TETHERED ORAL TISSUES: HOW THEY IMPACT DEVELOPMENT

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LEARNING OBJECTIVES

- Attendees will demonstrate the ability to define and classify Tethered Oral Tissues
- Attendees will describe how Tethered Oral Tissues impact feeding development (including breast and bottle feeding, and the transition to solids)
- Attendees will describe how Tethered Oral Tissues impact articulation and language development
- Attendees will identify resources and strategies to support the families of children with Tethered Oral Tissues, both before and after release

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THE Scope of Practice

Service Delivery Areas:
- Feeding and Swallowing
- Oral phase
- Pharyngeal phase
- Esophageal phase
- Atypical eating (food selectivity/refusal/negative physiological response)

Potential etiologies include:
- Oral anomalies

ASHA, 2016 ICF model

DIAGNOSIS AND TERMINOLOGY

Ankyloglossia (tongue tie) is defined as the embryologic remnant of the tissue in the midline of the tongue and floor of the mouth

Current/preferred terminology:
- “Tethered oral tissues”
- “Release” vs. “tongue tie”

Types of ties:
- Tongue
- Lip
- Buccal

DIAGNOSING TOTS

What causes a tie?
- Remains of the frenulum (the tissue that connects the tongue to the floor of the mouth) persists
- Occurs very early in gestation (weeks 4-7) as structures of the mouth form
- Programmed cell death patterns are called apoptosis

Why are we seeing TOTs more often?
- There is a genetic component
- Maternal or paternal pattern
- Higher in males than females (4:1)
- Extensive use of formula and bottle feeding has allowed the genes related to TOT presence to propagate and increase across the population
- Prevalence estimated at 3-4% of population, with ranges from 1-12%

DIAGNOSING TOTS

- Diagnosis is NOT based on location/classification of tie, nor ability to protrude (stick out) the tongue
- Elevation and tension are the key diagnostic indicators

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DIAGNOSING TOTS

https://vimeo.com/86784777
https://www.facebook.com/DrGhaheriMD/videos/290325983414903/

DIAGNOSING TOTS

Tongue Ties:
- Elevation of floor of mouth as tongue is raised
- Limited ROM of tongue
- Must feel base of tongue to diagnose posterior tongue tie (may be submucosal)

Lip Ties:
- Notching of bone at gumline
- Restriction of movement of upper lip
- Blanching of upper lip or gumline upon stretch
- Lip dimpling and poor flange

CLASSIFICATION OF TOTS

Note: type/class does NOT indicate severity or function!!

GHAHERI, 2018

Attached upper lip-tie classifications
- Class I: No significant attachment
- Class II: Attachment mostly into the gingival tissue
- Class III: Attachment in front of the anterior papilla
- Class IV: Attachment into the papilla or extending into hard palate

Coryllos tongue tie classifications
- Type I: Attachment of the frenum to tip of tongue
- Type II: Attachment is 3-5 mm behind tip of tongue or behind ankylosed ridge
- Type III: Attachment midline/midline of the floor of the mouth
- Type IV: Attachment against base of tongue, frenum and reteolar

Anatomic Classification Types and Prevalence Frequency for the Overall Cohort (n = 255)

<table>
<thead>
<tr>
<th>Anatomic Classification</th>
<th>Type</th>
<th>Definitive</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Anterior tongue tie</td>
<td>I</td>
<td>No significant attachment</td>
<td>39/80</td>
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<tr>
<td></td>
<td>II</td>
<td>Attachment mostly into gingival tissue</td>
<td>3/19</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>Attachment in front of anterior papilla</td>
<td>103/154</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>Attachment into papilla or extending into hard palate</td>
<td>10/154</td>
</tr>
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"CLASSIC" ANTERIOR TONGUE TIE

Attachment at or near tip of tongue
Where would this fall under Coryllos criteria?

