Universidad Europea

GRADUATION PROJECT

Degree in Dentistry

ANKYLOGLOSSIA IN THE PAEDIATRIC PATIENT, IS IT ALWAYS NECESSARY TO PERFORM FRENECTOMY?

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RESUMEN

Introducción: La anquiloglosia, también conocida como lengua anclada, es una afección congénita que afecta y limita la movilidad de la lengua. Según su clasificación, esta afección puede afectar en mayor o menor medida a las funciones bucales normales de los pacientes afectados, incluyendo la alimentación, el habla, el sueño y otras actividades. Su tratamiento óptimo sigue siendo objeto de debate, especialmente en lo que respecta a las indicaciones para el tratamiento quirúrgico.; **Objetivos:** Determinar si la frenectomía debe ser el tratamiento de elección para mejorar la calidad de vida de los pacientes pediátricos con anquiloglosia, en comparación con alternativas más conservadoras. ; **Metodología:** Para alcanzar el objetivo y confirmar o refutar la hipótesis, se llevó a cabo una revisión sistemática. Se llevó a cabo una revisión de artículos en diversas bases de datos, incluyendo estudios que evaluaban los resultados de los procedimientos quirúrgicos y el tratamiento conservador en pacientes pediátricos con anquiloglosia. **Resultados:** Numerosos estudios han demostrado mejoras significativas en la lactancia materna, la articulación del habla y el sueño tras la cirugía. Sin embargo, otros estudios han demostrado que no existen diferencias importantes entre el tratamiento conservador y la cirugía en determinados pacientes. La gravedad de los síntomas debe tenerse en cuenta en la decisión terapéutica. **Conclusiones:** Las intervenciones quirúrgicas, como la frenectomía, pueden resultar beneficiosas para los pacientes con anquiloglosia sintomática grave. En el caso de los pacientes con formas más leves de la afección, se debe considerar un tratamiento conservador. Cada caso debe evaluarse de forma individual.

PALABRAS CLAVE

Odontología, anquiloglosia, frenectomía, lactancia materna, cirugía

ABSTRACT

Introduction: Ankyloglossia, also known as tongue-tie, is a congenital condition that affects and limits the tongue's mobility. Depending on its classification, this condition can affect the normal oral functions of affected patients to varying degrees, including feeding, speech, sleep, and other activities. Its optimal management remains a subject of debate, particularly regarding the indications for surgical treatment.; **Objectives:** To determine whether frenectomy should be the treatment of choice to improve the quality of life in pediatric patients with ankyloglossia, compared with more conservative alternatives. ; **Methods:** To achieve the objective and confirm or refute the hypothesis, a systematic review was conducted. A review of articles across various databases was carried out, including studies assessing the outcomes of surgical procedures and conservative management in pediatric patients with ankyloglossia.; **Results:** Numerous studies have shown significant improvements in breastfeeding, speech articulation, and sleep following surgery. However, other studies have shown that there are no major differences between surgical and conservative treatment for certain patients. The severity of symptoms must be taken into account in the diagnosis.; **Conclusions**: Surgical procedures such as frenectomy may be beneficial for patients with severe symptomatic ankyloglossia. For patients with milder forms of the condition, conservative treatment should be considered. Each case must be evaluated individually.

KEYWORDS

Dentistry, ankyloglossia, frenectomy, breastfeeding, surgery

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1. INTRODUCTION

1.1. Generalities and definitions

1.1.1.Definitions

In the oral cavity, every healthy individual presents a fold of mucous membrane that extends from the ventral surface of the tongue to the floor of the mouth. This structure allows the tongue to remain stable and perform essential oral functions, such as swallowing, speaking and chewing. This mucosal fold is called the lingual frenulum (1).

However, in certain cases, this anatomical structure of the mouth may appear abnormally short, tense, thick and positioned too anteriorly (2,3). This condition is called ankyloglossia. Also known as tongue-tie, it corresponds to an uncommon congenital anomaly, that affects and limits the tongue's mobility and impair its normal range of movements (4,5).

1.1.2.Etymology

Derived from the Greek, agkilos meaning curved and glossa meaning tongue (6), this condition can be classified as either partial or total. Partial ankyloglossia occurs when the frenulum is shorter and thicker than a normal one. In contrast, it is considered total when the tongue is almost completely fused to the sublingual space (1).

1.1.3.Etiology

At the embryological level, the formation of the tongue occurs between the fourth and the seventh weeks of gestation (2). During this developmental process, numerous grooves and folds form to let the tongue acquire adequate mobility. However, a small portion of the growing tongue, is kept attached to the floor of the mouth and near the tip. This area will become the lingual frenulum. Around the eighth week of intrauterine life, a physiological process of cell death called apoptosis takes place enabling the frenulum to migrate distally. Nevertheless, if a disruption occurs during this stage of embryological developmental, ankyloglossia will manifest. (4)

1.1.4. Anatomical variants of ankyloglossia

The two most commonly described types of ankyloglossia are anterior and posterior.

