

FRENULOTOMY & FRENULECTOMY FOR ANKYLOGLOSSIA (TONGUE TIE)

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Frenulotomy (also referred to as frenotomy) and frenulectomy (frenectomy) are surgical procedures to correct ankyloglossia, a congenital condition in which the lingual frenulum is too short, causing restricted tongue movement. It is commonly called “tongue tie” and affects 4-11% of neonates¹.

Frenulotomy refers to an incision in the frenulum that frees the tongue from the floor of the mouth. **Frenulectomy** refers to complete excision of a frenulum. It is more invasive and may be difficult to perform on small children; however, the results are more predictable, and recurrence rates are lower.

Anatomy

The tongue is attached to the floor of the mouth by a lingual frenulum. A normal frenulum's appearance varies considerably between individuals. Microdissection of cadavers shows that it is a dynamic, layered structure formed by oral mucosa and underlying floor of mouth fascia, which is mobilised into a midline fold with tongue elevation and/or retraction². The base of the frenulum contains a "V" shaped hump of tissue which houses the two Wharton's ducts on either side (*Figure 1*). The sublingual salivary glands empty through tiny ducts on either side of Wharton's ducts. Superficial veins, known as ranine veins, run through the base of the frenulum (*Figure 1*).

Classification of ankyloglossia (*Table 1*)

There are no established criteria or grading systems to classify ankyloglossia. To diagnose ankyloglossia in neonates it is necessary to use both functional and anatomical criteria.

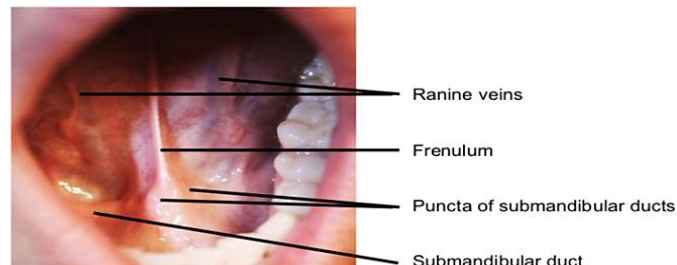


Figure 1: Floor of mouth and ventral surface of tongue

Various management guidelines have been proposed based on the following criteria:

- Length of the frenulum^{3,4}
- Upward tongue mobility (difficulty lifting the tongue to the upper dental alveolus)^{5,6}
- Limited tongue protrusion $\leq 1-2$ mm past the lower central incisors⁷
- Impaired lateral mobility of the tongue, ‘heart-shaped-tongue-appearance’ and a thick fibrous cord palpated on physical examination⁸

The classification by *Coryllos* permits identification of type III and IV frenula by means of palpation which can go unnoticed with macroscopic examination (*Table 1*).

Indications for surgery

There has been a surge in frenulotomies in recent years as an attempt to improve breastfeeding in neonates. A Cochrane review found that frenulotomy reduced mothers' nipple pain and had for the most part, positive short-term effects on breastfeeding¹.

- Difficulty feeding, poor latch in breastfeeding babies and poor weight gain
- Difficulty swallowing
- Decreased tongue mobility
- Speech difficulties
- Significant dental problems

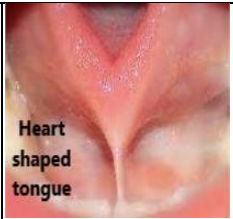
Type 1	Most extreme form, 100% of the tongue is attached to the lingual frenulum and is tethered to the floor of the mouth anteriorly	
Type 2	75% of the tongue is tethered with restricted elevation and extension of the tongue	
Type 3	50% of the tongue is tethered. Tongue appears normal, but mobility is limited.	
Type 4	Limited tongue mobility due to a posterior, fibrous limitation of the most distal portion of the lingual frenulum	

Table 1: Modified grading system developed by Coryllos et al ⁹. Type 2-4 images obtained from Yoon et al ¹⁰

A frenulotomy is appropriate in patients with symptomatic Type 2-4 ankyloglossia, provided that the frenulum is not fibrotic. Type 1 ankyloglossia, fibrotic frenula and revision cases would benefit from a frenulectomy.

