

Reinstating Oral Feeding in Tube-Fed Adult Patients With Dysphagia

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ABSTRACT: Feeding tubes are valuable assets in the rehabilitation of adult patients with dysphagia. Feeding tubes may be placed in response to perceived risks of airway compromise or insufficient nutrient intake. However, not all patients require long-term enteral feeding. With intensive dysphagia therapy, many patients will experience resolving deficits or improvement in swallowing ability. These patients require an appropriate strategy to transition from tube to oral feeding. This article reviews some of the basic characteristics of dysphagia and identifies specific swallowing difficulties in 2 groups of patients who often benefit from temporary enteral feeding: stroke survivors and patients treated for head and neck cancer. Specific suggestions are offered for clinical strategies to reinstitute oral feeding in these groups of tube-fed patients.

Tube feeding is used frequently with patients who are unable to safely ingest adequate amounts of food and liquid. Common diseases that require tube feeding when they occur include stroke and head and neck cancer.¹ Recent information has cast doubt on the clinical utility of tube feeding in advanced stages of some chronic diseases.^{2,3} However, in at least some geographic areas, the frequency of tube feeding has been observed to increase over the past 10–15 years, especially among older patients.⁴ Still, many patients who survive stroke or head and neck cancer treatment are candidates for feeding tube removal and transitioning to an oral diet. Conversely, many patients who require prolonged feeding tube support, especially those with extensive health limitations or the elderly, may face increased medical

complications and reduced quality of life.^{1,5} Swallowing therapy has been shown to be effective and to facilitate feeding tube removal (or prevent initial feeding tube placement) in these patient groups. Important factors to consider are patient readiness to transition to oral feeding from tube feeding, safety and efficiency of swallow function, and the impact on nutrition status.

Impaired Swallowing: Dysphagia

Dysphagia may be defined as any disruption in the swallowing process. Thus, patients with structural or physiologic deficits in the mouth, pharynx, larynx, or esophagus may demonstrate signs and symptoms of dysphagia. Terms such as *oral phase dysphagia*, *oropharyngeal dysphagia*, *pharyngeal dysphagia*, or *esophageal dysphagia* are often used clinically to describe the primary focus of dysphagia symptoms. However, dysphagia, like normal swallowing, reflects a complex interaction of multiple anatomic and physiologic components of the upper aerodigestive tract. Dysphagia may have many consequences to the individual patient, but primary among the consequences of dysphagia are safety and efficiency of the swallow. *Safety* typically refers to the ability of the patient to protect the airway from aspiration of prandial materials. *Efficiency* refers to how effectively and timely the patient can swallow food and liquid. Together, these consequences of dysphagia may compromise the patient's pulmonary and nutrition status.

Characteristics and Symptoms of Dysphagia

Patients may complain of a multitude of swallow-related deficits. Each should be taken seriously as a potential reflection of an underlying disease process that may interfere with swallowing abilities. For example, something as seemingly benign as prolonged mealtimes may be the result of xerostomia, reduced oral control of food and liquid, weakness in the muscles of the mouth or throat, or esophageal dysmotility. Patients who complain of “choking” likely have some degree of deficit in the

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Table 1
Examples of signs and symptoms associated with dysphagia

Symptom	Sign
Difficulty chewing	Food spills from lips; excessive mastication time on soft food; poor dentition; tongue, jaw, or lip weakness
Difficulty initiating swallow	Mouth dryness (xerostomia), lip or tongue weakness
Drooling	Lip or tongue weakness, infrequent swallows
Nasal regurgitation	Bolus enters or exits the nasal cavity, as seen on x-ray
Swallow delay	X-ray study identifies transport beyond normal standard
Food sticks	X-ray study identifies excessive residue in mouth, pharynx, or esophagus after completed swallow
Coughing and choking	Coughs on trial food attempts, material enters the airway on x-ray study
Coughs when not eating	X-ray study shows aspiration of saliva or lung abnormality
Regurgitation	Undigested food in mouth, x-ray study shows food returning from esophagus to pharynx or mouth
Heartburn	Acid taste in mouth, mucosal irritation on endoscopy, pH probe study positive for acid reflux
Weight loss	Unexplained weight loss, measurement of weight is below ideal standard

laryngeal or pharyngeal aspects of swallowing. Further, dysphagia may be food category specific. Patients who complain of isolated difficulty with solid foods often have esophageal components of dysphagia. Patients who complain of liquid and solid food dysphagia often demonstrate oropharyngeal limitations. As a general rule of thumb, the characteristics of impaired swallowing will reflect the characteristics of the disease or condition underlying the dysphagia. Thus, if a clinician is aware of the medical status of the patient, some direction is provided toward the interpretation of the clinical signs and symptoms. Table 1 lists several overt signs of dysphagia that may be noticed by patients or healthcare providers.

