

Ankyloglossia and effects on breast-feeding, speech problems and mechanical/social issues in children

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Abstract. *Ankyloglossia and effects on breast-feeding, speech problems and mechanical/social issues in children.*
Background: This aim of this study was to define the characteristics of the patients who underwent surgery for ankyloglossia.

Patients and methods: The patients (n = 127) with ankyloglossia underwent surgery between 1987 and 2005. The patients were evaluated for age, gender, complaints, grade, and operative procedures. This study did not cover postoperative evaluation of the procedure.

Results: The ages of the children ranged from 20 days to 7 years, and 84% of them were under 1 year of age. Seventy-two percent were boys; 28% were girls. The most common complaint of the parents of infants under one year of age was breast-feeding (35/84). When the tongue movements of the patients were examined, 57 patients (of whom 18 were over one year of age) had limited tongue mobility. The mean frenulum length of the patients was grade 1 in 72 patients and grade 2 in 55 patients. Ankyloglossia was corrected by frenotomy. Three patients had bleeding from their frenotomy site which resolved with local pressure. General anaesthesia was preferred for 77 patients, and there was a need for suturing in 20 patients.

Conclusion: The correction of ankyloglossia at an early age reduces the risk of latent complications. In addition, the early correction will mitigate the feeding- and speech-related concerns of parents and doctors alike.

Introduction

Ankyloglossia is a congenital oral anomaly characterised by a short lingula frenulum. It is commonly known as tongue-tie and may result in varying degrees of decreased tongue tip mobility.¹

The diagnosis and management of ankyloglossia has been a controversial topic. There are various opinions about the significance of this anomaly. Although some argue that ankyloglossia is only rarely symptomatic, others feel that it may lead to many problems. Infant breast-feeding difficulties, speech disorders, and various mechanical and social issues such as an inability to lick the lips or play a wind instrument are possible consequences of ankyloglossia.^{2,3}

The aim of this study was to make a retrospective study of children

with a diagnosis of ankyloglossia to determine the frequency of speech problems, breast-feeding difficulties, and other associated problems. In addition, the operative procedures and related complications are discussed.

Materials and methods

All the patients who underwent release of ankyloglossia were included in the study. The data of the patients treated between 1987 and 2005 were evaluated, noting age at time of surgery, gender, complaints on presentation, severity grade of ankyloglossia and operative procedures.⁴

Results

The ages of the children ranged between 20 days and 7 years

(mean = 15.6 months). Seventy-two percent were boys (n = 92). There were 127 children: 6% were <1 month; 34% between 1 and 6 months; 26% between 6 and 12 months; 15% between 1 and 3 years; and 18% older than 3 years (Table 1).

The majority of the complaints were breast-feeding difficulties and frequent speech problems. The primary complaint of the patients (n = 35) under 1 year of age was breast-feeding difficulties. The mothers of 58 patients under 1 year of age were concerned about possible breast-feeding difficulties. The weight gain of these patients compared to their birth weight was normal. However, the mothers of 16 of these patients, fearing that breast-feeding might not suffice, had started additional formula in the

Table 1
Clinical characteristics of the ankyloglossia patients

Age groups	Number (n =)	Grade (n =)	Complaints (n =)	Suture requirement (n =)	General anaesthesia (n =)
0-1 month	8	Grade I = 7 Grade II = 1	Breast feeding difficulty = 2	–	–
1-6 months	43	Grade I = 27 Grade II = 16	Breast feeding difficulty = 20	5	20
6-12 months	33	Grade I = 20 Grade II = 13	Breast feeding difficulty = 13	4	14
1-3 years	20	Grade I = 10 Grade II = 10	Speech disorder = 3	5	20
>3 years	23	Grade I = 8 Grade II = 15	Speech disorder = 5	6	23

first 6 months. Eight of the cases with either “R” deficiency or stutter were referred to our clinic by the Speech Therapy Centre of our hospital. The frenotomy procedure did not result in any improvement in these patients after one year of follow-up. Eight out of 43 patients over 1 year of age (18%) had speech disorders. The parents of 15 patients had concerns about possible speech disorders in the future. When the tongue mobility of the patients was evaluated, it was found to be limited in 57 patients. Of these 57 patients, 18 were over 1 year of age. The normal free tongue range (1-4) (defined as the length from the base of the insertion of lingual frenulum to the tip of the tongue) of the patients was grade 1 (mild = 12-16 mm) in 72 patients and grade 2 (moderate = 8-11 mm) in 55 patients. There were no severe (3-7 mm) or complete (<3 mm) ankyloglossia cases. The condition of all the patients was corrected by frenotomy (Figures 1,2). The tongue tie was crushed with a straight clamp (to reduce haemorrhage) from the tip of the tongue to the mouth floor, and then transected with scissors. In children