Anterior tongue-tie is characterized by a heart-shaped tongue and a frenulum attached close to the tip. It is the easiest form to diagnose and the most common.

In contrast, posterior tongue-tie is more difficult to diagnose and requires a more thorough oral examination (4).The frenulum appears to be attached to the posterior aspect of the ventral surface of the tongue. However, the concept of this type of ankyloglossia is controversial because some authors consider it to be a normal anatomical variation of the frenulum. In fact, difficulties encountered, for example, with breastfeeding may be associated with other factors such as the anatomy of the nipple and not the anatomy of the lingual frenulum (7).

1.1.5.Empirical treatment and historical background

Historically, to cure ankyloglossia, the traditional treatment has been the frenectomy, a surgical procedure used to release the frenulum. In fact, as early as the 18th century, midwives performed this type of procedure, cutting the frenulum of newborns with long fingernails to improve breastfeeding. Frenectomy involves excising the lingual frenulum to free the tongue. Nowadays, it can be performed in several ways, such as with scissors, laser, or electrocautery (5).

1.2. Epidemiology

Ankyloglossia can be diagnosed in the first few days of a child's life. It is much more common in newborns but can also affect older children and even adults if left untreated. Depending on the study, the reported prevalence of ankyloglossia is thought to range between 0.02% and 20% of the population. Males tend to be more affected with a ratio of 2.5:1, and no racial predisposition has been identified (1,3,4,6).

This condition has also been associated with certain congenital syndromes such as X-linked cleft palate syndrome (7). Some studies have found a correlation between ankyloglossia and the mother's use of cocaine or the pregestational folic acid ingestion (1,2).

Over recent years, the incidence of the ankyloglossia has significantly increased. One of the reasons is because of the lack of a clear single definition of what tongue-tie really is. This has led to an overdiagnosis by clinicians and, this way, a lot of unnecessary surgeries for pathologies that could have resolved spontaneously (7).

1.3. Clinical manifestations and functional impact

Ankyloglossia may significantly affect patients' oral functions and can have a direct impact on both their psychological and physical health.

From a very young age, babies can experience problems with feeding, swallowing, sucking, and latching (5). According to some studies, between 12% and 50% of patients with ankyloglossia experience breastfeeding difficulties. This problem can be frustrating and restrictive for the newborn, but also for the child's mother (4).

For the mother, breastfeeding sessions become longer or with less time between them, milk production is lower, and the nipples can be painful, bleed, or become infected (4,7).
For the infant, it can lead to difficulties gaining weight, refusal to breastfeed, gagging, or even choking (2,3).

As children grow up, they may encounter other problems related to ankyloglossia.
Difficulties in speaking and expressing themselves by pronouncing all sounds correctly may be noticed. For example, the consonants /s/, /z/, /t/, /d/, /j/, /l/, /ch/, and /r/ can be affected because they require a high degree of tongue elevation (1,3,5).

In addition, this condition can be a barrier to adequate oral hygiene. Children present more difficulty brushing their teeth effectively, leading to a large quantity of dental plaque. As a result, a significant increase in cavities and periodontal diseases has been reported (4,8).
With regards to the orthodontic field, it has been shown that tongue tie can cause certain malocclusions such as open bites or diastemas between the lower central incisors, as well as gingival recessions (1,8).

Finally, this condition may interfere with everyday activities such as eating ice cream, kissing, licking the lips, or playing a wind instrument (4,7). Over time, all of these limitations could have a psychological impact on patients' health and personal development from childhood to adulthood, affecting self-esteem and social development (8).

1.4. Diagnosis and classification

The diagnosis, management and treatment of tongue-tie are a controversial topic in the literature. Many questions often arise regarding when treatment should be performed, and which therapeutic approach should be used (7).

However, surgical treatment is not insignificant and should not be planned without a definite diagnosis (2).

Different medical and dental specialists must work together as a multidisciplinary team to ensure that the patient receives the best possible care (7).

The patients must be diagnosed and treated as early as possible to prevent further complications and long-term effects of this disease on their daily life (8).

1.4.1.Kotlow classification

Numerous classifications have been established in recent years to assist practitioners in their diagnosis. However, none of them has yet been universally accepted (1).

One of the most frequently used nowadays is the Kotlow classification (1999). It permits the measurement of the length of the free tongue from its insertion to its tip (3,9):

- Class I (mild): 12 to 16 mm
- Class II (moderate): 8 to 11 mm
- Class III (severe): 3 to 7 mm
- Class IV (complete): less than 3 mm

1.4.2.Hazelbaker Assessment Tool for Lingual Frenulum Function

Also, another diagnostic method that can be used is the Hazelbaker Assessment Tool for Lingual Frenulum Function (HATLLF) that permits the analysis of the anatomy and function of the tongue. A score will then be obtained to determine the best treatment option.

