UPPER LABIAL FRENECTOMY IN PEDIATRIC DENTISTRY: WHEN TO INDICATE? - LITERATURE REVIEW

REVIEW ARTICLE

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BRAZ, Andréa Cavalcante Leão. e*t al.* **Upper Labial Frenectomy in Pediatric Dentistry: When to Indicate? - Literature Review.** Revista Científica Multidisciplinar Núcleo do Conhecimento. Year. 08, Issue. 06, Vol. 03, pp. 05-16. June 2023. ISSN: 2448-0959, Access Link: https://www.nucleodoconhecimento.com.br/health/upper-labial, DOI: 10.32749/nucleodoconhecimento.com.br/health/upper-labial

ABSTRACT

The labial frenulum, or frenum, is one of the components of the oral mucosa that can be found in both the upper and lower mucosa. When it does not develop correctly, it can present anomalies. It is common among parents, caregivers, and even healthcare professionals to have some difficulty in managing improperly inserted labial frenula, as well as in addressing their potential consequences. The most common measure for managing this alteration is frenectomy, which is a surgery that completely removes the labial frenulum with abnormalities. However, there is still much to study to determine the best age or when to indicate frenectomy. The objective of this work is to review literature addressing when to indicate upper labial frenectomy in pediatric dental patients. To do this, the PubMed, Google Scholar, SciELO, and Virtual Health Library (BVS) databases were consulted, using the boolean operator OR for the descriptors: lip, labial frenulum, oral surgery, pediatric dentistry, and child. A period between 2013 and 2022 was also limited for article publication. A total of 2049 articles were found, with 642 from PubMed, 412 from Google Scholar, 469 from SciELO, and 526 from the Virtual Health Library (BVS). However, only 13 were chosen due to their richness of content within the theme. All articles that were duplicated or diverged from the proposed theme, as well as theses, dissertations, and monographs, were excluded from this work. In addition to the chosen articles, two books by renowned authors in dentistry, published in 2016, contributed to this work. Upon analysis of the articles and books, there was a significant discussion among professionals who treat anomalies found in frenulae; some advocate for early frenectomy, while others approach frenectomy with caution. Thus, there is an evident need for more multidisciplinary studies focused on age-related results and when to recommend upper labial frenectomy in children.

Keywords: Lip, Labial Frenulum, Oral Surgery, Pediatric Dentistry, Child.

1. INTRODUCTION

The labial frenulum, or frenum, is a fold of mucous membrane, usually with embedded muscle fibers, that connects the lips and cheeks to the alveolar mucosa and/or underlying gum and periosteum (CARRANZA *et al.*, 2016). According to Delmondes *et al.* (2021), the upper labial frenulum is located on the inner side of the lip at the midline, at the junction of the maxillae, and its function is to limit the movements of the upper lip, as well as to provide support and stabilization to the lip and prevent excessive exposure of the gum.

The presence of abnormalities in the labial frenulum is considered by some authors to be one of the causes of incisal diastema, as well as a triggering factor for other undesirable clinical conditions such as limited lip movements, speech interference, and aesthetic impairment in patients. These abnormalities in the insertion of the labial frenulum can be diagnosed even in infancy, and after diagnosis, treatment options should be considered, including frenectomy, which is a surgical procedure (GUEDES PINTO, 2016).

Delmondes *et al*. (2021) state that frenectomy involves the complete removal of the frenulum, including its attachment to the adjacent bone, comprising various surgical techniques that must be carefully selected according to each case.

However, there is significant debate among researchers and differences in professional practices regarding when and at what age to recommend upper labial frenectomy in pediatric patients. In newborns, the upper lip frenulum typically attaches to the incisive papilla, and this position can become permanent or change with the expansion of the alveolar bone ridge that occurs during tooth eruption (GUEDES PINTO, 2016).

The American Academy of Pediatric Dentistry - AAPD (2022), along with Naini and Gill (2018) and Tadros *et al*. (2022), advise against performing frenectomy before the

eruption of permanent canines and before subjecting the patient to orthodontic treatment.

Therefore, the aim of this work is to conduct a literature review on when to recommend upper labial frenectomy, specifically for incisal diastema, in pediatric dental patients.

