

*Helping Infants Suck
Correctly*

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Conceptual Framework

'Suck dysfunction' is the result of or compensation for an anatomical, neurological, physiological, or environmental limitation. Compensations can be adaptive or maladaptive. Maladaptive compensations can further limit the child's function or development. Identification of the root limitation is the first step toward improving oral motor function. Interventions are then selected and applied, with careful evaluation of their effect. Indiscriminate application of stereotyped interventions is usually ineffective or counterproductive.

Dysfunction vs. Disorganization

Marjorie Meyer Palmer (Neonatal Oral Motor Assessment Scale)

Disorganized suck (immaturity, irregularity in rate and rhythm)

Dysfunctional suck (presence of abnormal movements, disrupt normal feeding, correlated to neurological diagnoses)

Her patients mostly severely affected, there are other approaches.

Newborn mouth and pharynx



The tongue fills the mouth (and shapes the palate).

Buccal fat pads provide lateral border for tongue and stability to cheek.



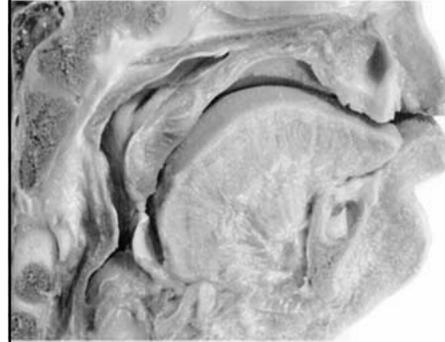
Courtesy of Betsy Hoffmeister IBCLC



Palate has a smooth slope from anterior to posterior.



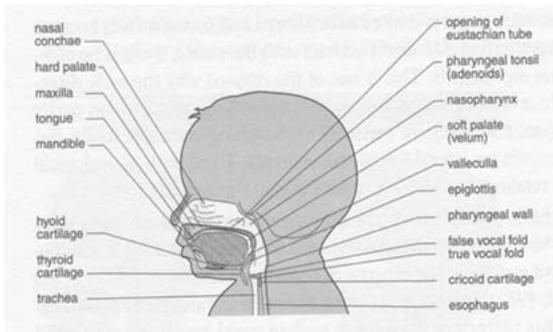
Epiglottis and velum approximate, and larynx is high to decrease aspiration risk.



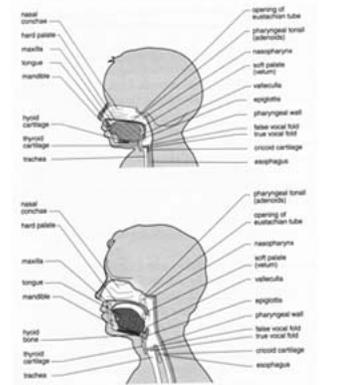
Mandible is small and retracted.

Hyoid is not yet ossified.

Anatomical Basis

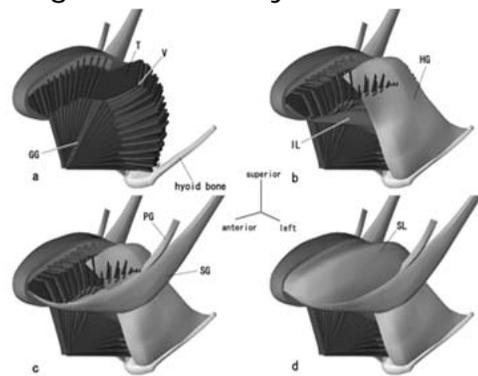


Differences between newborn and adult mouth and pharynx from Pre-Feeding Skills, 2nd edition Morris and Klein



Drawing by Peter Mohrbacher

Tongue Muscle Layers - Takemoto



Lips

- Open during rooting, gape response, most effectively stimulated at the philtrum.
- Valve to stabilize breast in mouth, maintain negative intraoral pressure along with anterior tongue.
- Should be neutral to minimally everted.
- Should remain stable during sucking, excessive movement is compensatory for tongue weakness or shallow latch.
- "fish lips" signal a shallow latch.

Gape response



"Fish lips"- overly everted lips signify a shallow latch.



Note:
 Prominent nasolabial crease.
 Lip angle less than 130 degrees.
 Chin and cheeks off breast.
 Nose flattened into breast.

Good grasp – upper lip neutral



Overuse of lips in sucking



Lip fixation - compensatory for low tone.



Loss of milk from lips can be due to poor lip seal, or may be deliberate.



