



# Eating While Receiving Mechanical Ventilation

Q Can patients receiving mechanical ventilation with a tracheostomy eat?

A Maureen A. Seckel, RN, APN, ACNS-BC, CCNS, CCRN, and Kim Schulenburg, MA CCC-SLP, reply:

### Swallowing in Patients With a Tracheostomy Who Are Receiving Mechanical Ventilation

Swallowing dysfunction or *dysphagia* occurs in approximately 50% of patients with a tracheostomy receiving mechanical ventilation, with elderly patients at higher

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risk.<sup>1,2</sup> Patients with prior dysphagia, concomitant neuromuscular disease, or other comorbid conditions are at much higher risk.<sup>3</sup> A tracheostomy alone creates an open hole in a closed system.

Airflow in these patients bypasses the larynx during inhalation and exhalation because the tracheostomy tube is located below the level of the vocal cords (see Figure). These airflow and pressure changes lead to disruption of the normal adduction of the vocal cords, folding of the false vocal cords, closure of the entrance to the laryngeal vestibule, inversion of the epiglottis, and upward movement of the larynx, all of which help to protect the airway during swallowing.<sup>5</sup>

Mechanical ventilation and the need for an inflated cuff to prevent loss of tidal volume lead to additional swallowing compromise. Laryngeal elevation as a protective mechanism may be limited by the anchoring effect of the inflated cuff.<sup>6</sup> The cuff itself is not a total mechanical barrier to secretions. Cuff inflation does limit copious secretions from leaking below the cuff into the lower airways. However, it does not protect food and liquid from being aspirated because the cuff is below the vocal cords. Food and liquids could pool

above the cuff and potentially lead to ventilator-associated pneumonia.<sup>7,8</sup> Additional potential adverse changes in swallowing include difficulty coordinating breathing and swallowing, muscle atrophy due to disuse, chronic laryngeal damage, and desensitization.

#### Definitions

*Dysphagia:* Any swallowing dysfunction in the 4 stages of swallowing: oral preparation, oral, pharyngeal, and esophageal.

*Aspiration:* The entry of foreign material below the level of the vocal cords.

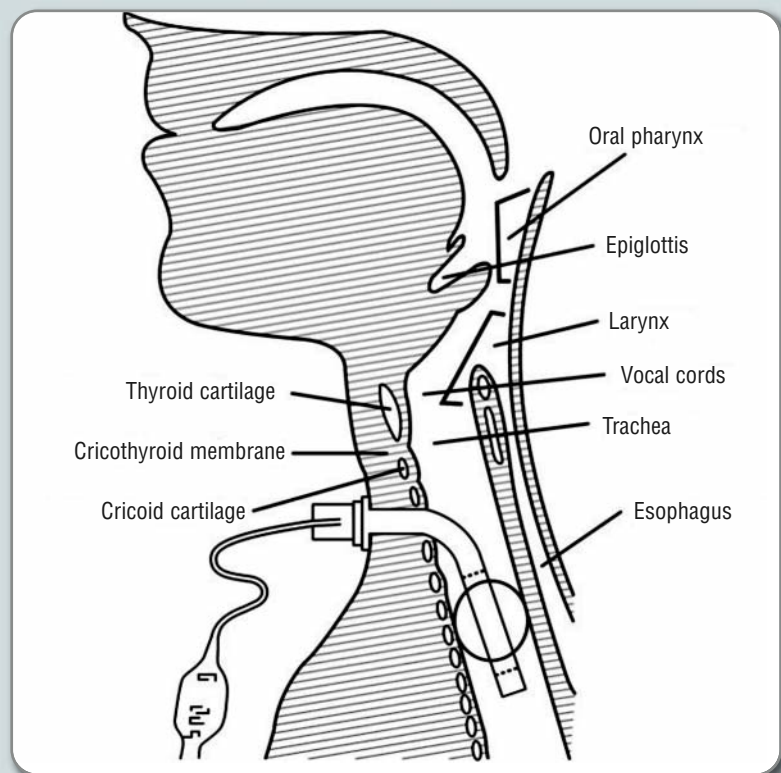
*Silent aspiration:* Aspiration without a cough or clearing of the throat to protect the airway because of decreased sensation.

*Penetration:* Foreign materials in the larynx above the vocal folds (increases risk of aspiration).