The anatomical part (or appearance item), which is assessed on a total of 10 points, evaluates characteristics such as the elasticity of the frenulum and the appearance of the tongue when it is lifted.

Regarding the functional part, which is analyzed on 14 points, the lateralization, cupping and extension of the tongue are elements that are evaluated.

At the end of the questionnaire, the final number of points gives the treatment recommendation to perform for the clinician between conservative or surgical intervention (7).

1.5. Justification of the study

While frenectomy is often considered the treatment of choice for the management and treatment of ankyloglossia in pediatric patients, there is no clear consensus on when it is indicated or not. Some more recent studies suggested that less invasive alternatives are available and that they could be sufficiently effective in certain cases. It is therefore necessary and interesting to analyze and compare the different approaches to treat ankyloglossia, through an in-depth literature review.

After the research across various electronic databases, it was noted that there were few studies addressing this topic. In fact, the majority of articles found mentioned other surgical interventions, notably frenotomy.
In addition, a large proportion of the documents found were systematic reviews or meta-analyses that could not be used because they did not meet the criteria for primary evidence.
The lack of articles mentioning frenectomy, which remains the main topic, led to expanding the scope of the review on surgical techniques more generally. Even if frenectomy and frenotomy differ in their surgical technique approach, they have the same final objective which is to release the lingual frenulum, improve tongue mobility and enhance the quality of life of both children and their mothers.

For this study, it was then decided to compare two treatment groups in different patient age categories. The first group will focus on pediatric patients who have undergone surgical treatment such as frenectomy or frenotomy. The other group of patients will focus more on children managed with non-invasive treatments such as observation, speech therapy, and lactation support.

2. OBJECTIVE

To find the objective of this review, a research question following the PICO framework was first established:
Among the pediatric population presenting ankyloglossia, is frenectomy (surgery) the best treatment option in comparison with more conservative methods, to improve the children's quality of life ?

This, led to the formulation of a hypothesis on the subject. It was said that based on the functional alterations that ankyloglossia can produce, pediatric patients with tongue-tie will obtain better results after performing a frenectomy or any kind of surgical treatment.

Therefore, the primary objective of this review is to determine whether frenectomy (surgery) should be the treatment of choice to improve the quality of life in pediatric patients with ankyloglossia , compared with more conservative alternatives.

3. MATERIAL AND METHODS

3.1. Study design

This project is a documentary research paper that follows the main guidelines of a systematic review.

The objective was to conduct some research about all the existing literature on the specific subject, analyze it, synthesize it and draw conclusions to expand and improve knowledge about the management of ankyloglossia in the pediatric population.

Certain key elements of a systematic review were used like the establishment of a PICO question, defined inclusion and exclusion criteria, and searches in different databases were conducted.

3.2. PICO question

As mentioned above, a research question was formulated using a simple method. The PICO framework was used and is composed of four categories: population, intervention, comparison and outcome. It was therefore applied to the subject to create a focused clinical question and guided the literature search strategy.

The following table illustrates the reasoning process that led to the formulation of the PICO question:

P (population)	I (intervention)	C (comparison)	O (outcome)
Pediatric patients (children and infants under 18 years old) with ankyloglossia	Frenectomy (surgical treatment in general)	More conservative treatments	Improving the children's quality of life (breastfeeding, speaking, sleeping…)

Table 1. PICO framework of the research question

3.3. Research strategy

3.3.1.Databases

As explained above, a comprehensive review of existing literature was conducted. To this end, electronic databases were used, primarily PubMed and Scopus. To ensure an effective and specific search, various methods were employed, using combinations of keywords.

3.3.2.Mesh terms and key words

The in-depth search for the articles through databases was conducted using Medical Subject Headings terms (MeSh) and free text keywords.

Here, the terms *ankyloglossia, infants, and children* were considered MeSh terms. The rest of the keywords, such as *tongue tie, frenectomy, frenotomy, speech therapy, myofunctional therapy, and pediatric*, were considered free-text terms.

3.3.3.Boolean operators and research equation

After determining the keywords, it was possible to begin establishing the search equation to target the most relevant articles for the review. To do this, Boolean operators were used, specifically AND and OR, to link the keywords and Mesh terms together.

Therefore the following equation was obtained, which was applied in the different electronic databases:

(Ankyloglossia [MeSh terms] OR tongue tie) AND (frenectomy OR frenotomy OR speech therapy OR myofunctional therapy) AND (infants [MeSh terms] OR children [MeSh terms] OR pediatric)

This equation helped to focus the research strategy on the identification of articles about the different treatments and management of ankyloglossia in the pediatric population.

3.4. Eligibility criteria

To make the selection more precise, filters were applied to narrow down the search and reduce the number of articles. This corresponds to the inclusion and exclusion criteria.

