

## Impact of Tongue and Lip Tie on Breastfeeding

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## Objectives

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After this presentation, learners will be able to:

- Learn lingual and maxillary labial frenula assessment strategies for infants
- Identify the incidence rate, available evidence and current thoughts around ankyloglossia
- Identify the impact of tongue/lip tie on breastfeeding
- Identify some treatment strategies and aftercare ideas



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## Disclosures

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I have no actual or potential conflict of interest in relation to this program/presentation.

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## Burning questions....

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- Why does it matter if the baby can't breastfeed?
- Is tongue tie real?
- Is diagnosis and/or treatment a fad?
- What is the difference between an anterior and posterior tie?
- Is frenotomy evidence based?
- Why does ankyloglossia matter? What are consequences of an untreated tie?
- What is the incidence rate of ankyloglossia and is it increasing?
- How can tongue and lip tie be properly assessed for?
- What pre and post frenotomy care strategies are useful?

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## Importance of Breastfeeding

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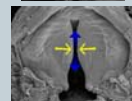
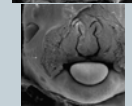
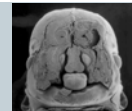
- "Breastfeeding and human milk are the normative standards for infant feeding and nutrition. Given the documented short- and long-term medical and neurodevelopmental advantages of breastfeeding, infant nutrition should be considered a public health issue and not only a lifestyle choice. The American Academy of Pediatrics reaffirms its recommendation of exclusive breastfeeding for about 6 months, followed by continued breastfeeding as complementary foods are introduced, with continuation of breastfeeding for 1 year or longer as mutually desired by mother and infant."
- Eidelman, A. I., Schanler, R. J., Johnston, M., Landers, S., Noble, L., Sures, K., & Viehmann, L. (2012). Breastfeeding and the Use of Human Milk. *Pediatrics*, 129(5), e827-e841. doi: 10.1542/peds.2011-3552
- There are benefits beyond the milk. Infant orofacial development, maternal-infant attachment, benefits to the mother (reduces risks of certain cancers, etc), benefits to society (reduces illness, care costs), etc. Bottle-feeding isn't always successful for tongue tied babies either...
- When an infant can't feed in a biologically normal way, we must explore the root cause of the issue like we would be any other medical condition.

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## Is tongue tie real? Why does it occur?

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- Yep, it's real (just like clefts and other congenital issues)! (ICD-10 = Q38.1)
- Ankyloglossia (tongue tie), and other tethered frenula, occur when improper apoptosis during embryological development occurs.
- The tongue develops approx wk 4, by wk 6 the maxillary labial frenum and primary palate are developing
- Wk 8-9, the tongue helps shape the palate as it is closing. As the development continues, apoptosis causes the lingual frenulum to retract away from the tip of the tongue. A 'tie' occurs when there is a disturbance during this stage of programmed cell death.



"Basic Embryology of Head and Neck". Chicago Medical Center. 2009-08-14. Retrieved from <http://enmedicine.medscape.com/article/1289057-overview#aw2a6682> on 2015-01-14

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Embryo Images — Drs Kathleen K Sahli and Peter R Bream Jr

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## What messes up apoptosis anyway?

- Environmental factors, genetic/epigenetic factors and physical injuries during embryogenesis may interfere with programmed cell death and thus induce malformations (Haanen, & Vermees, 1996)
- Genetic or epigenetic triggers seem to cause mutations in the gene encoding transcription process (TBX22, etc) that factor into improper apoptosis, are closely linked to other orofacial deformities like clefts.
- Methylation is involved in apoptosis and TBX22 function. It is extremely sensitive to environmental stressors (viruses, chemicals, meds, nutrition, stress) and may be a regulating factor in normal facial development  
(Acevedo et al., 2010; Kantaputra et al., 2011; Andreou et al., 2007; Abbot, 1995)

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## Should frenotomy really be controversial?

Would you consider syndactyly normal and tell parent's that separation of the digits won't help function?

Think of ankyloglossia in the same way...improper apoptosis impacts function no matter what part of the body is affected!

Do we want suboptimal compensation or full functionality?

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## Why does ankyloglossia matter? What are consequences of an untreated tie?

