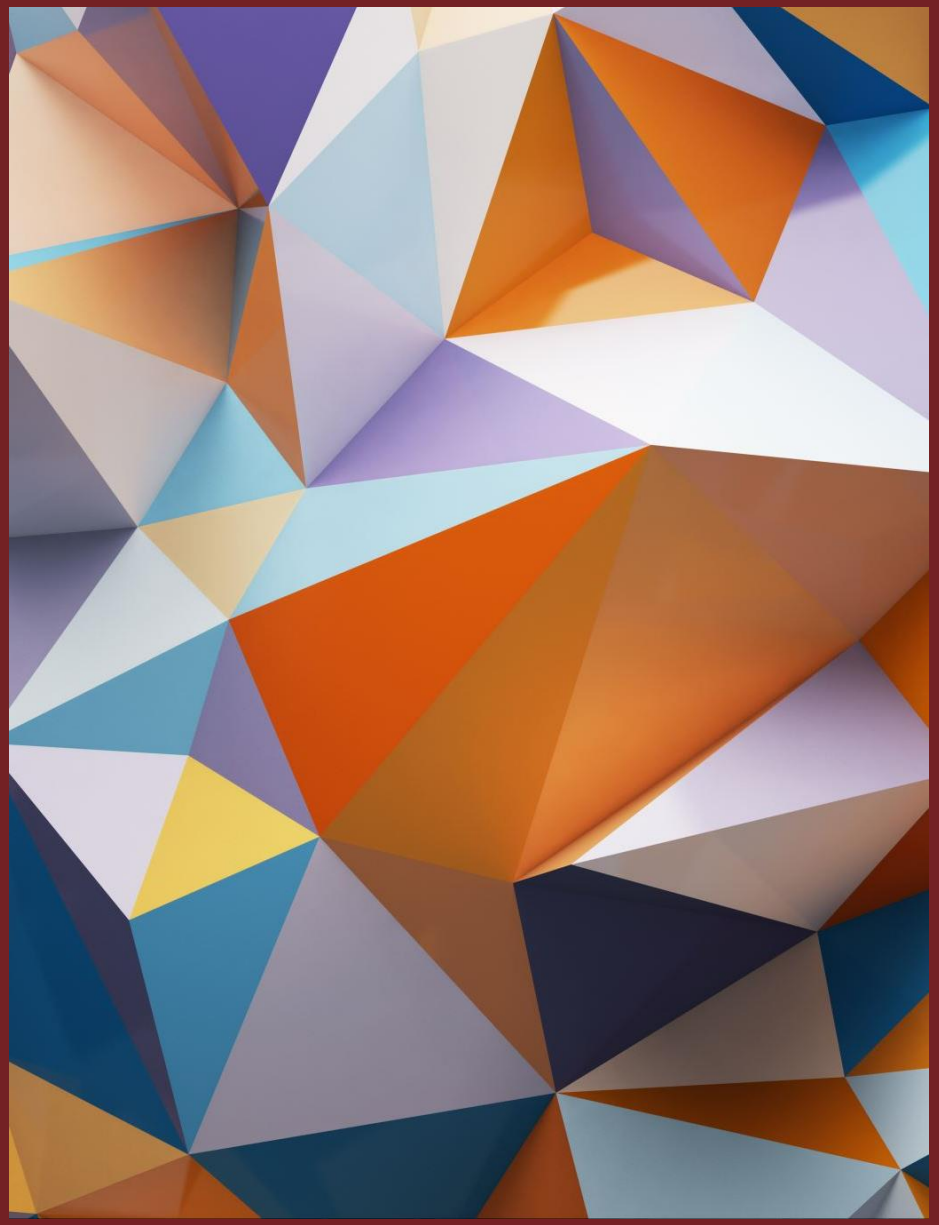


PEDIATRIC DYSPHAGIA PRAXIS REVIEW COURSE

Dr. Lauren Wright-Jones

Sponsored by the National Black Association of Speech Language & Hearing

FINANCIAL DISCLOSURE

- I am receiving a speaking fee from the National Black Association of Speech Language & Hearing for this presentation.
- I have no relevant non-financial relationships to disclose.

ABOUT THE SPEAKER

- Graduate degree from Fontbonne University in Saint Louis Missouri
- Doctorate in Special Education and Disabilities Studies from Saint Louis University
- 7 years as a pediatric SLP working with a variety of children and their families in a variety of settings
- Currently Program Director at University of Louisiana Monroe

OBJECTIVES

- Describe the role of the SLP with pediatric feeding & swallowing patients
- Understand the differences between adult and infant/child swallowing anatomy
- Explain normal development of feeding and swallowing anatomy
- Identify diagnoses that cause dysphagia in the pediatric population including craniofacial conditions
- Explain the evaluation, treatment, and management of pediatric dysphagia patients

PREVALENCE

- *According to Dodrill & Gosa (2015) approximately 1% of children in the general population experience swallowing difficulties*

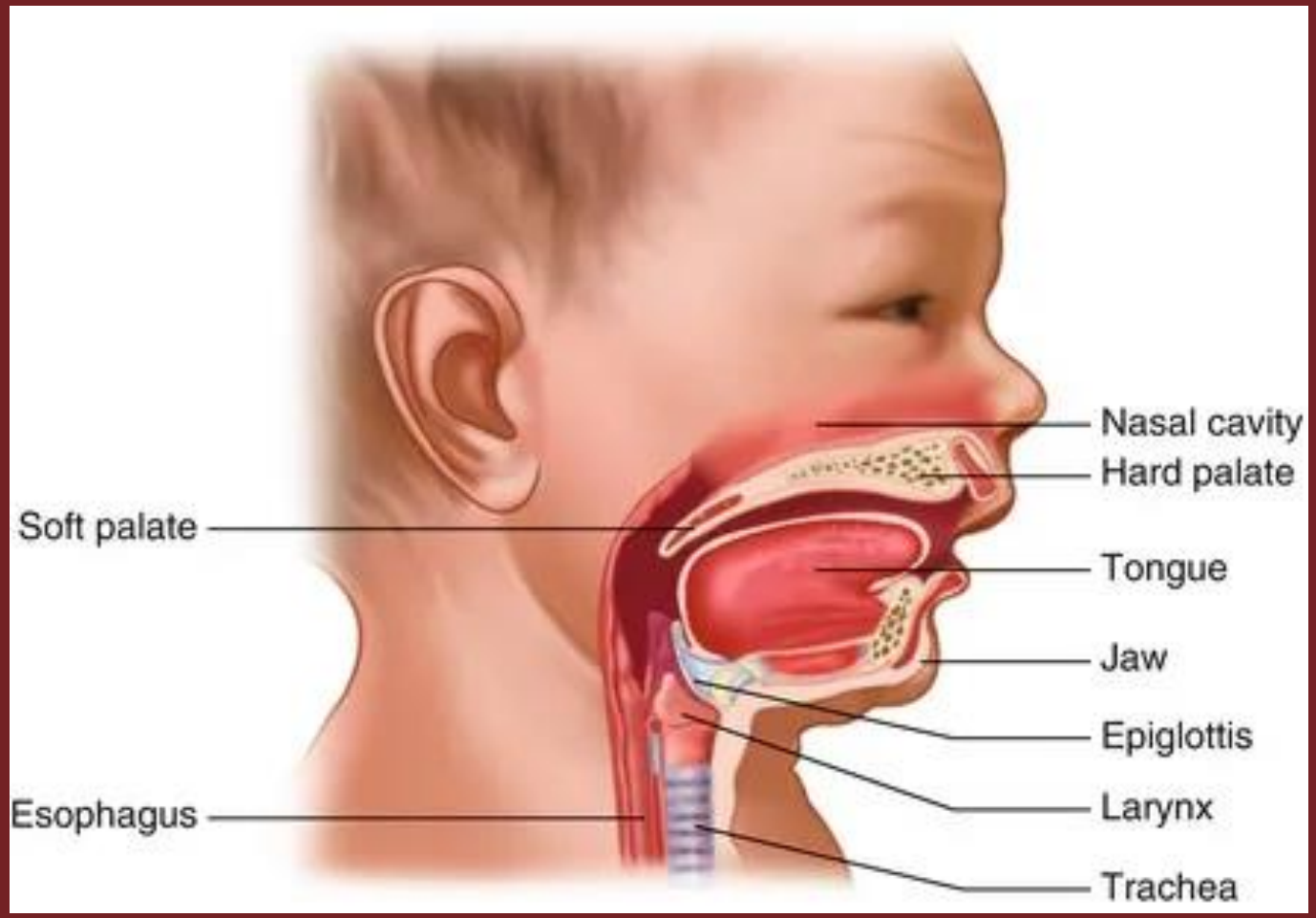
- *Roughly 40% of children that are born premature (pre-term being anything before 37 weeks) have swallowing and feeding issues (Arvedson, Brodskey, &* Lefton-Greif, 2020)

- https://www.aota.org/Advocacy-Policy/Federal-Reg-Affairs/News/2021/pediatric-feeding-disorder.aspx
- https://www.asha.org/siteassets/uploadedfiles/icf-pediatric-feeding-swallowing.pdf