POSTERIOR TONGUE TIE

Increased tension in fascia, leaving muscle of base of tongue
Where would this fall under Coryllos criteria?

UPPER LIP TIES

Note blanching of gingiva!

Note insertion to gum ridge and impact upon dentition!
25-80% of infants with tongue tie have breastfeeding problems. Recent research indicates that tongue does not compress anterior-posteriorly (as previously thought) to "empty" milk from breast. Instead, middle of tongue moves up and down, occluding against the palate to create a seal (and therefore suction) and drops down to create a vacuum. Milk follows the vacuum. The tip of the tongue does not really move - it acts as an anchor/pivot point for rest of tongue. So peristalsis of mid-tongue is the key - NOT compression with the tip.

SCHLATTER, 2019, GHAHERI, 2018

Why is this important?
- Must consider movement of middle of tongue for nursing, not just movement of tip
- Revising an anterior tie alone may not lead to desired improvement in skills

Infant Observations:
- Calluses/blisters on lips
- Milk residue/staining on tongue
- "Heart-shaped tongue" (but not always)
- Bowl or dimple in middle of tongue
- "Closing" while feeding (loss of latch)
- Purse lips, lack of flange
- Loss of liquid

Maternal Complaints:
- Poor latch
- Baby falling asleep while attempting to nurse or nursing constantly
- Damage to nipple (bleeding, cracks, bruising, blisters, blanching, creases, flattening)
- Baby wide attempting to latch
- Baby has reflux symptoms
- Difficulty to hold a pacifier in mouth
- Poor weight gain
- Colic symptoms
- Plugged ducts/eczema/thrash (possibly recurrent)
- Low milk supply

How do tongue ties impact breastfeeding?

A note on latch and milk supply:
- Poor latch leads to poor milk removal
- If milk is not removed from the breast, the breasts/brain are not cued to make more milk

Some mothers who are deemed to have "low supply" may actually have babies who are not removing milk well.
- Consider pumping during or between nursing sessions to cue breasts/brain to increase milk production
- Consider a prescription to increase for TOTs and determining cause of treatment

Compensations noted:
- Limited up-down movement of middle of tongue → no seal on nipple
- No seal → no/poor latch
- May see cheek dimples appear as child tries to suck, hear clicking noises with every suck as they pop off nipple
- With every suck where child pops off nipple, the following swallow includes AIR
- Consider sequelae of swallowing that much AIR!
How do lip ties impact breastfeeding?

Compensations noted:
- Small mouth opening (sucking with cheeks vs sealing with lips)
- Inadequate flanging of lip (may see upper lip "tucked under")
- Forced shallow latch

O’Callaghan et al (2013)
- 299 babies undergoing lingual frenotomy
- 16% had anterior TT, ALL had posterior TT
- 37% had lip tie

How do lip ties impact breastfeeding?

Tots and aerophagia

- Poor latch, seal, and tongue mobility can result in an increase in swallowing of air,
- which results in abdominal distention and possibly reflux (and colic?)
- Diagnosed by auscultation during feeds
- Differential diagnosis of colic and GER can be difficult; breastfeeding history often overlooked by medical team
- AIR (aerophagia induced reflux) presents with a different cause than GERD

Tots and aerophagia

- Retrospective analysis of 1000 dyads showed following outcomes:
  - 30.6% had improvement of reflux symptoms following tongue and lip tie releases (by the point of resolution or discontinuation of medications)
  - 26.3% had no change
  - 19.9% had some improvement but could not wean off medication
  - AIR vs GER
  - 340 dyads, 194 reporting symptoms related to reflux (worsening, pain, gas, nasal congestion in the morning)
  - Of 194, 60% were being treated with anti-reflux medications with no apparent resolution of symptoms
  - 93% of infants undergoing releases showed improvement in clinical signs of reflux

