All Tied Up!

Tongue Ties & Lip Ties

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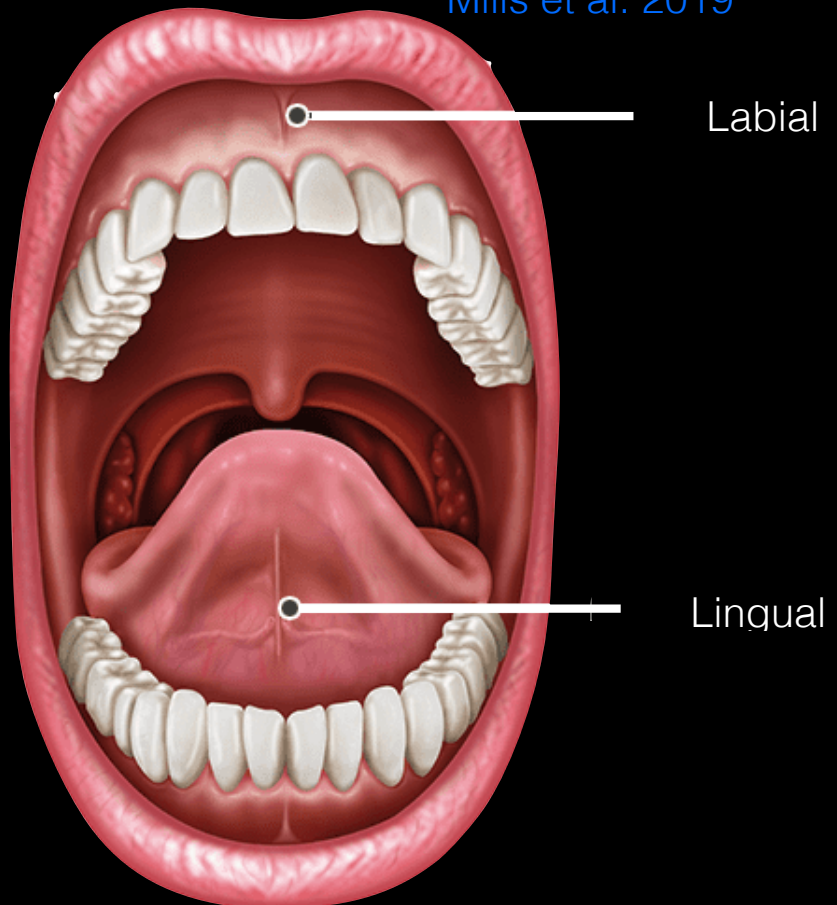
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Introduction

- Lingual Frenum
  - *a dynamic structure formed by a central fold of fascia that spans the floor of mouth and together with the overlying oral mucosa it forms the "roof" of the sublingual space...the fascia connects around the anterior and lateral ventral surfaces of the tongue, to stabilize tongue position while allowing freedom of movement*

Mills et al. 2019



Introduction

- ankyloglossia
  - restricted movement of the tongue causing functional limitations, accompanied by a visually restricted lingual frenum

- prevalence
  - 2 - 10%
  - male predominance (2.6 : 1)

    Webb 2013

• Can't just look at diagnosis!

Ankyloglossia

- classification

  Kotlow 1999



Fig.6: Normal (16mm)



Fig. 7: Class I (Mild 12-16mm)



Fig. 8: Class II (Moderate 8-12mm)



Fig. 9: Class III (Severe 4-8mm)



Fig. 10: Class IV (Complete 0-4mm)

"Your child has a tongue tie…!"

Infant Related	Maternal Related	Future Complications
Insufficient Extraction of Milk	Nipple Pain	Impaired Speech
• Poor Weight Gain	Nipple Trauma: Bleeding, Cracking, Ulceration	Malocclusion
• Failure to Thrive	Mastitis	Lower Incisor Spacing
Inefficient Extraction of Milk	Psychosocial Distress	Gingival Recession
• Poor Latch	Early Weaning	Difficulty Maintaining Good Oral Hygiene
• Poor Seal	Poor bonding between baby and mother	Increased Risk of Dental Caries
• Aerophagia		Difficulty Licking
• Reflux		Difficulty Playing Wind Instruments
• Irritability		Lower Self Esteem
Extended feeding time		

Patel et al. 2018

Feeding

- congenital abnormalities: metabolic disorders, neurological disorders, syndromes, premature birth and conditions such as cleft lip and palate

- oral dysfunctions: weak rooting and sucking reflexes, inverted lip position, biting patterns, excessive oral tension and altered tongue position

- miscellaneous: natal or neonatal teeth, use of orogastric or nasogastric tubes

Feeding

- 25% of Australian mothers stopped breastfeeding by 6-months or earlier citing that their baby was not attaching properly while 18% reported that breastfeeding was too painful

AIHW 2011

- prevalence of persistent nipple pain for mothers whose infant has ankyloglossia is between 36%-80%

Segal 2007

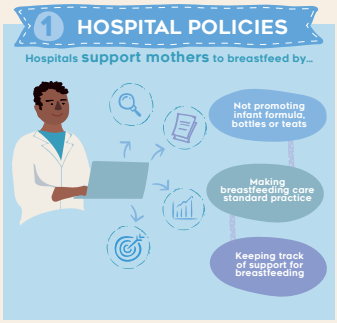
- normal infants, pain is transient, peaks on the third day, and resolves spontaneously within 2 weeks with only 3% of mothers of normal infants have intractable pain or difficulty getting their babies to latch at 6 weeks

Duffy et al 1997

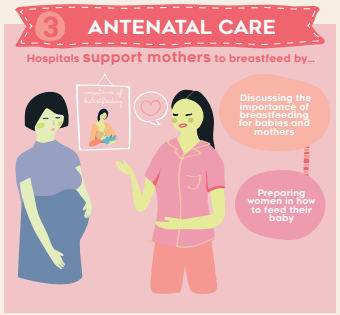
Feeding

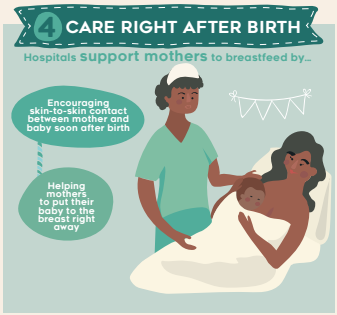
- level of discomfort and pain can become unbearable thus leading to early cessation of breastfeeding
- this can lead to maternal feelings of failure and negatively impact the psychosocial well-being of the mother

