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Three experienced lactation consultants reflect upon the oral tie phenomenon

SCENARIO

I've dashed into a coffee shop and ordered my take-away flat white. While waiting I observe a group of three mothers sitting outdoors with prams carefully arranged not to obstruct the flow of customers, enjoying a coffee and chat with babes in arms.

One mum is patiently wrestling with her about 1-month old baby trying to latch him to breastfeed, while the others watch sympathetically, offering support and advice. 'He always fusses like this. Sometimes it takes 5 minutes to get him on and by then he's lost the plot. Being somewhere different seems to make him worse'. 'Have you had him checked for tongue-tie?' one mother asks knowingly. I listen in, deliberately eavesdropping now. 'Yes, the Child Health Nurse had a look but said his mouth is quite normal and the fussing is just his impatience to get the food'. She popped a dummy in the baby's mouth and he calmed down temporarily. My coffee is ready and I sit down for a few sips. 'My friend's baby needed a release for a tongue-tie which many health professionals missed but the chiropractor found. Maybe you should take him to a chiropractor?'

The baby squawks spitting out the dummy, and the mother firmly lays his flailing arms across his chest trying valiantly to latch him again. At this point I cannot resist getting involved too, my heart is pounding as I introduce myself as an international board certified lactation consultant (IBCLC) 'Gosh you're having a battle there … can I offer a suggestion?' All three pairs of eyes look astonished at my bold intervention, but she gladly agrees 'Yes, whatever can help'. I verbally guide her to position her baby differently — his hip towards her hip, arms either side of her breast, his chest snuggling in contact with her own and holding him only over his shoulders allowing his head to fall back. She resists allowing his head to be free but complies as his chin rests at the base of her areola.

Baby gapes widely and spontaneously latches as my hand supports her hand on his shoulders to maintain a secure hold. The expression on her face tells me she is greatly relieved. 'It doesn't hurt,' she says with a look of disbelief as she stares at me, smiling. 'Great, remember what you and your baby have just done. Keep going. You are doing a fantastic job!'

Keywords: *breastfeeding*, *tongue-tie*, *frenotomy*, *frenectomy*, *reflux*, *oral tie*

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What does this short encounter tell us? Women today are keen to breastfeed their babies and mother-to-mother support is fundamental to perseverance and success (Patnode, 2016). Breastfeeding mothers are sharing the information about oral ties (tongue-tie and upper-lip tie) which has flooded social media and captured the attention of health practitioners and parents throughout the English-speaking world. This awareness has led to an increase in diagnosis and treatment of oral ties, particularly among babies who are experiencing breastfeeding difficulties.

What is a tongue-tie?

Definitions of tongue-tie vary, but it is generally agreed that a tongue-tie exists when the frenulum (membrane of connective tissue) underneath the tongue (known as

the lingual frenulum) restricts tongue movement in a way that negatively affects function. There are varying degrees of tongue movement restriction.

It is important to determine whether the degree of tongue movement restriction is, or isn't, affecting function (eg breastfeeding). When a baby's frenulum is restricting tongue movement and causing a functional problem with breastfeeding, a release (see frenotomy and frenectomy below) is warranted. Hence, a frenulum shouldn't be defined as a tongue-tie unless the frenulum is restricting tongue movement AND this restriction is contributing to a functional problem (eg interfering with feeding) (Haham, Marom, Mangel, Botzer & Dollberg, 2014). This is the definition of tongue-tie in babies used throughout this commentary.

What is frenotomy? And what is a frenectomy?

In the absence of clear definitions (Francis, Krishnaswami & McPheeters, 2015; Power & Murphy, 2015), we propose for this article that a *frenotomy* is division of a frenulum and a *frenectomy* is removal of the frenulum. Frenotomy is most commonly performed by a doctor or appropriately-credentialed clinician using scissors to carefully snip the frenulum separating it from the underside of the tongue, often accompanied by pressure from the operator's finger to further release the connective tissue. This takes a few seconds to complete and no anaesthetic is used when performed on young babies.