Identifying Patients With Dysphagia

In adults, dysphagia may result from a variety of diseases or medical conditions or from treatments of diseases or medical conditions. Aging alone may contribute to changes in health status or basic biologic function that may precipitate symptoms of dysphagia. As we age, we are more susceptible to a variety of disease states that might affect swallowing abilities. Young adults (and children) also may acquire or develop conditions that affect swallowing function. Thus acute neurologic changes caused by traumatic brain injury or stroke can contribute to significant dysphagia in adults across the age span. Other neurologic diseases such as motor neuron disease or multiple sclerosis can contribute to muscle weakness or related impairments or loss of motor control that may have a direct impact on swallowing functions. Patients with head and neck cancer may experience severe and lasting swallowing deficits from the effects of the cancer and from the treatments for cancer. Also, because the respiratory system is integrally related to swallow functions, pa-

tients with severe respiratory diseases, such as chronic obstructive pulmonary disease, may experience a variety of dysphagic symptoms. Individuals with irregularities in the esophagus or stomach also may have swallowing complaints. Patients with dementia may experience both feeding and swallowing difficulties that place them at significant risk for declining nutrition. Finally, as we age and experience more health complaints, we ingest more and various medications. Many medications have a direct and negative impact on the swallowing mechanism. Table 2 is a short summary of some of the underlying conditions that may affect the ability to swallow safely and efficiently.

The Need for Feeding Tubes

In general, 2 criteria top the list for feeding tube placement: (1) poor airway protection or (2) inability to consume adequate nutrition by mouth. The specific application of nonoral feeding mechanisms is typically determined by the nature of the underlying disease and the health status of the patient. However, different clinical situations will affect the decision to place an enteral feeding access, as well as when and how oral feeding may be reinstated. For many patients, feeding tubes should be temporary interventions. The question of how long any individual patient will require or benefit from tube feeding is difficult to answer. Follow up and reevaluation of tube-fed patients is critical to identify positive changes in swallowing ability that may permit transition from tube to oral feeding. Comprehensive feeding and swallowing evaluations by appropriately trained speech-language pathologists play a central role in the placement of feeding tubes and, for some patients, in the removal of feeding tubes.

Feeding tube placement is prevalent in patients who have survived stroke and in patients being

Table 2
Summary of conditions that may contribute to dysphagia

Neurologic diagnoses
Stroke
Traumatic brain injury
Dementia
Motor neuron disease
Myasthenia gravis
Cerebral palsy
Guillain-Barré syndrome
Poliomyelitis
Infectious disorders
Myopathy
Progressive disease
Parkinson's disease
Huntington disease
Progressive supranuclear palsy
Wilson's disease
Age-related changes
Connective tissue/rheumatoid
Polydermatomyositis
Progressive systemic sclerosis
Sjögren disease
Scleroderma
Overlap syndromes
Structural diagnoses
Any tumor involving the alimentary tract
Iatrogenic diagnoses
Radiation therapy
Chemotherapy
Intubation/tracheostomy
Postsurgical cervical spine fusion
Postsurgical CABG
Medication-related
Other, related diagnoses
Severe respiratory compromise
Psychogenic

CABG, coronary artery bypass graft.

treated for head and neck cancer. Both groups are at high risk for dysphagia and nutrition deficits precipitating frequent feeding tube placement. Yet, in both of these patient groups, feeding tube use is often temporary. Thus, reinitiating oral feeding is an important feature of clinical care for these patients.

Dysphagia After Stroke

Patients who survive stroke often need feeding tube support for multiple reasons. Initially, between 40% and 60% of stroke patients present with dysphagia.^{6,7} Limitations in the ability to swallow food and liquid may reflect an altered level of consciousness, physical weakness, or incoordination in the swallowing mechanism. These changes may threaten airway safety and limit the amount of food and liquid ingested by mouth. In the acute stroke population, dysphagia is independently associated with stroke severity.⁷ Thus, the stroke patient with greater neurologic impairment faces a higher likelihood of feeding tube placement than a patient with

less neurologic changes. As the patient recovers from an acute stroke, swallowing ability often, but not always, demonstrates improvement. The result of this collective scenario is that stroke patients, especially those with severe stroke, may require temporary nutrition support *via* a feeding tube, but these patients have a high probability of returning to total oral feeding. Clinical studies have depicted various durations of tube feeding in poststroke patients, but a conservative estimate is that a large percentage of patients with feeding tube placement in the acute poststroke period will return to oral feeding within 3 months of stroke onset.^{8,9} Recent clinical studies have shown that swallowing therapy can facilitate a safe return to oral feeding, with a positive impact on nutrition status.^{10,11} Even beyond the acute poststroke period, swallowing therapy has been shown to be effective to the point of return to total oral feeding.^{12,13} These observations highlight the importance of periodic long-term follow-up of the stroke patient who is dependent on tube feedings.