The TEN STEPS to Successful Breastfeeding

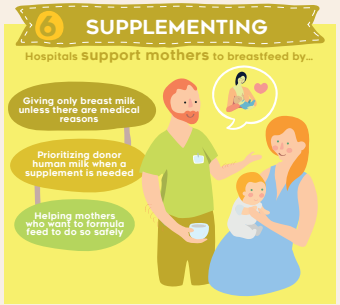


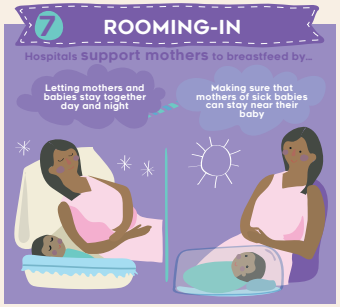






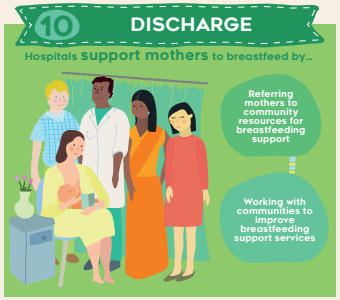












World Health Organization

unicef

Feeding

- level of discomfort and pain can become unbearable thus leading to early cessation of breastfeeding
- this can lead to maternal feelings of failure and negatively impact the psychosocial well-being of the mother
- 80% of tongue-tied infants were breast-feeding normally within one week
- Tongue-tied babies were 3 times as likely as control babies to be bottle fed only at 1 week
- By 1 month, tongue-tied babies were as likely as controls to be bottle fed only

Ricke et al. 2005

Feeding

- most studies evaluating the outcomes of surgical management of ankyloglossia have used objective assessment tools to gauge the degree of ankyloglossia and to evaluate breastfeeding difficulties
- severity of these complications is determined by the degree of ankyloglossia

Assessment tools

- Hazelbaker Assessment Tool for Lingual Frenulum Function (HATLFF)
  - used to quantify the risk of ankyloglossia negatively impacting on breastfeeding

Appearance Items	Function Items
Appearance of tongue when lifted 2: Round or square 1: Slight cleft in tip apparent 0: Heart- or V-shaped ***Elasticity of frenulum*** 2: Very elastic 1: Moderately elastic 0: Little or no elasticity ***Length of lingual frenulum when tongue lifted*** 2: > 1 cm 1: 1 cm 0: <1 cm ***Attachment of lingual frenulum to tongue*** 2: Posterior to tip 1: At tip 0: Notched tip ***Attachment of lingual frenulum to inferior alveolar ridge*** 2: Attached to floor of mouth or well below ridge 1: Attached just below ridge 0: Attached at ridge -Significant ankyloglossia is diagnosed when the appearance score total is 8 or less and/or function score total was 11 or less. -Severe maternal nipple pain during breastfeeding, without alternate explanation as assessed by a Lactation Consultant, is also grounds to consider frenotomy if a tight anterior frenulum is noted. **Ankyloglossia Grading:** Class I: mild ankyloglossia, 12-16 mm Class II: moderate ankyloglossia, 8-11mm Class III: severe ankyloglossia, 3-7 mm Class IV: complete ankyloglossia, less than 3 mm	***Lateralization*** 2: Complete 1: Body of tongue but not tongue tip 0: None ***Lift of tongue*** 2: Tip to mid-mouth 1: Only edges to mid-mouth 0: Tip stays at lower alveolar ridge or rises to mid-mouth only with jaw closure ***Extension of tongue*** 2: Tip over lower lip 1: Tip over lower gum only 0: Neither of the above, or anterior or mid-tongue humps ***Spread of anterior tongue*** 2: Complete 1: Moderate or partial 0: Little or none ***Cupping*** 2: Entire edge, firm cup 1: Side edges only, moderate cup 0: Poor or no cup ***Peristalsis*** 2: Complete, anterior to posterior 1: Partial, originating posterior to tip 0: None or reverse motion ***Snapback*** 2: None 1: Periodic 0: Frequent or with each suck **SCORE:** Appearance:_____(<8 = ankyloglossia) Function:_____(<11 = ankyloglossia)

Assessment tools

- Tongue-tie and Breastfed Babies (TABBY) assessment tool

TABBY Tongue Assessment Tool

	0	1	2	SCORE
What does the tongue-tip look like?				
Where it is fixed to the gum?				
How high can it lift (wide open mouth)?				
How far can it stick out?				

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Tongue tie
And
Breast fed
Baby
tool

Assessment tools

- Impact on feeding:
  - Assessment of lingual frenal function
  - Assessment of breast feeding

Assessment tools

- Assessment of breast feeding

	0	1	2	Score
L Latch	Too sleepy No sustained latch or suck	Repeated attempts for latch or suck Hold nipple in mouth	Grasps breast Tongue down Lips flanged Rhythmical sucking	
A Audible swallowing	None	A few with stimulation	Spontaneous and intermittent (<24 hrs)	
T Type of nipple	Inverted	Flat	Everted (after stimulation)	
C Comfort	Engorged Cracked, bleeding, large blisters, or bruises	Filling Reddened, small blisters or bruises	Soft Non-tender	
H Hold	Full assist (staff holds infant at breast)	Minimal assist (staff holds, then mother takes over)	No assist from staff Mother able to position and hold infant	
				TOTAL:

Jenson, Wallace & Kelsay (1994). LATCH: A breastfeeding charting system and documentation tool. JOGNN, 23(1):29.

Assessment tools

- Assessment of breast feeding

Infant Breastfeeding Assessment Tool (IBFAT)

Check the score which best describes the baby's feeding behaviours at this feed.

	3	2	1	0
In order to get baby to feed:	Placed the baby on the breast as no effort was needed.	Used mild stimulation such as unbundling, patting or burping.	Unbundled baby, sat baby back and forward, rubbed baby's body or limbs vigorously at beginning and during feeding.	Could not be aroused.
Rooting	Rooted effectively at once.	Needed coaxing, prompting or encouragement.	Rooted poorly even with coaxing.	Did not root.
How long from placing baby on breast to latch & suck?	0 – 3 minutes.	3 – 10 minutes.	Over 10 minutes.	Did not feed.
Sucking pattern	Sucked well throughout on one or both breasts.	Sucked on & off but needed encouragement.	Sucked poorly, weak sucking; sucking efforts for short periods.	Did not suck.

