

An Overview of Dysphagia in the Elderly

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ABSTRACT

PURPOSE: With the growing elderly population, dysphagia is becoming an increasingly common medical condition. Primary care physicians are often the first to hear of a patient's concerns regarding swallow function and changes in overall ability to eat.

EPIDEMIOLOGY: In persons over age 50, more than 20% might be affected by dysphagia.

REVIEW SUMMARY: Swallowing is a complex process that involves a large number of muscles and occurs in 3 phases: oral, pharyngeal, and esophageal. The proper diagnosis and treatment of dysphagia is of tremendous importance to a patient's physical, mental, and social well-being. Left untreated, dysphagia can lead to significant problems including aspiration pneumonia, dehydration, and malnutrition. In most cases, a proper history and physical examination can identify the underlying etiology and assist in determining a treatment plan. With information about treatment options and therapeutic interventions by a speech-language pathologist, patients and physicians are better able to address and help remediate swallowing disorders in the older population.

TYPE OF AVAILABLE EVIDENCE: Unstructured review, prospective cohort studies.

GRADE OF AVAILABLE EVIDENCE: Poor to Fair.

CONCLUSION: As the population ages, dysphagia will become more prevalent. Attention to its etiology and development of a treatment plan can help prevent physical and social complications associated with this disorder.

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Dysphagia is derived from the Greek words "dys" (difficulty) and "phagia" (to eat). Recent studies have identified older individuals as being at increased risk for dysphagia due to changes in the swallowing mechanism as aging occurs.^{1,2} With the expected doubling of the elderly population by the year 2025, dysphagia and its sequela, aspiration pneumonia, are more likely to become a major cause of significant morbidity and mortality. According to data compiled by the Administration on Aging, by the year 2030 there will be approximately 70 million Americans

aged 65 and older. Among nursing home residents, one study identified the frequency of dysphagia as 40%.³ In another study, it was found that up to 60% of the elderly in long-term care facilities suffer from eating difficulties.⁴ Other researchers have estimated the prevalence of dysphagia to be greater than 20% in persons over the age of 50.⁵ The medical implications of dysphagia are more readily quantifiable than their social and behavioral counterparts. Dehydration, respiratory infections, and death are all potential medical ramifications of swallowing disorders.

One of the most serious consequences of dysphagia is the development of aspiration

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pneumonia. Swallowing function has been noted to slow with advanced age; although safety may not be initially compromised by this decreased rate, older patients are more susceptible to dysphagia, increased airway disease, and decreased neurologic function and thus, are more likely to suffer aspiration and pneumonia as a result. In addition, poor oral hygiene and poor dentition have been linked to the development of aspiration pneumonia. Studies have indicated that poor oral care and failure to remove latent oral infections are contributing factors in the development of pneumonia in elderly persons.⁶

Compounding the medical implications of swallowing disorders, social implications may add to difficulty for older individuals with dysphagia. Feelings of anxiety at mealtimes, avoidance of public places for fear of coughing and choking, and the increased burden of care that occurs when a swallowing disorder presents are adverse complications of this disorder that directly impact affected individuals on an ongoing basis. In a study by Ekberg et al, 41% of patients who complained of dysphagia stated that they experienced anxiety during meals, 61% believed their condition to be untreatable, and 36% stated that they avoided eating in public.⁷ Other reports indicate that patients with dysphagia feel excluded by others and tend toward isolation rather than interaction at meals.⁸ Thus, the proper diagnosis and treatment of dysphagia is crucial to the patient's overall physical and mental well-being, as well as quality of life.

THE SWALLOWING MECHANISMS

Swallowing is a complex process requiring voluntary and involuntary coordination of more than 40 pairs of muscles and several cranial nerves. The initial phase of the normal swallow is termed the oral preparatory phase. Food or liquid is taken into the oral cavity and salivation occurs to assist in its breakdown. Mastication breaks down food into manageable, swallow-sized portions. This phase involves lip closure, rotary and lateral movements of the jaw and tongue, and anterior bulging of the soft palate to prevent premature spillage into the pharynx. The oral preparatory phase is under voluntary control with cranial nerves V, VII, X, and XII. Injury to any of these increases the potential for difficulty in this phase of swallow function.

