The THAI Journal of SURGERY 2004; 25:79-83.
Official Publication of the Royal College of Surgeons of Thailand

The Comparison of Frenulotomy with Conventional Frenuloplasty in the Management of Breastfeeding Difficulty : A Randomized Controlled Trial

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Abstract

Background: **Tongue-tie is a congenital underdevelopment of the lingual frenulum and it results in decreased tongue tip mobility. Tongue-tie that is related to breastfeeding difficulty was determined to have benefit from surgical correction. The conventional frenuloplasty has been performed under general anesthesia, although with satisfied results, the risk for anesthesia is still questioned.**

Objective: **To prove the efficacy of frenulotomy under local anesthesia in solving breastfeeding problems due to tongue-tie in the neonate compare with frenuloplasty under general anesthesia.**

Materials and Methods: **A randomized controlled study was conducted. All newborn in lactation clinic that had tongue-tie as the major cause of breastfeeding difficulties were randomized into 2 groups. Pre and post operative LATCH scores were evaluated. The increment of LATCH score indicates improvement in breastfeeding efficacy.**

Results: **From October 2002 to January 2003, 30 newborns were enrolled in this study. Mean increased score in frenuloplasty group was 3.07 and in frenulotomy group was 3.13 . There was no difference in increased LATCH score in both operations. No surgical complication was found in this study.**

Conclusions: **Frenulotomy under local anesthesia is as safe and effective procedure as frenuloplasty under general anesthesia for solving breastfeeding problems in neonate due to tongue-tie but has significant shorter time to resume breast feeding.**

"Tongue-tie" or ankyloglossia is a congenital oral anomaly characterized by an underdevelopment of the lingual frenulum, with the frenulum attaching to a varying degree in the midline to the tip of the tongue, along the floor of the mouth to the gingiva, and it results in decreased tongue tip mobility.[1-3]

There is currently no consensus regarding the significance and indications for its treatment.[3] Many authors agree that tongue-tie is significantly related to breastfeeding difficulty and surgical correction should be held.[1,3-12] Non-disturbing tongue-tie does not justify the surgical intervention except for parental concern.[2,10,11]

Various interventions have been introduced for the management of tongue-tie. All procedures reported good results in correction of the malfunction and parental satisfactory.[3,4,13,14] One study convinced that it was necessary to divide back deep to the genioglossus muscle.[4] The postoperative results of these procedures have never been compared to each other in any previous studies before.

In our hospital, the majority of patients referred for tongue-tie correction were newborn with breastfeeding problems from lactation clinic by lactation consultants. V-Y frenuloplasty, as the conventional procedure, has been performed under general

anesthesia without endo-tracheal intubation. Although results are satisfactory in correction malfunction and complications are rare, the parental concern for general anesthesia in still questioned. In order to reduce the cost and risk of general anesthesia, the less invasive procedure is preferred.

This study was conducted to prove the efficacy of frenulotomy under local anesthesia in solving breastfeeding problems due to tongue-tie in the neonate, compare with the conventional V-Y frenuloplasty under general anesthesia.

Materials and Methods

All newborns in lactation clinic that had tongue-tie as the major cause of breastfeeding difficulties defined by the lactation consultants were enrolled into this study. They were randomized into two groups to undergo either frenuloplasty under general anesthesia or frenulotmy under local anesthesia. Randomization was performed when decision for surgical management was made. It was undertaken by consecutive numbered opaque sealed envelops containing the treatment options, which were assigned by computer-generated random number.

The exclusion criteria included patients with maternal insufficient milk production due to inadequate mammary glandular tissue or significant medical problems (such as postpartum hemorrhage with Sheehan's syndromes, infection, severe malnutrition), preterm newborn with gestational age less than 34 weeks, neuromuscular dysfunction (eg. Down syndrome), craniofacial malformation that involved oral cavity or deglutition impairment, patients with severe ankyloglossia (frozen tongue). The excluded patients were proceeded to conventional frenuloplasty.

Surgical Procedures

All V-Y frenuloplasty were performed as usual by either pediatric surgeons or under supervised residents. After induction of general anesthesia (under mask by apnic technique), the tip of the frenulum was sutured with 5-0 chromic catgut as stayed suture for exposing the whole frenulum. One milliliter of 1% lidocaine with adrenaline solution was injected along the frenulum to the base of tongue, the frenulum was then severed just beneath the tongue by electrocauterization. The division was proceeded into the base of tongue with great care for Wharton's duct opening. The raw surface was closed with 5-0 chromic catgut by interrupted simple suture for 2-3 stitches.