In neonates and infants, it may be performed under local anaesthesia in an outpatient setting. The optimum age to perform a frenulotomy in infants is unclear ¹ and the age limit to perform the procedure under local anaesthesia is equally unclear. Consider general anaesthesia in babies older than 16 weeks.

Frenulotomy procedure

a. Outpatient Awake Procedure

Positioning

- The child is swaddled and restrained by an assistant
- The child is then placed flat with head in neutral position and mouth open

Local Anaesthesia

- Inject Lignocaine HCl 1% m/v local anaesthetic with adrenaline 1:160000 on either side of the frenulum
- It is important to remember that the dose limit is 7mg/kg for small infants and that each 1ml contains 10mg of lignocaine

Surgical Procedure

- Use a grooved retractor to retract the tongue (Figures 3,4,5)
- Crimp the frenulum with a straight Crile haemostat (Figure 6)
- Wait a few seconds, and then release the haemostat

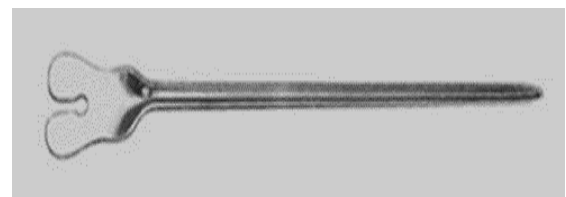


Figure 3: Example of a grooved retractor



Figure 4: Grooved retractor manufactured from a teaspoon



Figure 5: Grooved retractor tenting the frenulum



Figure 6: Haemostat clamped parallel to tongue

- Release the lingual frenulum at its attachment with sterile curved scissors
- Keep the incision close to the ventral surface of the tongue to avoid injury to the orifices of Wharton's ducts
- To ensure adequate release of the frenulum, use a finger to gently massage the tongue at the deep end of the cut frenulum
- Compress the floor of the mouth with gauze to provide haemostasis if necessary
- In the awake child, sucking and oral 50% dextrose syrup may also be used to sooth the infant

b. General Anaesthesia

Intubation

- Intermittent mask ventilation or nasal intubation for surgical access
- Oral intubation may also be performed

Positioning

- Place the child in a supine position with head extended
- Open the mouth and use a grooved retractor to tent the frenulum (*Figure 5*)

Surgical steps

- Inject or apply topical pledgets soaked with 1:80000 lignocaine with adrenaline to either side of frenulum
- Use the grooved retractor to retract the ventral tongue to fully expose the lingual frenulum (*Figure 5*)
- Clamp a straight Crile haemostat onto frenulum parallel to the tongue at its ventral surface (*Figure 6*)
- Wait a few seconds, and then release the haemostat
- Use sterile iris scissors to release the lingual frenulum at its attachment (*Figures 6-8*)
- Place the incision close to the ventral surface of the tongue to avoid injury to the submandibular and sublingual Salivary gland ducts which open onto the floor of the mouth
- The genioglossus muscle is the posterior limit of the incision
- Use gentle finger / peanut dissection to break down deeper fibrous bands at the deep end of the cut frenulum (encountered more often in thicker frenula and revision cases)
- Compress the floor of the mouth with gauze for haemostasis
- In revision cases, or with older children, interrupted absorbable sutures can be placed to prevent the release

from re-adhering to the floor of mouth. Take care when suturing near the papillae of the submandibular ducts (*Figure 9*)



Figure 7: Middle finger retracting lower lip to avoid injuring it while lingual frenulum is released



Figure 8: Diamond-shaped wound following frenulotomy



Figure 9: In revision cases, or with older children, interrupted absorbable sutures can be placed to prevent the release from re-adhering to the floor of the mouth

Complications of surgery (rare)

- Bleeding
- Swelling
- Discomfort
- Injury to Wharton's duct
- Infection
- Scarring requiring revision

Z-Frenuloplasty

This is recommended in older children and for revision cases to improve speech.