Next is the oral phase, in which the tongue, innervated by cranial nerve XII, is positioned at midline, elevates, and presses the bolus against the hard palate. This action signals receptors in the anterior tonsillar pillars, soft palate, and oropharynx to initiate the reflexive pharyngeal phase and clears food or liquid from the oral cavity. Elevation of the soft palate in this stage closes off the nasopharynx and prevents regurgitation.

During the pharyngeal phase, laryngeal closure occurs to ensure optimal airway protection. This complex sequence of events begins at the level of the true vocal folds and advances to the level of the false vocal folds, aryepiglottic folds, and epiglottis. The most critical component of laryngeal closure occurs at the level of the glottis. When vocal fold closure occurs, the arytenoid cartilages rise and tilt anteriorly and the tongue base moves posteriorly to close the laryngeal vestibule. Vocal fold closure prevents aspiration or entry of food or liquid into the trachea, below the level of the true vocal folds. Simultaneously, the epiglottis retroverts and covers the airway. The movement of the epiglottis occurs due to bolus pressure, muscular forces pressing downward, and the aforementioned pressure of the tongue base moving posteriorly and the larynx elevating. This epiglottic closure is essential to safe swallowing by preventing entry of food into the laryngeal vestibule. Along with the peristaltic muscular wave, pharyngeal peristalsis requires movements of the tongue and larynx to generate pressure within the pharynx during the swallow. Retraction of the tongue and lowering of the larynx at the end of the swallow increases pressure in the hypopharynx. The bolus is thus propelled through the upper esophageal sphincter (UES) by the pulling forces of the larynx, beginning the esophageal phase.

After the UES has relaxed enough to allow bolus passage, it then closes to seal off return of the liquid or food into the pharyngeal area. In the esophagus, peristalsis propels the food to the stomach. At the posterior of the esophagus, the lower esophageal sphincter opens and the contents of the esophagus are released. The lower esophageal sphincter then retroactively closes to prevent return of the bolus into the esophagus, or gastroesophageal reflux, from occurring.

ETIOLOGIES AND RISK FACTORS

Dysphagia is generally classified to 2 categories: oropharyngeal and esophageal. Oropharyngeal dysphagia is characterized as the difficulty initiating a swallow and/or moving the bolus from the oral cavity into the esophagus. Patients with oropharyngeal dysphagia often complain of feeling as if something is "stuck" in their throats following the swallow. Oropharyngeal dysphagia can be identified via difficulty tolerating thinner liquids, resulting in a cough or choking incident.⁹ Dysphagia of this category is often found in conjunction with neurologic conditions, such as stroke, Parkinson's disease, Alzheimer's dementia, and head and neck tumors or cancer. Loss of teeth, diabetes, xerostomia, and decrease in taste are other contributing factors.

Esophageal dysphagia is defined as difficulty moving food through the esophagus. Patients with esophageal dysphagia complain of pain in the chest

area after swallowing.¹⁰ Common causes of esophageal dysphagia include esophagitis, strictures, achalasia, and esophageal spasm.¹¹ Strictures can prevent fluid movement of the bolus to the stomach; achalasia is defined as the ineffective relaxation of the lower esophageal sphincter to permit passage into the stomach; and spasms impede efficient movement of the bolus into the stomach.

During any phase of the swallowing process, dysfunction may occur, creating dysphagia. Effective cranial nerve function is paramount to optimal swallowing. Injuries due to trauma, surgery, or a number of neurological conditions, such as stroke and Parkinsonism, can cause major swallowing dysfunction.^{12,13} Less-obvious yet still prevalent conditions such as poor dentition, gastroesophageal reflux disorder (GERD), and even the common cold can result in weight loss and swallowing problems—specifically in the geriatric population.^{14,15}

DYSPHAGIA IN THE ELDERLY

Persons over age 65 account for up to two thirds of all individuals with dysphagia. “Changes that occur as a natural part of senescence in the complex action of deglutition predispose us to dysphagia and aspiration.”¹⁶ These changes have been identified as reduced laryngeal elevation, decreased cricopharyngeal function, diminished esophageal peristalsis, and delayed pharyngeal swallowing.

