



ISSN: 2230-9926

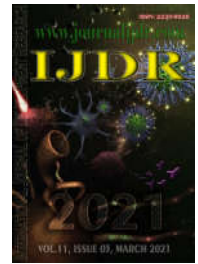
Available online at <http://www.journalijdr.com>

# IJDR

International Journal of Development Research

Vol. 11, Issue, 03, pp.45565-45567, March, 2021

<https://doi.org/10.37118/ijdr.21328.03.2021>



RESEARCH ARTICLE

OPEN ACCESS

## COMPARATIVE ANALYSIS OF ANESTHETIC TECHNIQUES IN LINGUAL FRENOTOMIES THROUGH INFANT CRYING: A RANDOMIZED CLINICAL TRIAL IN CHILDREN

<sup>1</sup>Rise Consolação Luata Costa Rank, <sup>2</sup>Ademir Esperidião Santos Segundo, <sup>2</sup>Renato Duarte Silva, <sup>3</sup>Ivan Luata Rank, <sup>4</sup>Wataro Nelson Ogawa, <sup>5</sup>Sara Falcão de Sousa and <sup>6</sup>Joana Estela Rezende Vilela

<sup>1</sup>Dr in Pediatric Dentistry, University of GurupiUnirG, Brazil; <sup>2</sup>Graduate in Medicine, University of GurupiUnirG, Brazil; <sup>3</sup>Graduate in Engineering, University of GurupiUnirG, Brazil; <sup>4</sup>Dr. Department of Medicine University of GurupiUnirG, Brazil; <sup>5</sup>Me. Department of Pharmacy, University of GurupiUnirG, Brazil; <sup>6</sup>Me. Department of Community Health, University of GurupiUnirG, Brazil

### ARTICLE INFO

#### Article History:

Received 18<sup>th</sup> January, 2021

Received in revised form

22<sup>th</sup> January, 2021

Accepted 20<sup>th</sup> February, 2021

Published online 30<sup>th</sup> March, 2021

#### Key Words:

Ankyloglossia; Child; Pediatric Dentistry; Crying.

#### \*Corresponding author:

Rise Consolação Luata Costa Rank,

### ABSTRACT

Ankyloglossia is considered a congenital anomaly characterized by the short insertion of the lingual brake. Babies with this anomaly may present restrict tongue mobility, providing swallowing difficulties, deficiency in breastfeeding, and even early weaning. This study was to compare anesthetic techniques for frenotomy through the analysis of infant crying. This randomized clinical trial (UTNU111112483748) consisted of 24 children aged 2 to 3 months, indicated for frenotomy from May to October 2019, performed by the pediatric dentistry team of the Health Unit Service (HUS), in Gurupi, Tocantins State, Brazil. Three anesthetics commonly used for this surgical intervention were tested. The children were evaluated by sound recording at two moments of the surgical act by a mobile device with a calibrated "decibel meter" application. The mean intensities of infant crying in surgery with phenylephrine/tetracaine topical were significantly lower than the mean intensities when lidocaine injection ( $p = 0.0096$ ) was used, but the same statistical procedure applied, comparing topical Benzocaine versus lidocaine injection, showed no significant difference ( $p = 0.35$ ). The methods of noninvasive topical applications were better than invasive ones, the sound analysis showed that topical application of ophthalmic eye drops of tetracaine/phenylephrine proved to be the best analgesia in frenotomies.

Copyright © 2021, Rise Consolação Luata Costa Rank et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Rise Consolação Luata Costa Rank, Ademir Esperidião Santos Segundo, Renato Duarte Silva, Ivan Luata Rank, Wataro Nelson Ogawa, Sara Falcão de Sousa and Joana Estela Rezende Vilela Rocha Souza, Fernanda Vasconcelos Prado Correia, Ana Carolina Amorim Oliveira, Gabriel Vinicius Rabelo dos Santos and Halley Ferraro Oliveira, 2021. "Comparative analysis of anesthetic techniques in lingual frenotomies through infant crying: a randomized clinical trial in children", *International Journal of Development Research*, 11, (03), 45565-45567.

