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Review Article

Etiology, pathophysiology and treatment of ankyloglossia in babies and its effect on breastfeeding

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ABSTRACT

The lingual frenulum inhibits tongue mobility in ankyloglossia, sometimes referred to as tongue-tie. It affects 4–16% of babies, with boys being more likely to be affected. Anterior and posterior tongue ties are the two primary forms. When a newborn opens their mouth, anterior tongue ties are easy to spot because they look like a heart; posterior tongue ties are trickier to spot. Ankyloglossia can make it difficult to nurse, speak clearly, maintain good oral hygiene, or engage in other oral activities. Tongue-tie can influence a baby's oral development as well as the way he or she feeds, talks, and swallows. It is crucial to diagnose ankyloglossia through a thorough examination. Treatment options include lactation consultation, improving latch during breastfeeding, and a procedure called frenotomy, which involves releasing the frenulum. Research is ongoing to establish evidence-based recommendations and standardized diagnostic criteria for ankyloglossia. This review will focus on etiology, pathophysiology and treatment of ankyloglossia in babies and its effect on breastfeeding.

Keywords: Ankyloglossia, Tongue-tie, Lingual frenulum, Newborns, Breastfeeding problems, Speech difficulties, Frenotomy

INTRODUCTION

The name "ankyloglossia," which means "tongue-tie," is derived from Greek. The lingual frenulum limits the tongue's movement due to a congenital abnormality.[1] Ankyloglossia is frequently described as tongue-tie. The tissue that connects the tongue's bottom to the floor of the mouth during the foetal stage is left behind in the form of the lingual frenum.[2] Ankyloglossia, or shortening of the free lingual portion, is an anatomical issue that limits tongue movement and may have a substantial impact on how effectively it operates, as well as changing the shape of the dental arches and the resulting occlusion. The tongue tie may occasionally not be an issue. Some situations might

just need a quick surgical fix. With a 2.5:1 preference for male patients, this condition affects 4–16% of neonates.[3] The superior fibres of the genioglossus muscle are occasionally inserted into the ventral tongue, between the apex and middle third, and the floor of the mouth, which may be situated between the lingual carunculi or have previously been displaced to the lower alveolar ridge.[4] During the fourth week of pregnancy, the first, second, and third pharyngeal arches give rise to the tongue. This stage sees the formation of grooves that allow the structure to move freely, with the exception of the area where the lingual frenulum first adheres near the tip of the tongue. The cells of the frenulum experience apoptosis throughout development and move distally to the medial area of the lingual dorsum. Ankyloglossia is established at this point because cell control may be interfered with and the migration may be partial or non-existent. The most prevalent types of ankyloglossia, which come in a variety of forms, are posterior and anterior tongue ties. Infants with anterior ankyloglossia display a distinctive "heart-shaped tongue" while opening their mouth.[5] Infants with a posterior tongue tie are more challenging to evaluate and the pathology is typically found during a physical oral cavity examination. The reason for posterior ankyloglossia is a larger and more fibrous lingual frenulum, which retains the tongue on the floor of the mouth without the help of the tongue tip.[3] Due to the frenulum's modest appearance and hiding behind the tongue, mobility is similarly restricted by a posterior tongue tie, but this condition is less noticeable.[6] In general, genetic disorders or other congenital abnormalities are not linked to anterior or posterior ankyloglossia.[3] Tongue-tie can influence a baby's oral development as well as the way he or she feeds, talks, and swallows. For example, a tongue-tie can lead to: breast-feeding issues and problem speech issues. Thus, Tongue-tie can interfere with the ability to make particular sounds, such as *t*, *d*, *z*, *s*, *th*, and *r*. More over poor oral hygiene for an older kid or adult might make it harder to brush food particles from the teeth. This can contribute to tooth decay and inflammation of the gingiva. A void or gap can develop between the two lower anterior teeth as a result of tongue tying. Challenges with other oral activities are another issue. Activities like eating an ice cream cone, licking one's lips, kissing, or playing a wind instrument might be hampered by a tongue tie. The association between ankyloglossia and breastfeeding has been an area of concern among clinicians. Ankyloglossia is linked to difficulties with latching during breastfeeding in the early days of life. This can put the success of breastfeeding at risk.[7]

METHODOLOGY

This study is based on a comprehensive literature search conducted on 21 June 2023, in the Medline, PubMed and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed etiology, pathophysiology and treatment of ankyloglossia in babies and its effect on breastfeeding. There were no restrictions on date, language, participant age, or type of publication.

DISCUSSION

Ankyloglossia is linked to both the mother's complaint and the infant's difficulties sucking in the early days of life. This can put the success of breastfeeding at risk.[8]

Etiology, pathophysiology of ankyloglossia

Ankyloglossia is a congenital disease.[3] During embryological development, the lingual frenulum fails to undergo apoptosis. The persistence of this embryological tissue results in the tongue-tie.[9] Ankyloglossia occurs in numerous variants, with the posterior and anterior tongue ties being the most prevalent. The anterior tongue tie is the more prevalent of the two and is easier to detect during an examination. A lingual frenulum causes limited tongue protrusion and mobility, including the attachment of the tongue tip, which results in anterior ankyloglossia.[10,11] The infant with a posterior tongue tie is more challenging to evaluate and is typically found during a physical oral cavity examination. A thicker and more fibrous lingual frenulum, which holds the tongue to the floor of the mouth without the help of the tongue tip, causes posterior ankyloglossia.

