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LINGUAL FRENECTOMY WITH ELECTROCAUTERY*

ABSTRACT

The purpose of this case report is to present a safe, effective and efficient technique for a lingual frenectomy using a fine tip electrocautery.

INTRODUCTION

The lingual frenum is a mucosa that connects the floor of the mouth and the ventral surface of the tongue. Some variants connect to the alveolar ridge. The frenum can affect the movement and function of the tongue. The thickness can span from a diaphanous (thin and veil-like) to a thick, bulky cord-like or even a web like frenum. The frenum shape can influence the shape of the tongue from notched, cupped, heart-shaped, square, rounded or blunted.

Ankyglossia (tongue-tie) has been described correctly and incorrectly in many different ways. To describe the condition using only visual anatomic criteria fails to consider the tongue's role in normal functions.

Watson Genna (2008) uses a description best described as morphofunctional language that offers a more encompassing definition of ankyglossia (tongue-tie).[7]

CASE PRESENTATION

Clinical Evaluation and Findings

Diagnosing lip and tongue problems requires proper visualization with adequate lighting and the appropriate instruments to assist in tissue deflection. (Figure 3) Having an infant held by the parents allows for control of flailing arms and legs and an opportunity for the parents to learn about the oral cavity. A mouth prop insures an opening to gain access and a grooved director helps to isolate and expose the tissues for diagnosis.

Tongue tie determination should be made first on function and second on appearance. There is a substantial body of research that shows that functional criteria supersede appearance criteria. (Hazelbaker)[8]

Kotlow's classifications are based on evaluating the clinical location of the insertion point of the lingual attachment to the underside of the infant's tongue and the tongue's ability to move (up and down; forward and backward) easily or with difficulty due to restriction.[13]

Fernando has developed the Tongue Tie Assessment Protocol (TAPP) which selects seven criteria to determine if surgery is recommended. (Fernando; From Confusion to Clarity)[6]

Hazelbaker has an elaborate Assessment Tool for Lingual Frenum Function that evaluates function and appearance.[8]

There are numerous other evaluation formats too numerous to fully enumerate.

Diagnostic Assessments for Case in Point

Using a grooved director and elevation of the tongue a taut, submucosal posterior tongue tie was noted. Elevation of the tongue was difficult for the patient. When elevation was assisted by a grooved director, Wharton's ducts became prominent and heavy recruitment of the hyoid muscles was necessary. The patient wanted to raise the mandible to assist and this position could not be held comfortably. A posterior tongue tie was diagnosed with the frenum presenting a web based insertion near the floor of the mouth. (See Figure 1 and 2)

