LINGUAL FRENULUM PROTOCOL WITH SCORES FOR INFANTS

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ABSTRACT

An experimental protocol model for frenulum evaluation was first designed, and administered to ten infants in 2010. After obtaining the data and statistical analysis, the protocol was re-designed and administered to 100 infants. The aim of this study is to present an efficient and effective lingual frenulum protocol with scores for infants. From the experimental protocol model, a new protocol was designed. One speech-language pathologist, and specialist in orofacial myology, administered the new protocol to 100 full-term infants. All steps of the protocol were recorded and photographed. The data collected was sent to two specialists in the area, who evaluated the cases based on the recordings and photographs. The data from the three evaluations were compared. A two-part protocol was designed to evaluate the lingual frenulum in infants. The first part consists of clinical history with specific questions about family history and breastfeeding. The second part consists of clinical examination: anatomo-functional, non-nutritive and nutritive sucking evaluations. A new lingual frenulum protocol with scores for infants was designed, and has proved to be an effective tool for health professionals to assess and diagnose anatomical alterations of the lingual frenulum, and its possible interference with breastfeeding.

KEYWORDS: Evaluation, protocol, lingual frenulum, breastfeeding, sucking, infants

INTRODUCTION

The tongue participates actively in the functions of sucking, swallowing, chewing and speech. A small fold of mucous membrane, called lingual frenulum, connects the underside of the tongue to the floor of the mouth (Singh & Kent, 2000). The lingual frenulum effects the movement of the tongue. When the lingual frenulum cells don't undergo apoptosis completely during the embryologic development, the residual tissue may restrain the movements of the tongue (Knox, 2010).

Diagnosing any severe frenulum alteration is not difficult, as it is visible. However, differentiating the anatomical variations of the altered frenulum and the potential implications requires extensive knowledge of the anatomy of the tongue and the floor of the mouth.

The absence of agreement on the criteria used for evaluation and anatomical classification of the lingual frenulum may be the cause of the variation in the reported incidence rates of ankyloglossia which is between 0.88% and 12.8% (Kotlow, 1999; Messner, Lalakea, Aby, MacMahon, Bair, 2000; Ballard, Auer, Khoury, 2002; Messner & Lalakea, 2002; Lalakea & Messner**,** 2002; Voros-Balog, Vincze, Banoczy, 2003; Marchesan, 2005; Marchesan, 2010).

Only one protocol was identified to evaluate the frenulum in infants up to six months of age (Hazelbaker, 1993). This protocol includes several items regarding the appearance of the frenulum, and proposes the evaluation of the movements of the tongue through the stimulation of reflex and non-nutritive sucking. However, Ricke, Baker, Madlon-Kay, DeFor, (2005), reported limitations of this protocol in the identification of children with tongue-tie, who also with present breastfeeding difficulties. Knox (2010) also reported that this assessment tool is not widely used, possibly due to its applicability and complexity. Breastfeeding is directly related to the functions of sucking and swallowing, coordinated with breathing. As sucking and swallowing depend on the movements of the tongue, any alteration can result in functional

impairment. Breastfeeding difficulties can lead to early weaning and/or poor weight gain (Hazelbaker, 1993; Ballard et al, 2002; Messner et al, 2000; Coryllos, Genna, Salloum, 2004; Griffiths, 2004; Ricke et al, 2005; Kupietzky & Botzer, 2005; Hogan, Westcott, Griffiths, 2005; Hall & Renfrew, 2005; Segal, Stephenso, Dawes, Feldman, 2007; Geddes**,** Gollow, Jacobs, Hartmann, Simmer, 2008; Geddes, McClellan, Garbin, Chadwick, Hartmann, 2010; Knox, 2010; Edmunds, Miles, Fullbrook, 2011).

The aim of this study is to present an efficient and effective lingual frenulum protocol with scores for infants.

METHODS

This study was approved by the Ethics Committee of the Faculty of Dentistry of Bauru, University of Sao Paulo under number 113/2011.

From the experimental protocol model, a new protocol was designed. One speech-language pathologist, who is a specialist in orofacial myology, administered the new protocol to 100 full-term infants. All steps of the protocol were recorded and photographed. The information collected was sent to two specialists in the area, who evaluated the cases based on the recordings and photographs. The data from the three evaluations were compared. There was agreement among them. The data was subjected to statistical analysis using the chi-square test, followed by Fisher's exact test for qualitative variables, the Pearson correlation coefficient for quantitative data as well as analysis of variance (ANOVA) followed by Tukey test. (For additional information on the statistical analysis, please contact the author.)

