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Swallowing and Speaking Challenges for the MS Patient

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Abstract

The therapeutic team approach helps multiple sclerosis patients meet the challenges of dysphagia (swallowing difficulty) and dysarthria (speech problems). Both stem either from plaques (or lesions) in the brain area responsible for these functions or from demyelination of the nerves in the brain stem. This article addresses diagnosis and treatment.

About one half of multiple sclerosis (MS) patients experience some dysphagia (difficulty in swallowing), possibly because of uncoordinated respiration during swallowing.[1-7] Dysphagia can result from any derangement of the normal orderly process of swallowing. Dysphagia can have serious consequences for the MS patient, including choking or aspiration, as well as the potential development of malnutrition, dehydration, and pneumonia. A 1994 survey of 460 MS and Parkinson's disease patients indicated that 33% of the MS patients had impaired chewing or swallowing.[3]

Difficulties with speech (dysarthria) are about as common in MS patients as is dysphagia. In a 1994 survey, 44% of MS patients reported "impaired speech and voice," and 16% of MS patients reported that a speech disorder was one of their greatest problems.[3]

The complexity and significant impact that speech and swallowing disorders have on quality of life demand a multidisciplinary team management approach. The team, which includes the patient, many health-care professionals, and a speech-language pathologist (Table 1), must assess the patient, diagnose the problem, and devise rehabilitative efforts. Among treatment goals for dysphagia are restoration to full oral intake and a healthy diet.[8] Potential goals for managing speech-language problems include reducing speech nasality, improving loudness control and intelligibility, and devising alternative communication strategies.[9-13] In general, the speech-language pathologist strives to strengthen and extend communication skills.

This article will discuss dysphagia and speech-language disorders such as dysarthria or dysphonia. Causes and treatments are also explored.

Table 1. *The MS Rehabilitation Team.*

- The patient
- Speech-language pathologist
- Occupational therapist
- Physical therapist
- Physiatrist
- Physicians: family practitioner; gastroenterologist; neurologist; neuropsychologist; otolaryngologist; psychiatrist; radiologist
- Pharmacist
- Nurse: nurse practitioner, RN
- Dentist
- Prosthodontist
- Social worker
- Family and friends

Dysphagia

The swallowing center in the medulla controls the complex process of transporting food from the mouth to the stomach. Digestion begins in the mouth, under voluntary control of the jaw and tongue muscles.[14] During the pharyngeal stage, the softened food bolus is transferred into the proximal esophagus. At that point, the swallowing process becomes involuntary and involves multiple cranial nerves. The esophageal stage of swallowing follows: Primary peristalsis (as a consequence of swallowing) and secondary peristalsis (arising from pressure on the inner wall of the esophagus) carry the food into the stomach. Refluxed material can travel upward through the same process.

Causes of dysphagia may include structural abnormalities and cancers as well as several neurologic diseases, such as MS, Parkinson's disease (PD), myasthenia gravis, muscular dystrophy, and Alzheimer's disease (AD).[14] Drugs commonly cause dysphagia, either from side effects or from drug action. Xerostomia (dry mouth), is the side effect from drugs (eg, oxybutynin chloride, to treat neurogenic bladder) that most frequently contributes to dysphagia.[7] Possible strategies include substitution of the drug causing the dry mouth, use of a saliva substitute, or sips of water between meals. The topic of drug-induced dysphagia has been previously explored in the March 2000 issue of this publication.[7]

The stages of swallowing during which dysphagia can occur are expectation (sights, smells and temperature, display);[15] oral preparation; pharyngeal (transfer dysphagia or difficulty in initiating swallowing); and esophageal (transport dysphagia or difficulty in transporting the food bolus) (see Figure).[14,16] Persons with neuromuscular disorders tend to experience combined oral and pharyngeal (oropharyngeal) dysphagia, because the oropharyngeal stage of swallowing requires coordinated movement of the tongue and other oropharyngeal muscles.[14] Clinical experience with MS patients, however, demonstrates persistent esophageal dysmotility despite correction of oropharyngeal difficulties.[14,17]