Increasing lip tone

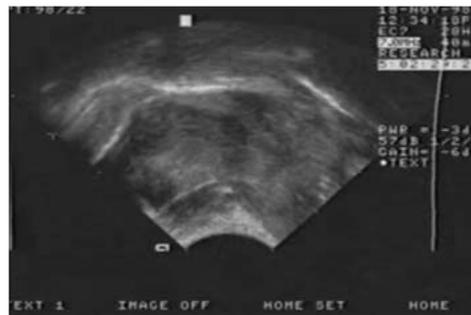
- Perioral stimulation – tap or massage around outside of vermillion of lips (over orbicularis oris).
- Watch for excessive jaw excursions – excessive mandibular depression can overcome lip strength. Dancer hand position or jaw support can stabilize jaw. Examine for tongue tie.

Tongue

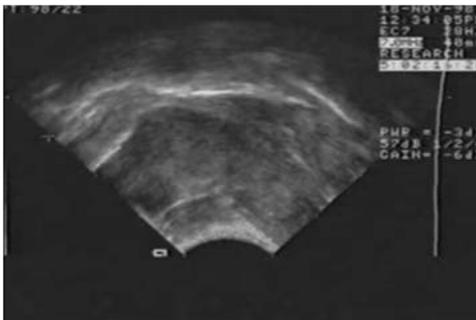
- Protrudes during oral searching.
- Grasps breast, pulls into mouth.
- Grooves to hold breast, tongue edges touch palate.
- Posterior tongue depresses to produce negative pressure.
- Milk flows to valleculae.
- Wavelike movement (peristalsis) produces positive pressure, moves bolus to pharynx (oral preparatory and oral phases of swallow).



Video courtesy of Mrs. Lorili Jacobs, DMU. Medical Imaging Technologist and Sonographer, Women's & Children's Health Service, Perth, Western Australia. 2004.
Contact Email: lorili.jacobs@gmail.com



Normal Newborn - day 3



Video courtesy of Mrs. Lorili Jacobs, DMU. Medical Imaging Technologist and Sonographer, Women's & Children's Health Service, Perth, Western Australia. 2004.
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Tongue retraction

- Severe tongue retraction makes latch difficult by bunching and elevating posterior tongue.
- Mild tongue retraction reduces milk transfer and increases work of feeding.
- Tongue over lower gum ridge normally suppresses the bite reflex. Tongue retraction triggers normal phasic bite.
- Tongue retraction is often due to tongue tie.

Mild retraction, posterior elevation



Note:

- Lack of elevation
- Lack of grooving
- High palate
- Usually indicates tongue tie.

Palate

- Opposes tongue movements, provides surface to stabilize breast.
- Is plastic in infancy, is shaped by tongue position and movements in utero, and re-shaped by tongue movements after birth.

Jaw

- Newborn's poor grading of jaw motions produces a wider gape to facilitate latch.
- Rhythmic opening and closing to assist the tongue in producing positive and negative pressure in the mouth.
- Tongue and jaw movements are linked in newborns.

Interplay between tongue and jaw in sucking

- There is a fine balance between positive and negative pressure during sucking.
- If the infant's ability to generate one type of pressure is compromised, the other will be over-accentuated in compensation.
- Infants will also experiment with unusual jaw movement patterns (e.g. rotary) and lip movements to move milk if the tongue does not do its job.

Chewing motion - excessive jaw compression – note tongue retraction



Phasic Bite vs. Tonic Bite

- Often confused by lactation consultants
- Phasic bite is normal, occurs when there is a pressure stimulus to the gum ridge; it's inhibited when the tongue is extended over the gum ridge.
- Tonic bite is abnormal, it is an unusually tight bite that is difficult for the infant to release.

TMJ – deformations



Cheeks



- Buccal fat pads provide border for tongue movements, help stabilize tongue.
- Cheeks maintain negative intraoral pressure during sucking.

Shallow latch decreases stability of the cheeks.



Note:

- Dimpling of cheek
- Excessive flanging of upper lip
- Tight nasolabial crease
- Prominent crease at corner of mouth

Is this a perfect latch?



Note:

- Dimple in cheek.
- Nose in breast.
- Gap between baby's chest and mom's breast.
- Body rotated relative to head.
- Wrinkles in neck.

Cheek Support



Velum (soft palate)

- Seals against posterior tongue to allow creation of negative intraoral pressure, which overcomes resistance of nipple muscles to release of milk.
- Seals off nasopharynx to prevent nasal regurgitation during swallowing.
- Speech – used to seal off nasopharynx to allow production of percussive sounds (p,b).

