

Impact of Neonatal Frenotomy on the Breastfeeding Rate at Discharge from the Maternity Ward: A Prospective, Cohort Study

Silvia Maya-Enero (✉ 62175@parcdesalutmar.cat)

Hospital del Mar, Universitat Pompeu Fabra

Luis Ruiz-Guzmán

Gavà Salut Familiar

Júlia Candel-Pau

Hospital del Mar, Universitat Pompeu Fabra

Xavier Duran-Jordà

IMIM (Institut Hospital del Mar d'Investigacions Mèdiques) (Hospital del Mar Institute for Medical Research)

María Ángeles López-Vílchez

Hospital del Mar, Universitat Pompeu Fabra

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Abstract

Background

Ankyloglossia may lead to an early abandonment of breastfeeding. Performing a frenotomy could increase the breastfeeding rate at discharge from the maternity ward.

Methods

This prospective cohort study included all the neonates born in our center in 2018 (1392). We offered a frenotomy to all tongue-tied patients. We determined how many frenotomies we performed (422), whether breastfeeding improved in the short term, and compared the breastfeeding rates between treated and untreated tongue-tied and non-tongue-tied neonates. Quantitative variables were described using the mean and standard deviation, and compared using a Student's t-test. Rates of breastfeeding were compared using the Pearson chi square. Significance was set at the $p < 0.05$ level.

Results

The breastfeeding rate at discharge was higher among tongue-tied infants (92.1%) than non-tongue-tied (84.2%), and higher among treated than untreated neonates (93.1 vs 75.9%, respectively).

Conclusions

Frenotomy could help increase the breastfeeding rate at discharge among tongue-tied neonates.

Trial registration:

Not applicable

Background

The lingual frenulum is a submucosal band of connective tissue or a membrane that inserts on the tip of the tongue or along its undersurface [1–3]. We refer to ankyloglossia, or tongue-tie, when a thickened, tightened or shortened lingual frenulum restricts tongue movement [1, 2, 4–9]. The reported prevalence of ankyloglossia varies between less than 1–12.1% depending upon the study population and criteria used to define and grade ankyloglossia, as standardized diagnostic criteria do not exist to date [1–4, 6, 7, 9–17]. However, some authors have found higher prevalences [8, 18]. We observed a prevalence of ankyloglossia of 32.5% among our neonates born in 2018 [19]. Most studies have focused their attention

to the so-called “anterior tongue-ties”, whereas the true prevalence of “posterior tongue-ties” remains unknown [14].

Breastfeeding difficulties are common in the neonatal period. Evidence shows that ankyloglossia is a potential cause of infant feeding problems, although not the only one. Retrognathia, nasal or airway obstruction, laryngopharyngeal reflux, cleft palate, etc. must be ruled out as well [6–9, 14–16]. Neonatal ankyloglossia is a subject of ongoing controversy among healthcare professionals. While some believe that it is rarely symptomatic, others believe that it may lead to several problems. Even though the majority of tongue-tied infants are able to breastfeed, they are more likely to present poor latch onto the breast and are less efficient at breastfeeding, with resultant low milk transfer and poor weight gain, and maternal nipple pain which may result in untimely weaning [1–4, 6–10, 13–18, 20–22]. Whereas an asymptomatic lingual frenulum does not need to be treated, ankyloglossia that interferes with breastfeeding is an indication for frenotomy. Performing a frenotomy in tongue-tied neonates with breastfeeding difficulties has positive effects [1–9, 11, 13–17, 24, 25]. Potential adverse effects include bleeding, infection, ulceration, pain, damage to the tongue and submandibular ducts, and recurrence, although most recent studies report little discomfort and few adverse effects [1–4, 6, 7, 9, 11, 13, 14, 16, 20, 23, 26].

Our hypotheses were that the surgical correction of tongue-ties in the first days would decrease nipple pain in the short term and increase breastfeeding at discharge from the maternity ward (48 to 72 hours after birth) and that the breastfeeding rate would be higher among treated than untreated tongue-tied neonates. We took other risk factors associated with unsuccessful breastfeeding into account, such as lack of breastfeeding experience, prematurity, low birth weight and being born by cesarean [25].