Effect on breastfeeding

Tongue ties can make it difficult for both newborns and infants in the neonatal intensive care unit to breastfeed. According to their mothers, between 12% and 50% of babies with tongue ties have difficulties eating.[6,12,13] When ankyloglossia is present, a number of additional issues with caring for it might arise. When caring for a baby with ankyloglossia, mothers frequently complain about ineffective or lengthy breastfeeding.[14] Despite their best efforts, some moms may finally turn to formula or bottle feeding if nursing proves to be difficult and unpleasant. Due to a poor attachment that reduces milk transfer during nursing, babies may grow irritated. This might result in longer feedings or shorter intervals, depleting both the mother and the child. The infants' inability to remove the milk when breastfeeding disrupts the supply and demand cycle for the creation of breast milk. Normally, the enhanced milk transfer from the mother to the newborn during nursing triggers a hormonal cascade that increases the mother's milk supply.[3] Nurses and healthcare professionals can assist breastfeeding when ankyloglossia negatively affects it by starting a lactation consultation or by providing additional expert help for nursing at the patient's bedside. Depending on how severe it is, ankyloglossia might interfere with healthcare.[3] The mechanics of breastfeeding are hampered by the tongue's reduced movement. Normal breastfeeding involves the

tongue helping to bring the entire nipple and portion of the breast into the baby's mouth and holding the milk until it is swallowed. When a woman is nursing, the tongue can also squeeze and suction the nipple to express milk. A shallow latch is the result of the newborn being unable to get enough of the nipple and breast into his or her mouth without complete tongue movement. In order to compensate for the shallow latch, the baby will show greater suction and compression that are concentrated at the tip of the nipple. This will allow the baby to get a milk letdown. The child could also bite or use his or her lips to injure the nipple, which could lead to bleeding. A tongue-tied newborn often has feeding difficulties inversely correlated to the degree of the tie; the more limited the tongue mobility, the shallower the latch, and the more compensatory movements the infant will display when breastfeeding. A missing ankyloglossia can eventually have harmful implications for both parties, physiologically and emotionally, because breastfeeding plays such a significant role in the maternal-infant dyad.[15] In addition to experiencing physical discomfort, ankyloglossia-affected mothers often experience mental distress. A short sample of the wide variety of experiences that might appear in moms who breastfeed a tongue-tied newborn can be seen in the lack of assistance and intervention offered to these women. Care must be taken to ensure that tensions that may arise from ankyloglossia do not adversely affect the mental health of moms who are breastfeeding. In order to try pain relief and offer emotional support, clinicians must look into allegations of painful, bloody, and challenging breastfeeding further.[13] When issues with breastfeeding arise because of ankyloglossia, infants experience a unique constellation of unfavourable effects. Several articles discuss nursing infants with ankyloglossia gaining insufficient weight as a result of inadequate milk intake and impaired milk transfer.[3] The same studies also note a rise in the introduction of bottle feeding among tongue-tied newborns and severe abdominal pain. Before deciding to stop or wean from nursing, breastfeeding-related problems must be identified and addressed. Given all of the advantages and health benefits of nursing, it is essential to protect the breastfeeding experience. It is the job of carers and medical professionals to examine breastfeeding in order to ensure that treatments are put in place to maintain breastfeeding and avoid any bad effects that tongue-tied newborns who do not get breast milk may experience.

Diagnosis of ankyloglossia

A complete breastfeeding attachment and oral examination are necessary for the diagnosis of ankyloglossia. When a woman is reported to be having problems with breastfeeding or having painful or bleeding nipples, it's critical to examine the mouth. In the absence of the recognisable heart-shaped tongue that signals anterior ankyloglossia, a careful inspection of the tongue's bottom is required.[3] Gloved hands should be used to push the baby's little finger to the base of the tongue on one side of the mouth before sliding the finger along the tongue's underside to the other side. It is possible to tell if the lingual frenulum is short or thick by performing the "Murphy manoeuvre," a physical examination technique. The Murphy Manoeuvre outcomes may be categorised into four main groups. The first observation demonstrates that there is no ankyloglossia of any type because there was no resistance during the sweep. The second finding is a small, wide strip of lingual frenulum that is embedded in the mouth's floor and connected to the base of the tongue. This kind of ankyloglossia may or may not affect the tongue's mobility. Thirdly, a "jump over the fence" frenulum was found, preventing the sweep and requiring the finger to be taken out of the mouth in order to hop over the tissue. The movement of the tongue is significantly restricted by this type of frenulum, which resembles a web and is more attached to the front of the tongue. A fourth visual finding that points to an anterior ankyloglossia is a brief white stripe on the base of the tongue that runs along the middle, feels like a wire when touched, and extends to the tip of the tongue. Due to pressure along this band, the tongue's tip will tilt downward, and its range of motion will be constrained. After assessing the tightness of the frenulum and how it affects breastfeeding, it is critical to inform the parents of any results and to offer any readily available solutions and support.

