“The swallow is a reflex”

The phrase “the swallow is a reflex” may often be stated by clinical supervisors or physicians to explain the physiology of a swallow; however, this statement is not necessarily correct and may be viewed as an overgeneralization. Swallowing is a complex sensorimotor biological function that contains involuntary and volitional behaviors controlled by cortical, subcortical, and brainstem structures (Hamdy, Rothwell, Aziz, & Thompson, 2000; Sörös, Inamoto, & Martin, 2009). It consists of interdependent stages involving the oral cavity, pharynx, and esophagus. Volitional control of the swallow occurs during the oral phase, in which material is masticated within the oral cavity and the bolus is transferred posteriorly towards the pharynx. Various studies have been conducted utilizing positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) to evaluate and document the extent of cortical involvement in swallowing.

Cortical involvement has been identified in studies evaluating volitional control of swallowing with water and saliva. fMRI results identified increased activation within the lateral precentral, lateral postcentral, and premotor cortices during swallowing, providing evidence of overlapping neural network involvement in the brain (Sörös et al., 2009). Further studies utilizing PET scans identified increased activation within the insular, brainstem, and cerebellum, showing asymmetrical involvement (Hamdy et al., 2000). In addition, individuals can swallow on command, as often seen during videofluroscopy sessions, furthering providing evidence regarding cortical involvement. If swallowing was simply a reflex, the individual would swallow with or without a command from the clinician. However, if a client chooses, after placing food or liquid within the oral cavity, they can refuse to masticate, formulate, and transfer the bolus posteriorly, thus not engaging the swallow reflex.

Individuals may argue that after the swallow has been initiated, it cannot be undone; therefore, it must be a reflex. While it is true that once the bolus has reached the pharynx and the pharyngeal phase has begun, it cannot be terminated, the swallow is more complex. The term reflex refers to an involuntary response to stimuli involving afferent and efferent neurons. During a reflex arc, sensory information is transmitted along an afferent neuron to the spinal cord and then along the efferent neuron, bypassing involvement from the brain (Waxman, 2010). As identified on fMRI and PET scans, cortical involvement is necessary in swallowing and involves multiple cortical structures. Individuals advocating the theory of swallowing as a reflex may further argue that sensory information pertaining to the viscosity of a bolus initiates laryngeal elevation and upper esophageal sphincter (UES) opening (Teismann et al., 2007). However, a study conducted utilizing topical anesthesia within the oral cavity as a means to decrease sensory input discovered decreased activity within the primary motor cortex and short-term dysphagia (Teismann et al., 2007). If the swallow was simply a reflex, impediments within the cortex would not facilitate dysphagia.

In conclusion, the swallow is a complex sensorimotor biological function. When functioning normally, the swallow presents with involuntary and volitional control of interdependent stages and activation of various structures within the cerebral cortex. Therefore, the complex nature of swallowing cannot be reduced to an overgeneralized statement of a swallow reflex.
Pulse oximetry

Some people believe that the use of pulse oximetry can be utilized as a bedside indicator of aspiration. The utilization of pulse oximetry is preferred among some facilities as a diagnostic tool in comparison to videofluroscopy (VFSS) regarding identification of dysphagia among patients. Pulse oximetry provides numerous advantages as it is noninvasive, requires no exposure to radiation, provides objective quantitative measurements, and involves minimal patient cooperation (Wang, Chang, Chen, & Hsiao, 2005). Pulse oximetry provides a measurement of arterial oxygenation saturation (Sp02) obtained from the ratio of red to infrared light pulsating through a vascular bed, such as a finger (Colodny, 2000). Numerous studies have evaluated the accuracy of pulse oximetry’s identification of aspiration and have concluded no substantial relationship of clinical significance.

A study conducted by Wang et al. (2005) evaluated Sp02 simultaneously during VFSS. Patient’s levels of oxygenation were monitored during the VFSS under conditions of thin, thick, and regular consistencies. The precise time of swallowing and occurrence of penetration or aspiration were compared to their Sp02 measurement. Results of the study found no significant correlation between decline in Sp02 and the presence of aspiration (Wang et al., 2005). Furthermore, an additional found similar results when they evaluated the success in which oximetry could identify episodes of aspiration in patients with neurogenic dysphagia. Results of the study determined no significant relationship between Sp02 and aspiration (Sellars, Dunnet, & Carter, 1998).

As with any form of measurement utilized to diagnose a patient, no one singular form should be used as the basis for a diagnosis. The use of pulse oximetry alone should not be used to state if a patient is an aspirator or not, in the same way videofluroscopy should not be used as a justification to change a patient’s diet. It is critical to evaluate the patient as a whole and not make alternations to their diet based on one data point. The utilization of pulse oximetry alone does not provide visual evidence of aspiration. If a facility relied solely on pulse oximetry, and results stated the patient was not an aspirator, and the patient did aspirate, the facility could suffer legal consequences. Therefore, if a facility were to use pulse oximetry, it should be used in conjunction with videofluroscopy to identify aspiration.

Tube Feeding

If a family member were to say, “Dad is receiving tube feeding, so at least we won’t have to worry about him aspirating,” that statement would not be correct. The term tube feeding is misleading. Feeding refers to the voluntary movements of food into the mouth and chewing it. It does not involve swallowing and as caretakers, we can help someone place food into their mouth by feeding them ourselves. However, we cannot swallow for them, and thus, in instances where the swallow is compromised, a feeding tube is used. While the feeding tube directly places nutrients into the body without using the mouth, the mouth still has bacteria living in it. Think about how your mouth feels when you wake up in the morning. Did you eat while you were sleeping? No, but your mouth still feels dirty because we have various forms of bacteria living there. The same bacteria lives in your father’s mouth even though he has not ingested food. It is very important to understand that bacteria live in our mouth and food and liquids are not the only things we aspirate.

Aspiration occurs when material (e.g., saliva, food) reaches the level of the voice box, also known as the vocal folds. Normally, when we swallow, the entrance to our lungs is closed.
off to allow the material to go to the esophagus, which leads to the stomach. Everyone has aspirated, and in healthy individuals, we often cough when we have. But in individuals with swallowing problems and who aspirate, it may be silent (meaning they do not cough). However, during aspiration, whether it is silent or not, the material is misdirected and goes below the vocal folds and into the airway (Finucane, Christmas, & Travis, 1999). It is a common misconception that individuals who are tube fed do not aspirate. This is not true because we can aspirate our saliva and reflux (Finucane et al., 1999). Even though food may not be taken in through the mouth, people continue to produce saliva and sometimes reflux, all day and throughout the night. If good oral care is not provided, due to the belief that it is unnecessary as they are being tube fed, your father can aspirate bacteria (El-Solh, 2011). In addition, if he has reflux, he may aspirate stomach acid.

Aspirating bacteria is very harmful and can lead to pneumonia. Pneumonia refers to a bacterial infection within the lungs resulting from aspiration of bacteria from the mouth or the regurgitation of stomach acid, also known as reflux (Yamaya, Yanai, Ohrui, Arai, & Sasaki, 2001). Therefore, it is essential to remember that tube feedings are not always healthier for the patient. It is a simpler means of providing nutrients to the body when it cannot be swallowed. However, not all aspiration is harmful to your father’s health. It all depends on what was aspirated. If your father aspirates saliva, but it is clean and not filled with oral bacteria, then his chances of developing pneumonia are very small. It is vital to always remember the importance of oral care in people who have tube feedings and to always remember tube feedings do not prevent aspiration or pneumonia.
References


