

Interchange of ankyloglossia for the evolution of the phonological framework: clinical case

Interferência do frênulo lingual para a evolução do quadro fonológico: caso clínico

Interferencia del anquilogossia para la evolución del cuadro fonológico: caso clínico

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Abstract

Introduction: Changing lingual frenulum becomes aggravating in children with Phonological Disorder. In view of the complexity of speech production, the speech-language intervention is necessary to ensure the balance between form and function. **Objective:** The purpose of this study is to describe the therapeutic process of a male child at five years of age with Phonological Disorder and lingual frenulum alteration. **Methods:** The diagnosis of Phonological Disorder was performed at 5 years of age. The evaluation of the phonological aspect was performed through the application of the imitation tests and appointment of the Children's Language Test ABFW- phonology and calculation of Percentage of Correct Consonants (PCC) in three different moments. The therapeutic intervention was based on the Modified Cycle Model and performed Frenectomy. **Results:** In the intervention process 12 speech therapy sessions were performed while the child waited for the surgical procedure, with a limited evolution of the / r / and / l / phonemes. A surgical procedure of Frenectomy and 23 speech therapy sessions were performed with the objective of organizing the phonological system. After therapeutic and surgical intervention, an

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MGC: reviewed the literature, defined the objective, methodological outline, analyzed and interpreted the results.

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improvement was observed in the degree of speech intelligibility that went from mild to moderate and adequacy of phonological processes not expected for the age. **Conclusion:** Speech therapy with a focus on phonological processes was important to improve speech intelligibility, but the surgical procedure is fundamental to improve articulatory distortions justified by the altered form.

Keywords: Lingual Frenulum, Speech Sound Disorder, Ankyloglossia.

Resumo

Introdução: A alteração de frênulo lingual se torna agravante em crianças com Transtorno Fonológico. Tendo em vista a complexidade da produção de fala, é necessário garantir que a intervenção fonoaudiológica contemple o equilíbrio entre forma e função. **Objetivo:** objetivo deste estudo foi descrever o processo terapêutico de uma criança, do sexo masculino, aos cinco anos de idade, com Transtorno Fonológico e alteração de frênulo lingual **Métodos:** O diagnóstico de Transtorno Fonológico foi realizado aos 5 anos de idade. A avaliação do aspecto fonológico foi realizada por meio da aplicação das provas de imitação e nomeação do Teste de Linguagem Infantil ABFW- item fonologia e cálculo de Porcentagem de Consoantes Corretas (PCC) em três momentos distintos. A intervenção terapêutica foi baseada no Modelo de Ciclos Modificado e realizada Frenectomia. **Resultados:** No processo de intervenção foram realizadas 12 sessões de terapia fonoaudiológica enquanto a criança aguardava o procedimento cirúrgico, notando-se evolução limitada dos fonemas /r/ e /l/. Foi realizado procedimento cirúrgico de Frenectomia e 23 sessões de terapia fonoaudiológica com o objetivo de organizar o sistema fonológico. Após intervenção terapêutica e cirúrgica foi observado melhora no grau de inteligibilidade de fala que passou de Levemente Moderado para Leve e adequação de processos fonológicos não esperados para a idade. **Conclusão:** A terapia fonoaudiológica com o enfoque nos processos fonológicos foi importante para amenizar a gravidade da inteligibilidade de fala, porém se faz fundamental o procedimento cirúrgico, visando melhorar as distorções articulatórias justificadas pela forma alterada.

Palavras-chave: Frênulo de Língua, Transtorno Fonológico, Anquiloglossia.

Resumen

Introducción: La alteración de frentes linguales se vuelve agravante en niños con trastorno fonológico. En vista de la complejidad de la producción de habla, es necesario garantizar que la intervención contemple el equilibrio entre forma y función. **Objetivo:** Describir el proceso terapéutico de un niño, sexo masculino, a los cinco años de edad, con trastorno fonológico y alteración de frente lingual. **Métodos:** El diagnóstico de trastorno fonológico fue realizado a los 5 años de edad. La evaluación del aspecto fonológico fue realizada por medio de la aplicación de las pruebas de imitación y nombramiento del Test de Lenguaje Infantil ABFW- elemento fonología y cálculo de Porcentaje de Consonantes Corretas (PCC) en tres momentos distintos. La intervención terapéutica fue basada en el Modelo de Ciclos Modificado y realizada Frenectomía. **Resultados:** Se realizaron 12 sesiones de terapia fonoaudiológica mientras el niño aguardaba el procedimiento quirúrgico, notándose una evolución limitada de los fonemas / r / y / l /. Se realizó Frenectomía y 23 sesiones de terapia fonoaudiológica con el objetivo de organizar el sistema fonológico. Después de intervención terapéutica y quirúrgica se observó mejoría en el grado de inteligibilidad de habla que pasó de Leoso Moderado a Ligera y adecuación de procesos fonológicos. **Conclusión:** La terapia de fala con el enfoque en los procesos fonológicos fue importante para amenizar la gravedad de la inteligibilidad de habla, pero se hace fundamental el procedimiento quirúrgico, buscando mejorar las distorsiones articulatorias justificadas por la forma alterada.