Frenectomy — a cut through the entire frenulum — requires attention to the control of bleeding and perhaps topical anaesthesia. It may be performed by ear, nose and throat (ENT) surgeons and by dentists, who often use laser equipment to control the bleeding at the same time as they resect the frenulum. Laser frenectomy may take at least a few minutes to perform. A general anaesthetic may be required in older infants.

How prevalent are tongue-ties?

Because studies assessing the prevalence of tongue-tie use different criteria, there is wide variability in reported prevalence. Jorgenson, Shapiro, Salinas and Levin (1992) reported a prevalence of 1.7% and diagnosed tongue-tie when 'the lingual frenum prevented protrusion of the tongue, the lingual frenum extended to the surface of the tongue, or the frenum caused a fissure in the tongue tip during normal movement' (p. 577). Flinck, Paludan, Matsson, Holm and Axelsson (1994) reported a tongue-tie prevalence of 2.5% and diagnosed tongue-tie when the lingual frenulum was attached close to the border of the papillated part of the tongue, preventing its protrusion. Ricke, Baker, Madlon-Kay and DeFor (2005) reported a 4.24% prevalence when tongue-tie was identified by nursing staff who referred babies suspected of having tongue-tie to the study investigators for confirmation. Hogan, Westcott and Griffiths (2005) reported a 10.7% prevalence in a regional survey of newborns, with tongue-ties identified visually by midwives, neonatal nurse practitioners and junior doctors after being given an explanation and comparison photographs of tongue-tie. This study, which occurred prior to the American Academy of Pediatrics newsletter which first proposed the diagnosis of posterior tongue-tie or submucosal tongue-tie, reported that only 43.8% of these mother/baby dyads had a feeding problem associated with the tongue-tie. A later study notes a rise in the incidence of posterior tongue-tie (Todd & Hogan, 2015), but reports a similar rate of tongue-tie division in an Australian hospital in 2008 and 2011 (4.7% and 5%, respectively). There are anecdotal indications, however, that in the past five years the incidence of frenotomy and frenectomy has risen exponentially in Australia, mirroring trends documented in other parts of the English speaking world (Joseph et al., 2016).

Who assesses a baby's tongue-tie and determines whether it needs to be released?

Midwives caring for women and newborn babies in postnatal settings are best equipped to support breastfeeding initiation and mother-baby skill development in the early weeks of life. Midwives who see babies in the early days with a suspected tongue-tie usually refer such babies to the hospital IBCLC or paediatrician for review. After discharge from the service, it may be the child and family health nurse or GP who refers the baby to a private IBCLC for assessment. The baby may or may not be experiencing difficulty establishing breastfeeding.

The causes of breastfeeding difficulties are multi-factorial. The first step should always be to observe a breastfeed and work with the mother to improve her breastfeeding technique. This may be all that is needed, as in the scenario described at the beginning. Adjustment of the mother's positioning and attachment technique can enable the baby to respond to his or her instinctive reflexes and achieve a comfortable and effective latch (Thompson et al., 2016).

A prominent lingual frenulum may or may not be a problem for a breastfed baby (Hogan, 2005). It is the role of the IBCLC to consider all the potential contributing factors when breastfeeding problems occur and to provide a comprehensive assessment of the mother-baby dyad. This enables the IBCLC to recommend an appropriate management plan, which in some cases may include referral for interventions such as frenotomy.

Factors that impact on a baby's tongue function are complex. A stressful birth, technological interventions and disrupted early feeding experiences may culminate in spirals of frustration, distress and physical tension for both mother and baby, including physical tension in a baby's oral musculature and connective tissues (Genna, 2015). Most importantly of all, a baby's tongue

function is affected by the way the baby — with his or her uniquely-shaped little mouth, chin and body — fits into the mother's uniquely shaped abdomen, arms, thighs and breasts, since human bodies, breasts and oral structures are highly anatomically diverse (Douglas, 2016).