2. METHODOLOGY

The consulted databases were: PubMed, SciElo, Virtual Health Library (BVS), and Google Scholar. The descriptors used for article searches were: lip, labial frenulum, oral surgery, pediatric dentistry, and child, using the boolean operator OR. Inclusion criteria: articles published between 2013 and 2022 that addressed the topic or were related to the work. Exclusion criteria: all duplicated articles, those with discrepancies in the topic, theses, dissertations, monographs, and articles published more than 10 years ago, considering the period of research conducted until the second half of 2022. Following the filters established in the databases, a total of 2049 articles were obtained, with 642 from the PubMed platform, 412 from Google Scholar, 469 from SciELO, and 526 from the Virtual Health Library (BVS). However, only 13 of the articles obtained from the platforms were chosen for better meeting the inclusion criteria. Twelve were in English, and one was in Portuguese. In addition to these articles, two dentistry books published within the aforementioned period were also part of the reviewed collection.

3. LITERATURE REVIEW

The American Academy of Pediatric Dentistry – AAPD (2022), which is the American Academy of Pediatric Dentistry, conducted a literature review with the aim of establishing fundamental principles for creating a reference manual in pediatric dentistry: Policy on Management of the Frenulum in Pediatric Patients. To underpin this policy, a review of dental and medical literature was carried out with bibliographic research in the PubMed®/MEDLINE, Web of Science, and Google Scholar databases regarding frenulum, frenotomies, and frenectomy. A total of 1,622 articles meeting the required criteria were obtained, which included the stipulation that articles had a maximum of ten years of publication. In addition to the literature review, the opinions

of professionals in the field were also considered. Some of the reviewed studies indicated that hermetic sealing between the lips and the maternal breast or bottle can be compromised in cases of infants with a restrictive maxillary frenulum, potentially contributing to reflux, gas, colic, and irritation. Regarding the results, the authors observed a limitation of evidence regarding the determination of the timing, indication, and type of surgical intervention to be recommended to the patient, leading them to consider the specifics of each case for frenotomy. Even though the academy recommends that frenectomy should not be performed before the eruption of canines and prior orthodontic treatment, the authors of this study concluded that there is a wide differential diagnosis where the approach should be multidisciplinary, involving the participation of various specialists to plan treatment. There is also a need for further studies to determine when to recommend frenectomy and its effects.

Tanik and Çiçek (2021) conducted a study with the aim of evaluating the periodontal status and diastema between the teeth of patients who had abnormal frenula in the maxillary and mandibular midline after one year of frenectomy. Fifty patients were observed, including 24 men and 26 women, aged between 13 and 53 years, all of whom had diastemas resulting from abnormal frenula between the incisors, which were removed by conventional frenectomy. Follow-up was performed by measuring the distances between the teeth using calipers, with the first measurement taken pre-surgery and subsequent measurements taken up to one year after surgery. Periodontal status was determined through measurements at four surfaces of pocket depth, plaque index, and bleeding on probing. The amount of attached gingiva as well as the degree of gingival recession were statistically analyzed based on the obtained records. The authors observed that after frenectomy, there was a significant reduction in the distance between the teeth, as well as a statistically significant difference in attached gingiva, pocket depth, gingival recession, plaque index, and bleeding on probing. The authors concluded that frenectomy for the removal of abnormal frenula contributes to the reduction of diastemas, increases the amount of attached gingiva, and reduces pocket depth, plaque amount, gingival recession, and bleeding.

Baxter, Zaghi, and Lashley (2022) conducted a cohort study through the analysis of patient records and treatment outcomes. The objective was to determine the safety

and efficacy of contemporary laser frenectomy, particularly regarding scar tissue, to evaluate whether releasing the frenulum prevents the closure of diastema in pediatric patients. In this study, they examined 192 records of pediatric patients who had undergone maxillary labial frenectomy under local anesthesia with diode and CO2 lasers at a private pediatric dentistry clinic from January 2015 to May 2018. Only patients who met specific criteria, including the requirement for standard intraoral photos up to one month post-surgery, were chosen for comparison of diastema reduction. Of the 192 patients, only 109 met the criteria. Among these, 95 patients had deciduous dentition, and 14 had mixed dentition. No adverse results were observed in either deciduous or mixed dentition patients after surgery. Both groups showed a reduction in diastema width of over 90%, with more than 70% change in diastema width, progressing from >2 mm preoperatively to <2 mm width post-surgery. The authors concluded that frenectomy is associated with aesthetic and oral hygiene benefits, and the proper performance of frenectomy positively affected diastema closure in patients aged 1.9 to 8.1 years, involving deciduous and mixed dentition.