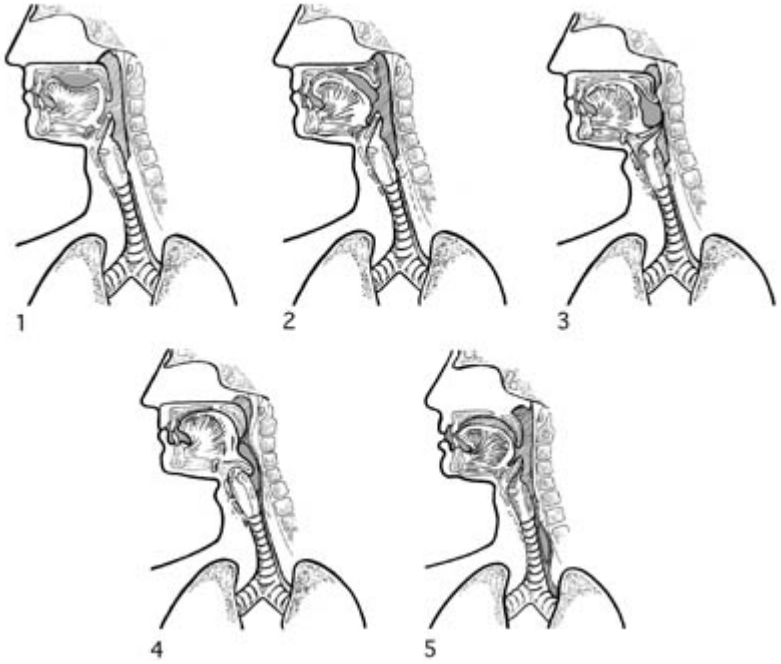

Figure. *Sequence of swallowing: 1) early oral stage; 2) late oral stage; 3) early pharyngeal stage; 4) late pharyngeal stage; 5) esophageal stage.*

Source: Lorman JS.[16] Reprinted with permission.

You can click on this image to see a larger version in a new browser window.

Early signs of swallowing problems include the patient's self-report; pocketing of food in the mouth; weight loss or dehydration; hoarse, wet-sounding voice; frequent throat clearing; change in diet; drooling; regurgitation; decreased food intake; food "sticking in the throat"; and "choking on saliva." Dysphagia may also present as chest pain from the impaction of the food bolus in the esophagus or as regurgitation.[18] In an observational study of 79 MS patients, 43% reported abnormal swallowing.[6] They complained more frequently about abnormal swallowing, coughing when eating, and of food "going down the wrong way" than did the 181 healthy controls ($P < .005$).[6]

Swallowing disorders include obvious or subtle aspiration of food entering the airway below the vocal folds; penetration of food entering the airway entrance (not below the vocal folds); or food residue in the mouth or pharynx.[8] Penetration of the larynx and aspiration may be silent, because of diminished cough reflex. Many MS patients are desensitized to this reflex because of chronic laryngeal stimulation (ie, chronic aspiration).[16]

MS dysphagia patients are at risk for aspiration of food or saliva. Possible signs of aspiration include a wet, gurgling quality of the voice; coughing, sputtering, or choking before, during, or after eating or drinking; cyanosis; rales; wheezing; fever; and increased mucus production. Because aspiration pneumonia is potentially serious and medications may diminish the natural cough reflex, the health care professional should maintain a high index of suspicion for dysphagia.[17] The key for suspecting dysphagia is that the *cough*—not the gag—is the protective reflex for the swallow, and MS patients with dysphagia often cough while eating. The gag does not protect the airway during swallowing, nor does it bring up aspirated material from the airway.[19]

Diagnosis of Dysphagia

In addition to a patient history and a physical examination, the diagnosis of dysphagia is established using several different tests: standard modified barium swallow (rapid-sequence video fluoroscopy); video endoscopy; flexible fiberoptic endoscopic examination; esophageal manometry; esophagography; and esophagogastroscopy.[8] Examining the esophagus is especially useful in determining the cause of motility disorders, because testing with only a standard modified barium swallow may miss them. Most swallowing difficulties in MS patients arise in the oropharynx. However, failure to resolve their swallowing difficulties has led to recommendations for an esophogram, preferably at the same time as the initial standard modified barium swallow.[14]

Esophageal manometry (the definitive test for diagnosing esophageal motility disorders) permits assessment of the upper esophageal sphincter (UES), the lower esophageal sphincter (LES), and contractions in the esophageal body. A transnasal catheter measures esophageal body and sphincter pressures during swallowing of water or occasionally of a cholinergic provocative agent.[14] Esophagography evaluates progression and clearance of food from the esophagus to the stomach; like video fluoroscopy, it can often reveal dysmotility.[14] Esophagogastroscopy investigates mucosal diseases by providing biopsy and cytologic specimens to rule out cancer.[14]

