



**MANAGEMENT FOR TONGUE TIE IN CHILDREN; A RANDOMIZED CONTROL
PROSPECTIVE STUDY**

¹Dr. Dhinesh Kumar, ²Dr. Thambithurai Davidm and ³*Prof. Dr. J. A. Jayalal

^{1,2}Assistant Professor Paediatric Surgery Kanyakumari Government Medical College.

³Professor of Surgery Kanyakumari Government Medical College.

*Corresponding Author: Prof. Dr. J. A. Jayalal

Professor of Surgery Kanyakumari Government Medical College.

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ABSTRACT

Ankyloglossia, known as tongue tie is a developmental disorder that manifests when the inferior lingual frenum is too short and is attached to the tongue tip, resulting in limitation of its movement. It has impact on the speech, oral hygiene, breast feeding and other tooth eruptions. There are different options available for the treatment of tongue tie. Two common methods used for frenectomy are by scalpel and by electro cautery. Nowadays laser therapy is also becoming popular. In this study we carried out in the Paediatric surgery unit of the teaching hospital, prospective study to compare the efficiency duration of surgery, immediate and follow-up outcome study in 100 cases treated for tongue tie using this two methods. Each group had 50 children at the age of 1-12 years. In our study 62% of population was male child and 38% (ratio 1:6:1) were female. Mean age group between 5-8 years. Majority of the patient were Kotlow's class III having ankyloglossia of (3-7mm) followed by class I having mild ankyloglossia (12-16 mm). All patients undergone frenectomy .In one group it was done with using scalpel combined with frenuloplasty and other group with bipolar cautery .Both the group had better patient perception in view of post-operative pain. Electro cautery taken less time, but had more chances of re adhesion with fibrosis than the frenectomy procedure using scalpel. The time taken for scalpel surgery was significantly more than for electro cautery. Blood loss and edema were also significantly low in electro cautery group In electro cautery group the edges were not approximated. We concluded frenectomy using bipolar cautery and approximation of the cut edges will be most beneficial.

KEYWORDS: Ankyloglossia, Electro cautery, Scalpel, edema.

INTRODUCTION

Tongue tie is a congenital abnormality in the development of tongue, which decreases the mobility of the tongue tip and it results due to an unusually short and thick membrane connecting the underside of the tongue to the floor of the mouth called as frenum.^[1]



Embryologically the term Ankyloglossia derives from the greek words “ agkilos” meaning curved and “glossa”

meaning tongue.^[2] Though it is a congenital anomaly it is observed in neonates, children and in adults too. As most often they do not complain about this anatomical anomaly now with the empowered school health screening programmes they are identified from the schools health examination and referred to paediatric surgery departments.

The frenum is a fold of mucus membrane containing muscle and connective tissue connecting the lip and cheek to the alveolus mucosa. Knox and Young studied and reported frenum contain orbiculus oris horizontal and transverse fibers. Henry et al stated it contains only dense collagenous tissue and elastic fibers.^[3]

Ankyloglossia definition range from vague description of a tongue that moves with a less than normal range of motion to a specific description of the frenum being short, thick, muscular or fibrotic.

As per Kotlow the Ankyloglossia are classified into 4 types^[4]

Clinically acceptable normal range of free tongue → 16mm

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 → 3mm

The sequel of ankyloglossia again remains controversial. As per the literature it includes^[5]

1. Lower incisor deformity
2. Gingival recession
3. Malocclusions

Ankyloglossia is not a cause for delay in speech onset, but may interfere with articulation. When there is restriction of elevation of the tongue tip the articulation of one or more of the tongue sounds—such as “t,” “d,” “l,” “th,” and “s”—will not be accurate and impaired. If the patient is able to produce these sounds with apparent Ankyloglossia, they are not a candidate for surgical correction.^[6]

Ankyloglossia in newborn may result in feeding difficulties including ineffective latch, inadequate milk transfer and maternal nipple pain. Messener et al in his study on ankyloglossia controversies in Management has concluded surgical interventions in the presence of significant Ankyloglossia have resulted in successful and improved breast feeding.^[7]

Ankyloglossia may result in, inability of the tongue to contact anterior palate. This will promote infantile swallow and will hamper the normal progression to an adult like swallow which will result in an open bite deformity. This can also lead to mandibular prognathism.^[8]

Ankyloglossia incidence amounts to 4.4 – is 3:1 in newborns the male to female ratio will 3:1. Most often minor Ankyloglossia remains asymptomatic and resolve spontaneously or the child may learn to compensate it.