*Choking precautions:* Sitting upright and eating and drinking at a slow pace while following the recommended strategies and diet consistencies.

#### Readiness to Swallow and the Role of the Speech Language Pathologist

Although not all patients may be suited for an oral diet, many patients with tracheostomy tubes and mechanical ventilation can



**Figure** Tracheostomy tube located below the vocal cords.

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safely swallow and may obtain all or part of their nutritional requirements through an oral diet.

A speech language pathologist (SLP), also commonly referred to as a speech therapist, specializes in the diagnosis and treatment of dysphagia, speech, and cognition disorders. SLPs are important members of the health care team, working with long-term ventilator-dependent patients and helping to evaluate for cuff deflation, speaking options (including speaking valves), and oral intake (depending on the goal of care). The SLP completes a chart review with a focus on the patient's age, duration of intubation, comorbid conditions, history of dysphagia, respiratory function, ventilator settings, and ventilator weaning plan. Physical examination of the oral mechanism

and ice trials may be done to test readiness for food acceptance, oral transfer, and laryngeal elevation.

Although aspiration occurs frequently in ventilator patients with a tracheostomy, most such patients can safely begin some level of oral intake after an objective study of their swallowing. Studies have shown that 50% to 82% of patients who aspirate are silent aspirators, and objective swallowing studies are important determinants of safe oral intake.<sup>2,9</sup> The patient is not coughing or clearing the throat because of decreased sensation, so it appears that their swallowing is safe. In reality, they could be silently aspirating and at high risk of pneumonia developing. Objective studies are the only way to assess the presence of silent aspiration and provide the only

opportunity for an SLP to assess compensatory strategies. Strategies are postures (eg, chin tuck, head turn) or techniques (eg, effortful swallow, liquid wash) that protect the airway in the event that a patient does aspirate.

## Objective Studies of Swallowing

### *Fiberoptic Endoscopic Evaluation of Swallowing*

This test is done by using a small flexible fiberoptic tube inserted transnasally into the pharynx. The SLP can observe secretion management, vocal fold function, and swallowing function with many liquid and solid consistencies. Benefits of the study are that it can be done at the bedside with the patient in a natural eating position. Swallowing strategies to eliminate aspiration can be tried and silent aspiration can be detected.

### *Videofluoroscopic Swallowing Study*

This test is done in the radiology department with the patient swallowing various consistencies of barium under fluoroscopic monitoring. The SLP can examine all stages of the swallow under direct view and a video image is recorded of the swallow from mouth, pharynx, and esophagus in a lateral and/or anteroposterior view. Swallowing strategies to eliminate aspiration can be tried and silent aspiration can be detected.

### *Modified Evans Blue Dye Procedure*

This screening test is done at the bedside by the SLP. A minimal amount of blue dye is mixed with

one food consistency at a time. The patient's secretions are monitored for blue for a 24- to 48-hour period. If blue dye is expectorated or suctioned from the tracheostomy tube, it indicates that the patient aspirated that food or liquid consistency. This test does not indicate the degree of aspiration or the cause of the aspiration. If no dye is detected, progression to the next level of consistency is tested by the SLP.

Note: In 2003, the Food and Drug Administration issued a public health advisory based on toxicity and mortality reports regarding the use of blue dye in enteral feeding.<sup>10</sup> In addition, multiple studies showed that the use of blue dye lacked sensitivity for detecting aspiration from tube feeding.<sup>11</sup> However, little evidence indicates that the small amounts of blue dye used by SLPs to test for aspiration of oral foods and liquids is harmful in this controlled procedure.<sup>12</sup>

### Diet Options

Diet options are dependent on clinical assessment and objective testing. Food consistency may be pureed, chopped, mechanical soft, or regular. Fluids may be thin (normal consistency), honey thick, or nectar thick. Commercial thickeners are available along with prepackaged products. Thickened liquids allow more control in the mouth and thus allow extra time for airway protection. The best functional exercise for swallowing is swallowing.



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Allowing patients to start oral diets with modified consistencies enables laryngeal function and thus limits atrophy.

End-of-life care may also include diet options for quality of life. Quality of life for patients who are awake, alert, and requesting to eat should be a strong consideration when contemplating initiating a swallowing evaluation on a patient receiving mechanical ventilation. The SLP's role is to initiate a safe diet that meets the patient's goals of care in conjunction with the health care team. **CCN**

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Financial Disclosures  
None reported.

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