From the data obtained a two-part protocol was designed to evaluate the lingual frenulum in infants. The first part consists of clinical history with specific questions about family history and breastfeeding. The second part consists of the clinical examination including: anatomo-functional, non-nutritive and nutritive sucking evaluations. All anatomical and functional aspects of the frenulum and tongue, including the assessment of nutritive sucking considered relevant, were included in the new protocol.

In the anatomo-functional evaluation, the position of the lips at rest and the tendency of tongue position during crying were observed. Rising the lateral margins of the tongue using the right and left index fingers, the speech-language pathologist observed whether it was possible to visualize the frenulum or not. Thickness and attachment to the tongue and to the floor of the mouth were assessed when the frenulum was visible.

Non-nutritive sucking was evaluated with the introduction of the gloved little finger in the infant's mouth for sucking. The movement of the tongue was observed, and considered adequate or inadequate. To evaluate the nutritive sucking, the infant was observed during breastfeeding. Rhythm and coordination among suction, swallowing and breathing were assessed.

RESULTS

A two-part protocol was designed to evaluate the lingual frenulum in infants. The first part consists of clinical history with specific questions about family history and breastfeeding. The second part consists of clinical examination: anatomo-functional, non-nutritive and nutritive sucking evaluations. Appendix A.

DISCUSSION

In the literature, only one specific protocol was identified, for the assessment of the lingual frenulum in infants, including anatomy and mobility of the tongue (Hazelbaker, 1993). This protocol was used in subsequent studies; however, there are controversies on its feasibility and effectiveness (Ballard et al, 2002; Ricke et al, 2005; Kupietzky & Botzer, 2005). Other studies propose a visual inspection of the lingual frenulum and a report by the mother concerning the infant during breastfeeding. Nipple pain, injury and difficulty with latching-on were the most common signs and symptoms related to the altered frenulum (Kotlow, 1999; Coryllos et al, 2004; Griffiths, 2004; Hogan et al, 2005; Knox, 2010).

Due to the absence of protocols to evaluate simultaneously the characteristics of the lingual frenulum and the functions of sucking

and swallowing during breastfeeding, a new protocol was proposed. Information was collected regarding the shape, fixation, thickness, and assessment of potential movements and functions which may contribute to an accurate diagnosis. Although there is a lack of agreement on the classification of frenulum alterations, studies confirm the interference with breastfeeding (Messner et al, 2000; Ballard et al, 2002; Messner & Lalakea, 2002; Coryllos et al, 2004; Griffiths, 2004; Ricke et al, 2005; Kupietzky & Botzer, 2005; Hogan et al, 2005; Hall & Renfrew, 2005; Segal et al, 2007; Geddes et al, 2008; Geddes et al, 2010; Knox, 2010). Frenectomy and *frenotomy* are also the subject of much discussion: whether surgery is recommended or not, which technique is the best, which professional should perform the procedure, and when it should be done (Messner et al, 2000; Navarro & López, 2002; Hogan et al, 2005; Wallace & Clarke, 2006; Geddes et al, 2008: Suter & Bornstein, 2009; Miranda & Milroy, 2010; Tuli & Singh, 2010, Knox, 2010; Kotlow, 2011). Specific protocols allow planned therapeutic actions, clinical procedure documentation, and evidence-based clinical practice.

CONCLUSION

A new lingual frenulum protocol with scores for infants was designed, and is considered to be an effective tool for health professionals to use for assessing and diagnosing the anatomical alterations of the lingual frenulum, and its possible interference with breastfeeding.

SPECIAL NOTE: In Brazil a law was recently passed which requires the free evaluation of lingual frenulum in all infants by a speech-language pathologist. At this time this law is valid only in the city Brotas which is in the State of Sao Paulo, and was signed on September 13, 2012 by the Major of Brotas city. The number of law is 2.565/2012. A request has been submitted to make the law a federal law in all of Brazil by the end of this year (2012).

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REFERENCES

Ballard, J.L.; Auer, C.E.; Khoury, J.C. (2002) Ankyloglossia: assessment, incidence, and effect of frenuloplasty on the breastfeeding dyad. *Journal of Pediatrics.* 110(5):1-6.

Coryllos, E.; Genna, C.W.; Salloum A.C. (2004) Congenital tongue-tie and its impact in breastfeeding. *Breastfeeding Newsletter.*1-6.

