Identifying and addressing suck dysfunction

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Nutritive sucking

- Suck develops at 16 weeks in utero
- Suck/swallow by 32 weeks
- Suck/swallow/breathe by 37 weeks
- Optimal feeding when swallow and respiration are well coordinated
- Rate is half of non-nutritive suck
- Immature pattern 3-5 sucks

- Normal pattern is a continuous burst
- Cupped tongue configuration jaw depression greater with swallow

The suck/swallow pattern of a feed

Beginning of feed - short, rapid sucks
Active feeding - long, slow, rhythmic sucking and swallowing, with pauses
End of feed - 'flutter sucking' with occasional swallows
Dynamics of sucking during breastfeeding

- Long standing controversy regarding the mechanics of sucking and motion of the tongue
- Classic interpretation was a peristaltic tongue movement

(Woolridge. Midwifery 1986; 2:164-171)
More Sucking dynamics

- Negative pressure draws nipple into mouth
- No peristaltic tongue motion
- Vacuum allows milk flow from the nipple
- Tongue moves back up, vacuum decreases, milk flow ceases until jaw drops again

(Geddes et al. Early Human Dev 2008;84:7)

Figure 4 The changes in infant tongue position during one suck cycle
Yet more sucking dynamics

- During non-nutritive sucking before milk ejection, infant’s tongue engaged in peristaltic motion
- After milk ejection, a swallow is seen corresponding to each suck
- Vacuum action is more pronounced (tongue depression)

- Infants may use both peristaltic tongue action to move the milk into the oropharynx for the swallow and a tongue depression to generate vacuum which allows milk from the nipple to enter the oral cavity

Even more sucking dynamics

- Anterior tongue moves as a rigid body with the cycling motions of the mandible (did not squeeze out milk in a peristaltic motion)
- Posterior tongue undulates like a peristaltic wave which is essential for swallowing

<table>
<thead>
<tr>
<th>Disorganized sucking</th>
<th>Dysfunctional sucking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refers to the lack of rhythm of the total sucking activity or a deficiency in the rate and rhythm of sucking</td>
<td>Refers to feeding interruption by abnormal movements of the tongue and jaw</td>
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</tbody>
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**Disorganized or dysfunctional sucking**
Neonatal Oral-Motor Assessment Scale (NOMAS) 1993 revision

Jaw - normal

- consistent degree of jaw depression
- rhythmical excursions
- spontaneous jaw excursions occur upon tactile presentations of the nipple up to 30 minutes prior to feed
- jaw movement occurs at the rate of approximately one per second (1/2 the rate of nns)
- sufficient closure on the nipple during the expression phase to express fluid from the nipple
Neonatal Oral-Motor Assessment Scale (NOMAS) 1993 revision

Jaw - Disorganization

- inconsistent degree of jaw depression
- arrhythmical jaw movements
- difficulty initiating movements
- inability to latch on:
  - small, tremor-like start-up movements noted
  - does not respond to initial cue of nipple until jiggled
  - persistence of immature suck pattern beyond appropriate age
Neonatal Oral-Motor Assessment Scale (NOMAS) 1993 revision

- **Jaw - Dysfunction**
  - excessively wide excursions that interrupt the intra-oral seal on the nipple
  - minimal excursions; clenching
  - asymmetry; lateral jaw deviation
  - absence of movement (% of time)
  - lack of rate change between nns and ns (nns = 2/sec; ns = 1/sec)
Neonatal Oral-Motor Assessment Scale (NOMAS) 1993 revision

**Tongue- normal**

- cupped tongue configuration (tongue groove) maintained during sucking
- extension-elevation-retraction movements occur in anterior-posterior direction
- rhythmical movements
- movements occur at the rate of one per second
- liquid is sucked efficiently into the oropharynx for swallow
Neonatal Oral-Motor Assessment Scale (NOMAS) 1993 revision

Tongue - disorganization

- excessive protrusion beyond labial border during extension phase of sucking without interruption sucking rhythm
- arrhythmical movements
- unable to sustain suckle pattern for two minutes due to:
  - habituation,
  - poor respiration,
  - fatigue
- uncoordinated sucking/swallowing and respiration which results in nasal flaring, head turning, extraneous movements
Neonatal Oral-Motor Assessment Scale (NOMAS) 1993 revision

