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# Diagnosing and Understanding the Maxillary Lip-tie (Superior Labial, the Maxillary Labial Frenum) as it Relates to Breastfeeding

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## Abstract

Successful breastfeeding is dependent upon an infant's ability to correctly latch onto a mother's breast. If an infant is born with oral soft tissue abnormalities such as tongue-tie or lip-tie, breastfeeding may become challenging or impossible. During the oral evaluation of an infant presenting with breastfeeding problems, one area that is often overlooked and undiagnosed and, thus, untreated is the attachment of the upper lip to the maxillary gingival tissue. Historically, this tissue has been described as the superior labial frenum, median labial frenum, or maxillary labial frenum. These terms all refer to a segment of the mucous membrane in the midline of the upper lip containing loose connective tissue that inserts into the maxillary arch's loose, unattached gingival or tight, attached gingival tissue. There is no muscle contained within this tissue. In severe instances, this tissue may extend into the area behind the upper central incisors and incisive papilla. The author has defined and identified the restrictions of mobility of this tissue as a lip-tie, which reflects the clinical attachment of the upper lip to the maxillary arch. This article discusses the diagnosis and classifications of the lip-tie, as it affects an infant's latch onto the mother's breast. As more and more women choose to breastfeed, lip-ties must be considered as an impediment to breastfeeding, recognizing that they can affect a successful, painless latch and milk transfer.

## Keywords

breastfeeding, breastfeeding difficulties, lasers, mastitis, maxillary frenum, median labial frenum, plugged ducts, superior labial frenum

## Background

The rapid growth of breastfeeding has brought to light many problems and challenges concerning infant feeding.<sup>1</sup> Mothers and infants may experience a variety of difficulties in mastering breastfeeding. A breastfeeding mother may develop sore nipples, blocked ducts, nipple and breast infection, and signs of low milk supply. Infants may be unable to transfer milk adequately, in part due to an inability of the infant to maintain an effective latch and seal onto the breast. The purpose of this article is to increase awareness and understanding of why the inability of the upper lip to properly flange upward during breastfeeding has an impact on the development of a good seal on a mother's breast. The upper attachment to the gingival tissue of the anterior maxillary arch should be included in any differential diagnosis when examining the causes of breastfeeding problems.<sup>2</sup>

A review of the literature indicates that there is a lack of articles that consider the relationship of the superior labial frenum (potential lip-tie) and how it may impact breastfeeding. If an infant displays the signs and symptoms of an inadequate latch, usually the lingual frenum attachment is

considered a significant potential cause.<sup>3</sup> During oral evaluations of infants and discussions with mothers experiencing breastfeeding difficulties, it was uncommon for the maxillary labial attachment to be considered as a contributing factor for latching problems. One of the first articles suggesting the involvement of the maxillary frenum (as a lip-tie) affecting breastfeeding was presented in 1995. This article identified a case where a breastfed baby with impending failure to thrive resisted assuming a wide-mouthed, flanged-lip position on the breast. The article stated that the lingual frenectomy was only partly successful in correcting the infant's breastfeeding problems. Following a labial frenectomy, the baby was better able to flange the upper lip against the breast and began breastfeeding with full efficiency.<sup>4</sup> In 2008, Watson-Genna, stated, "If the superior labial frenum is very

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tight, it might interfere with the infant's ability to maintain attachment to the breast."<sup>5</sup> Brian Palmer included the observations of Woolridge (England), Escott (Lactation Consultant–Australia), and Neil (Australia): "A normal suckle begins with a flanging of the lips to create a seal around the areolar tissue of the breast—much like a suction cup on a piece of glass." He also stated, "If the lip(s) cannot flange out (because of a tight labial frenum), a good seal cannot be created and a poor latch-on could be the result." As more and more women choose to breastfeed, evaluating the effect that a short frenum can have on an efficient latch and transfer is very important (slides 4, 44, 45).<sup>6</sup> Comprehensive oral evaluations of newborns presenting with breastfeeding difficulties and ankyloglossia usually reveal that they also exhibit an inability to flange the upper lip and achieve a good latch on the mother's breast.<sup>7</sup> This observation was also suggested by Hazelbacker. She stated that "there may be a tongue-tie syndrome in conjunction with other midline issues such as a high arched palate and a prominent labial frenum."<sup>8</sup>

