



# INTRODUCTION: DEFINITIONS AND BASIC PRINCIPLES OF EVALUATION AND TREATMENT OF SWALLOWING DISORDERS

Dysphagia has many definitions. The most frequently used one is difficulty moving food from mouth to stomach. Recently, some clinicians have used another definition that expands the meaning of dysphagia to include all of the behavioral, sensory, and preliminary motor acts in preparation for the swallow, including cognitive awareness of the upcoming eating situation, visual recognition of food, and all of the physiologic responses to the smell and presence of food such as increased salivation (Leopold & Kagel, 1996).

Swallowing disorders occur in all age groups, from newborns to the elderly, and can occur as a result of a variety of congenital abnormalities, structural damage, and/or medical conditions. They may present themselves acutely, for example, as a result of a cerebrovascular accident (CVA) or may worsen slowly over time, as in tumors of the pharynx or progressive neurologic disease (Lazarus & Logemann, 1987; Logemann, 1989; McConnel, Mendelsohn, & Logemann, 1987; Robbins, Logemann, & Kirshner, 1986; Veis & Logemann, 1985). Patients with swallowing disorders may be acutely aware of their problem and able to describe it to the clinician in great detail, or may be entirely oblivious to any difficulty with deglutition. Patients who do report oropharyngeal swallowing disorders and are able to describe them are typically highly accurate in their localization and definition of the problem (Kirchner, 1967; Logemann, 1983). In contrast, patients with esophageal disorders may be highly inaccurate

in describing and localizing their dysfunction. They may have symptoms of their problems at the level of the actual physiologic or anatomic disorder or above that level in the gastrointestinal tract. This occurs because the patient may perceive the food collecting above the dysfunctional region. Some patients with esophageal disorders may even exhibit pharyngeal symptoms.

This text presents in-depth discussion of the swallowing problems occurring in the preparatory, oral, and pharyngeal stages of the swallow. Swallowing disorders occurring in the esophageal stage of the swallow are mentioned but not discussed in detail because they are generally not amenable to techniques of swallowing therapy and are usually treated medically or surgically.

Literature on deglutition or swallowing falls into three categories. A number of studies have been devoted to the physiology of normal swallowing, including discussions and measures of the oral stage of the swallow, triggering of the pharyngeal phase of swallow, and the pharyngeal and esophageal stages of deglutition (Ardran & Kemp, 1951, 1956, 1967; Bosma, 1957, 1973; Dellow, 1976; Jacob, Kahrilas, Logemann, Shah, & Ha, 1989; Kahrilas, Dodds, Dent, Logemann, & Shaker, 1988; Kahrilas, Lin, Logemann, Ergun, & Facchini, 1993; Kahrilas, Logemann, Lin, & Ergun, 1992; Logemann, Kahrilas, Cheng, et al., 1992; Miller, 1972; Robbins, Hamilton, Lof, & Kempster, 1992; Tracy et al., 1989).

Another large body of research in the past 10 years has dealt with the changes in physiology of swallowing as a result of a variety of medical conditions (Lazarus & Logemann, 1987; Veis & Logemann, 1985). Some of these studies focus on particular neuromuscular aspects of deglutition, such as tongue movement in the oral stage of the swallow or airway closure during the pharyngeal stage of the swallow (Bisch, Logemann, Rademaker, Kahrilas, & Lazarus, 1994; Fujiu, Logemann, & Pauloski, 1995; Linde & Westover, 1962; Logemann, Rademaker, Pauloski, Kahrilas, et al., 1994; Sloan, 1977). Others examine a small number of patients in each of a variety of disorders and make broad or specific comparisons of swallowing physiology among these subgroups (Conley, 1960; Lazarus, Logemann, Rademaker, et al., 1993; Logemann & Bytell, 1979). Still other research examines in greater detail the swallowing physiology of a specific group of patients, such as those who have undergone hemilaryngectomy or supraglottic laryngectomy or have bulbar polio, myotonic dystrophy, or oculopharyngeal dystrophy (Duranceau, Letendre, Clermont, Levisque, & Barbeau, 1978; Kaplan, 1951; Lazarus & Logemann, 1987; Lazarus et al., 1996; Leopold & Kagel, 1996; Logemann & Kahrilas, 1990; Logemann, 1989; Logemann, Rademaker, Pauloski, et al., 1994; Logemann, Shanahan, et al., 1993; Margulies, Brunt, Donner, & Silbiger, 1968; Pauloski et al., 1993; Rademaker et al., 1993).