- **Why does ankyloglossia matter?**
  - The evidence available has shown a direct correlation to tongue tie and breastfeeding issues, poor infant weight gain, maternal pain, and other health issues through the lifespan, etc (Agency for Healthcare Research and Quality (AHRQ), 2015).
- **What are consequences of an untreated tie?**
  - Cessation of breastfeeding, poor infant growth, dental/orthodontic issues, potential airway and orofacial issues, speech concerns, eating/swallowing issues, social/emotional concerns, etc (AHRQ, 2015; Dalberg et al., 2011; Fernando, 1998; DeLobanits, 2000; Walls et al., 2014; Menakshi & Jagannath, 2014)
- **Won't it stretch?**
  - Nope. The collagen fibers identified in abnormal frenula are different and less elastic than the collagen fibers in unrestricted frenula.





Photo courtesy of Lisa Marazzo

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## Why does ankyloglossia matter? What are consequences of an untreated tie?

- "In infants with anterior or posterior ankyloglossia, there is a reported 25- to 80-percent incidence of breastfeeding difficulties, including failure to thrive, maternal nipple damage, maternal breast pain, poor milk supply, maternal breast engorgement, and refusing the breast. Ineffective latch is hypothesized to underlie these problems..."
- "Mechanistically, infants with restrictive ankyloglossia cannot extend their tongues over the lower gumline to form a proper seal and therefore use their jaws to keep the breast in the mouth for breastfeeding. Adequate tongue mobility is required for breastfeeding, and infants with ankyloglossia often cannot overcome their deficiency with conservative measures such as positioning and latching techniques, thereby requiring surgical correction"...



(Agency for Healthcare Research and Quality (AHRQ), 2015).

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## Johnny can stick his tongue out so he can't be tied...

What are a few things the tongue needs to do in order to successfully breastfeed?

- Elevate – If the tongue can't get maximal elevation and the drop, enough negative pressure won't be formed and milk removal will be suboptimal
- Cup – If a tongue can't cup, a proper seal won't form causing ineffective milk removal, excessive aerophagia, poor bolus control resulting in s/s reflux
- Extend – If the tongue can't maintain extension through the whole feed, maternal pain/nipple damage will occur and milk removal will be compromised
- Peristalsis – Poor peristalsis leads to excessive compression (maternal pain) and poor bolus control, increased air intake, etc
- Lateralize – Poor lateral movements indicate restriction, poor tone, resulting in excessive jaw/gum use, increased maternal pain and infant feeding inefficiency

Compromised lingual movements mean feeds will be less efficient for baby, lead to potential nipple damage/breast infections, poor milk removal compromising infant weight gain and maternal milk supply

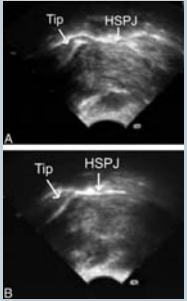
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## Frenulotomy for breastfeeding infants with ankyloglossia: effect on milk removal and sucking mechanism as imaged by ultrasound

(Geddes et al., 2008).

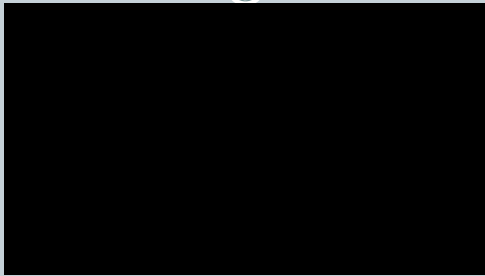
- **RESULTS:** For all of the infants, milk intake, milk-transfer rate, LATCH score, and maternal pain scores improved significantly postfrenulotomy. Two groups of infants were identified on ultrasound. One group compressed the tip of the nipple, and the other compressed the base of the nipple with the tongue. These features either resolved or lessened in all except 1 infant after frenulotomy.
- **CONCLUSIONS:** Infants with ankyloglossia experiencing persistent breastfeeding difficulties showed less compression of the nipple by the tongue postfrenulotomy, which was associated with improved breastfeeding defined as better attachment, increased milk transfer, and less maternal pain. In the assessment of breastfeeding difficulties, ankyloglossia should be considered as a potential cause.
- **Photos:** Panel A shows a tongue-tied baby compressing the nipple tip. Panel B shows less compression following a frenotomy. (HSPJ = hard/soft palate junction) (Geddes, 2008).