Sarmadi, Gabre, and Thor (2021) conducted a prospective, randomized, controlled, single-blind study to compare frenectomies performed using Er:YAG laser technology with those using the conventional scalpel technique. They focused on patient experiences regarding treatment time, bleeding during treatment, and wound healing. A total of 40 patients aged 7 to 19 years were randomly assigned to two groups, one undergoing conventional surgery and the other undergoing Er:YAG laser surgery. They were evaluated immediately post-surgery, at 5 days, 12 days, and 3 months post-surgery. This follow-up allowed comparisons of treatment time, bleeding, and wound healing between the two groups. The results showed that time spent, bleeding, and wound area were significantly greater in the conventional scalpel surgery group at the 5 and 12-day evaluations. At the 3-month evaluation, no difference was observed between the groups. At the end of the process, all patients were equally satisfied, regardless of the method used. The authors concluded that Er:YAG laser frenectomy offers more benefits in terms of treatment time, reduced bleeding, and smaller wound size, with results comparable to conventional scalpel frenectomy regarding wound

healing, median diastema reduction, or post-surgical discomfort, making Er:YAG laser frenectomy preferable, especially for children.

Olivi, Genovese, and Olivi G. (2018) conducted an observational study to indicate a surgical technique for repositioning the frenulum in a less invasive, safe, reproducible, easy, and predictable manner. They aimed to identify the appropriate clinical scenario for early frenectomy in combination with orthodontics. Twenty children aged 8 to 10 years underwent frenectomy using an Er:YAG laser. The laser settings were adjusted to 150 mJ, 2.25-3.0W, and 15-20 pulses per second, with water spray. Patients were followed up through clinical visits at 7, 21, and 90 days, followed by visits at 1, 2, 3, and 4 years post-procedure. The post-operative follow-up showed that all patients reported no pain, discomfort, prolonged bleeding, or significant suffering. There was no recurrence observed after four years. The authors concluded that the use of Er:YAG laser resulted in shorter operating time and reduced anesthesia requirements.

Tadros *et al*. (2022) conducted a systematic literature review aiming to obtain information associating abnormalities like hyperplasia or hypertrophy in the upper frenulum with the appearance of diastema. The goal was to provide parents and physicians with updated information on this topic. The authors conducted bibliographic searches in databases such as MEDLINE (PubMed), EMBASE, Web of Science, Cochrane Library, and Dental and Oral Sciences Source (DOSS), resulting in 314 articles. After a systematic review in the Covidence platform, only 11 articles were included in the final review. The review revealed that the literature indicates that diastema in the maxillary midline is related to two subtypes of frenulum, papillary and papillary penetrating. Therefore, frenectomy should not be performed before the eruption of canines and lateral incisors, and orthodontic treatment is recommended before frenectomy. Among the articles analyzed, it was common for diastemas to naturally decrease up to the age of 9. After this age, the presence of diastema can be considered abnormal. The authors concluded that, despite the high demand for frenectomy by parents, there is no consensus among healthcare professionals treating frenulum abnormalities regarding when to recommend frenectomy and the timing for its performance.

4. DISCUSSION

Labial frenulum abnormalities can have various consequences for individuals. The American Academy of Pediatric Dentistry - AAPD (2022) points out that among these consequences are difficulties in breastfeeding and feeding, resulting from the inhibition of a hermetic seal in the maternal breast or bottle due to labial restriction. This can lead to the entry of air, causing reflux, colic, or irritability in infants. Olivi, Genovese, and Olivi G. (2018), along with Özener, Meseli, Sezgin, and Kuru (2020), not only mention breastfeeding difficulties in babies but also highlight other consequences caused by anomalous insertion, such as interference with proper oral hygiene, leading to marginal gingivitis in surrounding areas, the appearance of carious lesions, and, most notably, the presence of diastemas. Ghaheri *et al*. (2017) also note that newborns with frenulum abnormalities often have lower than expected weights and further stress that the consequences are not limited to the baby, affecting mothers who suffer from constant nipple pain due to breastfeeding difficulties. Delli *et al*. (2013) associate the presence of variations in the maxillary frenulum with certain syndromes, such as Turner Syndrome, Ellis van Creveld Syndrome, and others.

