



Dysphagia as a predictor of malnutrition risk in older adults: a brief review of literature

Rebeca Kababie-Ameo^{a,b1}, Gabriela Gutiérrez-Salmeán^{b2*}

^aServicio de Apoyo Metabólico Nutricio, Hospital Regional Licenciado Adolfo López Mateos, ISSSTE, México.

^bCentro de Investigación en Ciencias de la Salud (CICSA), Facultad de Ciencias de la Salud, Universidad Anáhuac México Campus Norte, Huixquilucan, Estado de México, México.

ID ORCID:

¹<https://orcid.org/0000-0002-4575-2682>, ²<https://orcid.org/0000-0003-3651-0865>

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ABSTRACT

Dysphagia is known as any alteration of the swallowing process that affects the ability to eat a The use of mild and aromatic nd/or drink and presents in 30–40% of hospitalized patients. In the elderly, it is highly relevant due to its association with the development of frailty, malnutrition, and the high risk of morbidity and mortality. A set of factors has been proposed as a cause of dysphagia, such as anatomical and physiological alterations, neurological pathologies, drugs, and sarcopenia. Thickening liquids and texture-modified foods may be beneficial for patients with dysphagia, but they can also promote malnutrition if not prescribed properly. That is why nutritional support is key to avoid the risk of aspiration and malnutrition, which in turn, contribute to the development of dysphagia.

Key words: dysphagia; elderly; malnutrition; frailty; nutritional support.

RESUMEN

Se conoce como disfagia a cualquier alteración en el proceso de la deglución que afecta la capacidad para ingerir alimentos y bebidas, presentándose con una frecuencia del 30 al 40% en pacientes hospitalizados. En el adulto mayor es de gran relevancia por su asociación con el desarrollo de fragilidad, desnutrición y el alto riesgo de morbi-mortalidad. Se ha propuesto un conjunto de factores que contribuyen al desarrollo de la misma como las alteraciones anatómicas y fisiológicas, patologías neurológicas, fármacos y sarcopenia. Es por ello que el soporte nutricional resulta de vital importancia con el fin de evitar el riesgo de broncoaspiración y desnutrición que, a su vez, contribuyen al desarrollo de disfagia.

Palabras clave: disfagia; adulto mayor; desnutrición; fragilidad; soporte nutricional.

* *Corresponding Author:* Dra. Gabriela Gutiérrez-Salmeán. Centro de Investigación en Ciencias de la Salud. Facultad de Ciencias de la Salud. Universidad Anáhuac México. Address: Av. Universidad Anáhuac 46, Lomas Anáhuac, 52786. Huixquilucan, Estado de México, México, Tel: +52 55 2898 6740, Email: gabrielasalmean@yahoo.com

INTRODUCTION

Dysphagia is known as any alteration in the swallowing process that makes it difficult for food and/or liquids to pass from the oral cavity to the stomach and can be caused by different reasons.^{1,2} Oropharyngeal dysphagia is prevalent under different conditions among older adults and has been recognized as a geriatric syndrome by the Dysphagia Working Group.³

Dysphagia is one of the most frequent alterations in the elderly due to anatomical and physiological changes during aging, decrease in muscle mass and sarcopenia, and the development of diseases. In addition, the use of some drugs is associated with its presence.

Its diagnosis is of great importance since this condition reduces the quality of life and increases the risk of aspiration pneumonia, dehydration, social isolation, alterations in nutritional status, and morbi-mortality in patients who suffer from it.

The prevalence of dysphagia in the general population has been estimated to be between 2 and 16% and it can increase up to 30–40% in hospitalized patients.^{1,2} It has been observed in up to 64% of patients who have suffered a stroke and over 80% of those with dementia. However, dysphagia is poorly diagnosed due to variations between diagnostic methods.⁴

It is also related to malnutrition due to diminished intake, inadequate nutritional composition of texture-modified diets, and muscle weakness, leading to the persistence and worsening of malnutrition, sarcopenia, and dysphagia.

METHODS

A brief review of the literature was performed using PubMed as database. Key words identified as search terms were dysphagia, elderly, malnutrition, frailty, and nutritional support. These were combined using the AND Boolean operator.