### Embryology of the Upper Lip Attachment

Huang described the embryologic development of the lip attachment: "The superior labial frenum begins to form in the fetus at the tenth week of gestation. By the third month in utero the tectolabial frenum of the fetus—morphologically similar to the abnormal frenum of postnatal life—extends as a continuous band of tissue from the tuberculum (bump) on the inner side of the lip, over and across the alveolar ridge to be inserted in the palatine papilla. Prior to birth, the 2 lateral halves of the alveolar ridge unite and the continuous band of tissue becomes partially enclosed by bone. It is divided into the palatal portion (palatine papilla) and a labial portion (superior labial frenum) by this closure."<sup>9</sup>

Figures 1 and 2 are examples of an infant displaying both a lingual-tie and a lip-tie with breastfeeding difficulties. The author obtained written permission for all identifiable photographs that appear in this paper.

### The Maxillary Lip-tie

Historically, the upper lip attachment to the maxillary gingival tissue has been described as the superior labial frenum, median labial frenum, or maxillary labial frenum. It is a segment of the mucous membrane located between the upper lip and anterior maxillary arch containing loose, connective tissue and inserts into the maxillary arch free (not attached to bone) gingival or the attached gingival tissue. There is no muscle contained within this tissue. In severe instances, the tissue connects into the area of the incisive papilla, the midline leading edge of the maxillary gingiva. The author has defined and identified restrictions of movement of this tissue as the upper lip frenum, which reflects the clinical attachment of the upper lip attachment to the maxillary arch.

**Figure 1.** An Infant with Both Lingual- and Upper Lip-ties Presenting for Treatment with a History of Latching Difficulties



Class III tongue-tie and class III lip-tie, as described by Dr. Kotlow, are shown.

**Figure 2.** An Infant with Both Lingual- and Upper Lip-ties Presenting for Treatment with a History of Latching Difficulties



Class III tongue-tie and class III lip-tie, as described by Dr. Kotlow, are shown.

When a lip-tie restricts the movement of the upper lip, it may be difficult for the baby to latch effectively. When an infant is properly latched on, the infant is able to suckle both the areola and nipple, not just the nipple. If an infant is able to grasp only the nipple and fails to bring adequate breast tissue into the mouth, a breastfeeding mother may feel pain and/or experience breakdown of nipple integrity and the infant may fail to transfer an adequate supply of milk. When adequate nipple and breast tissue are positioned within the oral cavity, milk is expressed from the breast using progressive contraction to create in conjunction with the lower lip the pressure differential. A good seal is required and the infant's lips and cheeks are part of creating this seal. There should not be loud clicking sounds or sounds of the infant sucking in air. The upper lip should be untethered and able to easily flange upward to create a seal around both the upper portion of the areola and the nipple. When the nipple fails to be positioned near the junction of the hard and soft palates, the infant can compress the nipple with his or her gum pads

