

Feeding Problems in Infants and Children

Assessment and Etiology



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KEYWORDS

- Infants • Children • Feeding problems • Dysphagia • Feeding evaluation
- Development of feeding skills

KEY POINTS

- Feeding problems in infants and young children are common.
- Serious feeding problems are rare in otherwise healthy children who are growing and developing normally.
- Most serious feeding problems occur in children who have other medical, behavioral, or developmental problems.
- Serious feeding problems are best evaluated and treated by an interprofessional team of health care providers.

INTRODUCTION

Concerns about feeding problems in children have become increasingly common. It is unclear whether the incidence of feeding problems is rising or if parents and health care professionals have become more aware of them. As many as 50% of parents report their otherwise healthy children have feeding problems and as many as 80% of children with developmental delays may have difficulties feeding.^{1,2} Parents worry about their child's weight gain and potential developmental consequences, get frustrated by battles during mealtime, and worry about the social impact of their children eating a limited diet. The causes and associations of feeding issues in infancy and early childhood are widely varied and almost all feeding problems are multifactorial. A feeding problem is identified when a child is not progressing through the typical course of steps to independent feeding of table foods.³ Some children have difficulty with efficient, satisfying feeding experiences beginning at birth. Others stall or struggle

Neither author has anything to disclose.

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to move forward in accepting a variety of tastes and textures, and occasionally, children show a regression or sudden change in their feeding skills.

Despite these parental concerns, serious feeding problems that result in growth failure or nutritional deficiencies are uncommon in mostly healthy children who are developing and growing normally. In this group of children, feeding problems typically resolve with time.^{4–8} A majority of these children are characterized as “picky” or “selective” eaters, meaning a child eats a limited variety of foods, is unwilling to try new foods, and/or eats slowly and deliberately.⁹ Approximately half of parents characterize their preschool children as “picky eaters” and although the incidence of picky eating decreases as children get older, more than 10% of parents characterize their 6-year-old children as picky eaters.⁹ Many investigators contend that picky eating in the preschool age is part of normal development and, provided the child is growing and developing normally, in a majority of cases, no interventions are warranted other than reassuring the family, scheduling regular follow-up, and reviewing basic feeding guidelines, such as maintaining a pleasant and neutral attitude throughout meals, having regular and predictable meal times, serving age-appropriate foods, encouraging self-feeding when age appropriate, and avoiding distractions during mealtimes.^{7,9}

A majority of infants with more severe feeding disorders have medical and/or developmental conditions that predispose them to or are at least associated with difficulties feeding, as outlined in **Box 1**.^{4–8}

Box 1

Medical conditions predisposing to infant and early childhood feeding disorders

Structural abnormalities of the aerodigestive system

- Cleft lip and/or palate (including submucosal cleft)
- Pierre Robin sequence
- Macroglossia
- Tracheoesophageal fistula
- Laryngotracheomalacia
- Laryngeal clefts
- Esophageal atresia, stricture, or stenosis
- Vascular rings/slings

Neuromuscular and developmental disorders

- Cerebral palsy
- Generalized hypotonia
 - Idiopathic
 - Due to metabolic or genetic abnormalities (eg, trisomy 21 or Prader-Willi syndrome)
- Meningomyelocele with Chiari malformations
- Congenital myopathies
- Congenital neuropathies (eg, myasthenia gravis)
- Hypoxic ischemic encephalopathy
- Metabolic encephalopathy (eg, organic acidemia or urea cycle defects)

Cardiorespiratory disorders

- Congenital heart disease
- Chronic lung disease/bronchopulmonary dysplasia
- Acquired vocal cord paresis

GI disorders

- Gastroesophageal reflux disease
- Food allergies
- Eosinophilic esophagitis
- Constipation
- Generalized motility disorders

Although there are several different ways to categorize the medical conditions that predispose infants and young children to having difficulties feeding, in most cases these conditions interfere with a child's ability to perform the activities of feeding as a result of

- Structural abnormalities of the face, oral cavity, or aerodigestive system
- Neuromuscular dysfunction/incoordination
- Inadequate strength and/or rapid fatigue/lack of endurance
- Inability to coordinate suck/swallow/breathe normally as a result of respiratory distress
- Nausea and/or discomfort during the feeding process