Our inclusion criteria required articles written in English and Spanish that address dysphagia, dysphagia in elderly or malnutrition. The exclusion criteria comprised studies focused only on pediatric population, abstracts, and articles without full text.

RESULTS

Brief physiology of swallowing

To carry out an adequate swallowing, coordination, expansion, and displacement of the pharynx are required so

that the food bolus passes through the structures and the upper esophageal sphincter, while the airway is protected.⁵

This complex process includes three phases and requires the coordination of mouth, pharyngeal and laryngeal muscles, and esophagus, which are innervated by the cranial nerves V, VII, IX, X, and XII. The oral phase, considered voluntary, is responsible for chewing, bolus formation, propulsion, and passage to the pharynx. In this phase, various muscles are required, such as the tongue, cheek, orbicularis oris, and buccinator muscles.⁶ The pharyngeal phase allows the nasopharynx to be closed by the soft palate, while the hyoid bone and larynx are raised and the vocal cords are brought together to protect the airway. The pharynx contracts and the cricopharyngeal sphincter is relaxed, so that the food passes into the esophagus. After this step, the esophageal phase includes the peristaltic contraction of the esophagus and relaxation of the lower esophageal sphincter so that the bolus reaches the stomach. This is slower than the pharyngeal phase and may exceed 10 seconds.⁶ The pharyngeal and esophageal phases are considered involuntary, which implies that there is no control over them.^{7,8}

Swallowing physiology and disorders in the elderly

Physiologically, during aging, alterations occur in the organism that predispose older adults to dysphagia, such as sensory and motor variations, decreased salivation, and changes in taste and smell that may contribute to a reduction in the swallowing process.² Sensory changes include decreased smell and loss of taste appreciation, caused by medicines, among others.^{9,10}

The use of drugs, such as tricyclic antidepressants (due to their anticholinergic effect and decreased saliva), benzodiazepines, risperidone, and haloperidol is common among these patients. Still, it must be remembered that they have effects on the state of consciousness, may cause dry mouth, and have extrapyramidal effects that make swallowing even more difficult.^{11,12} Likewise, sedative drugs, such as antipsychotics, opioid analgesics, hypnotics, and anxiolytics directly impact the central nervous system, mainly due to their antidopaminergic action. They can alter swallowing and the cough reflex, thereby increasing the risk of suffocation.^{9,13}

Dysphagia is also associated with adulthood because adults present diseases that are related to this alteration more frequently. Among these conditions are neurological diseases, Parkinson's disease (due to the degeneration of dopaminergic pathways in the substantia nigra, striatum, and enteric nervous system), Alzheimer's disease, and cerebrovascular disease (CVD). It is also linked to head and neck cancer, dementia, and amyotrophic lateral sclerosis



in which a progressive function loss of the cortical motor neurons can cause spasticity of the mandibular muscles.^{1,8,14} It is also caused by traumatic brain injury, myasthenia gravis, cerebral palsy, myopathy, and Guillain-Barré syndrome due to involvement of the oropharyngeal muscles.²

Even in the absence of such diseases, cerebral atrophy may be the result of ageing and the consequent decline in nerve function, while a regional-dependent muscle atrophy may affect swallowing.¹⁵

There are other causes of dysphagia, like anatomical and physiological deficiencies in the mouth, pharynx, larynx, and esophagus, including decreased muscle mass and connective tissue elasticity. They lead to loss of strength and movement as well as weakness of the lip muscles, causing inability to completely seal them, and that of facial muscles. This increases the risk of retaining food in the mouth, difficulty forming the bolus, and passage through the oral cavity.⁸ In addition, other factors that contribute to this process are the loss of muscle strength and tone, decreased speed, precision, and coordination of movements, reduced esophageal propulsion and peristalsis, and tooth loss.^{1,2}

Among the changes that negatively impact the swallowing process are the ossification of the hyoid bone and the thyroid and cricoid cartilages, atrophy of the intrinsic muscles of the larynx, dehydration of the laryngeal mucosa, loss of elasticity of the laryngeal ligaments, flabbiness of the vocal cords, and loss of the geniohyoid muscle, all of which may occur approximately in 15% of men and 31% of women.^{9,16}