There are different treatment modulation available for symptomatic Ankyloglossia starting from speech therapy, frenotomy, frenectomy, frenuloplasty etc. these can be done by surgical blade, electro cautery, CO2 laser and many other methods. In our study, we adopted to study the impact of scalpel frenectomy vs bipolar frenectomy.

MATERIALS AND METHODS

This study is carried out as a prospective double blind controlled study in the paediatric surgery department of a teaching hospital from the year 2017 January to July 2018. As the department is attached with school health project, volume of cases reported were high.

Total number of cases included in this study were 100. The patients were randomized into two groups each having 50 patients. The first group underwent surgical frenectomy under short general anaesthesia and later group undergone Bipolar Cautery frenectomy under LA. The patients were followed up to 6 months and results were observed, tabulated and analysed.

Inclusive Criteria

The study population comprised of all children referred to the department and fulfills the following criteria.

1. Ankyloglossia is confirmed as per Kotlow 1 to IV types.
2. Aged between 1-12 of both sex.
3. Informed consent from parents or legal guardian to participate in the study.

Patients were analyzed on

Day 1 of the post-operative period for pain, and inflammatory signs,

On 7th day for wound healing and any complication

On one month post-operative for scar and contractures

On the 6th month of post-operative period for speech improvement and recurrence.

Exclusion criteria

- Child with severe co-morbid conditions
- Bleeding diathesis

Ethical clearance

The study was presented and approved by the ethical committee of the institution.

Intervention

Participants were subjected to

A: Surgical frenectomy

B: Bipolar Cautery frenectomy

Detailed demographic study of age, sex, was noted. General condition of the patients noted. Detailed history and oral examination were undertaken for all eligible candidates and typed as per Kotlow's classification.

The randomizations of the group were done using sequential method. The surgeons operating were blinded on the group. All procedures were carried out by the qualified Paediatric surgeons.

Classical Frenectomy Using scalpel

The classical technique was introduced by Archer (1961) and by Kruger in 1964.

Under short anaesthesia/LA frenectomy are performed with scalpel blade no 15. 2% lignocaine local anaesthesia is infiltrated. First an artery forceps placed at the vestibule depth and clamped into position followed by using a scalpel two incision at the superior and inferior aspect of the artery forceps. The intervening frenum is removed. Muscle fibres are teased and removed using an artery forceps. Complete hemostasis secured. Wound

edges are approximated using 4'0 vicryl sutures. Preoperative and post op single dose antibiotic prescribed. Analgesics and oral mouth gargle were given for 7 days.

Edema and pain were noted in the first post op day which subsided in the continuous medication. After 7 days the site showed formation of slough over the operated site extending along base of the tongue and floor of the mouth which indicate proper healing. After a month the wound is observed for proper healing or any fibrous adhesions.



Frenectomy using Bipolar Cautery.

Under short GA/sedation, the 2% local anaesthetic lignocaine hydrochloride is injected. Tongue is held with stay suture and using bipolar electrode cautery, the frenum is cut in the middle up to the depth of the vestibule. Complete hemostasis secured using cautery and no sutures done. Post op analgesic, antiseptic gargles were given as per the age group of the patients.



Post-operative period patient were advised to

1. to open the mouth widely and touch the front teeth with tongue.
2. stretch the tongue up towards the nose.

3. With a closed mouth to thrust the tongue to ® and L cheek.

OBSERVATION

The patients were evaluated on the 1st, 7th, 30th days and 6 month post-operative period.

Day 1: Pain and inflammatory signs

Day 7: wound healing

Day 30th: Scar and contracture

6th month: speech evaluation/recurrence

Assessments of these were done based on the clinical criteria by the blinded surgeon.

Operative time: time is calculated from the start of the incision to completion of the procedure. The duration of time for anaesthesia is not included. The operative time is categorized as three groups.

- a. 0-10 minutes
- b. 10-20 minutes
- c. > 20 minutes

Bleeding: the quantum of bleeding during the procedure is assessed by the blood soakage of surgical cotton pad and it is grouped in to three categories.

- a. No blood loss
- b. One cotton pad soaks
- c. more than one cotton pad soak

Suturing: the edges are approximated using 4' vicryl. Every patient in scalpel technique needed suturing.

Edema: in the first post op period, by clinical examination presence of edema at the site of operation are assessed.

Pain: pain was assessed in relation to eating or chewing using visual analogue score both on the 1st and 7th post op period.

Randomization: simple random sampling by sequential method done.

Blinding: this is a double blind study. Both the patient and surgeon were not aware of the treatment received or undertaken on the day. The patients were assigned unique ID and surgeon was asked to perform the procedure randomly without prior knowledge.

