

Rehabilitation medicine: 2. Diagnosis of dysphagia and its nutritional management for stroke patients

Hillel M. Finestone, Linda S. Greene-Finestone

Abstract

FOLLOWING STROKE, PATIENTS MAY HAVE REDUCED DIETARY intake, swallowing impairments (dysphagia) and other neurological deficits that could affect their nutritional and hydration status and lead to aspiration pneumonia. Impaired nutritional status is associated with reduced functional improvement, increased complication rates and prolonged hospital stays. This article is aimed at primary care physicians and others caring for stroke patients. We discuss the need for assessing the nutritional status of stroke patients and provide strategies for the management of dysphagia and patients' food and fluid intakes. In addition, we review clinical and radiological options for the diagnosis of dysphagia as well as oral and enteral feeding alternatives.

CMAJ 2003;169(10):1041-4

Case

Mr. B is a 56-year-old man who has hypertension and type 2 diabetes mellitus. He was well until the day of his admission to hospital. He presents with an occipital headache, tingling in the right hand, ataxia of the right limb, a hoarse voice, dysphagia, nausea, vomiting and vertigo. On examination he appears to be a well-nourished, physically fit but fatigued man. His blood pressure is elevated (190/110 mm Hg), and although no focal weakness is noted during the physical examination he is falling to the right. He has decreased pain and temperature sensation on the left side of his body, ptosis of the right eyelid and a diminished gag reflex. A CT scan demonstrates the presence of an infarct of the right lateral medulla oblongata. A chest radiograph shows the presence of pneumonia in both lungs; antibiotic therapy is initiated.

What is dysphagia and how is it diagnosed and managed? What is the relation between nutrition and stroke?

People who have had a stroke are nutritionally and medically vulnerable because dysphagia and other neurologic deficits can contribute to aspiration and decreased dietary intake, and potentially malnutrition. Malnourished states can lead to adverse outcomes (e.g., increased complication rates, a poorer functional outcome, a prolonged hospital stay and decreased quality of life),¹ and dysphagia is a frequent cause of aspiration pneumonia. In this article, we review practical strategies for the diagnosis and management of dysphagia by primary care physicians and others caring for stroke patients.

Nutritional status and related functional outcomes in stroke patients

Stroke may affect and be affected by nutrition and diet. An important clinical goal should be the prevention of, or identification and treatment of, dysphagia and inadequate nutritional and feeding states in patients with stroke to help them reach their full potential for rehabilitation.

Nutritional status should be monitored by means of routine nutritional screenings or comprehensive assessments every week or 2 weeks. Further information about nutritional assessment is given in the online Appendix 1 (see

Box 1: Signs and symptoms of dysphagia during and between meals^{11,12}

- Drooling, excessive secretions
- Excessive tongue movement, tongue thrusting or spitting food out of the mouth
- Poor control of tongue
- Facial weakness
- Pocketing of food in cheek, under tongue or on hard palate
- Slurred speech
- Coughing or choking while eating*
- Regurgitation through nose, mouth or tracheostomy tube
- Wet "gurgly" voice after eating or drinking, or frequent throat clearing
- Hoarse or breathy voice
- Complaints of food getting stuck in the throat
- Delay or absence of laryngeal (Adam's apple or thyroid cartilage) elevation
- Recurrent pneumonia (because of aspiration)
- Prolonged chewing or eating time
- Reluctance to consume particular food consistencies or to eat at all

*Caution: Aspiration commonly occurs without coughing. The presence or absence of the gag reflex does not indicate whether the swallowing reflex is intact.

Box 2: Factors contributing to eating difficulties and nutritional impairments after stroke¹³

Primary factor

- Dysphagia

Secondary factors

- Factors affecting ability to feed self (e.g., visuospatial perceptual deficits, upper extremity paralysis or paresis and apraxia)
- Cognitive changes affecting eating behaviours (e.g., attention-concentration deficit or forgetting to eat, combativeness or throwing food, eating too fast or too slowly, forgetting to swallow, or chewing constantly or overchewing food)
- Right and left disorientation
- Visual neglect or denial of the paralyzed extremity
- Disturbance of sensory function
- Depression
- Agnosia

Warning signs of dysphagia are listed in Box 1.^{11,12} The presence or absence of a gag reflex does not necessarily predict whether dysphagia is occurring. Physicians and allied health professionals must pay attention to other manifestations of dysphagia (e.g., coughing, drooling and facial weakness) during their assessments.