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### Ultrasound of how babies extract milk

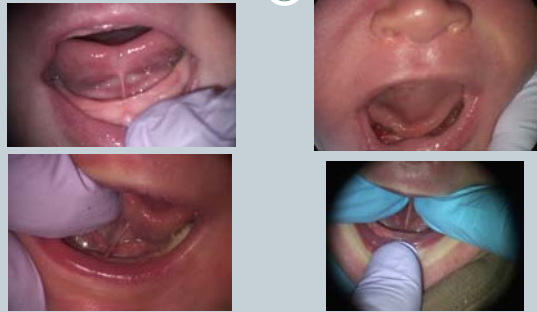
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### Tongue Tie presentations

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(c) Melissa Cole, IBCLC Photos courtesy of Dr. Lawrence Kofow

### Maternal nipple damage and breast concerns

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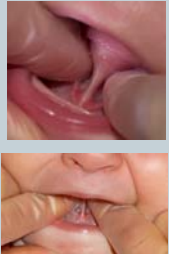


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### Is diagnosis and/or treatment a fad?

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- It is not a fad. Ankyloglossia is a real condition. As breastfeeding rates increase, causes for Bf failure must be explored. Maternal pain has been shown to be a real cause of premature weaning (Staab et al, 2014)
- On the flip side not every Bf issues is due to a tie. Proper assessment techniques and differential diagnosis are key so that over diagnosis and under diagnosis don't occur.
- We are failing many families 75% initiation in PNW, 25-30% duration/exclusivity at 3-6 mos



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### What moms report...

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- “The women in this study described a somewhat harrowing journey, which was at odds with the natural experience they had anticipated. They encountered health professionals who were found to have limited knowledge of tongue-tie and its potential effect on breastfeeding and were unable to provide appropriate advice concerning their breastfeeding difficulties. However, following treatment with frenotomy, their breastfeeding experience improved dramatically. The reported incidence of tongue-tie is significant, and early identification and prompt and effective management would contribute to improved breastfeeding.”
- Edmunds, J. E., Fullbrook, P., & Miles, S. (2013). Understanding the experiences of mothers who are breastfeeding an infant with tongue-tie: a phenomenological study. *Journal of human lactation : official Journal of International Lactation Consultant Association*, 29(2), 190-195. doi: 10.1177/0890334413479174


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### What is the difference between an anterior and posterior tie?

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- “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 ...”
- “Although treatment is similar in anterior and posterior cases, posterior ankyloglossia is more subtle in presentation. Usually, clinicians recognize the anterior frenulum as the cause of ankyloglossia. ...In essence, posterior ankyloglossia is under-recognized compared to the anterior variant...”

(Agency for Healthcare Research and Quality (AHRQ), 2015)



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## Incidence of ankyloglossia

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### Incidence rates as show in the literature

- A comprehensive lit review found a prevalence of ankyloglossia of between 4% and 10% (Segal et al., 2007)
- There is a reported 25- to 80-percent incidence of breastfeeding difficulties in babies with ankyloglossia (AHRQ, 2015)
- Ankyloglossia seems to be slightly more common in males compared to females (Griffiths, 2004)



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### Are incidence rates of tongue tie increasing?

- At present this is unstudied and unknown. Some researchers feel that epigenetic changes are occurring at a higher incidence rate potentially increasing congenital anomalies and midline defects. This is certainly something to invest more time and resources in studying.

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## Is frenotomy evidence based?

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- Yes, frenotomy is evidence based. The current evidence all points to frenotomies being a beneficial and very low-risk procedure.
- Some limitations exist around the quantity and quality of research as well as the logistics of creating an ethical study design regarding this intervention. Also, diagnostic criteria for defining or classifying ankyloglossia is not uniform (AHRQ, 2015; Segal et al., 2007)
- "Studies assessing the effectiveness of frenotomy for improving nipple pain, sucking, latch, and continuation of breastfeeding all suggested frenotomy was beneficial. No serious adverse events were reported" (Segal et al., 2007)



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## What the research shows...

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- Overall, division of the tongue-tie babies resulted in improved feeding in 54/57 (95%) babies...This randomized, controlled trial has clearly shown that tongue-ties can affect feeding and that division is safe, successful and improved feeding for mother and baby significantly better than the intensive skilled support of a lactation consultant.
- Hogan, M., Westcott, C., & Griffiths, M. (2005). Randomized, controlled trial of division of tongue-tie in infants with feeding problems. [Clinical Trial Comparative Study Randomized Controlled Trial]. *Journal of paediatrics and child health*, 41(5-6), 246-250. doi: 10.1111/j.1440-1754.2005.00604.x
- "Maternal self-efficacy, nipple pain, infant reflux symptoms, and the rate of milk transfer all significantly improves with lingual frenotomy with or without maxillary labial .... No complications were reported following any procedure"
- Ghaheri, R. A., Cole, M., Fazel, S. C., Chop, M., & Mace, J. C. (2016). Breastfeeding improvement following tongue-tie and lip-tie release: A prospective cohort study. *The Laryngoscope*. doi: 10.1002/lary.26306

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## What the research shows...