Many infants and young children with feeding disorders are diagnosed with gastroesophageal reflux,⁵ and many infants who are diagnosed with gastroesophageal reflux are reported to have feeding problems.^{10–12} It seems unlikely, however, that gastroesophageal reflux is a major causative factor of the feeding problems seen in infants and young children.^{7,13} Many infants suffering from the symptoms of gastroesophageal reflux have symptoms of colic and constipation, and, as such, the discomfort these infants seem to experience associated with feedings may not be the result of the reflux per se but rather are the result of a more generalized motility disorder akin to visceral hyperalgesia syndrome in older children and adults. This may explain why treatment of infants with acid inhibitors does not diminish fussiness, gagging, sleep disturbance, or feeding refusal¹⁴ and that even after the more typical symptoms of gastroesophageal reflux have resolved, many infants continue to have feeding difficulties.¹¹

It is important to recognize that in healthy children, oral stimuli and feeding experiences early in life are pleasurable. In contrast, many children with complex medical issues may spend much of their early life in medical settings where they experience an abnormal sensory environment that often includes several aversive oral stimuli and a variety of other medical interventions that may cause a child to associate discomfort rather than pleasure with feedings. Prolonged or frequent hospitalizations as a result of premature birth, congenital cardiac defects, or gastrointestinal (GI) defects or disorders result in an unpredictable and abnormal sensory and social environment for an infant or a young child. Conditions that require surgery, multiple diagnostic procedures, or extended periods when a child is not fed by mouth disrupt the normal progression of feeding, communication development, and social interaction. These children may have few opportunities to observe adults or other children eating and they may not experience the sights, smells, and sounds of food preparation or be able to explore foods with their hands and mouths. These simple everyday experiences play an important role in the sensory and social aspects of eating and they are often missed or interrupted in infants with complex or severe medical problems. These early life experiences can result in maladaptive behaviors around feeding that persist long after the painful experiences have been eliminated because once learned, abnormal motor patterns are difficult to unlearn. This may explain why the treatment of gastroesophageal reflux and the treatment of constipation are frequently not associated with improvement in feeding problems.⁷

NORMAL PROGRESSION OF FEEDING SKILLS

Sucking/Drinking

At birth, term infants demonstrate root, suck, swallow, and gag reflexes that allow them to feed immediately. They are able to coordinate suck-swallow-breathe during

breastfeeding or bottle-feeding, but they are dependent on caregivers for positioning. Early on, infants demonstrate a suckling pattern that is characterized by anterior-posterior movement of the tongue along with fairly wide jaw excursion. Suckling is highly automatic and reflexive. Newborns who are feeding comfortably have their arms and legs in flexion without extraneous movements, and they can maintain a quiet, alert state during breastfeeding or bottle-feeding for at least 10 minutes at a time. By 4 months of age, reflexive sucking fades, and suck-swallow becomes more voluntary. Feeding times increase to 20-25 minutes for most infants. The suckling pattern may persist until 6 months of age when more mature sucking emerges. Sucking is characterized by an up-and-down movement of the tongue and less jaw excursion. A combination of suckle and suck may be seen until 9 months of age, but children who continue to demonstrate only a suckle pattern beyond 6 months of age are not showing the typical progression. Cups are often introduced for liquid intake as early as 4 months to 6 months of age, but it is not until 11 months of age that most infants can drink from a closed cup independently and efficiently.^{15,16} At between 12 months and 18 months of age, a child may still rely on biting the edge of the cup or spout to help stabilize the jaw. Most children are able to independently stabilize their jaw during cup drinking by 24 months of age and they hold the cup between their lips. Independent drinking from an open cup is usually not mastered until 18 months or 19 months of age.^{15,16}

Development of Taste Preferences

Infants and young children seem to have an innate preference for sweet tasting foods that diminishes over time.¹⁷ There is increasing evidence, however, that their taste preferences are influenced and can be modified by both in utero and postnatal exposures and experiences. In utero events and exposures seem to influence taste and flavor preferences later in life and thus modulate the intake of certain foods as a child gets older. A mother's food choices influence the flavor of the amniotic sac, and the flavors infants experience while they are in utero effect infants' flavor preferences during early infancy as well as at weaning.¹⁸ Analogously, the foods and drinks a mother consumes while she is nursing influence the flavor of her breast milk, and these experiences effect an infants' subsequent liking and acceptance of these flavors in foods.^{17,18}