Diagnosis

- Paediatrician
- Child health nurse
- Lactation consultant
  └) mandatory if child is having issues
- Dentist
- ENT Surgeon
- GP
- Parent/family member

Diagnosis

- 90% of pediatricians and 70% of otolaryngologists opined that ankyloglossia never or rarely causes breastfeeding problems

Messner and Lalakea 2000

- not all infants with ankyloglossia will have breastfeeding problems and many will adapt or respond to conservative therapy

Webb et al. 2013

Diagnosis

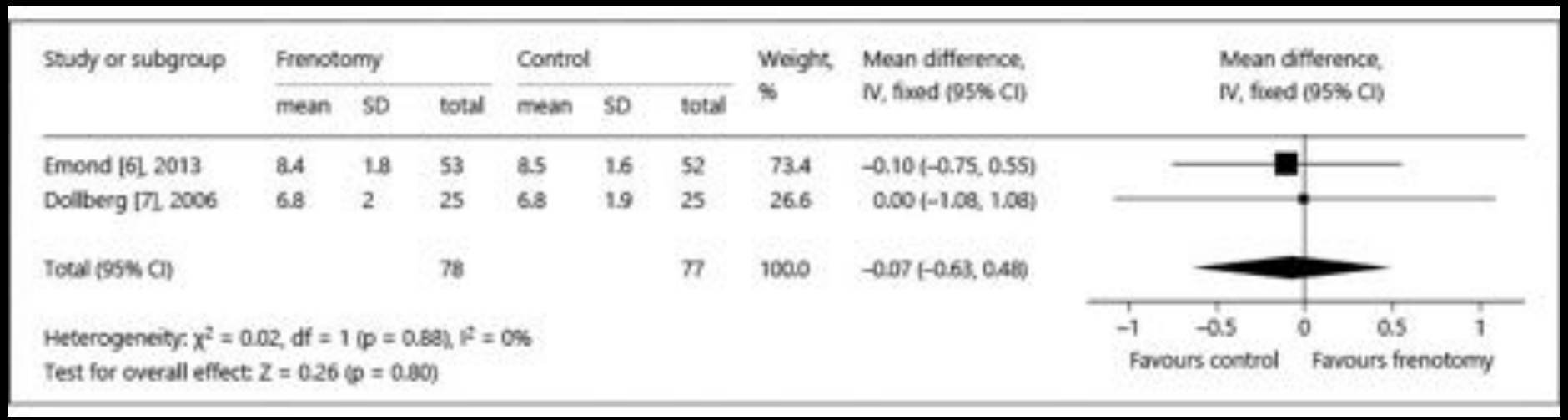
- The anatomical appearance of oral frena can demonstrate considerable variability without functional issues. Therefore, diagnosis of ankyloglossia should not be based solely on anatomic appearance. The key pre-requisites for a diagnosis are:

1. Thorough case history.
2. Objective functional assessment of tongue function using a diagnostic system.
3. Complete assessment of functional issues impacted by the suspected ankyloglossia by a qualified professional.

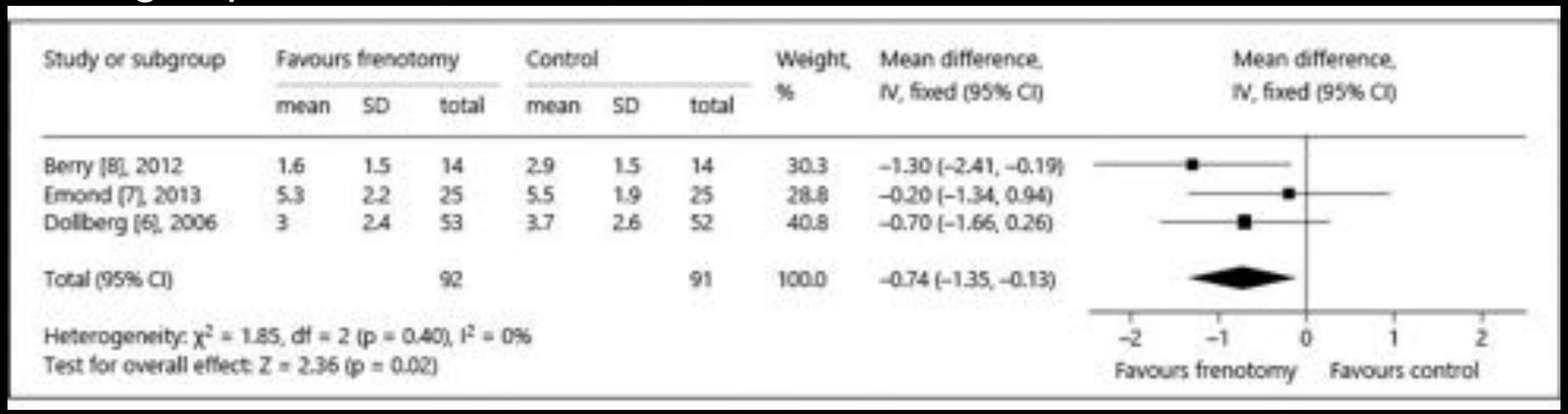
ADA 2020

Quality of Evidence

Frenotomy versus control. Infant breastfeeding assessed by the LATCH scale



Frenotomy versus control. Maternal nipple pain assessed by the visual analogue pain scale



O'Shea et al. 2017

Posterior ankyloglossia??

- posterior tongue tie is a condition where the lingual frenulum is not very prominent on inspection but thought to be tight on manual palpation or found to be abnormally prominent, short, thick or fibrous cord-like with the use of a grooved director
- poorly defined

Hong et al. 2010

- lack of evidence to support this as an entity
- associated with higher rates of surgical revision

Maxillary lip tie

- high labial frenal attachment
- if this attachment is tight, restricts the movement of the upper lip, or attaches near the maxillary alveolar crest, sometimes connecting with the incisive papilla, this is referred to as a maxillary or upper lip-tie