Tadros *et al*. (2022), in agreement with Naini and Gill (2018), point out that professionals such as pediatric otolaryngologists, speech therapists, pediatric dentists, and others have seen a significant increase in parents seeking frenectomy for their children with maxillary interincisal diastemas. There is evidence that an increase in diastema is normal as children's oral structures grow, typically occurring between the ages of 5 and 7. This is referred to as physiological diastema, which tends to regress spontaneously without any intervention. Closure can occur through the eruption of permanent upper central and lateral incisors, as well as cranial-caudal growth of the skull.

Frenectomy, the treatment for complete frenulum removal, is one of the most commonly performed procedures when associated with abnormalities. Azevedo, Marinho, and Barreto (2020) describe that this surgery can be performed using conventional techniques combined with the use of scalpels or techniques involving lasers. Tadros *et al*. (2022) explain that upper labial frenectomy has positive outcomes,

including improved feeding, nipple latch, speech, and aesthetic appearance. However, they caution that this treatment should follow the guidelines of the American Academy of Pediatric Dentistry and should be performed when there is an interincisal diastema > 2 mm. Concerns about diastema recurrence arise when the procedure is done too early. The opinion on performing frenectomy is divided among professionals, with no consensus on the appropriate age, timing, or technique.

Naini and Gill (2018) argue that a multidisciplinary approach is necessary for frenectomy recommendation. They also list some factors that may indicate the need for this procedure in the upper labial frenulum, such as frenulum insertion appearing low, thick, and fleshy, causing difficulty in oral hygiene or recurrent trauma during tooth brushing, among other factors. The American Academy of Pediatric Dentistry - AAPD (2022) primarily considers the presence of a diastema larger than two millimeters as an indication for frenectomy, even if the motivation is not purely aesthetic.

Regarding the recommendation for frenectomy, both the American Academy of Pediatric Dentistry - AAPD (2022) and Naini and Gill (2018) advocate for delaying any surgical procedure on the frenulum until the eruption of permanent canines. They both emphasize that orthodontic treatment should precede any surgical procedure. If orthodontics are unsuccessful, a more invasive procedure like frenectomy should be considered, according to these authors. Júnior *et al*. (2015) argue that if there is no physiological resolution for variations in the maxillary interincisal frenulum, frenectomy should be considered, but only after the eruption of all anterior upper teeth. These authors agree that no frenulum removal surgery in children should be based solely on aesthetic appearance because there is evidence that, with the growth of permanent lateral incisors, central incisors are pushed medially, causing pressure on the frenulum, which, according to some studies, leads to recession of hyperplasia or hypertrophy in the interincisal frenulum.

Despite the reservations expressed by most researchers about performing frenectomy, especially in the early years of an individual's life, Baxter, Zaghi, and Lashley (2022) are in favor of performing frenectomy. Their cohort study involving mostly children under the age of 2 suggests that such procedures can offer benefits. They argue that

their study contributes to the evidence base regarding the benefits of this procedure. They also suggest that parents or guardians of children should be informed about waiting for physiological regression of hyperplasia or hypertrophy in the interincisal frenulum but should also be given the option of early surgical intervention.

5. CONCLUSION

Upon the evaluation of the articles, it has been observed that, despite recommendations for performing frenectomy in childhood for aesthetic and functional reasons related to the upper labial frenulum, there is no consensus among healthcare professionals such as pediatric dentists, pediatricians, speech therapists, and others regarding the appropriate age or parameters to indicate this surgery in a child. The American Academy of Pediatric Dentistry recommends that frenectomy of the upper labial frenulum should be performed after the eruption of permanent canines. Therefore, it can be concluded that there is still a need for investment in multidisciplinary studies aimed at providing concrete guidelines on when to recommend frenectomy of the upper labial frenulum in pediatric dentistry.

REFERENCES

AMERICAN ACADEMY OF PEDIATRIC DENTISTRY. Policy on Management of the Frenulum in Pediatric Patients. **The Reference Manual of Pediatric Dentistry**. Chicago, p. 80-5, 2022. Disponível em: https://encr.pw/IArX0. Acesso em: 15/12/2022.

AZEVEDO, Alana Vieira; MARINHO, Jesaias Lisboa; BARRETO, Ranyelle Cavalcante. Anquiloglossia e Frenectomia: Uma Revisão de Literatura. **Brazilian Journal of Development.** Curitiba, v. 6, n. 12, p. 98628-35, 2020. Disponível em: https://www.brazilianjournals.com/ojs/index.php/BRJD/article/view/21661. Acesso em: 15/12/2022.

