



FRENULOTOMY AND FRENULECTOMY FOR ANKYLOGLOSSIA (TONGUE TIE) Ndivhuwo Diale, Shazia Peer, Jessica McGuire

Frenulotomy (also referred to as frenotomy) and frenulectomy (frenectomy) are surgical procedures used to correct ankyloglossia, a congenital condition in which the lingual frenulum is too short, causing restricted tongue movement. It is commonly called a tongue tie and it 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 the frenulum. It is more invasive and may be difficult to perform on small children; however, the results are more predictable, and the recurrence rate is lower.

Anatomy

The tongue is attached to the floor of the mouth by the lingual frenulum. The frenulum's appearance varies considerably between individuals. Microdissection of cadavers shows that it is a dynamic, layered structure formed by oral mucosa and the 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 in the floor of the mouth which houses the two Wharton's ducts on either side. The sublingual salivary glands empty through tiny ducts on either side of Wharton's ducts. Superficial veins running through the base of the frenulum are known as ranine veins (*Figure 1*).

Classification of ankyloglossia (*Table 1*)

Currently, there are no established criteria or grading systems to classify ankyloglossia.

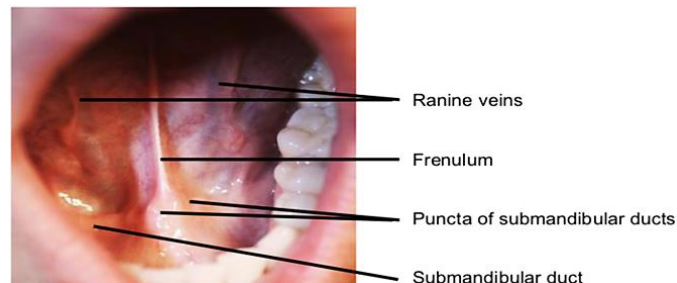


Figure 1: Floor of the mouth and ventral surface of the tongue

Several studies have suggested various guidelines 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 thick fibrous cord palpated on physical examination⁸

The classification by *Coryllos* permits identification of type III and IV frenula, which can go unnoticed with macroscopic examination, by means of palpation (*Table 1*). For a diagnosis of ankyloglossia in neonates it is necessary to combine both functional and anatomical criteria.

Indications for surgery

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

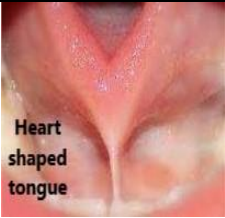



Type 1	Most extreme form, 100% of the tongue is attached to the lingual frenulum and is tethered to the floor of the mouth anteriorly	 Heart shaped tongue
Type 2	75% of the tongue is tethered with restricted elevation and extension of the tongue	
Type 3	50% of the tongue is tethered. Tongue appears normal, 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

Indications

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

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 author has performed this procedure in a 16-week infant. The op-

timum age to perform a frenulotomy in infants is unclear ¹ and the age limit to performing the procedure under local anaesthesia is equally unclear. Consider a general anaesthesia in babies much older than 16 weeks.

Frenulotomy

Surgical consent is obtained.

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

- Lignocaine HCl 1% m/v local anaesthetic with adrenaline 1:160000 is injected on either side of the frenulum
- The dose limit is 7mg/kg and each 1ml contains 10mg of lignocaine
- This is important to bear in mind for small infants

Procedure

- A grooved retractor is used to retract the tongue (*Figures 3,4,5*)
- A straight Crile haemostat is used to crimp the frenulum prior to release
- Sterile curved scissors are then used to release the lingual frenulum at its attachment
- The incision should be close to the ventral surface of the tongue to avoid injury to the ductal orifices
- To ensure adequate release of the frenulum, using your finger, gently massage the tongue at the deep end of the cut frenulum.