Dysphagia can be caused by sarcopenia, as seen in tongue atrophy in older populations, geniohyoid muscle atrophy, pharyngeal wall thinning, and diminished muscle mass of the anterior belly of the digastric and temporalis muscles.¹⁷

A study in community-dwelling older adults found that there is a moderate correlation between decreased grip strength and decreased posterior tongue strength.^{9,17} The muscles that participate in swallowing are mostly made up of type II fibers, which are the first affected in the processes of malnutrition and sarcopenia when compared to type I fibers.^{18,19}

Fat infiltration into the skeletal muscle causes weakness since it compromises the integrity of the muscle and increases the risk of frailty. Fat infiltration has been detected in the geniohyoid muscle, which participates in the movement of the hyoid bone for swallowing.⁹

The decline in muscle strength and the loss of teeth affect the choice of food, efficiency of chewing, and the swallowing of oral residue, impacting the choice of food texture and, therefore, its nutritional composition.^{9,10}

Frailty

Oropharyngeal dysphagia can be considered a geriatric syndrome, and at the same time it is closely related to frailty. Although there are several definitions, frailty can be described as the state of vulnerability associated with adverse events that increases the risk of morbidity and mortality. The prevalence of frailty in the Mexican elderly is estimated to be 39%.^{20,21}

Geriatric frailty syndrome is assessed when there are three or more of the following five criteria^{9,22,23}:

1. Weakness measured by dynamometry
2. Decrease in walking speed, evaluating the time in which 4.57 meters are traveled
3. Low level of physical activity
4. Low energy or exhaustion reported according to the geriatric depression scale
5. Unintentional weight loss of more than 4.5 kg or 5% in the previous year

Dysphagia has been identified to participate both as a factor contributing to frailty and as a consequence thereof.⁹ This is a consequence of physical, psychological and nutritional factors, being malnutrition a marker of this syndrome.⁵

Among the factors that increase the risk of developing frailty are diabetes mellitus, high blood pressure, chronic obstructive pulmonary disease, decreased upper limb strength, recent hospitalizations, low levels of physical activity, and economic and social factors, among others.^{20,21}

Frailty represents a vicious circle influenced by various factors, such as aging and low food intake due to anorexia of ageing, the underlying pathology that leads to loss of muscle mass and thus sarcopenia. The latter causes reduced strength and maximum oxygen volume, which in turn lead to a decrease in walking speed, and is also associated with a lower resting metabolic rate. These effects restrict activity and lower energy expenditure, which ultimately contribute to malnutrition and greater sarcopenia.^{22,23}

Dysphagia diagnosis

The assessment of dysphagia includes medical history, a physical exam, and instrumental examinations.²⁴ There are screening tools to measure the risk of dysphagia, as the Eating Assessment Tool-10 (EAT-10), developed in the United States in 2008. According to a study published in 2018, EAT-10 was



observed to be a predictor of aspiration. This tool consists of 10 questions that provide information on functionality, emotional impact, and physical symptoms that dysphagia could cause. A score of 3 or higher could be interpreted as a potential risk of dysphagia.^{1,3}

The clinical examination also includes a water swallowing test, where the patient is asked to swallow 50 ml of water in 5-ml aliquots. If the patient chokes, coughs or presents any alteration in the voice quality, dysphagia is diagnosed; still, silent aspiration may not be detected.⁶

A videofluoroscopic swallowing study (VFSS) or a modified barium swallow (MBSS) can be used to make an objective assessment, which is currently considered the gold standard in diagnosis.^{25,26} VFSS allows to identify alterations in the efficacy or safety of swallowing. Efficacy is more frequently associated with malnutrition and/or dehydration, while safety is linked to tracheobronchial aspiration.²⁷

Dysphagia and its impact on nutritional status

Regarding nutrition, dysphagia decreases or alters food and/or liquid intake, contributing to an impoverishment of the nutritional state. This subsequently hampers the functional capacity and, therefore, could promote frailty.²

