator for lip tethering

Buccal frena
- Buccal ties are uncommon
- Buccal ties are abnormal mucosal tethers extending from the cheeks to the gingiva
- Most are small and without medical significance
- Buccal ties can interfere with the gape response, labial seal causing aerophagia (swallowing of air), stabilizing the nipple, creating vacuum

Buccal tie
- [Image: buccal-tie.png]
# Lingual frenulum assessment

- **Assessment Tool for Lingual Frenulum Function (ATLFF)**
  - Hazelbaker AK. The assessment tool for lingual frenulum function (ATLFF): Use in a lactation consultant private practice. Pasadena, California, Pacific Oaks College; 1993

- **Bristol Tongue-tie Assessment Tool (BTAT)**

- **Coryllos classification system**

- **Lingual Frenulum Protocol with Scores for Infants**

- **Tongue-tie and Breastfed Babies (TABBY)**

- **Kotlow**

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### ATLFF (Hazelbaker)

Score of 0-3 indicate severe restriction of tongue function

Showed good correlation with ATLFF

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### Kotlow classification

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TABBY assessment tool

Score of 8 = normal function
Score of 6 or 7 = borderline
Score of 5 or below = tongue function impairment

Coryllos’ 4-type description
- Type 1: classical (anterior) lingual frenulum; attachment of frenulum to the tongue tip, usually in front of the alveolar ridge in the lower lip sulcus
- Type 2: 2-4 mm behind the tongue tip and attaches on or just behind the alveolar ridge
- Type 3: Posterior lingual frenulum; tongue-tie is attachment to the mid-tongue
- Type IV: essentially against the base of the tongue; thick, shiny and very inelastic

Kotlow maxillary lip tie classification
Kotlow LA. Diagnosing and understanding the maxillary lip-tie (superior labial, the maxillary labial frenum) as it relates to breastfeeding. J Hum Lact 2013;29:458-464

Stanford superior labial frenulum classification
Santa Maria C et al. The superior labial frenulum in newborns: What is normal? Global Pediatric Health 2017;4:1-6

Most infants (83%) were Type 2
Poor interrater reliability
Assessing buccal ties

- Buccal ties can be asymmetrical with some ties on both sides and some on only one side
- May change as child gets older
- No measurements or classification systems

http://bfmedaz.com/tongue-tie/

Finger sweep for assessing posterior tongue tie-Dr. James Murphy

- Insert your 5th finger, pad down, into the left side of the infant’s mouth under the tongue
- Advance the finger until meeting firm resistance
- Holding the finger at this depth, move the finger directly to the right side of the infant’s mouth.
- No resistance = no Tongue Tie
- Tongue vibrates only = Small Speed Bump = Small Risk of latch problems
- Tongue moves far to the right then swings back = Large Speed Bump = usually a problem
- Won’t move to the right = a fence = always a problem at some point in life, now or later

James Murphy finger sweep

Finding a posterior tie

- Elevate and push tongue back simultaneously
- Some studies show the occurrence of posterior frenulum at 35%
- May be normal in many infants and not causing problems

Problems with rating and classification systems

- May be too complicated to use in clinical practice
- Nuances or measurements may be slight or difficult to discern without actually measuring the frenulum
- Generally look only at structure or appearance and not function
- Often have very poor interrater reliability
- Should not be only criteria in determining interventions
Signs of frenulum restrictions

- Infant has a high or narrow palate
- Tongue normally rests pressed against hard palate in utero
- Lingual tie prevents tongue from assuming this posture
- Hard palate is maleable and without gentle rounding guidance from tongue, may take the form of high or narrow complicating breastfeeding because tongue cannot press nipple against palate

Signs of frenulum restrictions

- Milk leakage out of mouth
- Nasal regurgitation
- May indicate shallow latch, poor tone, lack of recruitment of compensatory muscles