3.4.1.Inclusion criteria

The first inclusion criterion that was applied for the research was, any article discussing different types of treatment aimed at treating ankyloglossia, whether surgical or non-surgical. Although the topic mainly refers to frenectomy, it was decided to also include articles mentioning frenotomy as it seems to be the surgical treatment most commonly used.

In addition, all articles selected for the study were published in the last 15 years.

Another inclusion criterion was that necessity of finding the full text version on the database.

Finally, the studies had to focus on a pediatric population, children between the ages of 0 and 18 were therefore concerned.

3.4.2.Exclusion criteria

Regarding exclusion criteria, all articles mentioning frenectomies but for another condition than ankyloglossia were not relevant to the study.

Furthermore, as the study is about the pediatric population, articles concerning adults were not selected.

To obtain the most relevant information with strong evidence, all types of reviews like meta-analyses, systematic reviews, literature reviews, as well as any non-scientific content such as forums, personal opinions, and blogs were excluded from the selection.

Moreover, all articles in another language than English were excluded.

Finally, studies on animals were not of interest in the research and were not selected for the work.

3.4.3. Filters application

Thanks to the clear definition of the inclusion and exclusion criteria, it was then possible to apply filters during the searches in the various databases to sort and reduce the number of articles retrieved. This enabled to make an initial selection of articles.

4. RESULTS

In PubMed, the initial number of articles was 259 using only our search equation. After applying filters such as the study type, publication years between 2011 and 2026, and language, 55 articles were obtained.

In Scopus, the same process was applied, reducing the number of articles from 83 to 59.

4.1. Study selection

4.1.1.Screening using Rayyan

To facilitate the management of the large number of articles found, the Rayyan software was used. It is especially designed for the organization and screening process in literature and systematic reviews. Therefore, the 55 articles from PubMed and 59 from Scopus were exported, giving a total of 114 articles to sort through using the software.

4.1.2.Duplicate removal

One of the main strengths of Rayyan software is that it can identify and delete duplicate articles. Since the articles came from different databases, it was important to identify them. After analysis, 20 duplicates were identified among the 114 items, resulting in the removal of 10 of the articles. After deleting the duplicates, a total of 104 articles were found.

4.1.3.Title, abstract and full text screening

The screening through Rayyan was carried out in several stages.

First, an initial selection was made by reading only the titles of the articles. This led to the exclusion of articles that were not relevant to the topic. This resulted in a total of 58 articles.

The next step was to read the abstracts of the 58 remaining articles. This gave a more precise idea of the subject of each study and enabled to select those that seemed relevant to the research question. After this evaluation, 30 articles remained.

Finally, the last step was to read the full text of the 30 remaining articles. This stage allowed a more detailed evaluation of the data of the different studies and their relevance to the subject. Following this step, a total of 10 articles were to be included in the results table.

4.1.4.Manual research

In addition to searching electronic databases, some articles were found through manual research. For example, by looking at the bibliographies of articles already selected or through the website of the Dulce Chacon University Library. With this method, 2 articles were found to be added to the results table.