There seems to be a sensitive period in infants' first several months of life during which they are receptive to a wide variety of flavors, and their taste experiences during this period influence taste preferences later in childhood.^{17,19} A majority of infants less than 4 months of age are willing to drink formulas containing hydrolyzed casein, such as Pregestimil, Alimentum and Nutramigen, which are extremely bitter and have an acrid aroma; however beyond 6 months of age, infants who have never been exposed to these formulas typically refuse to drink them.²⁰ Infants who are fed hydrolysate formulas in the first several months of life are more willing to eat savory, sour, or bitter-tasting cereals than are infants fed standard milk-based formulas. Moreover, compared with children who were never fed a hydrolysate formula, 5-year-old children who were fed a hydrolysate formula during infancy more readily eat foods and drinks with sour or bitter tastes or aromas, such as chicken and broccoli.¹⁷ These observations suggest infants should be exposed to a wide variety of flavors while mother is pregnant, during breast feeding, and as soon as complementary foods are added to the infant's diet.

Eating Solid Foods

Likely as a result of the slow postnatal growth and maturation, humans have developed a unique pattern of transitional feeding. Humans are the only mammals that

feed their young complementary foods before weaning and are the only primates that wean offspring before they can forage independently.²¹ Both the American Academy of Pediatrics and the American Academy of Family Physicians recommend that solid foods not be introduced into an infant's diet until 6 months of age.^{22,23} Despite these recommendations, more than a third of mothers in the United States introduce solid foods into their infant's diet before 4 months of age and approximately 10% of mothers introduce solid foods into their infant's diet before 4 weeks of age.²⁴ Similarly, in a majority of nonindustrialized populations, infants are typically fed solid foods beginning between 4 months and 6 months of age, with several societies introducing solids in the first several weeks of life.²⁵

Much as there seems to be a sensitive period in the first several months of life when infants readily accept varied tastes,^{17,19} there also seems to be a critical or sensitive period when infants are most receptive to different food textures.²⁶ Children who have been exposed to lumpy or chunky solid foods before 9 months of age are more likely to eat a wide variety of fruits and vegetables and are less likely to have feeding problems at 7 years of age than are children who have not been exposed to lumpy or chunky foods until after 9 months of age. Furthermore, there is no evidence that introducing lumpy or chunky foods before 6 months of age is harmful or detrimental.²⁶

Although there remains debate about when it is best to begin introducing solid foods into an infant's diet, all the available evidence suggests that provided the water and food supply are free of contamination and infants are provided adequate nutrition, there are no clear contraindications to feeding infants complementary foods at any age. Moreover, there is emerging evidence that early introduction of solid foods into infants' diet may increase their willingness to eat and variety of fruits and vegetables later in life, decrease their risk of later feeding problems,²⁶ and decrease their risk of developing food allergies.²⁷

In most developed countries, solid foods, usually in pureed form, are typically introduced between 4 months and 6 months of age. At this age, children open their mouths for a spoon, are able to use their tongue to move the bolus of food to the back of their mouth so they can swallow it, and are able to keep food in their mouth. Oral function progresses from sucking to a phasic bite or munching, with a bite-and-release pattern at between 5 months and 6 months of age.²⁵ These oral skills correspond to and are dependent on the gross motor skills of good head control, sitting with support, and trunk stability. At the same time, sensory experiences to the hands and mouth increase as the fine motor skills of bringing toys to the mouth, reaching for a spoon, using palmar grasp, and transferring objects hand to hand emerge.²⁸ This ability to explore textures with the hands and in the mouth is likely important to a child learning to accept varying and increasing food textures.

By 7 months of age, most children can close their lips on the spoon and use their upper lip to clear the spoon. Sustained biting and the beginning of rotary chewing are usually seen between 9 months and 12 months of age and the food textures tolerated at this age progress from purees to ground or mashed table foods and some chopped table foods. By this age, most infants can sit independently. At 9 months of age, most children have a pincer grasp, which makes it easier for them to manipulate finger foods and begin self-feeding. Most babies can hold food in their hand at 8 months of age and have begun trying to use a spoon. By 15 months to 18 months, most children can feed themselves with a spoon.^{15,16}

