

Ankyloglossia

Incidence and Associated Feeding Difficulties

Anna H. Messner, MD; M. Lauren Lalakea, MD; Janelle Aby, MD; James Macmahon, MD; Ellen Bair, MS, PNP

Objectives: To determine the incidence of ankyloglossia (tongue-tie) in the well-baby population, and to determine whether patients with ankyloglossia experience breastfeeding difficulties.

Design: Prospective controlled study.

Setting: Tertiary care children's hospital.

Patients: A total of 1041 neonates in the well-baby nursery were screened for ankyloglossia. Those positively identified were invited to participate in the study. Mothers of newborns with ankyloglossia and mothers of a matched control group of unaffected newborns were contacted by telephone on a monthly basis for 6 months after their children were discharged from the hospital to determine the presence of breastfeeding difficulties.

Main Outcome Measures: Incidence of ankyloglos-

sia, percentage of infants successfully breastfed, and incidence of breastfeeding difficulties.

Results: Fifty newborns were identified with ankyloglossia, for an incidence of 4.8%. The male-female ratio was 2.6:1.0. Of the 36 mothers of affected infants who were followed up and who intended to breastfeed, 30 (83%) successfully breastfed their infants for at least 2 months, compared with 33 (92%) of the 36 mothers of infants in the matched control group ($P = .29$). Breastfeeding difficulties were experienced by 9 (25%) of the mothers of infants with ankyloglossia compared with 1 (3%) of the control mothers ($P < .01$).

Conclusion: Ankyloglossia, which is a relatively common finding in the newborn population, adversely affects breastfeeding in selected infants.

Arch Otolaryngol Head Neck Surg. 2000;126:36-39

From the Division of Otolaryngology–Head and Neck Surgery (Drs Messner and Lalakea) and the Department of Pediatrics (Drs Messner, Aby, and Macmahon), Stanford University, Palo Alto, Calif; the Division of Otolaryngology–Head and Neck Surgery, Santa Clara Valley Medical Center, San Jose, Calif (Dr Lalakea); and the Division of Otolaryngology–Head and Neck Surgery, Lucile Packard Children's Hospital at Stanford (Drs Messner, Aby, and Macmahon and Ms Bair).

A NKYLOGLOSSIA, commonly known as tongue-tie, is a congenital oral anomaly characterized by an abnormally short lingual frenulum (**Figure**). Although the clinical significance of ankyloglossia is controversial, many lactation consultants and some physicians believe that tongue-tie can make breastfeeding difficult, causing sore nipples, poor infant weight gain, and early weaning in some infants with this condition.¹⁻³ With the increased popularity of breastfeeding in the last decade, there has been a resurgence of interest in ankyloglossia as it relates to infant feeding. Articles published to date, however, have been in the form of case reports and case series.^{1,2,4-6} The purpose of this study was to (1) determine the incidence of tongue-tie in the well-baby population and (2) determine the incidence and nature of feeding problems in infants with tongue-tie compared with matched control infants.

RESULTS

Fifty of the 1041 newborns screened were found to have ankyloglossia, yielding an incidence rate of 4.8%. Thirty-six of the affected newborns were male, and 14 were female (male-female ratio, 2.6:1.0).

Thirty-six mothers of affected infants and 36 mothers of control infants completed the feeding portion of the study, with follow-up ranging from 2 to 6 months. The demographic characteristics of the ankyloglossia group, as well as ankyloglossia grade are shown in the **Table**. The majority of affected infants were graded as having mild ankyloglossia, with thin frenula. No cases of severe ankyloglossia were identified.

Thirty (83%) of 36 infants with ankyloglossia were breastfed for at least 2 months, compared with 33 (92%) of 36 control infants ($P = .29$). Eight mothers of infants with ankyloglossia experienced sore nipples, with the soreness lasting longer than 6 weeks in 4 mothers. Similarly, 7 of

PATIENTS AND METHODS

The study population was composed of healthy neonates born at Lucile Packard Children's Hospital at Stanford, Palo Alto, Calif, who were admitted to the well-baby nursery "university service" under the attending supervision of one of us (J.A. or J.M.) between July 1997 and August 1998. These newborns underwent oral cavity examination by the attending physician to determine the presence of ankyloglossia as part of the routine newborn evaluation. Of the 1041 newborns examined, 50 were found to have ankyloglossia. Confirmation and severity grading of the ankyloglossia were determined by one of us (A.H.M. or E.B.). The ankyloglossia grading was a subjective determination made by the examiner based on the prominence of the frenulum and the apparent limitation of tongue movement. In a few cases, there was some debate whether the neonate should be included in the study because the frenulum was borderline normal. In borderline cases, the neonate was included in the study group.

