Clipping the (tongue) tie

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Abstract

Ankyloglossia is an uncommon congenital oral anomaly that can cause difficulty with breast-feeding and speech articulation. For many years, the subject of ankyloglossia has been controversial with practitioners of many specialties having widely different views regarding its significance and management. This study is about a series of five cases of ankyloglossia subjected to surgical correction by frenectomy procedure. Three cases were treated with electrocautery, one case with diode laser and one case with conventional scalpel technique. 1 week and 1 month post-operative follow-ups were done and healing was compared with the available literature. Manipulation of tissues was better in laser and electrocautery techniques when compared with scalpel. Post-operative complication of swelling and pain was seen in scalpel technique whereas it was largely uneventful in other techniques. Though, there was no difference in healing at the end of first month clinically, scalpel technique has shown better results in organization of muscle fibers. This clinical study indicates that laser and electrocautery treatment used for frenectomy operations provides better patient perception in terms of postoperative pain and function than that obtained by the scalpel technique. Considering the above advantages, when used correctly, the laser and electrocautery offers a safe, effective, acceptable and impressive alternative for frenectomy operations.

Keywords: Ankyloglossia, electrocautery, laser, scalpel

INTRODUCTION

Ankyloglossia is a Greek term originating from two Greek words skolios (curved) and glossa (tongue). Ankyloglossia or tongue-tie is a congenital condition, which occurs as a result of fusion between the tongue and floor of the mouth.[1] Wallace in 1960 defined tongue-tie as a condition in which tip of the tongue cannot be protruded beyond the lower incisor teeth because of a short frenulum linguæ. Tongue-tie can vary from a thin elastic membrane to a thickened, white nonelastic tissue.

In many individuals, ankyloglossia is asymptomatic; the condition may resolve spontaneously or affected individuals may learn to compensate adequately for their decreased lingual mobility. Some individuals, however, benefit from surgical intervention frenotomy, frenectomy and frenuloplasty for their tongue-tie. Patients should be educated about the possible long-term effects of tongue-tie so that they may make an informed choice regarding possible therapy. The prevalence of ankyloglossia reported in the literature varies from 0.1% to 10.7%. The prevalence is also higher in studies investigating neonates (1.72% to
10.7%) than in studies investigating children, adolescents, or adults (0.1% to 2.08%). It can be speculated that some milder forms of ankyloglossia may resolve with growth, explaining this age-related difference. There is some evidence that ankyloglossia can be a genetically transmissible pathology. It is unknown which genetic components regulate the phenotype and penetrance in the patients affected. More basic research is needed to clarify the exact etiopathogenesis of ankyloglossia. Ankyloglossia was also found associated in cases with some rare syndromes such as X-linked cleft palate syndrome, Kindler syndrome, Van der Woude syndrome and Opitz syndrome. Nevertheless, most ankyloglossias are observed in persons without any other congenital anomalies or diseases. Speech problems can occur when there is limited mobility of the tongue due to ankyloglossia. The difficulties in articulation are evident for consonants and sounds like “s, z, t, d, l, j, zh, ch, th, d” and it is especially difficult to roll an “r”.

**Kotlow's classification of ankyloglossia**

Free tongue is defined as the length of the tongue from the insertion of lingual frenum into base of the tongue to the tip of the tongue. Clinically acceptable normal range of free tongue is greater than 16 mm. According to Kotlow's observation, ankyloglossia can be of four types depending on clinically available free tongue (protrusion of tongue).[1]

- **Class I**: Mild ankyloglossia (12-16 mm)
- **Class II**: Moderate ankyloglossia (8-11 mm)
- **Class III**: Severe ankyloglossia (3-7 mm)
- **Class IV**: Complete ankyloglossia (<3 mm).

**Lingual frenum: Anatomy and development**

The root of the tongue is derived largely from hyoid arch material. Additions to the root are made from the third and perhaps the fourth branchial arches. As these processes of development continue, the body portion of the tongue gradually becomes free from the sides and the floor of the oral cavity. A median mucosal fold, which may vary in length, is left extending from the floor of the oral cavity to the undersurface of the tongue, not far from the tip. This inferior surface of the tongue is covered by smooth, thin mucosa which is reflected to the lingual or the oral side of the gingiva and the floor of the mouth. When the tongue is raised and elevated, a fold of this mucosa, the lingual frenulum, can be noted in the midline. On either side of the midline, a ridge of fimbriated mucosa extends forward and medially towards the tip of the tongue. Between these ridges and embedded in the undersurface of the tongue are lingual nerves, glands and vessels. Sometimes this attachment of lingual frenum with the tip of tongue restricts the movements of tongue giving rise to condition referred to as tongue-tie. In such conditions the aberrant lingual frenum consists of genioglossal muscle fibers.[2]