4.2. Prisma chart

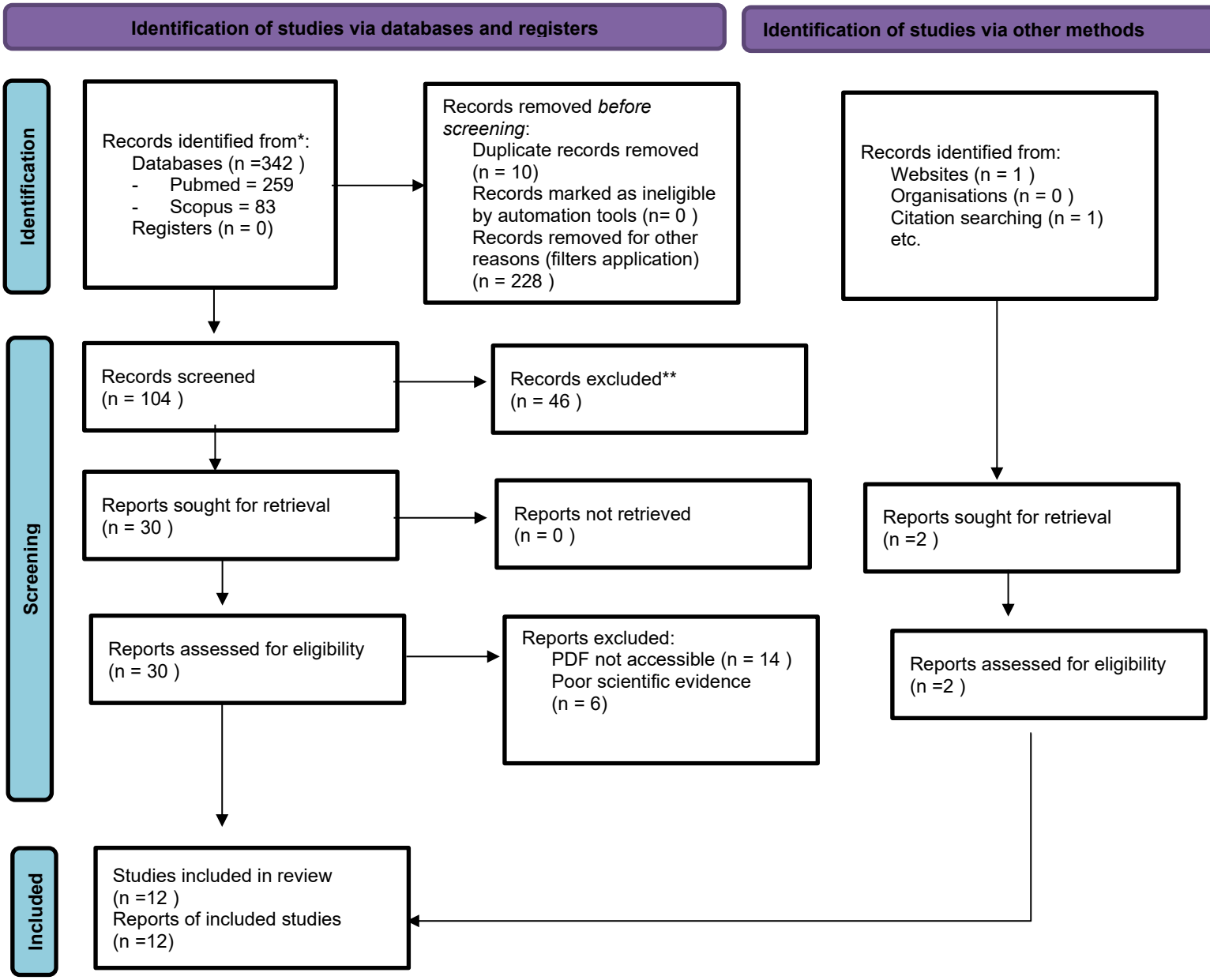


Figure 1. PRISMA flow diagram of the study selection process

4.3. Table of results

After the screening process and the establishment of a structured PRISMA chart aimed at selecting the best bibliographic references for the review, a total of 12 articles to analyze, summarize and transcribe into our results table were found.

Reference	Study design	Population studied	Indication for treatment	Treatment performed	Control	Main findings
Baxter et al., 2020 (10)	Prospective cohort study	37 children with ankyloglossia Between 13 months and 12 years old Average age = 4,2 years old	Speech, feeding and sleeping disorders	Lingual frenectomy with CO2 laser + myofunctional therapy post surgery	Pre and post surgery No control group	89% of speech improvements 83% of feeding improvements with: less gag reflex, and children eating faster 83% of sleeping improvements with less snoring and better quality of sleep
Knight et al., 2023 (11)	Randomized controlled trial	169 infants of less than 10 weeks old with ankyloglossia	Breastfeeding difficulties	Lingual frenotomy accompanied by lactation support	Group control with lactation support alone	88% of the frenotomy group was still under breastfeeding at 3 months 86% of the breastfeeding support alone group was still under breastfeeding at 3 months No significant differences between both groups with a risk ratio of 1.02 No improvements in nipple pain, duration of breastfeeding and growth of infants 3 infants of frenotomy group presented complications

Reference	Study design	Population studied	Indication for treatment	Treatment performed	Control	Main findings
Fioravanti et al., 2021 (12)	Randomized controlled trial	32 children with ankyloglossia and linked obstructive sleep apnea syndrome Age group between 4 and 13 years old	Sleeping apnea and difficulties	16 patients treated with diode laser lingual frenectomy and myofunctional therapy	Control group of 16 patients treated only with myofunctional and speech therapy	Significant amelioration of OSAS with frenectomy treatment group Apnea less severe and better quality of sleep Some pain post op but that disappears after 72h = surgery well tolerated
Zhao et al., 2022 (13)	Randomized trial	341 children between 2 and 5 years old presenting ankyloglossia	Speaking difficulties	Frenotomy	Control group without any treatment	Children of 2-3 years old, no significant evolution in terms of speech articulation between the 2 groups Children older than 3 years old, significant amelioration with the surgical treatment

Ghaheri et al., 2017 (14)	Prospective cohort study	237 mother-infant dyads Average age of infants = 2-3 months Infants with ankyloglossia (majority with posterior) or lip-tie	Breastfeeding difficulties	Lingual and/or labial frenotomy	No control group Pre and post surgery comparison	Significant improvements for the mother and the infant post surgery Higher breastfeeding self-efficacy, reduction of maternal nipple pain and infant reflux symptoms
Jones et al., 2024 (15)	Longitudinal observational study	Between January and October 2023 157 infants presenting ankyloglossia	Breastfeeding difficulties	96 infants received a frenotomy In situation where there is: -Inefficient suction -Poor latch -Nipple pain for the mother -Long time and agitation during feeding -Bad tongue mobility	Others infants were under observational follow up In situation where: -Mild symptoms -Baby gain weight - Lactation was still possible with breastfeeding support	61% of infants undergone surgery 39% of infants were treated by conservative methods Results of the frenotomy after 4 weeks: -Improvement of the breastfeeding -Better mobility of the tongue -Less nipple pain Results of the non surgical group: -Some infants situations improved thanks to lactation support only