Kotlow 2004

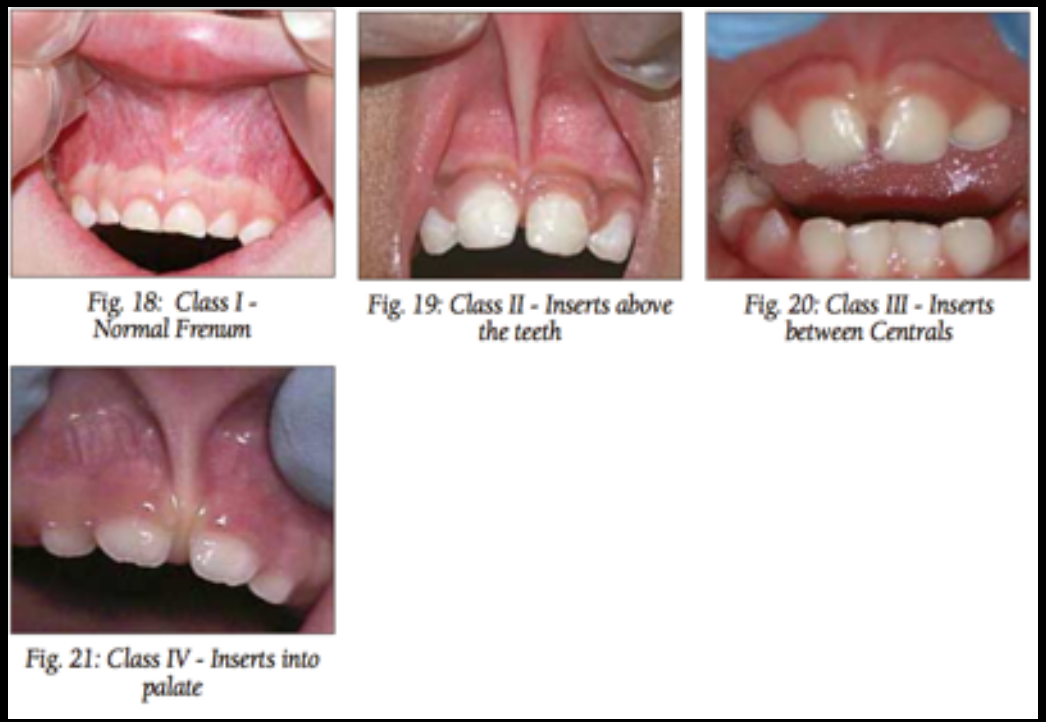


Fig. 18: Class I - Normal Frenum

Fig. 19: Class II - Inserts above the teeth

Fig. 20: Class III - Inserts between Centrals

Fig. 21: Class IV - Inserts into palate

Sequelae of maxillary lip tie

- poorer latch
- poorer/prolonged breastfeeding
- little to no strong evidence…

Historical Perspectives

Table 1: Impact of Ankyloglossia: A Historical Perspective

Year	Author	Location	Comments	Subject
350 BC	Aristotle	Stagira, Greece	*[in] the case of those whose tongues are slightly tied: their speech is indistinct and lisping*	Influence on speech
50 AD	Celsus	Rome	*In some the tongue is really attached to its base from the first day of life onwards, who therefore cannot speak…the tongue's tip should be seized with small forceps and the membrane thereunder incised But I have seen one who after cutting could protrude the tongue beyond the teeth, but still did not gain the ability to speak.*	Early description of frenotomy Influence on speech
200 AD	Galen	Pergamon, Greece	*Everything having to do with the tongue has been prepared most fully and perfectly by nature…nature has marvellously prepared a ligament of the size that would be most suitable.... if it ended farther out along the tongue or came to an end sooner than it should, it would certainly not be as good for the articulation of the voice and it would also be a hindrance to the motion in chewing.*	Natural individual variations in frenum position
700 AD	Paulus Aegineta	Aegina, Greece	*Those who have the fault congenitally begin to speak late and have a tight band under the tongue*	Influence on speech
1584	Hieronymus Mercurialis	Forlì, Italy	*Not to tear off the membrane itself, but to perforate it near its root with a needle, and with this needle to pull through a thread, and to ligate it. This thread, tightened daily, will soon and gently detach the membrane.*	Frenotomy technique to reduce the risk of haemorrhage
1610	Jean Hérouard	Haute-ville-la-Guichard, France	*Seeing that he had trouble nursing we looked into his mouth. It was seen that the tongue-string was the cause. At five in the evening it was cut in three places by M. Guillemeau, the king's surgeon*	Impact of on nursing
1620	Hieronymus Fabricius	Acquapendente, Italy	*The great presumptuousness the midwives exert everywhere; when they without exception, disrupt the band under each new- born infant's tongue using their forefinger's nail, which they maintain sharp and pointed for this purpose; under the pretext that, if they wouldn't do it, the infant never would learn to speak*	Role of the midwife in frenotomy Influence on speech
1752	Justine Siegmundin	Germany	*For the need to loosen the tongue-band or membrane, these are the signs: That it cannot protrude the tongue or cannot move and wind it around the nipple. Among thousand infants there is barely one suffering from this defect*	Indications for frenotomy Prevalence
1791	Johann Hagen	Berlin, Germany	*Among ten infants, in whom the midwife or the nurse seek the reason for poor sucking in a short frenulum, barely one has this cause... Frequently the parents are deceived, for profit, greed and ignorance this aid is abused, and one unties where nothing is tied.*	Impact on nursing Controversies in management of
1906	Ernst Moro	Heidelberg, Germany	The anomaly rarely causes symptoms, but one can, to comply with the urgent wishes of mothers and midwives, cut the tongue band with a scissors kick to calm them.	Subjective improvements following frenotomy
1941	McEnery and Gaines	Chicago, United States of America	*In observing a large series of newborn babies, the authors have never seen a tongue that had to be clipped. Nursing technique does not require that the short frenum be cut and because of the dangers associated with this so-called simple operation, they advise against it*	Indication for frenotomy
2000	Messner and Lalakea	Stanford, United States of America	*Most practicing lactation consultants believe that tongue-tie frequently causes feeding difficulties, and that neonatal frenotomy is quite helpful. In marked contrast, 90% of pediatricians and 70% of otolaryngologists believe ankyloglossia never or rarely causes a feeding problem.*	Diversity of opinion in management
2007	Segal et al.	Montreal, Canada	There is no well-validated clinical method for establishing a diagnosis of ankyloglossia… Frenotomy is likely an effective treatment, but further randomized controlled trials are needed to confirm this.	Lack of validated classification Limited evidence base
2015	Francis et al.	Nashville, United States of America	*Frenotomy may be associated with mother-reported improvements in breastfeeding, and potentially in nipple pain…the strength of the evidence is low to insufficient.*	Subjective improvements following frenotomy Limited evidence base

Patel et al. 2018

Surgical Management

Technique	Description	Advantages	Disadvantages
Frenotomy	Simple release of the frenulum	Rapid Relatively easy procedure Minimal equipment With or without local anaesthesia Can be performed in the neonatal nursery or clinic Can be breastfed immediately after the procedure	Risk of haemorrhage Need for clinical stabilisation Higher recurrence rate
Frenuloplasty/ Frenulectomy	Complete release of the frenum with plastic closure	Reduced scarring Lower recurrence rate	Requires a general anaesthetic for neonates Technique sensitive More involved than a frenotomy Longer procedure