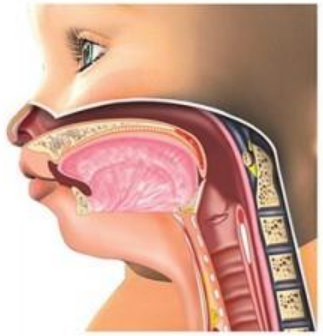
HABILITATION

- Work to support adequate growth and development through safe feeding and swallowing practices
- Therapy with young children is about teaching the skill of eating and swallowing this is known as habilitation of feeding and swallowing

ANATOMY AND PHYSIOLOGY OF FEEDING AND SWALLOWING

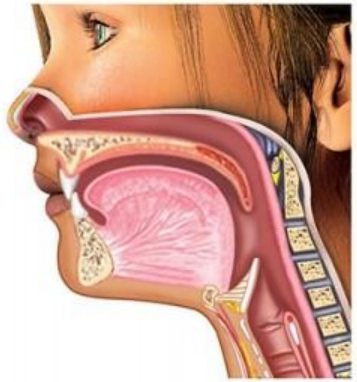


Child Swallowing *Support Card*

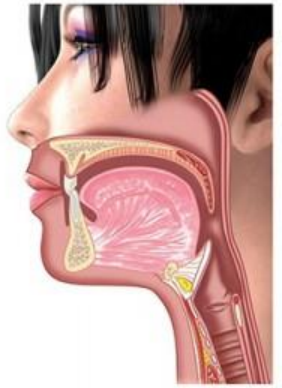


Infant

Toddler



Teen

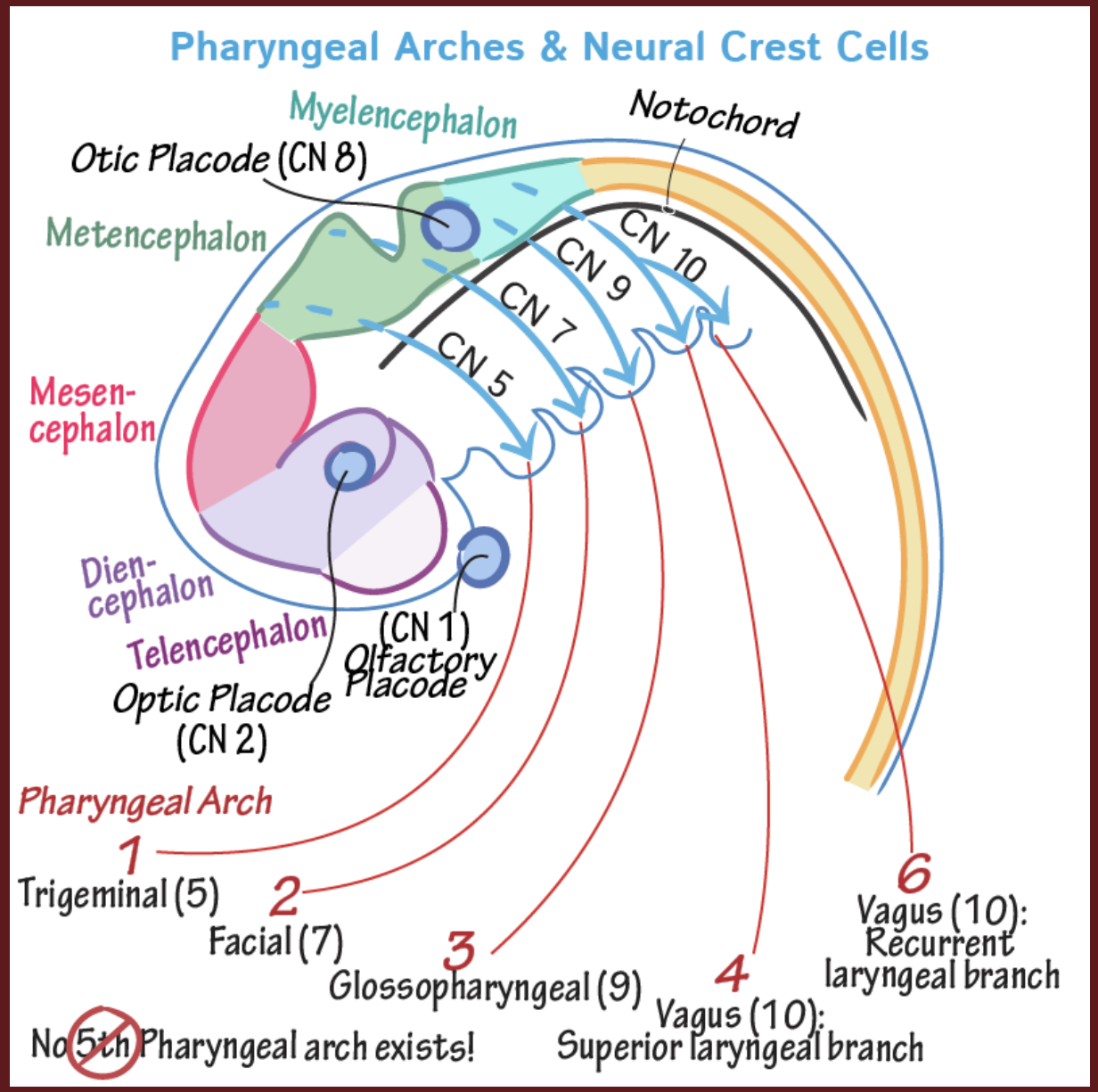


Adult

Blue Tree Publishing, Inc. 8927 192nd St SW, Edmonds, WA 98026 USA 425-210-4743 www.bluetreepublishing.com

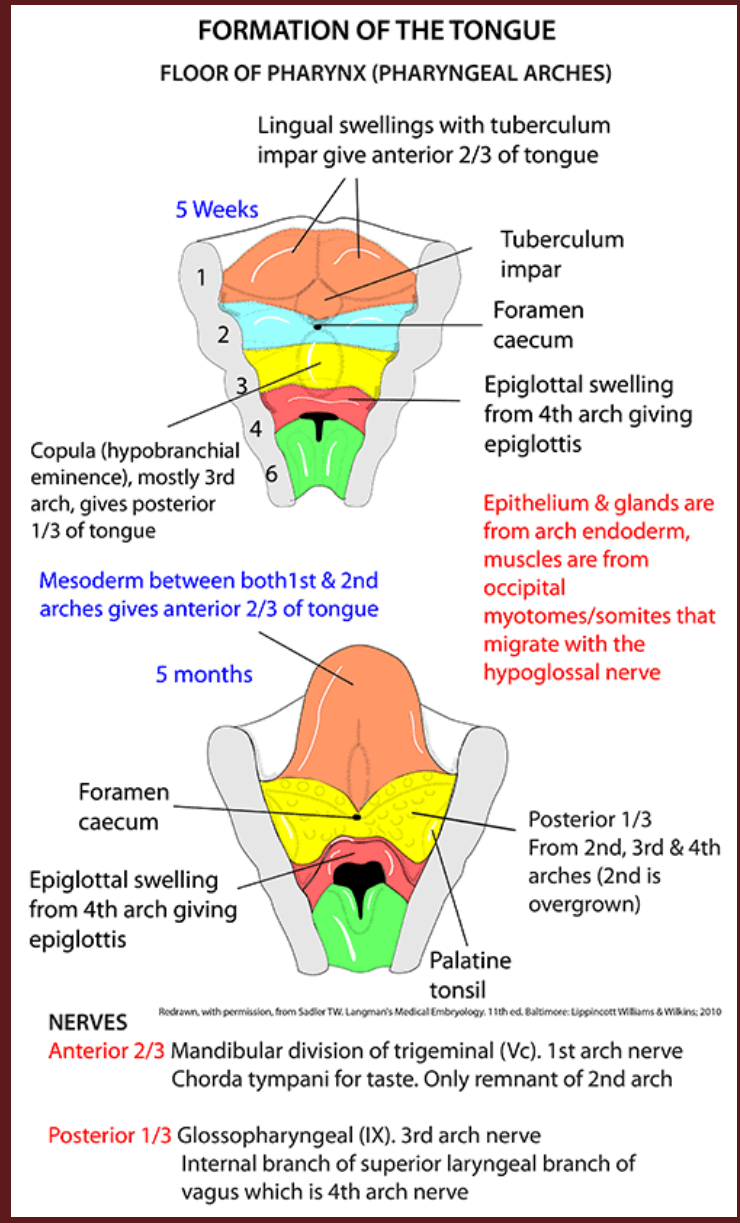
BASIC ANATOMY OF FEEDING: PHARYNGEAL ARCHES

- 1st through 4th pair are visible; 5th and 6th are not visible
- 1st arch: maxillary and mandibular prominences, muscles of mastication, ear
- 2nd arch: ear, facial expression muscles
- 3rd arch: hyoid bone
- 4th arch: fuses with 6th arch to form laryngeal cartilages
- 5th arch: no derivatives;exists only transiently during embryogenesis
- 6th arch: intrinsic muscles of larynx