Ghaheri et al., 2022 (16)	Prospective randomized controlled trial	47 infants with posterior tongue-tie Divided in 2 groups: *23 infants under frenotomy * 24 under control group 1 to 5 weeks old	Breastfeeding difficulties	Lingual frenotomy	No surgery received and continuation of normal feeding Observational group	10 days after the surgery, significant improvements like sucking efficiency, milk transfer, reflux, nipple pain of the mother, breastfeeding confidence
Emond et al., 2014 (17)	Randomized controlled trial	107 breastfed infants that present mild to moderate ankyloglossia Age of the infants is under 2 weeks	Breastfeeding difficulties	Immediate lingual frenotomy	Breastfeeding support only Delayed frenotomy if persistence of the symptoms	After 5 days, the authors did not find any relevant differences in LATCH score Mothers more self confident in the breastfeeding after the frenotomy Many mothers of the control group asked for the surgery due to continuing feeding difficulties
Dell'Olio et al., 2022 (18)	Prospective cohort study	56 newborns with ankyloglossia Age between 1 to 18 days old	Breastfeeding difficulties or not	Laser frenotomy	No control group	Minimally invasive and painful procedure No complications were reported Complete healing of the site after 30 days

						Relevant informations about the improvement of breastfeeding: -Less nipple pain -Weight gain of the newborn P inf to 0.05
Slagter et al., 2021 (BRIEF study) (19)	Prospective longitudinal cohort study	175 mother-infant dyads Infants presenting ankyloglossia or lip tie Follow up at 1 and 6 months	Breastfeeding difficulties	Lingual or labial frenotomy	No control group	Nipple pain decrease 1 week after surgery Reduction of gastric reflux, which directly results in less crying, regurgitation, and digestive discomfort 60,7% of infants still under breastfeeding at 6 months No surgical complications
Solanke et al., 2025 (20)	Case series	5 children with moderate to severe ankyloglossia Age of the patients between 3 and 9 years old	Speech disorders with problems pronouncing the sounds t, d, n, and l Atypical swallowing	Diode laser lingual frenectomy + postoperative tongue exercises to avoid reattachement of the frenulum	No group control	4 out of 5 patients showed gradual improvement in tongue mobility (elevation, protrusion) and sound pronunciation Patients with atypical swallowing also showed correction of their tongue position and

						improved oral coordination Rapid healing with no complications. 1 out of 5 experienced reattachment of the frenulum 6 months after
Carneiro et al., 2025 (21)	Randomized double blind clinical trial	80 infants from 0 to 6 months with severe ankyloglossia (BTAT 0-3)	Breastfeeding difficulties	Frenotomy with diode laser	Surgical scalpel frenotomy	Improvement of the BTAT score in both groups No significant difference between both techniques No complications in both groups

Table 2. Characteristics and main outcomes of the studies included in the review

5. DISCUSION

The aim of this literature review was to determine how to manage ankyloglossia or tongue-tie in the pediatric population. Indeed, the main question was to know if an invasive surgical treatment like frenectomy or frenotomy is always the best option to treat this kind of patient, in comparison with more conservative treatments. After a thorough analysis of the research findings on the topic, it is now necessary to compare them with one another to reject or validate the hypothesis.

5.1. Surgical treatments and breastfeeding

Breastfeeding difficulties in infants are the primary reason parents seek medical consultation for their child presenting ankyloglossia. In fact, this is one of the most common manifestations of this condition and could often be the reason for pursuing surgical treatment. The goal of these surgical procedures is to eliminate restricted tongue mobility in pediatric patients, which leads to impairments in the infant's oral abilities such as poor latch, ineffective feeding as well as discomfort for the breastfeeding mother.
Numerous studies included in this review described some improvements in feeding capacities after the realization of a surgical treatment like frenectomy or frenotomy.

In fact, in the study by Baxter et al. (2020), in which 37 children with ankyloglossia and breastfeeding difficulties, were treated with laser frenectomy followed by myofunctional therapy, it was found that 83% of the patients exhibited reduced gag reflexes and more efficient and faster feeding. Similarly, the study by Ghaheri et al. (2017), showed a significant improvement in breastfeeding and a reduction in maternal symptoms such as nipple pain. In addition, in the cohort study of Slagter et al. (2021), it was found that following lingual frenotomy, newborns exhibited reduced gastric reflux, less crying and less regurgitation. They also reported that, 60.7% of the patients were still breastfeeding 6 months after the procedure.