Tongue - dysfunction

- flaccid; flattened with absent tongue groove
- retracted; humped and pulled back into oro-pharynx
- asymmetry; lateral tongue deviation
- excessive protrusion beyond labial border before/after nipple insertion with out and down movement
- absence of movement (% of time)
Jaw asymmetry

- Position in utero
- Abnormal jaw development
- Asymmetrical muscle tone
- Injury
- Torticollis
- Facial nerve paralysis (forceps delivery)
- Difficulty latching

(Photos from Breastfeeding Atlas
Barbara Wilson Clay/Kay Hoover)
Torticollis

- Twisting of the neck by a sternocleidomastoid muscle (SCM) lesion
- Fetal malpositioning
- Unilateral breast refusal
- May be irritable with low tolerance to positional changes

(Photo from Genna. JHL 2015; ahead of print - DOI: 10.1177/0890334414568315)
Torticollis

- SCM provides support for jaw excursions
- Restriction can contribute to weak suck, lack of stamina, short sucking bursts
- Gap in the corner of the mouth

- TMJ may need finger support in front of the inner flap of the ear
- Sublingual support if tongue loses contact with the breast
Congenital torticollis with jaw asymmetry

- Use positions that allow most effective feeding
- Initially allow infant to turn toward the preferred side while feeding
- Chin support
- Nipple shield

(Photos from Wall & Glass. JHL 2006;22:328-334)
Positioning for torticollis
(Photos from Genna. JHL 2015;ahead of print- DOI: 10.1177/0890334414568315)
Ankyloglossia (tongue tie)

- Recoil of tongue during sucking/clicking sound
- Tremor of the tongue and mandible
- Sore nipples
  - Pinched
  - Cracked
- Limited milk transfer
- Fussy, gassy baby
  - May swallow excessive amounts of air
- Reflux
- Tongue does not protrude beyond lower gum
Assessment

- Types 1 and 2 are classic, obvious, and account for ~75%
- Types 3 and 4 are less obvious and require digital assessment
- Type 4 attaches at the base of the tongue, is thick, shiny, and inelastic
- Feels like a speed bump
Maxillary lip tie

- Poor lip seal on breast
- Upper lip unable to flare out
  - turned under when latched to breast
- Excessive air intake
- Low milk transfer
Ankyloglossia
Geddes et al. (2008) Pediatr; 122:e188-e194

- 2 types of sucking dynamics with tongue tie
  - Pinched nipple tip; long distance from junction of hard & soft palate
  - Nipple pinched at base and tip close to hard & soft palate junction
- Release of frenulum reduced nipple distortion, altered tongue movement, relieved pain
Feeding Plan Considerations Prior to Frenotomy (or if Frenotomy Will Not be Done)

- Use positions that encourage forward and downward movement of the infant’s tongue such as placing the infant ventrally (semi-prone), completely vertical, or in an upright clutch hold.

- Modifications surrounding latch-on can include: stroking the infant’s tongue down and forward with an index finger prior to latch, providing chin or jaw support to help maintain the latch, using techniques to evert nipples if they are flat, and shaping the breast for a deep latch.
Feeding Plan Considerations Prior to Frenotomy (or if Frenotomy Will Not be Done)

- Nipple shield if nipples are too sore or damaged
- May need to pump following each feeding to assure an adequate milk supply and to provide a supplement if infant can’t transfer sufficient amounts of milk at breast
- Infant weight should be checked every 3 days until an adequate pattern of weight gain is established.
- Even if a tongue-tied infant can feed at the breast, he may not feed at optimum efficiency and may require pumped milk supplements.
Early frenotomy improves breastfeeding outcomes

- Frenotomy is best performed before day 8
- See better weight gain when procedure is done during the first week, pain relief from sore nipples can be immediate
- Late frenotomy after 8 days resulted in improved latch but only small increases in weight
- Low milk production can be seen if frenotomy is delayed
Therapeutic interventions for weak suck

- Weak sucking
  - Preterm infant
  - Late preterm infant
  - Neurologically compromised infant
  - Respiratory problems
  - Cardiac issues
  - Lack of endurance

