ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 04 | April - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"FUNCTIONAL IMPROVEMENTS OF SPEECH AND FEEDING POST TONGUE-TIE RELEASE: A RETROSPECTIVE STUDY"

Otorhinolaryngology

Dr. Amonika M — Post Graduate, Department Of Otorhinolaryngology, J J M Medical College, Davanagere, Karnataka, India.

Dr. Santosh U.P — MBBS, MS (ENT) Professor, Department of Otorhinolaryngology, J J M Medical College, Davanagere, Karnataka, India.

Dr. B.M. Harsha — MBBS, MS(General Surgery) DNB(Pediatric Surgery) Professor & Head, Dept. of Pediatric Surgery, J J M Medical College, Davanagere, Karnataka, India.

ABSTRACT

Introduction Tongue tie or Ankyloglossia is a condition whereby the lingual frenulum attaches near the tip of the tongue and may be thick, short or tight which results in restricted tongue movement. Tongue tie is present in 4% to 11% of newborns. Tongue tie can cause poor breastfeeding, poor speech intelligibility. Tongue tie release is commonly performed procedure. It may correct the restriction of tongue movement, allows more effective breastfeeding and also improvement in speech. **Aim:** To determine the functional outcome of speech and feeding after Tongue tie release. **Materials and Methods:** This is a retrospective study, conducted in Chigateri District Hospital, Bapuji Hospital and Bapuji Child Health Institute and Research Centre, are the teaching hospitals attached to J.J.M. Medical College in Davangere, Karnataka, from January 2015 to October 2023. Sample size of 71 cases, age group between 13 months to 13 years of either gender. Detailed history examination was carried out. The Coryllos tongue tie classifications was used to assess the degree of restriction. Tongue tie release was done under short general anaesthesia using bipolar cautery by single surgeon to maintain uniformity. Pre and postoperative evaluation from a speech therapist was carried out. Postoperative myofunctional exercise were recommended. The patients completed a phone survey for speech and feeding improvements through a questionnaire which was adapted from [3] at 3 months post tongue tie release. Preoperative and postoperative body weight was checked for patients who underwent tongue tie release for feeding difficulty. **Results:** A total of 71 patients were part of the study, out of which 51(71.83%) were male and 20 (28.17%) were female patients. The mean age of the patients was 4.45±2.65 standard deviation, out of which 50(70.42%) were between the age group of 13 months to 5 years and 21(29.58%) between 6 years to 13 years. Parents of the children who underwent tongue tie release underwent a phone survey for speech and feeding improvement through a questionnaire. With significant improvement in children's speech and feeding problems post tongue tie release, also improvement in post operative weight gain (p-value <0.001) which is highly statistically significant. **Conclusion:** Patients who underwent tongue tie release along with myofunctional exercises showed significant functional improvement in speech and feeding abilities.

KEYWORDS

Ankyloglossia, Tongue Tie Release, Speech, Feeding.

INTRODUCTION

Ankyloglossia (tongue-tie) is a congenital anomaly that occurs when infants are born with an abnormally short lingual frenulum which results in restricted tongue movement.[2]

Although most cases of ankyloglossia are sporadic, it can be associated with some syndromes, such as Ehlers-Danlos, Ellis-Van Creveld, Pierre Robin, infantile hypertrophic pyloric stenosis or X-linked cleft palate. Cases of autosomal dominant and recessive inheritance have been documented, finding newborns with mostly first-degree family history.[5]

The lingual frenulum is a fold of mucous membrane that extends from the floor of the mouth to the midline of the underside of the tongue. It helps to stabilise the base of the tongue and does not normally interfere with tongue tip movement Tongue.tie (ankyloglossia) is a condition in which the lingual frenulum has an anterior attachment near the tip of the tongue and may be unusually short, tight and thick. This causes virtual adhesion of the tongue tip to the floor of the mouth and can result in restricted tongue tip movement.The exact cause of 'tongue.tie' (ankyloglossia) is not known. Genetics may play a role, as the condition tends to run in some families. Prevalence is about 4% to 11% among newborns.[1]