How can a physician tell if the dysphagia is from MS in a patient not previously diagnosed as having MS? MS dysphagia usually accompanies previously observed sensory, motor, visual, or bladder symptoms. The MRI shows white matter lesions and is normally definitive for MS. Additionally, a fluctuating history of dysphagia strongly suggests MS dysphagia. In comparison, sudden onset of dysphagia suggests stroke, while PD and AD patients exhibit gradual progressive onset of dysphagia and idiopathic degeneration of the central nervous system. Motor neuron disease (amyotrophic lateral sclerosis [ALS]) with bulbar palsy (lower motor neuron loss) or upper motor neuron degeneration (pseudobulbar palsy) must be ruled out by laboratory tests and electromyography.[17] Wasting and weakness of the facial, tongue, and pharyngeal muscles of ALS patients may cause dysphagia.

Treatment of Dysphagia

The modified barium swallow yields immediate information on swallowing difficulties and compensatory strategies.[8] In conjunction with a radiologist, the speech-language pathologist observes the patient after the initial swallow. Various foods and liquids are swallowed with the barium, thus allowing observation of changes related to food texture and composition.

Postural techniques should be employed first in an attempt to improve direction of food flow and dimensions of the pharynx. These techniques, combined with sensory enhancement and other therapy strategies, often provide immediate resolution. The other strategies include maneuvers to change tongue movement, close the true vocal cords, or increase the cricopharyngeal opening. Dysphagia patients can be taught compensatory swallowing strategies (see Table 2)[8,20-22] and how to maximize their useful muscles. Pureed foods are designed with eye appeal for encouraging an interest in food and weight maintenance (see "A Dysphagia Diet That Works!").

Immunosuppressant therapy, such as with corticosteroids, has been attempted but is of limited benefit.[17] Other alternatives are being explored.[17]

Table 2. *Postural Techniques Successful in Eliminating Aspiration or Residue From Various Swallowing Disorders.*

Disorder observed on fluoroscopy	Posture Applied	Rationale
Inefficient oral transit (reduced posterior propulsion of bolus by oral tongue)	Head back	Uses gravity to clear oral cavity
Delay in triggering pharyngeal swallow (bolus past ramus of mandible but pharyngeal swallow not triggered)	Chin down[20,21]	Widens valleculae to prevent bolus entering airway; pushes epiglottis posteriorly, increasing airway protection
Reduced posterior motion of the tongue base (residue in valleculae)	Chin down[19]	Pushes tongue base backward toward pharyngeal wall
Unilateral laryngeal dysfunction (aspiration during swallow)	Head rotated to damaged side[22]	Places extrinsic pressure on thyroid cartilage, increasing adduction
Reduced laryngeal closure (aspiration during swallow)	Chin down;[20] head rotated to damaged side	Puts epiglottis in more protective position, narrows laryngeal entrance; increases vocal fold closure by applying extrinsic pressure
Reduced pharyngeal contraction (residue spread throughout pharynx)	Lying down on one side	Eliminates gravitational effect on pharyngeal residue
Unilateral pharyngeal paresis (residue on one side of pharynx)	Head rotated to damaged side[22]	Eliminates damaged side from bolus path
Unilateral oral and pharyngeal weakness on same side (residue in mouth and pharynx on same side)	Head tilt to stronger side	Directs bolus down stronger side
Cricopharyngeal dysfunction (residue in pyriform sinuses)	Head rotated	Pulls cricoid cartilage away from posterior pharyngeal wall, reducing resting pressure in cricopharyngeal sphincter

Source: Logemann JA.[8] Reprinted with permission.

A Dysphagia Diet That Works!

Pureed food often looks so unappetizing that it discourages MS dysphagia patients from attaining proper nourishment. They call pureed food "glop," or "totally unpalatable." They dream of Big Macs™ ! An institutional problem is inconsistent commercial products, as thickened food is defined variously. Accurate definitions and consolidation of products are under way, as some dysphagia patients can tolerate only a narrow range of food consistency.