In the other group, frenulotomy was performed by the same group of surgeons as for the V-Y frenuloplasty. Half milliliter of 2% lidocain jelly was applied at the frenulum as the local analgesic. The tongue was retracted upward with surgeon's and assisstant's fingers, then the membranous portion of frenulum was grabbed and crushed with a clamp just beneath the tongue deep to just anterior to base of tongue. The frenulum was snipped with metzenbaum scissors and cotton bud sticks were applied to tract the remaining attachment. Dipped gauze with half milliliter of 1% lidocaine with adrenaline solution was packed at the surgical site for 10 minutes to control oozing.

The data collected preoperative and post-operative LATCH score (Table1) were assessed on the same day after the operation by the same lactation consultant. The types of the operations were not informed to the lactation consultant.

Preoperative parameters included age at consultation (day), birth weight (gram), body weight at consultation (gram), type of tongue-tie (short lingual frenulum or malposition) and LATCH score. Post-operative parameters included complications (surgical or anesthetic cause), time to begin oral intake after operation (hour), LATCH score, body weight at 1st and 2nd week after operation (gram) and wound healing at 1st and 2nd weeks after operation (complete or incomplete).

Informed consents were obtained from all parents. This study was approved by Siriraj hospital ethical committee.

The statistical analysis was calculated to compare differences between increment of LATCH score in both types of operations by Mann-Whitney U test with 95% confidence interval, p-value <0.05 considered statistically significant.

Results

From October 2002 to January 2003, thirty newborns were randomized into 2 groups, frenuloplasty (fp) group and frenulotomy (ft) group. Demographic data, such as gender, age at operation, gestational age, body weight, were comparable in both group. (Table 2, 3) Three in 30 cases reported tongue tie in their

Table 1 LATCH score

	2	1	0
1. "L" = Latch	Tongue at areola	Tongue at nipple	No latch on
2. "A" = Audible	Audible deglutition	Swallow once in a while	No audible swallow
3. "T" = Type of nipple	Lengthy nipple	Flat nipple	Dented nipple
4. "C" = Comfort	Soft breast No pain	Mild to moderate pain	Marked breast engorgement
5. "H" = Hold	Correct holding	Need some help	Dependent

Table 2 Demographic data

	Frenuloplasty	Frenulotomy	Total
Sex			
Male	10 (66.7%)	11 (73.3%)	21 (70%)
Female	5 (33.3%)	4 (26.7%)	9 (30%)
Total	**15 (100%)**	**15 (100%)**	**30 (100%)**
Parity			
1	11 (73.3%)	11 (73.3%)	22 (73.3%)
2	4 (26.7%)	3 (20%)	7 (23.3)
3	0	1 (6.7%)	1 (3.3%)
Total	**15 (100%)**	**15 (100%)**	**30 (100%)**

Table 3 Demographic data

	Minimum	Maximum	Mean
Frenuloplasty			
Age (day)	2	36	7.13
Maternal age (year)	18	39	29.53
Gestational age (week)	37	41	38.87
Weight (gram)	2,300	4,200	3,173
Frenulotomy			
Age (day)	2	39	11.20
Maternal age (year)	19	39	29
Gestational age (week)	34	40	38.33
Weight (gram)	2,100	4,100	3,080

families. Most common complaint was poor sucking (25 in 30), the others were nipple or breast tenderness (14 in 30). Lingual frenulum was identified as "short frenulum" in 8 of fp group, 11 of ft group and as "attach at or near tip of tongue" in 7 of fp group and 4 of ft group. Results are shown in Table 4.

Mean preoperative and postoperative LATCH score in fp group were 4.13 and 7.2 and in ft group were 6.2 and 9.33. Mean increased score in frenuloplasty group was 3.07 (range -1 to 7) and in frenulotomy group was 3.13 (range 1 to 7), p = 0.806. There was no significant difference in increased LATCH score in both operations.

Duration from operation to full breastfeeding varied from 15 minutes to 3 days, mean time in fp group was 13 hours (range 15 minutes to 72 hours) and 40 minutes (range 15 minutes to 2 hours) in ft group, p = 0.02. In ft group, time to resume breastfeeding after operation was significantly shorter than fp group.

Average post operative weight gain in 1st , 2nd week were 180 gm, 493 gm in fp group and 251 gm, 570 gm in ft group, respectively. Completely healed wound was noted in 7 in fp group and 12 in ft group at 1st week follow up. All cases achieved complete wound healing at 2nd week follow up. No anesthetic nor surgical complication was found.

Discussion

Incidence of tongue-tie is difficult to be assessed accurately because of the broad spectrum from barely abnormal to distinctly abnormal, so the previous studies gave figures of varying numbers (0.04-0.1%, 0.2-0.3 per 1,000).[4] Many studies concluded that tongue-tie is a rare condition, however a study in 1997 reported the incidence of 4.8% which is relatively common in the newborn population with male-female ratio of 2.6 : 1.[1-3,5] The incidence of tongue tie with breast-feeding problem in this sutdy was 6.8 in 1000 with male-female ratio of 2.33 :1.