Treatment of ankyloglossia

Infants with ankyloglossia that is severe enough to prevent care have limited treatment choices. A significant share of the top concerns among patients having tongue-tie surgery are related to articulation issues.[16,17] If one is available, a lactation consultation is the first course of action for moms who breastfeed tongue-tied infants. Establishing a deeper latch while breastfeeding with the help of a lactation consultant or nursing specialist may help reduce pressure and discomfort on the tip of the nipple.[15] When latching their babies, new moms may require extra assistance. A technique known as "frenotomy" is an option to release the frenulum and liberate the tongue if breastfeeding the tongue-tied newborn becomes challenging despite the attention and assistance of a lactation consultant. An experienced and licenced clinician can perform a frenotomy on an inpatient or outpatient basis. A frenotomy, in which the lingual frenulum is divided and the tongue-tie is released, is a procedure that many otolaryngologists, paediatricians, neonatologists, dental and oral surgeons, nurse practitioners, and physician's assistants are trained to do.[3]

It is crucial to evaluate the infant's hemodynamic and clotting stability before the surgery. Prior to frenotomy, it is advisable to consider factors such as intramuscular vitamin K treatment at birth to lower the risk of bleeding in the baby and family history of bleeding problems.[18] Because there are hazards involved with using invasive techniques of pain management, the treatment is often carried out without local or general anaesthesia. In most cases, anaesthesia is not required for procedures performed in the first few weeks of life. Using sucrose drops Pain management during frenotomy is frequently utilised two

minutes before the operation. The baby is not fed for an hour before the surgery, and either placed on a treatment table or in the lap of an attendant. The frenulum is then visible after the tongue has been raised with a grooved director. After the frenulum has been exposed, it is quickly divided by cutting with sterile, straight scissors while being careful not to harm any sublingual glands. A small piece of gauze may be placed underneath the tongue to provide pressure, but lingual frenulums are usually thin and homeostasis is achieved very quickly.[3] The procedure takes from 30 seconds to a few minutes and is reportedly well tolerated by infants. Simple post-frenotomy care involves checking for persistent bleeding, discomfort, and infection. Even though these issues are uncommon, to observe the infant for any. signs of severe discomfort such as heavy bleeding or persistent crying. In general, breastfeeding is permitted and recommended immediately after surgery for infants. In a large portion of the early literature, there is debate on the necessity of frenotomy. Practitioners' disagreement was sparked by the lack of established instruments for evaluating ankyloglossia both before and after surgery, as well as by the scant number of randomised controlled trials that showed frenotomies to be effective.

Recent studies, however, indicated that moms in the frenotomy group experienced better self-efficacy and a generalised rapid alleviation of nipple discomfort following the treatment. The use of lasers for frenotomy is also emerging as a modality in place of surgical snipping. Advantages to laser frenotomy may include minimal to no bleeding due to the cauterization provided by the laser, theoretical decreased pain due to the laser stunning the nerves, and possibly less postprocedural scarring and edema.[19,20]

Disadvantages in using the laser include the cost of procedure due to extensive equipment needed and it is not typically done inpatient during the immediately following child birth. While much of the literature regarding frenotomy by laser supports its use, the majority of patients discussed are outside of the neonatal population. The suggestion for frenotomy for all newborns with ankyloglossia is not substantiated. Many infants with ankyloglossia never present with nursing issues, inpatient or outpatient. Careful assessments for indications of frenotomy need to be undertaken before the treatment is proposed and executed.

CONCLUSION

Ankyloglossia, commonly known as tongue-tie, is a condition where the lingual frenulum restricts tongue movement. It affects a significant percentage of newborns, with a higher prevalence in males. The two main types of tongue-tie, anterior and posterior, have distinct characteristics. Ankyloglossia can lead to various challenges, including breastfeeding problems, speech difficulties, poor oral hygiene, and limitations in oral activities. Diagnosis requires a thorough examination, and treatment options include lactation consultation, improving latch during breastfeeding, and frenotomy, a procedure to release the frenulum. Ongoing research aims to establish evidence-based recommendations and standardized diagnostic criteria for ankyloglossia. Further studies are needed to enhance understanding of ankyloglossia's effect on breastfeeding and speech development, as well as to determine the appropriate management strategies for different age groups.

Recommendations

Research to support frenotomy in newborns with ankyloglossia is only now beginning to emerge. To create a set of evidence-based recommendations for ankyloglossia, more randomised controlled trials with larger study populations must be completed. Additionally, research is required to provide standardised, universal instruments for evaluating, grading, and diagnosing ankyloglossia. Furthermore, there are no established standards for frenotomy. While newborns and babies were the major age groups covered in this article, there is still a lack of knowledge on the significance of unexplained ankyloglossia extending into childhood and how it affects speech development.

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