**Physiological functions and limitations**

The lingual frenulum is important in various physiologic functions of the tongue:[2]

- Its length and place of attachment affect the movement of the tip in speech and mastication. Speech is affected when extension or elevation of the tip is limited or when there is an inability to touch the palate with the dorsum of the tongue. Most persons with ankyloglossia, though aware of the condition, are able to compensate adequately and can pronounce many sounds properly or nearly so. There are some, however, who are unable to effect this compensation. The most common difficulty is in production of the “s” sound off the incisal edge of the lower incisor instead of behind the incisive papilla. Other sounds that cause trouble are “t,” “d,” “l,” and “n”.
- In the edentulous mouth even a well-compensated ankyloglossia may require surgical correction prior to the construction of full dentures.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4095637/?report=printable
Inability to raise the tongue to the roof of the mouth may prevent development of an adult swallow and encourage continuation of the infantile swallow, which may lead to an open-bite. The lack of a free upward and backward movement of the tongue may result, in an exaggerated thrusting of the tongue against the anterior body of the mandible and produce a mandibular prognathism.

- Gingival recession on the lingual surfaces
- Mandibular prognathism and maxillary hypo development due to the low position and the forward and downward pressure applied.

**CASE REPORT**

A total of five cases, all classified as Kotlow's class III ankyloglossia, were selected from the department of periodontics. Informed consent was taken from all the patients. Institutional ethical committee clearance was obtained. The patients were young, belonging to age group between 17 and 25 years. There were four male patients and one female patient. All the patients presented with some kind of speech defect. All patients were able to protrude the tongue tip till the lower lip. Marginal tissue recession of 2 mm from the CEJ on the lingual aspect of 31, 41 was present in one of the cases Figure 1a.

**Frenectomy using scalpel**

One case of frenectomy was performed with scalpel using blade no. 15 Figure 1b. The procedure was carried under local anesthesia with 2% lignocaine hydrochloride. First a hemostat was inserted at the depth of the vestibule and clamped into position followed by giving two incisions at the superior and inferior aspect of the hemostat. This way the intervening frenum was removed. Muscle fibers were then removed with the help of hemostat. The wound edges were then approximated with 4-0 black silk sutures Figure 1b. Analgesics and antibiotics were prescribed. Swelling and pain was present on the 1st postoperative day, which subsided with the continuation of medication. One week post-operative image showed the formation of slough over the operated site (extending along base of the tongue and floor of the mouth) indicating the process of healing Figure 1c. Patient was advised tongue exercises after 1 week. One month post-operative image shows complete healing Figure 1d.

**Frenectomy using electrocautery**

Three cases of lingual frenectomy were performed using electrocautery. Frenum was held with hemostat at the depth of the vestibule and two incisions were placed using needle electrode Figure 2a,b. Muscle fibers were then separated using loop electrode. Coagulation was achieved by using ball electrode. Immediate post-operative views showed arrest of bleeding and no requisite for sutures Figure 2b. Antibiotics and analgesics were prescribed. One week post-operative view showed presence of slough in the operated site indicating healing process Figure 2c. One month post-operative view showed complete healing of tissues Figure 2d.

**Frenectomy using laser**

One case of lingual frenectomy was performed using laser. Tongue was raised to gain access and frenectomy performed using diode laser in a constant motion Figure 3a,b. Immediate post-operative images showed no signs of hemorrhage. Saline irrigation was given and there was no need for sutures Figure 3b. One week post-operative image shows partial healing Figure 3c. One month post-operative image shows complete healing with scar formation Figure 3d.

Many in vitro studies have tried to compare the healing after scalpel and electrosurgical excision of soft tissues. The importance of lateral heat generated during electrosurgical procedures and its adverse effects on wound healing has been documented in detail by Krejci et al. (1987).[5] Morosolli et al. (2010)[6] in their study evaluated and compared the healing process after surgical treatment of chemically induced lesions in the lateral edge of tongue of hamsters performed with scalpel, electrocautery and carbon dioxide.
(CO₂) laser radiation. Following are the observations of histological sections made by Morosolli et al. (2010) in hamsters during healing period [Figures 4a–c, Figure 5a–c and Table 1].