Many medical conditions lead to dysphagia. Table 1 lists some of the more common etiologies leading to dysphagia in the elderly, including degenerative central nervous system diseases and long-term effects of GERD, tobacco/alcohol use, osteoarthritis, autoimmune disorders, and mental or psychiatric conditions. The most common etiology, however, is cerebrovascular accidents. Data from Cherney showed that one third of those who suffer a stroke also suffer from dysphagia,¹⁷ while other studies have shown incidences of dysphagia as high as 40% to 60% following a stroke.¹⁸⁻²¹ The nature of a swallowing disorder following stroke tends to be specific to the site of the lesion. For example, in a study by Veis and Logemann,²² investigators found that left-hemisphere damage due to stroke increased the incidence of reduced tongue control and delayed the initiation of the pharyngeal swallow, whereas persons with right-hemisphere damage tended to present with delayed triggering of the swallow and reduced pharyngeal peristalsis. Although recovery of swallowing function after stroke has been shown to occur over time, clinical evidence supports that swallowing abnormalities are present in as many as 50% of individuals 6 months poststroke.²¹ For elderly individuals with decreased resistance and strength, the importance of early diagnosis and treatment of dysphagia cannot be overemphasized.

CONSEQUENCES OF DYSPHAGIA

Without proper diagnosis and implementation of treatment, dysphagia can lead to chronic and even fatal conditions. Medical complications of untreated dysphagia include malnutrition, dehydration, and weight loss.²³ Arguably the most important complication of dysphagia is aspiration. The incidence of aspiration after stroke, for example, has been shown to be around 50%.^{24,25} Aspiration itself can create a cough, obstructed airway, or, if the food or liquid enters the lungs,

Table 1. Common Causes of Dysphagia in the Elderly

Oropharyngeal

- Cerebrovascular accidents
 - Stroke
- CNS degenerative disorders*
 - Parkinsonism
 - Huntington's disease
 - Myasthenia gravis
 - Amyotrophic lateral sclerosis
 - Multiple sclerosis
 - Cerebral palsy
 - Alzheimer's disease
 - Postpolio syndrome
 - Dystonia
- Other
 - Head injury
 - Scleroderma
 - Thyroid disorders
 - Cranial or spinal surgery
 - Guillain-Barré syndrome
 - Severe xerostomia
 - Sedatives and medication interactions
 - Psychotropic medications

Esophageal

- Aging
- Esophageal narrowing due to infection/irritation
- Head and neck cancer
- Tissue scarring following radiation treatment to the head and neck for cancer
- Gastroesophageal reflux disorder (GERD)
- Alcoholism (esophageal varices)
- Esophageal diverticuli
- Achalasia
- Diffuse esophageal spasm
- Nutcracker esophagus
- Hypertensive lower esophageal sphincter
- Scleroderma
- Diabetes mellitus

*CNS = central nervous system.

aspiration pneumonia. The risk of developing pneumonia following stroke is nearly 7 times greater for patients who aspirate compared with those who do not.²⁵ A variety of conditions can lead to aspiration, including weakened or compromised muscular function, UES dysfunction, and esophageal dysmotility.