The tongue influences the growth and development of the oral cavity and also functional processes such as chewing, sucking, swallowing and speech. [5]

While reasons for variations are not always clear they are likely explained by differences in age groups across studies (i.e. from newborns to young adults of up to 17 years of age and by differences in how the tongue-tie was diagnosed (i.e. by clinician subjective assessment or by using objective measurement instruments, such as KOTLOW's method of grading or Hazelbaker's assessment tool. [2]

Tongue-tie has been cited as a cause of poor breastfeeding because the infant is unable to attach or stay latched on, and because maternal nipple pain may result .As an infant breastfeeds, the tongue moves with peristalsis over maternal lactiferous sinuses and extracts milk. When the infant's tongue movement is restricted, as is the case with severe tongue-tie, reduced movement may affect milk extraction, and friction may be present between the tongue or gums and the nipple, causing damage to the nipple and maternal pain..In older children and adults, tongue-tie has been implicated as a cause of speech delay, abnormal dentition, poor oral hygiene and inability to play wind instruments..References to tongue-tie causing speech problems date back to Aristotle in the third century BC. [1]

METHODOLOGY

Source of Data - The data is collected from the patients diagnosed with Tongue tie presenting to casualty, in-patient, and/or outpatient department at Chigateri District Hospital, Bapuji Hospital and Bapuji Child Health Institute and Research Centre, are the teaching hospitals attached to J.J.M. Medical College in Davangere, Karnataka.

Study Design: Retrospective cross sectional descriptive study.

Sampling method: Consecutive cases will be selected.

Study Period: January 2015 to October 2023

Sample size: 71 cases

Sample size was calculated based on the published study. The study reported prevalence of ankyloglossia varies from <1% - 10%. Considering prevalence of 5% with 5% margin of error minimum sample needed to conduct this study is 71 cases.

Method of Collection of Data

During the present study those patients presenting to casualty, in-patient, and/or outpatient department with Tongue tie were considered for the study. The data for this study will be collected from subjects fulfilling the inclusion and exclusion criteria.

Inclusion Criteria:

Patients with difficulty feeding, speech and restricted tongue

movements.

The patients included in this study were from 13 months to 13 years of age and either gender.

Exclusion Criteria:
Exclusion criteria included patients with cleft lip and cleft palate, age beyond 13 years and less than 13 months.
Patients with bleeding disorders, failure to receive vitamin K at birth.
Patients with life-threatening comorbid conditions
Patients with previous treatment for tongue tie.
Patient's attenders who did not give consent for surgery, medical contraindication to surgery.

Statistical analysis:
The data collected was entered into excelsheet and was analysed using SPSS version 25.0. Categorical variables were expressed as frequencies(percentages) and quantitative variables as mean±SD. Paired 't' test and McNemer's test were used to analyse the data.

Detailed history examination was carried out. The Coryllos tongue tie classifications was used to assess the degree of restriction. Tongue tie release was done under short general anaesthesia using bipolar cautery by single surgeon to maintain uniformity. Preoperative and postoperative evaluation from a speech therapist was carried out. Postoperative myofunctional exercise were recommended such as placing the ice cream stick in front to the mouth of the child and asking the child to touch the stick with the tongue and asking the child to mimic parent / guardian in front of the mirror like protruding the tongue out or touching the hard palate. The patients completed a phone survey for speech and feeding improvements through a questionnaire which was adapted from (3) at 3 months post tongue tie release. Preoperative and postoperative body weight was checked for patients who underwent tongue tie release for feeding difficulty.