**Figure 3.** Correct Way to Examine an Infant, Knee to Knee with Parent Controlling Infant Movements

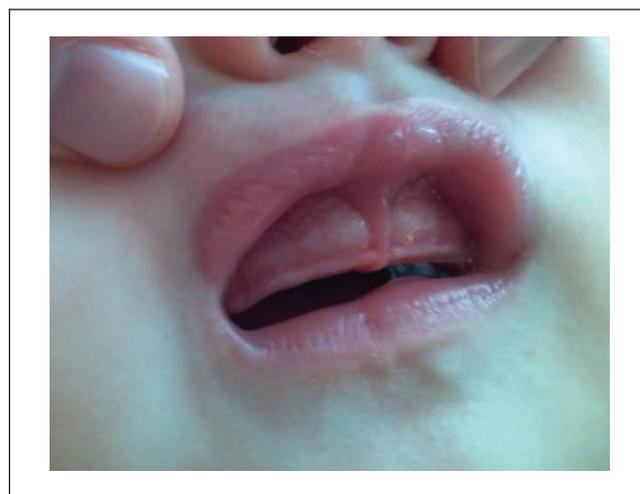


in an effort to maintain some degree of latch. This can cause traumatic injury to the mother's nipples.<sup>10</sup> When the upper lip is tied to the maxillary arch, it may not spontaneously allow for normal breastfeeding.<sup>11</sup> If a mother is experiencing pain and the infant is having problems latching on to the mother's breast, careful observation and examination of the position of the infant's lips on the areola should be performed. Typically, the lips should be 1 to 1.5 inches (2.5-3.8 cm) beyond the base of the nipple.<sup>12</sup>

### *Examination of the Infant for Lip-tie*

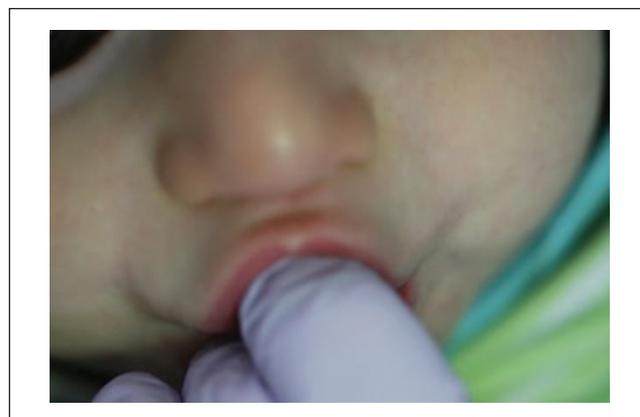
The most effective way to perform a comprehensive oral examination when evaluating for oral abnormalities is by placing the mother and the examiner in a knee-to-knee position. Figure 3 is an example of the correct position to examine an infant. The infant's face should be facing in the same direction as the person completing the oral examination. This allows for adequate control of head movements, examination of the upper lip for mobility and attachment, and direct vision into the oral area. The parent can assist the examiner by holding the infant's body and arms to prevent unwanted movements. If the oral evaluation is attempted while the infant is held in the parent's lap, with the baby's head facing the examiner, adequate visualization of the structures may not be properly completed. Part of the oral examination also must include an assessment of the infant's latch while he or she is breastfeeding. It is essential that the upper lip's flanging upward is observed to determine if a deep or shallow latch-on to the breast occurs. Figures 4 and 5 are examples of a tethered lip. When a small crease in the upper lip between the nose and the lip is observed, this is a sign that the lip is being tethered to the maxillary gingival tissue, interfering with the lip's ability to adequately extend upward.

**Figure 4.** Complete Tethering of the Upper Lip When the Lip is Attempted to be Pulled Upward



A sucking callous on the upper lip is displayed.

**Figure 5.** Clinical Examination of the Upper Lip



When placing a finger into the oral area, the lip developed a fold between the nose and the edge of the lip, which indicated that the lip was tied to the maxillary mucosa, displaying a skin crease.

### **Guidelines for the Assessment of the Maxillary Lip-tie**

All infants will exhibit some degree of an upper lip attachment to the maxillary arch. The limiting maxillary lip-tie appears as an excessive amount of vertical upper lip tissue extending from inside of the upper lip attaching to the alveolar mucosa of the maxillary arch. The attachment should be considered as a factor in limiting the mobility and function of the upper lip resulting in latching difficulties. At other times, the attachment may not create any significant problems. The following is a series of clinical diagnostic criteria, to assist in the evaluation and diagnosis of lip-tie in infants, based upon the examination of the insertion points of the lip-tie to the