Figure 1
Tongue-tie in infant



Figure 2
Tongue-tie corrected by frenotomy procedure for same patient

under six months of age no further haemostasis was required. Suture ligation was needed for some older children. The operations on 77 patients were performed while the patients were under face-mask or laryngeal-mask general anaesthesia. Twenty patients needed sutures intra-operatively, and three patients underwent bipolar cautery. Three patients had haemorrhaging after waking and sponge compression was performed to stop the haemorrhage. One of the patients, who was 3 years old, was re-operated due to a speech disorder developing after a previous correction operation in another centre at the age of 6 months.

Discussion

Ankyloglossia or tongue-tie is not a rare condition. It involves the attachment of the tongue to the floor of the mouth and arises as a result of failure in cellular degeneration leading to a much longer anchor between the floor of the mouth and the tongue.⁵ The incidence of ankyloglossia has been reported to range from 0.02 to as high as 4.8% of term new-borns.^{2,6} The literature includes reports confirming that it is 3 times more common among males.^{1,6} In our series, incidence was 2.6 times higher in males than in females, supporting the literature evidence. This variation in reported incidence may be associated with a lack of a common definition and objective grading system for tongue-tie, as well as the possibility of spontaneous resolution with age.

In some cases, ankyloglossia may persist, but this has not been considered clinically significant in the absence of speech problems.^{1,2}

Possible adverse effects of ankyloglossia can be listed as difficulty in breast-feeding because of difficulties with an appropriate seal, speech problems, dyspnoea caused by the forward dislocation of the epiglottis and larynx, problems with maintaining oral hygiene, and mechanical/social issues such as difficulty in playing a wind instrument, cuts beneath the tongue, and diastasis of the lower incisors due to the short frenulum.^{1,2,3,7} In our series, the most frequent complaint was difficulty in breast-feeding, which was seen in 35 patients (41%) under one year of age.

A previous study reported parental concerns about mechanical/social issues caused by tongue-tie, such as difficulty with licking the lips and licking an ice cream cone, although speech concerns were a more common complaint.³ The results of the study demonstrated that a number of children with ankyloglossia can speak normally despite restricted tongue mobility. However, a significant percentage of young children with ankyloglossia (71%) had ankyloglossia-linked articulation difficulties as measured by a formal speech pathology assessment.³ In our series, 8 out of 43 patients over 1 year of age (18%) had speech disorders, while the parents of 15 patients had concerns about possible speech disorders in the future. Contrary to what some parents believe, ankyloglossia is not associated with speech development failure or delay. These parents may seek the help of a paediatrician or otolaryngologist, demanding surgical intervention in the hope that normal speech development will promptly proceed. A clinician exercising good judgment must be

aware that ankyloglossia, rather than causing a lack of speech, leads to articulation problems with otherwise normal language development. A patient with such problems should be referred for further evaluation, including audiological, speech/language, and neurodevelopmental assessments. The ankyloglossia in these patients may be re-evaluated and, after the true aetiology of the speech delay is confirmed, surgical correction should be considered.³

The American Academy of Pediatrics has recommended that all newborn infants should receive breast milk for the first year of life and well into the second year whenever possible. Among the most common causes of untimely weaning or early discontinuation of breast-feeding are apparent breast refusal, perceived inadequate milk supply, and the introduction of formula supplementation with a subsequent decrease in milk supply. Inadequate milk supply may be rooted in a decreased ejection reflex as a result of maternal nipple pain or in suppressed lactation as a result of the infant's inability to drain the breast. Significant ankyloglossia was diagnosed on the first or second day of life in 3.2% of the entire breast-feeding population. Ankyloglossia was responsible for 12.8% of serious out-patient breast-feeding problems.⁸ Dollberg *et al.*⁹ found that, after frenotomy, there was an immediate and significant decrease in pain score compared with a sham procedure in a randomised prospective study. They also found a concomitant improvement in the infant's latch to breast in their patients.