## INTRODUCTION

Pain in babies is difficult to be measured because they cannot verbally express the painful sensation, therefore, interpreting and understanding when the child is crying for pain, fear, hunger, thirst, or only for protesting to reject something, deserves special attention by the scholars to quantify this crying (Weissman et al., 2009). Several physiological indicators can be used in the evaluation of the painful stimulus, such as heart and respiratory rates, blood pressure, oxygen saturation, palmar sweating, vagal tone, however, such physiological indicators do not are specifically related to pain. The main behavioral reactions of the child, when he or she feels pain is body movement, crying, and facial expression (Grunau, Craig, 1987). Ankyloglossia, popularly known as "trapped tongue", is an anomaly of development characterized by alteration in the lingual frenulum and when the newborn presents difficulty in breastfeeding because of this condition, lingual frenotomy is indicated and performed still in

the maternity (Buryk et al., 2011). Frenotomy consists of a cut in the frenulum with scissors or scalpel, with or without the use of anesthetics (Messner, Lalakea, 2000). However, many professionals use local anesthetic (Lidocaine 2%) or topics, to control the baby's pain and also to reduce parents' concerns (Suture, Bronsteine, 2009; Junqueira et al., 2014; Tecco et al., 2015). A cross-sectional documentary analytical research was done in 2020, in the Hospital and Maternity Dona Regina (HMDR) in the state of Tocantins. This hospital is considered a reference hospital in the Microregion of Porto Nacional that covers 11 municipalities of the State of Tocantins. The results showed that Palmas city has a 16.1% incidence of ankyloglossia, that males were the most affected (62.5%), and consequently a large number of surgical procedures (frenotomies) (Segato et al., 2020). At Gurupi Regional Hospital (GRH), all professionals who perform frenotomy surgeries are dentists, and election anesthesia is 2% lidocaine. The hospital team that serves

babies, cares about the painful infant sensation and whether this is the most effective anesthetic. Thus, this study aimed to compare anesthetic techniques for the performance of frenotomy, through the analysis of infant crying.

## MATERIALS AND METHODS

This randomized clinical study consisted of a children sample indicated by Gurupi Region Hospital (GRH) that is a reference in the State of Tocantins, Brazil, covering 18 municipalities in the Region of the Legal Amazon, considered Bananal Island microregion. This research was submitted and approved by the Ethics Committee on Research with Human Beings of UnirG University, with protocol number 77949417.8.0000.5518.

### Inclusion and Exclusion criteria

Healthy children aged 2 to 3 months of both genders with adequate weight for age were included in the sample indicated after the pediatric evaluation of GRH and who were still breastfeeding. Of the 27 children indicated for frenotomy by maternity hospital at Gurupi regional hospital in this period, only three did not participate, because one of them had the flu on the day of surgery, and the mothers of the others did not authorize participation in the study. The researchers clarified the methodology and objectives of the study to parents in surgical scheduling. The person responsible signed a free and informed consent form for participation in the research. All surgical procedures occurred in the Basic Health Unit (UBS) João Manoel, during the intravenous period. The children were scheduled on a first-come, first-served basis at UBS.