With the right support from caring helpers, often the mother's skills develop and confidence grows as she achieves comfortable breastfeeds with minimal intervention. However, if the baby's ability to latch and suck is limited by restricted tongue function, which often contributes to nipple pain and injury, a frenotomy is likely to greatly assist the mother and baby to achieve comfortable and effective breastfeeding.

Sometimes a multidisciplinary approach helps a breastfeeding dyad. When complex oral anomalies are identified, a speech pathologist may work collaboratively with the IBCLC to assess the baby's suck as well as swallowing and breathing abilities. If musculoskeletal problems (eg functional torticollis) are evident, gentle manual therapy performed by a skilled paediatric physiotherapist or paediatric osteopath may help release physical tensions which contribute to a baby's discomfort during breastfeeding (Genna, 2015). However, while such health professionals have a role in collaboratively assessing problems, they are not experts in the field of lactation. IBCLCs are uniquely skilled to consider all aspects of the breastfeeding experience and determine if breastfeeding is being affected by a tongue-tie or whether other mother-baby breastfeeding interventions may rectify the breastfeeding challenges. As with all health professionals, experience and clinical skills vary among IBCLCs so the effectiveness of supportive guidance may vary between clinicians. Unfortunately, the clinical skills of IBCLCs are not as yet formally assessed during qualification and opportunities to develop breastfeeding support skills in acute settings across the spectrum of breastfeeding babies' ages (pre-term to toddlers) are limited.

Indeed, many of the signs and symptoms some attribute to tongue-tie (eg colic, reflux, clicking, gassiness or tummy pain, painful nipples, low weight gains in baby, fussiness, arching away from the breast) can also be signs and symptoms of suboptimal breastfeeding technique or management, or other baby-related issues, which may be alleviated by expert breastfeeding guidance and support (Douglas & Hill, 2011; Douglas, 2013a, 2013b; Thompson et al., 2016).

What does the research tell us?

There are currently two well conducted systematic reviews which analyse and synthesise existing studies to offer high-level evidence about the effects of surgical intervention for a diagnosis of tongue-tie. A 2014 systematic review by Power and Murphy concluded that half of breastfeeding babies with tongue-tie will not have problems. If there were difficulties, mothers reported improvements after frenotomies or frenectomies. But the authors note that it is difficult to determine how much of this effect is placebo. A 2015 systematic review by Francis, Krishnaswami and McPheeters concluded that a small body of low to insufficient quality evidence indicates that frenotomy is associated with mother-reported improvements in breastfeeding and nipple pain, noting that the studies are short-term and of inconsistent methodology.

A new prospective cohort study of 237 breastfeeding babies who received frenectomy after referral by lactation consultants has been published subsequent to the 2015 systematic review (Ghaheri, Cole, Fausel, Chuop & Mace, 2016). The authors claim that observed improvements in validated scales of breastfeeding self-efficacy, nipple pain and behaviours attributed to reflux demonstrate improved breastfeeding outcomes secondary to tongue-tie and upper lip-tie release (75%), tongue-tie release (25%) or upper lip-tie release (0.4%). However this study is seriously methodologically flawed, with demonstrated bias. It lacks a control arm and improvements can be attributed to the well-known power of the placebo effect (Brody & Miller, 2011; Meissner, Bingel & Colloca, 2011), to the passage of time and the effects of the co-occurring, though poorly defined, lactation consultant support. The method used to evaluate milk transfer rate in this study has not been validated and does not account for the fact that sucking patterns change throughout a breastfeed and from breastfeed to breastfeed. The fact that 75% of infants in this study had upper lip-ties and tongue-ties released together means it is impossible to tell if the results could be attributed to the release of the tongue-tie, lip-tie or both. Also, it is concerning that details regarding the percentage of study participants who did not complete breastfeeding outcome survey evaluations within the 1-month study follow up were not included in the study. 'study participants were considered lost to follow-up if breastfeeding outcome survey evaluations were not completed within the 1 month study follow-up period; they were not included in the analysis' 'study participants were considered lost to follow-up if breastfeeding outcome survey evaluations were not completed within the 1-month study follow-up period; they were not included in the analysis'