Dysphagia in Head and Neck Cancer

Patients with head and neck cancers are usually treated by surgery or radiotherapy. Each treatment modality presents specific challenges for functional swallowing and may require placement of nonoral feeding sources. Extensive surgeries for tumor removal or reconstruction may render the patient unable to swallow in the postoperative period, and a feeding tube may be placed at the time of primary surgery.

Patients treated with radiotherapy may complete the entire course of treatment without feeding tube placement. Conversely, some institutions place feeding tubes in these patients prophylactically, whereas other centers place tubes during treatment if impairments in swallowing directly affect the patient's nutrition status. Barring significant complications from treatment, patients in both groups have a good prognosis for returning to oral intake of food and liquid. The primary barriers to oral feeding in the postsurgical head and neck cancer patient are postoperative edema and healing at the surgical site. Latent to surgery, factors that affect the return to oral feeding are movement restrictions that result from tissue resection and scarring of the primary surgical site and from reconstruction. The patient treated with radiotherapy presents additional challenges to return to oral feeding. Acute toxicity from radiotherapy may produce an intense mucosal response during the treatment period. Resulting mucositis and edema in the swallowing mechanism can significantly limit the functional oral intake of food and liquid, leading to compromised nutrition status. Weight loss during radiotherapy may exceed 10% of initial body weight.¹⁴ Add this loss to the possibility of significant weight loss before treat-

Table 3
Considerations for the medical history for the patient with dysphagia

Congenital family illness
Neurologic disease
Stroke
Progressive disease
Traumatic injury
Other CNS disorders
Medications taken for
Psychiatric disease
Medications taken for
Movement disorder (tardive dyskinesia)
Surgical procedures
Spinal fusion
Myotomy (upper or lower esophageal)
Alimentary tract
Fundoplication
Head/neck cancer
Thyroidectomy
Cardiac
Cancer-related
Irradiation
Chemotherapy
Systemic/metabolic
Nutrition/hydration status
Current and ideal weight
Laboratory values related to nutrition
Infections
Toxins
Diabetes
Respiratory impairment
Chronic obstructive pulmonary disease
History of aspiration pneumonia
Cardiopulmonary disease
Esophageal disease
Reflux/regurgitation
Motility disorder
Dilatation
Previous test results
Radiographic: esophagram or modified barium swallow
Manometric
Endoscopic: upper airway or esophageal
Current advance directive

CNS, central nervous system.

ment¹⁵ and the result is severely compromised nutrition status. Fortunately, the acute toxicity effects of radiotherapy on the swallowing mechanism resolve over time and are responsive to behavioral therapy provided by speech-language pathologists. Thus, in the absence of severe reactions to radiotherapy or other morbidities, a tube such as a percutaneous endoscopic gastrostomy (PEG) tube is often temporary. In fact, a recent study reported the average duration of tube feeding in radiotherapy patients to be 3.8 months.¹⁶ A separate study reported that 92% of tube-fed head and neck cancer patients treated with radiotherapy were able to return to oral feeding and 83% resumed a near-normal oral diet by 12 months after completion of treatment.¹⁷

Roles of the Speech-Language Pathologist in Tube Feeding

The speech-language pathologist performs 2 basic tasks with patients requiring tube feeding. The first task, assessment, is critical in determining the safety and efficiency of swallowing abilities. Swallow safety and efficiency are important factors in decisions to pursue nonoral feeding routes in patients with dysphagia. Assessment is also essential to identify those individuals who are candidates to transition back to oral feeding at that point in time when tube feeding is no longer required. The second task is treatment of patients with dysphagia. In some circumstances, resolution of disease or other factors that contribute to dysphagia will result in removal of feeding tubes in the absence of swallowing therapy. However, swallowing therapy has proven benefits to patients with dysphagia and facilitates removal of feeding tubes and return to oral intake.¹⁸

Assessment Strategies

Assessment of the patient with dysphagia typically includes both clinical and instrumental evaluations. Each of these evaluation aspects contributes specific information to the clinician, and each is useful in making functional decisions regarding the safety and efficiency of swallowing abilities.¹⁹