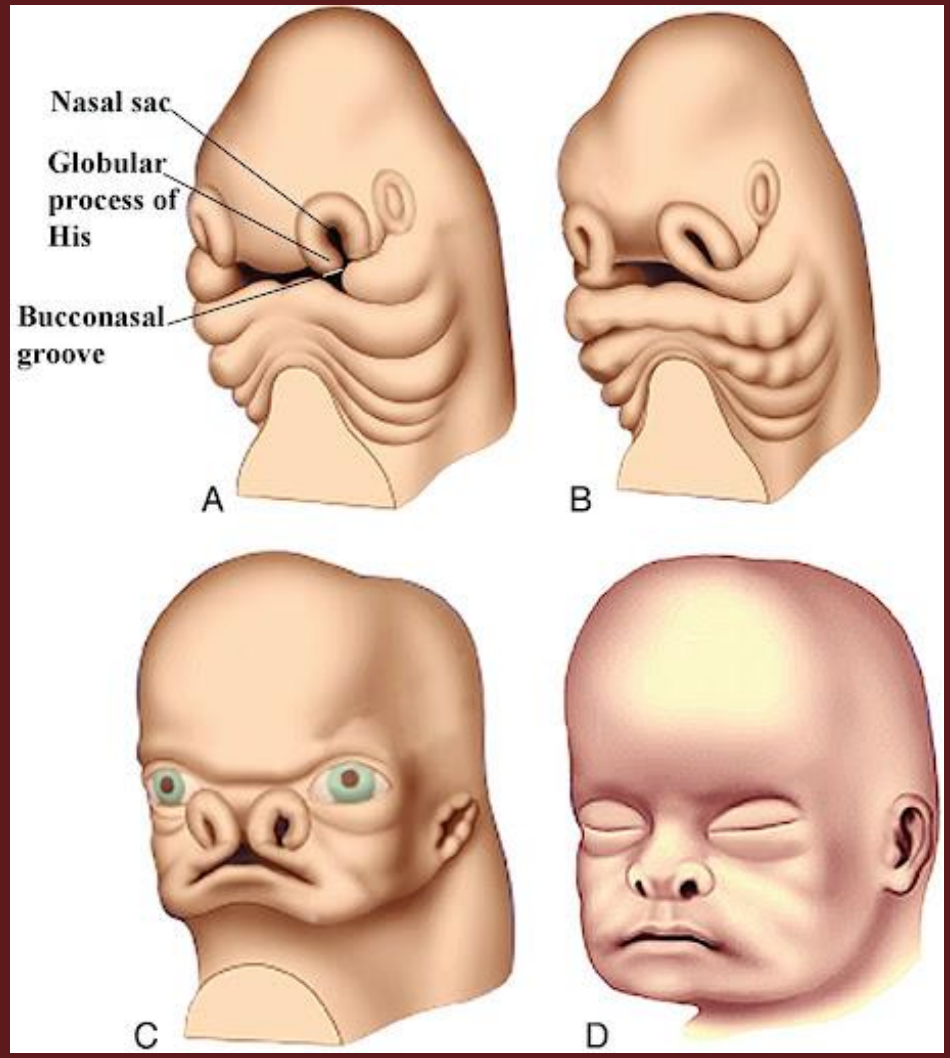
TONGUE

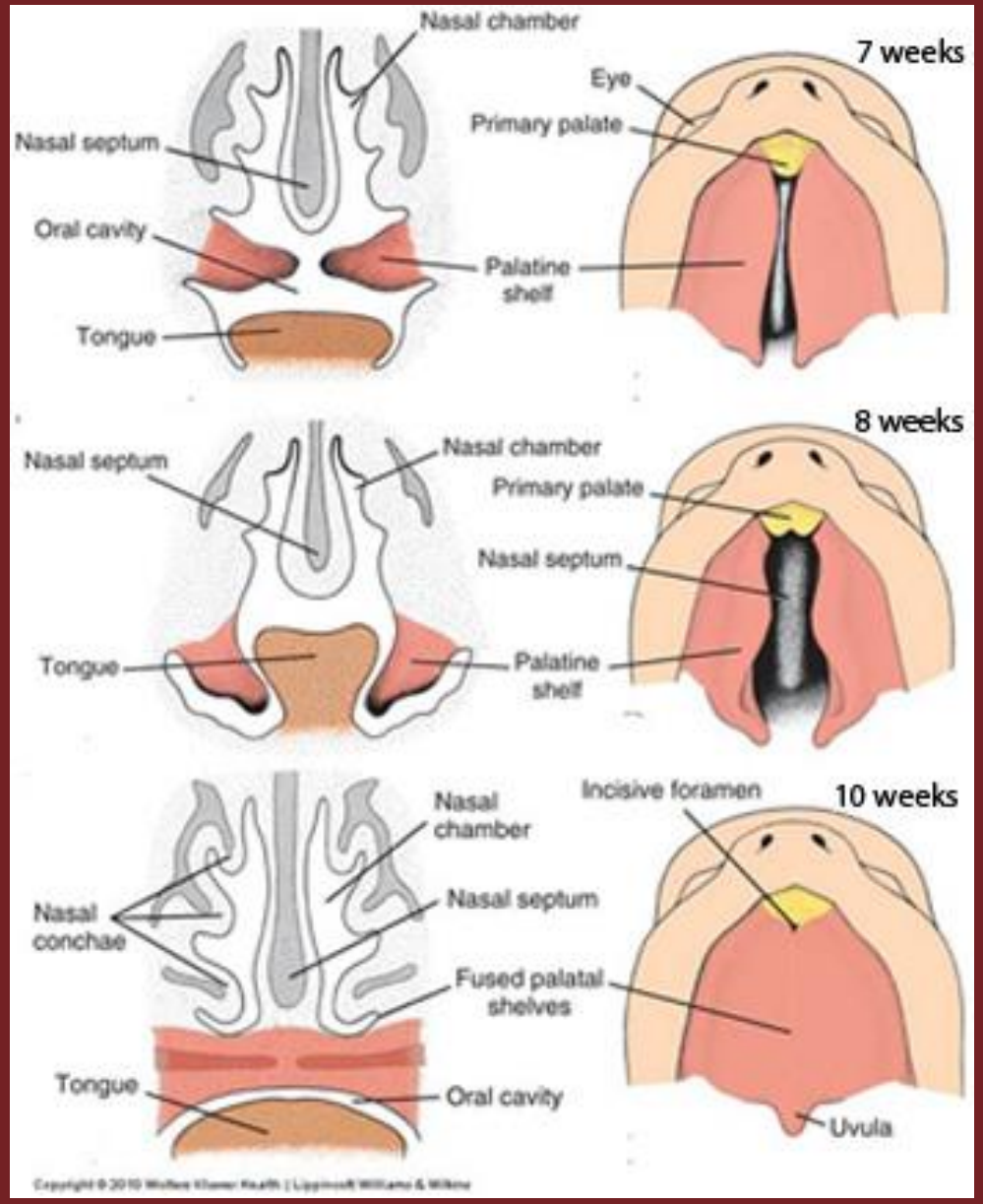
4 to 5 weeks	Tongue buds begin to form
6 to 7 weeks	Salivary gland development
8 to 10 weeks	lingual papillae appear
10 to 12 weeks	filiform papillae
13 to 15 weeks	Nerves from taste buds begin connecting to the brain.
20 weeks	Many taste buds are able to transmit taste signals to the brain.



FACIAL DEVELOPMENT

- primarily during weeks 4-8
- Face looks “normal” at end of embryonic period
- Lower jaw and lower lip form first





PALATE DEVELOPMENT (PALATOGENESIS)

- Begins in week 6 and ends at week 12
- Critical period of development occurs at end of week 6 though beginning of week 9
- Primary palate: develops early in week 6, forms anterior and midline aspects of maxilla (hard palate fusing occurs bettwen 8-9 weeks)
- Secondary palate: early in week 6; most of hard and soft palates

ORAL MOTOR DEVELOPMENT

Age	Function of Lips, Jaw and Teeth
Before birth	• Sucking observed in the womb (present at about 27 weeks) • Swallowing in the womb (present at about 12 weeks) • Rooting behaviors (present at about 32 weeks) • Tongue protrusion (present at about 27 weeks) • Tongue lateralization (present at about 28 weeks) • Phasic bite (present at 28 weeks) • Gag present at 27-28 weeks
Birth	• Opens mouth to suck fists • Gag reflex/response to food and objects in mouth • Moves tongue in and out, up and down
2 weeks-9months	• Can show open mouth for spoon at an early age. Response present before onset of complementary feeding at 4-6 months
2 months	• Can move food from a spoon to the back of mouth
6 months	• Gag response declines as mouth becomes more used to the feel of food
6-12 months	• Eruption of teeth
6-14 months	• Can chew softer lumps and keep most food in mouth
7-12 months	• Can close the lips to clear the spoon
8-12 months	• Can bite into harder foods when teeth have erupted
12 months-4 years	• Can cope with most textures offered by chewing not fully mature
2 years	• Can cope with most foods offered as part of family meal

ORAL FEEDING AND GROSS DEVELOPMENT ADAPTED FROM ARVEDSON (2006)