Tots and breast feeding

- Bottle feeding can sometimes be easier for babies with TOTs
- More cheek and lip movement vs tongue
- Can use more compression patterns to remove milk from bottle
- Back of tongue has to move less; less negative pressure required
- “No ‘work and wait’” for lutitrons; Immediate reinforcement from bottle
**TOTS AND BOTTLE FEEDING**

**RED FLAGS**
- Difficulty finding a bottle system/nipple
- Anterior loss of liquid
- "Nik-tongue" (white residue on tongue, other misdiagnosed as thrush)
- "Clicking" sounds at drink
- Gagging as nipple is presented
- Poor latch to nipple (e.g., upper lip tucked)
- Reflux symptoms
- Limited volume intake
- Extended feeding times (>30 min)
- Coughing; s/s of penetration/aspiration
- Poor weight gain

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**TOTS AND THE TRANSITION TO SOLIDS**

- Prolonged use of suckle/anterior-posterior pattern
- Difficulty transitioning from smooth to textured purées
- Gagging and "choking" with puree presentation
- Gagging and "choking" as food enters
- Accepting a limited variety of textures (e.g., few vegetables or proteins) or foods overall
- "Verbal"-mark; low patern
- Chewing using front teeth only, right lip pursing, use of fingers to move food in mouth
- Pocketing food in cheeks
- Fatiguing easily during meals

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**HOW DO TOTS IMPACT SPEECH: CONSONANT DEVELOPMENT**

**HOW DO TOTS IMPACT SPEECH: VOWEL DEVELOPMENT**

**TOTS AND THEIR IMPACT ON SPEECH**

Symptoms that might indicate a restriction:
- Decreased intelligibility with longer phrases
- Errors in consonant or vowel production
- Some errors in speech sounds that directly involve the use of the tongue
- Apraxia-like speech
- Frustration when communicating

**DOES SPEECH IMPROVE FOLLOWING A RELEASE?**

Messner & Lalakea, 2002
- Improvement was observed for tongue elevation and overall range of motion following a release
- There were improvements in articulation and overall perceived intelligibility per parent report postoperatively in a majority of the children (9/11 scored higher on speech measures)
- Some children prior to the release presented with normal speech development for their age
“Ankyloglossia does not cause a lack of speech but rather, at most, articulation problems with otherwise normal language development.”

Does this hold true for the birth-3 population?

Does speech improve following a release?

Ito et al., 2014

- Assessed the articulation/speech patterns of 3 children diagnosed with ankyloglossia
  - Substitution, Omission, & distortions were noted
  - Many errors noted in /s/, /l/, /d/, and /r/
  - 4/5 children made improvements in their overall articulation post-release
  - Substitutions and Omissions decreased overtime; distortions took longer to resolve
  - Speech therapy often required — especially for older children, based on learned speech patterns by the child

Ito et al., 2014

- 5 case studies presented (ages 17 months–11 years old)
- All children in this study presented with posterior tongue tie
- Improved speech was observed and reported at follow-up 1-3 weeks after the release
- Increased use of speech sounds requiring the tongue (/s/, /l/, /r/, /l/)
- Increased babbling and variety of sounds in younger participants

Baxter & Hughes, 2018

- Decreased speech sound repertoire could impact the ability to decipher whether it is a language delay or decreased range of the oral structures
- Other comorbidities

The evidence is coming!!
THE EVIDENCE IS COMING!!


Consensus on role of TOTs in breastfeeding difficulties is lacking
- >95% of lactation consultants believe it frequently causes breastfeeding problems
- A review of literature for local gum causes and frequency of breastfeeding problems

"We have no prospective longitudinal studies on the fate of the congenitally short lingual frenum"

However, the good-quality RCTs were relatively consistent in showing improvement in breastfeeding effectiveness within 5 days of release
- Some differences noted in reported depression in maternal nipple pain (may be based on age of infant, duration of breastfeeding, hormonal or immune in breast)

FRANCIS ET AL, 2015

Where are the gaps?
1. Studies comparing effectiveness of nonsurgical treatments for TOTs
2. Standardized approach to diagnosis and classification to improve comparability of outcomes
3. " Typical" history across children is unknown; makes it difficult to determine who would benefit from treatment
4. Lack of understanding of the role of age on effectiveness of frenotomy
5. Limited data on durability of outcomes after treatment

THE EVIDENCE IS COMING!!


