

# Ankyloglossia in infants: surgical aspects

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The increase in maternal breastfeeding (MB) as the most natural and healthy feeding method for newborns and infants requires having greater knowledge about ankyloglossia. The WHO recommends exclusive MB in the first 6 months of life<sup>(1)</sup>.

Ankyloglossia is caused by the presence of a sublingual frenulum limiting tongue mobility. Pediatric surgeons should become familiar with it<sup>(2,3)</sup> and know how to treat it.

## PHYSIOPATHOLOGY

The tongue is formed between gestation weeks 4 and 7, and the frenulum serves as a guide for tongue growth. Around week 8, physiological necrosis of the buccopharyngeal membrane occurs, in a process known as apoptosis<sup>(4)</sup>. Sublingual frenulum is the resulting mucosal remnant<sup>(5)</sup>, with variable sizes, insertions, and fixation grades to the mouth floor<sup>(6)</sup>.

Ankyloglossia is a congenital abnormality. Physiopathology is little known, but palate closure and sublingual and labial frenulum apoptosis natural processes coincide in time<sup>(7)</sup>.

Since Hazelbaker's test was first carried out<sup>(8)</sup>, various anatomical and observational classifications of sublingual frenulum types have been proposed<sup>(9)</sup>. The Bristol Tongue Assessment Tool (BTAT)<sup>(10)</sup> and the Neonatal Tongue Screening Test (NTST)<sup>(11)</sup> are the two epidemiologically validated tests.

Swallowing initiates around gestation week 12, whereas suction and tongue mobility start around gestation week 18. It is not until gestation week 32 that suction and swallowing

are intertwined. In the MB physiological process, suction, a voiding and aspiration mechanism, and a wavelike lingual movement squeezing the nipple against the palate and pushing the milk towards the pharynx for swallowing purposes are combined. This complex mechanism has been analyzed using dynamic ultrasonography during MB<sup>(12)</sup> and surface electromyography of the suprahyoid muscles<sup>(13)</sup>.

These functions must be balanced. If lingual peristalsis is reduced, the infant increases suction/aspiration pressure. The lactiferous duct circuit, which is elastic and has a low pressure, collapses instead of increasing flow, which leads to decreased efficiency. The infant's efforts increase, and so does local breast pressure. Learning about ankyloglossia's physiopathology helps achieve clinical diagnosis<sup>(7,14-16)</sup>.

## EPIDEMIOLOGY

Ankyloglossia's incidence has increased in the last years, occurring in 1-12% of infants<sup>(4,9,17)</sup>. According to a study, it may be caused by pre-gestational folic acid administration<sup>(18)</sup>. Some countries such as Brazil test all newborns by law<sup>(11)</sup>. In the UK, it is considered a national healthcare issue<sup>(19)</sup>.

## DIAGNOSIS

Pediatricians and pediatric surgeons are often consulted. For an adequate diagnosis to be achieved, signs and symptoms must be present. In breastfeeding mothers, local breast symptoms such as pain, nipple wounds, and low milk production occur. In infants, symptoms are general, such as breast refusal, long, ineffective feeds, slow weight gain, air intake, and eventually MB suppression. A short, thick, tense frenulum impairing lingual mobility is the main sign found at exploration<sup>(6,9)</sup>, which should include mouth floor vision and palpation, especially in posterior frenula, which are less visible<sup>(20)</sup>. Elevating the tongue using a grooved

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**Figure 1.** Adequate positioning and holding for exploration, surgery, and rehabilitation purposes.

director probe and exposing the frenulum proves highly useful. Surgical treatment cannot be scheduled unless an accurate diagnosis has been achieved.

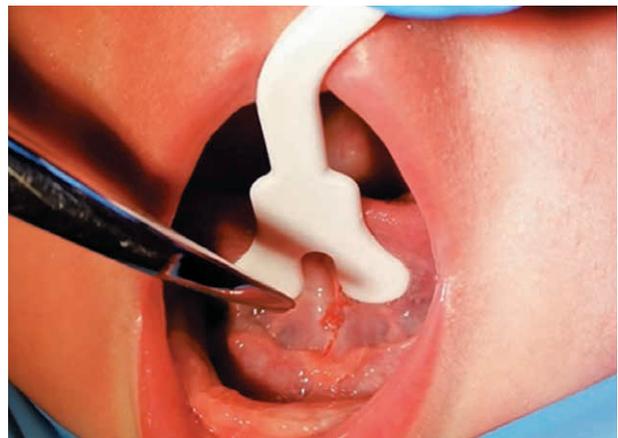
## SURGICAL REPAIR

The surgical technique used for ankyloglossia repair is the same for all types of frenulum in infants under 6 months of age.