Dysphagia has been associated with weight loss and malnutrition, fluid depletion, aspiration and pneumonia. Aspiration is defined as the entry of material into the airway below the level of the true vocal cords. Many stroke patients with dysphagia do not aspirate, but those who do are usually dysphagic and are at increased risk of pneumonia. Secondary problems related to stroke often adversely affect dietary intake as well (see Box 2¹³).

www.cmaj.ca/cgi/content/full/169/10/1041/DC1). After acute stroke, the prevalence of malnutrition has been reported to increase from about 16% on admission to 22%–35% at about 2 weeks.^{2,3} Of patients with severe stroke and longer hospital stays, over half were reported to be malnourished.⁴ Of rehabilitation patients, about 50% were found to be malnourished at 2–3 weeks after the stroke; this proportion dropped to 19% at 2–4 months.⁵ For acute and rehabilitating stroke patients, hypoalbuminemia and malnutrition have been associated with poorer functional outcomes,^{6,7} higher complication rates⁶ and reduced rate of functional improvement⁷ compared with those who were not malnourished or hypoalbuminemic.

Dysphagia

Dysphagia is simply defined as any difficulty with swallowing. Normal swallowing consists of 4 phases: oral preparatory, oral, pharyngeal and esophageal. Stroke usually affects the first 3 phases by interrupting the voluntary control of chewing and moving food around the mouth (more common with cerebral lesions) or delaying the pharyngeal reflex (more common with brainstem lesions).

Dysphagia is common after acute stroke, occurring in 29%–64% of patients,^{8–10} depending on the diagnostic method used. During rehabilitation after stroke, dysphagia has been reported to decline from 47% at 2–3 weeks to 17% at 2–4 months.⁵

If a patient is unable to consume food or fluid orally or is unable to consume sufficient quantities, or if the risk of aspiration is high, enteral nutrition (tube feeding) should be provided until swallowing improves and oral intake is adequate. Further information about enteral feedings, including formula selection, routes of access, methods of administration and complications, is described in the online Appendix 2 (see www.cmaj.ca/cgi/content/full/169/10/1041/DC1). Box 3¹⁴ identifies the clinical and radiological tests that are often used for the evaluation of dysphagia.

Box 3: What to do if dysphagia is suspected

- Referral of the patient to a speech–language pathologist or trained occupational therapist or to a dietitian can clarify the required feeding strategy
- The bedside assessment evaluates how the patient swallows food of varying consistencies. The physician, together with the dietitian, makes dietary recommendations to maintain or achieve normal nutrition and hydration status while minimizing the risks of choking and aspiration.¹³ Although it is acknowledged that this type of assessment can miss some cases of aspiration, it is helpful to guide management
- The videofluoroscopic modified barium swallow and videofluoroscopic swallowing study are radiologic tests often used to determine whether safe feeding is feasible, particularly when the results of the bedside assessment are equivocal
- If these resources are unavailable, discussion of the case with a speech–language pathologist, physiatrist or neurologist in another centre by telephone or other telehealth medium would be helpful. When the patient's swallowing status is uncertain, a nasogastric feeding tube should be inserted and feeding begun so that adequate hydration and nutrition can be provided while the clinical situation is being evaluated

The dysphagia diet

Dysphagia diets are highly individualized. Characteristics of the diet include modification of food texture or fluid viscosity. Foods may be chopped, minced or puréed, and fluids may be thickened. Table 1¹¹ lists food and fluid consistencies along with some examples. In general, solid foods are assigned to 1 of 4 groups, which progress from the easiest to the most difficult to swallow. Special attention should be given to the nutritional adequacy of mechanically altered diets, particularly the puréed form. Regular communication with team members about the patient's changing swallowing capabilities is essential if the patient is to progress from a dysphagia diet to a diet of food with normal textures. Appendix 3 (available online at www.cmaj.ca/cgi/content/full/169/10/1041/DC1) describes the steps that the physician and allied health professionals may take in the nutritional management of stroke patients.

