Tongue-tie (Ankyloglossia)

- Academy of Breastfeeding Medicine definition
  - “a sublingual frenulum (band underneath the tongue) which changes the appearance and/or function of the infant’s tongue because of its decreased length, lack of elasticity or attachment too distal beneath the tongue or too close to or into the gingival ridge”

Does tongue tie affect breastfeeding?

- 1041 infants screened for ankyloglossia at WBC
  - Incidence 4.8%, M:F ratio 2.6:1
- Breastfeeding problems (nipple pain lasting longer than 6 weeks and/or difficulty of the baby latching onto the breast) reported in:
  - 25% of infants with ankyloglossia
  - 3% of controls
- Conclusion: ankyloglossia is associated with BF difficulty in selected infants, while others are able to compensate...let’s explore why.

Tongue Embryology

- Tongue develops between 4-7 weeks of pregnancy
- Contributions from all 4 pharyngeal arches and their nerves
- Fusion of bilateral tissue buds from floor of the mouth (muscle layer under the tongue)
- buds fuse from back to front
- Apoptosis (programmed cell death) separates tongue from FOM
- The frenulum is a remnant of this process with a variable degree of persistence

Mechanics of Breastfeeding

- Upper lip flanges above nipple to reach areola, widening the mouth gape
- The infant moves the tongue forward to grasp and draw the nipple and areola into the mouth
- Front to mid-dorsal tongue lifts the nipple against the hard palate and must form an airtight seal with minimal compression
- Tongue base drops down, expanding the chamber to create negative pressure and extracting milk from the breast
- Some infants with latch restriction are unable to grasp the nipple/breast, while others attach poorly causing nipple pain or damage

Anatomy of Breastfeeding

- Milk glands

- [Diagram of tongue and areola]
Mechanics of Breastfeeding: Anatomic Consequence

- Most important single mechanical factor for latching success: Total surface area of contact between baby's mouth and nipple/areola

Restricted Latch Feeding Pattern

- Consequence of loss of suction with inadequate seal
- Trouble establishing latch, shallow latch, frequent separation
- Bitting, pinching or “chomping” nipple with gum ridges
- “Lipstick” compression or blanching of nipple
- Nipple pain, cracking or blistering; plugged ducts or mastitis
- Clicking and air swallowing, gassy after feeds, frequent spit up
- Ineffective milk transfer; breast not drained after feed
- Prolonged, frustrating feeds and little rest between feedings
- Frequent suspected thrush that does not respond well to typical treatments
- Poor weight gain in baby, poor milk production in mother

Multifactorial Elements

- Many factors other than tongue and lip ties may contribute to breastfeeding difficulties
- Infant Factors
  - High arched or cleft palate
  - Recessed jaw
  - Coordination/strength of suck, tongue muscle
  - Oromotor tone
  - Airway/breathing (suck/swallow/breathe coordination)
- Maternal Factors
  - Decreased milk supply
  - Breast hypoplasia/insufficient glandular tissue (IGT)
  - Stress, hormonal issues affecting letdown
  - Short, flat or inverted nipple
Pregnancy and Delivery Impact Breastfeeding

- Not all causes of poor breastfeeding are structural/anatomic
- Many causes of low milk production or ineffective breastfeeding can be identified and managed
  - hypothyroid
  - Insulin dysregulation
  - PCOS
  - Fertility struggles
  - Alcohol and tobacco use
  - Postpartum depression
  - Medications, herbs, and natural remedies

Summation of Factors

Evaluate Frenulum in Context

- The severity of breastfeeding difficulty does not correlate perfectly with anatomical severity of tongue-tie \textit{per se}
- If all other factors favor effective breastfeeding, the baby may feed well even with visible ankyloglossia
- On the other hand, if other factors (particularly the high arched palate) are suboptimal, treating the frenulum may be helpful even if the tongue tie itself appears very mild
- The tongue and lip are the most treatable anatomic factors affecting breastfeeding
- All other things being equal, MORE contact surface area is better than LESS.
- Therefore, the feeding pattern, not the exam, dictates the need and likely benefit of frenulectomy
Schematic of BF difficulty

Breastfeeding difficulty
Classical anterior ankyloglossia
Structural latch restriction