- Use firm jaw and cheek support
- Nipple tug to strengthen suck
Therapeutic interventions for excessive jaw movement

- Excessive jaw excursion may result in abnormal tongue patterns and compromised lip seal
  - Low tone
  - Immature muscle development
  - Neck hyperextension
- Smacking or clicking sounds as tongue loses contact with breast
- Good head and neck alignment
- Mandible support with finger to provide graded jaw movement
- Sometimes finger under where tongue attaches may help
Therapeutic interventions for weak latch and poor lip seal

- Weak latch, open mouth, lack of interest
  - Poor arousal
  - Low oral tone
  - Infant trying to maintain open airway
  - Milk leaking from corner of mouth due to poor seal

- External support to jaw
- Close lips manually
- Stimulate facial tone by tapping, stretching or stroking of orbicular oris muscle around lips prior to feeding
- Nipple tug

Photo from Breastfeeding Atlas
Barbara Wilson Clay/Kay Hoover
Therapeutic interventions for poor initiation of sucking

- Hyperactive rooting reflex
- Unable to close mouth to initiate sucking
- Ineffective tongue protrusion
- Behavioral disorganization from intense crying and over-hunger
  - May need to feed baby small amount of milk first prior to latch attempts
Dropper to stop rapid side-to-side head movements

Flow regulates suck

Photo from *Breastfeeding Atlas* Barbara Wilson Clay/Kay Hoover
Therapeutic interventions for disorganized sucking

- Disorganized, uneven pattern
- Coughing, gagging, choking
- May arise from
  - General neurological disorganization
  - Respiratory problems such as tracheomalacia or laryngomalacia
  - Forceful milk ejection or fast flow of milk
- Gentle rocking in vertical position
- Music to establish rhythm
- Entrainment
  - Synchronization and control of a physiologic rhythm by an external stimulus
Music for preterm infant sucking
Loewy et al. Pediatrics 2013;131:902-918

- Used live music interventions
  - Lullaby sung by parent
  - Ocean sounds
  - Entrained live heartbeat sounds
- Live heartbeat sounds produced more active sucking

Music for term infant sucking

- Song “Don’t let your baby cry-2” from the album “Colic” On Music production Company
- LATCH breastfeeding assessment tool utilized
- LATCH score higher in music group (8.61±1.37) vs control group (6.52±1.79)
Music therapy to enhance sucking

- 3 interventions - live singing of the song of kin used as a familial lullaby or “Twinkle, Twinkle”; entrained breathing sounds, through the live application of the ocean disc; and entrained live heartbeat sounds, through the use of the gato box.

- Interventions provided live through portholes of incubators, isolettes, or at bassinette side at the infants’ midline to encourage fetal positioning.

- Intermittent sucking is a rhythmic behavior that allows for swallowing and breathing. To suck without the pausing necessary to coordinate swallow and breath might lead to choking, drooling, and/or desaturation. Intermittent rhythmic sucking pattern can be coordinated using entrainment and rhythm when provided in the moment, by a music therapist.
Suspicion: Upper Airway Disorder?

- Choking and sputtering at breast, especially with let down
- Difficulty coordinating sucking, swallowing and breathing
- Resistance to common positions at breast
- Slow weight gain
- Milk supply problems
- Plugged ducts
- Mastitis
- Short frequent feedings
- Frequent pauses, coming on and off breast
Tracheomalacia

- Softening (malacia) of the cartilagenous rings surrounding the trachea
- Stridor is heard upon exhalation as the trachea collapses
- Natural stiffening of the airway usually allows resolution by 12-24 months of age
- Can mimic asthma
Laryngomalacia

- Floppy laryngeal structures such as the epiglottis, pulled into the airway upon inspiration
- Stridor heard upon inspiration
- Hoarse cry
- Stridor intermittent and worse when supine
Symptoms

- Loud breathing present at birth or within a few weeks of birth
- Stridor that worsens with crying and increases when lying supine (on the back)
- Cough
- Difficulty coordinating breathing and feeding
- May see poor weight gain
- Rare cases require intubation or tracheostomy
- Reflux
  - Forcibly inhaling or exhaling can result in pressure changes around the lower esophageal sphincter that encourages reflux
Symptoms