Dysphagia is highly associated with malnutrition and must be treated since malnutrition increases the risk of complications, length of hospital stays, hospital costs, mortality, and infections by reducing immune function.¹

Although data in the literature are scarce, 3–28% of patients suffer dysphagia and malnutrition since several definitions and diagnostic methods have been used to assess both entities. However, the coexistence of malnutrition and dysphagia is frequent.²⁸

Malnutrition is defined as the imbalance of energy, protein, and other nutrients that cause negative effects on body composition, physical functionality, and clinical results. The risk of malnutrition can be detected using various screening tools such as the MNA-SF (Mini Nutritional Assessment-Short Form) proposed by the European Society for Clinical Nutrition and Metabolism (ESPEN). This society suggests that malnutrition is indicated by a body mass index below 18.5 kg/m² and unintentional weight loss. Whether it is greater than 10% and indefinite or greater than 5% in the last 3 months, it must be accompanied by BMI <20 kg/m² in adults over 70 years of age, <22 kg/m² in adults under 70 years of age or a fat-free mass index <15 kg/m² in women and <17 kg/m² in men.³

It remains unclear whether malnutrition occurs before or after hospital admission. Then, nutritional screening is of utmost importance due to the large number of risk factors related to malnutrition, such as dysphagia, low BMI, decreased muscle strength, cognitive decline, various comorbidities, and polypharmacy.²⁹

During hospitalization, there is physical inactivity that compromises the functional capacity. It is known that prolonged immobility is related to a slower recovery, so a longer hospital stay increases hospital costs. In addition, older adults have lower biological reserves that promote recovery (Figure 1).⁵

Comprehensive management of dysphagia

There are different ways of managing dysphagia, as compensatory measures that involve the implementation of techniques that allow food and drink intake or provide alternative sources of nutrition. However, these measures only provide immediate benefits and refer to posture adjustments, swallowing maneuvers, and diet modifications; still, they do not solve the underlying problem.²

Oral hygiene is a factor of great importance and scarcely mentioned. It should be performed routinely even when the person lacks teeth to avoid bacterial colonization and decrease the risk of aspiration pneumonia.^{11,19}

Among other interventions for the management of dysphagia, modifications in diets (thickening liquids) have been frequently used to prevent aspiration and its consequences. Dietary modifications are usually guided by the VFSS swallowing study, which examines swallowing liquids and solids of different sizes and consistencies.^{30,31}

Currently, the classification proposed by the IDDSI (International Dysphagia Diet Standardization Initiative) can be used to identify the consistency and viscosity of foods and beverages according to the severity of dysphagia.³²

The diets modified in consistency are based on the fact that thick liquids have a slower flow, providing more time for the closure of the airway and thus reducing the risk of aspiration. Although they are easier and safer to chew and swallow, their prescription must be carefully monitored.³⁰

There is still insufficient evidence to suggest that modifying the texture of food and thickening liquids benefit adults with dysphagia to prevent pneumonia and its consequences. Instead, an increased risk of dehydration and malnutrition has been observed together with this type of modifications.^{16,30}



The absorption of the drugs these patients take is also modified and the increase in viscosity can delay the dissolution and disintegration of these drugs. Furthermore, thickened liquids may increase the risk of post-swallow oral and pharyngeal residues and there is a high risk of insufficient oral intake.^{30,33,24}

Thickeners are commonly used to modify the viscosity of liquids and food since they reduce tracheobronchial aspirations. However, the adherence to treatment only reaches 48–56% due to the organoleptic characteristics of these foods. In addition, they may require more effort for their preparation. Some studies have reported a greater risk of dehydration at a higher viscosity while a greater tolerance and attachment are found at a lower viscosity, as in the consistency of nectar.¹¹

With the aim of reducing the risk of suffocation and work in the oral cavity, textures have been used to modify foods. These modifications can range from softening food enough to break it with a fork to creating a puree consistency that does not require chewing. Generally, when there is a high risk of suffocation, it is suggested to consume small bites of food whose size (1.5 x 1.5 cm) does not occlude the airway if the food is not chewed.⁹ This risk is also present in the intake of fibrous, firm, sticky, dry, and crisp foods or those that can cause airway occlusion.⁹