- The floor of mouth is compressed with gauze to provide haemostasis, if necessary

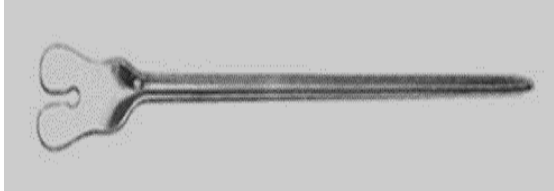


Figure 3: Example of a grooved retractor



Figure 4: Grooved retractor manufactured from a teaspoon



Figure 5: Grooved retractor tenting the frenulum

In the awake child, sucking and oral 50% dextrose syrup may also be used to soothe the infant

b. General Anaesthesia

Intubation

- Intermittent mask ventilation or nasal intubation is preferable for adequate access
- Oral intubation may also be performed

Positioning

- Place the child in a supine position with head extended
- Open the mouth and use the grooved retractor to retract the tongue

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



Figure 6: Haemostat clamped parallel to tongue

- Use sterile iris scissors to release the lingual frenulum at its attachment (Figures 6-8)
- Make the incision close to the ventral surface of the tongue to avoid the submandibular and sublingual salivary gland ducts which open onto the floor of the mouth
- To break down deeper fibrous bands, gentle finger / peanut dissection is recommended (encountered more often in thicker frenula and revision cases)



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



Figure 8: Diamond-shaped wound following frenulotomy

- The genioglossus muscle is the posterior limit of the frenulum incision
- Compress the floor of mouth with gauze to provide haemostasis
- In revision cases, or with older children, interrupted absorbable sutures can be placed to prevent the release from adhering back down onto the floor of mouth. Take care near the papilla of the submandibular ducts (*Figure 9*)



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

Complications of surgery (rare)

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

Z-Frenuloplasty

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

Surgical Steps

- Place a silk stitch through the tongue tip to retract the tongue and hold it in place (*Figure 10*)
- Apply lignocaine with adrenaline injection of 1:80 000 or topical pledgets to either side of frenulum
- Draw the Z-plasty incisions (*Figure 10*)
- Make a vertical/longitudinal incision along the length of the frenulum (*Figure 11*)

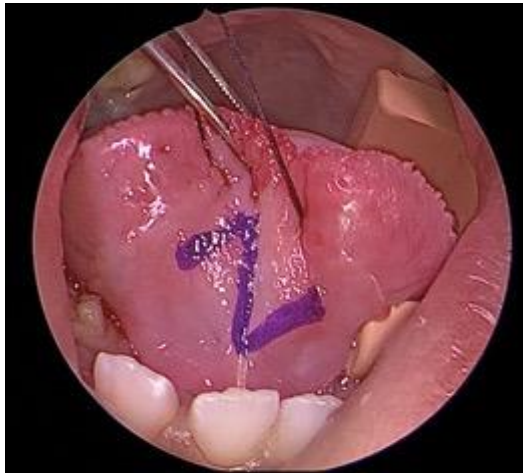
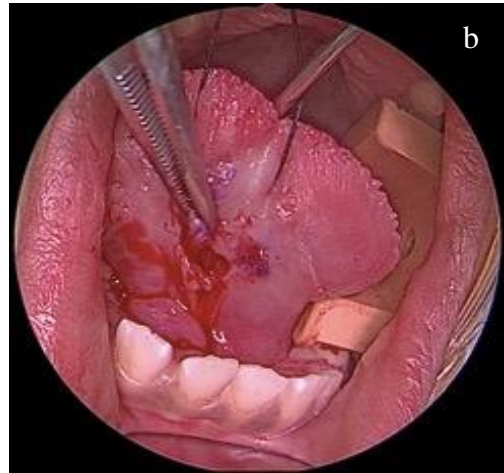
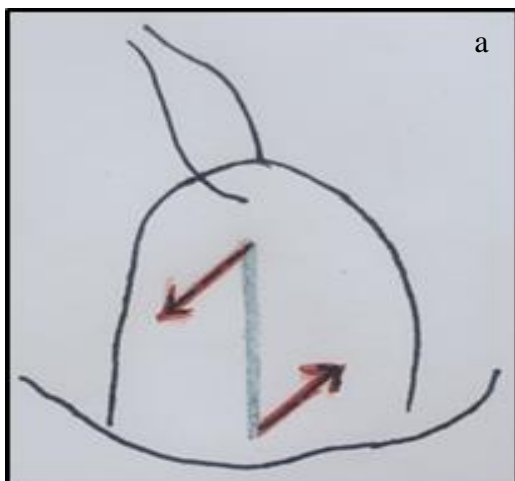