The Clinical Evaluation

The clinical evaluation of the patient with oropharyngeal dysphagia includes a thorough medical history, inspection of the form and function of the swallowing mechanism, and, if appropriate, observation of test swallows or full meals. The clinical evaluation should (1) define the etiology of the dysfunction, (2) establish a tentative plan for treatment, (3) address issues that require further study, and (4) establish the patient's readiness for cooperation in either diagnostic or treatment interventions.²⁰ Patients with acute oropharyngeal dysphagia often are unsafe for oral alimentation because of poor mental status. In this circumstance, the clinician must rely heavily on suppositions from the medical history and physical presentation because cooperation with a traditional clinical evaluation of swallow may not be possible.

Medical History

A myriad of medical diagnoses may precipitate signs and symptoms consistent with oropharyngeal dysphagia. More often than not, multiple contributing factors will be present, such as the poststroke patient with respiratory complications or the patient with acute congestive pulmonary disease requiring tracheostomy. Table 3 lists important issues to review from a medical history of a patient with dysphagia. In addition to the specifics of the medical

condition, clinicians should note previous and current medical treatments that may affect swallowing function. Particular attention should be given to medications that either interfere with cognition or motor performance (sedatives and barbiturates) and those whose side effects include xerostomia (eg, antidepressants, antipsychotics, bronchodilators). The existence of an advance directive will play an important role in treatment decisions.

The Physical Examination

The physical examination specific to swallowing impairment typically includes observations of medical interventions that affect swallowing function, including the presence and type of feeding tubes and the presence of any respiratory support measures. Typical assessment includes evaluation of the patient's mental status and of the cranial nerves that subserve swallowing. If the patient is eating any food or liquid by mouth, observations of their swallowing and feeding skills during test swallow attempts are made. A checklist of items of interest in the clinical evaluation of the dysphagic patient is presented in Table 4.

Investigators have sought to determine which elements in the clinical examination for swallowing are more important in detecting and defining the disorder. Those elements for which there is empiric support include dysphonia (strained or breathy voice), a wet-sounding voice, dysarthria (imprecise articulation of sounds or deviations in nasality), poor secretion management, impaired volitional cough, and reduced laryngeal elevation during swallowing.²¹ These clinical markers were found to be more predictive of compromised swallowing if 2 or more of these features were found upon clinical examination.²²

Considerations Specific to the Stroke Patient

In the stroke survivor, most swallowing deficits resolve over time. As a result, the focus of the physical examination is expected to change with increased time poststroke. In the acute stroke patient, the degree of alertness and physical endurance are key features that indicate readiness to participate fully in the swallowing evaluation process. Respiratory status is an important consideration in the acute stroke patient. Even in the absence of mechanical ventilation or a tracheostomy tube, many stroke patients demonstrate respiratory irregularities.²³ The physical evaluation should include cranial nerve evaluation and an assessment of upper limb strength and coordination. This latter aspect is important to estimate the potential for independent feeding. Feeding dependency is common among stroke patients with dysphagia,²⁴ and feeding dependency is associated with multiple negative outcomes.^{25,26} Feeding assistance is often provided by nursing assistants who have little knowl-

Table 4
Common items included in the clinical evaluation of swallowing

Clinical observations
Feeding method
Nasogastric
Gastrostomy
Jejunostomy
Intravenous
Respiratory status
SpO ₂ level
Tracheostomy
Ventilator
Mental status
Level of alertness
Orientation
Cooperation
Sustained attention
Cognitive screening
Memory
Language
Perception
Cranial nerve (CN) assessment
CN V
Jaw opening/closing
Jaw lateralization
Muscle strength/bite down
CN VII
Facial muscles at rest
Pucker/smile
Raise eyebrow
Lips closed against resistance
CN XII
Tongue range of motion
Tongue strength
Fasciculations/atrophy
CN IX, X
Gag reflex
Velum
Voice
Cough
Dry swallow
Oral cavity inspection
Lesions/thrush
Moisture
Dentition
Test swallows
Thin liquid
Thick liquid
Pudding consistency
Semisolid
Mealtime observations
Posture
Ambience
Self-feeding skills
Utensils
Assistance needed
Diet level
Respiratory pattern changes

edge about dysphagia or specific skills on how to feed patients with dysphagia.²⁷ This lack of knowledge, in combination with other factors, places the dependent patient at an increased risk for dysphagia-

related morbidities. Inspection of the oral cavity should go beyond basic movement characteristics of the lips, tongue, and velum. Oral hygiene is an important factor in determining pneumonia risk in this population,^{28,29} and the presence of oral infection or inflammation may contribute to pain, which may have a negative influence on swallowing function. In addition, the presence, availability, and use of dentures will be an important consideration in diet determination. Finally, oral moisture, especially on the tongue dorsum, is an important consideration in some stroke patients, specifically those taking antidepressant medications that contribute to xerostomia.

