



Pediatric Feeding and Dysphagia

Dear Fellow Feeders:

Happy New Year! In this issue, we provide a brief but comprehensive review of neuroanatomy for those who feel a bit rusty. Also included is an article on basic formulas, an introduction to the pigeon nipple, an interview with an ENT on why kids need trach's, and the usual Q&A, case history and research review.

I would like to introduce you to some wonderful illustrations I came across by an artist named Trevor Dunton in a book called The Good Feeding Guide. He was kind enough to give me permission to print them here. Check out his work at

www.dunton.dircon.co.uk .

I am also working on a website which should be up and running soon. The address will be www.feedingnews.com, and I hope to supplement information in the newsletter on the web page.



Neuroanatomy Review Relative to Swallowing

Susan G. Hiss, Ph.D., CCC-SLP; Assistant Professor, Seton Hall University, hissusa@shu.edu

The material that follows is meant to serve as a brief review of neuroanatomy relative to swallowing to renew our clinical knowledge and skills. It is not intended to serve as an exhaustive description of neuroanatomy.

During our initial consult or clinical swallowing evaluation, many of us routinely perform an oral mechanism examination before proceeding to administer test boluses. We assess and treat swallowing function; however, we also evaluate swallowing function relative to its neurological underpinnings. As we ask a child to close her lips, we are evaluating labial seal in light of anterior bolus containment and production of labial speech sounds. However, we are also cognizant of the fact that lip seal is largely innervated by the Facial Cranial Nerve (CN, V). Thus, this article serves to review basic Neuroanatomy relative to swallowing.

Overview: Swallowing Involves Two Major Processes of Motor and Sensory Components

➤ Swallowing: Efferent (Motor)

Swallowing occurs reflexively at a brainstem level. We know this through animal studies that have decerebrated cats where the cats continued to swallow. However, we also know that swal-

lowing receives cortical influences. That is, cell bodies of neurons originate in the motor strip (pre-central gyrus). Their axons course inferiorly through the internal capsule of the brain and synapse at other cell bodies of neurons in the brainstem. These axons emerge from the brainstem and innervate the muscles utilized in speech and swallowing. The first cell body (originating in the cortex) and its axon is known as the upper motor neuron. The lower cell body (originating in the brainstem) and its axon is known as the lower motor neuron, final common pathway, or cranial nerve.

➤ Swallowing: Afferent (Sensory)

Swallowing is a motor or efferent process but equally important is the role of the sensory or afferent limb. Oral and pharyngeal mucosal receptors "feel" the bolus and signal the brain as to the size, viscosity, taste, and temperature of the bolus. All of these bolus properties have been demonstrated to change the timing of swallowing physiology. Thus, this afferent process or the sensory part of the swallow is every bit as important as the actual swallow itself. I think it is easy to fall in the pattern of

(Continued on page 2)

Pediatric Feeding and Dysphagia Newsletter
Hiro Publishing

Volume 2, Issue 3

January, 2002

Special Points of Interest:

- Current information
- New products
- Research and publications
- Education

Editorial assistance provided by Elizabeth Crais Ph.D. CCC SLP, Division of Speech and Hearing Sciences, UNC-Chapel Hill.

Inside this issue:

Neuroanatomy	1
Intensive Feeding	3
Formulas	5
Case by case	6
Ped Trach	6
Q&A, bottle review	8-9
Research	10

Neuroanatomy Review Relative to Swallowing

Susan G. Hiss, Ph.D., CCC-SLP; Associate Professor, Seton Hall University

(Continued from page 1)

only evaluating and treating the motor part of the swallow while neglecting the sensory portion. That is, we tend to overlook how important it is that the brain receive the appropriate information as to the properties of the bolus so that it may generate an appropriate motor response. If the brain doesn't work correctly on the sensory end, it is highly unlikely it will work efficiently on the motor end.

Sensory pathways typically involve three major neurons. The first neuron (axon and its cell body) incorporates the receptor that "feels" the bolus and courses towards the central nervous system. This first neuron synapses with the second major neuron which is located in the spinal cord or brainstem. The second neuron projects its axon superiorly to the thalamus which begins processing the sensory information obtained. The third neuron projects its axon superiorly to the sensory cortex.

Both the motor and sensory pathways just described have been simplified; however, one can appreciate how a lesion to the cortex or brainstem can affect the ability to receive the appropriate sensory information and therefore execute delayed or weakened motor responses with swallowing.

