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Swallowing Disorders and Their Management in Patients with Multiple Sclerosis

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INTRODUCTION

Permanent and transitory swallowing disorders (dysphagia) occur in patients with multiple sclerosis (MS) (Abrahams & Yun, 2002; Bergamaschi, et al., 2008; Calcagno et al., 2002; De Pauw et al., 2002; Poorjarad et al., 2010; Prosiegel et al., 2004; Wiesner et al., 2002). In fact, swallowing disorders may be present long before the person with MS experiences any related symptoms.

In 1987, Dr. Angie Fabiszak studied three groups of individuals (Fabiszak, 1987): healthy controls with no diagnosis of multiple sclerosis or other medical problems; patients with MS but no complaints of swallowing problems; and patients with multiple sclerosis who were complaining of a swallowing disorder. Results of x-ray studies (modified barium swallow) on these patients revealed that both of the groups of patients with multiple sclerosis exhibited similar abnormalities in swallowing, whereas the normal control group exhibited no swallowing disorders. In recent years, several other investigators have corroborated the fact patients with multiple sclerosis frequently exhibit swallowing disorders, even if they have no such complaints.

It is, therefore, important for the MS patient's primary care physician to refer the patient with multiple sclerosis—with or without a complaint of swallowing problems—for a full workup of his or her oropharyngeal and esophageal swallowing function as soon as the patient has a diagnosis of multiple sclerosis, in order to establish a baseline swallow physiology against which to compare any future changes.

NORMAL SWALLOWING

Normal swallowing involves cortical control of the facial muscles and tongue in placing food in the mouth, manipulating and tasting the food, chewing it, and forming it into a ball or bolus to be swallowed. Once the bolus is formed, the tongue begins to propel the food, or part of it, into the

pharynx (throat), where control of the process is taken over by the brainstem (medulla). The movements of the tongue and bolus in the oral cavity stimulate sensory nerve endings which, in turn, trigger muscle contractions in the pharynx, initiating the pharyngeal stage of the swallow. When the pharyngeal swallow is triggered, a number of motor components are initiated:

1. The soft palate closes to prevent food or liquid from going into the nose.
2. The larynx (entrance to the airway) lifts and closes to prevent food or liquid from entering the trachea
3. The base of the tongue and walls of the throat converge to create pressure at the back of the bolus, propelling it throughout the pharynx into the esophagus.
4. The upper esophageal sphincter (located at the top of the esophagus) is pulled open by hyolaryngeal elevation to enable the food to enter the esophagus.

Once in the esophagus, sequential esophageal motor contraction (peristalsis) propels the bolus through the esophagus to the stomach. The lower esophageal sphincter opens to allow the bolus to enter the stomach. The entire swallow, from placement of food in the mouth through entrance to the stomach, occurs *rapidly* (1 second in the oral cavity, 1 second in the pharynx, and 8–10 seconds in the esophagus), *safely* (with no aspiration), and *efficiently* (with minimal residue).

The normal swallow depends upon a well-functioning central nervous system, including cortical and subcortical areas, the brainstem, and peripheral nerves—particularly cranial nerves. If the patient's MS lesions affect any of these areas, swallowing may be challenged. Many patients with MS will cough if food enters their airway or will require multiple swallows to clear food that has been left behind in the pharynx. Keep in mind, however, that patients who are experiencing reduced sensation may be unaware that food particles have entered the airway or that residual food particles have been left in the pharynx; they will not cough or repeat their swallows in spite of the need to do so.

BASELINE SWALLOW ASSESSMENT: THE MODIFIED BARIUM SWALLOW AND ESOPHAGRAM

The patient with multiple sclerosis should receive a *modified barium swallow* to examine oral and pharyngeal swallow physiology, followed by an *esophagram* to examine esophageal function. The modified barium swallow is preferred because the MS patient may aspirate when given the usual large-volume swallows, including cup drinking, which are used for a standard barium swallow. In contrast to the standard barium swallow, the modified barium swallow is designed to introduce calibrated, measured volumes of thin liquids first, beginning with 1 ml, which is similar to a saliva swallow, and building to 3 ml, 5 ml, and 10 ml as tolerated by the patient without aspiration. Then, the patient is given a cup to drink from, followed by several swallows of 3 ml of pudding, and then 2 pieces of Lorna Doone cookie ($\frac{1}{4}$ of a cookie) coated with barium pudding (Logemann, 1993). This procedure, which involves a total of 14 swallows, allows the clinician to identify any abnormalities in the swallow as it progresses at least from small to large volumes of thin liquids, and thin to thicker viscosities. In healthy individuals, both volume and viscosity sequentially change the physiology of the swallow; it is important to determine whether the person with MS exhibits a similar systematic

change in his or her swallow physiology in response to changing volume and viscosity (Logemann, 1998).

In addition to demonstrating the individual patient's swallow physiology, the modified barium swallow makes it possible to introduce and evaluate management strategies should they be needed. Strategies for management are introduced and evaluated on x-ray when the patient aspirates or has significant residual food left in the pharynx after the swallow. By the time the patient has completed the modified barium swallow procedure, the clinician should have identified the patient's swallowing disorders as well as an outline of recommendations for: 1) effective management strategies, including any swallowing therapy procedures that are needed; and 2) optimal, safe diet consistencies. The radiographic study should involve a speech-language pathologist who is familiar with the various management strategies and can introduce and evaluate the immediate effectiveness of the therapies during the radiographic study.