Between 8 months and 12 months, the first teeth have erupted and children can typically bite off crunchier foods. While chewing continues to mature, most children show interest and tolerance of nearly all textures without gagging. There is some evidence that chewing skills develop in response to a variety of food textures and

that children who are offered more solid textures at 6 months of age have better chewing skills at 12 months of age and are more accepting of and able to adequately chew most table foods by 2 years of age.^{29,30}

EVALUATING A FEEDING PROBLEM

Feeding problems in infants and young children are best evaluated by an interprofessional team. Bringing together a team of people with varied perspectives and different types of expertise provides an ability to consider influences of past and current medical problems, children's growth and development and their oral motor function, the adequacy of a child's nutritional intake, and the social milieu a child lives in. Team members can vary depending on the experience and expertise available at a particular institution. In most cases, the core team is composed of a pediatric speech-language pathologist (SLP), a pediatric occupational therapist, a registered pediatric dietician, and a pediatric gastroenterologist. The pediatric SLP evaluates oral function and a child's ability to handle an age-appropriate diet, looks for signs and symptoms of swallow dysfunction, and determines the need for and conducts an instrumental evaluation of swallow. The occupational therapist assesses fine motor development, self-feeding skills, and sensory issues. The pediatric gastroenterologist identifies, evaluates, and helps manage problems of gut motility, such as gastroesophageal reflux, poor gastric emptying, and chronic constipation as well as helping to manage enteral feeding. The registered pediatric dietician performs a comprehensive nutritional assessment, assesses the quantity and quality of dietary intake, and tries to incorporate cultural and family preferences for diet and mealtime routines. Depending on the child, additional team members could include a pediatric physical therapist, a child psychologist or psychiatrist, a pediatric social worker, a lactation consultant, and a pediatric otolaryngologist.

In a majority of cases, children should undergo a comprehensive clinical assessment of their feeding and swallowing before any more invasive assessment is performed. During this assessment, clinicians can often determine if a child's feeding problem is due to problems with the oral preparation (preparing liquid or food in the mouth to form a bolus), oral transit (moving the bolus back), or pharyngeal (initiating the swallow and moving the bolus through the pharynx) phase of swallow.³¹ This information defines the need and purpose of any more invasive study, such as a video-fluoroscopic swallow study (VFSS) or flexible endoscopic evaluation of swallowing (FEES). These studies are performed when there are concerns of pooling, laryngeal penetration, or aspiration. Pooling refers to the collection of secretions or residue from a food bolus that remains in the hypopharynx after a swallow. Aspiration is identified when any food material enters the airway, falling below the level of the true vocal cords. Penetration occurs when a food bolus enters the laryngeal vestibule but remains above the vocal cords.^{32,33}

The first part of any feeding assessment should be performing a comprehensive history. A parent's description of the problem can reveal issues with lack of hunger signals, lengthy times to feed, frequent coughing or choking, frequent vomiting during or after meals, limited tastes and textures accepted, inability or refusal to self-feed, and crying or behavioral outbursts during meals. Strong preferences for specific foods, utensils, position during meals, or location of meals, and even who the child accepts food from suggest well-established patterns that interfere with the normal progression of acquiring feeding skills. Issues with other care routines, such as bathing, oral hygiene, and dressing, may reveal unusual or exaggerated responses to more generalized tactile input. Cultural influences about food choices and behavioral expectations need to be assessed as well.

After getting a complete understanding of a caregiver's perception of a child's current feeding difficulties, it is important to carefully review the child's growth and development, the current diet, what textures the child eats, and a description of the typical feeding environment. Current and past medical and social issues that may have effected feeding should be identified—in particular, did or does the child have any developmental disabilities or medical problems that might interfere with the normal feeding process or might predispose the child to experience pain while eating or being fed (as outlined in **Box 1**)? A history of respiratory symptoms, such as coughing or choking with feedings, chronic upper airway congestion, intermittent stridor, wheezing, or recurrent pneumonia may be the result of aspiration during eating.

As part of the assessment, a complete physical examination should also be performed. A great deal of information about a child's gross and fine motor skills, expressive and receptive language abilities, and the parents' expectations and interactive style can be gleaned by observing the child and parent while taking the history. More direct components of the physical examination should include a careful assessment of the face and oral structures, looking for facial symmetry and the shape and integrity of the hard and soft palates; movement of the velum; range of motion of the tongue, lips, and jaw; the gag reflex; and the child's ability to manage secretions. The examiner(s) should also ensure there are no unexpected abnormalities on the cardiorespiratory, abdominal and/or neurologic examinations that might predispose a child to difficulties feeding. Depending on a child's age, developmental status, and disposition/personality, it is sometimes appropriate to defer the physical examination until after a feeding observation has been conducted.

