Dementia is a disorder of complex functions of the brain affecting approximately 4 million Americans. Hedonic stimuli such as hunger and satiety are affected in dementia resulting in inability to maintain sufficient nutritional requirement. Atrophy of muscles of deglutition over time affects normal swallowing pattern and can result in serious consequences such as aspiration. Our simple algorithm will be useful for primary care physicians to approach various physiologic and artificial means of feeding for patients with this condition.

**INTRODUCTION**

Dementia, a syndrome that affects numerous complex functions of the brain, affects more than 4 million Americans at an estimated annual cost of over $100 billion. It is a deterioration of acquired cognitive abilities that affects activities of daily living. The most common cognitive ability affected by dementia is memory. The skills of language, visuospatial ability, calculation, judgment, and problem solving are also affected. Inability to recognize hunger and fulfill the desire of eating commonly results in weight loss in dementia.

**Physiology of Swallowing**

Multiple complex chemoreceptors in the gut take part in the afferent signal pathway to the brain in order to control hunger and satiety. The perception of stimuli (also referred to as hedonic stimuli) in the frontal lobe, such as thought, smell and vision of food, activates the hunger center in the hypothalamus that results in salivation, gastric acid secretion, and peristalsis of the gastric musculature.

The process of deglutition begins with a voluntary phase, where a food bolus is pushed into the pharynx by a backward motion of the tongue. This bolus activates oropharyngeal sensory receptors that initiate the deglutition reflex, a complex involuntary phase, which prevents food entry into the airway and propels the bolus into the esophagus. During this process, the larynx moves forward, the superior pharyngeal constrictor contracts against soft palate and initiates a peristaltic contraction that moves the bolus through the pharynx into the esophagus as the upper esophageal sphincter opens. The sequential peristalsis in the esophagus pushes the food towards the lower sphincter that opens upon bolus entry into the esophagus and remains open until the bolus enters into the stomach.

**Impairment of Oral Intake in Dementia**

Progressive impairment of ability to perceive hedonic stimuli in advanced dementia may cause decreased oral intake by diminishing hunger. Due to the deficits in cognitive abilities required for successful meal ingestion, the patients with dementia suffer from inadequate oral intake. Decreased perception of hunger and satiety sensation also occurs in patients with advanced dementia. Elderly patients with multiple co-morbidities such as stroke may have additional musculoskeletal impairments that hinder adequate food intake.

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intake. Patients who live alone or have limited support at home are vulnerable to severe complications resulting from impaired nutritional intake.

The musculature of the oral cavity, pharynx and the esophagus may develop disuse atrophy over time. Oropharyngeal sensations weaken due to absence of bolus in the mouth and decreased salivation. Gradually, there is an interruption of this delicate sensorimotor cascade of swallowing that leads to uncoordinated movements of tongue, larynx, oropharynx, and upper esophageal sphincter. Consequently, muscles of swallowing fail to coordinate bolus propulsion into the esophagus. The larynx may open in the presence of bolus; this leads to aspiration into the lungs. Persistent poor oral intake results in decreased salivation, gastric acid secretion, gastric, intestinal, and colonic peristalsis. This phenomenon further impairs brain-gut axis of the gastrointestinal system by decreasing afferent stimuli to the brain.

Table 1. Pearls to improve oral intake and prevent feeding related complications in patients with dementia.⁴

<table>
<thead>
<tr>
<th>Improving Oral Intake</th>
<th>Preventing Aspiration Pneumonia</th>
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<tbody>
<tr>
<td>Identify preferred food and provide large quantity</td>
<td>Check mental status prior to each meal</td>
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<tr>
<td>Change flavors, amount and consistency</td>
<td>Sit upright while feeding</td>
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<tr>
<td>Use hot or cold items</td>
<td>Limit bolus size and allow time to swallow</td>
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<tr>
<td>Enhance flavor with condiments</td>
<td>Minimize/avoid clear liquid intake</td>
</tr>
<tr>
<td>Establish timely delivery</td>
<td>Clear pharynx with multiple swallows and gentle cough</td>
</tr>
<tr>
<td>Adjust feeding time as necessary</td>
<td>Examine oral cavity after each meal</td>
</tr>
<tr>
<td>Consider bedside supplements and use as needed</td>
<td>Supervise during eating</td>
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<tr>
<td>Consider midday meal</td>
<td>Restrict conversation during a meal</td>
</tr>
<tr>
<td>Provide frequent reassurance</td>
<td>Regular dental examination</td>
</tr>
<tr>
<td>Maintain daily diary of total food intake</td>
<td>Prompt evaluation if signs/symptoms of aspiration develop</td>
</tr>
<tr>
<td>Encourage family members to feed the patient</td>
<td>Use of straw to sip small quantities of liquid</td>
</tr>
<tr>
<td>Consider providing ethnic food of patient’s choice</td>
<td>Avoid food that is hard to chew/swallow</td>
</tr>
<tr>
<td>Encourage feeding with home cooked food</td>
<td>Keep oral cavity/lips moist by lemon glycerin swabs, hydrating lotion</td>
</tr>
<tr>
<td>Simulate “at home” experience while feeding</td>
<td>Periodic suction of oral secretions</td>
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Management
A detailed history and physical examination frequently reveals evidence of nutritional deficiency. Weight loss in patients with advanced dementia is a poor prognostic marker. According to the works of Wallace et al and Guyonnet et al, two modes of weight loss are described: slow progressive weight loss and severe weight loss. A weight loss of 4% of total body weight within one year is considered progressive and is an independent risk factor for mortality in the elderly population. A weight loss of 10% of total body weight within one year is considered severe. A comprehensive hematologic and metabolic laboratory analysis should be performed to rule out endocrine, metabolic, and hematopoietic disorders. A comprehensive dietary evaluation and a calorie count should be performed. A trial of foods with diverse consistency (puree, thick nectar, well-ground, liquid) should be performed (Figure 1). Assisted and supervised feeding is helpful in ensuring adequate calorie intake and to prevent aspiration (Table 1).