Medically, pneumonia has been shown to account for 21% of all infections in nursing home patients.²⁶ Halberg and colleagues found that among elderly patients admitted to rehabilitation facilities, those with eating difficulties on admission had a longer length of stay than those without eating difficulties. Most strikingly, pneumonia had the highest mortality rate of any nosocomial infection.²⁶

EVALUATION

For the primary care physician, evaluation of the patient suspected to have dysphagia begins with a thorough history and physical examination. Determination of the patient's overall nutritional and cognitive status is important. Special attention should be directed to the oropharynx, hypopharynx, and larynx. A complete cranial nerve examination to screen for deficits in nerves V, VII, IX, X, and XII is also crucial to proper diagnosis. Physical examination includes overall assessment of bodily and mental status, and a check for drooling, wheezing, and a change in vocal quality; the latter may indicate increased secretion production and/or vocal fold dysfunction, as vocal cord closure helps to provide a barrier against the entry of swallowed food through the pharynx.²⁷ Cranial nerves should be inspected at the tongue and palatal levels for strength and symmetry. An examination of laryngeal function may be performed to assess management of secretions and vocal fold motility.

At this point, it becomes crucial for the physician to distinguish whether the patient is presenting with oropharyngeal or esophageal dysphagia, as this determination will drive the direction of testing and treatment. Individuals with oropharyngeal dysphagia often present with the inability to control food or saliva in the mouth, coughing before, during, or after a swallow, frequent coughing at the end of or immediately following a meal, recurrent pneumonia, weight loss of undetermined origin, wet vocal quality, increased secretions in the pharynx, and pain with swallowing (odynophagia). Patients with esophageal dysphagia often complain of heartburn and regurgitation. Based on these determinations, the physician may choose to order testing to further assess function and cause. For any problems in which oral, pharyngeal, or esophageal dysphagia are suspected, it is important for the primary care physician to consult gastroenterologists, otolaryngologists, and/or swallowing specialists once a determination of dysphagia has been made.

DIAGNOSTIC ASSESSMENT

To assess swallow function, bedside swallowing assessments can be carried out, most often by a speech-language pathologist or other swallowing specialist (Table 2). During these assessments, the patient is monitored for signs of coughing and choking, and it is determined whether one texture of solid or thickness of liquid is better tolerated than another. Additionally, factors associated with the risk of aspiration are monitored, including dysarthria, dysphonia, voice change, and/or cough after trial swallows and abnormal volitional cough.²⁸ The cough reflex often is assessed following inhalation of tartaric acid via the laryngeal cough reflex test. For patients with tracheotomies, dysphagia and aspiration can be assessed at bedside, via a blue dye test. This test involves administration of a colored or dyed liquid or soft solid followed by suctioning to reveal if any material swallowed entered the airway.

A variety of diagnostic tests exist to more objectively determine if dysphagia exists and how to proceed with treatment if dysphagia has been identified. Videofluoroscopy/modified barium swallow is the most common radiographic study in the evaluation of dysphagia and aspiration, and is the most effective means of determining the severity of aspiration. This evaluation of the oropharynx and esophagus provides a real-time look at swallow function. X-rays are taken and the swallowing process is video recorded. This procedure most often occurs with a speech-language pathologist and a radiologist. The patient is provided with varying consistencies of contrast material (thin, thick, solid) to determine what foods and liquids present difficulty. Specific areas of dysfunction are identified via assessment of all phases of swallowing. The patient also is given compensatory swallowing strategies, such as chin positioning, head rotation, etc, to decrease aspiration risk. Advantages of this study include the ability to view in real-time all phases of swallow function and review again later on. Potential disadvantages include difficulty with coordination of the disciplines involved, inability to assess sensation, radiation exposure to the patient, and poor image quality. Additionally, often morbidly obese patients and patients unable to transport to radiology are not candidates for this examination.

The fiberoptic assessment of swallowing is another diagnostic tool to assess swallow function. Fiberoptic endoscopic evaluation of swallowing (FEES) is performed via standard fiberoptic examination of the upper aerodigestive tract. A flexible nasopharyngoscope is passed through the nose to assess function of the palate, pharynx, and larynx as well as reveal amounts of secretions in the pharynx and assess sensory function. Swallowing function is determined through the presentation of various consistencies of

dyed food and liquid, with the scope at the level near the palate. The food and liquid motion is observed during the swallow. An advantage to using FEES is that the equipment is portable and does not require the use of radiation. Additionally, patients are able to view their own swallow function via monitor and thus are better able to perform compensatory techniques as indicated. Disadvantages include the inability to assess the esophagus and UES. And, during the swallow there is a moment of no vision, so direct visualization of the swallow throughout the entire swallowing process is not possible.