- Sternal retraction
  - Use of accessory muscles to move air past obstruction
- Silent aspiration due to reflux
- More pronounced with upper respiratory infection
- May get worse before it gets better
- Babies like to be in charge of their breathing
Bronchoscopic findings in tracheomalacia. During inspiration, the trachea remains patent and the carina (ridge separating the 2 primary bronchi) is easily visible. During expiration, the trachea collapses on itself, obstructing the carina and distal airways.
Breastfeeding tips

- Position baby prone
  - Gravity pulls the mediastinal structures anteriorly, opening the airway
- Allow milk ejection first before putting baby to breast
- Consider use of a nipple shield to slow the flow and allow baby to pace the feed
Breastfeeding tips

- Alternate massage periodically to drain all quadrants of the breast
- May need to adjust position of the head to relieve airway obstruction at breast
  - Ventral position allows extension of head
- Usually cannot be fed lying down
- Milk expression may be necessary if baby is inefficient feeder
Therapeutic interventions for fatigue or lethargy during feedings

- Lack of stamina to complete a full feeding
- Small sucking bursts followed by long pauses or falling asleep before completing a full feeding
- Ventral positioning
- Alternate massage
- Tube feeding at breast for additional milk if needed
- Short, frequent feeds

(Photo from Breastfeeding Atlas
Barbara Wilson Clay/Kay Hoover)
Cleft lip

- Partial or incomplete cleft lip can be sealed with breast tissue pressed into cleft
- Complete cleft lip extends from the lip to the nares, harder to seal
- May place finger over cleft to create a seal

(Photos from *Breastfeeding Atlas* Barbara Wilson Clay/Kay Hoover and *Breastfeeding: an illustrated guide to diagnosis and treatment* Denise Both and Kerri Frischknecht)
Cleft of the hard palate

- Can be small or complete, occur with or without cleft lip, and can be unilateral or bilateral
- Nipple shield for small anterior cleft
- Palatal obturator separates oral and nasal cavities; keeps tongue from continuously lying in cleft
- Tube feeders, syringes for active supplementation at breast or finger feeding; cannot rely on suction to remove milk
- Use a straddle position

(Photos from *Breastfeeding Atlas* Barbara Wilson Clay/Kay Hoover and *Breastfeeding an illustrated guide to diagnosis and treatment* Denise Both and Kerri Frischknecht)
Cleft of the soft palate

- Soft palate elevates to seal off the nasopharynx during swallowing
- Soft palate is like a hinged flap attached to the posterior hard palate
- It moves downward to lie against the back of the tongue

(Photos from *Breastfeeding Atlas* Barbara Wilson Clay/Kay Hoover)
Submucous cleft

- At the junction of hard and soft palates disrupts the muscle arrangement of the soft palate
- Prolonged feeding
- Nasal regurgitation
- Seen in 36% of infants with cleft lip
- Cannot close off the nasopharynx

- Bifid uvula
- Paranasal bulging
- Skin covers the cleft which is not easily visualized
- Shine a light on the palate or a lighted probe within the nose
- Translucent area in central palate
- Use upright feeding position
Who else doesn’t suck well?

Mouth conformation on orthodontic nipples = closed mouth/tongue retraction/improper lip flanging
Who else doesn’t suck well?

- Vacuum extraction
- Receding chin
  - Position with head slight extended such that lower jaw extends into and indents the breast to prevent jaw closure on nipple shaft
  - Prone positioning may help
- Bubble palate
Bubble palate

- Ankyloglossia in utero can contribute to a bubble palate as the tongue shapes the palate.
- The two can sometimes been seen together so check palate as well as tongue.
- Nipple can be aimed to side of palate.
- Finger feeding might be helpful.
- Nipple shield could be tried.
Pumping considerations

- Infants with suck problems take a long time to feed
- Mothers may need to express milk
- Consider pumps that are hands free as a time saving intervention
- Or hands free bras or bustiers

- Freemie
- Medela
“All the rivers of the earth are milk that comes from the breast of the Great Mother. Our breasts give the waters of life to feed the children.”

(ChoQosh Auh’Ho’oh, Elder)