Methods

We conducted a prospective, cohort study of the neonates born at a tertiary care hospital with a reference area of about 400,000 people which experiences approximately 1,400 births per year. We included all the neonates born in our center between January 1st and December 31st, 2018. At least one of the three staff neonatologists evaluated each neonate for the presence of ankyloglossia as part of the routine neonatal evaluation and graded ankyloglossia based on Coryllos’s classification [27]. We assessed impact of the frenulum on tongue appearance and function using the Hazelbaker score: a patient was tongue-tied if it scored ≤ 8 points in appearance and/or ≤ 11 points in function [28]. Advice and help with positioning and latching onto the breast were given by IBCLC (International Board Certified Lactation Consultant) to all the mothers regardless of the presence of a tongue-tie and its treatment. We offered a frenotomy to all tongue-tied neonates. One of the three staff neonatologists performed it in the neonatal unit if the parents consented to after being orally informed of the potential benefits and risks. To perform it, we swaddled the neonate with a towel, gave it 24% sucrose as analgesia and let it suck for 2 minutes before the procedure. We placed a sterile groove director under the tongue, holding the frenulum in place with visualization of tongue base and frenulum, and snipped the frenulum with blunt-ended scissors along the underside of the tongue to its base just proximal to the genioglossus muscle [6, 7, 13, 14, 16, 17, 27]. Following the frenotomy, we returned the neonate to the mother for breastfeeding. At that time and until

discharge from the maternity ward, we assessed whether there was a short-term improvement in terms of a self-reported, subjective decrease of nipple pain and/or improved latch according to the LATCH score. The LATCH score evaluates the actual infant latch, audible swallowing, type of nipple, comfort, and hold/positioning during breastfeeding [16, 17, 29]. Even though there are not clinical trials that demonstrate the advantage of performing postoperative “tongue exercises” [6], we recommended them mainly to avoid readhesion during scarring [30]. We collected demographic variables (sex, maternal age, birth weight, weight at discharge, birth mode), the presence of ankyloglossia, treatment for ankyloglossia, improvement after the frenotomy, and type of feed at discharge.

Our Ethics Committee approved the study (reference number: 2019/8537/I), which was conducted in accordance with the Declaration of Helsinki.

Statistical analyses: Quantitative variables (gestational age, birth weight, weight at discharge), which were normally distributed, were described using the mean and standard deviation, and compared using a Student’s t-test. We compared the population of tongue-tied neonates (treated and untreated) with the total of neonates to verify that the samples were homogeneous in terms of gestational age, birth weight and sex. Rates of breastfeeding between the three groups were compared using the Pearson chi square. Significance was set at the $p < 0.05$ level. To perform statistical analyses, we used STATA version 15.1 (StataCorp, College Station, TX, USA).

Results

A total of 1392 neonates were born at our center in 2018. We excluded seven who were transferred to higher complexity hospitals because they were either extremely preterm or needed intensive care. Thus, we studied 1385 neonates (99.5%), who were mostly healthy, full-term or late preterm. Of them, 451 (32.5%) had a tongue-tie. Table 1 shows the characteristics of tongue-tied vs non-tongue-tied neonates. There were no differences in terms of gestational age, birth weight, weight at discharge, weight loss, prematurity rate and birth mode. The differences in maternal age were not clinically relevant (31.6 vs 30.9 years). We found a male to female ratio of 1.4:1 among tongue-tied neonates. The mean Hazelbaker score from tongue-tied infants was 5.8 points (SD 1.7, range 1-9) for appearance and 7.8 (SD 1.8, range 1-13) for function. Frenotomy was performed in 422 patients, and 402 improved according to the mothers’ self-report and the LATCH score. Twenty-nine parents declined the frenotomy. All the interventions were performed without significant incidents other than ten cases of minimal bleeding that ceased with pressure with a gauze and a case that required stitches.

Table 1
Demographic characteristics of patients with and without ankyloglossia.