The mothers of affected newborns were approached by the otolaryngology staff and asked if they would be willing to participate in a study of infant feeding habits. The consent form provided to mothers stated that some of the newborns in the study might be "tongue-tied." When questioned, the otolaryngology staff told the mother whether the baby was tongue-tied, but in no instance was the mother told of any specific possible consequences of the tongue-tie (eg, inability of the baby to latch onto the breast and maternal nipple pain) in an effort to minimize any bias. Written informed consent was obtained from the mothers under a protocol approved by the Stanford University Human Subjects Committee.

Forty-one mothers of affected neonates were enrolled. The ankyloglossia was graded as mild, moderate, or severe, and the frenulum was graded as thin or thick. Notching of the tip of the tongue was noted. Mothers of affected subjects were questioned regarding various demographic

characteristics (such as age, race, and parity) and their intent to breastfeed their baby.

A control group of newborns, unaffected by ankyloglossia, were selected from the well-baby population and matched with affected newborns based on factors thought to influence breastfeeding. The following parameters were used to match controls with affected newborns: approximate age of the mother, race, first vs later birth-order child, twinship, and, in most cases, sex of the child. Twinship, if present, was considered the dominant factor in breastfeeding, and the twins in this study were not necessarily matched for age of the mother, race, birth-order status, and/or sex of the child. Mothers of control neonates were provided the same consent form as mothers of affected neonates and were counseled in an identical manner regarding the nature of the study.

All mothers who agreed to participate were contacted by telephone each month for 6 months or until they ceased breastfeeding. Any mother who did not complete at least 2 months of follow-up was dropped from the study. The mothers were asked a series of standard questions at each telephone follow-up regarding their baby's weight gain, breastfeeding vs bottle feeding, and problems with breastfeeding, including nipple soreness or baby's difficulty latching onto the breast. Breastfeeding for a minimum of 2 months postpartum was used as the criterion for determining the percentage of infants who were successfully breastfed. Mothers were considered to be actively breastfeeding for as long as the breastfeeding continued, whether or not the feeding of infants was supplemented with formula; exclusive use of breastfeeding was not required. Weaning after 2 months was assumed to be more likely related to other factors, such as return to work, rather than to feeding problems related to ankyloglossia.

Of the 41 mothers of affected neonates enrolled, 1 was dropped from the study because she did not intend to breastfeed her baby, and 4 were unavailable for follow-up. Thirty-six mothers of affected infants and 36 control mothers completed the study. Statistical analysis was performed using the χ^2 test statistic. Significance was set at the $P < .05$ level.

the control mothers had breast or nipple pain, although only 1 had problems lasting longer than 6 weeks. Five mothers of affected infants, but none of the control mothers, reported problems with the baby latching onto, or staying on, the breast. Overall, difficulty with breastfeeding, defined as nipple pain lasting longer than 6 weeks and/or difficulty of the baby latching onto the breast, was reported by 9 mothers (25%) of affected infants, compared with 1 mother (3%) in the control group ($P < .01$). No infant underwent a frenotomy.

The relationship of ankyloglossia grade to feeding difficulties was further evaluated. Five (22%) of the 23 children with mild ankyloglossia had breastfeeding trouble, compared with 4 (31%) of the 13 children with moderate ankyloglossia ($P = .56$). Thick frenula (3/4, 75%) were more likely to cause breastfeeding difficulties than thin frenula (6/32, 19%) ($P = .02$). Only 1 child (1/8, 13%) with a notched tongue had feeding problems ($P = .27$).

COMMENT

Opinions range widely regarding the significance of ankyloglossia; some investigators believe that the anomaly is only rarely symptomatic,⁷⁻⁹ while others believe that it may lead to a host of problems, including infant feeding difficulties, speech disorders, and various mechanical and social issues related to the inability of the tongue to protrude sufficiently.¹⁰⁻¹³ Although the appropriate management of ankyloglossia has been much debated, there is currently a paucity of objective information regarding its incidence, natural history, and the need for and timing of treatment.