Palabras claves: Frenillo Lingual, Trastorno Fonológico, Anquiloglosia.

Introduction

Lingual frenulum is a small fold of mucous membrane that attaches the tongue to the floor of the mouth¹, suffering no change in thickness, attachment to the tongue and to floor of the mouth during the individual's growth².

Since adequate production of speech depends on the balance between basic motor processes of speech and anatomofunction structures of the stomatognathic system³, alteration in the lingual frenulum can result in losses in orofacial functions due to restriction of tongue movements, with a larger and more frequent impact in speech⁴⁻⁶.

As a result of the influence of lingual frenulum alteration in speech, the literature describes the phonetic speech disorder, with distortions in the production of phones [r],[l],[s],[z], [n], [t] and [d], as well as alterations in speaking rate, and articulatory imprecision⁶⁻⁷.

Lingual frenulum alteration becomes intensified in children with Phonological Disorder since these children present more alterations in their orofacial praxis abilities, tongue posture⁸, speech functions⁹⁻¹¹, swallowing¹², and chewing¹³. In addition, specific Language characteristics, speech programming, and child's age must be considered, which relate directly to the severity of the phonological disorder (speech intelligibility), without direct relationship to the severity of the alterations of tongue mobility^{8,14}.

Speech-language therapy focusing on eliminating phonological processes is important for the modification of articulatory parameters of speech¹⁵. Considering the complexity of speech production, it is important to ensure that phonological intervention favors the balance between form and function. Thus, the objective of this study is to describe the therapeutic process of a clinical case with Phonological Disorder and lingual frenulum alteration.

Method

A case study of a male child diagnosed with Phonological Disorder treated at a school clinic in the city of Bauru was carried out. This study was approved by the Human Research Ethics Committee under number CAAE 13033313.3.0000.5417.

Diagnosis of Phonological Disorder was given at 5 years of age through a speech-language therapy

evaluation including an audiological evaluation and evaluation protocols of speech and language.

The evaluation of the phonological aspect was done through imitation and naming tests of the ABFW Child Language Assessment - phonology¹⁶ in three distinct moments: preintervention, after 12 sessions of speech-language therapy, while waiting for surgery, and after surgical and therapeutic intervention. With a sample of the ABFW Child Language Assessment- phonology, it was possible to evaluate the degree of speech intelligibility from the calculation of Percentage of Consonants Correct (PCC)¹⁷.

The intervention was based in the Modified Cycles Model¹⁸. In this model of phonological intervention, each cycle lasts three weeks and a phonological process was worked in each week, using the chronological order of acquisition to define the order in which the process would be worked on. In each process, one or two target sounds were worked on and each was worked on during the session, moving on to another on the next session. Finalizing each process, a stimulatory probe was used aiming at verifying the generalizations reached by the child. When more than 50% of correct productions were reached, the next process would be started. An auditory bombardment with a list of 15 words with the target sound of the session was done at the beginning and at the end of each session.

Results

The audiological evaluation demonstrated hearing within normal standards and adequate function of the middle ear.

The following phonological processes were identified in the language assessment: Stopping, Fronting, Velar assimilation, backing, liquid simplification, Cluster Simplification, Final Consonant Deletion, being considered moderately severe.

In addition to phonological substitutions, lingual frenulum alteration was observed through the Lingual Frenulum Protocol. Limitation to opening of the mouth, heart-shaped tongue at elevation and regarding fixation, short anterior frenulum, in addition to alteration in mobility of the tongue due to interference of the frenulum were observed. Such aspects interfered directly with orofacial functions. Frenectomy was indicated.



Figure 1. Condition of the lingual frenulum on the clinical case studied (left) and performance in tongue lateralization (right).

The speech-language intervention aiming at organizing the phonological system started when the child was five years old and received the diagnosis of Phonological Disorder. There were 12 speech-language therapy sessions while the child waited for surgery, with very limited progress, especially in the production of phonemes /r/ e /l/. After the procedure, there were 23 sessions with the same objective, aiming generalization and improvement of speech intelligibility.