To produce attractive, palatable food, the "Dining With Dignity" program at Holy Name Hospital, Teaneck, NJ, was established by the Dysphagia Interdisciplinary Committee with the Food and Nutrition Services Department to provide the best possible nutrition to facilitate good health. With great success, they have introduced pureed food that is reshaped to look like "real food." Gelled cookies and carrot "coins" provide visual stimulation and texture to restore pleasure in eating. Patients and family respond gratifyingly: food trays are returned empty, patients are satisfied and sustain their weight, and they respond to the program saying, "My meal looked like food!" "We liked the presentation." "It was great!" "Real cookies!"

Attractively presented pureed food from the "Dining With Dignity" program
Image: Courtesy Holy Name Hospital, Teaneck, New Jersey.

Dysarthria

Dysarthria is a group of motor disorders associated with muscle paralysis, weakness, or incoordination resulting from central or peripheral nervous system damage. Spasticity and poor coordination of the oropharyngeal and respiratory muscles (tongue, lips, teeth, cheeks, palate, diaphragm, and vocal cords) create functional problems with speech and swallowing.[9,23] Problems range from minor speech difficulties to a total inability to speak. Dysphonia, which may be characterized as one component of dysarthria, involves problems with the vocal cords themselves and therefore with voice production.[24,25]

Dysarthria in MS patients is strongly correlated with multiple-system demyelination and disease progression.[26] In 1877, Charcot designated dysarthria as one of the three characteristic symptoms of MS.[27] Subsequently, more than 70% of Darley's 168 patients had impaired control of loudness and harshness, and about half had defective articulation.[26-28] Several investigators list speech symptoms by decreasing frequency of occurrence: 1) impaired loudness control; 2) voice harshness; 3) defective articulation; 4) impaired emphasis; and 5) impaired pitch control.[26,28] There is often a marked nasality or scanned or unintelligible speech.[4,23] The dysarthrias of MS are best categorized as a mixed spastic-ataxic dysarthria (see Table 3).[10,28,29]

Table 3. *Mayo Clinic Classification of Dysarthrias.*

Dysarthria	Neuropathology	Prominent Speech-Voice Symptoms
Spastic	Bilateral upper motor neuron lesion (pseudobulbar palsy) Hypertonia, reduced range of motion	Harsh voice, low pitch, imprecise articulation, and reduced rate of speech
Ataxic	Cerebellar lesions (Wilson's disease) Reduced timing and coordination	Excess and equal speech stress, irregular articulation breakdown, and distorted vowels

Source: Merson RM.[28] Adapted with permission.

Epidemiology of Dysarthria

The estimated prevalence of dysarthria in persons with MS is 40% to 50%.[3,5] Because of the high prevalence, dysarthria is used in the differential diagnosis of MS. Stroke can very likely be excluded as causing dysarthria in young people, but dysarthria is also part of the presentation of PD[30] and ALS.[31] However, vocal tremors occur in different sound wave frequencies for those diseases than for MS.[5,32] In MS patients, there are two general causes for speech problems: 1) lesions in the cerebellum and 2) demyelination in the brainstem affecting the muscles used in speech. Plaque or lesion location can be confirmed by brain scans, because lesions in the cerebellum are closely associated with speech problems in MS.[28]

Hartelius and colleagues investigated testing for dysarthria in MS by analyzing speech with the fast Fourier transform.[5] MS patients have three distinctive bands of instability (bandwidths) that help differentiate MS dysarthria from PD and ALS. The authors judged this test as superior in detecting vocal instability in the MS speakers, despite little evidence of dysarthria in connected speech.[5]

Many investigators have tried to confirm a relationship between declining cognitive ability and deterioration of speech in MS patients. Kujala concluded that impaired language functions may be indicative of disruption of linguistic processes.[33] Incipient cognitive decline in MS may be shown by performance slowness (correlated with more general information-processing slowness).[33] The onset of reduced cognitive ability may be positively correlated with a high prevalence of rare types of speech-language errors.[33]

Tools and Treatments

When dysarthria is treated, rehabilitative efforts usually concentrate on strengthening motor clusters involved in speech production. In surveying 460 MS and PD patients, however, only 2% of the MS group had ever received any speech-language therapy.[3] This suggests an

underutilized opportunity to help this patient population,[3] given the willingness of the patient to participate in a therapy program.