➤ Major Brainstem Nuclei Utilized in Motor and Sensory Swallowing Functions

At just the brainstem level, the major nuclei (compilation of neurons) involved in sensory functions is the nucleus solitarius. That is, the nucleus solitarius is a collection of neurons that receives the sensory information of bolus size, bolus viscosity, etc. The nucleus solitarius takes this information and sends it (via axons) up to the thalamus and sensory areas of the cortex. The nucleus solitarius also projects axons to other areas of the brainstem such as the nucleus ambiguus.

The nucleus ambiguus is a major nuclei of the brainstem that is involved in sending out motor commands to initiate swallowing. Since the nucleus ambiguus is part of the motor aspect of swallowing, it receives projections of neurons that originate at the motor strip of the cortex and project downward to the brainstem. The nucleus ambiguus also receives information directly from the nucleus solitarius. The neurons in the nucleus ambiguus are part of lower motor neurons. That is, the cell body found in the nucleus ambiguus projects its axon to the muscle that needs to be contracted for swallowing.

Review of the Cranial Nerves We Assess Indirectly During Oral Mechanism Examinations

Cranial Nerve V: Trigeminal

- The Trigeminal Nerve emerges from the pons of the brainstem. It has both motor and sensory components.

Motor:

- Supplies muscles of mastication and some of the suprahyoid muscles (i.e., anterior belly of digastric, mylohyoid) that facilitate hyolaryngeal elevation.

Sensory:

- Oral cavity ▪ Nasal cavity ▪ Tongue ▪ Teeth ▪ Face

The Trigeminal Nerve has three branches:

- i. Ophthalmic- Ophthalmic branch courses near the upper face and eyes.
- ii. Maxillary- Maxillary branch courses around the nose and upper lips areas.
- iii. Mandibular – Mandibular branch courses around the lower face and chin.

Brief Functional Assessment:

Motor:

- Palpate for strength and symmetry of jaw opening and closing; laryngeal elevation with phonation (/g/), and swallowing.

Sensory:

- Lightly stroke both sides of buccal area, tongue, lips, face with a feather or cotton swab. May ask, "Does this side feel the same or different as the other side?"

Example Report Writing:

- "Presents with jaw opening and closing WNL." "Present with hyolaryngeal excursion WNL."
- "Demonstrates adequate tactile sensation of oral cavity and structures."

(Continued on page 4)

Spotlight on Intensive Feeding Programs

WVUCED Feeding and Swallowing Clinic

Located: 955 Hartman Run Rd.

Morgantown, WV 26505

Phone: 304-293-4692

Director of Feeding Program: Monica Andis, MS, RD, LD. Diane Williams, the social worker on the team co-coordinates when needed.

Affiliated Physician: Margaret Jaynes, MD, pediatric neurologist

* The feeding clinic is administered through the nutrition and dietary Service program of the University Affiliated Center (UAP). Long term planning and funding for the clinic is done with the UAP's participation. The feeding clinic is associated with the University medical center and enjoys a good relationship with them but this is a community based center and clinic.

Mission: To provide assessment of feeding problems in children birth to 21 years.

Team Members:

- Behavioral psychologist
- Occupational therapist
- Speech -language pathologist
- Nutritionist
- Physical therapist as needed

Admission Process: This is a grant funded program, therefore services are free to the public. A doctor's referral or permission from an insurance company is not needed to see clients. Anyone can make a referral. Approximately half of the referrals come from physicians, other health care providers, or teachers, and the other 50% come from parents.

The director receives referrals and determines if the patient is appropriate for the clinic as well as suggesting preliminary testing needs. The patient is then scheduled for the team visit (each member writing an individual report) and then a summary is completed.

Fees: Clinic and follow-up services currently are funded through grants and are free.

Structure of the Program: It is an out-patient program. The team meets once a week on Thursday

mornings and sees no more than 2 children per morning. If a child needs follow-up behavioral therapy, the behavioral staff schedules this on an individual basis. This is a family centered interdisciplinary team.

Facility: The clinic is housed in the UAP, a pleasant office building with it's own parking. The clinic is equipped with microphones and a one-way mirror that connects to the observation room. The clinic room has a regular table and chairs, 3 high chairs, children's sized furniture and toys and games.