It has been suggested that adults over the age of 65, and men in particular, have a 7-fold risk of choking compared to children aged 1–4.⁹ The modification of purees contributes to a high risk of malnutrition since there is usually a lower intake and purees are low in calories, protein, and micronutrients as compared to foods in regular diets.³⁰ This type of management

faces problems such as lack of compliance and lower quality of life given that patients tend to dislike modified diets in consistency and find them less satisfactory.^{30,33}

During aging and in order to adapt to changes, adults often modify their choice of food textures to make chewing easier, which can contribute to weight loss. These modifications may also cause a decrease in energy density and changes in taste, making food unappetizing to the eye and contributing to a decrease in intake and a greater risk of malnutrition.^{9,24}

The use of mild and aromatic spices as well as natural flavorings including garlic, ginger, pepper, oregano, and capsaicin is recommended to promote the sensory appreciation of these foods.^{9,10} There is evidence that this type of diet could have some benefits, but there is also contradicting evidence pointing out the negative impact on quality of life. Then, it should be adopted with caution and under strict surveillance, allowing the patient to choose whenever it is possible.³⁰

The difficulty in indicating the type of diet to use is the lack of standardization and the presence of variable consistency of thickened liquids prepared by staff within and between hospitals. The same problems are likely present when texture-modified food is produced in-house.³⁰

Modified textures and thickened liquids should be used in persons with chronic dysphagia to enhance nutritional status (grade B recommendation). Texture-modified diets and thickened liquids should be prescribed after carrying out a clinical swallowing exam and/or instrumental assessment (Good practice point).²⁴ The oral diet can be adapted and even use oral nutritional supplements to cover the macro and micronutrient requirements of these patients, improve their

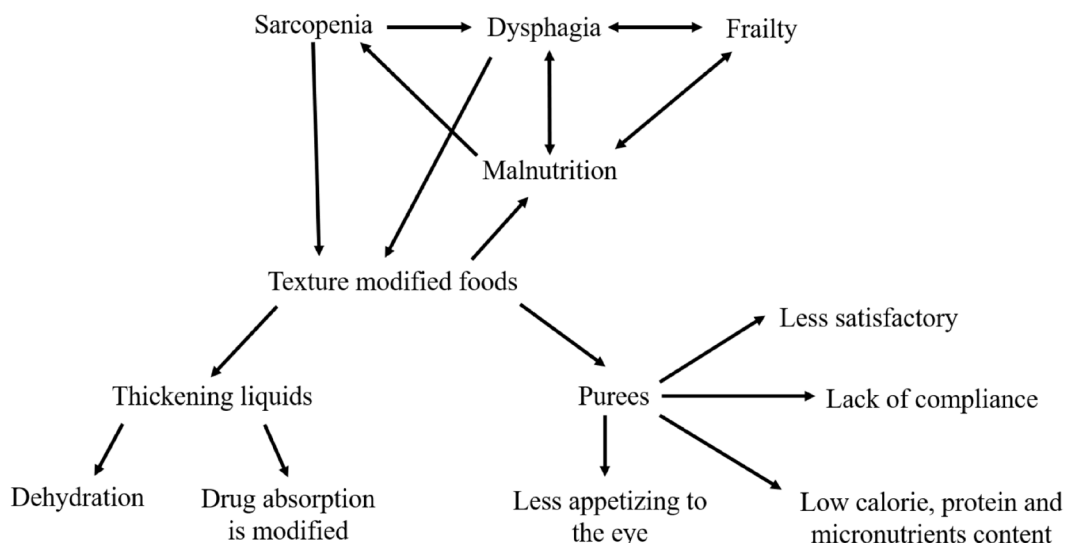


FIGURE 1. Mechanisms associating dysphagia and malnutrition.





nutritional status, reduce morbidity and mortality, and allow them the pleasure of eating.^{11,34}

The European Society for Swallowing Disorders (ESSD) suggests some strategies described by Ney et al. to promote food intake. Among them are eating slowly to control the food bolus, preventing food or drink consumption when tired or in a hurry, putting small portions of food or drink in the mouth (e.g. using a teaspoon), avoiding distractions at mealtimes to focus on swallowing, stopping from mixing solids and liquids in the same bite and alternating them to avoid residue, and using sauces and condiments that favor bolus formation. It is extremely important that caregivers or family members who share mealtimes with older adults have the necessary training.^{11,34}