The exact incidence of ankyloglossia is unknown. Figures reported in the literature vary, ranging from 0.02% to 4.4%.¹⁴⁻¹⁷ This variation in reported incidence may be attributable in part to the lack of a uniform definition and objective grading system for tongue-tie. Also, some of the variation may reflect age-related differences, as some cases



Mild ankyloglossia (tongue-tie) in a newborn.

Features of 36 Newborns Affected by Ankyloglossia

	No. (%) of Newborns
Sex, M/F	24/12
First born	8 (50)
Race	
Hispanic	18 (50)
White	8 (22)
Pacific Islander	5 (14)
Asian	4 (11)
African American	1 (3)
Ankyloglossia	
Mild	23 (64)
Moderate	13 (36)
Severe	0 (0)
Frenulum	
Thin	32 (89)
Thick	4 (11)
Notched tongue	8 (22)

are postulated to resolve spontaneously with age. This study recorded an incidence of 4.8% in the newborn well-baby population, with a male-female ratio of 2.6:1.0. This incidence confirms the findings of Friend et al¹⁵ and Harris et al,¹⁷ who each reported an incidence of 4.4%. A male predominance for ankyloglossia has been noted by others as well.¹⁵⁻¹⁷

Neonatal frenotomy as a treatment for ankyloglossia is not new. In the 18th century, several references, as cited by Marmet et al¹ and Catlin and De Hann,¹⁴ recommend clipping the frenulum in tongue-tied infants to facilitate breastfeeding. Horton¹⁰ reports that it was the practice of midwives of this period to divide the lingual frenulum of all babies with their fingernails. Since that time, support for tongue-tie as a cause of feeding problems in infants has waxed and waned. In the early part of the 20th century, there was strenuous opposition to the practice of frenotomy.^{1,10} Current opinion ranges from the belief that tongue-tie only rarely interferes with feeding, generally requiring no treatment,^{8,9} to enthusiastic support for neonatal frenotomy in the lactation literature.^{1,2,18-20}

This study provides evidence regarding the incidence of breastfeeding problems in infants affected by ankyloglossia as compared with normal control infants. Most women with infants affected by ankyloglossia were able to breastfeed without difficulty. The presence of ankyloglossia did not significantly affect the ability of mothers to successfully breastfeed their babies for at least 2 months postpartum (83% of study mothers vs 92% of controls). Thus, early weaning as a consequence of ankyloglossia was not substantiated by our results. Based on this study, neonatal frenotomy to enable breastfeeding is not indicated for every infant with ankyloglossia.

However, a minority of study mothers (25%) did have difficulty getting their child to latch onto or stay on the breast or had nipple pain that lasted longer than 6 weeks. The frequency of feeding difficulties in study cases was significantly higher than in matched control cases and appears to be more prevalent in infants with thick frenula. Ankyloglossia grade (moderate vs mild) had

no apparent relationship in this study to the incidence of breastfeeding difficulties. These findings suggest that neonatal frenotomy should be considered in those selected infants with ankyloglossia whose mothers are having problems with breastfeeding.

When indicated, neonatal frenotomy (clipping of the frenulum without repair) is a simple procedure that can be accomplished in the office setting at the time of initial consultation. Infants are allowed to breastfeed immediately after the procedure, and complications are extremely rare.²⁰ In our experience, and as reported anecdotally by others,²⁰ mothers frequently report an immediate subjective improvement in breastfeeding mechanics. Acetaminophen may be used for pain control, but is often not required.

To our knowledge, there are no previous prospective controlled studies that have allowed health professionals to predict the likelihood of feeding difficulties when ankyloglossia is present, or the likelihood that intervention will be required. The present study provides objective data regarding the incidence of breastfeeding difficulties in infants with ankyloglossia and suggests that, in most cases, breastfeeding proceeds uneventfully. Potential shortcomings of the study are as follows. The number of subjects involved was relatively small, and a majority of study infants had mild ankyloglossia. The determination of mild vs moderate ankyloglossia was subjective and may have resulted in some infants being misclassified. It is possible that had greater numbers of subjects been included, the slight trend toward reduced breastfeeding success in the study population might have achieved statistical significance. While our study evaluated the length of time that an infant was breastfed, it did not evaluate the quality of the breastfeeding experience, which may have been adversely affected by the infant's ankyloglossia. Despite these limitations, the study does convincingly document an increased incidence of breastfeeding difficulties in a minority of study mothers compared with the mothers in a matched control population. It is also possible that the study could be criticized for a relatively short follow-up period, in that breastfeed-

ing for 2 months should not be equated with “breastfeeding success.” Nonetheless, our assumption that breastfeeding problems related to ankyloglossia would present early in the course of breastfeeding seems reasonable. Finally, the present study addresses the need for intervention for ankyloglossia only as it relates to breastfeeding issues; it does not address the need for or timing of surgical intervention for other ankyloglossia-related morbidity (eg, speech problems or anticipated speech problems, inability to lick lips, and social embarrassment).