Parental Involvement: During clinic visits, parents are observed to see how they feed their child. In addition the OT or SLP may do some feeding. Instructions are provided on specific feeding techniques. For children receiving behavioral feeding therapy, the behavioral staff works intensively to train parents in appropriate techniques and behavioral management.

Success rate: Our clinic is at a 99.01% approval rating based on our follow-up survey with 60 families seen from 1999-2000. Our behavioral staff reports a 90% success rate with their clients.

Lodging: This area continues to be addressed:

- Behavioral staff travel to families who live within a 2 hour radius of Morgantown. Typically, families come to the clinic for initial treatment which may be followed by home intervention. A system using videotapes has also been implemented, where suggestions are made by the staff after viewing tapes.
- For families who live far away, a mid-point may be arranged in between for treatment.
- For out of state patients, help is provided to rent an apartment or a motel room for several weeks while the child receives behavioral therapy. The program hopes to move toward having complete day treatment services in the future.

Follow-up Services: Typically children are scheduled to follow-up 6 -12 months after their initial visit. Follow-up may be completed through phone calls or referral to a local clinician. Training is also available for referring clinicians. They are encouraged to visit the clinic if possible.

Addenda: The clinic see 60 -70 children per year, many of whom are from the Children With Special Health Care Needs Program in the state of WV. They also see children without developmental, neurological, or physical disabilities who have feeding aversions or food selectivity.

Neuroanatomy Review Relative to Swallowing

Susan G. Hiss, Ph.D., CCC-SLP; Associate Professor, Seton Hall University, hissususa@shu.edu

(Continued from page 2)

Cranial Nerve VII: Facial

- The Facial Nerve emerges from the lower margin on the Pons. It has both motor and sensory components.

Motor:

- Supplies muscles of facial expression and some of the suprahyoid muscles (i.e., posterior belly of digastric, stylohyoid).

Sensory:

- Taste from anterior two-thirds of the tongue and the hard and soft palates.

Brief Functional Assessment:

Motor:

- Pucker lips like giving a kiss, smile, lift eyebrows and then scowl.

Sensory:

- Give a LifeSaver and ask “What flavor is that?”

Example Report Writing:

- “Presents with labial protrusion and eversion WNL.”
- “Presents with upper face strength and ROM WNL.”
- “Presents with hyolaryngeal excursion WNL.”
- “Presents with gustatory discrimination for sweet WNL.”

Cranial Nerve IX: Glossopharyngeal

- The Glossopharyngeal Nerve emerges from the medulla.

Motor:

- Supplies some of the muscles in palatal elevation.

Sensory:

- Tactile sensation to posterior tongue.
- Taste from posterior one third of the tongue.

Brief Functional Assessment

Motor:

- Say “ahhh” loudly.
- May elicit gag and assess for velopharyngeal movement.

Sensory:

- Offer a cracker and ask what does that taste like?
- May touch back of tongue to see if gag is elicited.

Example Report Writing

Motor:

- Report CN IX palatal elevation under CN X.

Sensory:

- “Presents with lingual mechanotactile sensory abilities WNL”
- “Presents with gustatory discrimination for salty WNL.”

Cranial Nerve X: Vagus

- The Vagus Nerve emerges from the medulla.
- It has both sensory and motor components.
- The Vagus Nerve has three branches:

1. Pharyngeal Branch
2. Superior Laryngeal Branch
 - a. Internal limb
 - b. External limb
3. Recurrent Branch

Motor:

Pharyngeal:

- Supplies muscles of pharyngeal contraction.
- Supplies some of the muscles in velopharyngeal closure.

- Superior Laryngeal Branch – External Limb:
- Supplies innervation to the Cricothyroid muscle (responsible for voice pitch change).

Recurrent:

- Supplies innervation to all the intrinsic muscles of the larynx except the cricothyroid. Thus, it supplies innervation to the vocal fold adductor muscles and to the sole vocal fold abductor muscle (Posterior Cricoarytenoid).

Sensory:

Pharyngeal: Pharynx

Superior Laryngeal Branch – Internal Limb:

- Supraglottic Sensation (responsible for feeling penetration of food).

Recurrent Branch:

- Subglottic sensation (responsible for feeling aspiration of food).

Brief Functional Assessment:

Motor:

Pharyngeal:

- (Assessing with CN X) – say “ah” and assess for superior bilateral palatal movement. Also, observe lateral superior pharyngeal wall approximation.