ESPEN recommends the use of oral nutritional supplements in those patients at risk of malnutrition, with multimorbidity and frailty, after orthopedic surgery, and with anorexia. It is also indicated when there are some dietary restrictions for chronic diseases and <75% of unintentional weight loss or requirements, as long as oral appetite and nutrition are not compromised.^{11,34}

On the other hand, enteral nutrition by nasogastric tube or percutaneous endoscopic gastrostomy (PEG, grade A recommendation) could be considered in patients with severe dysphagia to improve nutritional status. However, the use of this type of nutrition is still controversial. The main indication for enteral nutrition is severe neurological dysphagia in which support should start as soon as possible together with swallowing therapy with the aim of reducing the risk of nutritional complications.^{11,34}

The nasogastric tube is usually suggested for short periods of time; that is, less than 4–6 weeks when there is no risk of aspiration. For example, it is recommended in patients with acute dysphagia, stroke or head injury. It should be considered that nasogastric tubes can cause side effects like mucosal erosion, kinking, and shifting.^{6,11,34} Meanwhile, PEG is recommended for periods longer than 4–6 weeks, as in chronic or progressive diseases, generally after CVD or dementia; it does not exclude aspiration risk.^{35,36}

In patients with mild to moderate dementia, it is suggested to use oral nutritional supplements or even nasogastric tube or PEG to cover the requirements and prevent malnutrition. Nevertheless, in patients with terminal dementia, the ESPEN guidelines and the American Geriatrics Society recommend avoiding tube feeding, as studies show artificial enteral nutrition in patients with advanced dementia is associated with morbidity and mortality.^{36,37,38}

Nutrition is a basic right that cannot be denied, but before making a decision in clinical practice, four principles must

be taken into consideration: beneficence, non-maleficence, respect for autonomy, and justice. Observing these will provide patients with an effective treatment for dysphagia and respect for their decisions, preferences, and goals.^{39,40}

In order to decide whether to apply a treatment, two aspects can be taken into account: knowing the patient's values and expectations and clarifying the cost-benefit. Furthermore, it is suggested to choose the treatment of the frail elderly based on the severity of the condition and efficacy and safety alterations identified during VFSS.^{11,27}

Oral feeding is a basic need, yet enteral nutrition could be considered a medical treatment and thus can be prescribed, started, and stopped. Before starting, it is important to clarify the duration time and the expected results.^{39,40}

The current treatment of oropharyngeal dysphagia consists of compensatory measures, rehabilitation or both. It includes modification in viscosity and lower chin, which are effective but not standardized. In consequence, it is not possible to determine the particular intervention required by each person.¹¹

Swallowing rehabilitation

Swallowing rehabilitation involves performing exercises that target specific muscles and improves lips and tongue functionality as well as bolus formation in the oral cavity. Rehabilitation has high degrees of evidence, A or B, depending on the technique used.^{11,34}

Position

Among the postural changes that could be easily implemented is sitting at 90° during the feeding and at least 30 minutes after finishing meals. Lowering the chin allows for airway closure and is easy to perform, besides having an A grade of evidence.¹¹

When tongue movements are impaired but the pharyngeal phase is intact, titling the head backwards helps guide the bolus into the pharynx.⁶

Other maneuvers and postures have an evidence grade of B, such as double swallowing to decrease waste before the next inspiration.¹¹

CONCLUSIONS

Social coexistence revolves around food and drinks, so swallowing difficulties have both social and emotional



consequences for older adults. In addition, they entail a high risk of dehydration, malnutrition, and aspiration pneumonia.

It is of utmost importance to evaluate the clinical conditions that lead patients to develop dysphagia. Only then will they be offered the best nutritional alternatives, such as nutritional supplementation, food enrichment, and artificial enteral nutrition. These alternatives improve the quality of life and do not represent more risks than benefits to the patients' health.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest in the preparation of this work.

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