CONCLUSIONS

The incidence of ankyloglossia in the newborn well-baby population is 4.8%. Ankyloglossia can adversely affect breastfeeding in a minority of cases, making it difficult for the baby to latch onto the breast and/or prolonged maternal nipple pain.

Accepted for publication November 3, 1999.

Presented at the annual meeting of the American Society of Pediatric Otolaryngology, Palm Desert, Calif, April 29, 1999.

Reprints: Anna H. Messner MD, Division of Otolaryngology–Head and Neck Surgery, Lucile Packard Children’s Hospital at Stanford, 725 Welch Rd, Palo Alto, CA 94304.

REFERENCES

- Marmet C, Shell E, Marmet R. Neonatal frenotomy may be necessary to correct breastfeeding problems. *J Hum Lactation*. 1990;6:117-121.
- Notestine GE. The importance of the identification of ankyloglossia (short lingual frenulum) as a cause of breastfeeding problems. *J Hum Lactation*. 1990;6:113-115.
- Zalzal GH, Cotton RT. Non-cleft disorders of the oral cavity and oropharynx. In: Cummings CW, Fredrickson JM, Harker LA, Krause CJ, Schuller DE, eds. *Otolaryngology–Head and Neck Surgery*. 2nd ed. St Louis, Mo: Mosby–Year Book Inc; 1992:1170-1171.
- Nicholson WL. Tongue-tie (ankyloglossia) associated with breastfeeding problems. *J Hum Lactation*. 1991;7:82-84.
- Wilton JM. Sore nipples and slow weight gain related to a short frenulum. *J Hum Lactation*. 1990;6:122-123.
- Huggins K. Ankyloglossia: one lactation consultant’s personal experience. *J Hum Lactation*. 1990;6:123-124.
- McEnery ET, Gaines FP. Tongue-tie in infants and children. *J Pediatr*. 1941;18:252-255.
- Paradise JL. Evaluation and treatment for ankyloglossia. *JAMA*. 1990;262:2371.
- Ulshen M. Clinical manifestations of gastrointestinal disease. In: Behrman RE, Kliegman RM, Arvin AM, eds: *Nelson Textbook of Pediatrics*. 15th ed. Philadelphia, Pa: WB Saunders Co; 1996:1031.
- Horton CE. Tongue-tie. *Cleft Palate J*. 1969;6:8-23.
- Fletcher SG, Meldrum JR. Lingual function and relative length of the lingual frenulum. *J Speech Hear Res*. 1968;2:382-390.
- Wright JE. Tongue-tie. *J Paediatr Child Health*. 1995;31:276-278.
- Gray SD, Parkin JL. Congenital malformations of the mouth and pharynx. In: Bluestone CD, Stool SE, Kenna MA, eds. *Pediatric Otolaryngology*. 3rd ed. Philadelphia, Pa: WB Saunders Co; 1996:989-991.
- Catlin FI, De Hann V. Tongue-tie. *Arch Otolaryngol*. 1971;94:548-557.
- Friend GW, Harris EF, Mincer HH, Fong TL, Carruth KR. Oral anomalies in the neonate, by race and gender, in an urban setting. *Pediatr Dent*. 1990;12:157-161.
- Jorgenson RJ, Shapiro SD, Salinas CF, Levin SL. Intraoral findings and anomalies in neonates. *Pediatrics*. 1982;69:577-582.
- Harris EF, Friend GW, Tolley EA. Enhanced prevalence of ankyloglossia with maternal cocaine use. *Cleft Palate Craniofac J*. 1992;29:72-76.
- Berg KL. Tongue-tie (ankyloglossia) and breastfeeding: a review. *J Hum Lactation*. 1990;6:109-112.
- Nicholson WL. Tongue-tie (ankyloglossia) associated with breastfeeding problems. *J Hum Lactation*. 1991;7:82-84.
- Masaitis NS, Kaempf JW. Developing a frenotomy policy at one medical center: a case study approach. *J Hum Lactation*. 1996;12:229-232.