**Figure 6.** Decalcification and Beginning Decay on Facial Surfaces of an Infant Exclusively Breastfeeding, Nursing on Demand at Night, and Having a Class IV Lip-tie



**Figure 7.** Severe Decay on Facial Surfaces of an Infant Exclusively Breastfeeding, Nursing on Demand at Night, and Having a Class II-III Lip-tie



maxillary gingival tissue. Insertion points include the following: The problematic lip attachment may occur into the area where the maxillary central incisors will eventually erupt, and in severe instances, it may be inserted in a wide fan-like attachment into the area extending into the hard palate just anterior to or into the incisive papilla. Depending on the actual insertion point, the maxillary frenum can limit the function and mobility of the upper lip, creating a structural impediment to latching and problem-free breastfeeding. The inability to properly flange and completely extend the upper lip can be a significant and often unrecognized contributing factor to an infant's inability to establish a good attachment and seal. It also creates an area for milk retention as the central incisors begin to erupt. In older infants who have erupted upper incisors and nurse on demand during the night, this location of the attachment of the lip may allow for pooling of milk in the pockets created by the lip-tie and result in the development of dental caries on the anterior (facial) surfaces of the infant's maxillary central incisors.<sup>13</sup> This potential for facial dental decay on the upper front teeth is increased significantly when the infant does not have the milk wiped off the teeth after on-demand nighttime breastfeeding. Figure 6 is an example of an exclusively breastfed infant displaying areas of decalcification. Figure 7 is an infant with a more advanced degree of developing dental caries.

The lip-tie attachment may appear in many different forms, from a small, string-like appearance to a wide, fan-like band of connective tissue. A maxillary lip-tie will not resolve by itself. If left untreated, a nursing mother will continue to experience pain and other breastfeeding problems, eventually resulting in premature cessation of the breastfeeding relationship.

In order to aid the examiner in the diagnosis and the need for treatment of a tightly attached upper lip, a simple classification-system has been created by the author.<sup>14</sup> These classifications utilize both the clinical appearance of the lip and

**Figure 8.** Class I Lip-tie



**Figure 9.** Class II Lip-tie



its attachment to the maxillary arch.<sup>15,16</sup> In infants, prior to the eruption of the maxillary anterior teeth, the following guidelines are utilized. Figure 8 demonstrates a class I lip-tie. The class I lip-tie attachment does not appear to create problems during breastfeeding.

The soft tissue covering the maxillary bone is divided into 3 zones. The tissue just under the nasal area (zone 1) is called the free gingival area; this tissue is movable. Zone 2 tissue is

**Figure 10.** Class III Lip-tie**Figure 11.** Class IV Lip-tie

attached to the bone and has little freedom of movement. A class II lip-tie, demonstrated in Figure 9, displays an insertion point at the junction of the free and attached gingival margins. Zone 3 extends into the area between the teeth and is known as the interdental papilla. This is where the erupting central incisors will position themselves at around 6 months of age. Figure 10 demonstrates a class III lip-tie, showing that the frenum inserts between the areas where the maxillary central incisors will erupt, just short of attaching into the anterior incisor. The most severe frenum is shown in Figure 11, demonstrating a class IV lip-tie, which involves the lip-tie wrapping into the hard palate and into the anterior papilla (a small bump located just behind where the central incisor will erupt).

In a normal, healthy infant, there are no known contraindications to correcting or releasing the lip-tie. Once the review of the infant's signs and symptoms of latch difficulties, maternal history of pain and/or nipple damage, and clinical assessment of the infant and maternal anatomy determine that the release of the upper lip attachment to the maxillary gingival tissue is required, this should proceed expeditiously.