**Development:** The surgeries occurred in six weeks from May to June 2019 every Friday. The groups were divided into six days: Group 1 (G1) – first and fourth day; Group 2 (G2) second and fifth day; and Group 3 (G3) third and sixth day. Due to the absence of emotional and psychological maturity, all children received the use of playful protective stabilization "Baby pacotinho®" and there was a reassessment of the frenulum condition with the Bristol protocol (BTAT) to certify the surgical need. The techniques followed the same pattern of surgical sequence, use of protective stabilization, oral antiseptics with Chlorhexidine at 12%, anesthesia stipulated for the group, frenulum surgery with fine-tipped surgical scissors, and breastfeeding immediately after Surgery. The anesthetic techniques used in groups: G1 – The patient received the use of topical anesthetic gel Benzocaine 20% (12g-Benzotop®), a small amount was taken in the cotton roll and maintained for 3 minutes in the sublingual region. G2– The child received the anesthetic of ophthalmic eye drops tetracaine hydrochloride 1% phenylephrine hydrochloride 0.1%, drip 4 drops on a cotton roll that was taken and maintained for 3 minutes in the sublingual region. G3 was considered the control group - The baby received local anesthetic applied with a short needle the injection of Lidocaine 2% in the sublingual region. After surgery, the child was released for immediate breastfeeding. The mother waited for 15 to 20 minutes in a room to check if the local bleeding stopped, and at this time the time of post-surgical crying was measured. The other day, the team contacted the mother by phone and questioned about some adverse reactions. Data were collected at the surgery with filming and recording of the baby's crying. In the post-surgical period, crying monitoring and adverse reactions were monitored. The timed time of crying recording was divided into two Surgical Moments (MS): RECORDING MS1: in the last minute of a topical anesthetic or anesthetic injection; and MS2 recording: in the minute of the frenulum cut act. The researcher monitored and recorded how long in the post-surgical period (in seconds), after the child's release of protective stabilization, she stopped crying. Crying was recorded on the mobile device with a properly calibrated "decibel meter and frequency" app (Figure 1). The surgery site was adapted so as not to have external noises and the mother who entered and accompanied the surgery was instructed to maintain total silence. The distance from the mobile device in the recording was 30 cm next to the child's oral cavity.

The decibels (dB) of the child's crying were measured in minimum dB, maximum dB, and mean dB value in 60 seconds for each MS. The result of the mean of MS1 and MS2 was calculated between the crying of each child. The analysis of the means of MS1 and MS2 was compared using the parametric Student test. The data were previously submitted to the Shapiro-Wilk normality test (BioEstat 5.3) and the results signaled possibilities for a parametric statistical treatment. The decibels of the application was duly recorded in the form of the average value found in each MS recorded.



**Figure 1.** Image of the reading of the mobile device with application "decibel meter", presenting the graph of sound measurement, with a minimum, maximum and average value of dB with the 1 minute recording period of the child's crying

## RESULTS

Among the 24 children included in the study, 8 were female and 16 males. In Table 1, the means of MS1 and MS2 were compared using a paired parametric test (Student) and for G1 ( $p=0.571$ ) and G2 ( $p=0.21$ ) did not present a significant difference at the level of 5% in crying intensity. G3 showed significant evidence in the intensity difference (dB) of the two MS ( $p=0.003$ ). For surveys in this regard, the mean intensities of MS1 between G2 and G3 were compared, in which G2 was significantly lower than the mean intensities of G3 ( $p=0.0096$ ), but the same statistical procedure applied to compare topical Benzocaine versus lidocaine injection, showed no significant difference ( $p=0.35$ ). The mean intensities (dB) of G2 were lower than the mean obtained in G1, thus G1 and G2 resulted in significant evidence of difference ( $p<0.001$ ). The analysis of the differences in means presented in table 1 was made using only the Student test, but Table 2 the one-way ANOVA test demonstrated at a criterion, and the results were similar ( $F=8,824$ ;  $p=0.002$ ), followed by Tukey's test to evaluate multiple comparisons in single-stage, where it also showed the same statistical results obtained in G1 ( $p < 0.01$ ); G1 and G3, it was not significant, but there was a significant difference between G2 and G3 ( $p < 0.05$ ).

**Table 1.** Distribution in number of sound intensity in decibels (dB) in both Surgical Moments; and Crying time after surgery.

G1		G2		G3	
Topic gel	Post	Topic	Post	Local	Post
BENZOCAINA		Tetracaine/ Phenylephrine		injection LIDOCAINE 2%	
MS1	MS2	MS1	MS2	MS1	MS2
37	43*	42	32	43	43
88	71	48	49	41	47*
69	72*	49	52	68	74*
68	68	47	41	49	62*
75	68	53	53*	55	69
64	64	55	55	54	65*
63	77*	50	51	49	58*
73	75*	54	31	73	76*
66 ± 9,8	67,3±10,6 *	49,8±4,3	45,5 ± 9,6 *	54 ± 11,3	61,8 ± 11,9*

A= the child stopped crying at the immediate moment when breastfeeding  
\* Standard decibel deviation

Table 2. Differences in the means between the groups.