Superior Laryngeal Branch – External Limb:

- Pitch change tasks such as gliding voice on the vowel /i/ up and down the musical scale.

Recurrent:

- Say “ah” and assess voice quality in terms of vocal fold adduction. Think in terms of the ability of the vocal folds to approximate midline.
- Clear throat and cough while assessing potential for vocal fold adduction and ability to clear airway.

Sensory:

- (Assessing with CN IX) – May touch posterior oropharyngeal wall with tongue depressor and ask if she feels the depressor (This may also elicit gag reflex).

Example Report Writing:

- “Presents with palatal and oropharyngeal movement WNL on a speaking task” (Anatomy functioning may differ on tasks such as speaking and swallowing).
- “Presents with pitch range WNL.”
- “Presents with vocal quality WNL.”
- “Presents with apparent vocal fold adduction WNL on throat clearing and coughing tasks.”
- “Presents with adequate oropharyngeal wall mechanotactile recognition abilities.”

Cranial Nerve XII: Hypoglossal

- The Hypoglossal Nerve emerges from the medulla of the brainstem. It has only a motor component.

Motor:

- Supplies all intrinsic and extrinsic muscles of the tongue (except the palatoglossus muscle).

Brief Functional Assessment

- Stick out tongue.
- Move tongue from one corner of mouth to the other corner.

(Continued on page 7)

Since the first attempts to mimic breast milk, numerous types of formulas have been developed for many different situations. Overall, despite the loss of quality for typically developing infants, the creation of formulas has saved many lives. However, the volume of formula choices makes it difficult to know whether a child's formula is the cause or the solution to his problems. Some basic tips may help shed some light on the confusion.

Purpose

Most formulas are designed to be a meal in a bottle or a can. They provide all of the protein, fat, carbohydrates, vitamins and minerals that are known to be needed for the growth and development of an infant or child. **Key concept:** what is "known to be needed" changes regularly as new research emerges. For instance, initially the concept of a sterile constant product was very appealing. Babies would always get exactly what they need in the safest way possible. But we learned that premature babies need different amounts of nutrients than term babies who need different amounts than toddlers. So new formulas were developed. Really necessary? For preemies -- decidedly so, for toddlers who should be moving on from an all milk diet -- maybe not. Now we know that breast milk flavor varies with a mother's diet and may help introduce an infant to the flavors of her culture. We also know that the intestines are not sterile and that some of the bacteria that grow there are very helpful to digestion and normal bowel function. Will formulas be changed to reflect this new knowledge? Maybe, maybe not.

Proteins

Formulas have not only been adapted to meet the age-related nutritional needs of infants and children, they have also been adapted to improve digestibility and decrease allergies. Proteins may be intact (whole), peptides (partial), or amino acids (pieces). Whole proteins come in the form of casein, whey and soy. Casein takes longer to digest than whey, so whey is often added to formulas to decrease the time it takes for the stomach to empty. This can be especially helpful for infants and children with GE Reflux. Soy protein is an alternative for vegetarian infants or infants with documented allergy to cow's milk that has not damaged the intestines. Most standard infant formulas, pre-term formulas, toddler formulas and child formulas have intact proteins.

Hydrolysis breaks up intact proteins into peptides or amino acids so that allergies are reduced and digestion is easier. Generally, peptides are the easier to tolerate than amino acids, but less allergy resistant. The smaller the piece of protein, the lower the allergic response, but the higher the cost, the worse the taste and the greater the risk of gastrointestinal intolerance. Good Start and Peptamen Jr. have whey peptides, Pregestimil, Nutramigen and Alimentum have casein peptides with added amino acids, and Neocate and Neocate 1+ have only synthetic amino acids.

Carbohydrates

Lactose, the simple sugar found in breast milk and cow's milk, is also the main carbohydrate in most term formulas, toddler formulas and pre-term formulas. It is taken out of soy formulas and formulas such as Lacto-Free to help infants who may be lactase deficient due to a gastroenteritis or to inherited lactase deficiency. Sucrose (table sugar) is sometimes added to the formulas of older infants and children to increase acceptance.