Recently, the clinical assessment of swallowing for stroke patients has been structured and psychometrically evaluated into a formal assessment procedure. The Mann Assessment of Swallowing Ability³⁰ is a numerically scored clinical protocol that provides cutoffs for the identification of dysphagia and risk ratings for the severity of dysphagia and aspiration.

Considerations Specific to the Patient Treated for Head and Neck Cancer

Depending on the specifics of the cancer treatment, the patient with head and neck cancer may present significant anatomic or physiologic deviations that have a negative impact on swallowing function.³¹ In surgical patients, the presence of postsurgical edema in the upper aerodigestive tract often leads to placement of both gastrostomy and tracheostomy tubes. Once the swelling abates, an important consideration is the degree of movement of structures within this area that support swallowing function. Surgical outcomes relative to swallowing are related to the extent of tissue removed, the location of the surgery, and the need for and type of any reconstruction. Patients treated with radiation therapy (RT), especially in combination with surgery, typically have greater limitations imposed on the swallow mechanism.³² Acute RT effects include mucosal deviations in the mouth and throat that cause pain and swelling and result in reduced movement. These patients also experience xerostomia and reduced taste, and they may have reduced appetite. If the teeth are in poor condition before RT, or if decay is worsened after treatment, dental extractions may be necessary. Even in edentulous patients who wore dentures before treatment, the same dentures may not fit properly because of mucosal changes after treatment. Once these acute mucosal alterations resolve, a major obstacle to restoration of oral feeding can be reduced movement. Reduced mouth opening, or trismus, is common in this patient group. In addition, fibrosis and muscle weakness throughout the upper swallowing mechanism can have a negative influence on the ability to regain or increase oral feeding.

Observing Swallowing Performance During the Clinical Assessment

In a cooperative, alert patient, the clinician may want to grossly assess the swallow response using real food items. If the patient has not taken any material by mouth for a prolonged time and the swallow is questionable, a common practice is to use ice chips as an initial test of swallow function. However, no data exist to support this decision, and most clinicians use an array of items, including thin and thickened liquids, pudding, and soft food items and items that require mastication.³³ Volumes usually range from 5 to 10 mL, starting first with a smaller size bolus and, if successful, moving toward larger boluses with similar rheologic characteristics. If successful with 10-mL boluses, the examiner may allow the patient to self-select the volume to be ingested. The patient's performance on each material should be the guide for advancing to the next material or volume increase. This observational aspect of the clinical swallowing evaluation should not be underestimated because some evidence exists in acute stroke patients suggesting that selective tolerance of soft foods and thin liquids is predictive of the need for feeding tube placement.³⁴

If a patient is able to consume meals or partial meals, the examiner should make observations on whether the eating process is more efficient at the beginning or end of the meal because fatigue may compromise safe swallowing in some patients. Clinical observations should include changes in respiratory status taken from bedside monitors (SpO₂) or signs of audible respiratory distress such as wheezing or difficulty clearing secretions.

The Instrumental Examination

Instrumental swallowing examinations focus on imaging the swallowing mechanism to examine anatomy, physiology, and swallowing performance. In circumstances when the clinical examination for oropharyngeal swallowing disorders does not adequately define the problem, when the clinical examination does not fit the medical history or patient complaint, or in instances when a treatment plan based on the clinical evaluation has failed, it is important to use instrumental examinations to further elucidate the problem.³⁵ The 2 most widely used instrumental examinations of oropharyngeal swallowing are videofluoroscopy and videendoscopy.

Videofluoroscopy

Videofluoroscopy is a technique that allows the examiner to visualize the dynamics of the oropharyngeal swallow, beginning at the mouth and ending at the proximal esophagus. This technique commonly is referred to as the modified barium swallow.³⁶ It is to be distinguished from a barium swallow because the procedure is done in an upright

position, with small amounts of test (barium-impregnated) materials. Although it provides the only method of direct visualization of the entire oropharyngeal swallow event, it is limited by the requirement that seriously ill patients may not be able to be transported to the radiographic suite. In addition, there can be disagreement in interpretation of results and treatment planning.^{37,38} Nonetheless, it is used routinely to evaluate the oral and pharyngeal phases of swallowing. Often, in conjunction with a radiologist, this examination is combined with a cursory view of the esophageal body and the lower esophageal sphincter. The purpose of this extension of the examination is to identify any overt esophageal contributions to oropharyngeal swallowing deviations.