TUKEY	Differences	Q	P	A one-way ANOVA (BioEstat 5.3)	
Mean (G1)	21.750	5.7130	<0.01		67.3
Mean (G2)	5.5000	1.4447	ns		45.5
Mean (G3)	16.250	4.2683	<0.05		61.8
				$f= 8.824$	$p= 0.002$

## DISCUSSION

The skin nerve endings and neurophysiological properties of the child's nociceptive receptors are similar to adults (Sweet, McGrath 1997; Cameron et al., 2007). Technological advances in the children's area seek to find measurable responses to subjective situations, such as a painful sensation for patients who cannot express themselves objectively. Thus, infant crying has characteristics that should be evaluated (Dahmani, 2018), it should be audible, varied, and harmonic timbre (Walco et al., 1994). Even medical professionals and dentists knowing that babies feel pain, show doubts about the best anesthetic technique in frenotomy. The indication of topical anesthetic during frenotomy was challenged by Ovental et al. (2014), who demonstrated that children cried less in frenotomy without the use of analgesia when compared to the use of benzocaine, assuming that perhaps the taste bothered more than the painful procedure. Although several studies report the use of analgesia for frenotomy in babies, many professionals do not use any anesthetics for this surgery (Patchos 2006). The selected topical anesthetics were Benzocaine and anesthetic eye drops (tetracaine hydrochloride/phenylephrine) that has been widely used in babies by Brazilian dentists (Conceição, 2017; Almeida, 2018). However, care should be taken to prevent swallowing and aspiration by the child. Swallowing these products can promote glottis analgesia, causing malaise in the patient (DiMarco, Wetmore, 2016). Therefore, in this study, the only dentist responsible for the surgeries took care that the baby did not swallow saliva during the application of the anesthetic, using the saliva and gauze suckers. Among the anesthetic studied, the cost of the procedure should also be taken into account, in which the topical benzocaine gel (Benzotop® 20%) costs around \$ 2.00. Ophthalmic eye drops Tetracaine hydrochloride + phenylephrine hydrochloride (Oculum®) costs around R\$ 8.96. On the other hand, the application of Lidocaine (Alphacaine 2%®) requires the use of a disposable tube, more disposable needle, and Carpule that ranges from \$ 12.00 to \$ 38.00 depending on the brand. The GRH team performs the frenotomy analgesia procedure with Lidocaine 2%, and in this sense, the use of topical anesthetic becomes more feasible, since the price of application with more carpule the anesthetic ends up being more costly for the professional and less advantageous for the patient because the result in dB demonstrated that this technique generates more pain when applying the injection when compared to the surgical procedure with the use of the topics. The post-surgical effect of the techniques used was measured according to crying time, and it was observed that the children cried more in the technique of application of lidocaine. The mothers reported that the children had difficulty making the handle on their chests and sucking, so they cried. Probably the babies had difficulty breastfeeding because local anesthesia infiltrates the tongue, while topical anesthetic was deposited more in the sublingual region, not affecting language movement. The fragility of this work occurred due to the difficulty of performing surgery in newborns because the Hospital only referred to those babies who sought help late, so the ages focused on 2 and 3 months. It was also not possible to equalize the patients of the same sex to compose the study sample since the malefactor is influenced by genetic factors evidenced in the sample distribution itself (Han, 2012).

Another fragility of the study, despite being a random sample, the anatomical individuality of the frenulums (anatomical variations: greater distribution of nociceptors) which would cause greater sensitivity to pain and the individual threshold of painful sensation with sound power in every child weeping. Through this experimental study, it is concluded that the methods of noninvasive topical applications were better than invasive ones, and among noninvasive ones, choro analysis showed that topical application of ophthalmic eye drops of tetracaine with phenylephrine proved to be the best procedure for frenotomy surgeries in babies from 2 to 3 months of age.