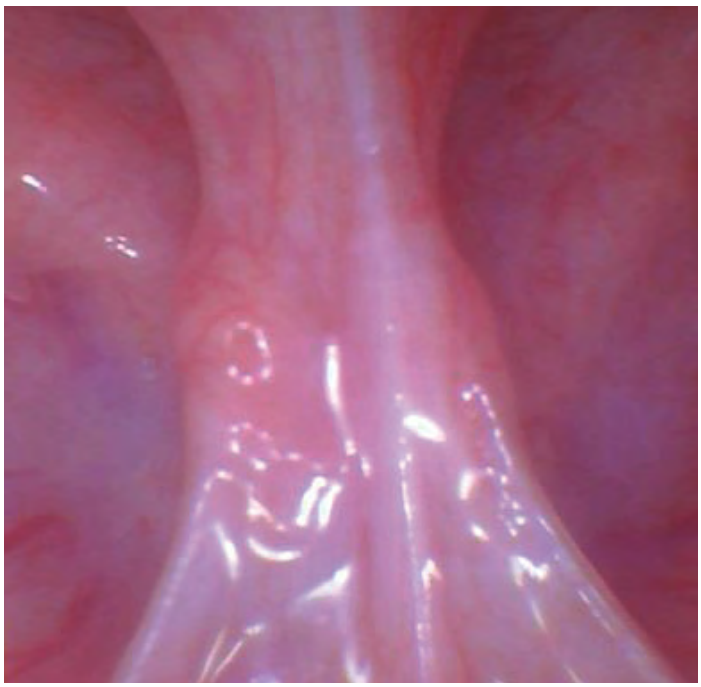

Figure 1: *Pre-op posterior tongue tie*

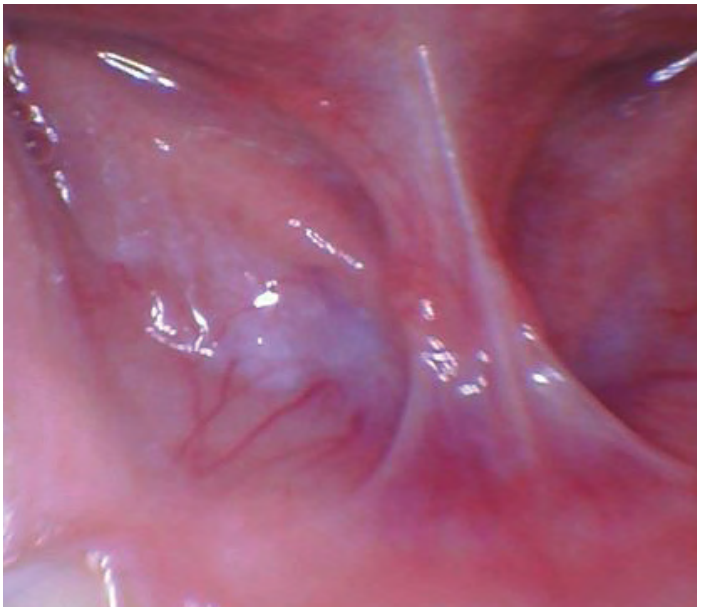

Figure 2: *Pre-op tongue tie*

TREATMENT PLAN

Following diagnosis of the posterior tongue-tie, consultation was made with the speech-language pathologist (SLP). The SLP wanted to follow a protocol of some exercises and speech-language therapy before surgery. After completion of this protocol the patient was referred back to our office for the frenectomy.

Figure 3 shows some of the instruments necessary for proper visualization, tissue deflection and the armamentarium necessary to facilitate the procedure. Topical anesthesia, injectable local anesthesia, mouth props, loupes with magnification and high-intensity light, grooved director (Mickey Mouse appearing instrument) for tissue deflection and isolation along with fine-tipped hand-held electrocauteries are included.

Figure 3: *ARMAMENTARIUM (picture of instruments)*

Electrosurgery vs Electrocautery difference[1-20]

Significant differences exist between "electrocautery" and "electrosurgery". The literature frequently misuse the terms .In actuality they are quite different in terms of both tools used and the methods of application.

1) Electrosurgery passes electrical current through tissue to accomplish a desired result. The electricity used is a form of alternating current similar to that used to generate radio waves.

2) Electrocautery uses electrical current to heat a metal wire that is then applied to the target tissue in order to ablate, cauterize or coagulate the specific area of tissue. It is not used to pass the current through the tissue, but rather is applied directly onto the targeted area of treatment There is no electrical current passing through the body that might cause a muscular stimulation.

3) Another rather obvious difference between the two is that electrocautery devices are small. Battery operated device which use physical heat to ablate, shape or recontour the targeted tissues or cause a specific and desired effect. The electrosurgery devices are more sophisticated radio-wave generators that pass modified electrical current through the target tissues to achieve the desired surgical result. (www.boviemedical.com)

Electrocautery can be safely used on patients with pacemakers, ICD's and deep-brain stimulators because the electric current does not pass through the patient. (Convissar)[4]

There have been incorrect reference to "electrocautery burns" when the case in point was actually utilizing an electrosurgery unit requiring a grounding pad.