Complex carbohydrates such as maltodextrin and corn starch are less sweet, but better tolerated by children who are tube fed or are prone to diarrhea. In fact, PediaSure and Kindercal now have two recipes: one with more sucrose for oral feedings, and the original recipe for tube fed children to prevent diarrhea. Families of children living with tube feedings at home have to make a special request for the "institutional" version if their children have difficulty tolerating the "new and improved" version.

Fats

Fats in formulas are also changed to improve digestion. Fresh breast milk comes with enzymes to digest fat. Since formula makers can't provide enzymes they add MCT (medium chain triglyceride) oils in variable amounts to formulas for pre-term infants, for infants with digestive difficulties such as cystic fibrosis and for tube fed infants and children. MCT oils are more easily digested and absorbed than other fats. However, they do not contain essential fatty acids, so are never the only fat in a formula. MCT oil is also very expensive.

Calories

Typically, the assumption is that term formulas and toddler formulas will be 20 calories per ounce, pre-term formulas will be 24 calories per ounce and transitional formulas (NeoSure and EnfaCare) will be 22 calories per ounce. PediaSure and its peers (Kindercal, Nutren Jr., Resource for Kids, etc.) are always 30 calories per ounce.

Sometimes an infant or child is tolerating his or her formula well, but needs more calories and can't take in any more volume. In that case, less water can be mixed with formula powder or concentrate making Enfamil 20 (20 calories per ounce) into Enfamil 22 or 24. Also, additives such as Polycose can be added (another whole topic). **Important:** concentrating formulas or adding products should only be done with the guidance of a physician or dietitian because the potential for problems is great. Alternatively, some formulas come premixed to a higher calorie concentration. Similac, Similac Special Care and Enfamil Premature are examples of formulas that can be purchased in different calorie concentrations.

And Beyond... There are many other highly specialized formulas which are too complex for the scope of this discussion that help babies and children with kidney, liver, lung and other metabolic or digestive complications. Hopefully a basic understanding of formula types and possible variations will help explain why a particular formula may have been chosen for a child and provide a higher level of comfort in discussing formulas with parents, physicians and nutritionists.



Case Presentation: Selecting What to do First

It is well known that most if not all the children that we see for feeding and swallowing problems demonstrate a variety of issues inhibiting their advancement. As treating therapists we must be able to address all of these concerns to help the child be a successful PO feeder. This article will demonstrate a case of a child with multiple variables affecting advancement in textures and what the primary issue was delaying this advancement.

AA was a 15 month old boy referred for treatment due to the inability to advance textures and relying primarily on Pediasure for nutrition. Medical diagnosis included Sturge-Weber syndrome, seizure disorder s/p right hemispherectomy, congenital glaucoma of the right eye, left hemiplegia, port wine stain over the right side of the face and neck with thickening of the right facial tissues and maxilla. He demonstrated severe cognitive delays with moderate gross and fine motor delays.

Respiratory history was remarkable for approximately 10 URI's with chronic fluid in the ears with normal BAER's by 3 months of age. He had a history of apnea at night requiring monitoring up to 13 months of age. Gastrointestinal history was remarkable for gagging with increased amounts of food in his mouth and constipation with bowel movements every 1-3 days that were hard and difficult to pass. Medication included 15 mg Phenobarbitol AM and 30 mg PM.

Feeding history demonstrated introduction of baby soft purees at 8 months taking no more than 2 oz. at a time. When higher textures (soft table foods) were introduced AA stopped taking anything by spoon. He was taking 24 oz. Pediasure a day. He primarily was fed every 3 hours from 7:30 AM through 8 PM. AA's Mom continued to offer table foods with AA only taking 1/2 fish stick or chicken nugget at any one time. It is also noted that when AA drank from the bottle he took frequent breaks.

Oral- facial tone was decreased, left greater than right with an open mouth posture but no drooling. He was able to move the tongue anterior, posterior and laterally though there was decreased dissociation of the tongue from the jaw. He was able to demonstrate lateralization of food and a functional munch pattern. He had wide jaw excursions with the inability to bite through solids presented.

Initial impression was nutrition primarily from Pediasure, volume limitation, refusal of purees and higher textured foods, gagging with high textured foods, constipation and oral-motor inefficiency with soft solids.