## REFERENCES

- Almeida KR, Leal TP, Kubo H, Castro TES, Ortolani CLF. 2018. Lingual frenotomy in a newborn, from diagnosis to surgery: a case report. *Revista CEFAC*. 20(2): 258-262.
- Buryk M, Bloom D, Shope T. 2011. Efficacy of neonatal release of ankyloglossia: a randomized trial. *Pediatrics*.128(2):280-288.
- Cameron EC, Raingangar V, Khoori N. 2007. Effects of handling procedures on pain responses of very low birth weight infants. *Pediatr Phys Ther*. 19(1):40-47.
- Conceição LS, de Oliveira LA, dos Santos BM, Ribeiro ALR, Levy Anderson César Alves LACC. 2017. Terapêuticacirúrgica da anquilog lossiaemlactentutiliz andoanestesiatiópicaoftálmica. *J Orofac Invest*. 4(2): 41-46.
- Dahmani, Habiba. Quantifying baby crying rhythm abnormalities using multilayer perceptron. (2018). <http://dspace.univ-masila.dz:8080/xmlui/handle/23456789/4377>
- DiMarco AC, Wetmore AO. 2016. Clinical Comparison: Fast-Acting and Traditional Topical Dental Anesthetic. *Anesthesia Progress*. 63(2): 55–61. DOI:10.2344/0003-3006-63.2.55
- Grunau RV, Craig KD. 1987. Pain expression in neonates: Facial action and cry. *Pain* .28(3):395–410.
- HAN, G. A. 2012. Study on the Genetic Inheritance of Ankyloglossia Based on Pedigree Analysis. *Arch Plast Surg*. 39(4):329-332.
- Junqueira MA, Cunha NNO, Silva LLC, Araújo LB, Moretti ABS. Filho CEGC, et al. 2014. Surgical techniques for the treatment of ankyloglossia in children: a case series. *J Appl Oral Sci*. 22(3): 241-248.
- Messner AH, Lalakea ML. 2000. Ankyloglossia: Controversies in management. *Int J Pediatr Otorhinolaryngol*. 54 (2-3):123-131,.
- Ovental A, Marom R, Botzer E, et al. 2014.Using topical benzocaine before lingual frenotomy did not reduce crying and should be discouraged. *Acta Paediatr*. 103(7):780–792.
- Paschos E, Huth KC, Benz C, et al. 2006. Efficacy of intraoral topical anesthetics in children. *J Dent*. 34(6):398–404.
- Segato CKX, Rank RCIC, Vilela JER, Marquez L, Borges TS, Silva JB, Ogawa WN. 2020. Prevalence of ankyloglossia in newborns of palmas (brazil). *Int journal of Develop Research*. 10; p. 33766-33769.
- Suture VGA, Bronsteine MM. 2009. Ankyloglossia: Facts and myths in diagnosis and treatment. *J Periodontol*. 80(8):1204-1219.
- Sweet SD, McGrath PJ. 1997. Physiological measures of pain. In: Finley GA, McGrath PJ. Measurement of pain in infants and children. *IASP Press: Seattle*. p. 59-81.
- Tecco S, Baldini A, Mummolo S, Marchetti E, Giuca MR, Marzo G et al. 2015. Frenulectomy of the tongue and the influence of rehabilitation exercises on the sEMG activity of 13 masticatory muscles. *Journal of Electromyography and Kinesiology*. 25(4): 619 – 628.
- Walco GA, Cassidy RC, Schechter NL. Pain, hurt, and harm. 1994. The ethics of pain control in infants and children. *N Engl J Med*. 331(8):541–544.
- Weissman A, Aranovitch M, Blazer S, et al. 2009. Heellancing in newborns: Behavioral and spectral analysis assessment of pain control methods. *Pediatrics*.124(5): e921–926.

\*\*\*\*\*