	Tongue-tied infants n = 451 (%)	Non-tongue-tied infants n = 934 (%)	Total of neonates n = 1385 (%)	p-value
Male newborn	265 (58.7)	457 (48.9)	722 (52.1)	0.003^{a*}
Ratio male:female	1.4:1	1:1	1.1:1	
Maternal age (years) (SD)	31.6 (6.0)	30.9 (6.3)	31.1 (6.2)	0.038^{b*}
Gestational age (weeks) (SD)	39 ^{0/7} (2 ^{3/7})	39 ^{1/7} (1 ^{5/7})	39 ^{1/7} (2 ^{0/7})	0.153 ^b
Birth weight (g) (SD)	3180 (540)	3204 (530)	3196 (533)	0.419 ^b
Weight at discharge	3008 (491)	3045 (483)	3033 (486)	0.184 ^b
Birth mode:	294 (65.2)	652 (69.8)	946 (68.3)	0.164 ^a
Vaginal	51 (11.3)	80 (8.6)	131 (9.5)	
Instrumented	106 (23.5)	202 (21.6)	308 (22.2)	
Cesarean				
Feeding choice at discharge:	415 (92.1)	787 (84.2)	1202 (86.8)	<0.001^{a*}
Breastfed	16 (3.5)	40 (4.3)	56 (4.0)	
Breastfed and bottle-fed	20 (4.4)	107 (11.5)	127 (9.2)	
Bottle-fed				
First baby	239 (52.8)	418 (44.7)	657 (47.4)	0.030^{a*}
Previous breastfeeding experience	153 (33.8)	375 (40.1)	528 (38.1)	0.126 ^a
Prematurity	45 (9.9)	94 (10.1)	139 (10.0)	0.573 ^a
Frenotomy	422 (93.6)	0 (0)	422 (30.5)	<0.001^{a*}
Improvement	402 (95.2)	–	–	–
^a Pearson Chi-square. ^b Student's t test. *p <0.05.				

Table 2 shows feeding choice at discharge. Neonates with treated ankyloglossia had a significantly higher rate of exclusive breastfeeding than neonates without ankyloglossia and higher than neonates with untreated ankyloglossia (p <0.001).

Table 2

Feeding choice at discharge from the maternity ward in tongue-tied patients who underwent frenotomy, in untreated, tongue-tied patients, and in non-tongue-tied patients.

At discharge from the maternity ward				
	Tongue-tied and frenotomy, n = 422 (%)	Tongue-tied without frenotomy, n = 29 (%)	Non-tongue-tied, n = 934 (%)	p-value ^a
Breast-feeding only	393 (93.1)	22 (75.9)	787 (84.2)	<0.001
Breast-feeding and bottle-feeding	15 (3.6)	1 (3.4)	40 (4.3)	
Bottle-feeding only	14 (3.3)	6 (20.7)	107 (11.5)	
^a Fisher's exact test.				

Discussion

Midwives performed neonatal frenotomies in the 19th century. In the 1960's, frenotomies decreased due to the rise of bottle feeding. With the increased popularity of breastfeeding, especially since the 1990's, there was a resurgence of interest in ankyloglossia [1, 4, 6–8, 10, 13–15, 20]. Nowadays, approximately 80% of mothers in our area initiate breastfeeding. However, breastfeeding problems are common, keeping rates of breastfeeding lower than they should be [3, 8, 9, 18, 31, 32]. Causes of early weaning include apparent breast refusal, inadequate milk intake, introduction of formula supplementation with a subsequent decrease in milk production, and breast and nipple pain [6–9, 13, 15, 18].

Lingual function is more important than appearance of the frenulum, and must be carefully evaluated as well. One of the most widely used tools to assess lingual function is HATLFF (Hazelbaker's Assessment Tool for Lingual Frenulum Function) score [28], which we used to evaluate our patients. Some tongue-ties restrict extension of the tongue beyond the lower gum and force the infant to use its jaw to keep the breast in the mouth and form a proper seal, making breastfeeding difficult [1–6, 12–14, 16–18, 20, 25, 32]. Research has shown that between 25 and 80% of tongue-tied infants have difficulty breastfeeding [13, 25, 33]. Even though most studies have not found any effects on bottle feeding, given the more passive efforts involved with it, a few authors have observed that tongue-tied infants may have trouble sucking from a bottle as well [1, 2, 10–12, 20]. We believe that all the newborns should be explored to rule out the presence of a lingual frenulum and should be offered a frenotomy as soon as possible in case of ankyloglossia given the risk of breastfeeding cessation [4, 6–8, 11–13, 16, 17, 20, 25]. Frenotomy has shown to reduce maternal nipple pain in the short term, although improvement varies individually. Further randomized controlled trials of high methodological quality are warranted to determine longer term effects of frenotomy in terms of breastfeeding effectiveness, decrease in breast/nipple pain and feeding problems, increased duration of breastfeeding, and infants' growth [9, 16, 17]. Like Ballard and Hogan, we