Primary consideration was to stop the gagging when presented with purees or soft solids. The initial recommendation was to have AA's primary physician prescribe medication to help him evacuate the bowels 1-2x/day. We would then begin a therapeutic feeding session presenting a dry spoon to regain acceptance of the spoon in a systematic manner on a daily basis. As AA began to accept the spoon we began offering dipped spoons of purees already accepted and then systematically increase the amount on the spoon. We then began to increase the time between meal(Pediasure) presentation and to increase the amount presented in the therapeutic meals. When AA was able to take 2 oz. of purees they were presented in a nutritional meal before the bottle was presented. A variety of purees (fruit, vegetables, meat/veg. combos)were begun with increased volume accepted and then soft solids were initiated.

During treatment oral-motor facilitation was done and higher textured foods were presented. As AA became more facile with the higher textured foods they were given in nutritional meals. The Pediasure was decreased and then eventually changed to whole milk with continued weight gain.

Discussion:

As with all children with feeding/swallowing issues, AA had a multitude of problems affecting advancement to higher textured foods. His neurologic diagnosis was not the primary reason for his difficulty, but his constipation. GI issues manifest themselves in many ways (GERD, dysmotility, etc.) and constipation is one of them. When his physician placed him on Lactulose and he began to have regular bowel movements on a daily basis this made a remarkable difference in his willingness to accept purees and textures and to increase his food volume. Within a 3-4 month period, AA was accepting many new foods in nutritional meals and taking in enough calories after 6 months to stop the Pediasure and begin whole milk.

During this time period it was also easy to monitor his progress or regressions. If AA had an illness or a decrease in food volumes or acceptance, it was usually due to decreased bowel movements. As long as these stayed stable his progress was steady.

Neuroanatomy Review Relative to Swallowing Continued

(Continued from page 4)

- Do the “around the world” by moving tongue on upper and lower lips in a circular fashion.
- Push tongue against the tongue depressor or therapeutic band at midline and on both sides of mouth.
- Repeat the word “buttercup” several times.

Example Report Writing:

- lingual protrusion and bilateral lateralization WNL.
- Presents with general lingual ROM (range of motion) WNL.
- Presents with lingual strength WNL.
- Presents with lingual diadochokinesis abilities WNL.

C1 – C3: Cervical Spinal Nerves – Ansa Cervicalis

- Spinal Nerves function similarly to cranial nerves however they emerge from the spinal cord as opposed to the brainstem.
- The infrahyoid muscles (i.e., those that depress and posteriorly displace the hyoid and larynx to complete the swallow – Thyrohyoid, Sternohyoid, etc.) receive innervation from C1 – C3.
- Hyolaryngeal depression after the swallow may be palpated at the thyroid notch during a swallow; however, this functional assessment is conducted best under direct visualization such as videofluoroscopy.

C3 – C5: Phrenic Nerve

- When assessing swallowing function, it is important we are cognizant of respiration and its coordination with swallowing.
- The Phrenic Nerve is a spinal nerve as described above. That is, it is similar to a cranial nerve but it emerges from the spinal cord instead of the brainstem.
- The Phrenic Nerve innervates the diaphragm which is the primary muscle utilized in inspiration.

T1 – T12: Thoracic Spinal Nerves

- When assessing swallowing function, it is important we are cognizant of respiration and its coordination with swallowing.
- The Thoracic Spinal Nerves innervate the other muscles of inspiration and expiration such as the external and internal inter-

Pediatric Tracheostomy: Interview with Dr. Ameila Drake, Pediatric Otolaryngologist, Director of the UNC Craniofacial Clinic, UNC Hospitals

What are the most common reasons why a child would receive a trach?

The most common reasons fall into the following categories;

- a. chronic ventilatory support (patient is going to need extended ventilation, in general a child would not be intubated for more than 6 – 8 weeks
- b. chronic aspiration or pulmonary toilet,
- c. airway obstruction (subglottic stenosis, vocal cord paralysis, papaloma, laryngeal web, tracheomalacia, floppy airway, sometimes need to stint airway open to avoid collapse)

*with laryngomalacia fewer patients are getting trached because they can undergo supraglottoplasty (procedure that trims the aryepiglottic folds, the arytenoids, or a combination of both)

What is the typical course of a patient with vocal cord paralysis?

These patients typically have a longer term trach, until the toddler years. They will undergo surgical reconstruction if one is available such as 1.) the cricoid split -generally, before a trach is required, the cricoid cartilage is split to open the area of stenosis. The endotracheal tube will stint it without using a graft, 2.) laryngo- tracheoreconstruction – split and graft, and 3.) cricotracheal reconstruction – newer operation, resect cricoid and stenotic area, sew vocal cords and cuff to trachea.