Ineffective sucking in the newborn may also result in

insufficient milk drainage in the mother, which in turn may lead to mastitis, decreased maternal milk supply, and eventually, poor infant weight gain secondary to non-nutritive sucking.⁶ Ankyloglossia and feeding difficulties seem to be associated with breast-feeding in some, but not all, affected infants. Although four of the 25 parents/patients in the current study who attempted to breast-feed were unsuccessful, the majority reported no problems.³ Similarly, another recent study has demonstrated that, while most babies with ankyloglossia can be breast-fed without difficulty, approximately 25% will have difficulty latching onto the breast, or the mother will have prolonged nipple pain.¹⁰ Ricke *et al.*⁶ screened 3490 newborns and detected 148 (4.24%) with ankyloglossia. The male-female ratio was 2.3:1. The comparison of the babies with ankyloglossia with the controls revealed that the mothers of the former group (with ankyloglossia) had extremely sore, cracked, or bleeding nipples and the doctors of these babies had concerns about poor growth rates. In our series, while the mothers of 58 patients (69%) under 1 year of age were concerned about breast-sucking disorders in the babies, they had no nipple complaints. In fact, although 16 babies under 6 months of age had normal weight-gain percentages, they were given additional formula by the mothers due to weight-gain concerns.

The clinical significance and therapy modalities depend on the subjective perception of the treating physician. In a study by Messner *et al.*,³ otolaryngologists (n = 423), pediatricians (n = 425), speech pathologists (n = 400), and

lactation consultants (n = 350) were randomly selected. Sixty-nine percent of the consultants, but a minority of the physician respondents, believed that tongue-tie is frequently associated with feeding problems. Sixty percent of the otolaryngologists, 50% of the speech pathologists, but only 23% of the pediatricians associated tongue-tie with speech difficulties at least sometimes. Like 21% of the pediatricians, 67% of the otolaryngologists believed that tongue-tie was sometimes associated with social/mechanical issues. Although 53, 74, and 69% of otolaryngologists recommended surgery in certain cases with feeding, speech, and social/mechanical difficulties respectively, only 21%, 29%, and 19% of pediatricians considered surgery to be the best therapy. In general, the pediatrician respondents were significantly less likely than otolaryngologists to recommend surgery. The most common indication for surgery was speech problems. Seventeen percent of otolaryngologists stated that surgery should be performed for speech if an attempt at speech therapy fails. Otolaryngologists also commonly offered surgery for social/mechanical issues and sucking/feeding dysfunction. Eleven percent of the otolaryngologists stated 'other' indications for surgery, while only eight practitioners wrote 'when parents request.' Only 2% (4:209) of the otolaryngologists believed that there was no indication for surgery.²

In a study by Lalakea *et al.*¹ of an adult population, subjective data provided by the patients in their series suggested that ankyloglossia might frequently be symptomatic in this age group.

While 93% of the adults noted ongoing speech and/or mechanical difficulties related to tongue-tie, nearly half reported feeling embarrassed about his or her condition. Although speech articulation was found to be normal in all subjects, 50% had subjective complaints about speech, stating that they considered their speech more effortful than that of others.¹

In the current study, all the patients underwent frenotomy, so no other methods were required. This may be primarily attributed to the absence of severe ankyloglossia cases. Tongue-tie can be repaired by various methods, including frenotomy or 'clipping', and frenuloplasty, either in the office or in the operating room. The most commonly performed techniques for severe ankyloglossia are the horizontal to vertical frenuloplasty or the Z-plasty release. Individual practitioners may choose more than one type of surgery depending on the patient's age or other factors. However, there is currently no consensus among physicians about surgical repair for ankyloglossia.^{2,3,11} Unfortunately, the lack of a method to predict which patients with tongue-tie are likely to become symptomatic complicates decision-making about surgical timing. One-third of otolaryngologists believe that frenuloplasty or frenotomy may be appropriately performed at any age, while others believe that surgery is inappropriate for young infants and/or for patients over the age of 12. Similarly, some authors have supported repair in infancy and prior to the development of speech; others advocate waiting until a speech problem manifests itself, usually after the age of 4 years.^{2,12-15} Early operations on all patients

may not be indicated, but delaying surgery until the onset of symptoms may result in an unnecessary period of rehabilitative speech therapy or social embarrassment for some patients.² Early repair of the disorder eliminates the concerns of both the parents and the physicians about the possible social/mechanical difficulties and speech disorders in the future. As in our series, the need for anaesthesia, as well as sutures, is also reduced. While the suture requirement is 10% in patients under 1 year of age, anaesthesia is needed in 40%. These requirements for those over 1 year of age were 20% and 100% respectively, exacerbating the cost and risks of anaesthesia. Surgery should therefore be performed at the most appropriate time and in the optimal conditions once the diagnosis has been established.