Data analysis

All the data were collected and tabulated in the computer using excel sheet. Statistical analysis was done using SPSS 20 package. Chi-square test was used for comparison with P-value <0.05 is considered as statistically significant.

RESULTS

1. Age and Gender

Out of the 100 patients included in the study 62 were male and 38 female. The male to female ratio was 1.6: 1

Most common age group noted in both sexes were for 5-8 years and lowest group is from 9-12 years.

Athishkumar Gujarath et al in their study of tongue tie with 62 patients reported the most common age group was 1-4.^[9] However in our study, most of the patients were from school health project, the majority was from 5-8 years and it was statistically significant (8). The data is shown in Fig: 1 and Table: 1.

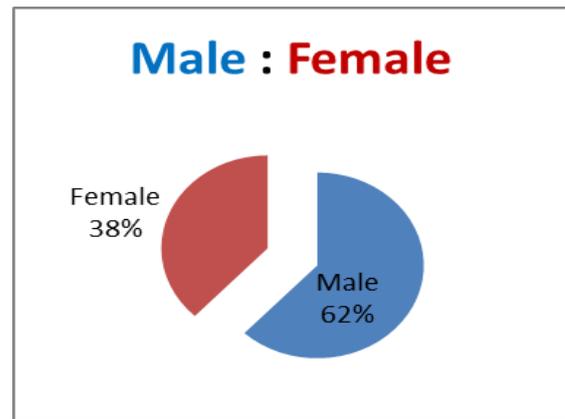


Fig:1.: Showing the Male : Female population of study:

Table 1: Demographic variables.

Variable	Intervention group		Total	Chi-square	P value
	A	B			
Gender			100		
Male	30	32	62	5.76	0.0164
Female	20	18	38		
Age group				11.78	0.0028
1-4	15	14	29		
5-8	24	25	49		
9-12	10	12	22		
Kotlow Classification				26.32	0.0001
I	7	8	15		
II	11	9	20		
III	23	24	47		
IV	9	9	18		

The participants in the study having ankyloglossia were typed based on the tongue movement as per Kotlow classification. Majority of the patients were in the 111rd group and shown in Figure 2.

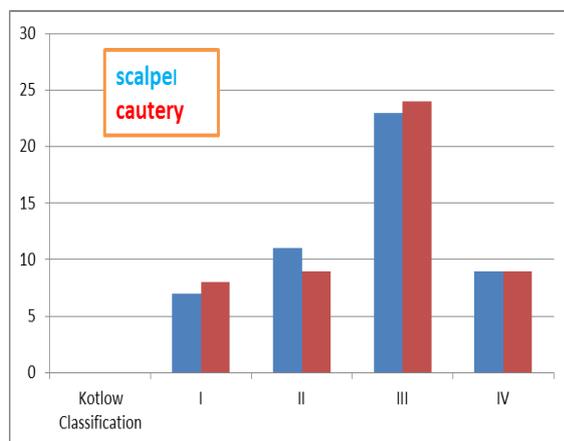


Figure 3: Classification of Ankyloglossia.

The intra operative and post-operative factors such as operation time, bleeding, post-operative pain, edema, medication needed, wound contracture, adherence were studied and assessed for statistical significance. Various variables are observed and data tabulated in Table 2.

Table 2: Summary of treatment factors in different groups.

Variable	Intervention group		Chi-square	P value
	A	B		
I. Operative Time				
i. 0-10 mts	1 (2)	18(36)	40.7267	<0.0001
ii. 10-20 mts	20(40)	30(60)		
iii.>20 mts	29(58)	2(4)		
II. Bleeding				
i. Blood loss	1(2)	29(58)	52.2667	<0.00001
ii. one cotton pack	18(36)	20(40)		
iii>one pack	31(62)	1(2)		
III. Pain				
i. No pain (score 0)	1(2)	20(40)	47.6824	<0.00001
ii. Mild(1-3)	8(16)	22(44)		
iii. Moderate (3-7)	22(44)	7(14)		
iv. Severe (>7)	19(38)	1(2)		
IV. Suturing				
i. Yes	0(11)	49(98)	92.16	<0.00001
ii. No	50(100)	1(0.2)		
V. Edema				
i. none	4(08)	45(90)	67.2669	<0.0001
ii. present	46(92)	5(10)		
VI. Wound contracture and scaring				
i. Yes	2.8 (56)	20(40)	2.5641	0.10931
ii. No	22(44)	30(60)		
VII. Post Op medication				
i. Not needed	1(02)	2(04)	66.0023	<0.026982
ii. Needed on day1	1(02)	40(80)		
Needed on day 7	48(96)	8(16)		
VIII. 6 month evaluation				
i. Adherence with fibrosis	0(00)	4(8)	4.8913	0.026982
ii. Normal	50(100)	46(92)		