Problems with sucking, breastfeeding, chewing, swallowing, dentofacial growth and development, gingival hygiene, and speech have all been attributed to tongue-tie.[2] A review reported its relationship to sucking and breastfeeding problems such as insufficient

Table 4 Results

	Frenuloplasty	Frenulotomy	P value
Mean LATCH score increment	3.07	3.13	0.806
Mean time to resume breastfeeding	13 hours	40 minute	0.020
Mean Increased body weight at 1st week	180 gm	251 gm	0.304
Mean Increased body weight at 2nd week	493 gm	570 gm	0.138
Mean Complete wound healing at 1st week	7 cases	12 cases	0.063

infant weight gain and reduced milk supply, sore nipples and repeat bouts of mastitis in the mother.[6] Most cases of tongue-tie are thought to resolve spontaneously by adulthood with little speech-development problems.[2] Since the benefits of breastfeeding over bottle-feeding are obvious, the correction of this small abnormality become an important key to successful breastfeeding in selected case. Other indications are speech dysfunction, social or mechanical limitation and dental malocclusion or prognathia.[3-5,7]

Various interventions have been introduced for management of tongue-tie : frenulotomy under general anesthesia,[4] transverse-vertical frenuloplasty under general anesthesia,[7] bipolar scissors division under tubeless general anesthesia,[13] frenulotomy under local anesthesia,[2,10] frenotomy without anesthesia[14] and revision frenulum under local anesthesia.[15] All procedures were reported to have good results in correction of the malfunction and parental satisfactory,[3,4,13,14] these procedures have never been compared to each other before. The complications secondary to these operations are rare and include bleeding, injury to soft tissue, infection and pain.[2,3,4,7,15] Other study reported the most common complication was recurrent due to scarring, but the result was less severe than the original presentation,[3] however significant recurrence is uncommon.

The decision to operate was made in patients who were unable to be breastfed effectively with identifiable abnormally attached lingual frenulum. All cases were advised by lactation consultant and non operative modalities, such as positioning were initially tried. Unsuccessful non operative treatment was the indication for corrective surgery.

LATCH score was used to assess success in breastfeeding. Since breastfeeding problem is multifactorial, then the increased score was calculated for improvement in individual cases. Both operations resulted in no significant difference in the increment of LATCH score. The post operative LATCH score decreased (-1) in two of frenuloplasty group, both of them returned to better sucking on the third day after the procedures. All frenulotomy group experienced increased score within two hours after operation. Time to resume breastfeeding after operation was significantly shorter in frenulotomy group. Failure in some of frenuloplasty group to resume breastfeeding in early post operative period may be due to excessive pain and anesthetics effect. Pain severity in neonate is difficult to assess, it was assumed from crying, refusal to sucking and immobility of the tongue when breastfeeding was attempted.

Lingual frenulum was identified as 1) short narrow membrane (19 in 30 : 63%) and 2) long membrane attached at the tip or near the tip of tongue (11 in 30 : 37%). The latter seem to cause less mobility disorder than the other. Frenulotomy can be performed to correct both types of abnormality, except for severe adhesive base of tongue where no membranous part is found. The extreme case should undergo conventional frenuloplasty under general anesthesia because frenulotomy may fail to control hemorrhage and too large open wound is left. Fortunately severe frozen tongue is uncommon. So frenulotomy can be performed in almost all cases to correct early breastfeeding problems.

Post operative weight gain at first week in frenulotomy group was more than in frenuloplasty group (35 and 25 gram per day respectively). At the second week follow up, wieght gain in frenuloplasty group nearly catch up with that in frenulotomy group (35, 40 gram per day). Complete wound healing was defined as having normal mucosa covering the entire wound. Frenulotomy produced smaller open wound, so faster wound healing was observed. Post operative complications can be avoided with meticulous technique, beware of Wharton duct injury is the rule.

The conventional frenuloplasty has been per-

formed as standard procedure for several years. The results have been satisfactory but the risk of general anesthesia should also considered. Less invasive procedure will reduce that risk and simple technique enhances other medical staff to perform safely, even in rural area with lack of specialized surgeon.

After we concluded the study, the standard operation for tongue-tie in Siriraj hospital has been changed to frenulotomy under local anesthesia. From September 2003 to April 2004, 484 cases underwent frenulotomy and post operative improvement in breastfeeding has been found in 94%.

Conclusions

Frenulotomy under local anesthesia is safe and effective procedure for solving breastfeeding problem in neonate due to tongue-tie. The results are comparable to frenuloplasty under general anesthesia in almost all cases. The advantages of frenulotomy include no risk of general anesthesia, less post operative pain, faster return to sucking and wound healing. Other problems associated with tongue-tie, such as speech, need long term follow up and re-evaluation should be considered.

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