Where do you place the trach?

Between the 2nd and 3rd tracheal ring (not too high secondary to stenosis but below 1st tracheal ring)

How are trach's sized?

There are two manufacturers of pediatric trachs; Shiley and Bivona (same as endotracheal tube). If a child is on a vent you want a larger trach to decrease the leak, you never want a cuffed trach. Usually kids can't be downsized to a smaller trach because they're growing and they will naturally grow out of a trach.

(Continued on page 9)

Q and A: What is your opinion on the use of sipper cups?

Answered by Suzanne Evans Morris PhD CCC/SLP, New Visions, <http://www.new-vis.com>

There are many different views on the role of sipper cups in children's development and their use with infants and children who have feeding or oral-motor development difficulties. All sipper cups are not alike, and you have to look at the specific features of the cup you are choosing rather than just saying sipper cups are "good" or "bad". The three most important things that I look for as a therapist are the shape and size of the sipper spout, whether a child can drink from the cup without tipping the head backward, and how much pressure or force a child must use to suck out the liquid. Cups that have a wide or broad spout can be very helpful initially for infants and toddlers who have difficulty getting good lip closure since the spout fills in the space. This can give stimulation to the lips that can be very helpful in oral development. However, when kids continue to use these cups for a long time, they don't learn to get the finer degree of lip closure by themselves. Some cups have a depressed lid or a longer spout that makes it easy for the child to keep the head in a more forward chin-tuck position during sucking and swallowing. This prevents the tipping back of the head that can interfere with swallowing and reduce the precision of oral development.

If you are using a non-spill sipper cup, you need to check out how much sucking effort is required to get the liquid. Most of them require a great deal, and many kids revert back to the strong backward-forward suckle movement of the tongue that they used with the bottle. I think that this does interfere with oral development and may influence speech development when there are underlying oral issues. I've never seen anything that correlates this type of spout cup with later speech development in normally developing kids. There are, however, some cups that don't require as much pressure. Many of these cups also have a removable valve so that you can use the cup as a non-spill cup in the early stages or when driving in the car and then take the valves out when children are a bit older or in situations where they can learn to put the cup down without spilling.

The biggest issue for me with sipper cups is that many children are never (or rarely) given the opportunity to learn to drink from an open cup. Because the spout fills the mouth, it is often impossible for the child to learn to bite down on the edge of a cup/glass and learn to steady or stabilize the jaw. This jaw stabilization is a very important stage in oral development and kids need to learn this in order to get more independent movement of the tongue in drinking and in speech. So if you are using sipper cups, it's important to provide many opportunities when you are with the child to offer opportunities to drink from a cup that doesn't have a spout or a lid.

I have also seen a delay in tongue tip elevation in many of these toddlers as they are drinking from the cup. For most children, the spout of the sipper cup physically prevents the independent upward movement of the tongue tip and encourages the child to continue using a suckle movement during drinking. This does not mean that the child will use the suckle when taking soft food from the spoon or during speech. Kids have underlying motor programs for more advanced feeding and speech movements. They are going to be there even if they do not have early opportunities to elicit them. However, if a child already has an underlying problem with oral-motor tone and coordination, there may be less flexibility and ability to adjust and adapt movements to different situations. For example, a child may become stuck in the backward-forward tongue movement of the suckle and have greater difficulty moving into alternate movements. The solution, in my mind lies not in taking a stand against a specific cup but in encouraging parents to provide their children with a wide range of cups, straws, and drinking experiences.

It has been extremely hard to find a cup (especially for older toddlers and preschoolers) that had a non-spill feature without a spout. Playtex has recently released a new cup that I just love! It is called the DrinkUp Cup and it is simply wonderful! The cup looks like a regular plastic glass but has a special round "Tip'N Sip" seal in the center of the glass. This prevents liquid from spilling out. When the person drinks, the upper lip gently presses against this seal and activates the flow of liquid. It is a very clever design and I think gives us some alternatives that as therapists and parents we haven't had before. I also like it a lot because it is a very grown up and "normal looking" cup for kids who need a little extra help. It doesn't look like a baby cup and I think this is very important. (The DrinkUp Cup is available through New Visions and some children's stores).