Surgical Modalities

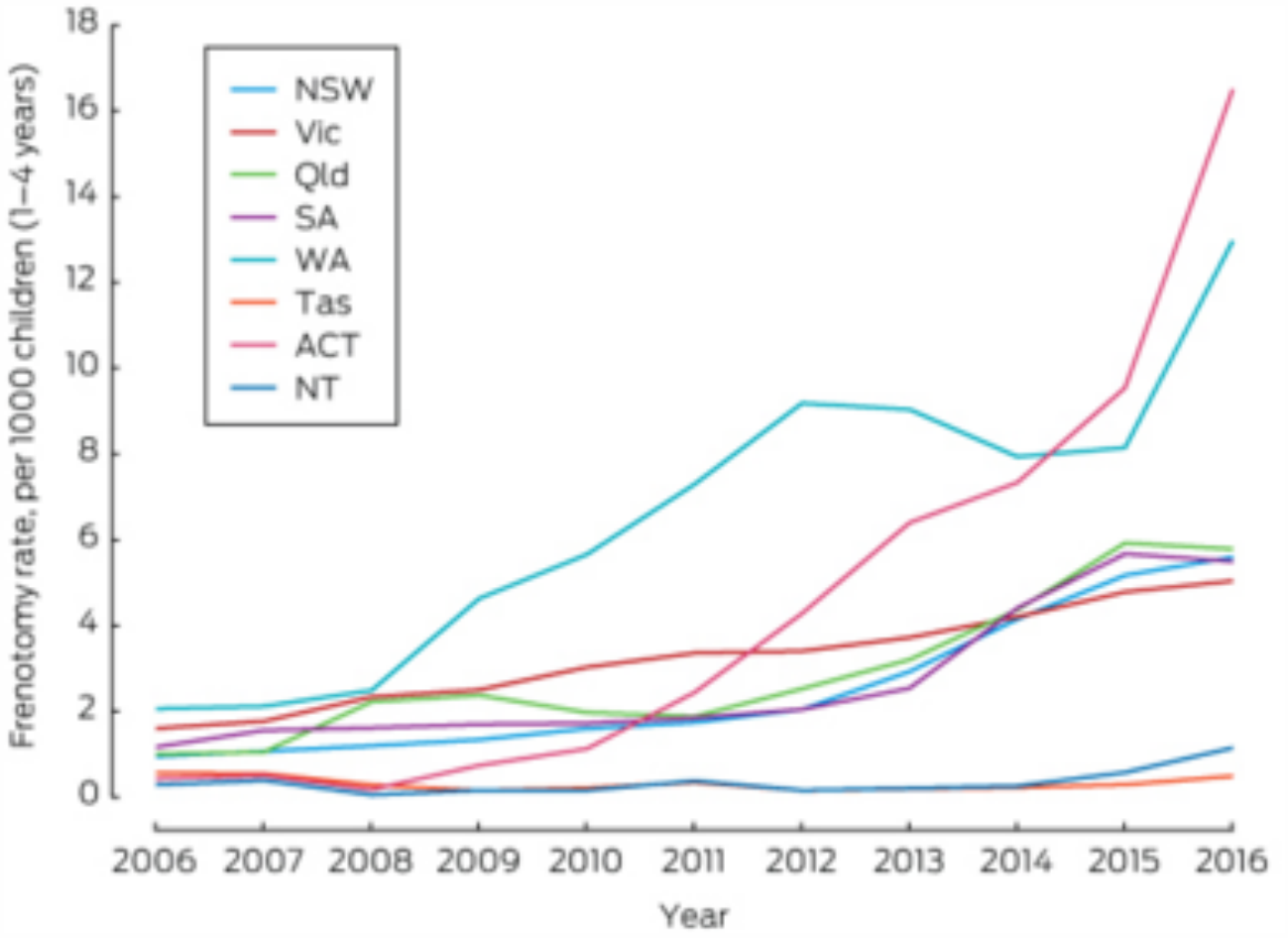
Modality	Description	Advantages	Disadvantages
Scalpel or sterile scissors	Haemostat used to clamp the depth of the vestibule. Small sterile scissors/scalpel is used to release the frenulum, beginning at its free border and proceeding posteriorly directly adjacent to the tongue	Relatively quick and simple Can be achieved with no/topical anaesthetic Infant can be breastfed immediately which will also indirectly act as a tamponade to control bleeding	Multiple cuts may be required for visualisation/retraction and to achieve adequate release May require post-operative analgesia May require sutures Longer treatment time compared to other modalities
Laser	CO2 Laser (10600 nm and output power of 1.5 W, frequency of 100 Hz and pulse duration of 400 µsec) Erbium: Yag Laser (2970 nm, laser energy of 20 Hz and 65 mJ, 600µsec pulse duration) Diode Laser	Very quick Minimal bleeding Can be achieved with no/topical anaesthetic Reduced scarring Low risk of infection (wound sterilisation) Low post-operative pain (cauterisation of nerve endings)	Cost of equipment Laser safety and additional precautions
Electrocautery	Incisions placed using a needle electrode, muscle fibers separated using a loop electrode, coagulation achieved using a ball electrode	Relatively quick and simple Minimal bleeding	Requires adequate anesthesia Young children may require a general anaesthetic Risk of burns

Surgical Management

- frenotomy for tongue-tie in Australian children, 2006–2016: an increasing problem

Kapoor et al. 2018

Box 1 – Frenotomy rates in Australia, 2006–2016, based on Medicare data*



Surgical Management

- frenotomy for tongue-tie in Australian children, 2006–2016: an increasing problem

