OPEN ACCESS ATLAS OF OTOLARYNGOLOGY, HEAD & NECK OPERATIVE SURGERY

FRENULOTOMY & FRENULECTOMY FOR ANKYLOGLOSSIA (TONGUE TIE)

Ndivhuwo Diale, Shazia Peer, Jessica McGuire

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 neonates[1].

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 retraction [2]. 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.

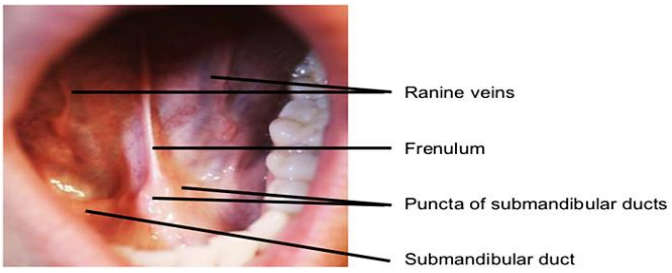


Figure 1: Floor of mouth and ventral surface of tongue

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 ≤ 1–2 mm past the lower central incisors [7]
- Impaired lateral mobility of the tongue, 'heart-shaped-tongue-appearance' and a thick fibrous cord palpated on physical examination [8]

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 breastfeeding [1].

- 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

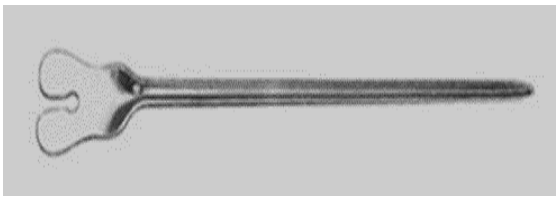


Figure 3: Example of a grooved retractor

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-adhesing 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-adhesing 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 90^0 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)*

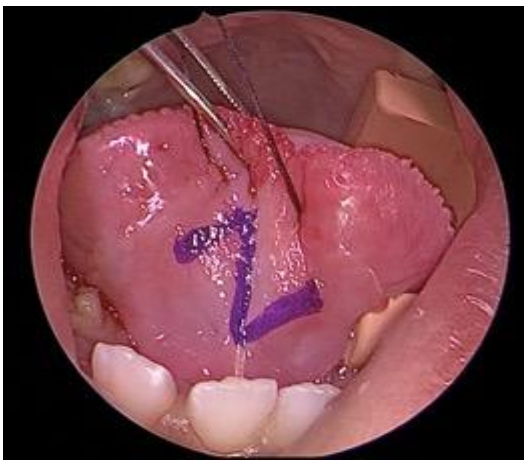
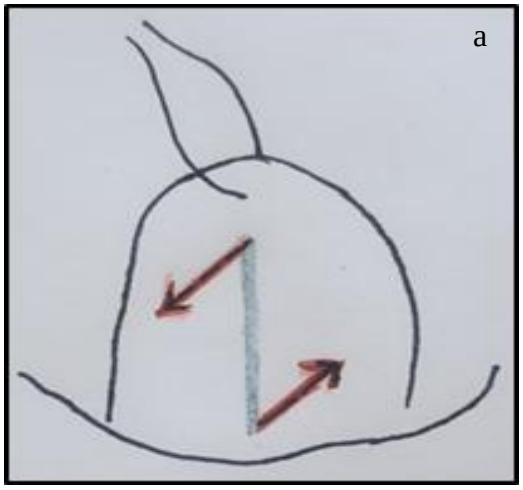
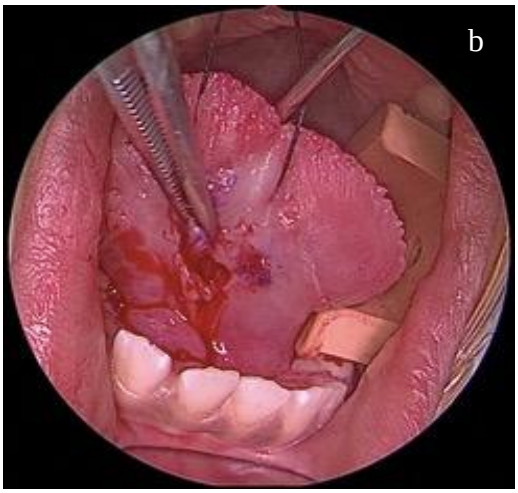


