Anatomical Contributions to Infant Sucking Skills

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Normal Tongue Movements
- Extension
- Lateralization
- Elevation
- Extension

Normal palate

Fetal Airway and Mouth

Tongue motions in sucking and swallowing
- Protrusion - grasp and draw in breast during oral searching
- Configuration - grooving to stabilize teat
- Suck - requires simultaneous anterior elevation and posterior extension
- Depression – increase negative pressure in mouth
- Swallow – dump bolus into pharynx

Video courtesy of Mrs. Lorili Jacobs, DMU. Medical Imaging Technologist and Sonographer, Women’s & Children’s Health Service, Perth, Western Australia. 2004. Contact Email: Lori.Jacobs@fhindia.co.in
Restrictions in movement with tongue tie (ankyloglossia)

- protrusion - shallow latch (D. Ramsay)
- cupping – difficulty latching/staying on
- elevation--depression - smaller bolus
- Restricted wavelike movements - small bolus, fatigue, prolonged feeds
- grooving - poor bolus handling, difficulty with milk flow, microaspiration.

Other effects of restrictive lingual frenum

- Lateralization - poor handling of solid foods, poor oral hygiene
- Recoil - snap back, releases negative pressure, “clicking”
- Reduced gape – connections between tongue, jaw and hyoid

Restricted elevation - bunching

Restricted extension and elevation due to anyloglossia

Note notch in hard palate, evidence of a submucous cleft
Cleft tip on extension

Tongue-tip rolls under on extension

Posterior tongue tie from above

Asymmetrical tongue movements in neurotypical infants raise suspicion of tongue tie

Tongue tie predisposes to shallow latch

Shallow latch

Deep latch
Tongue retraction with gape

Difficulty staying attached

Normal suckling and swallowing

Compensatory Movements

- Excessive jaw compression - “chewing”
- Sliding - friction to nipple - “sandpaper”
- Asymmetric tongue elevation (only posterior tongue lifts) - “bumping” (ultrasound D. Ramsay/Geddes)
- Excessive lip pressure – sucking blister

Maximum nipple compression pre and post frenotomy
Excessive compression

Breast and nipple wounds
- Bruising of areola - pressure from gums, excessive jaw compression

Petechiae and bruising

Compression of nipple base

Geddes et al
http://www.pediatrics.org/cgi/content/full/peds.2007-2553v1

Compression of nipple base

Tongue mass displaced posteriorly – posterior tongue elevation
Nipple wound from posterior tongue elevation

Same infant post frenotomy

Suckling infant with tongue tie

Sucking blister from excessive lip use

Tongue sliding

Video courtesy of Micky Jones
Sliding the tongue

Excessive jaw excursions

After frenotomy

Same infant after frenotomy

Excessive jaw excursions

Oral structural effects

- High arched, narrow, V-shaped palate or bubble palate
- crowded upper arch
- lower central incisors tipped lingually, destabilized
- decreased nasal airway
- sleep apnea?

http://www.brianpalmerdds.com
Mother breastfed despite tongue tie, did require some “relief” bottles.

High, narrow palate from tongue tie with restricted tongue elevation

Breastfeeding management
- Increase tongue contact with breast - asymmetrical latch, defining a mouthful
- capital extension
- reclining to assist bolus handling
- frequent and longer feeds
- sublingual support
- refer - evaluate for treatment

Asymmetric latch - nipple at philtrum

Asymmetric latch - alignment
Asymmetric latch completed

Wait for the tongue to be down

Mouth covers more areola below nipple

Laid-Back Breastfeeding

full ventral contact

Giving Baby Autonomy

Denting the breast to keep the tongue in place during latch
Jaw Support

Sublingual Support

Elasticity

Complementation temporarily needed for infant with elastic frenulum

Maintain Milk Production

Referring for Evaluation

- Function is more important than appearance.
- Distortion of the palate indicates severity of tongue restriction.
- Elasticity of the floor of the mouth or the frenulum itself can partially compensate for a restrictive placement.
“A short lingual frenulum (“tongue-tie”) may be worrisome to parents but only rarely interferes with eating or speech, generally requiring no treatment.”

(This unreferenced statement is the only mention of this topic in a 2200 page book!)

“The tongue may lengthen as the child gets older. If severe, speech may be affected and surgical correction is indicated.”

Muscle hypertrophy due to ankyloglossia
Still tongue-tied after all these months…and weaned early.

Communicating with Pediatricians
- Identify any relevant family history of speech difficulties, dental problems, and sleep apnea in report.
- Advise specialist evaluation.
- Provide scientific information.
- Prepare parents for differences of opinion among health care professionals.