Videoescopy

Videoescopy is the direct visualization of the upper airway during swallowing attempts, as seen through a flexible endoscope transnasally passed into the pharynx. Because the technique is portable, it is particularly useful in the acute care circumstance or for those patients who otherwise would not have access to radiologic studies. This technique is particularly valuable for patients who are suspected of upper airway abnormality, anatomic deviations in the oropharynx or larynx, and cranial nerve deviations. The endoscopic swallowing examination is also the best method to identify secretions in the larynx or pharynx.³⁹

Treatment of Dysphagia: Implications for the Tube-Fed Patient

Upon completion of clinical and instrumental swallowing examinations, clinicians face decisions regarding safe and efficient oral feeding. These decisions implicate the possibility of recommending non-oral routes for nutrition and hydration or returning tube-fed patients to oral feeding. As part of this latter decision, the clinician must decide whether active intervention will provide benefit to the patient and, if so, what type of intervention.

Treatment for patients with oropharyngeal dysphagia can be broadly divided into 3 categories: medical, surgical, and behavioral. Speech-language pathologists provide behavioral treatment options. In conjunction with the dietitian, speech-language pathologists provide recommendations for dietary modifications. Dietary recommendations usually are established after evaluation of the patient's response to a variety of swallowed materials during the clinical or instrumental examinations. After establishing an appropriate initial diet prescription, specific postures, swallowing adaptations, or other aspects of symptomatic therapy may be initiated.

Behavioral Swallowing Therapy

Behavioral swallowing therapy may be categorized into 4 approaches: (1) modify the diet, (2)

modify the patient, (3) modify the swallow, and (4) modify the swallow mechanism. Diet modification is typically recommended in response to the patient's physical swallowing abilities. Common recommendations are to thicken liquids in response to poor oral control or airway compromise⁴⁰ and to replace masticated or particulate foods with soft, cohesive, or pureed foods.⁴¹ Clinicians can modify patient behavior during swallowing by teaching postural adjustments that are intended to improve the safety of swallows. Various postures may be used by the patient to slow or redirect bolus passage through the upper swallow mechanism. Common postures used in this capacity include side lying, chin up or down, and head turns.⁴²⁻⁴⁴ To modify the swallow, a patient must be taught to use a variety of swallowing adaptations that are intended to improve the efficiency of the swallow or improve swallow safety. Examples of such swallowing adaptations or maneuvers include the supraglottic or super supraglottic swallow, effortful swallow, and the Mendelsohn maneuver.⁴⁵⁻⁴⁸ Attempts to modify the swallow mechanism would include exercises to strengthen the muscles within the swallow mechanism. Examples of exercises intended to improve swallow function include lingual resistance exercises and the head lift technique.^{49,50} The indications for each technique, their effect on swallow physiology, expected outcomes, and concerns are summarized in Table 5.

For those patients treated with RT for head and neck cancer, interruption of oral feeding may be temporary in response to an intense mucosal response during treatment. In this situation, the treating clinician should pursue strategies to facilitate resolution of the adverse mucosal response⁵¹ that may be the primary deterrent to oral feeding. In addition, clinicians should provide patients with exercises to maintain muscle function in the swallowing mechanism.

The benefits of behavioral therapy for dysphagia in stroke patients have been recently demonstrated in a large randomized controlled trial.¹⁰ Benefits of behavioral therapy for swallowing may extend to improved nutrition status in this population.¹¹ Therapy benefits for dysphagia in patients treated for head and neck cancer also demonstrate positive outcomes, including reinstating oral feeding and removal of feeding tubes.^{18,52} In either group of patients, the intervention plan must include a strategy for feeding tube removal and transitioning back to oral feeding to ensure that therapy is successful.

Transition From Tube Feeding to Oral Feeding

Though much discussion and research has focused on which patients will require feeding tubes, little effort has been focused on which tube-fed patients can transition to oral feeding. At a minimum, tube-fed patients with dysphagia who are candidates to return to oral feeding must demon-