RESULTS

Table - 1 :

Variable	Values
Age • 13 MONTHS - 5 YEARS • 6 YEARS – 13 YEARS	4.45±2.65# 50(70.42%) 21(29.58%)
Sex • Male • Female	 51(71.83%) 20(28.17%)
Pre-op weight(in kgs)	15.39±5.57#
Post-op weight(in kgs)	17.58±5.66#

#mean±SD
The difference between the pre-op and post-of weight is highly statistically significant(p<0.001)

Table - 2 : Speech improvements

Variable	N	Problem indicated	Improvement	p-value
Frustration with communication	71	33	7	0.614
Difficult for parents to understand	71	54	52	<0.001**
Difficult for outsiders to understand	71	67	60	0.01*
Difficulty speaking fast	71	37	29	0.512
Difficulty getting words out	71	53	53	<0.001**
Trouble with sounds	71	25	25	<0.001**
Speech delay	71	42	41	<0.001**
Stuttering	71	38	31	0.726
Mumbling or speaking softly	71	36	30	0.632
Baby talk	71	26	26	<0.001**

*p-value<0.05- statistically significant, **p-value<0.01- highly statistically significant

Problem indicated implies problem observed with the patient before tongue tie release

Improvement implies improvement observed with the patient after tongue tie release
Inference: Significant functional improvement in speech abilities post tongue tie release.

Table - 3: Feeding improvements

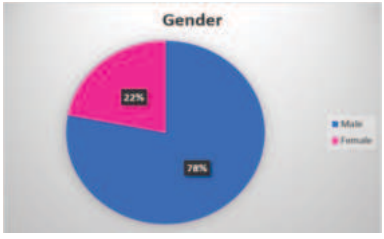
Variable	N	Problem indicated	Improvement	p-value
Frustration when eating	71	55	50	0.002*
Difficulty transitioning to solid foods	71	36	33	0.903
Slow eating/does not finish meals	71	37	35	0.223
Grazing throughout the day	71	35	34	0.156
Packing food in cheeks	71	56	51	<0.001**
Picky eater	71	53	48	<0.001**
Choking or gagging on food	71	36	34	0.839
Spits out food	71	36	33	0.903
Will not try new foods	71	66	65	<0.001**

*p-value<0.05- statistically significant, **p-value<0.01- highly statistically significant

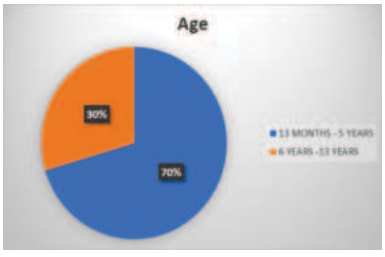
Problem indicated implies problem observed with the patient before tongue tie release

Improvement implies improvement observed with the patient after tongue tie release

Inference: Significant functional improvement in feeding post tongue tie release.



PIE CHART - 1
Inference: Among 71 patients, 51 patients were male and 20 patients were female.



PIE CHART - 2
Inference: Out of 71 patients, 50 patients belong to the age group of 13 months to 5 years and 21 patients belong to the age group of 6 years to 13 years.

Image - 1

Pre operative image of Ankyloglossia

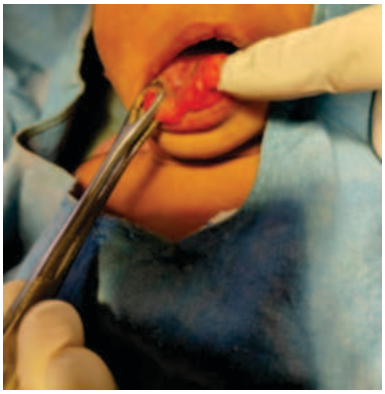


IMAGE - 2
Intra operative image of Tongue tie release

RESULTS

A total of 71 patients were part of the study , out of which 51(71.83%) were male and 20 (28.17%) were female patients. The mean age of the patients was 4.45±2.65 standard deviation , out of which 50(70.42%) were between the age group of 13 months to 5 years and 21(29.58%) between 6 years to 13 years. Parents of the children who underwent tongue tie release underwent a phone survey for speech and feeding improvement through a questionnaire.

Significant improvement in children's speech were reported (Table 2). In case of Frustration with communication, improvement was seen in 7 patients out of 33 who reported problem (p-value = 0.614).It was easier for parents (p-value <0.001) and others (p-value =0.01) to understand what child spoke. It was easier for the children to speak quickly (p-value =0.512), get words out (p-value <0.001), and make previously difficult sounds (p-value <0.001). Speech-delayed children produced new words (p-value <0.001), improvement in stuttering(p-value = 0.726), children mumbled less (p-value =0.632) and used less baby talk (p-value <0.001).