Normal infant tongue

Tongue elevates completely at the tip, reaches palate with mouth at least halfway open, no lateral curling

http://www.cwgenna.com/qhcontent.html
Anterior (Type 1) Tongue-Tie

Frenulum inserts at tongue tip; obvious heart-shaped indentation with protrusion and lateral curling/cupping with elevation, variable degree of restriction depending on length, height, laxity of frenulum

Anterior (Type 2) Tongue-Tie

Still a visible mucosal frenulum, but inserts posterior to tip, may not be obvious unless tongue is elevated

Posterior (Type 3) Tongue-Tie

No mucosal frenulum, but tight attachment is visible with attempted elevation and easily palpable
Posterior (Type 4) Tongue-Tie

- No visible frenulum unless floor of mouth compressed with groove director or tongue depressors
- Poor tongue tip elevation evident, lateral curling
- Other “relative ankyloglossia” with short tongue, inadequate mobility to compensate for high palate/other adverse factors

Labial Tie

- Usually associated with “posterior tongue-tie”
- Labial frenulum thickened, inserts on or beyond gumline
- Lip cannot flange up over nipple, limiting depth of latch

Frenulectomy Procedure

- Tolerated well in-office until at least 3, up to 6 months of age
- Infiltrate local anesthetic (1% lidocaine with epinephrine) to reduce pain and bleeding
- Elevate tongue (and/or lip) and expose frenulum with grooved director
- Clamp to dispel vessels and stabilize band
- Sharply release lingual and/or labial frenulum with scissors or laser
- Oxymetazoline/silver nitrate as needed to reduce any bleeding
- Bleeding is the most significant risk; Suture rarely necessary (<0.5%) but should be available
- Immediate breastfeeding after treatment to soothe baby and get feedback from mom
When to do it

- Anatomy is not irrelevant but is not the primary concern in treatment decision. Favor release when feeding pattern (function) and exam are suggestive of structural latch restriction, even when tongue tie itself not obvious.
- Recommended even with normal feeding if tight enough to potentially affect speech (i.e., anterior type 1-2).
- Not urgent unless unable to bottle feed, but the earlier the better.
  - Maladaptive compensatory maneuvers
  - Decreased milk supply
  - General anesthesia required in older infants and children
- Parental option or waiting period, especially in equivocal cases.
- Goal is to work with the baby’s anatomy to treat the treatable factors and achieve maximum safe release.

Decision Algorithm

- Latch Restriction Feeding Pattern
  - Under 6 months
    - Tip restriction (type 1-2)
      - NO
      - YES
        - Yes: In-office (local) lingual/labial frenulectomy
        - No: No procedure needed
      - NO

Timing of Frenulectomy

- Review of 302 infants who underwent frenotomy
- 91 mothers in f/u telephone survey
- 80% strong benefit; 82% restarted/continued breastfeeding
- 86% success in 1st week of life, 74% afterwards
- Once tongue tie is diagnosed, earlier treatment is better

Immediate Results

- Randomized crossover trial
- 57 infants enrolled with breastfeeding difficulty and anterior tongue-tie
- 29 controls assigned to lactation consultation: 1 improved (3.4%) enough to decline frenulectomy at 48h
- 28 immediate frenulectomy: 27 improved (96%)
- 28 who failed LC only arm then underwent frenulectomy: 27 improved (96%)
- 60% still breastfeeding at 4 months


Frenulectomy & Breastfeeding Outcomes

- 62 feeding pairs referred after failure to improve with lactation consultation to optimize positioning and latch
- Uncontrolled prospective cohort study with questionnaire on presentation and at 3 months

<table>
<thead>
<tr>
<th>Symptoms at presentation</th>
<th>Number reporting n=62 (%)</th>
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<tbody>
<tr>
<td>nipple pain</td>
<td>52 (84)</td>
</tr>
<tr>
<td>nipple trauma</td>
<td>32 (52)</td>
</tr>
<tr>
<td>poor latch</td>
<td>52 (84)</td>
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<tr>
<td>prolonged positive</td>
<td>4 (13)</td>
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<tr>
<td>early feeding</td>
<td>39 (63)</td>
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<tr>
<td>infant frustration</td>
<td>58 (93)</td>
</tr>
<tr>
<td>infant not satisfied after feed</td>
<td>27 (44)</td>
</tr>
</tbody>
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Improved Breastfeeding