COMMON SWALLOWING DISORDERS IN MS

The most common MS-related swallowing disorders in the oral and pharyngeal areas are:

◆ Delay in triggering the pharyngeal swallow

The delay in triggering the pharyngeal swallow, which is the most common problem seen in MS patients, can cause particular difficulties with liquid swallowing, including aspiration (Logemann, 2000). When the pharyngeal swallow is delayed, liquid may splash from the mouth into the pharynx. Because motor control of the pharynx has not been activated by the brainstem, the airway remains open and the upper esophageal sphincter remains closed, causing liquid that enters the pharynx to splash into the open airway and be aspirated.

◆ Reduction in hyolaryngeal elevation

Reduced hyolaryngeal elevation can contribute to weakened closure of the airway during the swallow and to reduced clearance of material from the pharynx, because the hyolaryngeal elevation is reduced which reduces upper esophagus opening into the esophagus thereby causing residue after the swallow and possible aspiration.

◆ Reduction in tongue base retraction and pharyngeal contraction

Reduction in tongue base activity and/or pharyngeal wall contraction reduces the pressure generated during the swallow, allowing residual food to remain in the pharynx and be aspirated when the patient resumes breathing.

These disorders can be mild, without causing any significant difficulties such as aspiration or inefficient swallow; or, they can be more severe and require therapeutic (behavioral) management.

THE BARIUM SWALLOW EVALUATION

Esophageal disorders require a standard barium swallow evaluation in which the patient is given a cup of barium and asked to swallow sequentially. A typical swallow from a cup or glass includes approximately 15 to 20 ml per swallow, a large volume that can cause difficulty if the patient has any significant

pharyngeal abnormality. For this reason, the modified barium swallow should always precede the barium swallow to identify the locus of oropharyngeal swallow difficulty prior to giving the patient a large volume of liquid in a barium swallow or esophagram.

DYSPHAGIA MANAGEMENT

The goal of dysphagia management is to maintain the patient on a normal diet as much as possible. Generally, two management plans are devised for each patient—one to promote safe and efficient swallowing for oral intake and one focused on exercise/therapy (Logemann, 2006). There are various kinds of strategies that can be introduced, including

- ◆ Postural change—which helps to redirect food along the correct pathway (i.e., away from the airway);
- ◆ Heightened oral sensation prior to the swallow—which enables the patient to get a faster pharyngeal swallow;
- ◆ Voluntary control over swallows, such as holding one's breath to protect the airway, or increasing effort, if possible, to clear a greater amount of bolus per swallow.
- ◆ Exercises to improve range of motion or coordination of the movement in the oral and pharyngeal structures as well as techniques to improve strength in the tongue.

One factor that can play a role in the selection of strategies for swallowing therapy is the patient's level of fatigue. If the patient is extremely fatigued, some swallow therapy strategies are not appropriate.

If the patient experiences significant exacerbations and/or the disease progresses, the nature or severity of his or her swallowing disorder could be expected to change as well. A re-assessment of the person's swallowing problems and a revised treatment plan are appropriate at that time.

Recommendations for Non-Oral versus Oral Feeding

After the videofluoroscopic study of oropharyngeal swallow, the clinician will recommend continued oral feeding, or partial or complete non-oral feeding—depending upon the patient's safety and efficiency of swallow. If the patient is regularly aspirating on all foods, no matter what food viscosity is presented or therapy is used, non-oral feeding may be recommended for two reasons: First, regular aspiration can cause pneumonia; second, whatever the patient aspirates will not provide nutrition or hydration. Several studies have shown that patients who aspirate during the x-ray study have a significantly increased risk of pneumonia in the next 6 months than patients who do not aspirate during the study (Pikus et al., 2003; Schmidt et al., 1994). Non-oral supplements to ensure adequate nutrition and hydration may also be recommended for patients who have been exhibiting weight loss and fatigue when taking food orally. Whether or not the patient exhibits chronic aspiration or fatigue, partial non-oral feeding may be helpful. For example, the patient who aspirates may do so only on certain foods and be able to eat other foods orally. Or, the patient who fatigues easily may eat some foods orally and initiate non-oral nutrition when fatigue sets in.

The two basic types of non-oral feeding that allow food and liquids to be taken into the body without being swallowed are the *nasogastric tube* that goes through the nose and throat into the esophagus and stomach (generally used only on a very temporary basis because of the irritation it can cause to the nose and throat), and the percutaneous endoscopic gastrostomy (PEG) that involves inserting a feeding tube through the abdominal wall directly into the stomach. Both of these options for non-oral feeding are temporary and can be removed or not used when desired. Often patients and their significant others think that a decision to introduce partial or full non-oral feeding means that the patient will never eat by mouth again. This, however, is not the case. Non-oral feeding can serve as a temporary bridge while the patient improves and returns to oral feeding. Thus, at the end of the radiographic study, the recommendation for continued oral feeding, partial non-oral, or full non-oral feeding will be made. This is a recommendation to be carefully considered by the patient's physician, the patient, and their significant others.

Patient and Family Counseling Regarding Swallowing Management

The patient's physician and/or speech-language pathologist can provide counseling to the patient and their family regarding the importance of completing the exercises given in therapy and ways in which the family can facilitate the patient's practice of exercise and application of techniques for swallowing improvement during mealtime.

FOLLOW-UP

It is important for MS patients and their family members to contact both their physician and their speech-language pathologist if the swallow appears to worsen or improve. It is common for dysphagia in patients with multiple sclerosis to wax and wane. This does not mean that swallowing management cannot be done, but rather that the therapy procedures used may need to be changed. The goal of swallowing management is to keep the MS patient from getting pneumonia or losing weight because of a swallowing difficulty.

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