Surgical Steps

- Place a silk stitch through the tip of the tongue to retract the tongue (*Figure 10*)
- Inject 1:80 000 lignocaine with adrenaline or apply topical pledgets soaked in lignocaine with adrenaline to either side of the frenulum
- Draw Z-plasty incisions (*Figure 10*)
- Make a vertical/longitudinal incision along the length of the frenulum (*Figure 11*)
- Make 2 incisions at 90° to the first vertical one (*Figures 12a, b*)
- Create and elevate 2 rectangular flaps (*Figures 13a, b*)
- Transpose the 2 flaps adjacent to each other to close in the form of a Z-plasty (*Figure 14*)

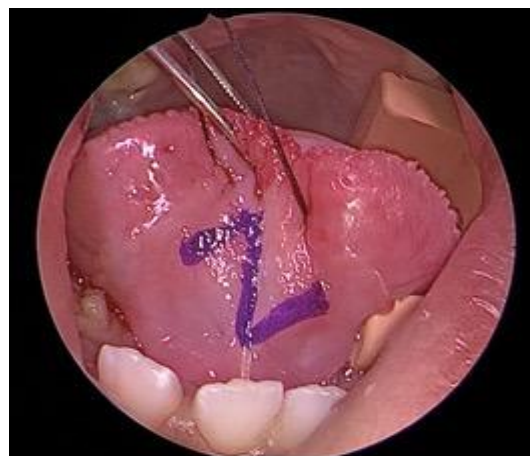
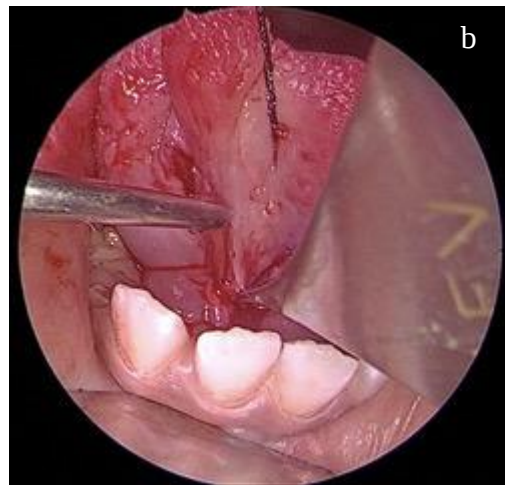
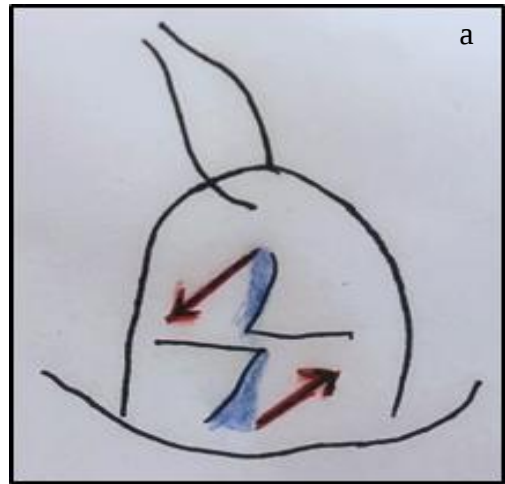