Figure 10: Incisions outlined



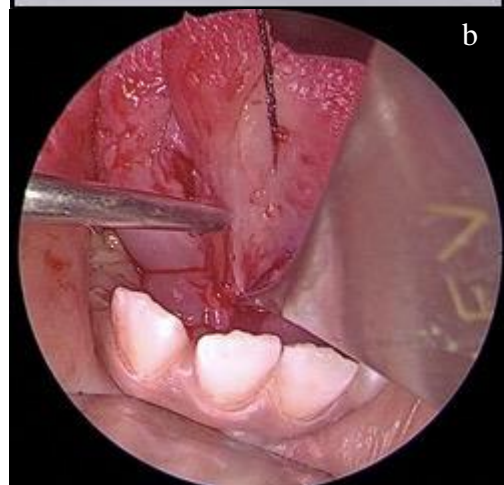
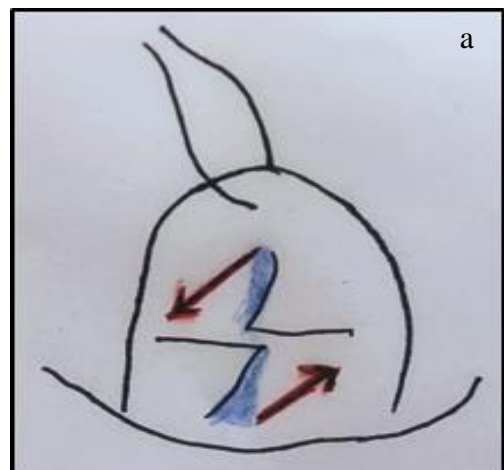
Figure 11: Vertical incision along frenulum

- Make 2 incisions at 90° to the first vertical one (Figures 12a, b)



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

- Two rectangular flaps are now created and elevated (Figures 13a, b)



Figures 13a,b : Two flaps are elevated

- Transpose the 2 flaps adjacent to each other to close in the form of a Z-plasty (Figure 14)

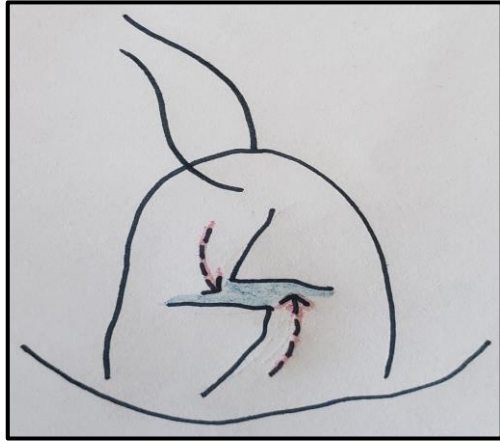
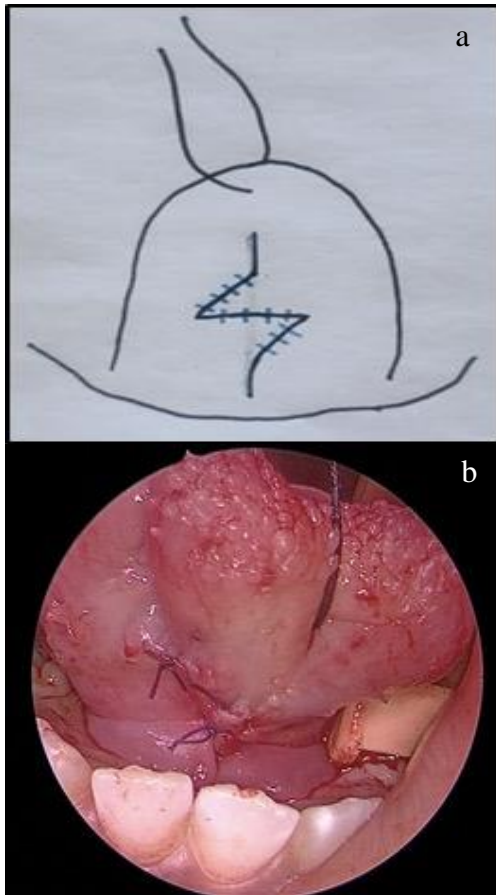


Figure 14: Transpose the 2 flaps adjacent to each other to close in the form of a Z-plasty



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

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

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