Kapoor et al. 2018

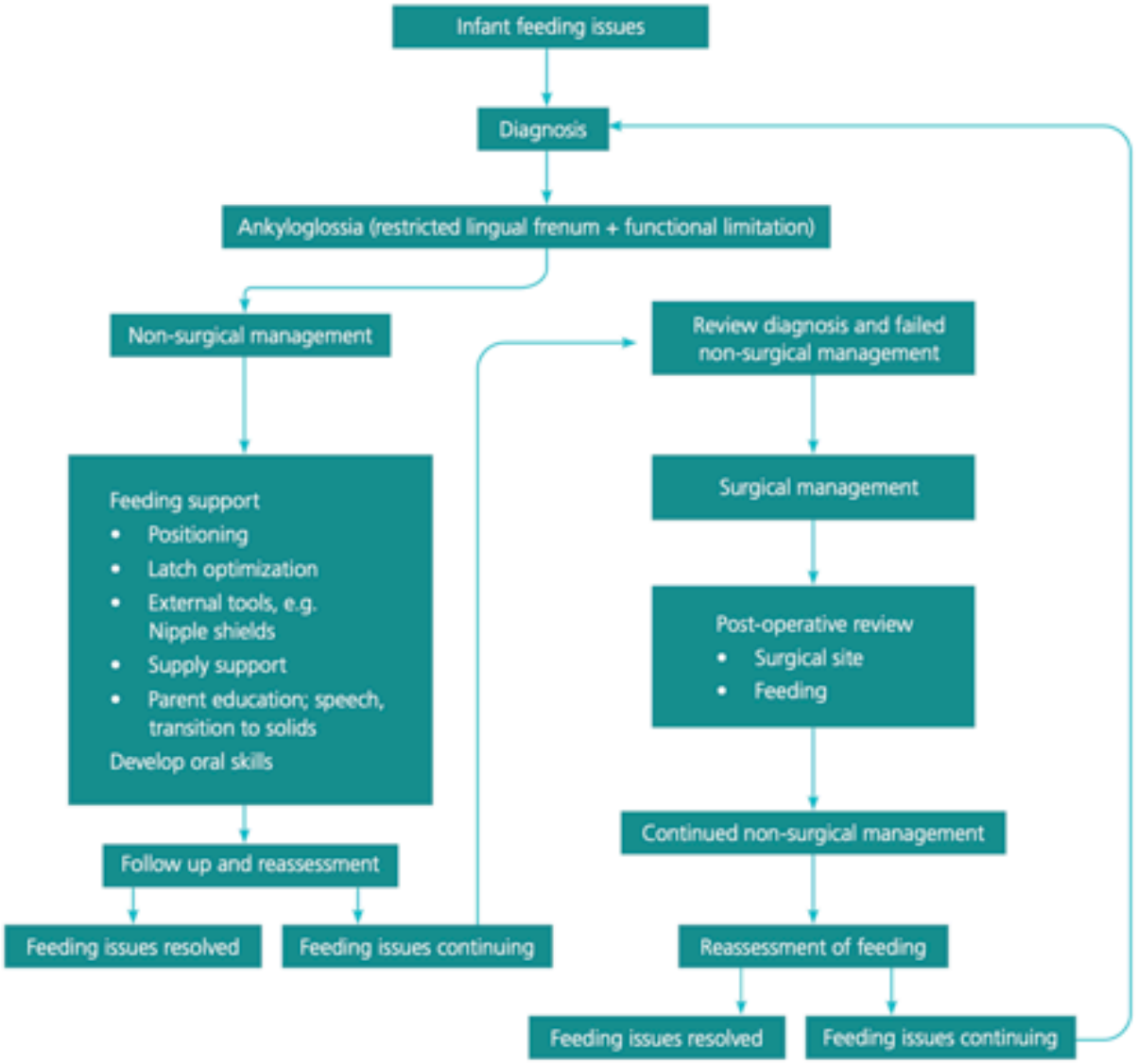
Region	2006			2016			Change in rate, 2006–2016
	Children (0–4 yrs)	Frenotomies	Rate per 1000 children (0–4 yrs)	Children (0–4 yrs)	Frenotomies	Rate per 1000 children (0–4 yrs)	
Australian Capital Territory	20 781	9	0.43	27 816	459	16.5	3710%‡
Western Australia	129 770	267	2.06	175 292	2274	13.0†	530%‡
New South Wales	431 534	411	0.95	495 452	2771	5.59†	487%‡
Queensland	263 024	265	1.01	319 561	1849	5.79†	474%‡
South Australia	89 004	104	1.17	101 567	558	5.49†	370%‡
Northern Territory	17 561	5	0.28	19 171	22	1.15†	303%‡
Victoria	312 581	502	1.61	396 693	1999	5.04†	214%‡
Tasmania	30 123	17	0.56	30 615	15	0.49†	−13%
Australia	*1 294 378*	*1580*	*1.22*	*1 566 167*	*9947*	*6.35*	*420%*

Management

- no clear indication/guidelines on management of ankyloglossia
- frenotomy is a well-tolerated procedure and provides both objective and subjective benefits to the breastfeeding dyad
- non-surgical interventions?

Management

Figure 1. Suggested management pathway for infants diagnosed with ankyloglossia.



ADA 2020

Complications?

- Bleeding
- Infection
- Ulceration
- Pain
- Damage to the tongue and submandibular ducts
- Recurrence
- Oral Aversions

Complications?

Int J Pediatr Otorhinolaryngol. 2017 Sep;100:223-224. doi: 10.1016/j.ijporl.2017.07.013. Epub 2017 Jul 14.

Hypovolemic shock after labial and lingual frenulectomy: A report of two cases.

Tracy LF[1], Gomez G[2], Overton LJ[3], McClain WG[2].

Author Information

Abstract

Lingual and labial frenulectomy are commonly performed as an outpatient procedure, either in an office setting or under general anesthesia. Frenulectomy is generally regarded by both otolaryngologists and dentists as a straightforward and low-risk procedure with limited evidence-based indications and similarly few contraindications. We describe two cases of hypovolemic shock occurring after outpatient frenulectomy requiring emergent interventions of cardiopulmonary resuscitation and blood transfusion. These rare, but life-threatening outcomes warrant recognition as potential complications for the presumed benign labial and lingual frenulectomy. We additionally briefly review indications for upper labial and lingual frenulectomy.

Complications?

Neonates presenting with severe complications of frenotomy: a case series

Peace I Opara[1*], Nneka Gabriel-Job[1] and Kingsley O Opara[2]

Abstract

Introduction: Tongue-tie or ankyloglossia is an anatomic variation in which the lingual frenulum is thick, short or tight. It may be asymptomatic, or present with complications like breast feeding difficulties or speech, dental and cosmetic problems. The treatment of this condition, where indicated, is frenotomy. This procedure usually has few or no complications. However, when it is done by untrained personnel, it may lead to life-threatening complications. This paper highlights complications that could arise from improper treatment of ankyloglossia.

Case presentation: Case 1 was a one-day-old male neonate, a Nigerian of Igbo ethnicity, who was admitted with bleeding from the mouth and passage of dark stools after clipping of the frenulum by a traditional birth attendant. He was severely pale and in hypovolemic shock, with a severed frenulum which was bleeding actively. His packed cell volume was 15%. He was resuscitated with intravenous fluids and a blood transfusion. The bleeding was controlled using an adrenaline pack. He also received antibiotics. He was discharged five days later.
Case 2 was a three-day-old male neonate, a Nigerian of Ikwerre ethnicity, who was admitted with profuse bleeding from a soft tissue injury under the tongue, after clipping of the frenulum by a community health worker. He was severely pale and lethargic. He was resuscitated with intravenous fluids and a blood transfusion. The bleeding vessel was ligated with repair of the soft tissue. He also received antibiotics and was discharged home one week later.