Tube Feeding
A nasogastric or nasoduodenal tube can deliver nutrition to the gut for the patients unable to eat effectively. However, these methods can be used temporarily and are associated with adverse events such as dislodgement, blockage, and development of sinusitis. Percutaneous endoscopic gastrostomy (PEG) tube delivers nutrition and medication into the stomach and can be used on a long-term basis. The family members, medical and nursing team should be explained the rationale, risks, benefits, and alternatives to the PEG feeding. It must be emphasized that tube feeding does not improve survival, prevent weight loss or risk of aspiration in patients with dementia. Tube feeding does not improve hemoglobin or albumin levels.

In a study of terminally ill patients with dysphagia due to cancer and stroke, the patients retained their awareness to hunger and thirst most of the time. The

Figure 1. Schematic representation of suggested evaluation of swallowing in a patient with dementia.
Abbreviations: PEG- Percutaneous endoscopic gastrostomy CT- Computed tomogram
patients who expressed hunger received a small amount of food, while those experiencing thirst and dry mouth received mouth swabs, sips of water, ice chips, and lubrication of the lips. The amount of food and liquid given to them was significantly less than the amount needed to replenish their losses. But, a majority of these patients (84 percent) reported alleviation of their hunger and thirst.4,6 Another prospective study did not show a significant difference in the mean patient comfort score between pre-dehydration and dehydration phases.4,7

Other Considerations

The patients, family members and decision makers often expect dramatic improvement in functional status, illness and survival from artificial nutrition and hydration.4,10 However, a few cohort studies did not demonstrate such an outcome.4,8,9 This was also found in acutely ill patients with severe dementia.11 The mortality rate approaches 50 percent at six months in such patients.4,11

Several non-clinical factors often influence the decision for the means of feeding a patient with dementia. Many physicians fear a legal action if an alternative feeding method is not arranged in patients with severe dementia.4 The alternative of hand feeding is labor intensive and may not be feasible in long-term care facilities. Thus, nursing home residents are at higher risk of receiving a feeding tube.4,11 Progressive decrease in oral intake is expected as a part of natural course of dementia. The decision not to feed by artificial means can be equally difficult especially when the patient enters the stages of progressive weight loss and malnutrition.12

PEG placement is associated with increased risk of procedure related and feeding tube related complications.13 PEG site infection, leakage, buried bumper, dislodgement, blockage, gastric outlet obstruction, diarrhea and increased gastroesophageal reflux are commonly related to long-term tube feeding.13 Interestingly, a study found that patients with severe dementia were 90 percent more likely to receive “mittens” and 71 percent of these required placement of additional restraints.4,14 Placement of physical restraint may potentiate aggravation, agitation of a patient with dementia and lead to the use of pharmacologic restraints.4,15 These adverse events associated with the use of feeding tube in patients with dementia may result in increased suffering.4

CONCLUSION

Patients with advanced dementia are likely to suffer from nutritional deficiency due to insufficient oral intake. Dedicated attempts should be made in order to identify and treat correctible causes of reduced oral intake. A dietary plan should be designed to provide sufficient nutrition in a form that is palatable and can be administered orally without complications. The nursing staff and family members should be encouraged to hand-feed and supervise the patient during their meals. The decision to feed by artificial means is complicated and will have to incorporate a multi-pronged discussion surrounding factors like advance directives, emotional concerns, ethical, cultural and religious issues.

References