A Sensory-Motor Approach to Feeding

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Abstract

Speech-language pathologists (SLPs) play an increasingly significant role in the treatment of children with feeding disorders (American Speech-Language-Hearing Association, 2009). Physicians often refer children for feeding therapy secondary to what is seemingly a behavioral issue. This assumed diagnosis usually reflects a child's refusal to eat; a self-limited diet based upon taste, texture, and visual appearance; or difficulty progressing from breast or bottle to pureed or solid foods. However, a child's case history review may reveal gagging, choking, or vomiting incidents with the introduction of pureed or solid foods, in addition to possible medical and developmental issues. Food refusals can develop secondary to these concerns. Additionally, the child's motor skills may not be adequate to handle the food, and the resulting sensory reaction can be described as "fright, fight, flight" (Overland, 2010). Interactions between the sensory and motor systems cannot be ignored (Fisher, Murray, & Bundy, 1991). The use of a purely behavioral approach to treat these children negates the impact of sensory-motor issues on the oral phase of feeding. Though behavioral issues may develop secondary to sensory-motor problems in the mouth, we need to consider the child's refusal as an adaptive, communicative response to a negative experience, rather than as the primary disability to be addressed. Assessment and treatment of the underlying sensory-motor issues should, in many cases, precede behavioral interventions.

When an infant or child is referred to a speech-language pathologist (SLP) for feeding issues, the SLP should conduct a comprehensive feeding assessment, including a review of the child's medical status; overall gross, fine, and oral-motor development; nutritional status; and sensory processing (Arvedson & Brodsky, 2001). Issues that affect safe, effective, nutritive feeding may be secondary to oral, pharyngeal, or esophageal dysphagia. This article will focus on the oral phase of feeding.

The oral phase of feeding includes intake of food into the oral cavity, preparation of the bolus, and oral transport in preparation for swallowing. Infants are born with hard-wired synergies, or reflexes, that support the oral phase of feeding. These synergies become mature motor skills secondary to the infant's experiences with the environment and feeding (Morris & Klein, 2000). Medical issues, such as craniofacial anomalies, gastrointestinal disorders, compromised respiration, and allergies, may interfere with feeding. Delays or disorders in gross motor development, such as reduced postural stability or head control, may interfere with the development of integrated oral-motor skills. In addition, sensory processing issues, such as regulation disorders, sensory discrimination, and sensory-based motor delays, may also contribute to feeding disorders.

Children with sensory regulation problems may not be able to organize themselves for feeding. Those with oral sensory issues may not feel the food in their mouths, or they may be overly sensitive to the feeling of the food in their mouths. In addition, they may not feel hunger or satiation. Sensory processing issues can cause feeding disorders, such as food refusal and self-limited diets (Twachtman-Reilly, Amaral, & Zebrowski, 2008).

It is important for the clinician to know the typical development of motor skills that support feeding in order for him/her to complete an oral phase assessment. By 2 years of age, the typically developing child has the ability to eat a wide variety of food textures and usually has been exposed to a variety of food tastes (Bahr, 2010). Assessment of oral-motor skills should include task analysis of the movements typically observed in the wide range of normal skill developments.

We must also consider the impact of the sensory systems on the oral phase of swallowing. Think about the motor skills that a 2-year-old uses for spoon-feeding. The jaw opens just wide enough to accept the spoon. The upper lip comes down and inward to remove the food as the lower lip provides stability (Morris & Klein, 2000). A labial seal is maintained as tongue retraction and cheek contraction support oral transport of the bolus. The taste, texture, temperature, and size of the bolus provide sensory input.

Children with muscle-based issues that affect feeding often use compensatory movements such as wide jaw excursions, tongue protrusion, jaw/lower lip protrusion, biting the spoon, and using head retraction to remove the food from the spoon. Oral transit time may be delayed, and the sensory feedback that facilitates a swallow may be inhibited (Overland, 2010).

To manage solid foods, the 2-year-old child needs a different set of motor skills. In a typically developing child, these skills develop as the child learns to handle liquids and purees and mouths toys. A 2-year-old child has the ability to bite through a texture, such as a hard cookie. The tongue tip and lateral borders of the tongue are used to move the food to the molars for mastication. The bolus is then collected, organized, and swallowed. Jaw strength must be graded and adequate to break down the bolus (Bahr, 2001).