Fluid requirements

The risk for dehydration in stroke patients is often underappreciated, particularly in patients with dysphagia who are receiving all their nutrition by mouth.¹⁵ The most difficult consistency for these patients to control orally is often thin fluids such as water. Even when fluids are thickened to ease control, adequate hydration can be a challenge. For inpatients, physicians should consider ordering overnight intravenous fluid administration, which should not interfere with the patients' participation in any daily rehabilitation therapy.

General guidelines for the determination of fluid requirements are given in Table 2.^{16,17} Fluid requirements

should take into account the effects of age, disease and medical treatment. Requirements are increased as a consequence of fever, diarrhea, vomiting, excessive sweating and fistula drainage, and during the administration of hyperosmolar formulas.^{14,18}

The case revisited

A lateral medullary infarction is often associated with dysphagia. Mr. B's pneumonia is a strong indicator that aspiration occurred. His pneumonia is a probable sequela of aspirating saliva. Mr. B is not allowed to have anything by mouth when he is admitted to hospital. The speech-language pathologist uses a bedside swallowing assessment to screen for dysphagia and notes that Mr. B coughs and sputters when he has only small amounts of liquid and pudding. Mr. B is clearly at high risk of further aspiration and is fed enterally with an isotonic, fibre-fortified liquid formula through a nasogastric tube for 10 days. He is subsequently transferred to a stroke rehabilitation service.

It becomes clear that Mr. B's dysphagic state will not resolve quickly, and so the nasogastric tube is replaced by a

Table 2: Baseline daily fluid requirements for adults^{16,17}

Adult patient group (age, yr)	Fluid requirements, mL/kg
Young, active (16–30)	40
Average adult (25–55)	35
Older patient (56–65)	30
Older patient (66–75)	25–30
Elderly patient (> 75)	25

Table 1: Description of food and fluid consistencies¹¹

Consistency	Description
Foods	
Puréed	Thick, homogenous textures; pudding-like consistency
Ground or minced	Easily chewed foods; no coarse textures or raw fruits or vegetables (except mashed banana)
Soft or easy to chew	Soft foods prepared without use of blender; meats minced or cut into cubes 1 cm or less; no tough skins, nuts or raw, crispy or stringy foods
Modified general	Soft textures prepared without grinding or chopping; no nuts or crisp foods
Fluids	
Thin	Regular fluids; no changes necessary
Nectar-like	Fluids thin enough to be sipped through a straw or from a cup but thick enough to fall off a tipped spoon slowly (e.g., buttermilk, eggnog)
Honey-like	Thick fluids eaten with a spoon, unable to hold their shape, too thick for a straw (e.g., thick yogurt, tomato sauce and honey)
Spoon-thick	Pudding-like fluids that must be eaten with a spoon, that hold their shape on a spoon (e.g., thick milk pudding, thickened applesauce)

percutaneous endoscopic gastrostomy (PEG) tube for feeding. He requires cloxacillin administration on one occasion because of a subcutaneous infection at the tube site that did not clear with use of local antibiotic ointment. After receiving instructions from the nurses, he administers his own feeding on a cyclical basis using an infusion pump. He continues tube feedings at home after discharge from the stroke rehabilitation service. Over the following 15 months, progressive improvements in his swallowing capabilities are evident on clinical examination and on videofluoroscopic swallowing studies. The percutaneous endoscopic gastrostomy tube is removed. Mr. B retains some residual neurologic and swallowing deficits but is able to live independently and consumes a normal diet.

This article has been peer reviewed.

Hillel Finestone is Medical Director of the Stroke Rehabilitation Program in the Department of Physical Medicine and Rehabilitation, Elisabeth Bruyère Health Centre, University of Ottawa, Ottawa, Ont. Linda Greene-Finestone is a dietitian and doctoral student in the Department of Epidemiology and Biostatistics, University of Western Ontario, London, Ont.

Competing interests: None declared.

Contributors: Both authors contributed substantially to the conception, design, analysis and interpretation of the research material, drafted and critically revised the manuscript for important intellectual content and gave final approval of the version to be published.