Finally, there is a body of information in the literature that presents methodologies for screening, diagnosis, and management of patients with dysphagia (Aguilar, Olson, & Shedd, 1979; Dobie, 1978; Gaffney & Campbell, 1974; Kirchner, 1967; Lazarus, Logemann, & Gibbons, 1993; Lazarus, Logemann, Rademaker, et al., 1993; Linden & Siebens, 1980; Logemann, 1993, 1997;

Logemann, Pauloski, et al., 1995; Pauloski et al., 1993; Pauloski, et al., 1994; Rasley et al., 1993). Articles in this category can be divided into two groups: those that describe procedures to improve the oral stages of the swallow, including both manipulation of food in the preparatory stage prior to swallowing and the transport of food through the oral cavity (Davis, Lazarus, Logemann, & Hurst, 1987; Logemann, 1989; Logemann, Kahrilas, Hurst, Davis, & Krugler, 1989), and those that discuss techniques to improve the triggering of the swallow and the pharyngeal stage of the swallow, in addition to the preparatory stage of oral manipulation and the oral stage (Lazarus & Logemann, 1987; Lazarus, Logemann, & Gibbons, 1993; Lazzara, Lazarus, & Logemann, 1986; Logemann, Kahrilas, Kobara, & Vakil, 1989). Articles in the former group generally describe procedures that can be called *feeding techniques*, whereas those in the latter category describe methodologies for *swallowing therapy*.

Typically, the term *feeding* is limited to the placement of food in the mouth; the manipulation of food in the oral cavity prior to the initiation of the swallow, including mastication if necessary; and the oral stage of the swallow when the bolus is propelled backward by the tongue. Therapy procedures designed to improve feeding generally attempt to improve (1) positioning of food in the mouth; (2) manipulating food in the mouth with the tongue; (3) chewing a bolus of varying consistencies; (4) recollecting the bolus into a cohesive mass prior to initiation of the oral stage of swallow; and (5) organizing lingual action to propel the bolus posteriorly. Thus, feeding techniques deal with the oral preparatory and oral stages of the swallow that terminate when the pharyngeal swallow is triggered.

In contrast, procedures used in *swallowing therapy* include techniques for reducing any delay in triggering the pharyngeal swallow, and improving pharyngeal transit time and the individual neuromotor actions comprising the pharyngeal stage of swallow, as well as all of the techniques used to improve the oral preparatory and oral stage of the swallow. Thus, the term *swallowing* refers to the entire act of deglutition from placement of food in the mouth through the oral, pharyngeal, and esophageal stages of the swallow until the material enters the stomach through the gastroesophageal junction. Throughout this book, the term *swallowing* rather than *feeding* is used, as the physiology of deglutition is examined in all stages, and techniques for modification of disorders in each stage of the swallow except the esophageal are discussed.

## Signs and Symptoms of Dysphagia

Signs of swallowing difficulty or dysphagia include but are not limited to the inability to recognize food; difficulty in placing food in the mouth; inability to control food or saliva in the mouth; coughing before, during, or after a swallow; frequent coughing toward the end or immediately after a meal; recurring

pneumonia; weight loss when no other reason can be defined; gurgly voice quality or increase in secretions in the pharynx or chest after a swallow or toward the end of a meal or after a meal; and patient complaints of swallowing difficulties. The first task of a swallowing therapist is to identify patients who are at high risk for oropharyngeal dysphagia. This is usually done in a screening process, which involves a 10- to 15-minute review of the patient's chart and a very brief observation of the patient.

## *Screening: Identifying the Patient at High Risk for Oropharyngeal Dysphagia*

Screening involves looking for signs and symptoms that the patient is at high risk for oropharyngeal dysphagia. Screening should involve a quick, efficient, cost-effective, and safe method for identifying patients at highest risk for oropharyngeal dysphagia in order to refer these patients for an in-depth physiologic assessment of their swallowing mechanism and identify the underlying anatomic or physiologic abnormalities so that the clinician can proceed to plan and implement effective treatment.