Signs of frenulumrestriction

- Sucking blisters on infant’s lips
- Overcompensation of facial muscles to maintain latch
- Infant may still obtain milk in presence of ties due to abundant milk supply, forceful milk ejection reflex

Signs of frenulum restriction

- Milk tongue
- Typically only in center of tongue compared to thrush
- Tongue cannot elevate high enough to clear milk by cleansing against the hard palate

Signs of frenulum restriction

- Low tongue posture
- Sides of the tongue are raised
- Front of tongue pulls downward
- Tongue appears flattened against floor of mouth

Signs of frenulum restriction

- Aerophagia
- Poor seal around the breast may contribute to excessive swallowing of air
- May see excessive gas in infant, reflux, bloating, excessive spitting up, crying
Nipple deformity

Signs of interference with breastfeeding

Potential interference with speech
- Lingual tie
  - Reduced ability to retract tongue for k, g, h
  - Reduced ability to elevate/depress tongue tip for s, z
  - Reduced ability to elevate tongue tip for t, d, l, n
- Labial tie
  - Reduced lip rounding for w
  - Compensatory jaw jutting for f and v
- Buccal tie
  - Decreased ability to contract cheeks during production of o, u, w

Tongue placement and breastfeeding

Does TOT revision make a difference?
- 24 infants with lingual tongue-tie underwent revision with scissors
- Total milk production pre-frenotomy: 455 + 323 g (16.05 oz + 11.39 oz)
- Total milk production post-frenotomy: 615 + 289 g (21.69 oz + 10.19 oz)
Does TOT revision make a difference?

- Observational analysis of the ultrasound scans revealed 2 distinct patterns of sucking by the infants before frenulotomy.
- One group of infants (11 of 24 [46%]) placed the nipple close to the HSPJ and pinched the base of the nipple.
- Second group (9 of 24 [37%]) placed the nipple further away from the HSPJ, and the posterior tongue seemed to hump compressing the tip of the nipple to a point.

Ultrasound pre- and post-frenotomy

- Post-frenotomy shows smoother contour of the back of the tongue which no longer deforms the nipple.
- Probably where much of the nipple pain and damage originates.

Frenotomy Decision Rule for Breastfeeding Infants

- Is restriction present?
- Check both appearance and function.
- Does tongue/lip/check alteration interfere with breastfeeding?
- Might the restriction also interfere with speech?
- What are maternal and infant signs and symptoms:
  - Nipple pain/damage
  - Infant weight gain issues
  - Excessively long feeding sessions
  - Milk production problems
  - Do parents wish to initiate corrective procedure?
  - Do parents understand the risks of the procedure and that it may not always fix the problem, at least not immediately?
  - Is mother ready to abandon breastfeeding?
- Better breastfeeding outcome noted when tie revision done by 72 hours postpartum.
Procedure (Pros and Cons)

- Scissors
- Light scalpel
- CO₂ laser (diode, Erbium)

Hospital or office procedure
Pediatrician or OMT
Less pain
Preserves tissue
Widens posturgical area
Avoiding sensory nerves, salivary, lingual glands
Needs specialized equipment and provider

Maxillary lip tie release


Pre-frenotomy activities
- Many protocols and suggestions with little research, consistency, or validation
- Some say to delay procedure for up to several weeks to engage in pre-frenotomy activities
- Accustoms the infant to how things about the mouth are supposed to move
- Prepare and re-pattern tongue function
- Strengthen intrinsic and extrinsic tongue muscles
- Offer tummy time opportunities