Studies conducted to determine when it is appropriate to perform frenotomy lack clear and consistent definitions of tongue-tie (Francis et al., 2015; Power & Murphy, 2015). Breastfeeding difficulties attributed to tongue-tie are wide-ranging (Ghaheri et al., 2016). The nature of the surgery is inconsistently reported (Francis et al., 2015; Power & Murphy, 2015). It is not possible to measure meaningfully the effects of the surgery because breastfeeding interventions are commonly applied at around the same time, although the nature of this breastfeeding support is not defined. There are few comparisons with the effects of the passage of time (Francis et al., 2015; Power & Murphy, 2015).

Some studies analysed in these systematic reviews rely on a commonly used diagnostic tool, the Hazelbaker Assessment Tool for Lingual Frenulum Function (HATLFF).

The HATLFF pioneers a systematic approach to the clinical examination of oromotor and tongue anatomy and function, a historical step forward in the development of the relatively new field of clinical breastfeeding support. Amir, James and Donath (2006) found the Appearance items of the HATLFF received kappa values (a measurement of reliability) between 0.4 to 0.6 ('moderate' reliability) and the first 3 Function items (lateralization, lift and extension of tongue) had kappa values over 0.65 ('substantial' agreement). The 4 Function items relating to infant sucking (spread, cupping, peristalsis and snapback) all received low kappa values.

However, because the HATLFF is still based on underlying subjective clinical assessments Webb, Hao and Hong (2013) and Madlon-Kay, Ricke, Baker and DeFor (2008) concluded that the HATLFF is not reliable. When it comes to determining if a baby requires a frenotomy, clinical judgement is also required. Other than in the case of a very obviously restrictive membrane under the tongue, when early frenotomy is a sensible precaution, a full assessment of the mother and baby should be conducted by an experienced IBCLC. This involves the taking of a thorough maternal and baby history, examination of mother and baby, including an oral examination and observation of a breastfeed, all prior to referring for a tongue-tie release.

How effective is frenotomy compared to frenectomy?

As discussed, there is weak high level evidence indicating an immediate mother-reported improvement in breastfeeding after simple frenotomy for tongue-tie (Francis et al., 2015; Power & Murphy, 2015). Interestingly, while the randomised controlled trial by Berry, Griffiths and Westacott (2012) found that 78% (21 of 27) of mothers reported an immediate improvement in feeding following frenotomy, 47% (14 of 30) of mothers also reported improved feeding when no frenotomy was performed, suggesting a placebo effect.

Some practitioners assert a frenectomy (ie a 'full release of the posterior component of anterior tongue-tie' or severance of the frenulum) is required to achieve optimal breastfeeding results (Todd & Hogan, 2015; Ghaheri et al., 2016). However, there is no research to support this assertion. It is not currently known what degree of release of a tongue-tie is required to optimise function in individual babies.

Frenectomy is a significant procedure regardless of who performs it. If a wound is left to heal by secondary intention (ie not sutured), the wound can take approximately 2 weeks to heal. Dentists or surgeons who perform frenectomies using lasers commonly instruct parents to perform post-procedure wound-stretching exercises multiple times daily for several weeks to help avoid wound reattachment during healing (Ghaheri et al., 2016), an uncomfortable or even distressing activity for both the baby and the parents, according to parental reports in our clinics. There is currently no evidence to demonstrate the efficacy of such stretches. Parents tell us that some providers of laser frenectomies sometimes attribute some of the post procedure success to the parent's diligence in performing the wound stretches regularly and correctly after the procedure.