Product Review: the Pigeon Bottle

This is a special cleft palate nipple designed by a Japanese company called the Pigeon corporation. We've nicknamed it affectionately "the pigeon bottle."

What makes it special is the design itself. Made of non-latex material, the top half of the nipple is firm, providing stabilization in the infant's mouth and assisting closure of the cleft. The bottom half is softer and more pliable allowing the baby to extract liquid with compression provided by tongue movements. A valve located at the base of the nipple helps maintain continued milk flow into the nipple and an air hole at the top decreases extra air ingested by the infant.

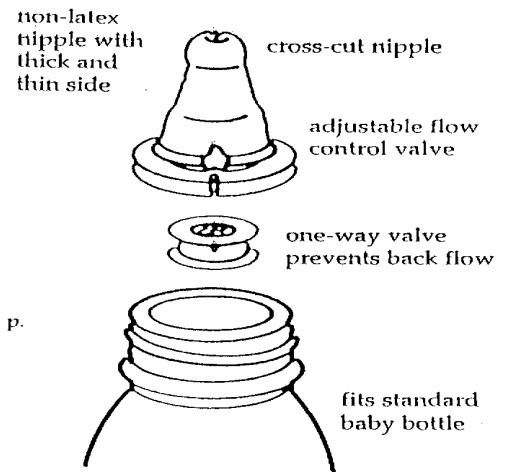
The nipple is cut in a Y shape which lets slightly thickened liquids pass through without altering the nipple shape and integrity.

This bottle differs from other cleft bottles on the market because it is not a squeeze bottle. Once the nipple is positioned correctly in the baby's mouth, he or she does all the work.

Parent's like this bottle for several reasons. The main attraction is its appearance, it looks like a normal bottle. The special nipple and ring fit on most bottles. The second reason is the price. It sells for approximately \$3.00 per nipple or \$7.50 for a set of two nipples and bottle.

Who should use it? Definitely your patients with a diagnosis of cleft palate. We have had success using this with infants with a variety of craniofacial disorders and with infants who have a weak suck or poor endurance such as preemies or infants with cardiac problems. Watch the flow rate though, it can be fast! The nipple is large in size and may be too big for some newborns. Some kids grow into it.

Where to get the pigeon bottle? Children's Medical Ventures, call them at 1-800-377-3449 or 781-871-6226 for a catalogue, web site: www.childmed.com, fax number is 781-871-2928, address is: 275 Longwater Drive, Norwell, MA 02061



The cleft palate nipple system

Pediatric Tracheostomy: Interview with Dr. Ameila Drake, Pediatric Otolaryngologist, Director of the UNC Craniofacial Clinic, UNC Hospitals

Does having a trach automatically mean you'll have more secretions?

After trach placement, the body reacts to the foreign object by hypersecreting but then it adjusts to it.

Do you expect aspiration?

We expect a tendency toward aspiration because the trach tube fixes the larynx decreasing hy-olaryngeal excursion.

** Coming in the next issue: Placement of Passy-Muir tracheostomy valves and its effect on swallowing.*

© all rights reserved.

Hiro Publishing
607-B North Greensboro Street
Carrboro, NC 27510

Special for Feeding Therapists and Professionals!

Questions, comments, submissions, and suggestions are all welcome. Please be vocal, the hope is that this forum will be educational and will help to connect us as professionals working together.

On the Research Front:

Manikam, R. & Perman JA. Pediatric feeding disorders. *Journal of Clinical Gastroenterology*.2000;30(1):34-46.

This is a nice comprehensive article on feeding disorders:

- Pediatric Feeding disorders are common: Feeding disorders are reported in 25% of typically developing children and 80% in developmentally delayed children.
- Early detection is critical to ward off later complications (which can include growth failure, susceptibility to chronic illness and even death)
- Feeding disorders are influenced by organic, developmental, psychosocial and environmental causes. These causes interact to maintain feeding difficulties.
- Assessment and treatment depend on the collaboration of an interdisciplinary team of experts. The team should include a gastroenterologist, nutritionist, behavioral psychologist, and occupational and/or speech therapist.
- Intervention should include medical intervention, behavior modification to alter the child's learned feeding pattern, and parent education and training in appropriate feeding skills.
- A majority of feeding problems can be resolved through medical, behavioral, and oromotor feeding therapy.