Screening procedures identify signs and symptoms of oropharyngeal dysphagia. They do not define anatomy or physiology of the oropharynx. To identify and distinguish a screening procedure from a diagnostic procedure, the clinician should ask the question, "What information does this procedure provide me?" The technique is a screening procedure if it provides information on the presence or absence of symptoms of dysphagia, including aspiration, inefficient swallowing, such as residual food left in the mouth or pharynx; or behaviors such as gurgly voice or coughing while eating. If the technique provides physiologic data, such as identification and measurement of the duration of a delay in triggering the pharyngeal swallow, poor laryngeal elevation or anterior motion, poor tongue base posterior motion, and so forth, it is a diagnostic procedure. Most dysphagic patients are initially identified through screening, which is followed by an in-depth physiologic diagnostic procedure if symptoms of pharyngeal stage dysphagia are seen. In some cases, the patient's medical diagnosis so frequently causes pharyngeal dysphagia that it alone indicates the immediate need for an in-depth diagnostic assessment and initial screening procedures are not needed. In some situations, the patient's nurse, physician, or dietitian performs the screening function and refers the patient for a radiographic (X-ray) or other type of in-depth physiologic assessment. Even if this is the case, the swallowing therapist usually completes some form of bedside, clinical assessment prior to the physiologic evaluation to be sure that the patient is ready and appropriate for a radiographic or other physiologic study.

Recently, various clinicians have attempted to identify new procedures for screening patients for possible oropharyngeal dysphagia. Some of these procedures are considered invasive and may place the patient at high risk; neither of these characteristics should be present in a screening procedure. These and other, more appropriate screening procedures are described in Chapter 5.

The following symptoms of oropharyngeal dysphagia are often observed during a diagnostic assessment procedure:

1. *Aspiration* or the entry of food or liquid into the airway below the true vocal folds
2. *Penetration* or entry of food or liquid into the larynx at some level down to but not below the true vocal cords
3. *Residue* or food that is left behind in the mouth or pharynx after the swallow
4. *Backflow* of food from the esophagus into the pharynx and/or from the pharynx into the nasal cavity

The swallowing therapist's job is to identify the symptom(s) during a diagnostic procedure and, from the symptom(s), identify the underlying abnormality(ies) in anatomy or physiology that cause the symptom(s). In Chapter 4 these symptoms observed during diagnostic assessment are related to anatomic and/or physiologic swallowing disorders.

## Complications of Dysphagia

Pneumonia, malnutrition, and dehydration may be symptoms of a swallowing disorder. In fact, they are also complications of dysphagia, which result from either unsafe swallowing, which causes aspiration and the risk of pneumonia, or inefficient swallowing, which results in an insufficient amount of food or liquid reaching the stomach.

## Multidisciplinary Approach

The approach to management of swallowing disorders discussed here represents a multidisciplinary model for the safe evaluation and treatment of patients with a swallowing problem that makes oral feeding difficult or impossible. In addition to the swallowing therapist, the dysphagia team typically includes the patient's physician(s), nursing staff, dietitian, occupational therapist, physical therapist, pharmacist, and radiologist. Although the bedside examination is conducted by the swallowing therapist, the radiographic examination is usually conducted

by both the radiologist and the swallowing therapist (usually the speech–language pathologist), and resulting chart notes and recommendations are the consensus of the two professionals. Once a management–therapy program has been outlined by the swallowing therapist in conjunction with the patient’s attending physician, the swallowing therapist may involve the nursing staff for day-to-day carryover of desired procedures, and interacts closely with the dietitian to ensure adequate nutrition through the program.

The philosophy reiterated throughout this book is that swallowing therapy is superimposed on continuously adequate nutrition and hydration. Nutrition is never jeopardized during the course of management of the patient’s swallowing problem. Thus, from the day of the initial evaluation, the swallowing therapist must interact closely with the patient’s physicians, nursing staff, and dietitian to outline the best program to maintain nutrition and increasingly improve the patient’s swallowing function.

In some settings, the occupational therapist and/or physical therapist may be serving as the swallowing therapist. In other settings, the occupational therapist may be providing therapy to improve arm and hand control for self-feeding or may devise feeding devices to assist the patient’s self-feeding. Together with the physical therapist, the occupational therapist may improve sitting balance and design optimal seating for the patient.

Establishing the multidisciplinary team is discussed in Chapter 13 of this text.