Age	Oral Motor Skills	Developing Gross Motor Skills	Feeding Milestones	Appropriate Foods/Textures to Introduce
Birth – 2 months	• Baby uses coordinated suck swallow breathe pattern during breast and bottle feeds, to efficiently consume calories		• Efficient suckle of bottle nipple	• Breast and/or formula provides all of baby's nutrition
2 – 4 months	• Tongue and jaw move together	• Head control is improving each month		• Begins to put their hands on the bottle during feeding
4 – 6 months	• Baby's tongue begins to move without the lips • Baby's automatic suck is more voluntary • Baby develops phasic bite and vertical munching pattern	• Sits upright with assistance • Holds head steady without assistance • Begins to bring hands to mouth	• Open cup drinking can be introduced around 6-12 months • Baby is able to use upper lip to clean a spoon	• Breast milk or formula continues to provide a majority of the baby's nutrition • Introduce infant cereals, thin pureed foods off of a spoon
6 – 8 months	• Gag response declines as mouth becomes used to solid foods • Child develops lateral placement of	• Child has greater postural stability and is able to sit up mostly on their own	• Open cups can be introduced from 6-12 months • Helps adult with spoon	• Breast milk or formula continues to provide a majority of the baby's nutrition • Introduction of lumpy mashed

ORAL FEEDING AND GROSS DEVELOPMENT ADAPTED FROM ARVEDSON (2006)

8 – 10 months	• Lip seal emerges for cup drinking • Rotary chew may begin to emerge	• Stands while holding on to something • Puts toys in mouth	• Open cups can be introduced from 6-12 months	• Breast milk or formula continues to provide a majority of the baby's nutrition • Mash with harder/lumpier solids
10 – 12 months	• Baby can use a sustained, controlled bite		• Open cups can be introduced from 6-12 months • Wean bottle feeding around 12 months old	• Breast milk or formula continues to provide a majority of the baby's nutrition
1 – 1 ½ years	• Tongue tip elevation	• Pulls to stand up • Gets into a sitting position without help	• Holds cup with both hands • Grabs and holds spoon with both hands for self-feeding	• Solid foods become child's primary nutrition source
1 ½ – 2 years	• Tongue tip elevation • Rotary chewing pattern is refined • Lateral placement of foods is refined		• Child self-feeds a majority of foods • Can chew a wide range of textures • Able to chew with mouth closed • Child has more control of cup drinking	• Solid foods are child's primary nutrition source • Children should be able to eat most all food by this time
2 years and beyond	• Child refines all skills		• Child refines all skills	• Child is able to chew and eat fruits, veggies, meats, and grains

PHASES OF SWALLOWING

- 1.Oral phase: Nipple compression and sucking to generate negative pressure
- 2.Pharyngeal phase: Tongue base, velum, and posterior pharyngeal force bolus down the pharynx
- 3.Esophageal phase: Upper esophageal sphincter opens esophagus; lower esophageal sphincter opens into stomach

- https://youtu.be/HIaW3FUVM3k

ORAL PHASE

- Suckling or mastication, and the transportation of the bolus towards the pharynx; triggering of the swallowing reflex;
- Possible Causes/Results of disordered Oral Phase
  - *cleft* lip and/or palate
  - absent oral motor reflexes
  - weak, uncoordinated sucking
  - immature biting and chewing
  - oral apraxia
  - tongue and/or lip ties (TOTs)
  - micro- or macroglossia
  - micro-/retrognathia
  - Cranial nerve damage brain injury

PHARYNGEAL PHASE

- Transportation of the bolus through the pharynx

Possible Causes/Results of Pharyngeal Phase Disorder

- Poor suck-swallow-breathe- coordination
- Delayed triggering of swallow
- Poor pharyngeal clearance
- Bronchopulmonary dysplasia (or long-term breathing and lung problems) and/or Chronic Lung Disease
- Enlarged tonsils
- Laryngeal cleft
- Cranial nerve damage
- Recurrent Laryngeal Nerve damage
- Brain injury

ESOPHAGEAL STAGE

- Transportation of the bolus through the esophagus to the stomach

Possible Causes/Results of Esophogeal Phase Disorder

- Impaired UES or LES opening
- GERD
- Decreased motility
- Delayed gastric emptying
- Esophageal atresia
- Tracheoesophageal fistula
- Esophagitis
- Strictures
- Achalasia
- Brain injury

POSSIBLE CONSEQUENCES OF PEDIATRIC SWALLOWING DIFFICULTIES (DYSPHAGIA)

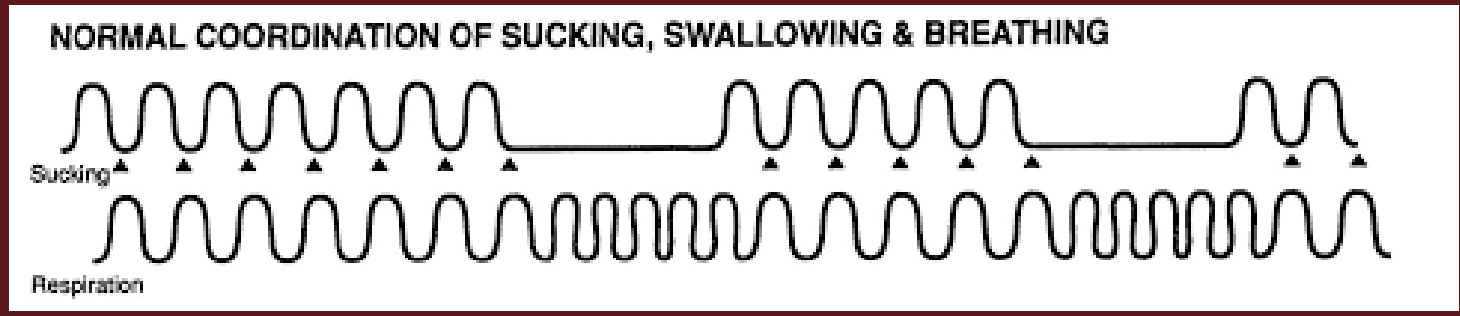
- Airway invasion/aspiration
- Respiratory illness (e.g., pneumonia)
- Child is unable or unwilling to eat a variety of age appropriate foods
- Low volume of intake and poor weight gain
- Limited food repertoire
- Limited variety of textures
- Prolonged mealtime duration (>30 minutes)
- Problematic behavior at mealtimes
- Family stress
- Decreased quality of life

- Meyer Turner (2020)

COMMON COMORBID CONDITIONS

- pulmonary hypoplasia
- respiratory distress syndrome
  bronchopulmonary dysplasia
- Laryngomalacia
- heart defects
- Prematurity
- necrotizing enterocolitis
- hirschsprung's disease
- gastroesophageal reflux
- Microcephaly
- Intraventricular hemorrhage
- hypoxic ischemic encephalopathy
- stroke
- dandy walker malformation
- treacher collins syndrome
- DiGeorge syndrome
- moebius syndrome
- jaundice
- diabetes
- neonatal abstinence syndrome
- tethered oral tissues
- autism spectrum disorders
- Gastroschisis
- seizures
- cerebral palsy
- medication
- Prolonged tube feedings
- Pierre robin sequence

EFFECTIVE FEEDING/ NORMAL SSB



Breathing should occur at regular intervals during sucking (after every 1-2 sucks)

Swallowing momentarily interrupts breathing

Breathing rate is faster during pauses •

Wolf, Glass 1992

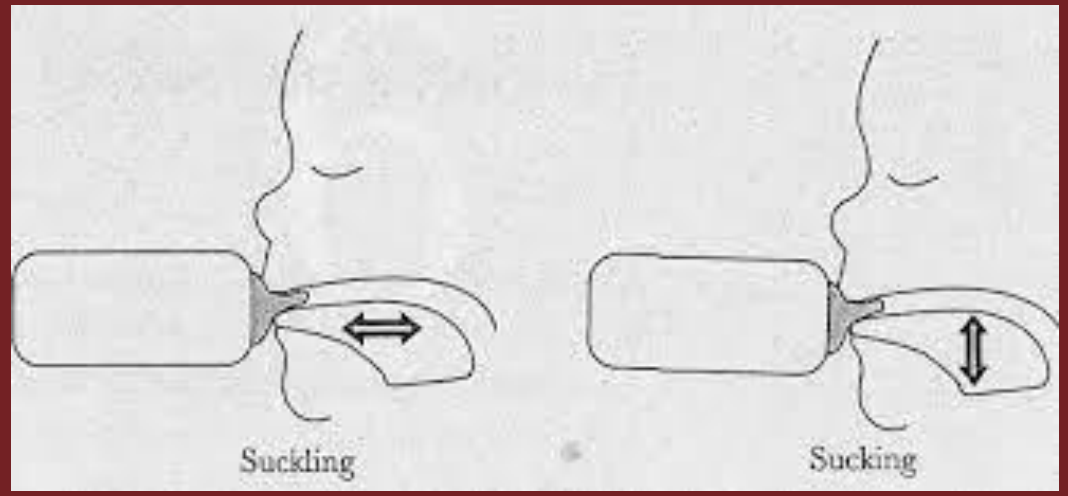
IMPAIRED OR IMPACTED SUCK-SWALLOW-BREATHE