Feeding Observation

Observation of a child eating foods typically offered at home using familiar utensils provides an opportunity to assess a child's interest and response to the foods presented including the child's willingness to touch and either self-feed or accept those food in the mouth, and the oral preparation, oral and pharyngeal phases of the swallow. It is also important to try to ascertain caregivers' responses to a child during feeding. Parents may feel strong pressure to get a certain amount of food into a child when there is an early history of poor feeding and slow weight gain. Is the child allowed the opportunity to self-feed and experience new tastes and textures? Many parents find that feeding a child is more efficient than letting the child attempt self-feeding and that smoother foods fed by spoon result in faster and increased intake. On the other hand, a lack of structure and mealtime expectations can lead to a limited diet and poor intake. What is the response to a coughing or choking episode, refusal of a food, or spitting out of food? Maladaptive feeding behaviors may have been inadvertently reinforced by parental behaviors.

Assessment of Tone, Posture, and Movement

Overall muscle tone, movement patterns, and control all influence oral function. For example, head control and trunk stability are necessary to stabilize the jaw for cup drinking and to use the upper lip to clean food from a spoon. Adequate fine motor control to pick up food and bring it to the mouth or load a spoon and transfer the bite to the mouth is needed to reach certain feeding milestones. Hypertonicity or hypotonicity is often associated with exaggerated sensory responses, which may be expressed as refusal of hot or cold foods, refusal of new tastes, strong refusal or gagging with lumpy foods, thicker purees, or even soft solids. Some children show signs of seeking more intense sensation in their mouth while eating by taking large bites or overstuffing their mouths. Many of these children demonstrate clear preferences for strong tastes, such

as salty or spicy foods, and/or have a preference for very crunchy textures. Lengthy chewing times, pocketing of food, or spitting out food after chewing without swallowing also suggests a sensory component to the feeding issue. Muscle tone and coordination influence the ability to manipulate liquids and solids in the mouth. A child must have the strength to bite off pieces of food; have sufficient control of the tongue to lateralize the food bolus for chewing; be able to close the lips to contain food and liquid in the mouth; and coordinate lips, tongue, jaw, and soft palate to collect the food into a bolus and propel it back for swallow.

Increases in tone and changes in movement patterns may signal pain during eating. Although it may be difficult to recognize pain with feeding in infants, extraneous movement of the arms and legs, repeated pulling off of the bottle or breast, arching or sudden fussing after only a few minutes of feeding, or lengthy comfort sucking at bottle or breast with little transfer of milk may indicate discomfort. Decreased appetite, refusal of previously accepted foods, signs of cramping, and complaint of localized pain can be associated with pain during or just after eating in children.

Vocal Quality

Assessment of vocal quality prior to observing feeding enables assessment of any changes after food or liquid has been introduced. Dysphonia—a breathy, hoarse, or raspy quality to the voice—may indicate vocal cord edema or a paralysis or weakness in one of the vocal cords. Decreased vocal cord function places a child at risk for aspiration. During eating, congested sounds at the level of the larynx, a wet or gurgling voice, throat clearing, coughing, or multiple swallows to clear one bite suggest difficulty during the pharyngeal phase of the swallow and raise concerns for pooling, penetration, or aspiration even in the absence of a history of respiratory symptoms.

Videofluoroscopic Swallow Study and Flexible Endoscopic Evaluation of Swallow

A clinical feeding evaluation may reveal signs or behaviors suggesting swallow difficulty; however, an instrumental evaluation of swallow is the only way to objectively confirm laryngeal penetration or aspiration. Instrumental assessment of swallow function can be accomplished by videofluoroscopy or by endoscopy.³² VFSS (sometimes called a modified barium swallow) is conducted in the fluoroscopy suite with an SLP and radiologist present. As much as possible, the child is positioned in the usual feeding position. Infants are usually positioned in an infant seat in a semireclined position and older children are put into a seated position and provided with lateral or head support as needed. Food and liquid are mixed with barium and presented to the child in the usual manner. The image is lateral, with the oral cavity and neck in view. VFSS allows a dynamic view of the oral preparatory, oral, pharyngeal, and upper esophageal phases of swallow.³⁴