observed an improvement in 95.2% of cases. Sometimes improvement is not immediate because sore or traumatized nipples may take 24 to 72 hours to heal, and the infant may need time to re-learn suckling [2]. Ghaheeri's prospective cohort study found an immediate improvement following frenotomy but also that breastfeeding continued to improve over the first month post-procedure [32]. Schlatter evaluated breastfeeding at the age of 2.5 weeks and found that only 13% of frenotomized neonates had breastfeeding problems following the procedure [6, 25]. Messner found that 83% of infants with ankyloglossia were breastfed for at least two months, compared with 92% of control infants [10]. In our case, 415 of 451 (92.0%) neonates with ankyloglossia were exclusively breastfed at discharge, and the percentage was higher in frenotomized infants, probably because mothers who accept a frenotomy are more prone to breastfeeding. We found that the rate of exclusive breastfeeding at discharge was higher among tongue-tied infants than non-tongue-tied infants (Table 1). When comparing treated and untreated infants, the rates of exclusive breastfeeding at discharge were significantly higher in favor of frenotomy (Table 2). These results could indicate that performing a frenotomy in tongue-tied infants may help establish breastfeeding. However, they must be cautiously interpreted because we did not have a formal control group.

The main limitation of our study is the lack of a formal control group. We offered the frenotomy to all tongue-tied patients and most parents consented to it. Due to the low risk of frenotomy and the risks of early weaning, we did not find it ethical to have a control group. Another limitation is that the group of mothers with tongue-tied neonates, despite being homogeneous with non-tongue-tied infants in regard to the variables we measured, may not be homogeneous in terms of motivation to breastfeed. This could justify the higher breastfeeding rate among the ankyloglossia group. Motivation for breastfeeding may be even more relevant among mothers who refused a frenotomy, for which comparisons with the 29 untreated infants must be interpreted cautiously. Parents who refused a frenotomy could be less motivated for breastfeeding, for which they preferred not to do any interventions. We measured short-term improvement in terms of maternal nipple pain by asking the mothers if they felt less pain after the procedure, but we did not use quantitative measures of pain. We used no quantitative measures of infant latch onto the breast but relied on lactation consultants' observation of the feeds according to the LATCH scale. Neither the observer nor the mother were blinded, because the objective of our study was to describe our current practice, not to demonstrate the effectiveness of the frenotomy. The mother was confident that the frenotomy would solve her breastfeeding problems, and witnessing the procedure may have conditioned her immediate perception of the feed. All the parents were informed of the presence of ankyloglossia, which could have influenced them to believe that there would be problems breastfeeding. We took into account whether the mother had previously breastfed a baby; however, we did not analyze for how long or if exclusively. The intervention took place prior to the establishment of breastfeeding, and since sucking improves during the first days and weeks, the improvement could have been erroneously attributed to the intervention [1]. Our study has strengths as well. This is, as far as we know, the largest study published to date, which took place at one single center and was carried out by a small team of neonatologists. We need to analyze our group to look for the duration of breastfeeding.

Conclusions

Frenotomy is a simple, safe, and effective procedure. In our study population, tongue-tied neonates who underwent a frenotomy were more likely breastfed at discharge from the maternity ward than those who did not undergo it.

Abbreviations

IBCLC: International Board Certified Lactation Consultant

Declarations

Ethics approval and consent to participate

The Ethics Committee of Hospital del Mar (CEImPSMAR) approved this project (reference number: 2019/8537/I). The Ethics Committee deemed it unnecessary to obtain a written consent form from the participants. This research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and analyzed during this study are available from the corresponding author on reasonable request.

Competing interests

The authors have no financial relationships relevant to this article to disclose. I declare that I have no competing interests.

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Authors' contributions

SM designed the study, collected data, analyzed the results, drafted the initial manuscript, and approved the final manuscript as submitted.

LR instructed SM in distinguishing the different types of tongue-tie, helped analyze our results, helped draft the initial manuscript and approved the final manuscript as submitted.

JC and ML helped collect data, helped draft the initial manuscript and approved the final manuscript as submitted.

XJ performed all the statistical analyses and helped the authors interpret them. He helped write the “Patients and methods” part and approved the final manuscript as submitted.

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