## Patient Safety

A concern second only to maintenance of adequate nutrition and hydration in the management of a patient with difficulty in swallowing is safety of the patient during oral feedings if oral feeding is appropriate. In general, aspiration (entry of material into the airway below the true vocal cords) should be kept to a minimum. Currently, no clear guidelines exist as to the amount of aspiration that can be tolerated by a patient before such complications as aspiration pneumonia arise. Also, the interaction between such parameters as pulmonary function and tolerance for aspiration is not clearly understood, despite the dramatic increase in research regarding dysphagia. Aspiration is kept to a minimum by giving the patient only a small amount of material during the bedside clinical examination, by *beginning* the radiographic examination with a small amount of material (generally 1 ml) and increasing volume as tolerated, and by carefully monitoring, radiographically, the gross amount of aspiration the patient experiences per bolus. Any patient whose aspiration is larger than approximately 10% per bolus of a particular food consistency despite optimal interventions should be restricted from eating that consistency of food by mouth. This recommendation is based on data collected from 50 surgically treated head and neck cancer

patients who aspirated food postoperatively. Each of these patients was aware of the aspiration after it entered the airway below the vocal cords, and was able to expectorate most of the aspirated material. These patients spontaneously stopped eating the food consistencies on which they had aspiration greater than approximately 10% because the continuous coughing quickly made their chests sore and uncomfortable. Patients who could not swallow any food consistency without more than approximately 10% aspiration stopped eating all foods by mouth and required nasogastric feedings (Logemann, Sisson, & Wheeler, 1980). Many physicians consider chronic aspiration of more than small trace amounts (liquid or solid) as a hazard to normal pulmonary function. Others are more tolerant of larger amounts of aspiration for short periods of time. This variance results from each physician's individual experience and the absence of clear guidelines for management beyond those presented above.

It is equally important to ensure that a patient's airway not be blocked by a bolus of material that may be 100% aspirated. Thus, throughout this text, frequent references are made to the use of small amounts of material initially until the patient's swallow is well understood. Small swallows are insufficient to ever completely block or even severely narrow an adult patient's airway.

Patient safety during swallowing therapy can also be assured by completing a radiographic diagnostic examination in addition to any bedside clinical evaluation. A radiographic examination will identify any silent aspirators (i.e., those patients whose sensitivity is reduced and who aspirate food or liquid without coughing or other visible or audible sign). Approximately 50% of patients who aspirate do not cough in response to this aspiration. Research has shown that even the most experienced clinicians fail to identify approximately 40% of the patients who aspirate during a bedside examination (Logemann, Lazarus, & Jenkins, 1982). Also, bedside clinical evaluation is notoriously unable to identify the anatomic and physiologic cause(s) of the aspiration, information that is necessary for effective treatment planning. Therefore, radiographic evaluation of any patient who is suspected of aspiration is absolutely necessary to (a) identify the presence of aspiration; (b) define the etiology of the aspiration; (c) examine immediate effects of selected treatment procedures and design appropriate therapy for the patient; and (d) determine the best method of nutritional intake (i.e., oral, nonoral, or some combination of the two).

### *Focus of this Book*

The vast majority of this book is devoted to evaluation and treatment of oral and pharyngeal swallowing disorders. However, some information on esophageal disorders is provided in order for the swallowing therapist to be able to identify signs and symptoms of esophageal abnormalities. Often, the swallowing therapist is the first health care professional to take a complete history of the dys-

phagic patient's eating complaints from the patient or caregivers. These complaints can point the clinician to the need for an esophageal assessment by a gastroenterologist in addition to the oropharyngeal evaluation. It is not uncommon for patients with oropharyngeal swallowing disorders to have concurrent esophageal dysfunction. For example, children born with neurologic impairments have a higher than normal incidence of both oropharyngeal swallowing problems and esophageal abnormalities. Similarly, older individuals (over age 60) are at higher risk for both acquired oropharyngeal disorders, because of a stroke, Parkinson's disease, motor neuron disease, and so on, and esophageal dysfunction, because of their age.

This text provides the clinician with the requisite knowledge base regarding the anatomy and physiology of the upper aerodigestive tract as swallow coordinates with respiration and phonation, and the available screening and diagnostic tools for assessment of the mechanism during swallow in order to evaluate the dysphagic patient's swallowing abnormalities accurately and plan an appropriate and effective treatment strategy. The process of evaluation and treatment of swallowing disorders requires a thorough knowledge base in anatomy and physiology of the normal mechanism, as well as effects of aging and disease processes on the mechanism over time. To effectively and efficiently treat oropharyngeal swallowing disorders, the clinician must be able to define the anatomic and/or physiologic abnormalities in the mechanism that are causing the swallowing disorders so that treatment can be directed at these underlying abnormalities. Symptomatic treatment, on the other hand, results in longer, more expensive care and less effective long-term health for the patient when examined over the total course of the patient's management.

This text is not designed to review all of the literature in oropharyngeal dysphagia. Rather, it presents a logical, safe, and efficient physiologically based approach to assessment and treatment of oropharyngeal dysphagia, based on my experience with over 20,000 patients.

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