FEES is done at the bedside or in a clinic setting by an SLP with advanced training and experience in the procedure.³⁵ Infants can be positioned in an infant seat or held in a typical feeding position by a parent or care provider. Older children are seated in a chair or in a parent's lap. A small flexible endoscope is inserted through the nose to allow visualization of the pharyngeal and laryngeal structures. With the scope in place, the child can be fed a typical meal. This can be breastfeeding or bottle-feeding, drinking from a cup, and/or eating solid foods.³⁶ The view through the scope is primarily superior, looking down into the laryngeal vestibule, thus allowing direct visualization of the nasopharynx, oropharynx, hypopharynx, and larynx during swallows. The oral and esophageal phases of the swallow cannot be seen with this technique.

There are advantages, disadvantages, and limitations to both of these assessments:

- VFSS gives specific information about the oral phase of swallow, which may be key in determining the cause of the swallowing problem. It also provides a view of the passage of the bolus through the structures during the entire swallow.
- The oral phase cannot be viewed with FEES, and there is a white-out period during the swallow when tissues contract and obscure the view of the bolus and structures.
- FEES provides information about laryngeal anatomy and function and about secretion management that VFSS does not and also allows for a longer view just before and immediately after the swallow.
- VFSS can usually be completed with children of any age whereas FEES may be limited to children under 12 months and older than 4 years because it requires a child's cooperation for the scope to be inserted. Babies can usually be quickly calmed with the presentation of the bottle, and children old enough to follow directions are often interested in the video and the camera and can often be coaxed into allowing the scope to be passed.
- Food taken during VFSS must be mixed with barium, resulting in a change in taste and texture, whereas plain food or food with dye added to improve visibility is used during FEES.
- Although FEES is invasive, it is not associated with any ionizing radiation so can be repeated multiple times without risk and can be used to view an entire feeding.
- VFSS is a less invasive procedure but does expose children to ionizing radiation so must be time-limited. Most recent information suggests the long-term effects of radiation exposure are greatest in younger children. Reported effective doses for a typical VFSS in a child vary widely ranging from 0.08 mSv to 0.8 mSv. In comparison, the dose of a typical chest radiograph is 0.05 mSv.^{34,37,38} A screening time of 2 minutes to 3 minutes has been reported to be required to complete an evaluation, including a variety of food textures. Turning the fluoroscopy on and off during the study, limiting the number of swallows observed, and using a lower fluoroscopy pulse rate can limit the radiation dose. Ensuring that the study is done in a facility adhering to keeping exposure as low as reasonably achievable (ALARA), with pediatric radiologists and experienced SLPs and avoiding repeated studies, especially completed only weeks or months apart, is crucial to protecting children.

INTERVENTION

Impressions from the clinical examination and any instrumental evaluation findings direct intervention strategies. The primary goal of any intervention is to help a child achieve age-appropriate feeding skills through positive feeding experiences while ensuring swallow safety and adequate nutrition and growth. Therapy may focus on behavioral interventions, oral motor treatments, physical and sensory treatments, adjustments to diet, and the methods of intake or a combination of these approaches.

The family must collaborate with any behavioral interventions to reinforce appropriate responses to food during mealtimes and reduce interfering behaviors to be successful. Oral motor treatment to improve strength, movement, and coordination of the lips, tongue, jaw, soft palate, and pharynx may involve sensory stimulation to these areas as well as resistance, chewing, or swallowing exercises. Physical and occupational therapy may complement feeding therapy by the SLP and help a child develop

postural control and self-feeding abilities and decrease aversive responses to tactile stimulation to the hands and mouth.

Modifications of the diet may include changing the viscosity of liquids, increasing or decreasing the consistency of solids offered, and adding supplemental feedings (eg, tube feedings, calorically dense formulas, or drinks) as needed. Changes during oral intake, such as altering position for feedings; altering the bottle nipple, cup, or straw to reduce or increase the flow rate; introducing compensatory maneuvers to improve bolus movement and control during swallow; and systematic introduction of new tastes and textures can be guided by the SLP or the therapy team.³⁹

SOME REPRESENTATIVE CASE STUDIES

Case 1

KA is a 2-week-old boy with a hypoplastic aortic arch and slightly hypoplastic aortic valve who underwent reconstructive surgery during the first several days of life. He was extubated 4 days after surgery. The following day, the medical team consulted the SLP. During her consultation she noted a dysphonic cry and hyperactive gag; however, he was able to latch onto the bottle nipple and demonstrated short sucking bursts. His lip seal on the nipple was poor and he quickly showed signs of fatigue. He took only 5 mL by mouth during his initial feeding session but he did not cough or develop worsening congestion.