Recovery of speech function and communication are very important for the psychological well-being of the patient and family. Because speech often deteriorates as MS progresses, the team must assess the patient's use of speech and gesture. The team can customize simple or complex communication programs, keeping in mind possible underlying cognitive difficulties in learning new ways of communicating.[11] Silverman suggests administering a relatively "language free" standardized test, such as the Leiter International Performance Scale, which is felt to assess cognitive ability relatively independent of expressive oral and receptive language ability.[11]

After testing the muscle groups, the health care professional should consider suggesting alternative body movements, such as shoulder shrugging and neck tilting, to use for communication.[34] The team should assess a patient's verbal and nonverbal communication style and consider the people with whom the patient needs to communicate (eg, with very young children). Unfortunately, communication is only as good as the communication partner.[35]

Together with maximizing the patient's own ability to communicate, it is helpful to explore the many augmentative devices and communication aids (see Table 4).[14,31,32] Assistive communication devices range from simple boards and enlarged or downsized computer keyboards to more elaborate dedicated microcomputers.[34] They are available through electronics stores and specialty vendors. An all-purpose computer (preferably a laptop) is cheaper than a dedicated speech writer, and it may include a low-cost printer and/or speech synthesizer. Voice recognition software is useful if speech is sufficiently clear. Despite availability, some of these devices are expensive and it may be difficult to persuade a third-party-payer to provide them. Many organizations can provide detailed information on these issues to professionals, patients, and families (see "Resources for MS Information").

Table 4. *Communication Aids for Use With Dysarthria Patients.*

- Computer programs (for PCs and Macintosh) to supplement dysarthria/dysphonia voice therapy. These include programs for articulation, pitch, rhythm, duration, volume, stress, and connected speech elements
- Devices that include visual and auditory feedback for sound, loudness, pitch, voicing onset, timing, phoneme and speech segment production, waveform, and spectra displays
- Supplementary speech synthesizers, eye pointing frame
- Hands-free telephone
- Call bells, personal alarms, typed text messages via the telephone (TTY or TTD); AT&T Relay Service (voice carry-over)
- Various computerized communication aids (eg, small voice amplifiers)
- Special switches for lights, computers, appliances, operated photoelectrically or by foot, mouth (suck-blow), shoulder, eyes, etc
- Communication boards (to display symbols, cues, or words for basic needs); daily communicators (pocket-size devices with pictures to which the patient can point)
- Special typewriter or computer keyboards with restraints or finger guards

Resources for MS Information

- American Speech-Language-Hearing Association (ASHA); 10801 Rockville Pike; Rockville, MD 20852; voice: (800) 638-8255; voice/TTY: (301) 897-5700; fax: (301) 571-0457; Web site: www.asha.org.
- ATT Customer Relay Service; voice: (800) 855-2881.
- Consortium of Multiple Sclerosis Centers; 718 Teaneck Rd; Teaneck, NJ 07666; Voice: (201) 837-0727, ext 113; fax: (201) 837-8504 or (201) 837-9414; Web site: www.mscare.org.
- International Society for Augmentative and Alternative Communication (ISAAC); Secretariat; 49 The Donway West, Suite 308; Toronto, Ontario, Canada M3C 3M9; voice: (416) 385-0351; fax: (416) 385-0352; Web site: www.isaac-online.org.
- National Multiple Sclerosis Society; 733 Third Ave; New York, NY 10017; Voice: (800) FIGHT-MS or (800) 344-4867; Web site: www.nmss.org.

Although rehabilitation is used to help restore speech, currently available pharmacologic treatments for MS (interferon beta-1a, interferon beta-1b, and glatiramer acetate) help reduce the frequency of exacerbations overall of MS. Pharmacologic treatments (eg, adrenocorticotropic hormone administration) aimed at improving dysarthria are under investigation.[13] Other approaches include stimulation with weak electromagnetic fields[4]; thalamic deep brain stimulation[36]; and computer tomography-guided thalamotomy.[37] The major treatment remains speech-language therapy.

Conclusion

Dysphagia and dysarthria are common challenges for MS patients to overcome in maintaining proper nourishment and adequate communication. The multidisciplinary team approach uses intensive clinical and cognitive testing and patient input to diagnose the problem and formulate and carry out treatment plans for both disorders. It is encouraging that much can be done to help dysphagia and dysarthria patients to maintain their physical and communication integrity.

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