Assessment of esophageal dysphagia is usually performed via a barium-contrast esophagram. In this procedure, radiographic images are taken as the patient drinks liquid barium to determine the observance of strictures, spasm, achalasia, or other esophageal dysmotility problems. The procedure can help determine whether an obstruction exists. Other esophageal func-

tion tests include gastroesophageal endoscopy, which examines the esophageal mucosa and is often used in conjunction with the barium study when an obstruction lesion is suspected. Other tests that may be used include nasopharyngoscopy, which utilizes a scope to view the throat; endoscopy, which involves examination of the esophagus via a small lighted tube; manometry, which tests esophageal pressures to determine function and assess deficits; and pH monitoring, which factors the amount of esophageal acidity to determine if reflux is present.

Any one of these tests can be performed based on the individual patient and his or her overall level of stability. Most often, modified barium swallow studies and fiberoptic swallowing assessments are performed to determine oropharyngeal swallowing ability, with barium swallows or esophagrams utilized to determine esophageal function. All of these aforementioned examinations can be performed on an inpatient or out-

Table 2. Diagnostic Assessments of Dysphagia

Procedure	Types of Dysphagia Assessed	Advantages	Disadvantages	Availability
Bedside swallow assessment	Oral phase, limited pharyngeal	Easily performed at bed or chairside	Does not assess silent aspiration Less objective means of assessment	Inpatients, outpatients
Videofluoroscopy/ modified barium swallow	Oral, pharyngeal, limited esophageal	All phases of swallow assessed Compensatory strategies able to be trialed Offers real-time view	Must be coordinated with multiple disciplines Does not allow for assessment of sensation Requires radiation exposure Excludes obese patients and those unable to transport to radiology	Inpatients and outpatients at most hospitals
FEES	Oropharyngeal	Portable Does not expose patient to radiation Patient can view assessment on screen and perform compensatory swallowing strategies more effectively due to direct visual feedback	Unable to view esophageal function or UES Moment of no vision occurs during swallow, so viewing of entire swallow is not possible	Inpatients and outpatients at some hospitals
Barium swallow/ esophagram	Limited pharyngeal, esophageal	Objective assessment of esophageal dysmotility Can determine if obstruction exists	Requires radiation exposure Requires consumption of thin liquid barium Does not show oral or complete pharyngeal swallow	Inpatients and outpatients at most hospitals

FEES = Fiberoptic endoscopic evaluation of swallowing.

patient basis, and generally take between 30 minutes to 1 hour to perform.

TREATMENT

Once dysphagia is diagnosed, a treatment plan is determined based on the underlying etiology. In cases of severe dysphagia, with subsequent aspiration pneumonia, dehydration, and/or malnutrition, a patient may require hospitalization and placement of a feeding tube. Although alternative nutrition and hydration does not eliminate the risk of aspiration and has been a controversial means of supplying nourishment to the aspirating patient, individuals who most often require placement of enteral feeding tubes present with significant aspiration of consistencies ingested by mouth, decreased consciousness, esophageal obstructions, and chronic respiratory ailments. Thus, the long-term effects of chronic neurologic impairments and disease may still occur despite placement of a feeding tube.²⁹

For persons with chronic conditions that predispose them to dysphagia, the incorporation of other specialists to the healthcare team to encourage behavioral and functional techniques can prove highly beneficial. Individuals diagnosed with reflux may require diet modification and positioning changes at rest to minimize the incidence of reflux occurring. Additionally, dietary and dental consultations may be utilized to ensure proper nourishment and optimal dentition, respectively. Antireflux medications have proven beneficial for certain individuals suffering from GERD, xerostomia, and aspiration pneumonia. Reducing or eliminating xerostomia-causing medications and angiotensin-converting enzyme inhibitors has been found to reduce the incidence of symptomless dysphagia in the cases of some elderly individuals.³⁰ In other cases, surgical intervention may be recommended. Patients whose dysphagia has been determined to be caused by a narrowing or stricture formation, Zenker's diverticulum, or achalasia may require minimally invasive endoscopic procedures or surgery to address the affected areas. Persons with severe esophageal dysphagia or chronic aspiration may benefit from more involved surgical remediation.