Figure 4: *Ultra-thin cautery wire tip (~.07 mm)*

Collateral damage

Concern for the possibility of collateral thermal damage can be eliminated or mitigated with the proper surgical technique. The recommended "Duty Cycle" is 2 seconds on 6 seconds off for a continuous time of no more than 15 minutes.[1] Because of the delicate tissue under the tongue and the thin diameter, most frenectomies are completed in less than 2 minutes. This represents a 25 % Duty Cycle. Kalkarf recommended for electrosurgery that "single electrosurgical incisions should be accompanied by a speed of approximately 7 mm per second and that successive incisions should be separated by a cooling interval of 8-10 seconds[9] Judicious and careful "hand speed" is the key to success.

This technique is similar to the technique used in working with lasers when the surgeon can control the amount of time "on" and the time "off" In the laser literature this is also called the "duty cycle". This is also referenced as allowing the tissue to experience "thermal relaxation".[18] This is the brief period of "cooling" so that the tissue temperature does not continue to ramp upwards and the surrounding temperatures near the surgical site remain less affected.

SURGICAL NARRATION

Using the grooved director instrument to safely reflect the tissue and provide optimal controlled visible access, we are able to dissect the frenum fibers providing the frenectomy release. At no time in the muscle of the tongue affected or involved in this surgery.

A non-benzocaine local anesthetic topical is applied and the injection which follows is minimized so that the surgical site is not distended obliterating the anatomical landmarks. It is important to determine the extent and depth of the frenum attachment by manipulation of the frenum to see the areas of tension.

Using either a Bovie® AA00 low temperature fine tip or a AA01 high temperature fine tip electrocautery the tip is slowly moved so as to delicately release the tissue fibers. The motion is a sculpting motion accompanied by the recommended 25% Duty Cycle. This represents the electrocautery being ON for 25% of the time and OFF for 75% of the time.

Periodically we wiggle the frenum to exacerbate the frenum pull allowing us to completely visualize the extent of the frenum tension. We proceed as deep as necessary to remove the frenum attachment. The ideal depth is a clear connective tissue base without fibers or tenting. Any dark tissue visible is not charred tissue but coagulated blood since this is a vascular area.

Care is taken to avoid the vascular structures and nerves under the tongue. The openings of the salivary glands (Wharton's ducts) surface on both sides of the frenum close to the floor of the mouth. Note the delicate dimensions of the electrocautery tip. (Figure 4)

It is advisable to suction the "plume" from the ablated tissue and to avoid the presence of any flammable gases.[24] (See information on the Bovie Smoke Shark™ II – www.boviemedical.com/smoke-shark-ii/)

The classic post-surgical diamond will be visible upon completion. (See Figure 5)

Post-op sensitivity is minimal, there is no bleeding and no sutures are necessary.