- Presentation with nipple pain most predictive of long-term success (OR 5.8 [95% CI 1.1 – 31.6])
- 78% still breastfeeding at 3 months
- 52% had difficulty score of 0 (no breastfeeding problems) post-tx
Ultrasound Confirmation

- 24 infants with ankyloglossia experiencing persistent breastfeeding difficulties despite lactation advice
- Ultrasound images taken from below the jaw, before and after frenectomy, showed improved breastfeeding as defined by:
  - Decreased jaw excursion (i.e., less biting/chomping)
  - Less compression of the nipple by the tongue
  - Better attachment with less frequent separation
  - Increased milk transfer
  - Also associated with less maternal pain

Additional Reported Benefits

- Increases post-frenotomy in:
  - Mean infant milk intake (50.5 ml → 69.1 ml)
  - Mean milk transfer rate (5.6 ml/min → 10.5 ml/min)
  - Mean maternal 24 hr milk production (455 ml → 615 ml)

Anterior vs. Posterior Tongue-Tie Success Rates

- 311 infants evaluated for fren, 299 (95%) treated
- 16% Type I/II, 36% Type III, 49% Type IV
- 37% also labial (21% Type I/II, 30% Type III, 48% Type IV)
- Among those with these pre-intervention problems:
  - No post-intervention latch difficulty: 100% ant, 50% post
  - No maternal nipple pain: 79% ant, 60% post
- Frenectomy can be successful in both groups but more posterior tie more likely to be refractory to treatment
Lip Tie/Posterior Tongue Tie

- Retrospective review of 618 patients from a dedicated breastfeeding difficulty clinic in 2014
- 47% - anterior ankyloglossia alone
- 19% - posterior ankyloglossia
- 6% - both anterior ankyloglossia and upper lip-tie
- 5% - posterior ankyloglossia and upper-lip tie
- 2% - upper-lip tie alone
- 21% - “no anomaly”
- Anterior ankyloglossia: 78% reported some degree of improvement in breastfeeding after frenotomy.
- Posterior ankyloglossia: 91% reported some degree of improvement in breastfeeding after frenotomy.
- Upper lip-tie release also led to improved breastfeeding (100%).


Lip Tie/Posterior Tongue Tie

- Prospective cohort study of 237 dyads from a dedicated breastfeeding difficulty clinic in 2014-15
- 70% had posterior tongue tie
- 75% lip/tongue release; 25% tongue only, 0.4% lip only
- 3% required revision procedures
- Preop, 1 week, and 1 month postop surveys
  - Breastfeeding self-efficacy (BSES-SF): 42.9→52.3→56.5
  - Visual analog scale (VAS) for nipple pain severity: 4.6→2.2→1.5
  - Infant Gastroesophageal Reflux (I-GERQ-R): 16.5→13.2→11.6
  - Breastmilk intake and transfer rate pre- / 1 wk post: 3.4→4.9 ml/min
- All changes statistically significant at p<0.001


Lip Tie Recommendations

- More recently recognized contributor to latch restriction
- No studies addressing labial frenulectomy isolated from treatment of tongue tie, as they typically coexist and are treated together
- Improved flanging of upper lip allows wider mouth opening, deeper position of nipple/areola within mouth, increased contact surface area and more effective tongue function; “every little bit helps.”
- 5-10 seconds additional procedure time; no additional risk or recovery time; avoidance of potential second procedure
- Therefore I favor lip release along with lingual frenulectomy unless lip flanging is clearly unrestricted
Post-treatment care

- First feed not always successful due to numbness and/or pain; first goal is to soothe baby
- 30-50% immediate response rate, 80% will have improvement within first 3-5 days
- Infant acetaminophen as needed
- Lip/tongue stretching to help reduce re-scarring
- Bottle supplementation as needed to rest mom and/or baby
- LC visit about 3-7 days out is helpful in consolidating improvements and addressing positioning issues

Post-treatment Care

- Skin to skin to reduce pain and improve coordination
- Laid-back breastfeeding
- Kindness during stretches
- Continue follow up with therapists (especially LC, may also include ST/OT, some find success with CST)
- Expect progress with regressions (“two steps forward, one step back”)

Thank You!