**Figure 12.** Shallow Latch and Failure of Upper Lip to Flange Correctly in an Infant with Both Lip-tie and Tongue-tie Prior to Release of Both Ties

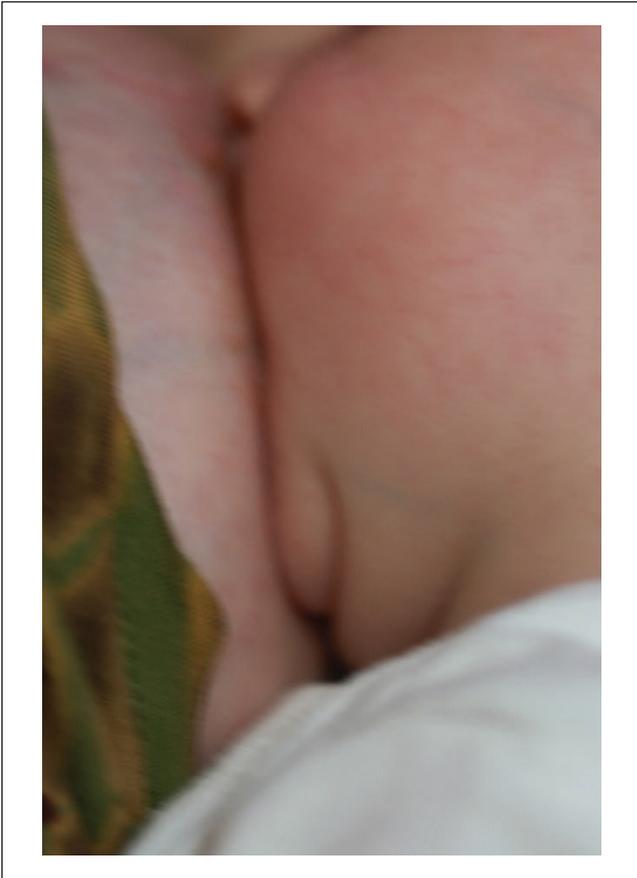
### *Infant A*

Infant A's lip-tie, displayed in Figure 12 (1 month of age), was evaluated due to a restrictive tongue-tie and lip-tie. A comprehensive examination as described in this article also indicated that there existed an inability of the infant to flange the upper lip adequately, resulting in a poor latch. Pretreatment of the upper lip-tie shows the latch and failure to extend the upper lip. Figure 13 displays the results immediately after the lip-tie was released. There was an obvious increased oral opening and improved latch depth. This mother also described the new latch as deeper and kinder.

### *Infant B*

Figure 14 shows infant B (6 months of age), as the infant presented with a history of not gaining weight, a poor latch, and the mother experiencing painful breastfeeding. The infant had both lingual and lip-ties. Prior to surgery, the latch was short and ineffective. Note the failure of the upper lip to extend fully. Figure 15 shows the results immediately after

**Figure 13.** Immediate Postsurgery of the Infant Having Both Ties Revised Displaying Improved Latch and Good Flanging and Extension of Upper Lip



revising the ties; notice the increased opening of the entire oral area and the increased flange covering more of the upper areolar tissue.

## Conclusion

As breastfeeding rates increase in many countries, it is important to be aware of and able to recognize all of the problems that may prevent an adequate latch and make breastfeeding uncomfortable for the mother and inefficient for the infant. When a differential diagnosis is made, it is important to include evaluating the maxillary frenum (lip-tie) as a potential cause for inadequate latch on the mother's breast. In the author's experience of treating over 1000 infants, revision of the lip-tie has shown an increased ability of the upper lip to flange upward, allowing the infant to develop a more effective latch and improve the breastfeeding experience for both infant and mother.

**Figure 14.** A 6-Month-Old Infant, Failing to Thrive and Latch on to Breast



Class II-III (Kotlow) tongue-tie and class III maxillary tie are shown pre-treatment. Upper lip is not fully extended.

**Figure 15.** Immediate Improvement of Latch after Surgery to Revise Upper Lip-tie and Tongue-tie



Class II-III (Kotlow) tongue-tie and class III maxillary tie are shown immediately postsurgery. Notice improved opening and latch and improved extension of upper lip.

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