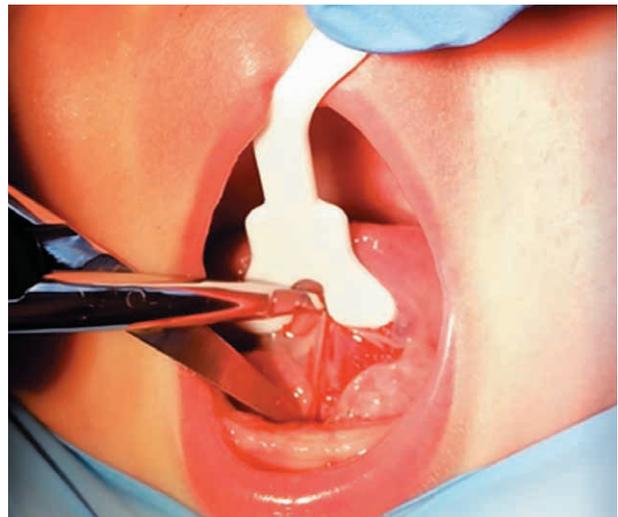
- *Patient position:* Placing a towel underneath the shoulders allows for neck hyperextension, mouth opening, and a nice sublingual space vision. Close collaboration is essential to fully immobilize the patient (Fig. 1).
- *Materials:* A grooved director probe or a tongue elevator, as well as a pair of short, curved- and blunt-tipped scissors, are required.
- *Technique:* Two steps are needed:
  1. Mucosal and hyoid membrane division, as close as possible to the tongue, until the tongue base (Figs. 2 and 3).
  2. Anteroposterior and lateral mucosal opening until a rhombus-shaped wound has been created (Fig. 4). Anatomical limits include the caruncles in the lower portion, the genioglossal muscle and the lingual nerve branches in the deep portion, and the sublingual veins at the lateral ends. The rhombus should be as large and symmetrical as possible (Fig. 5).

## DISCUSSION

Ankyloglossia is not a trend. A lot of mothers choose to breastfeed their baby. However, in the presence of breast-

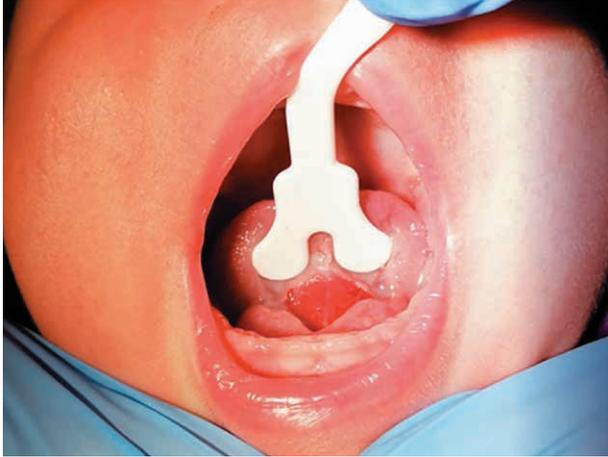


**Figures 2 and 3.** Tongue exposure and elevation, and division of the membranous portion close to the tongue. End of the first step.



**Figure 4.** Mucosal opening laceration with lateral opening.

feeding difficulty, physicians investigate what causes it, and ankyloglossia is one explanation for that.



**Figure 5.** The rhombus-shaped wound should be as large and symmetrical as possible.

Various systematic reviews have assessed division's effectiveness<sup>(21,22)</sup> and its benefits in terms of local issues and breastfeeding improvement<sup>(23-26)</sup>.

Ankyloglossia surgery is a simple procedure any pediatrician can perform. However, there are some important guidelines.

The hyperextension position is highly comfortable. The patient should be positioned in the same way for exploration and rehabilitation purposes.

Surgery is carried out without general anesthesia or sedation. Sucrose and topical anesthesia may help.

Division is only performed on the mucosal surface and the hyoglossal membrane – a muscular fibrous sheath –, while preserving genioglossal muscle fibers, which become exposed. The procedure is the same in all cases, since all symptomatic frenula have a relatively visible anterior component and a posterior component which fixates the tongue base and is the most important one. The larger the rhombus, the higher tongue elevation will be.

Division causes minimal bleeding. Venous bleeding may occur as a result of sublingual vein injury, and arterial bleeding may take place due to genioglossal muscle capillary division. Surgery is not free from complications, such as bleeding, ranula, or hematoma<sup>(27)</sup>, but these are infrequent if the procedure is carried out with caution<sup>(28)</sup>.

Providing infants with breastfeeding immediately after lingual frenectomy has a positive double effect – an anti-bleeding effect thanks to the milk and the pressure exerted by the tongue on the surgical wound during breastfeeding, and an analgesic effect as a result of breastfeeding itself<sup>(29)</sup>.

The rhombus-shaped wound is not sutured so as not to limit mobility again. It will heal through second-intention healing in a humid area. In this repair process, there is greater granulation tissue and higher fibroblast concentration. Healing maturation makes fibrosis and retraction more likely, which means the tongue base could be re-fixed.

Along with the suprahyoid muscles, the genioglossal muscle also plays a role, since it retracts and moves the tongue down, accommodating it on the tongue floor when at rest.

Retraction risk is not avoided with normal breastfeeding tongue mobility, which means rehabilitation massages in the sublingual zone stretching and pushing the tongue backwards are required.

Parents should be educated on how to perform them<sup>(30)</sup>. Massages should be intense and take place prior to each feed for at least two weeks, since this is how long second-intention mouth healing takes. However, tongue rehabilitation may take longer. The genioglossal muscles have never been stretched, which means all sublingual muscles should be rehabilitated, even with the help of a speech therapist.

Incomplete division – of the anterior component only – is frequent, and along with insufficient rehabilitation, is one of the main causes of lack of clinical improvement and/or recurrence. Fibrosis and re-ankyloglossia are the most frequent complications<sup>(27)</sup>.

Laser technology may also prove efficacious in infants and is a forward-looking strategy, since it reduces the repairing inflammatory process and therefore the tendency towards retractile healing<sup>(31)</sup>.

Ankyloglossia causes difficulty in maternal breastfeeding, but speech<sup>(32,33)</sup>, dentition, occlusion, swallowing<sup>(34)</sup>, and breathing disorders, as well as postural issues and snoring, have also been reported<sup>(35)</sup>. Primary treatment of ankyloglossia in the breastfeeding period could prevent future problems, but this should be the subject of a new update.

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