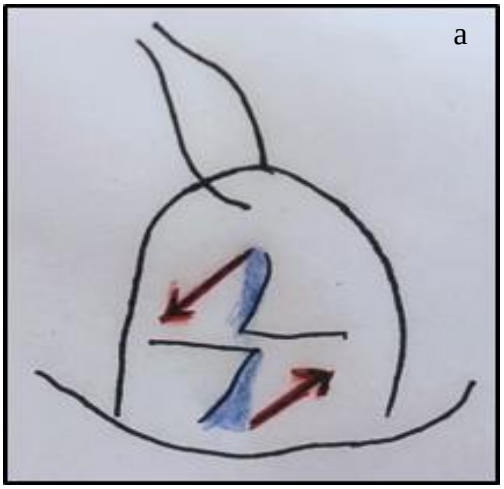
Figure 10: Incisions outlined

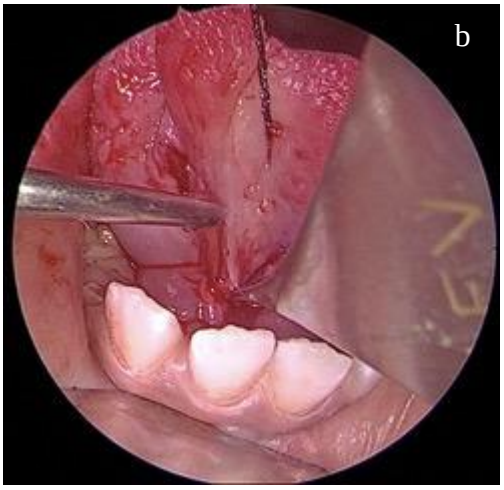
Figure 11: Vertical incision along frenulum





Figures 12a, b: Two incisions at 90^0 to vertical incision





Figures 13a,b : Two flaps are elevated

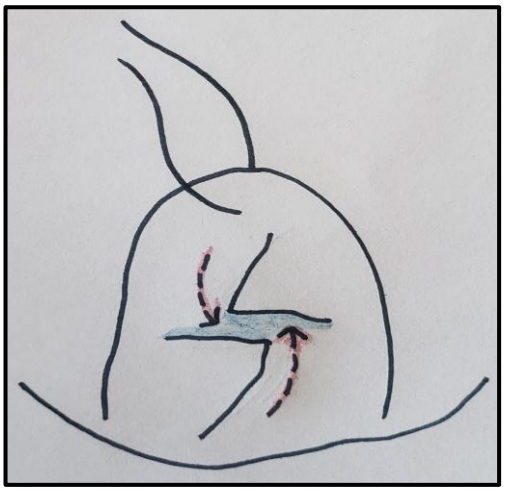
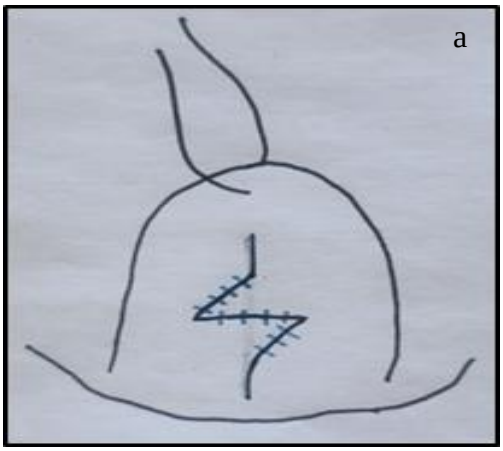
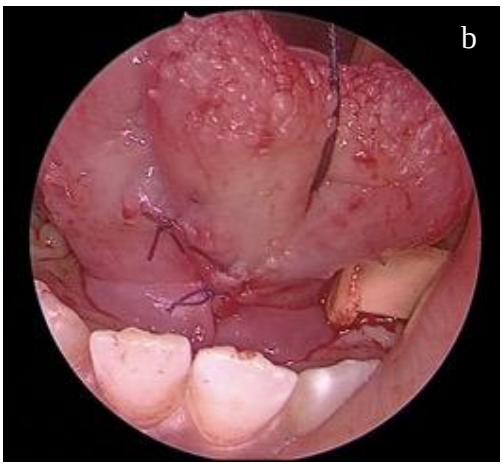