Pre-frenotomy activities
www.Drghaheri.com
- Sucking exercises
  - It's important to remember that you need to show your child that not everything that you are going to do to the mouth is associated with pain. Additionally, babies can have disorganized or weak sucking patterns that can benefit from exercises. Starting these exercises from the moment you make your appointment can speed up your recovery after the procedure. The following exercises are simple enough to be done at home with quick, short activities. Aim for 4x/day leading up to the day of your procedure.
  - Slowly rub the lower gumline from side to side and your baby’s tongue will follow. This usually strengthens the infant’s extrinsic tongue muscles.
  - Let your child suck on your finger and do a tug-of-war, slowly trying to pull your finger and ultimately try to suck it back in. This strengthens the tongue itself. This can also be done with a pacifier.
  - Let your child suck your finger and apply gentle pressure to the palate. Once the baby starts to suck on your finger, just press down with the back of your nail into the tongue. This usually interrupts the sucking motion while the baby just pokes against your finger for a second then puts your finger back in the palate to resume sucking. Repeat as tolerated.
  - With one index finger inside the baby’s cheek, use your thumb outside the cheek to massage the cheeks on either side to help release the tension.

Post procedure exercises
- Controversial
- Some say no exercises needed
- Some say stretching exercises for 6 weeks
- Dr. Ghaheri-4 weeks
  - Stretches 6x/day for 3 weeks, then 4th week taper down to 4x/day, not going more than 6 hours between stretches
- Dr. Baxter
  - Stretches 6x/day for 3 weeks

Are there contraindications or cautions
- Any airway compromise which could worsen with increased tongue mobility
- Macroglossia
- Small mandible
- Pierre Robin Sequence
- Genetic anomalies of a more complex nature
- Familial bleeding history
- Infection/fever
- Illness
- Questionable ability for follow-up
What if it doesn’t work?

- Should the revision be revised
- Most but not all revisions result in improved breastfeeding, reduced nipple pain and damage
- Some studies show up to 22% of revisions do not result in better breastfeeding
- Some studies and clinicians postulate that the longer the revision is delayed the less likely the procedure will be successful
- Infant may have recruited other muscles and altered sucking patterns to compensate for tethered oral tissues

Other muscle involvement

- Tongue composed of 8 muscles
- Intrinsic originate and attach within the body of the tongue
- Extrins: originate outside the body of the tongue and attach within it
- Muscles work in pairs, unequal contraction, weakness or strength, may cause the tongue to still not work as desired
- Other breastfeeding issues may also be in play

Bodywork

- Bodyworkers locate areas of the body impacted by restriction, tightness, decreased mobility, asymmetry and mobilize these areas
- May be helpful whether or not revision is successful
- Orofacial myology
- Chiropractic
- Craniosacral
- Osteopathic
- Speech and Language Pathologist (SLP)
- Occupational therapy
- Physical therapy

When parents decide against revision

- Is breastfeeding uncomfortable/painful but still effective?
- Is breastfeeding comfortable but ineffective?
- Is breastfeeding comfortable and effective
- Is breastfeeding uncomfortable and ineffective?
- All of this can change over time and may require long term follow-up
- Some mothers may have particular breast/nipple or milk ejection characteristics that allow successful breastfeeding in presence of TOT

Considerations when revision will not be done

1. Monitor infant weight
   - Some infants rely on a ample milk supply and strong milk ejection to gain weight in the early days and weeks
   - This may change as baby gets older and must rely on generating vacuum to maintain milk production
2. Maintain milk production
   - Create an overabundance of milk
   - May need to pump milk several times per day

Considerations when revision will not be done

3. Manage nipple discomfort/pain/damage
   - Can try nipple shields
4. Try different nursing positions
   - Ventral or prone positioning may use gravity to bring tongue forward
5. General suckling exercises to strengthen tongue muscles bilaterally
   - Finger tug
   - Lateral tongue stimulation
6. Consider bodywork and referrals such as:
   - Myofacial/myofunctional therapy
   - Exercises to strengthen and maintain range of motion for jaw, lips, cheeks, and tongue
   - SLP referral for impact on speech and feeding
   - Chiropractic, cranio-sacral
Resources

- International Affiliation of Tongue-tie Professionals (IATP)
  - https://tonguetieprofessionals.org/
- International Association of Orofacial Myology
  - https://www.iaom.com/
- Ankyloglossia Bodyworkers
  - http://www.ankyloglossiabodyworkers.com/