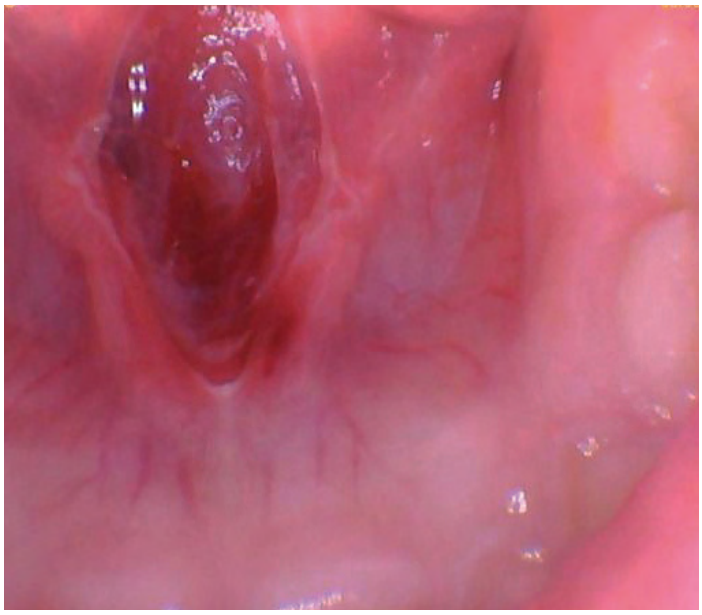

Figure 5: *Classical post-surgical diamond*

Post-op Active Wound Management

A wound in the body will inherently close with contraction towards the center (primary adhesion). This is contrary to our surgical goals. We do not want the tongue to readhere back down to the floor of the mouth. Active wound management with the proper movements is critical. Vertical movement is important. With the younger child or infant, the facilitation of stretching and massaging exercises must be facilitated by the parents. With the older child incorporate activities such as touching the upper lip, lower lip and lateral commissures of the mouth. Reaching and touching the palate is also important.

A creative task for the older child is to lick an ice cream cone at least once a day or lick the syrup from the nooks and crannies of a waffle. Activities should be at least 3x per day for almost 2 weeks.

Part of the postsurgical protocol may involve, myofunctional therapists, and body work such as cranial osteopathy and/or cranial sacral therapy.[13]

The parents are educated thoroughly about the recovery process. Minor discomfort is easily managed with analgesics. Care should be taken to avoid spicy foods or acidic foods.

A small white triangular patch is expected to develop at the surgical site within the first 24-48 hours. This may change in color to a yellowish hue and eventually dissolve or slough off. This is a normal process and is not an infection, necrotic tissue or thrush.

Figure 6: *Classical change of color of diamond to yellow/white after 24-48 hours.*

We routinely do at least two follow-up assessments.

The need for post-op analgesics was minimal. Khullar reports "less pain scores" for electrocautery surgery over the scalpel surgery.[12] No sutures are required which is a foreign body that can be irritating until it dissolves or is removed which reduces the risk of post-operative infection.[12, 14] Tanwar reported that there was less collateral thermal damage than the laser with the electrocautery and healing comparable to the scalpel technique.[24] Shah commented on the efficient "minimal time" involved with the procedure which is always a plus factor in working with young children.[21] A bloodless field contributes to the heightened visibility and ability of the surgeon to be precise.

CONCLUSION

This patient underwent a satisfactory healing sequence and noticed greater mobility of the tongue. The patient returned to the speech pathologists for continued guidance with this new found mobility and function. Post-operative visits were schedule to monitor and insure that no readhesion occurred. Improvement and results may not always be immediate as the patient often need to relearn habits with this new found ability.

An adjunctive benefit in working with the Bovie electrocautery is that all persons in the operatory do not need to wear specific protective eyewear to guard against potential corneal/ retinal injury related to the laser beam. Location wise when using the Bovie electrocautery there is no need to isolate a specific area (safe zone) in proximity to the laser procedure. (Example: a soft tissue laser at 10 watts requires an isolation of 4.77 meters or 15.65 feet; signs need to be posted so individuals do not walk into the area).[14] There is another logistical benefit for the electrocautery for a busy clinic or clinical operatories in an open bay where isolation of a zone with required signs stating 'DANGER' is not necessary.[14]

- Minimal need for post-op analgesics
- Minimal bleeding
- Bloodless operating field/ideal visibility
- No sutures
- Less swelling and discomfort
- Minimal risk of infection
- Minimal procedure time
- No need for eye protection wear
- No need for clearance of area around operatory

ABOUT THE AUTHOR

Dr. Randy Ligh received his Bachelor of Arts degree from the University of California at Berkeley. He went on to receive his DDS from Temple University at Philadelphia. Dr. Ligh completed his Pediatric Dental Residency at Martin Luther King, Jr. General Hospital and UCLA. He is also a certificated lactation educator counselor (CLEC) from University of California, San Diego.

He lectures at the Veterans Administration Hospital General Practice Residency at Palo Alto and was affiliated with the University of the Pacific School of Dentistry as an Associate Professor in Pediatric Dentistry.

Dr. Ligh utilizes both Bovie electrocauteries and a soft tissue diode laser in his private practice at San Jose, California.

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