Depending on the size and texture of the bolus, the child may transfer it between right and left molar areas in conjunction with a rotary chew pattern. Lip closure and cheek contraction serve to control the bolus and support mastication. The taste, texture, size, and shape of the bolus provide the sensory input. If the child does not have the motor skills to adequately masticate a solid bolus, he/she may develop compensatory strategies. Compensatory motor skills may include a nondissociated munch chew, suckling the food on the surface of the tongue, or pooling of the bolus on the anterior surface of the tongue or behind the front central incisors. In addition, food may be held intra-orally for an extended period of time, or the bolus may be swallowed prior to being adequately masticated. Both problems can be related to decreased sensory awareness and/or registration.

Any breakdown in oral sensory-motor development can result in gagging, choking, vomiting, and subsequent food refusal (Twachtman-Reilly et al., 2008). The sensory properties of the food affect the ease with which it is masticated. A Cheerio® or Gerber Puff® can be handled with a munch chew or suckle pattern, whereas these early motor skills cannot effectively break down a piece of meat or a raw vegetable (Overland, 2010). For some children, this results in a self-limited diet that may include easy-to-dissolve, meltable solids. Children who accept only small amounts of food that is more difficult to masticate may tire easily or lose interest. The nutritional value of meltable solids is lower than that of meats and vegetables that are more difficult to masticate. This affects a child's ability to thrive and gain weight (Gisel, 1994). These self-limited diets or self-limited quantities are often viewed as behavioral issues, when they are actually adaptive responses to primary oral phase feeding disorders (Overland, 2010).

Purely behavioral feeding programs use preferred foods, toys, books, or television to reinforce children for eating challenging foods. They do not account for the sensory and motor challenges children may be experiencing. In addition, many children are resistant to doing therapy with food given their past negative experiences. While a behavioral feeding program can encourage children who have compromised motor skills to swallow purees, these children are often at risk for choking with the introduction of solids. Purely sensory-based programs encourage children to explore the smell, feel, and taste of food. However, this approach does not help a child with limited motor skills to develop the ability to safely handle food. It is essential to incorporate behavioral and sensory components into a feeding program; however, they should be implemented in conjunction with a motor-based pre-feeding approach.

The goal of a pre-feeding program is to develop the motor skills for feeding. Following task analysis/evaluation of the sensory and motor systems, the clinician designs a program to help the child develop skills needed to support safe, nutritive feeding (Overland, 2010). The motor planning required for specific feeding tasks, such as spoon feeding and chewing, can be addressed with oral sensory-motor activities and exercises prior to the introduction of solid foods. Appropriate oral massage and motor planning tasks with oral-sensory tools can help facilitate the development of motor movements required for the oral phase of feeding (Beckman et al., 2004).

Oral massage may assist with oral sensory registration and regulation. Carefully selected motor-planning tasks may assist with successive approximations toward the requisite motor skills used in feeding. After the child has improved sensory regulation and some pre-requisite oral-motor skills, a therapeutic feeding program can be designed. This includes choosing adaptive utensils, cups, and therapeutic straws (Rosenfeld-Johnson, 2009). Other decisions the clinician considers when designing a therapeutic feeding program may include the choice of foods, the size and shape of the bolus, and the placement of foods in the oral cavity (Overland, 2010).

The following case study illustrates the use of pre-feeding and therapeutic feeding techniques with a 2-year-old child who has a diagnosis of Down syndrome.

Case History

Allison was referred to my office by her physician, secondary to concerns regarding nutritive feeding. In addition to a diagnosis of Down syndrome, Allison had a complicated medical history that included prematurity, bronchiopulmonary dysplasia (BPD), and neutropenia. Allison had feeding challenges from birth. She was initially fed intravenously and then transitioned to oral gastric (OG) tube feeds, which were followed by nasogastric (NG) tube feeds. Finally, a gastrostomy tube (G-tube) was placed prior to Allison's leaving the neonatal intensive care unit (NICU). Allison's family worked hard to transition her to bottle feeds and purees. She reportedly "never really enjoyed eating purees" and the majority of her nutrition continued to be provided from formula at age 2 years. Her parents had attempted to introduce solid foods at 1 year of age. Allison gagged and choked numerous times; she eventually refused to open her mouth for anything but rice crackers, Veggie Stix®, and Goldfish® crackers. Allison's family had been advised by their SLP to "just keep giving her a variety of foods to explore and she will eventually eat."

Assessment Notes

During the evaluation, Allison was observed exploring a rice cracker. She broke off a small piece using a nondissociated head and jaw movement. She clearly enjoyed the salty flavor on the first trial. The cracker was held on the front third of her tongue, and a suckle-like pattern was used to break it down. Over the next three trials, the following observations were made:

- Allison partially broke down the cracker and used a suckle-like pattern to facilitate oral transport of the poorly masticated bolus followed by a hard swallow.