Velopharyngeal Insufficiency



- Improve bolus handling and swallowing comfort by working to improve central grooving of tongue.
- Encourage mother to breast milk feed exclusively.

Straddle positions



Pharynx

- Pharyngeal walls contract to contact velum posteriorly and laterally, close off nasopharynx during swallowing and shorten length of pharynx.
- Residue left in pharynx if incomplete movement of bolus.
- Inadequate strength, coordination, or timing of palato-pharyngeal musculature is another cause of VPI.

Pharyngeal divisions

- Nasopharynx – area behind nose, sealed off during swallow by soft palate and pharyngeal muscles
- Oropharynx – back of oral cavity
- Hypopharynx – area right above larynx, helps transit food around airway

Facilitation vs. Compensation

- Facilitative strategies— techniques that encourage normal development
- Compensatory strategies—techniques which allow for more optimal feeding but do not change the underlying problem

Facilitative Strategies for BF

- Skin to skin ↑ arousal/ interest in breast
- Regulation of suck-swallow-breathe bursts (pacing) with imposed pauses
- Oral motor exercises to ↑ range of movements
- Oral stimulation to ↑ strength and tone
- Oral desensitization to allow deeper attachment to breast

(Adapted from Hall)

Compensatory Strategies

- Maintaining quiet environment conducive to feeding, lower lighting
- Optimal positioning - compensate for infant or maternal anatomical variations
- Swaddling and flexing infant when stress cues exhibited
- Use of nipple shield – preterm infant, tongue tie/high palate
- Cheek support – hypotonic baby

The first step to better sucking:



Importance of Positioning and Latch

- **Proximal stability determines the function of distal structures!**
- Human neonates are totally **"motorically dependent"**- they receive all their stability from external support. Thus the crucial role of positioning, alignment and latch in suckling quality.

Gravitational stability (Biological Nurturing, Suzanne Colson)



Helping mom stop overcontrolling





Let baby self attach



Don't fight the baby's hands

- Babies are COMPETENT
- Hand movements PART of the neurobehavioral program for feeding
- Baby's hand movements increase mom's oxytocin levels
- Watch this baby using his fists to position mom's breast for a perfect latch



Quality of Component Movements.

Sucking movements need to be:

- Easily initiated
- Sustained
- Rhythmic
- Effective

Sucking is a flexor pattern and is facilitated by physiologic flexion at the hips and shoulders and inhibited by extension.

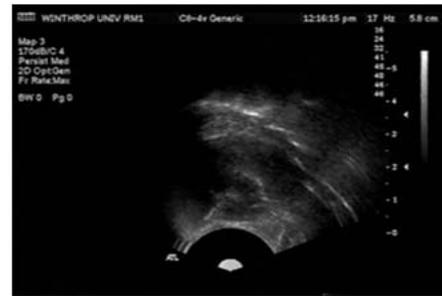
Normal sucking with good coordination of sucking, swallowing and breathing.



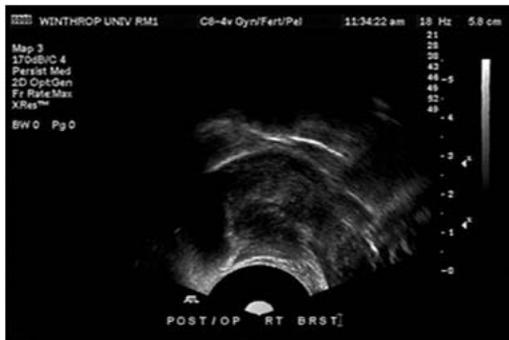
Excessive lip movement during sucking in tongue tied infant



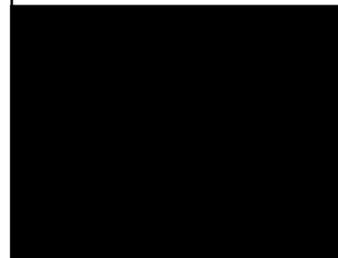
Tongue Sliding – Tongue tied infant



After frenotomy



Infant experimenting with sucking compensations



- Excessive jaw excursions.
- Lip pursing, sliding of tongue, and excessive negative intraoral pressure (note collapsed cheek).
- Excessive upper lip movement.