Complications rarely occur after frenotomy or frenuloplasty. About 82% of otolaryngologists, 90% of pediatricians, 98% of lactation consultants, and 87% of speech pathologists reported never having seen a complication secondary to these procedures. Recurrent ankyloglossia due to scarring was the most common complication reported by 14% of otolaryngologists, and 2% of pediatricians, lactation consultants, and speech pathologists. Although the presence of a 'worsening or new speech disorder' was reported by 7% of speech pathologists and by only one pediatrician, no otolaryngologists reported this complication.² Another complication, 'excessive bleeding', has been reported by 3% of otolaryngologists and 8% of pediatricians. Infection or increased difficulty in feeding as a result of frenotomy/frenuloplasty were rarely

observed (cited by 1% or less).² In our study, only three patients (2.3%) had early post-frenotomy haemorrhage, and this was dealt with by sponge compression without a need for anaesthesia or resuturing. Another patient was re-operated due to recurrence after a previous operation in another centre.

Conclusion

The decision to operate was reached after a physical examination based on breast-feeding problems stated by the mother or the pediatrician monitoring the baby in most of our patients aged less than 1 year at the time of the frenotomy. Administration of general anaesthesia using a laryngeal mask instead of a face mask gives the surgeon the opportunity to manipulate the tongue freely and to make sutures safely (if required) without stopping the delivery of anaesthetic gases, which may lead to undue hastening and perioperative complications. We therefore strongly recommend using a laryngeal mask during this procedure. In addition, the early correction minimises the feeding- and speech-related concerns of the parents and physicians alike.

References

1. Lalakea ML, Messner AH. Ankyloglossia: the adolescent and adult perspective. *Otolaryngol Head Neck Surg.* 2003;128:746-752.
2. Messner AH, Lalakea ML. Ankyloglossia: controversies in management. *Int J Pediatr Otorhinolaryngol.* 2000;54:123-131.
3. Messner AH, Lalakea ML. The effect of ankyloglossia on speech in children. *Otolaryngol Head Neck Surg.* 2002;127:539-545.

4. Kotlow LA. Ankyloglossia (tongue-tie): a diagnostic and treatment quandary. *Quintessence Int.* 1999;30:259-262.
5. Kalu PU, Moss AL. An unusual case of Ankyloglossia Superior. *Br J Plast Surg.* 2004;57:579-581.
6. Ricke LA, Baker NJ, Madlon-Kay DJ, DeFor TA. Newborn tongue-tie: prevalence and effect on breast-feeding. *J Am Board Fam Pract.* 2005;18:1-7.
7. Naimer SA, Biton A, Vardy D, Zvulunov A. Office treatment of congenital ankyloglossia. *Med Sci Monit.* 2003;9:CR432-435.
8. Ballard JL, Auer CE, Khoury JC. Ankyloglossia: assessment, incidence, and effect of frenuloplasty on the breastfeeding dyad. *Pediatrics.* 2002;110:e63.
9. Dollberg S, Botzer E, Grunis E, Mimouni FB. Immediate nipple pain relief after frenotomy in breast-fed infants with ankyloglossia: a randomized, prospective study. *J Pediatr Surg.* 2006;41:1598-1600.
10. Messner AH, Lalakea ML, Aby J, Macmahon J, Bair E. Ankyloglossia: incidence and associated feeding difficulties. *Arch Otolaryngol Head Neck Surg.* 2000;126:36-39.
11. Heller J, Gabbay J, O'Hara C, Heller M, Bradley JP. Improved ankyloglossia correction with four-flap Z-frenuloplasty. *Ann Plast Surg.* 2005;54:623-628.
12. Notestine GE. The importance of the identification of ankyloglossia (short lingual frenulum) as a cause of breastfeeding problems. *J Hum Lact.* 1990;6:113-115.
13. Berg KL. Tongue-tie (ankyloglossia) and breastfeeding: a review. *J Hum Lact.* 1990;6:109-112.
14. Wright JE. Tongue-tie. *J Paediatr Child Health.* 1995;31:276-278.
15. Warden PJ. Ankyloglossia: a review of the literature. *Gen Dent.* 1991;39:252-253.

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