Edmunds, J; Miles, S; Fullbrook, P. (2011) Tongue-tie and breastfeeding: a review of the literature. *Australian Breastfeeding.* 19(1):19-26.

Geddes, D.T.; Kent, J.C.; McClellan, H.L.; Garbin, C.P.; Chadwick, L.M.; Hartmann, P.E. (2010) Sucking characteristics of successfully breastfeeding infants with ankyloglossia: a case series. *Acta Pædiatrica*. 99:301–303.

Geddes, D.T.; Langton, D.B.; Gollow, I.; Jacobs, L.A.; Hartmann, P.E.; Simmer, K. (2008) Frenulotomy for Breastfeeding Infants With Ankyloglossia: Effect on Milk Removal and Sucking Mechanism as Imaged by Ultrasound. *Pediatrics.*122:e188-e194.

Griffiths, D.M. (2004) Do Tongue Ties Affect Breastfeeding? *Journal of Human Lactation.* 20(4):409-414.

Hall, D.M.B.; Renfrew, M.J. (2005) Tongue-tie: common problem or old wives tale. *Archives Disability Childhood*. 90:1211-1215.

Hazelbaker, A.K. (1993) The assessment tool for lingual frenulum function (ATLFF): Use in a lactation consultant private practice. Pasadena, CA: *Pacific Oaks College*. Thesis.

Hogan, M.; Westcott, C.; Griffiths, M. (2005) Randomized, controlled trial of division of tongue-tie in infants with feeding problems. *Journal of Paediatric Childhood Health.* 41:246–250.

Knox, I. (2010) Tongue Tie and Frenotomy in the Breastfeeding Newborn. *NeoReviews.* 11(9):513-519.

Kotlow, L.A. (1999) Ankiloglossia (tongue-tie): a diagnostic and treatment quandary. *Quintessence International.* 31:276-278.

Kotlow, LA. (2011) Diagnosis and treatment of ankyloglossia and tied maxillary fraenum in infants using Er:YAG and 1064 diode lasers. *European Archives of Paediatric Dentistry. 1*2(2).

Kupietzky, A.; Botzer, E. (2005) Ankyloglossia in the Infant and Young Child: Clinical Suggestions for Diagnosis and Management. *Pediatric Dentistry*. 27:(1).

Lalakea, M.L.; Messner, A.H. (2002) Ankyloglossia: the adolescent and adult perspective. *Journal of Otolaryngology Head and Neck Surgery*; 127:539-545.

Marchesan, I.Q. (2005) Lingual frenulum: quantitative evaluation proposal. *International Journal of Orofacial Myology*. 31:39-48.

Marchesan, I.Q. (2010) Protocolo de avaliação do frênulo da língua. *Revista de Atualização Científica CEFA*C.12(6):977-989.

Messner, A.H.; Lalakea, M.L.; Aby, J.; MacMahon, J.; Bair, E. (2000) Ankyloglossia incidence and associated feeding difficulties. *Archives of Otolaryngology Head and Neck Surgery.* 126:36-39.

Messner, A.H.; Lalakea, M.L. (2002) The effect of ankyloglossia on speech in children. *Archives of Otolaryngology Head and Neck Surgery.* 127:539-545

Miranda, B.H.; Milroy, C.J. (2010) A quick snip - A study of the impact of outpatient tongue-tie release on neonatal growth and breastfeeding. *Journal Plastic Reconstruction Aesthetic Surgery.* 63(9):e683-685.

Navarro, N.P.; López, M. (2002) Anquiloglossia en niños de 5 a 11 años de edad. Diagnóstico y tratamiento. *Revista Cubana Estomatologia*. 39(3):3-7.

Ricke, L.A.; Baker, N.J.; Madlon-Kay, D.J.; DeFor, T.A. (2005) Newborn tongue-tie: prevalence and effect on breast-feeding. *Journal of the American Board Family Medicine.* 18(1):1–7.

Segal, L.M.; Stephenso, R.; Dawes, M.; Feldman, P. (2007) Prevalence, diagnosis, and treatment of ankyloglossia. *Canadian Family Physician*. 53:1027-1033.

Singh, S.; Kent, R.D. (2000) Dictionary of speech-language pathology. San Diego, California: *Singular's.*

Suter, V.G.; Bornstein, M.M. (2009) Ankyloglossia: facts and myths in diagnosis and treatment. *Journal of Periodontology.* 80(8):1204-1219.