Why babies might not suck correctly

- Poor latch (destabilizes oral structures)
- Oral anatomical variations:
 - Clefts
 - Tongue tie (ankyloglossia)
 - tongue lesions or macroglossia
 - Micrognathia
- Neurological dysfunction
 - Abnormal muscle tone
 - Poor feedback (sensory integration)
- Abnormal molding
 - Torticollis
 - Facial asymmetries

Clefts



Occult submucous cleft – failure of soft palate musculature to join in midline.

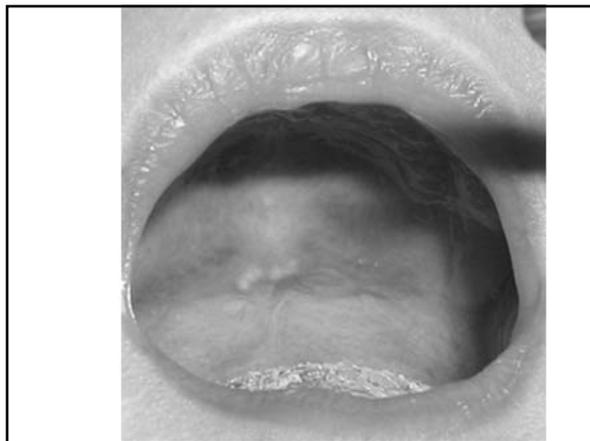
- Prevent intraoral negative pressure
- If extensive, reduce surface area for positive pressure by tongue



Cleft of soft palate – easily missed



Hypertelorism & Paranasal bulging – risk factors for submucosal cleft

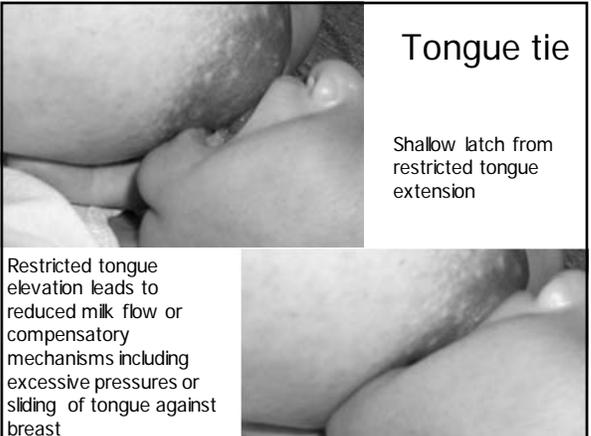


Tongue in cleft

Tongue tie



Tongue tie



Shallow latch from restricted tongue extension

Restricted tongue elevation leads to reduced milk flow or compensatory mechanisms including excessive pressures or sliding of tongue against breast

Space taking lesions

Increase the size of the tongue, obstruct latch
Interfere with normal movement, cause pain?



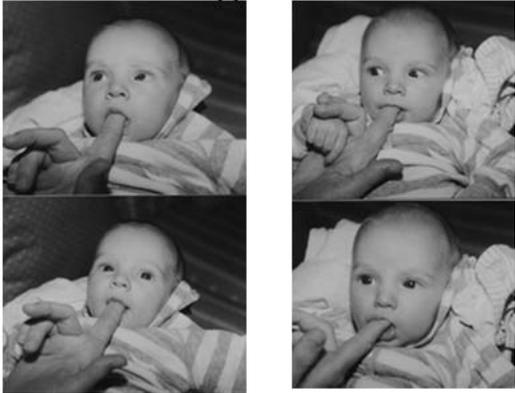
Lymphangiohemangioma Vascular malformation

Macroglossia



Large tongue reduces intraoral space
Tongue pressure enlarges palate and jaw

Hypotonia



Hypotonia

- decreased postural (muscle) tone.
- poor central stability of neck and trunk leads to poor quality of motion in jaw, tongue, & lips.
- Increases effort of feeding.

Hypotonia - neonatal encephalopathy



Excessive jaw excursion

- poor control of jaw leads to wide excursions.
- effect- wide jaw excursions increase energy and time expenditure- slow feeding and increase sleepiness. widely open jaw destabilizes tongue, further reducing the amount of milk obtained.
- OR Vice-versa – tongue restriction prevents seal against breast with anterior tongue, forming a larger intraoral space

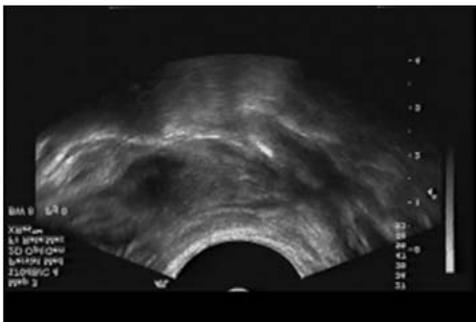
Excessive jaw excursion due to neurological impairment