- Around 28 weeks GA; more mature at 32-34 weeks GA
- Fully sequenced SSB 1:1:1 pattern including great respiratory support at full term
- Potential issues with feeding in medically compromised infants:
- Aspiration: Entry of fluid into the airway
- Decreased ventilation

SUCKLING/SUCKING FUNCTION

- Suction:
- Generation of an intraoral negative pressure to draw liquid into the mouth
- Closure of the nasal passages by the soft palate, tight labial seal around breast or bottle, lowering of the mandible

- Expression:
- Positive pressure exerted by the tongue against the hard palate by squeezing or stripping to ejection of milk



Characteristics	Suckling	Sucking
Tongue configuration	Flat, thin, cupped or bowl-shaped.	Flat, thin, slightly cupped or bowl-shaped
Movement direction	In-out movement horizontal	Up-down movement vertical
Range	Extension or protrusion no further out than middle of the lip	From mandible to anterior hard palate
Lip approximation	Loose	Firm
Expected state	Normally in early infancy	Normal later infancy, childhood, and adult

EARLY FEEDING AFFECTS LATER FEEDING

Thoyre, 2007

- *54% of parents at 1 month PMA reported a feeding problem*
- *Feeding difficulties are a major concern for families post-discharge*
- *High percentage of children with FTT and feeding disorders were preterm*

Samara et al., 2010

- *Oral hypersensitivity and behavioral feeding problems found in 25% of extremely premature children at 6 years of age*
- *Oral motor dysfunction persisted in 33% of extremely premature children*

SENSORY ISSUES IN PEDIATRICS

- Unpleasant oral experiences, delayed introduction to oral feeds, chronic illness, neurological issues, feeding tubes, intubation, application/removal of facial tape ● Oral Aversion ○ reluctance, avoidance, or fear of eating, drinking or accepting sensation on or around the mouth ○ mild to severe ○ apprehension, defensiveness ○ may lead to failure-to-thrive and reduced oral-motor development
- Indicators
    - poor suck ○ food refusal ○ gagging ○ drooling ○ vomiting ○ slow feeding ○ pocketing ○ refusal to progress in textures

BEHAVIORAL ISSUES

- Poor habits, lack of structure/routine, eating with distractions, inconsistent expectations, lack of limit setting
- Problem behaviors at mealtime ○ refusal to sit at the table ○ refusal to feed self when capable ○ throwing food ○ vomiting to conclude the meal or get attention ○ eats better for some people or in certain places ○ no medical reason!

SELECTIVE/PICKY EATERS

- refuses food from an entire food group ● refuses to eat a color of food or texture ● may eat no more than 3-5 different foods ● identify variables related to refusal and selectivity ○ manipulate the types and textures of food

EVALUATION & TREATMENT

- Table 1-3 (Arvedson (2020).
- Process Steps for Diagnosis and Treatment of Pediatric Swallowing and Feeding Disorders
    - Define problem feeding and swallowing
    - Identify etiology(ies)
    - Determine appropriate diagnostic tests
    - Plan approach to patient/family
    - Teach about problem, implement treatment
    - Monitor progress
    - Evaluate progress (outcomes focused)

SKILLS AND WHAT TO LOOK FOR

CN	Stimulus	Typical Response	Deficit Response
V	Food on tongue	Mastication	Bolus not formed
VII	Sucking	Lip pursing to latch on nipple	Lip seal not attained
	Food on lower lip	Lip closure	Limited or no lip movement
	Smile	Lip retraction	Lack of retraction or asymmetry
IX,X	Food in posterior oral cavity	Swallow initiated <2 sec	Delayed initiation of pharyngeal swallow
XII	Food on tongue	Tongue shaping with pointing and protruding	Tongue lacking elevation and thinning; excessive thrusting; atrophy

Source: Adapted from Arvedson et al. [2002].

CHART REVIEW/CASE HISTORY

- Gestational Age (GA) -Maternal hx/pregnancy complications? -Birth history (APGARs, BW, csx/svd) -Diagnoses, surgeries, testing/imaging -Course of treatment in NICU -Respiratory support -Feeding tubes -Medications
- -Feeding at home (diet, utensils, support) -Family/social issues -Other milestones -Motor -Speech/language -Social -Behavior -Sensory -Allergies, intolerances -Medications

EXAMPLE QUESTIONS TO ASK PARENTS

- How long does it take to feed your child?
- Is your child totally dependent on others for feeding?
- Does your child refuse foods?
- Are mealtimes stressful?
- Have you noticed a change in weight?
- Are there any signs of respiratory distress such as congestion?
- Does your child vomit regularly?
- Does your child get irritable or lethargic during mealtimes?

NEONATAL CLINICAL BEDSIDE EXAMINATION

- 1. State/alertness, hunger cues, self-regulation
- 2. Physiological status (HR/O2/RR)
- 3. Stress cues, engagement cues
- 4. Reflexes a. gag/phasic bite/rooting/sucking/swallow/tongue lateralization/tongue thrust
- 5. Physical strength/stability/posture
- 6. Oral-facial structures (oral mechanism examination) a. jaw/cheeks/lips/tongue/palate/pharynx/larynx

INFANT STATES OF ALERTNESS/CONSCIOUSNESS

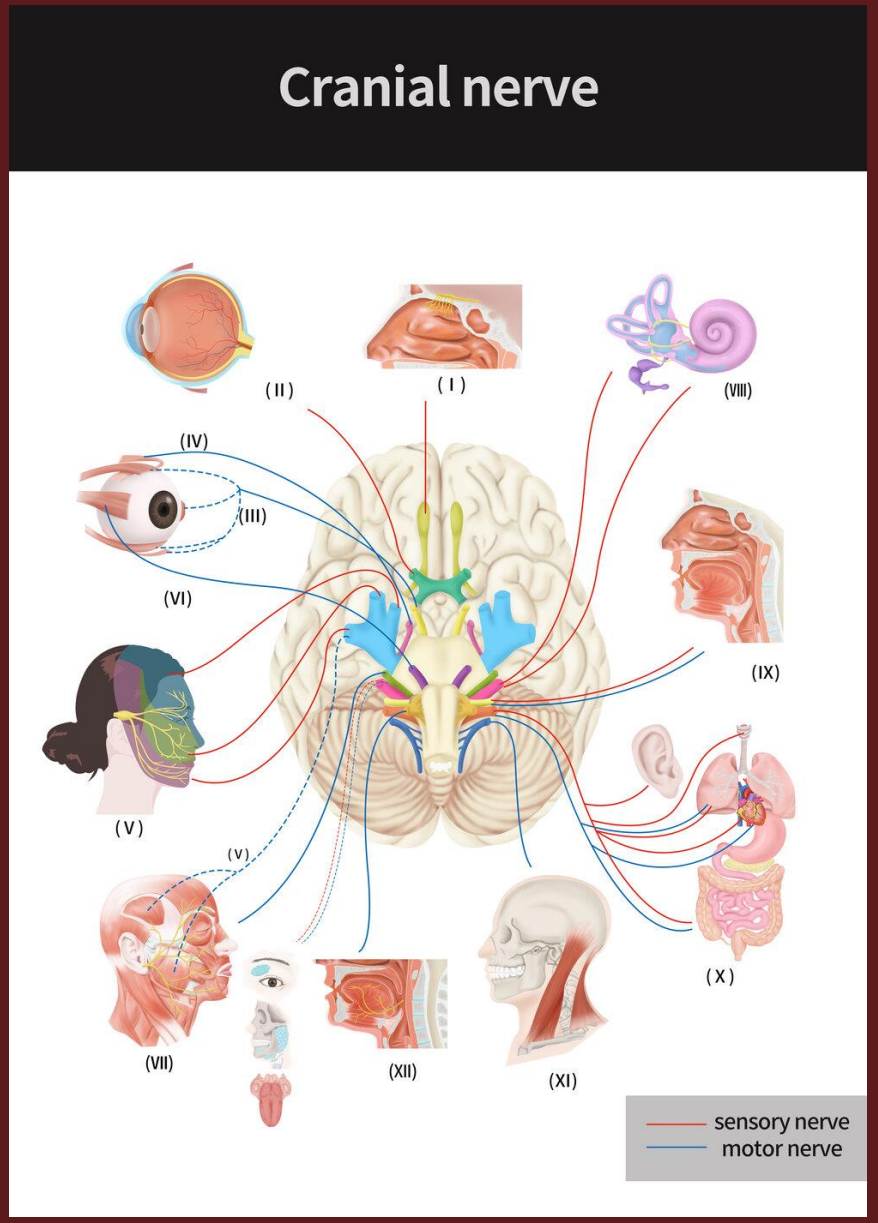
1. Sedated
2. Quiet Sleep
3. Active Sleep
4. Drowsy
5. Quiet Alert
6. Active Alert
7. Mild irritability, crying
8. Extreme irritability

STRESS CUES

- Neonatal and premature infant stress cues can involve the autonomic, motor, and/or state/attention systems
- apnea, bradycardia, desaturations
- increased work of breathing (nasal flaring, head bobbing); decreased/increased tone; rapid state changes; falling asleep; yawning; sneezing; hiccuping; arching; turning head from stimulus; stop signs; gagging; vomiting; crying; color changes; facial grimacing; tremor