1. Operating time: In our study the frenectomy using electro cautery has taken less operating time. Mean time taken was 11.8 minutes while in frenectomy using scalpel the mean time taken was 20.6 minutes. The difference is statistically significant with p value less than 0.00001. This was mainly because the bleeding was less and no sutures were applied when electro cautery was used. The data is shown in Fig :3.

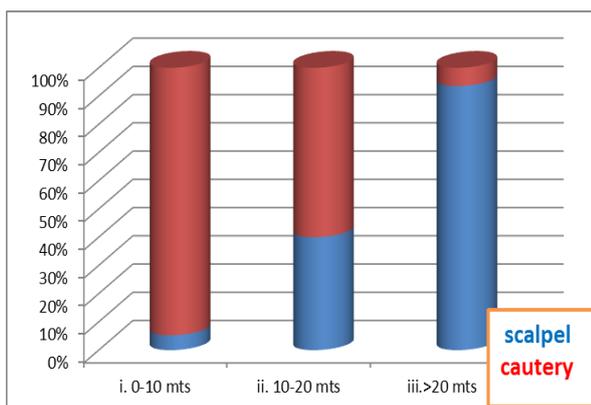


Fig 3: Operating time in Scalpel and Electro cautery Frenectomy.

3. Bleeding: In our study, in cases where electro cautery was used 98% of cases either needed one pack or no pack as bleeding was very minimal and only 2% of cases required more than one pad. But in scalpel frenectomy 62% of patients needed more than one pad. This is also statistically significant.

4. Pain: Pain factor was high in scalpel surgery than in electro cautery in a significant way. 82% of patient had moderate to severe pain in the scalpel surgery however only 16% had moderate to severe pain in the electro cautery group. This is a statistically significant observation.

5. Edema: in scalpel surgery 92% patient had edema and in electro cautery 90% of patients had no edema, statistically significant with p value less than 0.0001.

6. Recurrence: it was observed in 4 patients in the 6months post-operative period, the scaring and adherence of the tongue resulting in practical ankyloglossia in patient who had no approximation of mucous membrane using suture. This is a statistically

significant and may be due to healing by secondary intention.

DISCUSSION

In spite of numerous advances in the field of surgery the most common and widely used procedure of choice for Ankyloglossia is only frenectomy using scalpel. However this conventional technique can result in scarring which may lead on to periodontal problems and an unaesthetic situation.

Newer advances in the instrumentation like electro cautery, laser and harmonic scalpels are been used for frenectomy with various advantages.

The operative time, bleeding, edema, pain all were significantly less than the conventional scalpel frenectomy.

Lasers are used more in soft tissue surgery. However, looking into the cost involved, collateral tissue damage it produces, requirement of safety glasses for using the laser and time required, electro cautery are much superior to the use of laser.^[10]

In comparing the handling property obviously scalpel is less expensive and it is much user friendly, precise incision with well-defined margins, no unwanted lateral tissue damage and advisable to use near bones and implants. However, the scalpel has the disadvantage of need for anaesthesia, excess of bleeding, need of suturing and post op medication.

Disadvantage of the use of electrocautery include unavoidable burning, flesh odor, low tactile sense cannot be used near implants, impact injury on the bone, collateral tissue damage and explosive environment. It cannot be used in patient with pace maker.^[11]

Haytec et al^[14] conducted a study comparing frenectomy done with scalpel and Co2 laser reported patient who had laser surgery experienced less pain.^{[12][13]} However as our institution is not having laser we conducted this study comparing electro cautery vs scalpel frenectomy.

One of the significant finding in our study, the post-operative adhesive scarring in patient treated with electrocautery resulting in features of ankyloglossia.^[15] We observed this is due to the fact the edges are not approximated and healing by secondary intention and the post-operative tongue exercise not done properly. Hence we recommend the advantage of using electro cautery but approximation of edges will prevent this complication.

CONCLUSION

The research study indicates the electro cautery used for frenectomy provides better patient perception on pain, reduced operative time, lesser inflammatory sign, suture less and cost effective. However, few cases of healing by

secondary intention resulted in re adhesion due to fibrosis. Using the advantage of electro cautery primary approximation of the edges will be beneficial for long term aesthetic effects.

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