During a session 2 days later, his hyperactive gag had diminished and he latched rapidly to the nipple and had a more vigorous suck on the bottle; however, this more effective extraction of milk from the bottle was associated with periodic coughing during the feeding. His voice remained dysphonic and his cough was weak. The feeding trial was discontinued because of concerns for laryngeal penetration and/or aspiration. The SLP recommended a pediatric otolaryngology consultation because of concerns for vocal cord paralysis or paresis associated with his cardiac surgery.

FEES was completed by the SLP with the pediatric otolaryngologist in attendance. View of the laryngeal vestibule demonstrated decreased mobility of the left vocal cord. Penetration and aspiration were observed while the child was fed thin liquid from a slow-flow nipple as well as an extra slow-flow nipple. When he was fed slightly thickened liquid from a slow-flow nipple and he was positioned in a side-lying position with his right side down to promote more medial positioning of his left vocal cord, he was better able to protect his airway and he had only episodic laryngeal penetration and no aspiration. He was discharged from the hospital a week later feeding in this manner without any clinical suspicion of laryngeal penetration or aspiration.

Case 2

SB is a 3-month-old boy who was the product of an uncomplicated term pregnancy, labor, and delivery. At a week of age he began experiencing repeated bouts of what seemed to be abdominal pain associated with eating and frequent bouts of vomiting. These symptoms worsened over time. He was initially breastfed and nursed vigorously for 5 minutes before suddenly pulling off the breast, arching, and crying. His mother eliminated a wide variety of foods from her diet without any improvement in his symptoms. He was treated with probiotics, ranitidine, and omeprazole without improvement. Pyloric ultrasound and upper GI series were normal. At 2 months of age, his mother decided to stop breastfeeding and commence bottle-feedings, hoping feedings would become less stressful for both her and her baby. His symptoms did not improve with a protein hydrolysate formula or an amino acid-based formula. The

family tried different bottles and nipples without any change in his symptoms. His parents observed that he fed best and seemed most comfortable feeding when he was nearly asleep. Despite his feeding difficulties, SB continued to grow and develop.

On examination he was fussy but consolable. His weight was at the 25th percentile for age, his height at the 50th percentile, and his head circumference at the 50th percentile. His physical examination was entirely normal, including his oral examination. He had frequent episodes of crying and flailing while being held by his mother but quieted when put into a semireclined position and offered a bottle. He showed difficulty establishing a latch with frantic and disorganized movements but was able to latch and immediately showed vigorous, rhythmic sucking with a calm state for several minutes, consuming approximately 20 mL before suddenly pulling away from the bottle and arching and crying. He calmed after a minute or so and resumed feeding but his sucking bursts continued to be interspersed with crying/agitation and pulling off the nipple. His mother reported this pattern typical of a feeding at home, which often took up to an hour to complete. No vocal changes, congestion, or signs of penetration or aspiration were observed during feeding and, when actively sucking, SB was able to efficiently transfer milk from his bottle.

Based on his history, previous evaluation, and feeding assessment, there was no need for instrumental evaluation of his swallowing mechanism. His feeding difficulties seemed to be the result of GI discomfort associated with feeding. Although he had symptoms consistent with gastroesophageal reflux, it seemed unlikely this was the source of his discomfort, given numerous formula changes and treatment with acid inhibitors did not offer him relief. Rather, he seemed to be suffering from extreme colic/visceral hyperalgesia. He was treated with a low dose of gabapentin and within 5 days of starting this medication, his discomfort with feeding abated. At 6 months of age, the gabapentin was discontinued and he continued to feed well from the bottle and began eating solid foods without any difficulty or discomfort.

Case 3

JW is an 18-month-old boy without any history of serious illnesses who has been growing and developing normally. He was referred to the feeding clinic because he has been coughing and choking when he eats since he began eating table foods at 10 months of age. His coughing episodes frequently result in post-tussive vomiting. He had no problems with coughing, choking, or vomiting before solid foods were added into his diet. A chest radiograph was normal, and an upper GI series demonstrated normal esophageal anatomy and motility.