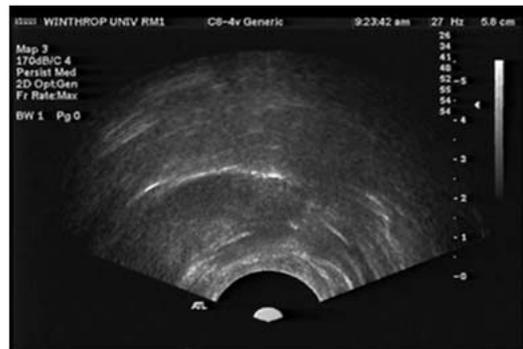
Excessive jaw excursion in tongue-tied infant



Excessive jaw excursions – tongue tied infant



Same infant after frenotomy



Tongue Retraction



Retracted and bunched tongue in infant with ankyloglossia

- tongue is pulled backwards by tongue tie, or neck extension and shoulder retraction in neurologically impaired infants. baby often presses tongue against palate to prevent blockage of airway by retracted tongue.
- effect- obstructs latch, causes phasic biting. mild tongue retraction reduces milk transfer, increases effort associated with feeding.

Hypotonia – bunched, flaccid tongue



- Hypotonic tongue (intrinsic muscles) interferes with tongue configuration- tongue is bunched and thick rather than thinned & grooved.
- effect- inability to strip milk from breast, inability to form bolus for swallowing--coughing.

Differentiating bunching due to hypotonia to bunching from tongue tie

Hypotonia – loose lip seal

- hypotonic lips- loose seal.
- effect- milk drips from mouth; seal is continuously broken preventing negative pressure & reducing milk transfer.
- Look at tongue as well- anterior tongue = primary seal

Fixing

- excessive contraction of muscles in attempt to stabilize joint or structure.
- effect- difficulty initiating movements, reduced quality of movement, tiring.

Why babies might not suck correctly....

- Prematurity
 - Low muscle tone
 - Neurologic immaturity
 - Poor state control
 - Depressed oral reflexes
 - Decreased oral motor skills
 - Abnormal environment – separation from mother

Preterm infant (34 weeks g.a.)
3lb12oz Reduced endurance.

Modified clutch (football) hold may increase baby's alertness and muscle tone

Short sucking bursts - prematurity

Reduced cheek stability in preterm infant 36 weeks g. a.



If the preterm infant's cheeks collapse during sucking, supporting them with a Dancer Hand position may decrease the work of feeding.

Optimal support and body alignment



Prone position



Useful for increasing head extension in micrognathic infants
Can allow infant to better handle a fast milk flow
May increase tone in hypotonic infants
Can encourage self attachment in reluctant babies.

Jaw Support



"C" or "U" hold can be easily modified to support baby's jaw to reduce excessive mandibular excursions.

Supporting breast forward into mouth for low tone infant



Prone position and jaw support



Sublingual pressure



Can stimulate tongue extension.
Support weak or low tone intrinsic tongue muscles.
Stimulates more sustained sucking efforts.

Sublingual massage during feeding



Preparatory Handling

Uses:

- Helps to normalize muscle tone.
- Helps to improve infant neurobehavioral organization.

Some examples:

- Blanket swing
- Vestibular stimulation
 - Fast bounce
 - Incremental flexion
- Charm hold (colic hold with finger sucking)

Massage (Cross Body)



Colic Hold



Blanket swing – “head to foot”



Swaddling in Flexion



Use sparingly (state maintenance for feeding)
Consider leaving arms free to allow breast finding, communication and self soothing

Swaddling in Flexion



Vestibular Stimulation



Digital Sucking Exam



What do sucking compensations feel like?

- Sliding – rubbing on finger instead of pressing (may be very subtle)
- Posterior elevation – rhythmic bumping on finger tip by posterior tongue
- Excessive intraoral pressures – hard, painful pressure (relation to flow)

Sucking Compensations

- Tongue thrust – may push finger out of mouth (more forceful than sliding)
- Excessive lip movement – will be apparent on finger as well
- Tongue retraction – gum is exposed, and infant bites down

Sucking compensations

- Anterior tongue loses contact with finger (excessive jaw excursion)
- Loose suck – mid to posterior tongue loses contact with finger during sucking.