Tuli, A.; Singh, A. (2010) Monopolar diathermy used for correction of ankyloglossia. *Journal of Indian Society of Pedodontics and Preventive Dentistry.* 28:130-133.

Voros-Balog, T.; Vincze, N.; Banoczy, J. (2003) Prevalence of tongue lesions in Hungarian children. *Journal of Oral Disease.* 9:84-87.

Wallace, H.; Clarke, S. (2006) Tongue tie-division in infants with breast-feeding difficulties. *International Journal of Pediatric Otolaryngology.* 70(7):1257-1261.

APPENDIX A

LINGUAL FRENULUM PROTOCOL WITH SCORES FOR INFANTS

HISTORY

Name: _____Birth: ____/____/_____

Examination date: ___/___/_____ Gender: M ( ) F ( )

Mother's name: _____

Father's name: _____

Address: _____ _____

City _____ State _____ ZIP: _____

Phone home: ( ) _____ office: ( ) _____ cell: ( ) _____
email: _____

Family history (any lingual frenulum alteration)

( ) no (0) ( ) yes (1) Who: _____ What:_____

Other health problems:

( ) no ( ) yes What: _____

Breastfeeding:
-
time between feedings: ( ) 3 hours (0) ( ) 2 hours (0) ( ) 1 hour or less (2)

-fatigue during feeding? ( ) no (0) ( ) yes (1)

sucks a little and sleeps? ( ) no (0) ( ) yes (1)

slips off nipple? ( ) no (0) ( ) yes (1)

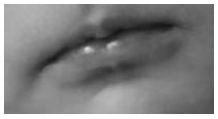
chews nipple? ( ) no (0) ( ) yes (2)

HISTORY SCORES: Best result = 0 Worst result = 8

CLINICAL EXAMINATION
(video for future analysis suggested)

PART I – ANATOMO-FUNCTIONAL EVALUATION

1. Lip posture at rest



( ) closed (0)



( ) half-open (1)



( ) open (1)

2. Tongue posture during crying



( ) midline (0)



( ) elevated (0)



( ) down (2)

3. Tongue shape during crying



( ) round or square (0)

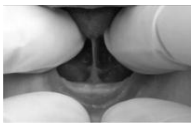


( ) V-shaped (2)



( ) heart-shaped (3)

4. Lingual Frenulum



( ) visible



( ) not visible



( ) visible with maneuver (*)

IF THE LINGUAL FRENULUM IS NOT VISIBLE, GO TO PART II (evaluation of orofacial functions)

4.1. Frenulum thickness



( ) thin (0)



( ) thick (2)

4.2. Frenulum attachment to the tongue



( ) midline (0)



( ) between midline and apex (1)



( ) apex (3)

4.3. Frenulum attachment to the floor of the mouth



( ) visible from the caruncles (0)



( ) visible from the crest (1)

* Maneuver: elevate and push back the tongue. If the frenulum is not visible, the infant must be seen by speech-language pathologist each two months for periodic frenulum evaluation.

Anatomo-functional evaluation scores: Best result = 0 Worst result = 12

PART II – EVALUATION OF OROFACIAL FUNCTIONS

1. Non-nutritive sucking (little finger suction wearing gloss)

1.1. Tongue movement

( ) adequate: tongue protrusion, coordinated movements and efficient suction (0)

( ) inadequate: restricted tongue protrusion, uncoordinated movement & late suction start (1)

2. Nutritive sucking (when breastfeeding starts, observe infant sucking during 5 minutes)

2.1. Suction Rhythm (observe groups of suction and pauses)

( ) several suctions in a row followed by short pauses (0)

( ) a few suctions followed by long pauses (1)

2.2. Coordination among suction/ swallowing/ breathing

( ) adequate (0) (balance between feeding and suction-swallowing-breathing without stress)

( ) inadequate (1) (cough, choking, dyspnea)

2.3. Nipple chewing

( ) no (0)

( ) yes (2)

2.4. Clicking during sucking

( ) no (0)

( ) non-systematic (1)

( ) frequent (2)

Orofacial function evaluation scores: Best result = 0 Worst result = 7

HYSTORY + CLINICAL EXAMINATION TOTAL SCORES:

BEST RESULT=0 WORST RESULT= 27

WHEN THE SUM OF HISTORY AND CLINICAL EXAMINATION IS EQUAL OR MORE THAN 9, LINGUAL FRENULUM MAY BE CONSIDERED ALTERED.

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