Table 5
Examples of behavioral techniques for swallowing therapy

Technique	How done	Physiology	Intended to . . .	Outcomes	Concerns
Chin down	Lower chin	Narrows oropharynx	Improve airway protection	Reduced aspiration	May weaken pharyngeal constriction
Chin up	Raise chin	Widens oropharynx	Propel bolus to back of mouth	Better oral transport	Airway protection must be intact
Head turn	Turn head to right or left	Redirect bolus to opposite side	Reduce aspiration and residue	Increase amount swallowed	Patients with multiple cranial nerve deficits
Supraglottic swallow	Hold breath, swallow, gentle cough	Adduction of vocal folds with breath hold	Increase airway closure	Reduced aspiration	Prolonged apneic duration and degree of glottal closure
Super supraglottic swallow	Hold breath, bear down, swallow, gentle cough	Adduction of vocal folds and anterior-posterior closure of endolarynx	Increased airway closure	Reduced aspiration	Prolonged apneic duration; potential impact of effort on cardiovascular system
Mendelsohn maneuver	Squeeze at point of highest laryngeal elevation	Increased and prolonged hyolaryngeal elevation	Improve swallowing coordination	Reduced aspiration and improved functional swallowing	Prolonged apneic duration; difficult to teach; difficult to monitor
Effortful swallow	Swallow harder	Increased tongue-palate contact; increased effort of pharyngeal swallow	Increase force on bolus	Less residue	Difficult to monitor
Lingual resistance	Push tongue against palate or other object for resistance	Increased strength of lingual muscles	Improved force of swallow	Few clinical studies	Few clinical studies
Head lift exercise	Lie supine and raise head isometric and isotonic	Strengthen submental muscles	Improved opening of upper esophageal sphincter	Less residue and less aspiration	Few clinical studies; patient selection; compliance

strate a safe and efficient swallow on a consistent basis. And, they must be able to consume adequate food or liquid to support nutrition requirements.

Specific to patients with acquired brain injury or stroke, Buchholz⁵³ has presented a clinical algorithm with valuable suggestions for transitioning tube-fed patients to oral feeding. The initial phase of weaning from tube feeding is termed the *preparatory phase*. This phase focuses on physiologic readiness for oral nutrition and incorporates medical and nutrition stability, implementation of intermittent tube feeding, and swallowing assessment. The second phase, weaning, is described as a graduated increase in oral feeding, with corresponding decreases in tube feeding. Once a patient is able to consume 75% or more of their nutrition requirements consistently by mouth for 3 days, all tube feedings are discontinued. Specific clinical parameters to evaluate for patients being weaned from enteral nutrition support include weight, hydration, and swallowing ability, with a specific focus on respiratory complications. No data are presented to support the specifics of this weaning approach in this population. However, there are data from other populations that pursue different recommendations and criteria for tube removal.

Naik and colleagues⁵⁴ evaluated predictors of feeding tube removal (and return to oral feeding) in cancer patients before PEG tube placement. Four clinical variables predicted PEG removal and return to oral feeding in these patients: age <65, localized head and neck cancer, serum albumin level ≥ 3.75 g/dL, and serum creatinine level <1.1 mg/dL. In the multivariate analyses, only age and localized head and neck cancer predicted resumption of oral feeding with PEG removal.

Clinical reality dictates that patients vary in terms of need for feeding tube placement and in terms of readiness and success of feeding tube removal. In fact, not all tube-fed patients seek feeding tube removal. In addition, the process of transitioning from feeding tube to oral feeding can be challenging both cognitively and physically for some patients. Following are some suggestions based on our clinical experience with tube-fed patients. We exercise caution in interpretation of these strategies similar to the algorithm offered by Buchholz.⁵³ These suggestions are based on clinical plausibility and experience and have not been rigorously tested.

Patient Goals to Remove Feeding Tubes

Patients with feeding tubes typically consider the removal of the tube to be their primary goal, although some patients prefer to continue tube feedings even if return to some degree of oral intake is deemed possible. However, the *process* to transition from tube to oral feeding should be thoroughly discussed with the patient and a plan of action outlined. For example, patients may be too aggressive when returning to oral feeding, experience

failure, and then cease any attempts to return to an oral diet. Other patients are less aggressive and require more guidance and structure to make the transition. Often, it is advisable to discuss simple and patient-specific goals for transitioning to oral feeding. One example might be for the initial goal to be oral intake of a single material to the point of nutrition adequacy. At this point, the feeding tube might be removed and subsequent goals focused on the expansion of the oral diet. In all cases, the initial step is to determine the safety of any material taken by mouth and to provide the patient experience and practice in a safe treatment structure until they progress to the point where the type and amount of material consumed orally can be expanded. We have found the "functional oral intake scale" to be a useful tool to focus discussions on oral diets with patients.¹² We developed and validated this tool to reflect an estimate of a patient's daily intake of food and liquid. Clinically, this simple ordinal scale helps to focus a patient's goals for resuming or increasing oral feeding.