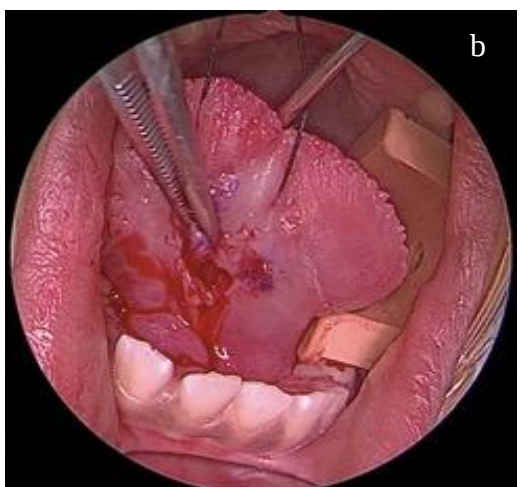
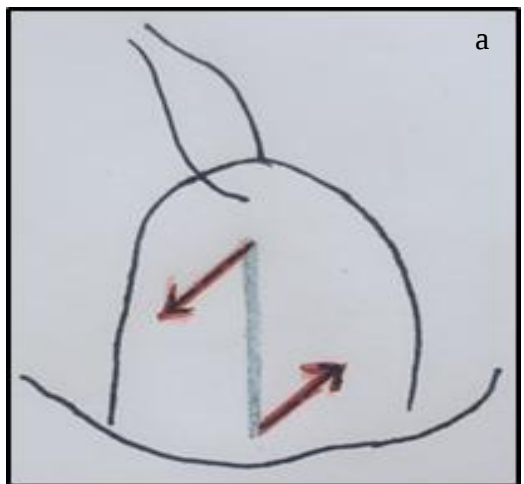
Figure 10: Incisions outlined



Figure 11: Vertical incision along frenulum



Figures 13a,b : Two flaps are elevated



Figures 12a, b: Two incisions at 90° to vertical incision

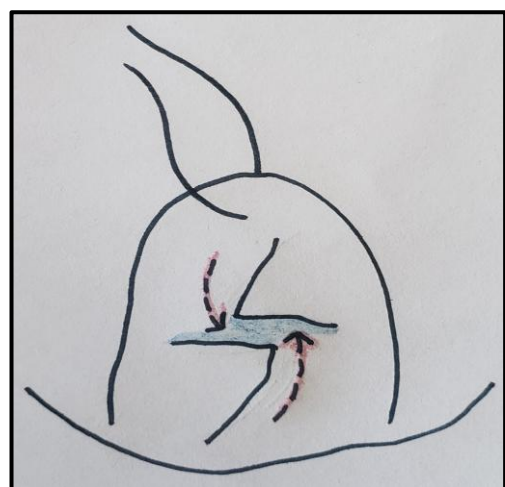
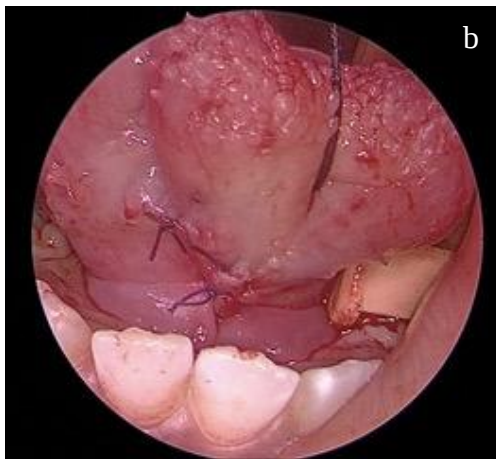
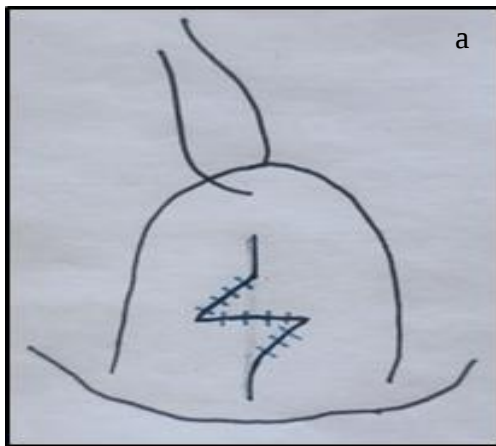


Figure 14: Transpose the 2 flaps adjacent to each other as a Z-plasty



Figures 15a, b: Sutures flaps to complete the Z-plasty

- Suture with interrupted 5.0 Vicryl (Figures 15a, b)

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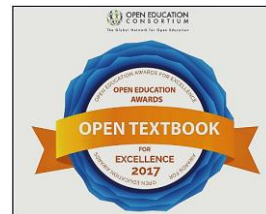
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