Acknowledgements: We gratefully acknowledge the help of Dr. Leonard Bloom, family physician, in reviewing the manuscript.

Series editors: Dr. Mohan Radhakrishna is Assistant Professor in the Division of Physical Medicine and Rehabilitation, McGill University and Montreal General Hospital, Montréal, Que. Dr. Lalith Satkunam is Associate Professor in the Division of Physical Medicine and Rehabilitation, University of Alberta and Glenrose Rehabilitation Hospital, Edmonton, Alta.

References

- Hoffer LJ. Clinical nutrition: 1. Protein-energy malnutrition in the inpatient. *CMAJ* 2001;165(10):1345-9.
- Axelsson K, Asplund K, Norberg A, Alafuzoff I. Nutritional status in patients with acute stroke. *Acta Med Scand* 1988;224:217-24.
- Davalos R, Ricart W, Gonzalez-Huix F, Soler S, Marrugat J, Molins A, et al. Effect of malnutrition after acute stroke on clinical outcome. *Stroke* 1996;27:1028-32.
- Axelsson K, Asplund K, Norberg A, Eriksson S. Eating problems and nutritional status during hospital stay of patients with severe stroke. *J Am Diet Assoc* 1989;89:1092-6.
- Finestone HM, Greene-Finestone LS, Wilson ES, Teasell RW. Malnutrition in stroke patients on the rehabilitation service and at follow-up: prevalence and predictors. *Arch Phys Med Rehabil* 1995;76:310-6.
- Aptaker RL, Roth EJ, Reichhardt G, Duerden ME, Levy CE. Serum albumin level as a predictor of geriatric stroke rehabilitation outcome. *Arch Phys Med Rehabil* 1994;75:80-4.
- Finestone HM, Greene-Finestone LS, Wilson ES, Teasell RW. Prolonged length of stay and reduced functional improvement rate in malnourished stroke rehabilitation patients. *Arch Phys Med Rehabil* 1996;77:340-5.
- Gordon C, Hewer RL, Wade DT. Dysphagia in acute stroke. *BMJ* 1987;295:411-4.
- Barer DH. The natural history and functional consequences of dysphagia after hemispheric stroke. *J Neurol Neurosurg Psychiatry* 1989;52:236-46.
- Mann G, Hankey GJ, Cameron D. Swallowing function after stroke: progress and prognostic factors at 6 months. *Stroke* 1999;30:744-8.
- Pardoe EM. Development of a multistage diet for dysphagia. *J Am Diet Assoc* 1993;93:568-71.
- American Dietetics Association. *The manual of clinical dietetics*. 5th ed. Chicago: The Association; 1996. p. 145-63.
- Buelow JM, Jamieson D. Potential for altered nutritional status in the stroke patient. *Rehabil Nurs* 1990;15:260-3.
- Chicago Dietetic Association, South Shore Suburban Dietetic Association and Dietitians of Canada. *Manual of clinical dietetics*. 6th ed. Chicago: American Dietetic Association; 2000. p. 3-38, 667-93.
- Finestone HM, Foley N, Woodbury MG, Greene-Finestone L. Quantifying fluid intake in dysphagic stroke patients: a preliminary comparison of oral and nonoral strategies. *Arch Phys Med Rehabil* 2001;82:1744-6.
- Blackburn GL, Bell SJ, Mullen JL, editors. *Nutritional medicine, case management approach*. Philadelphia: WB Saunders; 1989.
- Food and Nutrition Board. *Committee on dietary allowances*. 9th ed. Washington: National Academy of Sciences; 1980.
- Scientific Review Committee, Department of National Health and Welfare. *Nutrition recommendations: the report of the Scientific Review Committee*. Ottawa: The Department; 1990. p. 173-7.

Correspondence to: Dr. Hillel M. Finestone, Department of Physical Medicine and Rehabilitation, Elisabeth Bruyère Health Centre, 43 Bruyère St., Ottawa ON K1N 5C8; fax 613 562-6312; hfinesto@scohs.on.ca

Articles to date in this series

Blackmer J. Rehabilitation medicine: 1. Autonomic dysreflexia. *CMAJ* 2003;169(9):931-5.