JW's parents state that he coughs at nearly every meal and that even after he has a bout of post-tussive vomiting, he resumes eating. During her feeding evaluation, immediately after JW ate a cracker, the SLP heard congestion at the level of the larynx and a wet vocal quality. During subsequent food trials, there was a suggestion of pooling and penetration as his congestion and vocal symptoms increased, and he would periodically cough. He did not seem to be in any discomfort, and he remained willing to eat. His parents had a tendency to present JW large pieces of solid foods in rapid succession.

Although there was no history of recurrent pneumonia or any other chronic or recurrent respiratory symptoms, the SLP was worried about the possibility of decreased sensation, pharyngeal swallow dysfunction, and chronic aspiration and recommended performing VFSS. She recommended performing VFSS rather than FEES because, given his age and demeanor, it was unlikely he would be able to cooperate with FEES. VFSS demonstrated poor oral control of boluses of hard solids that required chewing and this resulted in premature spillage of the bolus into the hypopharynx,

delayed triggering of his swallow, and numerous episodes of penetration; however, no aspiration was seen.

Based on these findings, the authors recommended downgrading JW's diet to smooth or soft solids and offering chopped or ground higher-texture solids in small bites. JW was also referred for speech and occupational therapy services to provide him with sensory stimulation to improve his oral/pharyngeal sensory responses to higher-textured foods, develop better chewing skills and improve JW's self-feeding skills.

Case 4

AP is an 8-year-old girl who has been healthy and growing and developing normally. She had no history of asthma or other respiratory symptoms, eczema, or any problems swallowing. She was referred to the feeding clinic because of a 6-week history of refusing to eat any solid foods. Her refusal to eat solid food began immediately after she choked on a piece of steak for which her father performed the Heimlich maneuver. Since then, she had consistently refused to eat any solid foods, including purees, complaining that the food "gets stuck" in her throat. She continued to drink liquids without any choking, gagging, or coughing. As a result of her refusal to eat any solid foods, she lost 7% of her body weight. Given she was entirely normal and had no difficulties eating or swallowing prior to her choking episode, it seemed most appropriate to perform a clinical evaluation prior to any instrumental evaluation of her swallowing mechanism or her esophagus. In the clinic, she reported a sense of her "throat closing" and an inability to swallow the food. After acknowledging and validating her sense of fear of choking, the SLP explained that fear and anxiety would produce tension in the muscles of her throat, which would indeed make it hard to swallow. The SLP then led her through several breathing exercises to help her relax, and together they practiced swallowing beginning with liquids and then moving to purees, soft solids, and finally hard solids. Using the relaxation breathing she had learned, taking very small bites, chewing thoroughly, and using liquid wash after each bite, she was able to successfully swallow each consistency. Throughout the session, the SLP continuously assessed her swallow and did not see any signs of swallow dysfunction, pain, or obstruction. AP's confidence increased after she successfully swallowed each solid texture. She was given specific instructions for home oral intake using the techniques she had learned and practiced in clinic. Her mother reported that within an hour of leaving the clinic, AP ate an entire fried chicken sandwich at a fast food restaurant. Within a week, she had resumed her previous diet and she denied any difficulties swallowing or feeling as though food was "getting stuck." She regained all the weight she lost. In this case, performing VFSS prior to a clinical assessment would have exposed AP to unnecessary radiation and reinforced the idea that she was suffering from a serious illness. Acknowledging that her symptoms were real, giving her an explanation for those symptoms, and providing her with a safe environment and techniques to help her eat solid foods enabled her to overcome her fear of choking.

SUMMARY

Feeding problems in infants and young children are common. In otherwise healthy children who are developing and growing normally, feeding problems are usually not serious, are transient, and can be managed conservatively by reassuring the family, providing them with anticipatory guidance, and providing regular follow-up. A majority of more serious childhood feeding problems occur in children who have other medical, developmental, or behavioral problems. These more serious problems are

best evaluated and treated by an interprofessional team who can identify and address issues in a child's medical and/or developmental history, problems with oral motor control and function, problems with swallowing, and behavioral and/or sensory issues that may interfere with normal feeding progression.

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