Criteria for Safe Oral Intake of Food and Liquid

Swallowing safety usually is defined by one's ability to protect the upper airway throughout an entire meal without postprandial complications. Failure to protect the upper airway may be the result of poor cognitive status, failure of the mechanism (weakness or incoordination), or a combination of both. Therefore, the return to oral feeding often is predicated on improvement in both cognition and the physiologic ability to direct a bolus safely into the esophagus. Good cognition often is predictive of swallowing success if the mechanism is functioning.⁵⁵ For some patients, gastrostomy tubes provide the needed nutrition to improve overall muscle strength and cognitive status. For others, the stabilization of, or improvement in their medical status may provide the impetus for a reevaluation of their oropharyngeal swallowing safety. A stable respiratory pattern is particularly desirable because those with respiratory problems that required mechanical ventilation are at high risk for aspiration.⁵⁵ Patients with a reduced energy level, either from respiratory fatigue or from general medical decompensation, often have slowed swallow responses and are therefore potentially unsafe during swallow attempts.¹⁹ Ideally, the patients' cognitive status should allow them to appreciate the eating circumstance, follow at least 1-step commands, and be able to cooperate either with self-feeding or with assisted feeding.

Choosing the Initial Material for Oral Intake

The choice of initial materials to reinitiate oral feeding in the tube-fed patient is complex and based on findings from both the clinical and instrumental swallowing examinations. Key considerations will focus on the patient's ability to control the material

in the mouth and to transit this material to the pharynx. For example, stroke patients with oral weakness may have difficulty controlling a liquid material, which may leak anterior from the lips or posterior into the pharynx and into an open airway. Conversely, patients recovering from treatment for head and neck cancer sometimes perform better with thin liquids as a result of xerostomia. Beyond the oral stage of the swallow, the speech-language pathologist will be concerned with the patient's ability to protect the airway during the swallow and the potential for aspiration of postresidue associated with ineffective transport. As a result of clinical and instrumental evaluations with various materials, the speech-language pathologist is likely to recommend not only a specific initial material for oral intake but also some basic intervention strategies such as specific postures or swallowing adaptations that function to increase airway protection or reduce postswallow residue (see Table 5).

Return to Oral Feeding

Once the nutrition goals and requirements for behavioral intervention have been identified, the patient may be ready for oral intake. Unfortunately, swallow safety does not always mean that the patient is able to ingest an adequate amount of nutrition in order to allow the feeding tube to be discontinued. Strict documentation of oral intake is necessary to determine whether supplemental nutrition may be needed *via* the feeding tube.

Attempts at oral ingestion should be made at times when the stomach is not full, taking full advantage of the hunger drive. Continuous feedings should be modified to an intermittent schedule to reinvolve normal hunger cycles.⁵³ Ideally, intermittent feedings should be well tolerated before oral ingestion is attempted.⁵⁶ Attempts at oral feeding should be accomplished with the patient fully upright and alert. Patients with small-bore nasogastric tubes may find that the presence of a tube in the oropharynx bothersome, although there is little evidence that the small-lumen tubes interfere significantly with the swallow response.⁵⁷ For patients who have fluctuating mental status, attempts at oral ingestion should be made when their pattern of alertness is maximal. Therefore, for these patients, return to oral ingestion may only involve attempts at 1 or 2 meals per day. The number of items on their trays may need to be limited due to the difficulty in swallowing them, as established during the clinical or instrumental examination. As tolerance improves, more challenging items in larger amounts can be added. Table 6 summarizes some simple considerations in developing a strategy to transition the tube-fed patient to oral feeding.

Summary

Enteral nutrition support is an essential component of rehabilitation for patients who experience

Table 6
Suggestions for transitioning tube-fed patients back to oral feeding

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- Identify a safe oral bolus
 - Provide intermittent tube feeds
 - Ingest oral feedings before tube feeding
 - Reestablish a normal meal routine
 - Provide a specific diet in the initial stages
 - Document the type, amount, and time to eat of all materials taken by mouth
 - Document any problems with the oral diet and any complications
 - Involve patient/family in preferences for advancing oral diet
 - Monitor swallow performance, nutrition and hydration, and respiratory complications
-

severe swallowing difficulties. However, as difficulties with swallowing improve, these same patients are candidates to return to oral feeding. The speech-language pathologist, working as part of an integrated healthcare team, plays an essential role in evaluating, monitoring, and treating the tube-fed patient with dysphagia. Understanding the factors that indicate readiness to return to oral feeding and developing a strategic plan for the patient to follow during the transition are critical factors in determining the success of reinstating oral intake in the tube-fed patient.

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