In our experience, a course of manual therapy (or 'bodywork') may also be recommended by some providers post laser frenectomy. Parents may also be advised it may take many weeks before breastfeeding problems resolve. This could lead to the belief it was the frenectomy that helped resolve the baby's feeding problems when it may be that the problems would have resolved over time without the frenectomy procedure. If breastfeeding problems are not resolving within a certain time frame, parents may be advised that a revision of the incision is required. Revisions are more commonly performed for posterior tongue-ties than for anterior tongue-ties (Brookes & Bowley, 2014; Hong, 2010), also suggesting that release of posterior (as compared to anterior) tongue-ties may be less likely to address the underlying cause of the breastfeeding problems.

Providers of laser frenectomy may also recommend release of the baby's upper lip (labial or maxillary) frenulum, diagnosing upper lip-tie, asserting this will further enhance a baby's latch for breastfeeding (Kotlow, 2011; Kotlow, 2013). We argue that the baby's upper lip does not have to flange outwards like the lower lip for effective breastfeeding, but merely needs to rest in a neutral position on the breast. There is no reliable assessment tool for upper lip-tie and a lack of evidence to support the efficacy of a frenotomy of labial frenula in breastfed babies. Kotlow's definitions confuse normal anatomic variants of the labial frenulum with ties (Flinck et al., 1994), based on co-existence with breastfeeding problems, which in our experience resolve with other interventions.

Further, in our experiences working as IBCLCs, we have been informed by clients that some providers of laser frenectomy are identifying buccal (cheek) ties (restrictive bands in the buccal mucosa) and performing release of these to resolve breastfeeding issues. There is no evidence to inform how buccal ties may impact breastfeeding.

Is reflux caused by oral ties and swallowed air?

Kotlow (2011, 2016) and Siegel (2016) theorise that infants with a tongue-tie and/or upper lip-tie swallow more air when breastfeeding, causing post-feeding

gastric distension, colic and reflux. Siegel cites a single study on 15 children identified with Rome II Committee Aerophagia between 1975–2003 (Chitkara, Bredenoord, Wang, Rucker & Talley, 2005), aged between 1 and 17 years, with a mean duration of symptoms of 15 months, to support their theorising, though it is not relevant to breastfeeding. Kotlow uses an image to illustrate 'aerophagia' which in our view (assuming medical conditions have been ruled out) illustrates functional lactose overload, that is, gas in the colon in a breastfed baby (Smillie, 2005; Douglas, 2013a), not air in the stomach (Kotlow, 2011, p. 27; Kotlow, 2016, p. 13).

Siegel investigates Aerophagia Induced Reflux (AIR) in a retrospective analysis of 1000 breastfeeding mother-baby pairs before and after oral laser surgery (2016), and Kotlow (2016) in prospective analysis of 237 mother-baby pairs before and after oral laser surgery. But the methodologies of chart analysis and uncontrolled pre-post parent-reports by survey are notoriously unreliable, prone to placebo effect and interpretation bias.

The AIR hypothesis has led to reflux being used as another reason to diagnose oral anatomic abnormality in infants in the presence of breastfeeding problems. Kotlow (2016) and Siegel (2016) do not integrate the extensive body of literature from the past three decades, which has carefully elucidated the physiological mechanisms of infant reflux. There is no evidence to suggest that babies who have difficulty latching at the breast swallow more air than others and there is no evidence to suggest that air in the stomach is a cause of increased frequency or noxiousness of refluxate or of oesophageal pain (Vandenplas et al., 2009).

Their theorising also ignores the neurobiological model of infant crying and reflux. Hyperarousal of the infant's sympathetic nervous system, which occurs with breastfeeding difficulties, increases the frequency of reflux through known effects on gastric contraction and oesophageal motility (Douglas & Hill, 2013).

A diagnosis of AIR may worsen parental anxiety. In Scherer's 2013 study, 175 parents were asked to determine whether or not they would want treatment for a one month old infant's unsettled behaviour and reflux. They were significantly more likely to press for treatment of their baby when these signs were given a medical label.

What about long-term outcomes?