Sucking in Neurologically Impaired Infants

- More likely to include an arrhythmic piston-like motion of tongue (up and down)
- May use tongue thrusting
- Feels uncoordinated and weak

Refer for Speech Pathology/Oral Motor Tx

Digital Suck Exercises

- Useful when tongue motions are unusual but anatomy is normal.
- Improve awareness of oral structures.
- Can temporarily increase low muscle tone or decrease high muscle tone.
- Post-frenotomy improvement of ROM and suck.
- May improve suck in lieu of frenotomy.

- Model sensitivity to the infant's acceptance of digital oral stimulation.
- Avoid stimulating the infant's gag response.
- Signs of progress are usually immediate. If the exercise does not work quickly, find a different approach.



Making it Fun

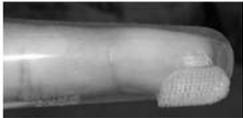
- Eye contact
- Playful attitude and expression
- Repetitive pattern
- Sound effects



Tools for Oral Stimulation



First Years Massaging Action Teether



First Years finger toothbrush



Nuk Toothbrush trainer

The newest iteration of the First years vibrating teether



Tickling down the tongue tip



- Infants with strong tongue tip elevation may not drop their tongue when they open their mouths
- Sometimes tickling the tongue tip gently is enough to induce them to depress the tongue

Improving latch by tickling down tongue tip at the breast.

Stroking the tongue down and out



- Tickle lips to stimulate gape
- Slide finger into mouth along palate
- Allow infant to suck finger several seconds
- Withdraw finger while pressing on the tongue
- Tell infant "tongue down"

Pacifier "tug of war"



- Helpful for poor central grooving of tongue and persistent tongue tip elevation.
- Gently tug on pacifier, using a slight downward traction on the tip against the baby's tongue. Let baby try to resist the pull.

Baby held onto the breast with his mandible, causing bruising and pain. Tug of war games increased his tongue's ability to groove and keep the breast stable.

Tug of War-negative resistance



Vibratory stimulation (“walking back on the tongue”)

- Meant to stimulate the pattern of peristalsis – sequential activation of genioglossus and intrinsic transverse tongue muscles.
- Press fingertip on anterior tongue and provide small amplitude, high frequency movement (vibration).
- Move finger back a few mm and repeat.
- Stop short of stimulating gag

Walking back on the tongue



Using vibration to reduce tongue thrust



Stimulating Tongue Extension



- Tickle upper lip to elicit gape.
- Touch anterior surface of lower gum ridge until tongue extends to explore finger.

Stimulating Tongue Extension



Stimulating tongue grooving



- Place finger, pacifier, or toothbrush trainer flat on anterior half of tongue, along central groove.
- Gently sweep from center to lateral border of tongue, pause, sweep down to center, pause, then up to other side.
- Repeat several times as baby tolerates.

Tongue Hugs - grooving



Reducing posterior tongue humping



Stimulating ROM – lateralization and extension



Fingerfeeding

- Combines stimulation to tongue and palate with a milk reward for correct sucking.
- Infants are intelligent, and will modify their behavior until they get optimal milk flow.
- Important to cue them for breastfeeding behaviors to reinforce latch skills.

“Work in function!” J. Joan Sheppard, CCC-SLP, PhD



Syringe and 5 french feeding tube



Hazelbaker fingerfeeder
www.fingerfeeder.com



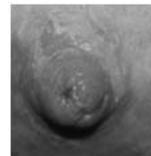
Fingerfeeding to improve coordination
of swallowing and breathing



Reducing tongue
"humping"



- Fingerfeed with sublingual support
- Put pressure on posterior tongue if baby elevates it.



Fingerfeeding to reduce posterior
tongue elevation (humping)



Modified bottle feeding



Preserve breastfeeding
gape by crossing lips with
nipple.
Jaw and chin support for
hypotonic infant.

Modified Bottle Feeding



Using a wide based nipple



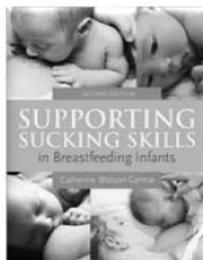
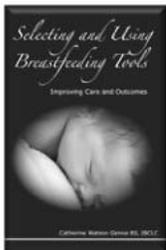
Bait and Switch with a bottle...



Review of Approach

- Observe sucking compensations, try to determine the root deficit.
- Refine positioning and supportive techniques and observe changes.
- Use therapeutic techniques to try to address the root deficit.
- Observe for unwanted effects, adjust if necessary.

For More Information:



<http://www.cwgenna.com/clinicalcornerpage.html>