In the evaluation prior to the surgery, the child obtained 79% PCC in the naming test and 77% in the imitation test, having intelligibility level Mildly Moderate. After surgical and therapeutic intervention, the child obtained 88% PCC in the naming test and 92% in the imitation test, changing their classification to mild, as observed in Chart 1.

Chart 1. Evaluation of the phonological aspect pre and post intervention.

| Aspect Evaluated | Pre-intervention Evaluation | Evaluation after 12 sessions, without surgical intervention | Post-Intervention (surgery and therapy) Evaluation |
|---|---|---|---|
| Phonology (Phonological Processes) | <i>Not expected:</i> Stopping, Fronting, Velar assimilation, backing and liquid simplification <i>Expected:</i> Cluster Simplification and Final Consonant Deletion. | <i>Not expected:</i> Liquid simplification <i>Expected:</i> Cluster Simplification and Final Consonant Deletion. | <i>Expected:</i> Cluster Simplification and Final Consonant Deletion. |
| Percentage of Consonants Correct (%) | Imitation: 61% Naming: 64% | Imitation: 77% Naming: 79% | Imitation: 92% Naming: 88% |
| Alteration of Speech Intelligibility | Moderately Severe | Mildly Moderate | Mild |

Discussion

Manifestations of language and speech in children with Phonological Disorder are diverse, stemming from difficulties in the linguistic and/or motor speech processing¹⁹. In the case presented, the child showed phonological substitution processes characterized by the exchange of a sound for another of a different class (Stopping), of assimilation, related to the exchange of a sound making it similar to an adjacent sound (Fronting, Velar assimilation, backing, liquid simplification, Cluster Simplification) and of syllabic structure, which alters the syllabic structure of the word (Final Consonant Deletion), with difficulty in the evolution of processes related to liquid phonemes.

It is expected that a child acquires more complex sounds between the ages of 4 and 7, stabilizing the phonological system²⁰. However, in the case studied, in addition to the difficulty in the linguistic processing, there was also the alteration of the lingual frenulum influencing negatively the articulatory productions.

The most common problems related to frenulum alteration are related to speech articulation, causing limitations to articulatory production involving ampler and more elaborate movements and difficulty in the production of consonant clusters. The alterations described usually appear during childhood and go on to adulthood if adequate intervention is not offered²¹⁻²⁴.

The Speech-Language Therapist inspects the frenulum visually, evaluating movements of the tongue and orofacial functions such as chewing, swallowing, and speech, and from this evaluation, surgical or therapeutic intervention is suggested, whenever necessary to correct those altered functions^{23,25}.

It was possible to note improvement in speech intelligibility and adequate production of sounds after both interventions. This is explained because stimulation of cognitive and linguistic abilities can make motor abilities involved in the production of sounds of speech easier²⁶. Literature also shows that frenectomy corrects functions such as speech quality that was previously influenced by the quality of the sounds before surgery, leading to persistent failure in articulatory production²⁷⁻²⁸.

Conclusion

Speech-language therapy focusing on phonological processes was important to diminish the severity in speech intelligibility; however, surgical procedure was fundamental for lingual frenulum, aiming to alleviate articulatory distortions justified by the altered form.