CRANIAL NERVE EXAM

- Rooting (32 weeks GA) •CN V, VII, XI, XII
- Phasic Bite (28 weeks GA) •CN V
- Tongue Protrusion (integrates at 4-6 months) •CN XII
- Transverse Tongue (28 weeks) •CN V, VII, IX, XII
- Swallowing (12 weeks GA) •CN V, VII, IX, X, XII
- Sucking (18-24 weeks GA) •CN V, VII, IX, X
- Gag (26-27 weeks GA) •CN IX, X



ORAL MECHANISM EXAMINATION

- Cheeks
  - Tone, symmetry, frenulum
- Lips
  - Tone, symmetry, cleft, movement, frenulum
- Jaw
  - Symmetry, excursion, position at rest
- Tongue
  - Tone, frenulum, movement, symmetry, cupping, groove
- Palate
  - Shape, height, cleft

IMPORTANT CONSIDERATIONS FOR FEEDING/MEALTIME OBSERVATION

- Feeding schedule: What time does the infant/child typically eat meals?
- Mealtime location: Where is the infant/child typically consuming meals?
- Duration of meals: How long does it take for infant/child to finish meals
- Hunger/satiation cycle: Is there anything that may affect infant/child's ability to feel hunger or full?
- Developmental level: Is the infant/child delayed in development?
- Tools for consumption: Bottlefed? Breastfed? Spoon feeding? WOW cup?
- Food preferences: Does infant/child demonstrate a preference for specific formula, food, liquids, etc?
- Interest and motivation: Is child willing to complete the tasks?

COMMON NEONATAL/PEDIATRIC INTERVENTIONS

- adjust flow rate
- change nipples
- Cups
- Straws
- change position
- Upright
- Sidelying
- breastfeeding holds?
- utilize pacing especially with bottles
- alter viscosity
- alter texture (i.e., texture fading, food chaining)
- alter flavor
- adjust time or feeding schedule

STRUCTURE AND FUNCTION STRATEGIES

- Oral stimulation ▪ tapping ▪ vibration ▪ stretches
- Oral motor exercises ▪ passive vs. Active
- Positioning ▪ during and after feeding ▪ special chairs (e.g., Bumbo, foot support, "corner" chairs)
- Oral motor techniques ▪ tongue groove cues ▪ chin support ▪ cheek support

STRUCTURE AND FUNCTION STRATEGIES

- Specialized bottles, nipples, utensils, and cups ▪ cleft palate bottle ▪ cross-cut/y-cut nipples ▪ Honey Bear cups ▪ textured spoons
- Other interventions ▪ thickening liquids ▪ change formula ▪ allergy testing ▪ medication (i.e., GI issues) ▪ surgery (e.g., cleft repair, supraglottoplasty) ▪ NPO

FOOD CHAINING

- Taking accepted foods/liquids in child's repertoire and modifying or linking them to other foods
- May take several days or weeks to complete a "chain"
- Goal is to increase variety of foods in child's repertoire

TEXTURE FADING

- Based in psychological theories (e.g., change deafness, change blindness) that small changes go unnoticed
- Taking accepted texture and changing it slightly until the child accepts a new texture

TREATING SENSORY ISSUES

- Oral exploration and oral experiences
- Encouraging hand to mouth
- Mouthing toys
- Pleasurable stroking to lips, cheeks
- Giving kisses
- Rubbing face with variety of textured cloths/blankets
- Oral stimulation prior to feeding for HYPOsensitivity
- Oral motor exercises
- Sensory Integration

TREATING BEHAVIORAL FEEDING ISSUES

- Promote structure and routine
- Turn off the television
- Model appropriate behaviors at the table
- Provide SPECIFIC positive reinforcement frequently
- Feeding time limited to 30 minutes
- NO FORCE FEEDING!!
- Refer to behavioral specialist of psychologist? Discourage “grazing” and snacking between meals. Limit milk and juices
- Ignore undesirable behaviors

PARENT AND CAREGIVER EDUCATION

- Stages of Grief ○ denial ○ anger ○ depression ○ disorganization ○ eventual adaptation/coping
- Home programs…MUST hold parents accountable!
- Teach ○ positive vs. negative reinforcement ○ age-appropriate praise/awards ○ ways to prevent or minimize feeding problems (the DO's and DON'Ts) ○ modeling, shaping, antecedent manipulation
- Food journal or diary
- Model and observe in therapy sessions

IMAGING STUDIES

Advantages of Pediatric VSS	Disadvantages of Pediatric VSS
Clear view of all phases of swallowing: oral, pharyngeal, and esophageal; can help determine readiness to transition to oral feeding	Requires radiation, time limitations
Infant, child can use customary bottle, cup, utensils and usual liquid and solid consistencies	Requires addition of barium to liquid and solid consistencies
No discomfort involved	Vocal fold mobility cannot be clearly assessed
Abnormalities in the swallowing process can be readily identified	Infants or children may reject the taste of the barium
Protective and compensatory responses to abnormalities in swallowing process can be implemented and effect immediately viewed	Positioning to obtain adequate imaging may be problematic in some cases (cervical and spinal abnormalities)
Visual feedback may be beneficial for parent/caretaker as well as patient depending on developmental level	Requires special training
Advantages of Pediatric FEES	**Disadvantages of Pediatric FEES**
Specific focus on airway protection during swallowing	Possible discomfort with scope passage
Provides assessment of patient ability to manage secretions	Presence of scope may induce gagging and vomiting in patients with hypersensitive responses
Does not require alteration of food or liquid with contrast	View is obscured during swallowing contraction; can only view events before and after "white-out"
No radiation exposure, no time limits	Focus of exam is limited to primarily the pharyngeal phase
Can determine readiness to transition to oral feeding in regard to airway protection ability	Lack of view during rapid sequential swallowing (bottle-feeding)
Effect of compensatory strategies on improvement of swallowing function/safety can be determined during exam	Contraindicated for patients with choanal atresia, nasal stenosis, nasal obstruction, pharyngeal stenosis
Visual picture of swallowing may provide beneficial feedback to patient	Requires special training
Specialized sensory testing to objectively measure sensory threshold in the pharyngeal/laryngeal areas is possible	Requires compliance by patient

adequacy of protective reaction
spiration events. Movement of the
aglottic and glottic structures for

initiation and maintenance of airway
closure can be visualized and tested
prior to introduction of food or liquid. If

appropriate, the assessment is comp
by giving the patient their customary
foods and liquids per their customar

PEDIATRIC FEES

- Fiberoptic Endoscopic Evaluation of Swallowing (FEES)
- SLP passes scope nasally
- view of the hypopharynx
- no radiation or barium
- can be done at bedside or infants, can be done during breast feeding

- https://www.youtube.com/watch?v=APaRQlPEDXM

MODIFIED BARIUM SWALLOWING STUDY (MBSS)

- SLP and radiologist
- Lateral and A-P views of oral, pharyngeal, and esophageal stages
- Variety of textures and viscosities
- Barium and radiation