Long-term breastfeeding improvements post-frenotomy or frenectomy (that is, beyond 5 days) have not been adequately determined by the research. Steehler and coworkers' (2012) retrospective review is the only study to compare long-term outcomes between babies who did and did not have a frenotomy. They found that 83% of the frenotomy group continued to breastfeed for an average of 7.09 months, compared to 67% of the babies who received no intervention and continued to breastfeed for 6.28 months. Lack of data on long term breastfeeding improvements is concerning since a main goal of frenotomy (when done for the purpose of helping breastfeeding problems) is to increase breastfeeding duration.

Limited evidence exists that tongue-tie contributes to other long term problems, for example, of speech. Chinnadurai and coworkers' 2015 systematic review about the treatment of tongue-tie for non-breastfeeding problems concluded:

> *Although individuals and clinicians report anecdotally that challenges and concerns persist into childhood related to feeding, speech, and social outcomes among children with ankyloglossia, evidence is sparse on management of the condition. Very little is known about whether ankyloglossia treatment, particularly frenotomy, is associated with positive changes in these non-breastfeeding outcomes.* (p. e1473)

It cannot be accurately predicted if a baby's tongue movement restriction is likely to contribute to future functional problems. The practice of advocating frenotomies to avoid potential future problems is not substantiated by current research. However, it is our opinion that when there is a very obvious and restrictive membrane under the tongue, frenotomy should be offered.

Which way forward regarding oral ties and breastfeeding?

There is lack of agreement among health practitioners regarding the overall prevalence of oral ties which affect breastfeeding. Many health professionals caring for mothers and babies are concerned about the increasing number of babies being diagnosed with oral ties by a variety of practitioners and the subsequent rising number of referrals for laser frenectomy. This trend has been confirmed in a recent Canadian population-based cohort study whose interpretation regarding the increasing identification of tongue-ties and subsequent frenotomy procedures 'may indicate a diagnostic suspicion bias and increasing use of a potentially unnecessary surgical procedure among infants' (Joseph et al., 2016, p. E33). While frenectomies can be performed by various specialists including ENT and paediatric surgeons, anecdotally, laser frenectomy is now most commonly performed on babies by dentists.

Concerned health professionals believe many breastfeeding problems could be better addressed by skilled adjustments of breastfeeding technique along with greater understanding of the wide range of normal behaviours and diverse oral connective tissue anatomies typically exhibited by babies, thus avoiding significant and expensive procedures. The focus on oral ties as the cause of breastfeeding problems is creating confusion

among parents, some of whom seek a second opinion from an IBCLC. They are often relieved to find frenectomy is unnecessary when their issues are examined, explained and resolved with appropriate breastfeeding advice and support.

In our day to day practices, we work with mothers and babies whose laser frenectomies haven't provided the desired results (Reid & Rajput, 2014). Some babies can exhibit breast refusal or oral aversion behaviours and a long journey must be travelled to reinstate trust in these damaged breastfeeding relationships. When a laser frenectomy procedure is unsuccessful, mothers may lament the considerable money they have spent (often up to $1000) and feel reluctant to return to the dentist because they feel they must have failed their baby in their after-care.

Studies of the long-term outcomes of babies who have had laser frenectomies do not exist as the procedure is less than a decade old. Without this data, we cannot be certain complications or unexpected adverse effects will not arise. This is especially pertinent when frenectomies are being performed on babies in the absence of breastfeeding problems, but in anticipation of future problems.

The rising popularity of frenotomies and frenectomies to 'fix' breastfeeding problems is a recent phenomenon which lacks a credible scientific basis. Unfortunately, inserting a simplistic intervention into an evolving and complex system such as the breastfeeding mother-baby pair is known to risk unintended consequences (Douglas, 2016).

So where does this leave parents hoping to make sense of their baby's breastfeeding struggles? Health professionals are trusted to provide unbiased, evidence-based information so parents can make well-informed decisions about how best to protect their baby's health and wellbeing. The IBCLC has a pivotal role in ensuring that wise, evidence-based support is provided to every mother (detailed in the Code of Professional Conduct for IBCLCs), enabling the woman to achieve her personal breastfeeding goals with her baby.

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