References

1. Kotlow LA. Ankyloglossia (tongue-tie): a diagnostic and treatment quandary. *Quintessence Int.* 1999;30(4):259-62.
2. Martinelli RLC, Marchesan IQ, Berretin-Felix G. Estudo longitudinal das características anatômicas do frênulo lingual comparado com afirmações da literatura. *Rev. CEFAC.* 2014;16(4):1202-1207.
3. Martinelli RLC, Fornaro EF, Oliveira CJM, Ferreira LMDB, Rehder MIBC. Correlações entre alterações de fala, respiração oral e oclusão. *Rev CEFAC.* 2011;13(1):17-26.
4. Perlato NM, Nahás-Scocate ACR, Jabur LB, Ferreira RI, Garib DG, Corotte KMV. Correlação entre a presença do ceceo anterior e os tipos de trespasse vertical interincisivos na dentadura decídua. *Ver OdontolUniv São Paulo.* 2009;21(2):98-103.
5. Marchesan IQ, Teixeira AN, Cattoni DM. Correlações entre diferentes frênuos linguais e alterações na fala. *Rev Disturb Comun.* 2010;22(3):195-200.
6. Martinelli RLC, Marchesan IQ. Aspectos da Fala nas alterações de frênulo lingual. In: Berretin-Félix Giédre et al Org. *A Fala nos diversos contextos da Motricidade Orofacial.* Editora Pulso São José dos Campos. 2015.
7. Cuestas G, Demarchi V, Corváln MPM, Razetti J, Boccio C. Tratamiento quirúrgico del frenillo lingual corto en niños. *Arch Argent Pediatr.* 2014;112(6):567-70.
8. Gubiani MB, Carli CM, Keske-Soares M. Desvio fonológico e alterações práxicas orofaciais e do sistema estomatognático. *Rev CEFAC.* 2015; 17(1):134-142.
9. Suzart DD, Carvalho ARR. Alterações de fala relacionadas às alterações do frênulo lingual em escolares. *Rev. CEFAC [Internet].* 2016 Dec [cited 2018 Feb 26];18(6): 1332-1339.
10. Braga LAS, Silva J, Pantuzzo CL, Motta AR. Prevalência de alteração no frênulo lingual e suas implicações na fala de escolares. *Rev CEFAC.* 2009;11(3):378-90.
11. Gonçalves CS, Ferreiro MC. Estudo da relação entre presença de frênulo lingual curto e/ou anteriorizado e a dorsalização do fone [r] na articulação da fala. *Rev CEFAC.* 2006;8(1):56-60.
12. Morisso MF, Berwig LC, Silva AMT. Anquiloglossia: ocorrência de alterações do sistema estomatognático. *Porto Alegre: Rev Gaúcha Odontol.* 2012; 60(2):203-208.
13. Silva MC, Costa MLVCM, Nembr K, Marchesan IQ. Frênulo de língua alterado e interferência na mastigação. *Rev CEFAC.* 2009;11(3):363-9



14. Marini C, Brancalioni AR, Gubiani MB, Freitas GP, Keske-Soares M, Cechella C. O fonema /r/ e as alterações do sistema estomatognático, idade, gênero e gravidade no desvio fonológico. *Rev Soc Bras Fonoaudiol.* 2011;16(4):422-9.
15. Melo RM, Dias RF, Mota HB, Mezzomo CL. Imagens de ultrasonografia de língua pré e pós terapia de fala. *Rev CEFAC.* 2016; 18(1):286-297
16. Andrade CRF, Béfi-Lopes DM, Fernandes FDM, Wertzner HF. ABFW – Teste de linguagem infantil: nas áreas de fonologia, vocabulário, fluência e pragmática. Carapicuíba, São Paulo: Pró-Fono, 2004.
17. Wertzner HF, Amaro I, Teramoto SS. Gravidade do distúrbio fonológico: julgamento perceptivo e porcentagem de consoantes corretas. *Pró-Fono.* 2005;17(2):185-94.
18. Tyler A, Edwards ML, Saxman J. Clinical application of two phonologically based treatment procedures. *Journal of Speech and Hearing Disorders.* 1987; (52):393-409.
19. Dodd B. Differential diagnosis of pediatric speech sound disorder. *Curr Dev Disord Rep.* 2014;1(3):189-96. <http://dx.doi.org/10.1007/s40474-014-0017-3>.
20. Wertzner HF. Fonologia: desenvolvimento e alterações. In: Ferreira LP, Béfi-Lopes DM, Limongi SCO. *Tratado de Fonoaudiologia.* 1. ed. São Paulo: Roca, 2004;772-786.
21. Wallace AF. Tongue-tie. *Lancet.* 1963; 2(7304):377-8.
22. Messner AH, Lalakea ML. The effect of ankyloglossia on speech in children. *Otolaryngol Head Neck Surg.* 2002; 127(6):539-45.
23. Marchesan IQ. Frênulo de língua: classificação e interferência na fala. *Rev CEFAC.* 2003;5(4):341-5.
24. Marchesan IQ. Frênulo lingual: proposta de avaliação quantitativa. *Rev. CEFAC.* 2004; 6(3):288-93.
25. Garcia-Pola MJ, Garcia-Martin JM, Gonzalez-Garcia M. Prevalence of oral lesions in the 6-year-old pediatric population of Oviedo (Spain). *Med Oral.* 2002; 7(3):184-91.
26. Nip ISB, Green JR, Marx DB. The co-emergence of cognition, language, and speech motor control in early development: A longitudinal correlation study. *J Commun Disord.* 2011;44(2):149-60.
27. Marchesan IQ, Martinelli RLC, Gusmão RJ. Frênulo lingual: modificações após frenectomia. *J Soc Bras Fonoaudiol.* 2012;24(4):409-12
28. Suter VGA, Bornstein MM. Ankyloglossia: Facts and Myths in Diagnosis and Treatment. *J Periodontol.* 2009; 80(8):1204-19.