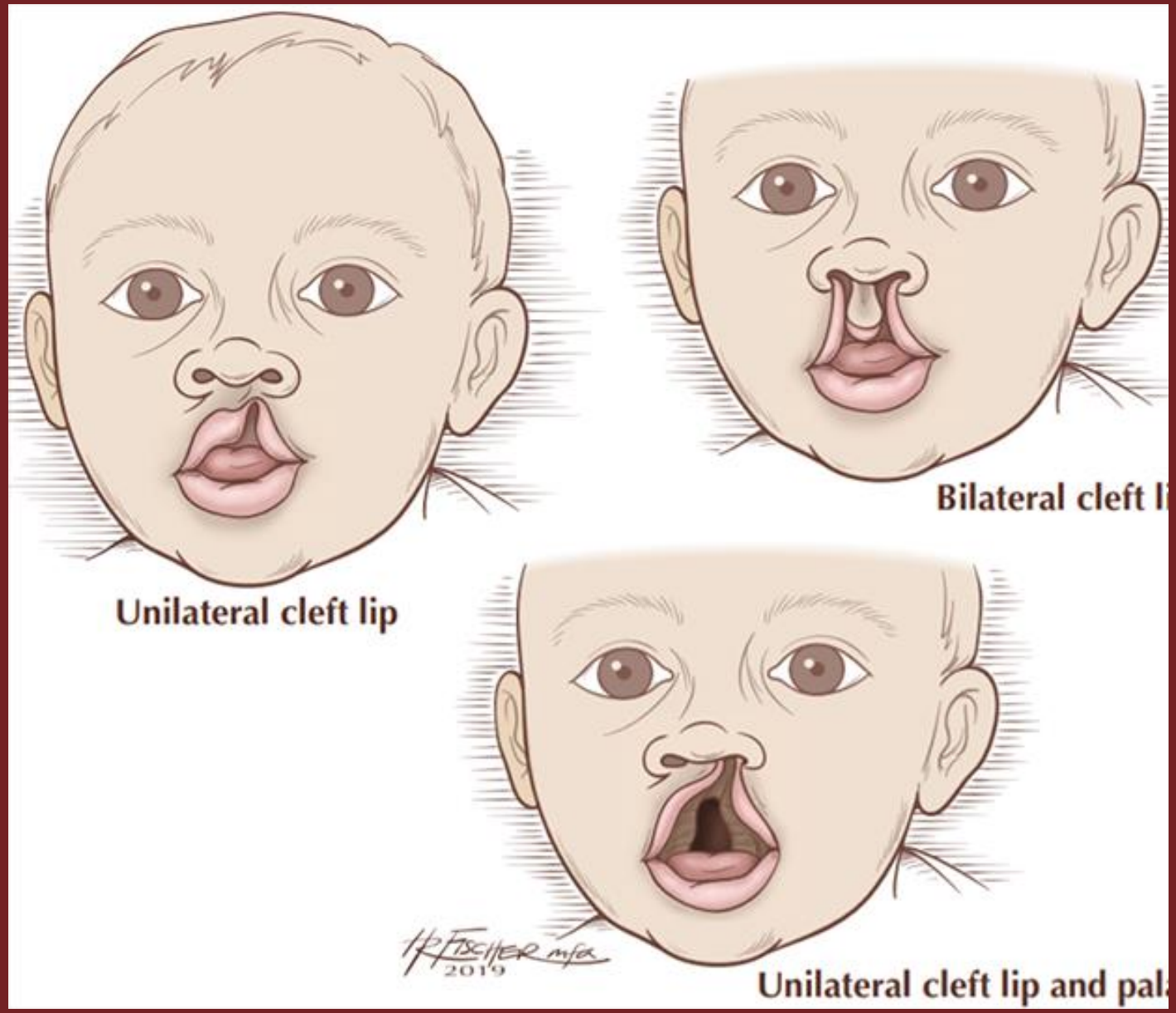
- https://youtu.be/lrD9cemJNyw

CRANIOFACIAL CONDITIONS AND THEIR IMPACT ON FEEDING AND SWALLOWING

- Cleft Lip and Alveolus (Primary Palate)

  Infant may have:

  - Difficulty achieving an adequate lip seal on the nipple
  - Difficulty finding a surface for compression of the nipple
  - Cleft lip repair (around 3 months) resolves the issues
  - https://www.asha.org/siteassets/practice-portal/cleft-lip-and-palate/guide-to-treatment-decision-making-for-cleft-type-speech.pdf
  - https://www.asha.org/siteassets/uploadedfiles/icf-cleft-palate.pdf



CRANIOFACIAL ANAOMOLIES AND THEIR IMPACT ON FEEDING AND SWALLOWING

- Cleft Palate (Secondary Palate)

  Depending on the extent of the cleft, the infant may have:

  - Inability to generate negative pressure for suction
  - Nasal regurgitation
  - Cleft palate repair (around 10 months) resolves issues

CRANIOFACIAL ANAOMOLIES AND THEIR IMPACT ON FEEDING AND SWALLOWING

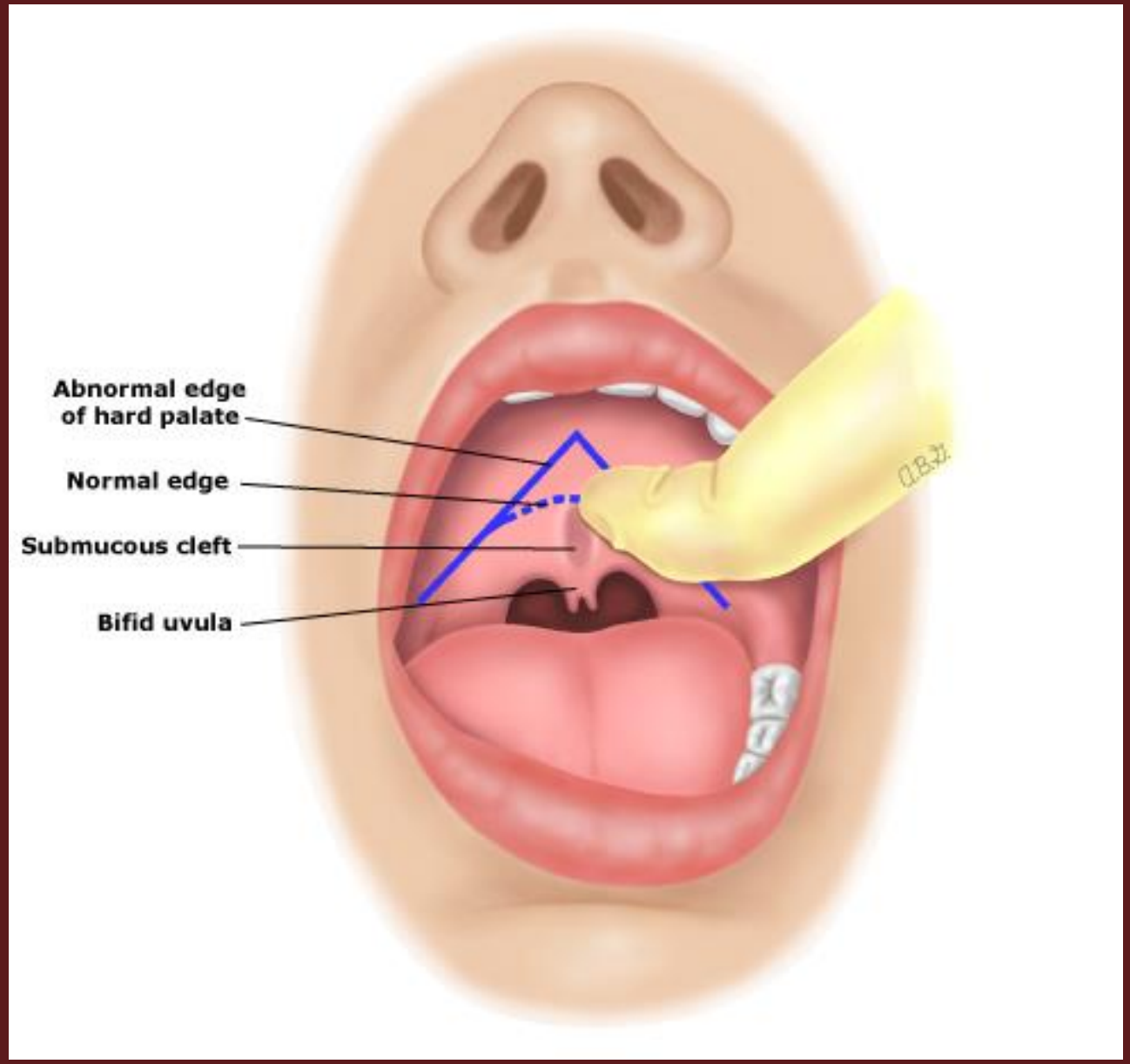
- Cleft Lip and Palate (Complete Cleft)

  Infant may have all the difficulties noted above, including:

  - Difficulty achieving an adequate lip seal on the nipple
  - Difficulty finding a surface for compression of the nipple
  - Inability to generate negative pressure for suction
  - Nasal regurgitation
  - Feeding modifications are needed to mitigate these problems
  - Lip and palate repair will resolve all these issues

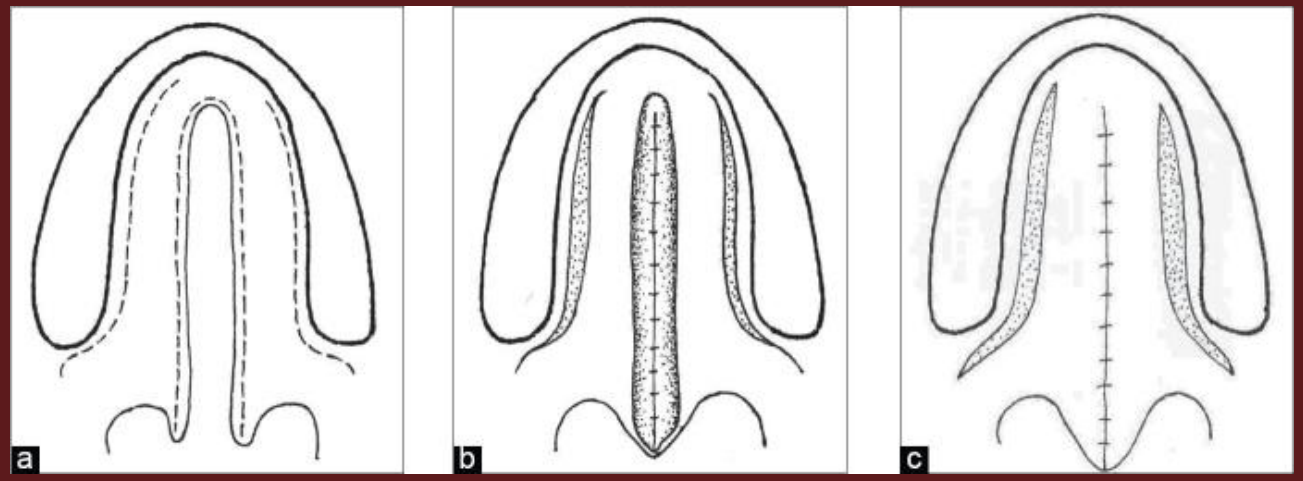
OTHER IMPORTANT CONCEPTS

- Submucousal/Occult Cleft: The surface tissues of the soft and hard palate fuse, but the underlying bone tissue fails to fuse