However, these results differ from the findings of the different randomized controlled trials studied in the review. In this type of articles, surgical procedures were compared with more conservative treatments. Indeed, Knight et al. (2023) showed that 86% of infants were still breastfeeding after 3 months with breastfeeding support alone, compared to 88% after a frenotomy. This shows an insignificant difference between the two groups and clearly demonstrates that more conservative methods can be an effective alternative in certain cases.

These discrepancies can be the result of the differences in the type of study used in the review. Cohort studies such as the ones by Baxter et al. (2020) and Ghaheri et al. (2017) do not include control groups. They may, therefore, overestimate the need for patient to be treated surgically, as there is no comparison with a group of patients treated conservatively.

Finally, in the randomized controlled trials like the one of Knight et al. (2023), standardized outcome measures were used to provide more relevant results. Conversely, the findings of observational and cohort studies were based on parents' subjective experiences and therefore yielded less precise results that could lead to overtreatment.

5.2. Surgical treatments and speech

Another problem that ankyloglossia can cause in pediatric patients is the difficulty in articulating certain sounds that require tongue elevation and protrusion, leading to speech disorders. However, the current literature remains divided on this subject and presents conflicting findings. Indeed, it appears that ankyloglossia does not systematically cause language disorders, and conversely, that language disorders present in children are not necessarily due to the condition.

On the other hand, numerous studies included in this review showed some improvements in tongue mobility after the realization of a surgical treatment like frenectomy or frenotomy, leading to ameliorations in speech. For instance, in the study conducted by Baxter et al. (2020), 89% of the children experienced a speech amelioration after the surgery. Similarly, Zhao et al. (2022) noted an improvement in articulation following frenotomy in the group of patients over 3 years of age but not in younger ones. Finally, the case series conducted by Solanke et al. (2025) on children between 3 and 9 years old, explains that after performing a frenectomy followed by tongue re-education exercises on patients with moderate to severe ankyloglossia, 4 out of 5 patients showed improved pronunciation of sounds and better tongue mobility.

The analysis of these results highlights some differences that could be explained by the age of the patients in the studies. Indeed, since the language develops as children grow, pronunciation problems become more apparent once a child reaches a certain age. This is why surgery appears to be more effective in older children. Moreover, some studies like Baxter et al. (2020) and Solanke et al. (2025) associated their surgery with postoperative speech therapy or myofunctional exercises, which makes it difficult to attribute the success solely to surgery.

These findings suggest that a surgical treatment may be effective and more appropriate for older children but it remains important to consult a speech therapist to determine the cause of the disorder in order to avoid unnecessary treatment.

5.3. Surgical treatments and sleep related breathing disorders

More recently, some studies have begun to suggest a potential link between ankyloglossia and sleep-related breathing disorders such as sleep apnea.

Restricted tongue mobility may influence tongue posture during sleep and contribute to upper airway obstruction.

In the study conducted by Fioravanti et al. (2021), where 32 children with ankyloglossia and obstructive sleep apnea syndrome were treated with diode laser frenectomy, a significant amelioration was shown. Patients reported better sleep quality and fewer episodes of apnea.

In Baxter et al. (2020) study, there was an improvement in 83% of the cases after lingual CO2 frenectomy. The patients presented less snoring and a better quality of sleep.

However, the scientific evidence and the number of articles linking the two topics remain very limited. Further research is needed to determine the role of surgical treatment in the management of sleep disorders, including in particular, larger sample sizes and the use of standardized outcome measures.

5.4. Influence of severity of the symptoms

The severity of symptoms and the degree of anatomical restriction caused by ankyloglossia are factors that appear to play a crucial role in treatment decision strategy.

In the study of Jones et al. (2024), infants with the most severe symptoms underwent surgery, while those with milder symptoms were simply kept under close observation.
The study concluded that, although frenotomy was effective for patients in this group, some experienced symptoms improvement with follow-up and lactation support alone.
This clearly demonstrates that the presence of the condition alone cannot be the sole determining factor in treatment decisions.
The severity of symptoms and their impact on the patient's functional abilities must be taken into account. An infant who, for example, is gaining weight and is able to feed through breastfeeding may simply be monitored without resorting to more invasive treatment.
Conversely, if the baby exhibits a poor latch, inefficient sucking, or significant agitation during feeding, it may be advisable to treat the condition with surgery.

This can be compared with the findings of Knight et al. (2020) where infants with mild to moderate tongue-tie showed similar outcomes regardless of the treatment used. It sheds light on the fact that conservative treatments like myofunctional therapy or lactation support can be the better option for milder cases.

These results highlight the importance of differentiating between anatomical ankyloglossia and clinically significant functional impairment.

5.5. Surgical complications

Frenectomy for ankyloglossia is considered a simple, safe, and reliable procedure but always with potential risks of complications associated with surgery.
However, a review of the literature revealed that, in most of the cases, the patients studied did not experience any complications.