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- "The frenotomy group improved significantly more than the sham group ( $P < .001$ ). Breastfeeding scores significantly improved in the frenotomy group ( $P = .029$ ) without a significant change in the control group.... This should provide convincing evidence for those seeking a frenotomy for infants with significant ankyloglossia."
- Barvik, M., Bloom, D., & Shupe, T. (2011). Efficacy of neonatal release of ankyloglossia: a randomized trial. *Pediatrics*, 128(2), 280-288. doi: 10.1542/peds.2011-0077
- There was a significant decrease in pain score after frenotomy than after sham ( $P = .001$ ). There was also a nearly significant improvement in latch after the frenotomy in these mothers ( $P = .06$ )...Frenotomy appears to alleviate nipple pain immediately after frenotomy. We speculate that ankyloglossia plays a significant role in early breast-feeding difficulties, and that frenotomy is an effective therapy for these difficulties.
- Dollberg, S., Botzer, E., Grunis, E., & Mimouni, F. B. (2006). Immediate nipple pain relief after frenotomy in breast-fed infants with ankyloglossia: a randomized, prospective study. [Randomized Controlled Trial]. *Journal of pediatric surgery*, 41(9), 1598-1600. doi: 10.1016/j.jpedsurg.2006.05.024

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## What the research shows...

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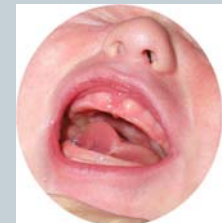
- All frenuloplasties were performed without incident. Latch improved in all cases, and maternal pain levels fell significantly after the procedure....Ankyloglossia is a relatively common finding in the newborn population and represents a significant proportion of breastfeeding problems. Poor infant latch and maternal nipple pain are frequently associated with this finding. Careful assessment of the lingual function, followed by frenuloplasty when indicated, seems to be a successful approach to the facilitation of breastfeeding in the presence of significant ankyloglossia.
- Ballard, J. L., Auer, C. E., & Khoury, J. C. (2002). Ankyloglossia: assessment, incidence, and effect of frenuloplasty on the breastfeeding dyad. [Comparative Study Research Support, Non-U.S. Gov't]. *Pediatrics*, 110(5), e63.
- This review of research literature analyses the evidence regarding tongue-tie to determine if appropriate intervention can reduce its impact on breastfeeding cessation, concluding that, for most infants, frenotomy offers the best chance of improved and continued breastfeeding. Furthermore, studies have demonstrated that the procedure does not lead to complications for the infant or mother.
- Edmunds, J., Miles, S. C., & Fullbrook, P. (2011). Tongue-tie and breastfeeding: a review of the literature. [Review]. *Breastfeeding review - professional publication of the Nursing Mothers' Association of Australia*, 19(1), 19-26.

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## A Frenulum vs. a Tie

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- Everyone has multiple frenula throughout the body
- Frenula are not the problem. The problem is when they restrict normal mobility and functionality.
- Visible assessment of the oral frenula is not enough. Assessing function is the most important piece.



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### Common signs and symptoms of tongue/lip tie

Infant Issues to Consider	Maternal Issues to Consider
<ul style="list-style-type: none"> <li>Latch is poor, hard to maintain, slips off, chews/gums</li> <li>Prolonged feeds, sleepy at breast</li> <li>Short feeds, infant fatigues</li> <li>Nursing marathons "uses me like a pacifier"</li> <li>Infant always hungry</li> <li>Weight gain concerns</li> <li>Poor seal, clicking, gag reflex</li> <li>Colic, reflux, gas, yeast</li> <li>Unable to hold pacifier/bottle feed</li> <li>Not every baby will present with the same issues</li> <li>Latch may look good but (tug, gum, scrape)</li> </ul>	<ul style="list-style-type: none"> <li>Nipple pain, compression</li> <li>Incomplete breast drainage</li> <li>Recurrent yeast, mastitis</li> <li>Nipple blebs, plugged ducts</li> <li>Low milk supply</li> <li>Familial Hx of ankyloglossia</li> <li>Has been working on "the latch" but nothing ever improves much</li> <li>Seems like oversupply but regular management doesn't help</li> <li>Feeling of infant gumming, flicking</li> <li>Not every mom will have the same issues</li> </ul>

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### How can tongue and lip tie be properly assessed for?