Additional areas that were mentioned in the current research:
- Feeding
- Speech
- Social concerns

Where are the Gaps?
- Higher quality research is needed to address additional concerns associated with ankyloglossia, especially speech development
- Very few studies available that address other concerns typically associated with ankyloglossia (dentofacial, sleep disorders, etc)
- Lack of evidence to support effectiveness of alternative treatments (lactation consultant or cranial-sacral therapy)

CHINNADURAI, ET AL., 2015

RELATED DEVELOPMENTAL CONCERNS
- Torticollis
- Sleep apnea, mouth breathing
- Changes in facial/palatal structure
- Enlarged tonsils and adenoids
- Related diagnoses/conditions
  - Do of TOTs is often concurrent with other midline defects
    - Clefting
    - Sacral dimple
    - Heart defects
    - Hypospadias
    - Abdominal hernia
    - Umbilical hernia

WHAT DO YOU DO IF YOU SUSPECT TOTS WHEN WORKING WITH A FAMILY?

Ask about or observe:
- Feeding history
- Speech sounds
- Child's overall posture (mouth and body)
- Other medical concerns

Provide education on the impact this could have on development if suspected and provide resources as needed
- Support the parents through the process of referral and release
- Share information about what supports might be needed after release

SURGICAL RELEASE

Use laser or blunt-edged scissors
- General anesthesia not required for babies (use local anesthetics, if anything)
- Key is releasing laterally to open mucosa across base of tongue, not just clipping anterior frenulum

Follow up exercises are crucial
- Gravity wants everything in mouth to collapse to midline
- New frenulum WILL form (this is expected)
- Goal is to maintain decreased tension and increased ROM following release by maintaining separation of edges of surgical sites
Surgical Release - Lightscale CO2 Laser

Before and After Release

Healing Tongue Tie Release

Note diamond-shaped wound!

The Role of the SLP

- SLPs may be the first to see the child, or have these suspicions!
- Referral to appropriate/preferred specialist
- Counseling/education for family
- Treatment may include:
  - Supporting families for post-release care (if recommended)
  - Addressing and/or feeding skills
  - Supporting home feeding skills
  - Choking skills
  - Logrolling Therapy
  - Language Therapy

The Role of the SLP: Breastfeeding

SLPs on the TOTS Team

- 115 infants evaluated by teams (SLP and pediatric ENT); SLP evaluated 3-6 days prior to EMT
  - Standardized examination completed
  - Social history, initial breastfeeding assessment tool; feeding swallow impact study; Hazelbaker
  - Cleft examination of lips and hands; SIB examination
  - Overall medical/birth data, weight gain, etc.
- SLPs recommended and trialed interventions based upon perceived primary cause of feeding difficulty
  - Sleep or hunger state regulation
  - Latch (positioning, trunk support, maternal breast support)
- Of 115 initial referrals, 43 were recommended for release procedure (37.4%)
- Conclusion: through team assessment, factors contributing to feeding difficulties were better determined, resulting in more accurate diagnosis of and referrals for TOTS
RESOURCES FOR PROVIDERS

- Make friends with your local lactation consultants!
- La Leche League
- WIC
  - https://tonguetieprofessionals.org/
  - Facebook: Tongue Tie Support- MD, DE, DC, VA, WV, PA Area

RESOURCES FOR FAMILIES

- https://www.dralighthari.com/
- https://www.kiddsteeth.com/
- Facebook: Tongue Tie Support- MD, DE, DC, VA, WV, PA Area

QUESTIONS?

REFERENCES

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