Parents also reported positive feeding changes (Table 3) Frustration when eating improved (p-value = 0.002),there was easy transition to solid food (p-value = 0.903) and would finish food fast (p-value = 0.223) exhibited less grazing behavior (p-value = 0.156), would not pack food in cheeks (p-value <0.001), were less picky (p-value <0.001), choked and gagged on food less (p-value =0.839), and spit food out less often (p-value =0.903) and also tried new food (p-value <0.001).

The difference between the pre-operative and post-operative weight is highly statistically significant (p-value <0.001) as there was significant increase in weight post tongue tie release (Table 1).

DISCUSSION

The results suggest that speech and feeding can be affected by a restricted tongue, and releasing a tongue-tie properly combined with myofunctional exercises can provide functional and quality of life improvement.

O'Shea JE, et al., The study was a randomised, quasi-randomised controlled trials or cluster-randomised trials that compared frenotomy versus no frenotomy or frenotomy versus sham procedure in newborn (n = 302). The objective of the study was to determine whether frenotomy is safe and effective in improving ability to feed orally among infants younger than three months of age with tongue-tie (and problems feeding). The conclusion of the study is frenotomy reduced breastfeeding mothers' nipple pain in the short term. Investigators did not find a consistent positive effect on infant breastfeeding. Researchers reported no serious complications, but the total number of infants studied was small. The small number of trials along with methodological shortcomings limits the certainty of these findings. Further randomised controlled trials of high methodological quality are necessary to determine the effects of frenotomy. [1]

Mudloon et al., It is a prospective before and after cohort study. Breastfeeding variables were determined at baseline prior to the frenotomy procedure and at 1-month post-frenotomy, and compared.The objective of the study is to determine breastfeeding variables at baseline prior to frenotomy in infants with tongue-tie;To determine if frenotomy has an impact on breastfeeding variables in infants with tongue-tie, and explore whether such impacts are positive or negative; To explore and determine factors that influence breastfeeding women's decision to choose frenotomy for their infants. Eligible participants were postpartum women, 18 years of age or older, who were breastfeeding their infants and attending a healthcare clinic for the purpose of a planned frenotomy.There was no sample size for the study .Overall, the study's findings demonstrate that frenotomy procedure positively affects breastfeeding variables. Overwhelmingly, almost all of the women in the study reported an overall improvement in breastfeeding and in specific challenges such as attachment and baby settling post-feed post-frenotomy.[2]

Richard Baxter et al., It is a prospective study involving children with tongue restrictions and speech, feeding, and sleep issues underwent lingual frenectomies with a CO2 laser, paired with myofunctional exercises. Questionnaires were completed before, 1 week after, and 1 month following treatment. Thirty-seven patients participated in the study (mean age 4.2 years [range 13 months to 12 years]). Overall, speech improved in 89%, solid feeding improved in 83%, and sleep improved in 83% of patients as reported by parents. Fifty percent (8/16) of speech-delayed children said new words after the procedure (P = .008), 76% (16/21) of slow eaters ate more rapidly (P < .001), and 72% (23/32) of restless sleepers slept less restlessly (P < .001).The results suggest that speech, solid feeding, and sleep can be affected by a restricted tongue, and releasing a tongue-tie properly combined with oral motor or myofunctional exercises can provide functional and quality of life improvement.[3] This study correlates with my study , as there is improvement in feeding and speech post tongue tie release with myofunctional exercises.