- There are several assessment tools. One commonly used, validated tool is the ©Hazelbaker Tool for Lingual Frenulum Function
- Learning to use such tools can help understand the lingual function.
- Other tools are also in the process of being created and validated



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### How might restrictions of the lingual frenulum present?

- Ankyloglossia compromises tongue functionality and may make the tongue:
  - Appeared bunched, retracted, pulled down in center
  - Create posterior tongue humping
  - Create poor-moderate elevation, extension, lateralization, cupping
  - Remain flat or low when infant is crying or gaping widely
  - Not reach the palate, creating a heightened gag reflex and poor tongue cleaning
  - Snap back after extension, peristalsis issues
  - Have a indent/cleft at tip...or not...



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### Assessment video #1




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### Tongue Tie Classification

- There are several classification systems regarding tongue tie. One very common one is the Coryllos, Genna, Salloum typing system:
- Type 1: attachment of frenulum to tongue tip
- Type 2: 2-4 mm behind tongue tip
- Type 3: attachment of frenulum to mid tongue
- Type 4: attachment at the base of the tongue

(AAP newsletter, 2004)


- Remember, a classification system is not an assessment technique – just a charting/communication tool.



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### Maxillary Labial Frenum Presentations

Kotlow diagnostic classifications of maxillary frenum attachments (photos used with permission of Dr. Lawrence Kotlow)



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### Superior Maxillary Labial Frenulum Restrictions

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Photos courtesy of Melissa Cole

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### A variety of tie presentations

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### Some presentations of lingual restriction

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Photo courtesy of Catherine Watson Genoa

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### What do you notice?

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### What do you notice?

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### Treatment of Ankyloglossia

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- **When is the procedure done?**
  - As soon as possible! There is no benefit to delaying treatment and in fact delaying treatment creates further complications.
- **How is the procedure done?**
  - The baby is swaddled/held down briefly, the head immobilized and the frenulum is numbed then incised/excised with a pair of sterile scissors or laser. Baby can nurse/feed immediately before and afterwards.
- **Speakin' the lingo...the procedure is called various things but here's the lo-down:**
  - Frenotomy – Incision of the frenum
  - Frenectomy/frenulectomy – Excision of frenum tissue
  - Frenoplasty/Z-Plasty – A type of surgery for severe tongue tie where more advanced techniques are employed ("Z" angle of the incision helps with functionality/scar healing)
  - GA is really never needed for the procedure (rare exceptions do exist)

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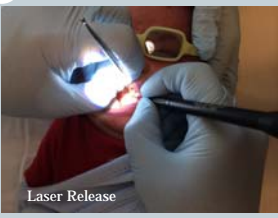
## Slide 33

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**B6** show better pics, show my own pics  
Melissa Cole, 12/20/2014

### Tongue-Tie Treatment

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**Scissors Release**      **Laser Release**

- Skill level of provider more important than which tool is used
- Laser is more vasoconstrictive, 'cleaner looking results'
- Training opportunities


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### Frenotomy Tools for Scissor Release

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Groove director for elevating the tongue and isolating the frenulum      Stevens Tenotomy Scissors

For scissor release, area can be numbed with 1:100000 epinephrine with 1% lidocaine

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### Newborn Scissors Tx Video

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### Older baby – Scissor Tx


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### Laser Frenotomy Tools

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- There are a variety of lasers being used for frenotomy (CO2, Diode, waterlase, etc).
- In our area we most commonly use a diode laser (Xlase 1064nm)
- Frenula are numbed w/ EMLA. Starting at the anterior edge of the frenulum, the laser is used to incise midline to the mucosa overlying the genioglossus muscle. The opening is also extended laterally to provide optimal mobility and release (care is taken to not disturb the underlying fascia of the genioglossus). For the lip – the labial frenulum is released off the alveolar ridge up to the mucogingival junction



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### Newborn - Laser Tx video

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### What pre and post frenotomy care strategies are useful?