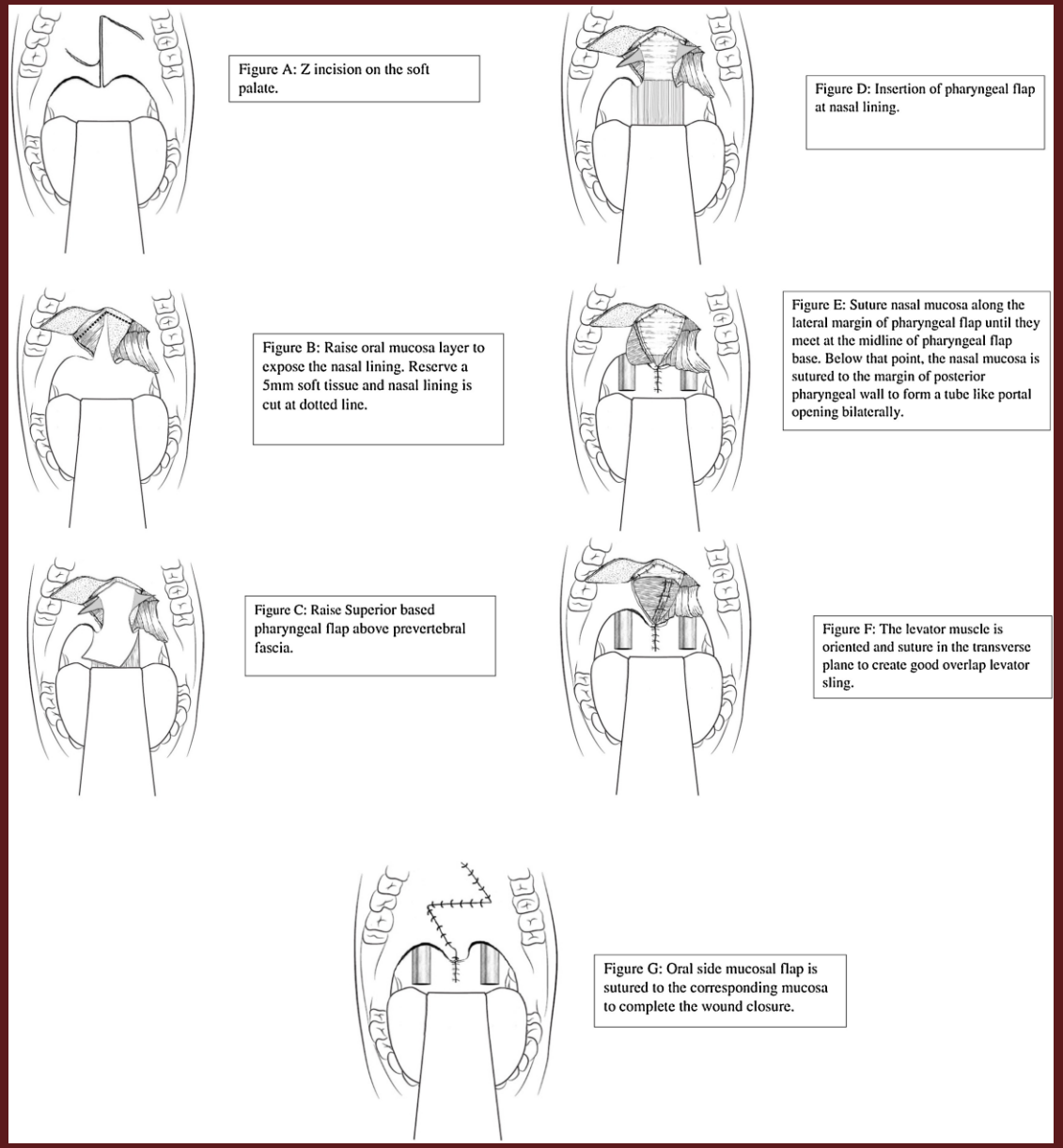
COMMON REPAIR TECHNIQUE

- von Langenbeck
- Raises two bipedicled flaps of mucoperisosterum
- Brings them together
- Attaches them to close the cleft



COMMON REPAIR TECHNIQUE

- Furlow Method
- Initially used in children with submucousal cleft
- Two flaps myomucosal are rotated posteriorly and the two mucosa-only flaps are transposed anteriorly
- Short limb of the Z is placed on the midline, and the long axis across the cleft
- Palate is lengthened in AP direction at the expense of increased tension in closure of the lateral mucosa



FEEDING RECOMMENDATIONS POST-PALATOPLASTY

Postoperative recommendations vary:

- Some allow unrestricted sucking after surgery
- Others discourage sucking postoperatively and recommend cup, spoon, or supplemental tube feeding

SPECIALTY NIPPLES AND BOTTLES

- Orthodontic nipple
- Pigeon nipple
- Ross® premature nipple
- Standard traditional nipple

POSITIONING

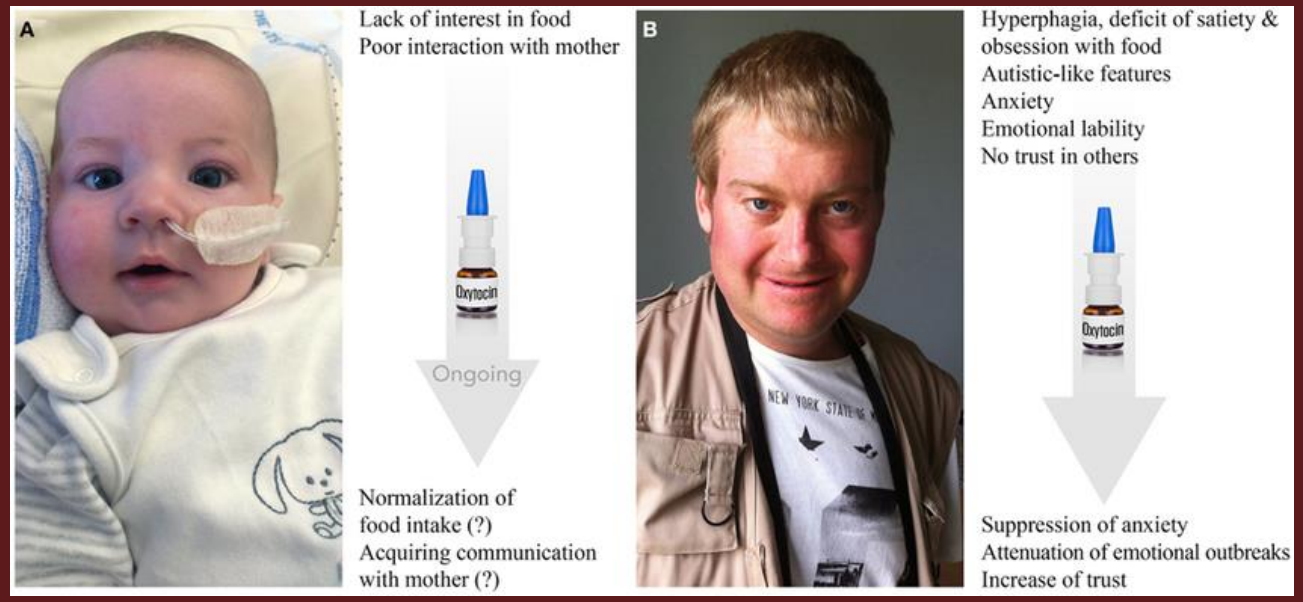
- Infant is semi-upright (at least 60°)
  - Facilitates control of jaw, cheek, lip, and tongue movements
  - *Allows* gravity to assist with swallowing
  - Helps prevent nasal regurgitation
  - Nipple is placed under palatal bone to aid nipple compression.

DOWN SYNDROME

- Presence of an additional whole number chromosome 21.
- Generalized or gross hypotonia
- Flat facial profile
- flat head-Brachycephaly
- Possible sensorineural hearing loss
- Feeding and swallowing difficulties as a result of hypotonia

PRADER-WILLI SYNDROME

- Genetic disorder; deletion in long arm of chromosome 15
- Hypotonia resulting in difficulties with sucking, feeding--- poor weight gain and growth; possible failure to thrive
- Lethargy



PRACTICE QUESTION 1

During the process of palatogenesis, the hard palate fuses when?

a. during the first week of gestation

b. at 10 to 12 weeks gestation

c. at 5 to 6 weeks gestation

d. after 12 weeks

PRACTICE QUESTION 2

- What surgical method for cleft palate repair consists of two flaps myomucosal being rotated posteriorly and the two mucosa-only flaps are transposed anteriorly
- a. Von Longenbeck surgical method
- Veau-Wardill Kilner Method
- Furlow Method
- Pharyngeal flap
- Z-Y Plasty

PRACTICE QUESTION 3

- Given what you know about muscle and nerve innervation possible Eustachian tube dysfunction in children with creaniofacial conditions including cleft palate are likely the result of a lack of contraction of what
- a. Veli palatini
- b. Levator veli palatini muscle
- c. Tensor veli palatini muscle
- d. Palatopharyngeus muscle