Bobak A. Ghaheri, et al., It is a prospective cohort study, participants consisted of breastfeeding mother–infant (0–12 weeks of age) dyads with untreated ankyloglossia and/or tethered maxillary labial frenula who completed preoperative, 1 week, and 1 month postoperative surveys consisting of the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF), visual analogue scale (VAS) for nipple pain severity, and the revised Infant Gastroesophageal Reflux Questionnaire (I-GERQ-R). Breastmilk intake was measured preoperatively and 1 week postoperatively.Surgical release of tongue-tie/lip-tie results in significant average improvement in maternal and infant breastfeeding outcome measures. Improvements occurred as early as (1 week postoperatively) and continue to improve 1 month postoperatively. Improvements were demonstrated in both infants with classic anterior tongue-tie and less obvious posterior tongue-tie.[4]

Franciso Guinot, et al., A descriptive, cross-sectional, population-based, retrospective study of newborns over a 5-year period (2016–2020) studied a total of 2333 newborns were included in the study (50.02% males and 49.98% females). The prevalence of ankyloglossia was 7.84% (n = 183). Of the infants examined, 136 underwent lingual frenotomy. The 4 number of infants who maintained exclusive breastfeeding, both surgically and nonsurgically treated, was no statistically significant differences at 1 month (p = 0.65), 3 months (p = 0.61) and 6 months (p = 0.49). The study concluded that lingual frenotomy was only performed on patients with ankyloglossia associated with ineffective suction that causes breastfeeding difficulties. The realization or not of frenotomy was not a determining factor for the maintenance of breastfeeding at 1 month, 3 months and 6 months. On the contrary, it was a determining factor for the prolongation of mixed feeding. Ankyloglossia related to breastfeeding difficulties should be treated by a multidisciplinary team.[5]

Zhao H, et al., The objective of the study is to determine the most appropriate intervention and optimal timing for infants with speech articulation caused by ankyloglossia. A total of 341 paediatric patients (aged 2 to 5 years) being referred for speech concerns due to ankyloglossia were enrolled in a randomized trial and assigned to either a surgical intervention (N = 166) or a no surgical intervention (N = 175) group. Further categorized into 3 groups according to age: 2 to < 3 years, 3 to < 4 years, and 4 to < 5 years. Measures of tongue appearance, tongue mobility, speech production, and parent and clinician intelligibility ratings were collected at preintervention, 2-month postintervention, 6-month postintervention, and 12-month postintervention. Conclusion of the study is surgical intervention should not be performed too early for infants aged 2 to < 3 years with

speech articulation caused by ankyloglossia, but rather watch and wait for the physiological growth of the lingual frenulum. The optimal timing range for surgical intervention is 4 to 5 years. This should provide certain significant guidance for infants with speech articulation caused by ankyloglossia.[8]

CONCLUSION

Patients who underwent tongue tie release along with myofunctional exercises showed significant functional improvement in speech and feeding abilities.

Limitations

As, this is a single tertiary care hospital based study, this may not necessarily represent the entire population.

Declarations:

Funding: The authors have no relevant financial or non-financial interest to disclose.

Conflicts of interest:

The Authors declare that there is no conflict of interest.

Availability of data and material:

The data used in this study was not used/published in any other publications.

Code Availability:

IBM SPSS Version 25.0 for windows will be used for analysing the data.

Consent to publication:

All authors have reviewed the manuscript and approved the version to be published.

Ethics approval:

The study was done after approval of the Institutional Ethics committee from JJM Medical College, Davangere, Karnataka, India in accordance with ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent to participate:

Informed consent was taken from all the patient attenders.

REFERENCES

[1] O'Shea JE, Foster JP, O'Donnell CPF, Breathnach D, Jacobs SE, Todd DA, Davis PG. Frenotomy for tongue-tie in newborn infants. Cochrane Database of Systematic Reviews 2017, Issue 3. Art. No.: CD011065. DOI: 10.1002/14651858.CD011065.pub2.

[2] Muldoon et al. Effect of frenotomy on breastfeeding variables in infants with ankyloglossia (tongue-tie): a prospective before and after cohort study; BMC Pregnancy and Childbirth 2017;17:373.