BAXTER, Richard T.; ZAGHI, Soroush; LASHLEY, Ashley P. Safety and efficacy of maxillary labial frenectomy in children: A retrospective comparative cohort study. **Int Orthod**, Los Angeles, v. 20, n. 2, 2022. Disponível em: https://pubmed.ncbi.nlm.nih.gov/35283058/. Acesso em: 15/12/2022.

CARRANZA, Fermin A. *et al.* **Periodontia Clínica**, 12ª ed. Los AngeLes, Elsevier, 2016.

DELLI, Konstantina *et al*. Facts and myths regarding the maxillary midline frenum and its treatment: a systematic review of the literature. **Quintessence International.** Suíça, v. 44, n. 2, p. 187-87, 2013. Disponível em: https://pubmed.ncbi.nlm.nih.gov/23444184/. Acesso em: 28/11/2022.

DELMONDES, Fernanda Simão; GUTIERREZ, Gabriela Mancia; IMPARATO, José Carlos Pettorossi; RAGGIO, Daniela Prócida. Upper labial frenum: When and how do i intervene? **Research, Society and Development.** São Paulo, v. 10, n. 2, 2021. Disponível em: https://rsdjournal.org/index.php/rsd/article/view/12608. Acesso em: 03/12/2022

GHAHERI, Bobak A. *et al.* Breastfeeding improvement following tongue-tie and lip-tie release: A prospective cohort study. **Laryngoscope**. v. 127, n. 5, p. 121723, 2017. Disponível em: https://pubmed.ncbi.nlm.nih.gov/27641715/. Acesso em: 28/11/2022.

GUEDES PINTO, A. C. **Odontopediatria,** 9ª ed. São Paulo, Santos. 2016.

JÚNIOR, Rui Medeiros *et al*. Labial frenectomy with Nd:YAG laser and conventional surgery: a comparative study. **Lasers in Medical Science.** Londres, v. 30, p. 851–6, 2015. Disponível em: https://pubmed.ncbi.nlm.nih.gov/24146237/. Acesso em: 15/12/2022.

NAINI, F.B.; GILL D.S. Cirurgia oral: Oral surgery: Labial frenectomy: Indications and practical implications. **British Dental Journal**. Londres, v.225, n. 3, p.199–200, 2018. Disponível em: https://www.nature.com/articles/sj.bdj.2018.656. Acesso em: 28/11/2022.

OLIVI, M.; GENOVESE, M.D.; OLIVI, G. Laser labial frenectomy: a simplified and predictable technique. Retrospective clinical study. **Eur J Paediatr Dent.** Itália, vol. 19/01, p. 56-60, 2018. Disponível em: https://pubmed.ncbi.nlm.nih.gov/29569455/. Aceso em: 28/11/2022.

ÖZENER, Hafize Öztürk; MESELI, Suleyman Emre; SEZGIN, Gamze; KURU, Leyla. Clinical Efficacy of Conventional and Diode Laser-Assisted Frenectomy in Patients with Different Abnormal Frenulum Insertions: A Retrospective Study. **Photobiomodulation, Photomedicine, and Laser Surgery.** Turquia, v. 38, n.09, p.565-70, 2020. Disponível em: https://pubmed.ncbi.nlm.nih.gov/32833580/. Aceso em: 28/11/2022

SARMADI, Roxana; GABRE, Pia; THOR, Andreas. Evaluation of upper labial frenectomy: A randomized, controlled comparative study of conventional scalpel technique and Er:YAG laser technique. **Clinical and Experimental Dental Research**. Suécia, v. 7, n.4, p. 522–530, 2021. Disponível em: https://pubmed.ncbi.nlm.nih.gov/33369213/. Aceso em: 28/11/2022.

TANIK, Abdulsamet; ÇIÇEK, Yasin. Evaluation of the distance between the central teeth after frenectomy: a randomized clinical study. **European Oral Research.**

Turquia, v. 55, n. 2, p. 99-103, 2021. Disponível em: https://pubmed.ncbi.nlm.nih.gov/34250477/. Acesso em: 03/09/2022.

TADROS, Sandra *et al*. Association between superior labial frenum and maxillary midline diastema — a systematic review. **International Journal of Pediatric Otorhinolaryngology**. Nova Iorque, v. 156, 2022. Disponível em: https://www.sciencedirect.com/science/article/pii/S0165587622000246. Acesso em: 10/12/2022.

Submitted: May 30, 2023.

Approved: June 6, 2023.

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