Figure 14: Transpose the 2 flaps adjacent to each other as a Z-plasty





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

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

References

1. O'Shea JE, Foster JP, O'Donnell CP, Breathnach D, Jacobs SE, Todd DA, Davis PG. Frenotomy for tongue-tie in newborn infants. *Cochrane Database of Systematic Reviews*. 2017(3)
2. Messner AH, Lalakea ML, Aby J, Macmahon J, Bair E. Ankyloglossia: incidence and associated feeding difficulties, *Arch Otolaryngol Head Neck Surg*. 126 (2000) 36–9
3. Kotlow LA, Ankyloglossia (tongue-tie): a diagnostic and treatment quandary, *Quintessence Int*. 30 (1999) 259–62
4. Marmet C, Shell E, Marmet R, Neonatal frenotomy may be necessary to correct breastfeeding problems, *J Hum Lact*. 6 (1990) 117–21
5. Hogan M, Westcott C, Griffiths M, Randomized, controlled trial of division of tongue-tie in infants with feeding problems, *J Paediatr Child Health*. 41 (2005) 246–50
6. Masaitis NS, Kaempf JW. Developing a frenotomy policy at one medical center: a case study approach. *J. Hum. Lact*. 12 (1996) 229–32
7. Chu MW, Bloom DC. Posterior ankyloglossia: a case report, *Int J Pediatr Otorhinolaryngol*. 73 (2009) 881–3
8. Harris EF, Friend GW, Tolley EA. Enhanced prevalence of ankyloglossia with maternal cocaine use, *Cleft Palate Craniofac J*. 29 (1992) 72–6
9. Coryllos E, Genna CW, Salloum AC. Congenital tongue-tie and its impact on breastfeeding. AAP section on breastfeeding. 2004; Vol. Summer http://www.aap.org/breastfeeding/files/pdf/BBM-8-27%20Newsletter.pdf
10. Yoon AJ, Zaghi S, Ha S, Law CS, Guilleminault C, Liu SY. Ankyloglossia as a risk factor for maxillary hypoplasia and soft palate elongation: A functional–morphological study. *Orthodontics & craniofacial research*. 2017 Nov;20(4):237-44

How to cite this chapter

Diale N, Peer S, McGuire J. (2017). Frenulotomy and frenulectomy for ankyloglossia (tongue tie). In *The Open Access Atlas of Otolaryngology, Head & Neck Operative Surgery*. Retrieved from https://vula.uct.ac.za/access/content/group/ba5fb1bd-be95-48e5-81be-586fbaeba29d/Frenulotomy%20and%20frenulectomy%20for%20ankyloglossia%20_tongue%20tie_.pdf

Authors

Ndivhuwo Diale MBChB, MMed, FCORL
Otolaryngologist
Sefako Makgatho Health Sciences University, Gauteng Province,
South Africa
ndivhuwobele@yahoo.com

Shazia Peer MBChB, MMed, FCORL
A-Professor, Paediatric Otolaryngologist
Red Cross War Memorial Children's Hospital, Cape Town, South Africa
shazia.peer@uct.ac.za

Jessica McGuire MBChB, MMed, FCORL
Paediatric Otolaryngology
Red Cross War Memorial Children's Hospital, Cape Town, South Africa
jkmcguire2@gmail.com

Paediatric Section Editor

Nico Jonas MBChB, FCORL, MMed
Paediatric Otolaryngologist
Addenbrooke's Hospital
Cambridge, United Kingdom
nicojonas@gmail.com

Editor

Johan Fagan MBChB, FCS(ORL), MMed
Emeritus Professor and Past Chair
Division of Otolaryngology
University of Cape Town
Cape Town, South Africa
johannes.fagan@uct.ac.za

THE OPEN ACCESS ATLAS OF OTOLARYNGOLOGY, HEAD & NECK OPERATIVE SURGERY

www.entdev.uct.ac.za