Individuals who have dysphagia induced by neurologic disorders most often benefit from swallowing therapy. A speech-language pathologist usually carries out this type of treatment. Two main modes of treatment include providing techniques and compensatory strategies to help swallowing become easier to perform, as well as exercises to strengthen oral and pharyngeal musculature.

Modifications to diet based on different textures, thickening of liquids, and alternating temperatures can dramatically reduce the incidence of aspiration in many individuals.^{31,32} Additionally, patients can partic-

ipate in therapy to strengthen pharyngeal and oral musculature to reduce the adverse effects of muscular and sensory impairment.

Depending on the area(s) of weakness, oral and pharyngeal muscle-strengthening exercises will be performed. For example, if it has been determined that residue from above the glottis causes dysphagia and subsequent aspiration, the supraglottic swallow technique may be effective in clearing this residue.³³ In this technique, the patient may be instructed to take a deep breath prior to swallowing. The patient then swallows, coughs, and swallows a second time before breathing again. If, on examination, pharyngeal weakness is evidenced unilaterally (most often this occurs following stroke), the patient is instructed to turn his or her head to the weaker side—an act that, by compressing the area, helps prevent residue from remaining on the weaker side. Similarly, tucking the chin can compress the valleculae and reduce residue risk in that area. Other individuals may require multiple swallows to achieve optimal swallow safety, due to generally weakened musculature. All of these techniques can be assessed during a modified barium swallow study to determine their effectiveness.³³

Examples of exercises requiring direct patient participation are the supersupraglottic swallow, effortful swallow, Mendelsohn maneuver, and the tongue-hold or Masako maneuver,³⁴ as well as the Shaker exercise.³⁵ This last technique, which involves the patient lying flat and holding head and neck flexed forward while looking toward their feet, works to strengthen the muscles that open and close the esophageal sphincter, a muscle that is often weaker in elderly people.

Thermal-tactile stimulation involves use of a laryngeal mirror or probe dipped in ice and then presented to the faucial pillars to trigger pharyngeal constriction. This technique incorporates tactile and thermal modalities to affect a constriction and thus increase muscle strength and function. Other newer techniques, which may prove of additional therapeutic benefit following additional research and study, involve electrical stimulation of the swallowing musculature and pharyngeal muscle stimulation via lemon glycerin swabs.

If treatment and compensatory strategies are not wholly effective, individuals may require thickening liquids to ensure safe swallowing, chopping, or grinding of foods to achieve optimal safety, as well. Those with esophageal disorders may find thinner liquids more optimal for swallow function. In extreme cases, surgery may be utilized to dilate the esophagus if it is too narrow, or to remove strictures or webs in the esophagus.

CONCLUSION

As the elderly population in the United States continues to expand over the next few decades, the impor-

tance of proper assessment and treatment of individuals affected with dysphagia will follow suit. Future research in diagnosis and treatment of swallowing disorders is strongly indicated. Studies to address the effects of therapeutic techniques on dysphagia, such as electrical stimulation and etiology-based treatment outcomes, remain research opportunities in need of further investigation.

Swallowing difficulty has a tremendous impact on social and psychologic levels as well as overall health, and is crucial to a person's sense of well-being. Physicians should be able to easily identify underlying etiologies of dysphagia. Because appropriate diagnostic testing and early treatment can improve the condition and help prevent serious morbidity in the elderly, attention to the diagnosis and treatment of swallowing disorders in the elderly should be of paramount import and concern to the physician, therapist, and individual.

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