The use of diode laser at high power settings have shown to produce charring of tissues and separation of epithelium from the underlying connective tissue thus advocating the use of low power settings with diode lasers.[7]

**DISCUSSION**

Optimal management of tongue-tie including timely and appropriate surgical intervention, followed by speech therapy when indicated, has the capacity to deliver pleasing results, often in a shorter time than expected. It is being so increasingly accepted by disciplines associated with infants, children and adults with tongue-tie that there is now no place for ‘wait and see’ policies when the frenum has been identified and diagnosed as abnormal, and early intervention is the optimal management.

The correction of ankyloglossia at an early age reduces the risk of latent complications. Therefore, surgery should be considered at any age depending on the patient's history of speech, feeding, or mechanical/social difficulties. Surgical techniques for the therapy of tongue-ties can be classified into three procedures. Frenotomy is a simple cutting of the frenulum. Frenectomy is defined as complete excision, i.e., removal of the whole frenulum. Frenuloplasty involves various methods to release the tongue-tie and correct the anatomic situation. There is no sufficient evidence in the literature concerning surgical treatment options for ankyloglossia to favor any one of the three main techniques.[8]

In this case report, a series of five cases of ankyloglossia were subjected to surgical correction by frenectomy procedure. For three cases, surgical excision of lingual frenum was performed with electrocautery. The remaining two cases underwent surgical excision with laser and scalpel techniques, respectively. As it is evident from the literature, the manipulation of tissues was better in procedure with laser and electrocautery. Bleeding was less pronounced when compared to conventional scalpel method. First post-operative day showed swelling and pain in the conventional case whereas it was uneventful in electrocautery and laser cases. Post-operative healing is faster as there is no need for the undermining of muscular tissues and suturing with catgut, or suturing superficial tissues with resorbable sutures.[9] In vitro studies have shown that healing does not show any considerable difference histologically when the three procedures are carried out on rats. Skeletal muscle fibers were better organized and dynamics of healing process were more rapid in scalpel group. Thus, though the approaches to the problem of not using the traditional scalpel have merits but further improvements can still be made considering the healing aspect. Healing was complete by first post-operative month. Speech therapy must include exercise for tongue such as oral kinesthesia (ability to feel the part and how they are moving) and DDK (diadochokinesis-ability to perform rapid, alternating movements) without which no significant improvement in speech will be achieved.

**CONCLUSION**

This clinical study indicates that laser and electrocautery treatment used for frenectomy operations provides better patient perception in terms of postoperative pain and function than that obtained by the scalpel technique. Considering the above advantages, when used correctly, the laser and electrocautery offer a safe, effective, acceptable and impressive alternative for frenectomy operations.

**Footnotes**

**Source of Support:** Nil

**Conflict of Interest:** None declared.

**REFERENCES**


**Figures and Tables**
Figure 1

Frenectomy with conventional technique (Scalpel and Blade), (a) preoperative view, (b) operative view, (c) 1 week post-operative view, (d) 1 month post-operative view
Figure 2

Frenectomy with electrocautery, (a) preoperative view, (b) operative view, (c) 1 week post-operative view, (d) 1 month post-operative view
Figure 3

Frenectomy with laser, (a) preoperative view, (b) operative view, (c) 1 week post-operative view, (d) 1 month post-operative view
Figure 4

Healing after 14 days, (a) with scalpel, (b) with electrocautery, (c) with laser
Figure 5

Healing after 28 days, (a) with scalpel, (b) with electrocautery, (c) with laser
### Table 1

<table>
<thead>
<tr>
<th>Scalpel</th>
<th>Electrocautery</th>
<th>Laser</th>
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<tr>
<td>14th day: Loose connective tissue replacing the pre-existing muscle. New atrophic muscle fibers were observed in a disorganized distribution.</td>
<td>14th day: Loose connective tissue replacing the damaged muscle tissue. This tissue was still disorganized and had been penetrated by some remainders of atrophic muscle fibers in degeneration processes.</td>
<td>14th day: Extensive ulcerated area with re-epithelialization in ulcerated area. An extensive area of loose connective tissue is seen, well cellularized and well organized with degeneration of remaining muscle bundles.</td>
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<td>28th day: The muscle bundles present were numerous and more organized. Scarce fibrous connective tissue among the muscle fibers also present.</td>
<td>28th day: Histological sections revealed atrophic muscle bundles and some skeletal muscle fibers disposed in isolated groups and among the connective tissue rich in collagen fibers.</td>
<td>28th day: Predominance of well-cellularized connective tissue, interspersed with isolated skeletal muscle fibers and some bundles. Some fibers presented with structural alterations like central nuclei and hypertrophy.</td>
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Demonstrates the comparison of healing process histologically after surgical excision of frenum by scalpel, electrocautery and laser.

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