For instance, in the work of Dell'Olio et al. (2022) or Slagter et al. (2021), and Carneiro et al. (2025) no complications were reported on the infants treated with frenotomy, which shed light on the fact that there is a very low risk rate when the surgery is performed by a trained surgeon.

However, in Knight et al. (2023) study, 3 patients over 169 presented complications
and in the case series of Solanke et al. (2025), 1 child over the 5 experienced a reattachment of the frenulum 6 months post-surgery. Although these complications were not severe, their occurrence is not risk free.

The comparison of these results indicates that the complications appear to be higher in long follow-up studies as delayed reattachment may not be seen in short term periods. The literature has also demonstrated that some minor complications like bleeding, pain and infections can occur.
It is therefore important to weigh the benefits against the risks before opting for surgery, especially in pediatric patients.

5.6. Comparison between surgical and conservative treatments

Since the main objective of the review is to determine whether a frenectomy is systematically necessary compared to conservative treatment, it is interesting to compare the different approaches.

In the randomized controlled trial of Ghaheri et al. (2022), it has been shown that in the group of patients who underwent lingual frenotomy, there was a marked improvement in sucking efficiency, as well as a reduction in reflux and nipple pain for the mother in comparison with the control group.

However, as mentioned above, some studies, such as those by Emond et al. (2014) and Knight et al. (2023), have not shown significant differences in results between the two groups.

These discrepancies in the results, can be explained by the study design choice, the population studied and the severity of the symptoms of the patients. In fact, a patient with significant oral functional impairments who is planned for surgery will see significant results that a patient with fewer symptoms would not necessarily see, or that could be achieved with conservative treatment. Moreover, the presence of supportive interventions like breastfeeding support may significantly influence the outcomes, potentially reducing the apparent benefit of surgical treatment.

5.7. Limitations of the study

Although a detailed and in-depth analysis of the various articles leads to certain conclusions, it is important to note that this review has methodological limitations.

First, due to the scarcity of scientific articles providing primary evidence, a large number of the selected studies are cohort studies. As a result, there were few studies with control groups, which could lead to an overestimation of the need for surgical treatment.

Furthermore, since the patients were mostly infants, the data rely on subjective assessments by parents, which may lead to less accurate results.

Finally, there is also significant heterogeneity among the studied populations, whether in terms of the number of patients, their age, or their gender.

6. CONCLUSIONS

The management and treatment of ankyloglossia in pediatric patients is a topic that generates much debate within the scientific community and among the healthcare professionals, especially in dentistry.

After reviewing various articles for this review, it was noted that in many cases, surgical procedures such as frenectomies were beneficial for patients. Indeed, these interventions help improve patients' oral functions, which are sometimes severely impaired due to the disease. They can help to improve breastfeeding efficiency, tongue mobility, and speech articulation. However, the magnitude and consistency of these improvements vary across studies.

A critical analysis and comparison of the results highlight discrepancies between the different studies. Indeed, while observational studies reported a lot of improvement after surgery, randomized controlled trials showed very similar outcomes between invasive and conservative treatments. These findings can be attributed to differences in the study design, patient age selection, and the severity of ankyloglossia within the study populations.

The severity of the child's symptoms also appears to be a determining factor in the selection of the treatment plan. Patients with significant impairment of oral function show better outcomes with surgery, whereas patients with mild symptoms and limited functional impact can be treated with a more conservative approach.

Although the risk of complications is very low, certain complications can still occur and lead to postoperative symptoms ranging from mild ones, such as pain or bleeding, to more severe ones, such as infections or even reattachment of the frenulum. It is therefore important to carefully weigh the risks and benefits of surgery on a case-by-case basis for each patient.

Ultimately, frenectomy and invasive treatments in general do not appear to be the standard of care for every case of pediatric ankyloglossia. All patients should be evaluated on a case-by-case basis by a multidisciplinary team, based on the severity of symptoms, age of the patient, potential complications, and functional impairment. Further research with standardized diagnostic criteria and long term follow- up should be considered to strengthen the evidence base and to improve the quality of life of children with ankyloglossia.

7. SUSTAINABILITY

In the medical field, and particularly in dentistry, sustainability ensures that treatments are effective and conducted in accordance with ethical values. In recent years, the incidence of ankyloglossia in pediatric patients has increased, leading to an exponential rise in the number of surgical procedures performed. However, the lack of informations on this subject can often lead to overdiagnosis and overtreatment, even though more conservative methods could be employed.

At the social level, providing appropriate treatment for patients improves not only the baby's well-being but also the mother's. This helps reduce functional limitations such as difficulties with breastfeeding, speech problems, or sleeping disorders.

From an environmental and economic point of view, proper patient care through a multidisciplinary approach to developing a treatment plan helps avoid unnecessary surgeries. As a result, this optimizes the use of healthcare resources such as materials, equipment and energies and reduces healthcare costs.

This way, the study provides an overview of the Sustainable Development Goals, such as health equity, patient well-being, and the reasonable and efficient use of resources.

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