Conclusion: Treatment of tongue-tie, a benign condition, when done by untrained personnel may result in life-threatening complications. Clinicians should pay more attention to parents' worries about this condition and give adequate counseling or refer them to trained personnel for surgical intervention where clinically indicated.

Complications?

Journal of Paediatrics and Child Health

doi:10.1111/jpc.14682

ORIGINAL ARTICLE

Complications following frenotomy for ankyloglossia: A 24-month prospective New Zealand Paediatric Surveillance Unit study

Matthew Hale,[1] Nikki Mills,[2] Liza Edmonds,[1] Patrick Dawes,[3] Nigel Dickson,[4] David Barker[1] and Benjamin J Wheeler[1]

[1]Department of Women's and Children's Health, [4]New Zealand Paediatric Surveillance Unit, Department of Women's and Child Health, Dunedin School of Medicine, University of Otago, [3]Department of Surgical Sciences, Dunedin Hospital, Dunedin and [2]Department of Paediatric Otorhinolaryngology, Starship Children's Hospital, Auckland, New Zealand

Aim: To investigate the incidence and characteristics of complications arising from frenotomy for ankyloglossia (tongue-tie) in New Zealand.

Methods: Prospective surveillance among hospital-based paediatricians of complications arising from frenotomy for ankyloglossia to children <1 year old was conducted by the New Zealand Paediatric Surveillance Unit for 24 months, from August 2016 to July 2018, inclusive.

Results: A total of 16 cases of complications arising from frenotomy were reported. The overall average annual incidence rate was 13.9/100 000. Geographic variation was noted with a peak of 85.6/100 000 in one region. Complications reported: poor feeding (44%), respiratory events (25%), pain (19%), bleeding (19%) and weight loss (19%). Three children (19%) also had delayed diagnosis of an underlying medical condition initially overlooked in favour of treating their ankyloglossia, this has not previously been reported. The majority (75%) of cases required admission to hospital. Treatments given included supplementary feeds (44%), surgical intervention (25%), breastfeeding support (19%), analgesia (13%) and blood products (13%). A total of 25% of children had one or more frenotomies; 50% were treated for two or more of: 'anterior' ankyloglossia, 'posterior' ankyloglossia or 'lip tie'; 50% had their frenotomies performed out of the hospital. Dentists were the most common performing practitioner (31%).

Conclusions: Frenotomy rates in New Zealand are unknown. Poor feeding, pain, bleeding, weight loss and delayed diagnosis of an alternative underlying medical condition are important complications that require hospital assessment and admission. Practitioners and parents/families need to be aware of these possibilities. Centralised guidelines with access to specialist second opinions should be developed.

Key words: ankyloglossia; breastfeeding; frenotomy; lingual frenulum; neonatology.

Recommended Reading

Review

Review > J Clin Pediatr Dent. 2018;42(6):407-413. doi: 10.17796/1053-4625-42.6.1.
Epub 2018 Aug 7.

All Tied Up! Influences of Oral Frenulae on Breastfeeding and Their Recommended Management Strategies

Jilen Patel, Robert P Anthonappa, Nigel M King

PMID: 30085873 DOI: 10.17796/1053-4625-42.6.1

Abstract

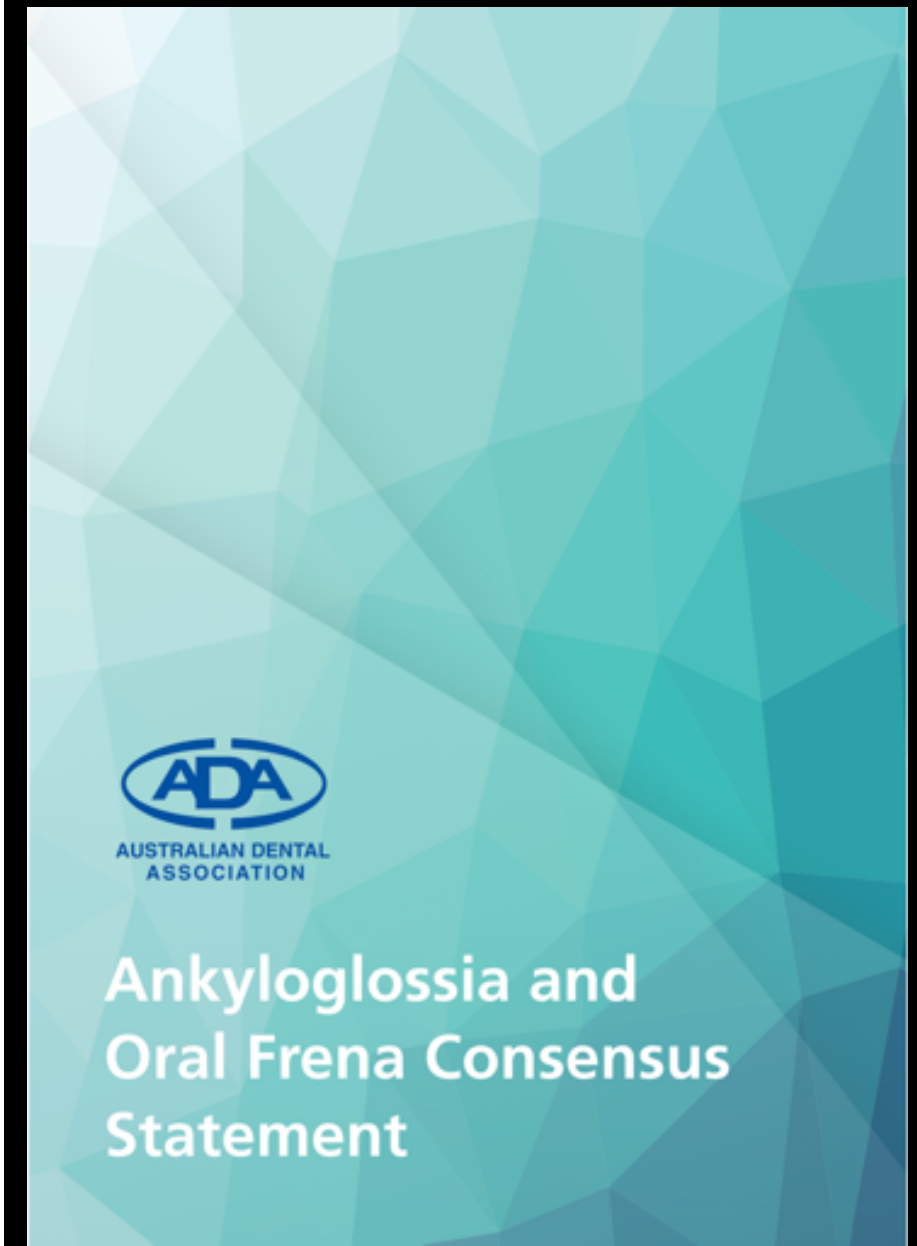
Background: Recently, there has been an increased awareness of the role of the labial and lingual frenulae on a neonate's ability to latch and breastfeed efficiently. This critical review explores the (i) oral physiology of a baby nursing (ii) factors that can decrease a baby's ability to nurse efficiently, the problems these cause and their management and the (iii) relation between poor nursing efficacy and the risk of early childhood caries (ECC) Study design: An expansive search of the literature was performed using four electronic databases.