[3] Richard Baxter et al. Functional Improvements of Speech, Feeding, and Sleep After Lingual Frenectomy Tongue-Tie Release: A Prospective Cohort Study; Clinical Pediatrics 1–8 © The Author(s) 2020 DOI: 10.1177/0009922820928055 journals. sagepub.com/home/cp

[4] Bobak A. Ghaheri, et al. Breastfeeding Improvement Following Tongue-Tie and Lip-Tie Release: A Prospective Cohort Study; The Laryngoscope VC 2016 The American Laryngological, Rhinological and Otological Society, Inc.; The Laryngoscope VC 2016 The American Laryngological, Rhinological and Otological Society, Inc.

[5] Guinot Jimeno F, Carranza N, Ferrés-Amat E, Carranza M, Veloso A. Tongue-tie: incidence and outcomes in breastfeeding after lingual frenotomy in 2333 newborns. J Clin Pediatr Dent 2022;46(6):33-39.

[6] Wen Z, Walner DL, Popova Y, Walner EG. Tongue tie and breastfeeding Int J Pediatr Otorhinolaryngol. 2022 Sep;160:111242 doi: 10.1016/j.ijporl.2022.111242. Epub 2022 Jul 20.PMID: 35930834

[7] Ghaheri BA, Lincoln D, Mai TNT, Mace JC. Objective Improvement After Frenotomy for Posterior Tongue-Tie: A Prospective Randomized Trial. Otolaryngol Head Neck Surg. 2022 May;166(5):976-984. doi: 10.1177/01945998211039784.

[8] Zhao H, He X, Wang J. Efficacy of Infants Release of Ankyloglossia on Speech Articulation: A Randomized Trial.Ear Nose Throat J. 2022 Mar 24:1455613221087946. doi: 10.1177/01455613221087946. Online ahead of print.PMID: 35324342

[9] Wang J, Yang X, Hao S, Wang Y The effect of ankyloglossia and tongue-tie division on speech articulation: A systematic review. Int J Paediatr Dent. 2022 Mar;32(2):144-156. doi: 10.1111/ipd.12802. Epub 2021 May 22.PMID: 33964037

[10] Power RF, Murphy JF. Tongue-tie and frenotomy in infants with breastfeeding difficulties: achieving a balance.Arch Dis Child. 2015 May;100(5):489-94. doi: 10.1136/archdischild-2014-306211. Epub 2014 Nov 7.PMID: 25381293

[11] Webb AN, Hao W, Hong P. The effect of tongue-tie division on breastfeeding and speech articulation: a systematic review.Int J Pediatr Otorhinolaryngol. 2013 May;77(5):635-46. doi: 10.1016/j.ijporl.2013.03.008. Epub 2013 Mar 26.PMID: 23537928

[12] Cordray H, Mahendran GN, Tey CS, Nemeth J, Raol N. The Impact of Ankyloglossia Beyond Breastfeeding: A Scoping Review of Potential Symptoms.Am J Speech Lang Pathol. 2023 Nov 6;32(6):3048-3063. doi: 10.1044/2023_AJSLP-23-00169. Epub 2023 Aug 22. PMID : 37606583

[13] Srinivasan A, Al Khoury A, Puzhko S, Dobrich C, Stern M, Mitnick H, Goldfarb L. Frenotomy in Infants with Tongue-Tie and Breastfeeding Problems.J Hum Lact. 2019 Nov;35(4):706-712. doi: 10.1177/0890334418816973. Epub 2018 Dec 13.PMID: 30543756

[14] Bundogji N, Zamora S, Brigger M, Jiang W. Modest benefit of frenotomy for infants with ankyloglossia and breastfeeding difficulties.Int J Pediatr Otorhinolaryngol. 2020 Jun;133:109985. doi: 10.1016/j.ijporl.2020.109985. Epub 2020 Mar 9.PMID: 32193010

[15] Caloway C, Hersh CJ, Baars R, Sally S, Diercks G, Hartnick CJ. Association of Feeding Evaluation With Frenotomy Rates in Infants With Breastfeeding Difficulties. JAMA Otolaryngol Head Neck Surg. 2019 Sep 1;145(9):817-822. doi: 10.1001/ jamaoto. 2019. 1696.PMID: 31294774