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- **Pre-frenotomy game plan:**
  - Ensure the family is working with an IBCLC so that they have a feeding care plan in place, provide anticipatory guidance for the family (what can they expect during and after Tx)
- **Post-frenotomy game plan:**
  - Ensure they are following up with their IBCLC for feeding support and post frenotomy care, provide guidance on pain relief and aftercare strategies
  - Not just 'clip it and forget it' – more care is almost always needed
  - Feed baby, protect supply, keep working toward goals



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### Post frenotomy pain relief: pharmacological and non-pharmacological ideas

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"Inadequate pain management ... in early infancy has negative effects on neurodevelopmental outcomes... Neonatal pain management is still in search for the Holy Grail. At best, effective pain management is based on prevention, assessment, and treatment followed by a reassessment of the pain to determine if additional treatment is still necessary" (Allegaert & van den Anker, 2016)

**Non-pharmacological pain relief ideas:**

- Swaddling, skin to skin, breastfeeding, NNS, environmental interventions (light, noise, temp)

**Pharmacological pain relief options (usually not needed, controversial):**

- Acetaminophen
- Ibuprofen
- Oral sucrose
- NEVER old fashion teething gels/benzocaine




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### Why is adequate pain relief important?

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"The neonate has a functional nociceptive system. However, recent research suggests that infants may be more vulnerable to the negative effects of pain than older children and adults. Apart from short-term effects, untreated pain may also have long-term effects, which may later affect neurological development, including the reaction to pain. Despite convincing evidence from recent research, the neonate is still subjected to painful procedures, even surgery, without adequate treatment" (Larsson, B. A., 2001)

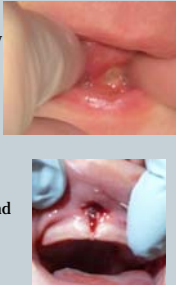


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### Post frenotomy healing

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- Oral wounds heal quickly.
- Many of us that work with babies post frenotomy find that some type of aftercare is needed to prevent re-attachment.
- Wound healing happens in stages:
  - Hemostasis/blood clot formation
  - Inflammation
  - Re-epithelialization
  - Granulation tissue formation
  - Remodeling of the connective tissue
- Oral motor work can be combined with the wound care to optimize healing and functionality. Every feed (4-6x/day min for 4+ wks)
- Goal is one better feed per day



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### Post Frenotomy Visuals

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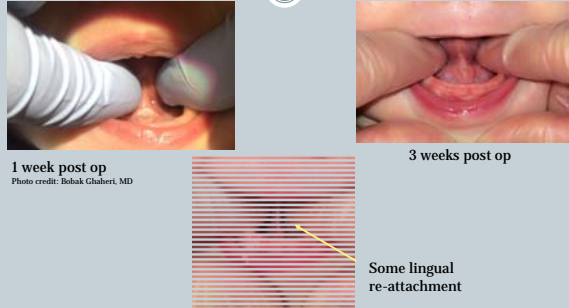
Day 1 post op

Day 3 post op

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### Post Frenotomy Visuals

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1 week post op  
Photo credit: Babak Ghaheri, MD


3 weeks post op

Some lingual re-attachment


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### Incision site appearance


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Labial frenotomy  
(scissors)



Labial frenotomy  
(laser)





Labial frenotomy  
(scissors)

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### Goals for post frenotomy consult

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- **Post frenotomy assessment**
  - Extension, elevation, lateralization, cupping, overall tone – can use same assessment tools you used pre-frenotomy to compare progress, check incisions sites, pain
- **After care stretches/exercises**
  - Positions for holding baby, hands-on work, playful, bodywork, return demo by parents
- **Facilitate physical and emotional healing**
  - Decrease oral aversion/increase oral acceptance, foster parent/infant connection, enhance parental self-efficacy

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### After care stretches and exercises: Hands-on work

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**Sample care routine:**

- ‘Beep bop boop bip’ (chin nose, philtrum, chin tug)
- Jaw massage + chin tug (loosens tight mandible)
- Gum rub for lateralization
- Wipers on the palate (desensitizes heightened gag reflex)
- Tug-o-war (cupping, extension)
- Lift lip/tongue up and massage over incisions site – use gentle but firm pressure – visualize the diamond shape
- Can add in gentle side of tongue pushes or cheek pulses if needed (lingual/buccal strengthening)

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### After care stretches and exercises: Wesley’s Video

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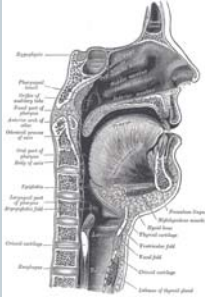
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### Thank you!

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Your attendance today means that you are invested in supporting mothers and babies with the highest level of care!

Assessment and care strategies for oral restrictions are still in their infancy. I look forward to learning alongside all of my colleagues in the field as new evidence and information emerges.



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### Conclusion

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