- On the next “bite” the cracker piece was slightly larger, and Allison used a lingual protrusion to expel the bolus.
- On the last bite, the cracker was “stuck” at the midline on Allison’s tongue; she subsequently gagged, vomited, and adamantly refused another piece.

A task analysis of Allison’s oral-motor skills revealed she did not have adequate jaw strength or the motor plan for chewing. She was also unable to sweep the bolus to the molar ridge using the lateral margins of the tongue and the tongue tip. Following episodes of gagging, choking, and vomiting, Allison’s sensory system went into “fright, fight, flight.” She self-limited her diet to foods that could be easily broken down with existing motor skills.

Treatment Plan

The initial pre-feeding plan was established to address adequate and graded jaw strength and the motor plans for chewing. Because Allison was averse to trying new movements with foods and tolerated firm bouncing on a therapy ball, whole body movement was initially paired with the facilitation of up-down jaw movement. Once she tolerated up-down jaw facilitation, a Chewy Tube® was placed, while she was seated, perpendicular to the lateral molar ridge where her first molar would emerge. A “munch” chew on the tube was facilitated using jaw support. Allison was now ready to move toward therapeutic feeding. The Chewy Tube® was filled with a Veggie Stix® and the entire sequence was repeated. At this point, Allison was able to bite on a Chewy Tube® with imposed support. Allison was able to manipulate the crushed Veggie Stix® and swallow the bolus. Finally, the Chewy Tube® was replaced with a Veggie Stix®. Jaw support to facilitate a chew was imposed as the Veggie Stix® was presented perpendicular to the lateral molar ridge, making sure she could only bite off what she would crush with her gums. Once again, Allison was successful with oral transport of the crushed bolus. The use of carefully selected pre-feeding exercises and activities allowed Allison to develop the motor plan for chewing along with positive sensory feedback and safety. Presentation of the bolus on the molar ridge allowed Allison to break down the bolus, even though she did not have the lingual mobility to move the bolus. Future goals for this client include the development of lingual mobility and the motor plans for tongue lateralization to support a rotary chew.

Conclusions

Children such as Allison, who present with delays in the motor skills to support feeding, may have had negative sensory experiences with food. If a child resists the use of food paired with therapeutic feeding techniques, a sensory-motor based pre-feeding program could be implemented with carefully selected oral sensory-motor exercises and activities. This will allow the child to develop the motor plans for safe nutritive feedings. Once prerequisite oral-motor skills have been acquired, sensory exploration techniques and behavioral reinforcements, if needed and appropriate, can be used effectively to expand the diet and increase food quantity.

References

American Speech-Language-Hearing Association. (2009). *Roles of speech language pathologists in swallowing and feeding disorders* [Technical Report]. Available from www.asha.org/policy

Arvedson, J. C., & Brodksy, L. (2001). *Pediatric swallowing and feeding: Assessment and management* (2nd ed.). Albany, NY: Singular.

Bahr, D. C. (2001). *Oral motor assessment and treatment: Ages and stages*. Boston, MA: Allyn & Bacon.

Bahr, D. (2010). *Nobody ever told me (or my mother) that! Everything from bottles and breathing to healthy speech development.* Arlington, TX: Sensory World.

Beckman, D., Neal, C., Phirsichbaum, J., Stratton, L., Taylor, V., & Ratusnik, D. (2004). Range of movement and strength in oral motor therapy: A retrospective study. *Florida Journal of Communication Disorders, 21*, 7-14.

Fisher, A. G., Murray, E. A., & Bundy, A. C. (1991). *Sensory integration: Theory and practice.* Philadelphia, PA: F. A. Davis.

Gisel, E. G. (1994). Oral-motor skills following sensorimotor intervention in the moderately eating-impaired child with cerebral palsy. *Dysphagia, 9*, 180-192.

Morris, S. E., & Klein, M. D. (2000). *Pre-feeding skills: A comprehensive resource for mealtime development.* San Antonio, TX: Therapy Skill Builders.

Overland, L. (2010, June). *A sensory motor approach to feeding.* Professional lecture for Innovative Therapists International, Charleston, SC.

Rosenfeld-Johnson, S. (2009). *Oral placement therapy for speech clarity and feeding.* Tucson, AZ: Innovative Therapists International.

Twachtman-Reilly, J., Amaral, S. C., & Zebrowski, P. P. (2008). Addressing feeding disorders in children on the autistic spectrum in school based settings: Physiological and behavioral issues. *Language Speech and Hearing Services in Schools, 39*, 261-272.