Results and conclusions: Most studies assessing the role of labial and lingual frenulae on breastfeeding were of a low quality. The relation between ECC and poor nursing efficacy was found to be largely speculative. Hence, the results of these studies should be interpreted with caution. Despite the limited quality and external validity of the current evidence, in cases where breastfeeding difficulties are identified, surgical management of labial or lingual frenulae may provide some subjective improvements in breastfeeding outcome.

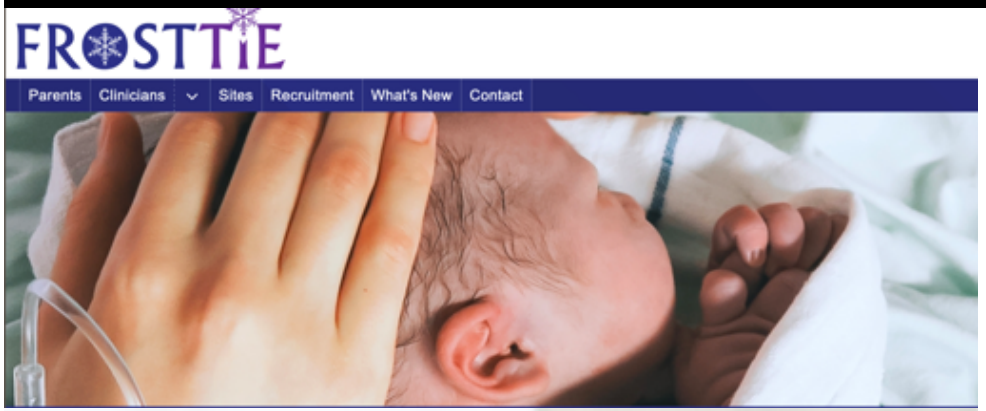
Keywords: ankyloglossia; breastfeeding; frenotomy; lip tie; tongue tie.

Recommended Reading

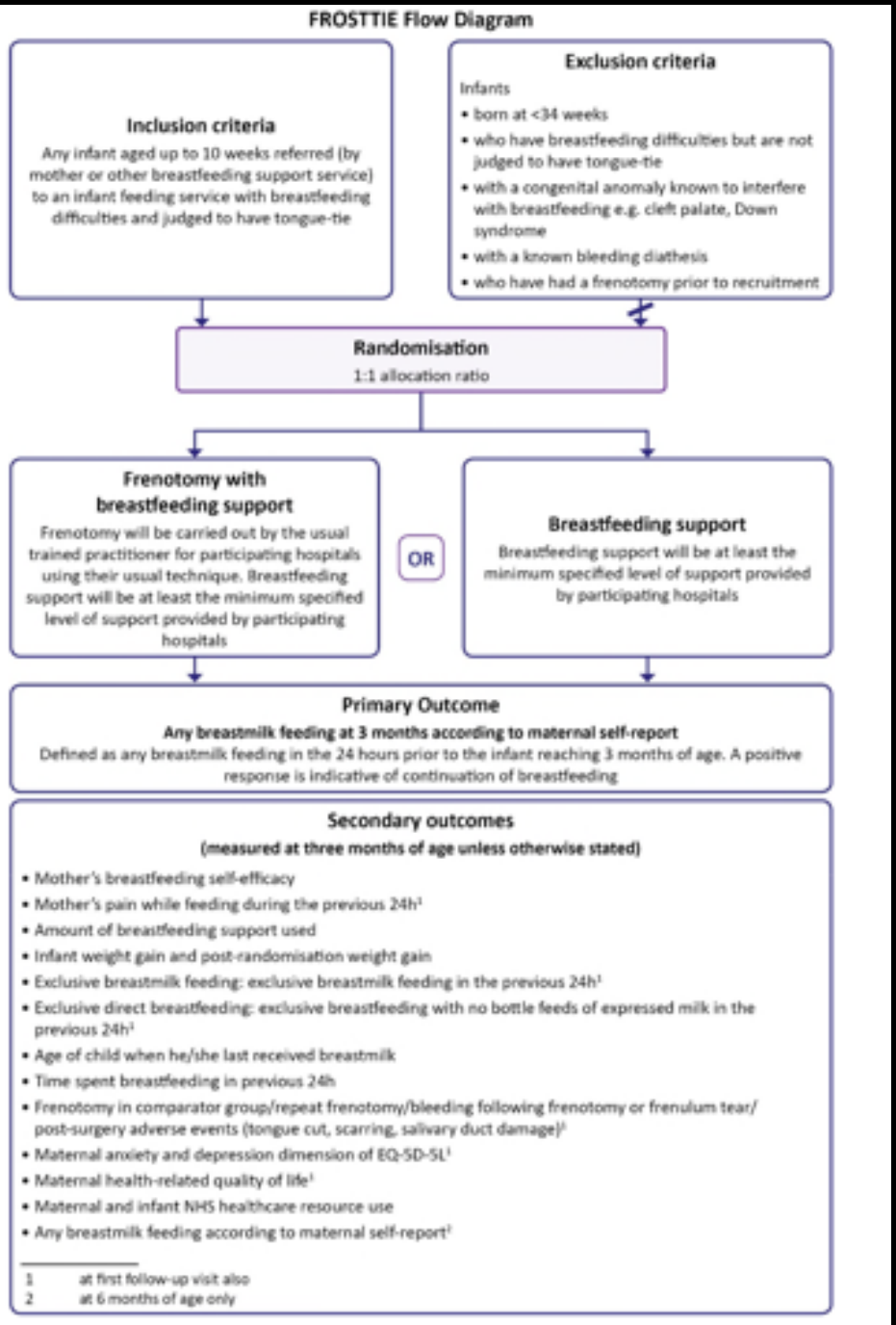
Consensus Statement



Future Studies…



FROSTTIE: A randomised controlled trial of FRenotomy and breastfeeding support Or breastfeeding Support without frenotomy to investigate continuation of breastfeeding for babies with Tongue-TIE



Thank you