Treatment options
- Frenotomy
- frenuloplasty
- z-plasty
- laser surgery

Frenotomy using a grooved director

After frenotomy – “milk drunk” for the first time!
Mom: "Wow, it doesn’t pinch."
Dad: "She’s really going at it now!"

Palate spontaneously broadened after frenotomy
"PDF" + ankyloglossia = F.T.T.

Invisible (submucosal) attachment

Submucosal tongue tie before and after treatment

Macroglossia and Ankyloglossia

Micrognathia

- Jaw index: maxillary alveolar overjet times maxillary arch divided by mandibular arch (all in mm's).
- Tongue attachment is closer to alveolar ridge, even without tongue tie, mid-tongue elevation is restricted.

Influence of micrognathia on placement of tongue attachment
Influence of relative tongue length in micrognathic infants

- Long tongue - may push nipple out of mouth, may fix tongue tip on palate. *Try nipple shield, fingerfeeding*
- Short tongue - excessive compression to compensate for poor tongue contact. *Try extreme asymmetrical latch* *sidelying works well*
Linda Pohl’s method

Latching with a nipple shield

Fingerfeeding

Breastfeeding the micrognathic infant - sidelying

Breastfeeding the micrognathic infant - transitional hold

Micrognathia and vasospasm

- Extreme excessive compression of nipple can cause reflex vasospasm
  * blanching of nipple tip after feeding
  * may be delayed
  * mother reports pain, stinging, burning sensations
  * fix latch, apply warmth, nifedipine to break the cycle if necessary.
Micrognathia and vasospasm

Treating Vasospasm

- Dry nipple immediately, use wool nursing pads
- Squeeze blood back into nipple with fingers (Diana West)
- Warm pack in bra, over nursing pad (Dr. Nancy Powers)
- Nifedipine 30 mg for 12-28 days (Dr. Jack Newman)

Respiratory Issues in Micrognathic Infants

- Airway is narrower
tongue fixing to stabilize airway
head extension improves breathing by elevating larynx

- Pierre Robin sequence - micrognathia, U-shaped cleft palate, retroplaced tongue
  extreme airway compromise
  feed in prone with head extension

Respiratory compensations in micrognathic infants

- Head extension to enlarge airway
- Oral breathing
- Tongue tip fixed to palate to stabilize airway
Tongue “Fixing”

Create seal
Protect airway

Cleft Lip

Photos courtesy of Esther Grunis, IBCLC

Macrostomia - Transverse Facial Clefts

Restrictive lingual and labial frena – association recognized by D. Wiessinger

Superior Labial Frenum

Use support and gravity to help baby stay attached
Macroglossia

Use extreme asymmetric latch.
Feeding will probably be inefficient, track intake, supplement if necessary.

Macroglossia: Modified bottle feeding

After tongue reduction

Fetal Airway and Mouth

Courtesy of Brian Palmer, DDS, used with permission.

Normal Larynx

Laryngomalacia

Photo courtesy of Joe Edmonds, MD, used by permission

Photo courtesy of Joe Edmonds, MD, used by permission
Laryngomalacia Signs and Sx

- Inspiratory stridor
- Suprasternal retractions (esp. supine)
- Cyanosis or pallor becomes apparent or worsens with crying, feeding, agitation, exertion or supine positioning.
- Strongly associated with GER (80%)

Feeding Management

- Head extension expands airway
- Prone positioning or mom reclining improves ability to handle milk flow
- Beware of increasing milk flow
- Supplement with Haberman feeder if breastfeeding insufficient
- Request pediatrician to follow growth

Stridor & suprasternal retractions

Feeding a baby with laryngomalacia

Note: Short sucking burst duration (average 3 sucks/burst)

Stridor after swallowing

Management of Laryngomalacia

- Refer infant to ENT for evaluation
  - Most infants grow out of respiratory difficulties by 6-18 mos., as epiglottis and larynx become anatomically separated. Severe cases may require surgery.
- Encourage parents to position in sidelying for sleep, handle with head extension, and respond promptly to cries.
**Velopharyngeal Dysfunction**

- Soft palate (velum) is unable to close off the pharynx for swallowing or speech
- Can be anatomical = insufficiency (overt or occult submucous clefts, hypoplasia of velum) or functional = incompetency (neurological)
- Causes harsh respiration without cyanosis, difficulty feeding, loss of milk through nose while feeding or regurgitating.

**Velopharyngeal Insufficiency**

Try upright positioning; straddle position; short, frequent feeds

**Summary**

- Look for anatomical variations or anomalies if infant cannot breastfeed well with proper management.
- Anticipatory guidance – maternal expectations and accommodations
- Encourage mother to maintain milk supply, most infants improve with age and experience.
- Psychosocial support.

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